



CORPORATE
FINANCE

THEORY AND PRACTICE



SECOND EDITION

VISHWANATH S.R.

Corporate Finance

Corporate Finance

Theory and Practice

Second Edition

Vishwanath S.R.

Response Books

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To

*Professor Myers,
whose writings continue to inspire me*

and

*Fisher Black, Miller, and Franco Modigliani;
three giants who rode in our midst.*

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Preface

Financial economics is the study of markets for real and financial assets. The past three decades have witnessed an unprecedented series of theoretical and empirical advances in our understanding of the markets, with major breakthroughs in capital asset pricing under uncertainty, portfolio theory, valuation of options, and response of security prices to corporate financial behavior. The practical implications of these breakthroughs, commonly known as modern finance theory, are widely accepted and applied by finance practitioners.

Finance is concerned with the manner in which individuals and firms allocate resources across assets and over time. The developed body of financial knowledge deals with portfolio decisions of individuals, with investment and financing decisions by firms, and with the implications of such behavior for the pricing of capital assets in the marketplace.

The goal of this book is to provide a rigorous understanding of how and why firms make their financial decisions the way they do and their impact on shareholder value. The central theme of the book is Value Based Management, which assumes that maximizing shareholder value is the governing objective of a firm.

This book examines the role of finance in supporting other functional areas while fostering an understanding of how financial decisions can create value. Topics covered in this book are related to estimating divisional cost of capital, executing a financing strategy, establishing debt and dividend policies consistent with the company's strategy and environment, choosing between dividends and stock repurchases, managing high growth, and managing working capital.

When I set out on the second edition I had three things in mind:

- Provide rigorous yet managerially relevant introduction to finance theory.
- Build industry knowledge among readers.
- Critically test theory in realistic settings.

This led me to write this book *through* cases. A typical case requires instructions to instructors. To obviate the need I have analyzed and written many real-life examples. For instance I have included two short cases on financial statements along with solutions. At times I have integrated real-life managerial situations with theory so that students can get a better picture of what they can expect to see in real life. I have also critically

tested theory with real-life data. At times I have not revealed the name of the company for the sake of confidentiality.

Brief Description of Topics Covered

Corporate Financial Flexibility (Real Options)

Most corporate investments grant managers a great deal of flexibility such as the right to abandon, expand or add technologies. This flexibility is best described as a series of options. The chapter on real options focuses on the analysis of this type of corporate investment decisions under uncertainty. I have covered simulation of capital structure under financing although both deal with corporate financial flexibility.

New Financial Instruments

The chapter on financing choices has been written to provide an understanding of how financial engineering can be used to advance the strategic goals of firms. While the perspectives of issuer, intermediary and investor are all relevant, special emphasis is given to problems faced by corporate finance managers. The goal of this chapter is to show how financial managers can utilize capital markets technology to create value.

The chapter deals with the design and pricing of a wide range of instruments.

Project Finance

The chapter on project finance has a particular emphasis on how firms structure, value, and finance large, greenfield projects such as telecommunications systems, toll roads, manufacturing plants, and mines. Interestingly, many of the largest projects have encountered financial distress. For example, Eurotunnel, Euro Disneyland, and Iridium have all been restructured.

Project finance is a method of financing an economically viable project on the basis of the cash flows it is expected to generate. The project is a separate legal entity and its cash flows are segregated from the sponsoring organization. The sponsor may be the main user of the project's output, contractor or supplier, a consortium or a government. The revenue generated from the project should be adequate to cover all operating expenses, debt-servicing burden and provide an adequate return to the equity investors. This enables the sponsors to shift the operating risk and debt-servicing burden to the project entity while retaining some benefits from the project. Project finance is usually restricted to large scale, capital intensive projects and often involves a high proportion of debt finance (60–90 percent) provided by a group of lenders. Toll roads, tunnels, bridges, ports and power projects are general candidates for project financing. The Eurotunnel project in France, Hub power project in Pakistan, and Petrozuata in Venezuela are some of the prominent project finance transactions. I have extensively revised the material on project finance. I have also included a real-life case on HPL Cogeneration Ltd.

Acquisitions and Control

In the recent years, the worldwide M&A volume has been averaging \$2 trillion. The chapter on takeovers focuses on purchase and sale of equity whereas the case on ICICI Bank focuses on the design of consideration

in mergers and acquisitions. Topics covered include value drivers and target valuation, design of consideration, board room response to hostile takeovers and the empirical evidence on mergers.

Performance Measurement and Incentive Compensation

One of the most important tools that owners and managers have is the design and implementation of:

1. The ownership and governance structure of organizations
2. Performance measurement and reward systems

The chapter on EVA provides a general framework for how to analyze, build, and manage these structures and systems. The goal is to understand how governance and incentive strategy affects individual, team and company performance, and to give readers a powerful way to think about organizational problems and their solutions.

Acknowledgements

This book is the product of hard work by many individuals. Many students at Bharathidasan Institute of Management, SP Jain Institute of Management, and TA Pai Management Institute have assisted me in writing this book. I am grateful to them. In particular I wish to thank the following individuals:

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Section One

BUILDING BLOCKS

Chapter 1

Introduction

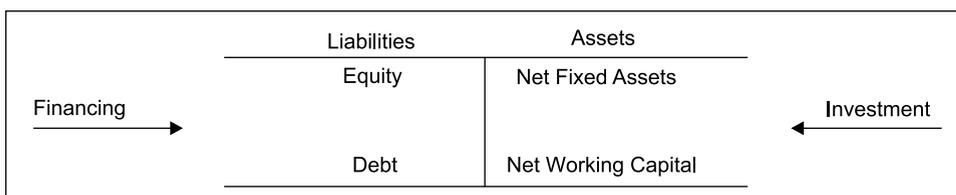
OBJECTIVES

- ◆ Introduction to the goal of financial management.
- ◆ Competitors to the rule of wealth maximization and their limitations.
- ◆ Factors affecting value creation.
- ◆ Corporate governance around the world.

Corporate Financial Management deals with the decisions of a firm related to investment, financing and dividend. To carry on business, a firm invests in tangible assets like plant and machinery, buildings, and intangible assets like goodwill and patents. This comprises the *investment decision*. These assets don't come free; one has to pay for them, so a company needs to tap various sources of funds including promoter's contribution. This forms the *financing decision*. The investment in assets generates revenues and cash flows for a specific period of time. The managers of the company can either retain cash with the company for further investment or distribute to the owners of the company—the shareholders. This constitutes the *dividend decision*. In short, a finance manager will be concerned with such financial decisions as:

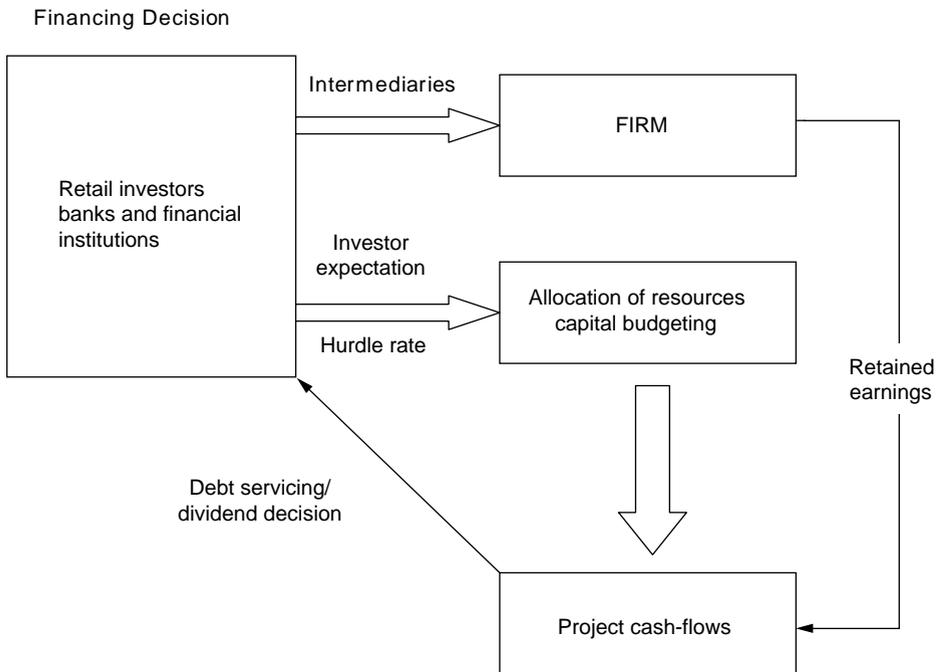
- Which investment/s should the company accept and what are the financial implications of undertaking the same?
- How should the company finance those investments? What should be the mix of owners' contribution—equity and borrowed funds, i.e., debt at any given point in time?
- How much of the income generated from operations should be returned to shareholders in the form of dividends and how much is to be retained for further investment?

We could think of investment decision as managing the right-hand side of the balance sheet and financing decision as managing the left-hand side of the balance sheet.



The relationship between financial decisions is shown in Exhibit 1.1. The company decides on its investments and approaches investors through ‘financial middlemen’ to provide funds in the form of debt and equity. Investors do not provide money free. They expect something in return. The investor’s expectation is the cost of money. For instance, if someone was to lend you Rs 5,000 for a 5-year period, s/he would expect interest payments at specified intervals and the principal repayment at the end of the loan term. Loan is one type of liability; there are several others. These liabilities have a cost attached to them—cost of capital. This also means that the company should earn more than the cost of capital to keep the investors happy. An example will clarify the point. Suppose you lend Rs 10,000 to a company at an interest rate of 14 percent. The company should earn more than 14 percent on its investments to service your debt at all times. If earnings fall, a default will occur. Do investors not realize the inherent risk of investing in companies? They do. The investor’s expected rate of return—14 percent in this case—is set after assessing risk. In sum, the investor’s expected rate of return is a function of risk. We have not defined risk as yet, nor established the relationship between risk and return. Chapters 3 and 4 are devoted to this.

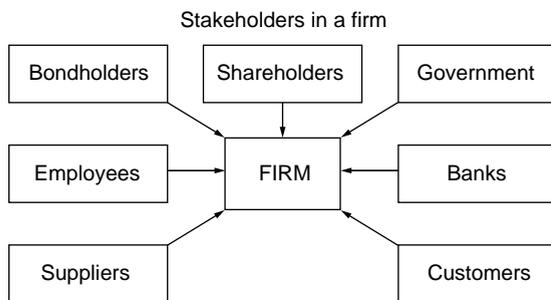
Exhibit 1.1 Overview of financial decisions



THE SEARCH FOR THE BEST CORPORATE OBJECTIVE

A firm is a group of claimants such as shareholders, creditors, suppliers, customers, and employees. Shareholders, the owners of the firm, appoint a board of directors to oversee the functioning and shape the strategic direction of the company. In theory, the board is supposed to act in the interest of the claimants: but which of the claimants? Who should the managers serve? Or, to rephrase the question, what should be the objective of

a firm and indirectly, that of its managers? Why should anyone have an objective in the first place? Without an objective one wouldn't know if one has achieved what one set out to achieve. Corporate Finance theoreticians generally agree that the objective of a firm is to maximize wealth although there may be some disagreement as to whether it should be the wealth of shareholders or the wealth of the firm, which includes bondholders and preferred stockholders. Shareholder wealth maximization rule requires managers to work towards a sustainable increase in the price of the firm's stock.



COMPETITORS TO THE WEALTH MAXIMIZATION RULE

Profit maximization, social welfare and growth are the three principal competitors to the wealth maximization rule. These alternative objectives are supposed to be proxies for the wealth maximization rule. The underlying assumption is that, an increase in any of these proxies results in an increase in the value of the firm (alternatively, shareholder value).

Profit Maximization

Profit is the excess of revenue over expenses. Profit maximization requires managers to keep all expenses low (including salaries and wages), extract the last rupee from the customer, sell spurious goods as long as it is legal, pay the lowest possible price to suppliers, etc. That is, hoodwink all the stakeholders for the sake of profit. Some point out that profit maximization is all right as long as managers consider the long-run consequences of their actions. How long is long? How does one estimate the long-run consequences at the time of decision making? Anyway, since long-run is long way off, why bother? If profit maximization is the objective, then why provide housing facility to employees or spend millions on research and development (R&D)? The message is: we do not see profit maximizing behavior in reality although the proponents of profit vouch for the contrary. Moreover, accrual profits can hardly be taken as a proxy for value given the creativity of accountants when it comes to reporting income.

Social Welfare

Businessmen are supposed to be socially responsible. They do not live in an ethical vacuum. But the social welfare objective, often pursued by government organizations, has conceptual problems such as: What constitutes society—social welfare? Can we make one section of society better off without making another section worse off, and so on. Moreover, what was considered moral 30 years ago could be immoral now?

Moral standards, that is, may change as society evolves. The executive is an agent serving the interests of his principal. When executives start spending money for social purpose they become, in effect, public servants even as they remain employees of the organization.

Corporate Growth

Emerging markets like India and Korea are dominated by business conglomerates some of which control as many as 90 (group) companies. Big businesses in Korea, the *chaebol*, typically own 30—50 companies in all key business areas; and the big five—Daewoo, Samsung, Hyundai, LG, and SK—account for 20 percent of all borrowing and contribute to almost 50 percent of GDP. Debt ratios at the top 30 *chaebol* are in the range of 550 percent; they suck up a major portion of the available credit and drive out smaller businesses. The *chaebol* understand only one language: borrow to the hilt; focus on size and not profit; focus on growth and not productivity; invest aggressively and acquire companies. Productivity in South Korea is about half that of US levels. When earnings fall due to recession, competition, or some such thing, these companies will default on borrowings. If these companies default, the banks that have lent them money go bust. These banks will then have to find a way to bail them out because the banks do not want a hole in their balance sheet. So the financial supervisory commission in Korea has set out to straighten these businessmen.¹

Everything about the business groups in Korea or India is not bad. In these countries, it appears, there are certain important benefits from being a part of a business house not available to other stand-alone companies.² Illiquid capital markets, scarce managerial talent and poor judicial system characterize emerging markets. These business groups often perform several useful institutional roles not available in the country. For instance, they act as venture capitalists to start up ventures within the group; solve information problems to customers by attaching their group brand name to products manufactured by the group companies (i.e., assure a certain level of quality); act as business school by providing high quality management education to managers, etc. In other words, for shareholders, business groups that act as proxy market institutions create greater value than the more focused, unaffiliated companies. Given this benefit, it is probably not prudent to dismantle them. Despite this benefit several business groups create little or no value. This is probably due to the fact that liberalization of the economy has induced intense competition in most businesses. So, what was unique to these business groups is no longer their domain. For instance, capital is more freely available to profitable companies. They may source capital from abroad if necessary. Likewise, the number of business schools has gone up from a few tens to a few hundred in the last 20 years.

To summarize, growth, though important, need not necessarily lead to an increase in shareholder value.

WHY NOT PURSUE MULTIPLE OBJECTIVES?

One of the advocates of this view was Peter Drucker: *To manage a business is to balance a variety of needs and goals. This requires judgment. The search for one objective is essentially a search for the magic formula*

¹ At the time of writing, Daewoo was undergoing a massive restructuring and many of them have been forced to downsize.

² Khanna, Tarun and Krishna Palepu (1997). 'Why Focused Strategies May be Wrong for Emerging Markets', *Harvard Business Review*, July–Aug.

——— (1999). 'The Right Way to Restructure in Emerging Markets', *Harvard Business Review*, July–Aug.

that will make judgment unnecessary. But the attempt to replace judgment by formula is always irrational; all that can be done is to make judgment possible by narrowing its range and available alternatives, giving it clear focus, a sound foundation in facts and reliable measurements of the effects and validity of actions and decisions. And this, by the very nature of business enterprise, requires multiple objectives.

Companies may pursue objectives like market standing, innovation, productivity, profitability, worker performance and attitude, public responsibility simultaneously. Pursuing multiple objectives is like serving many masters; nobody will be served consistently. Worse, the wrong master might be served at the wrong time. What good is innovation if customers do not attach value to it? There are several examples in the past where innovation was not translated into profits because customers were unwilling to buy the product either because they didn't like it or the product was way ahead of its times.³ Productivity is a comparative idea and not an absolute idea. If the improvement in productivity is less than the increase in productivity of competition, the company will be *worse off*. How is worker attitude measured? What good is right attitude if a product is no good? Customer delight, employee satisfaction, maintaining good relationship with bankers and suppliers are all-important. But they are not ends in themselves. Winning the award (Malcolm Baldrige National Quality Award from the National Institute of Standards and Technology, US) and incurring an economic loss in the process, is hardly a good idea.⁴

Do Firms Pursue Multiple Objectives?

In a survey of management views on alternative objectives, Porwal⁵ found in his sample that in 67 percent companies—with high profitability—the first preference is given to the objective of maximizing percent ROI and, in 33 percent companies, the first preference is given to the objective of maximizing aggregate earnings. His study suggests that firms indeed try to maximize multiple objectives. Similar results have been obtained in the United States (US).

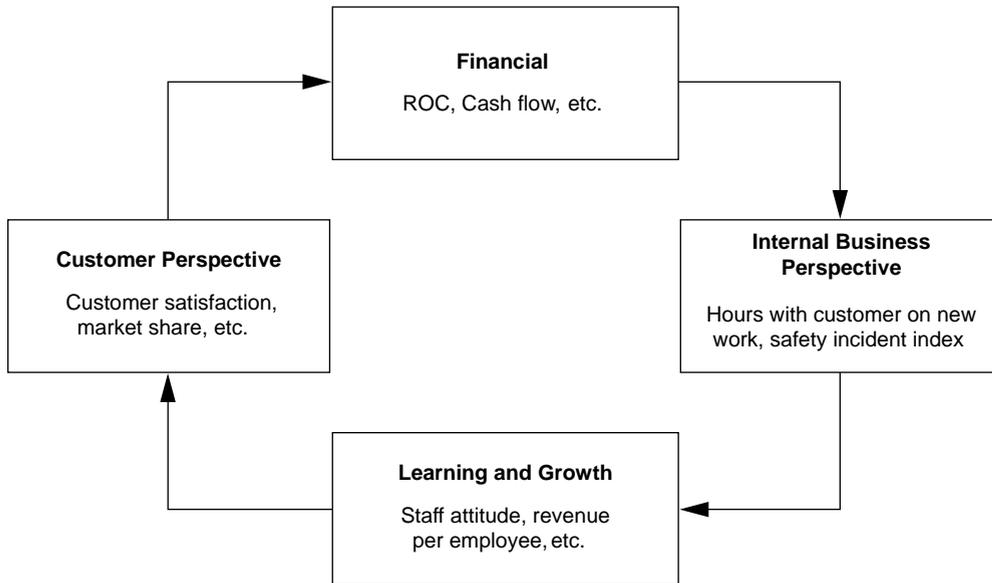
The 'Balanced Scorecard'⁶ popularized by Kaplan and Norton recognizes the fact that executives do not focus on one set of measures as no single measure can provide a clear performance target or focus attention on the critical areas of business. The balanced scorecard allows managers to look at their business from the perspective of customers, shareholders, and employees. A typical balanced scorecard (Exhibit 1.2) considers goals and measures from various perspectives and tries to bring all the elements of the business together in a single management report. The trouble with this scorecard is that it is not balanced, in the sense that it does not tell us how the measures on the scorecard are to be weighted. Meaning, it does not specify the trade-off among the measures. Further, it fails to provide a link between performance measurement and incentive system.

³ Real Value launched Vacuumisers in the mid-1990s: the product bombed although it was very effective in its claim (to keep food fresh). What Real Value failed to consider, then, was that Indians prefer freshly prepared food, and would not be comfortable with the idea of storing it even in specialty containers.

⁴ General Motors apparently spent millions of dollars on the Saturn car project, winning the (US) National Quality Award. But, while customers loved the car, the stock price stagnated.

⁵ Porwal, L S. *Capital Budgeting Practices in India*, Sultan Chand and Sons, New Delhi.

⁶ Kaplan, Robert S and David P Norton (1992). 'The Balanced Scorecard—Measures that drive performance', *Harvard Business Review*, Jan–Feb.; Kaplan and Norton (1993). 'Putting the balanced scorecard to work', *Harvard Business Review*, Sep–Oct.

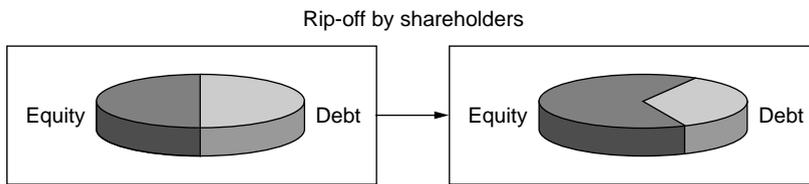
Exhibit 1.2 The balanced scorecard

IMPEDIMENTS TO SHAREHOLDER WEALTH MAXIMIZATION

Shareholder wealth maximization rule is based on the assumption that other investor groups in the company are unaffected by the latter's decisions. There could be potential conflict of interest between shareholders and bondholders, managers and shareholders, majority and minority shareholders. So, maximizing wealth of one group could be achieved *at the expense of* other groups.

Shareholders vs Bondholders

Bondholders get a fixed, contractual payment (interest) during the term of the bond but have a prior claim on the assets of the company; whereas equity investors have a residual claim on the cash flows of the company as they are owners. Since bondholders get a fixed slice of the earnings pie, regardless of the size of the earnings, they are more risk averse than shareholders who get to share the upside potential. Bondholders can suffer opportunity wealth loss due to the company's investment, financing and dividend decisions. A company making losses may be tempted to borrow and take on business gambles, the benefits of which largely go to shareholders. It's a 'heads-I-win, tails-you-lose' strategy. If the project succeeds, shareholders enjoy the upside potential but bondholders get fixed interest payment; if the project fails, shareholders have nothing to lose—it's not their money anyway. Bondholders make an estimate of default risk at the time of lending and the price is set assuming that no further debt will be issued. The bondholders' claim gets diluted if additional debt is issued with same or higher priority. The increase in default risk leads to a decrease in the price of the bond. Potential conflicts can arise due to the firm's dividend decision as well. Bondholders lend money assuming that their money will be invested in profitable venture and the cash flows from the project would be used to service them. If the firm chooses to distribute that money to shareholders in the form of dividends, the bondholders will be left with an empty shell.



Managers vs Shareholders

Investment in projects generates cash flows, which can either be reinvested in the business or returned to shareholders in the form of dividends who in turn can decide where to invest their money. Managers, as agents of shareholders, have discretion over investment of residual cash flow. Increasing dividends reduces the resources under the manager's control and limits growth. Since managers are appraised on the basis of growth, it is likely that they may pursue unprofitable projects that do not yield adequate returns; leaving the shareholders in a lurch. This leads to conflict of interest between managers and shareholders. Conflict is more severe in those firms that generate substantial cash flows but do not have profitable investment avenues. Of course, empire building is no longer in fashion, but high growth is still in vogue. In theory, the shareholders elect the board to oversee the Chief Executive Officer (CEO) on their behalf. But in practice, the CEO, who chairs the board, exercises considerable influence on the board, instead of the other way round (i.e., the board deciding CEO compensation). Typically, boards are populated with friends and relatives of the CEO.⁷ Erring managers may be replaced if the market for corporate control is active. The threat of acquisition by another company and the subsequent emotional upheavals keeps managers on their toes. Yet, takeovers are an expensive disciplining tool, entailing large administrative and legal expenses. Add the premium over the market price an acquirer has to pay. Moreover, most acquirers do not acquire companies with the objective of holding on to them forever. Acquired companies are milked in 3–5 years and resold to another acquirer.

Shareholder vs Shareholder

In all but few advanced economies—like the US, UK, and Japan—most publicly traded firms are closely held with the majority shareholder playing an active role in the management. The majority shareholder often serves as the chairman of the board. A study of the world's top 27 stock markets suggests that only 36 percent of the largest publicly traded firms are widely held, i.e., with no shareholders holding more than 20 percent of the votes (La Porta et al., 1999). Most of the widely held firms are concentrated in US, UK, and Japan. Most large publicly traded firms have a controlling shareholder, which may be a family, a state or another company. The 10 largest families in Indonesia, the Philippines and Thailand control half the corporate structure in terms of market capitalization; while the 10 largest in Korea and Hong Kong control about a third.⁸ In the Philippines and Indonesia the control of about 17 percent of market capitalization can be traced to a single family. Indonesia's Suharto family, led by Suharto's children, relatives and business partners, control 417 listed and unlisted companies. Control is defined as 20 percent of voting rights and a widely held company is one in which no owner has significant rights. In many East Asian countries control is enhanced through pyramid structures and cross holdings. Exhibit 1.3 presents the control of publicly traded companies in East Asia in 1996.

⁷ Latham, Mark (1999). 'The Corporate Monitoring Firm', *Corporate Governance: An International Review*, Vol. 7, No. 1.

⁸ Claessens, Stijn, Simeon Djankov, and Larry Lang (2000). World Bank Discussion Paper No. 409.

Exhibit 1.3 Control of publicly traded companies in East Asia in 1996 (in percent)

<i>Economy</i>	<i>No. of corp.</i>	<i>Widely held corporation</i>	<i>Corporations with ultimate owner</i>			
			<i>Family</i>	<i>State</i>	<i>Widely held financial institution</i>	<i>Widely held corporation</i>
Hong Kong	330	7.0	71.5	4.8	5.9	10.8
Indonesia	178	6.6	67.3	15.2	2.5	8.4
Japan	1,240	85.5	4.1	7.3	1.5	1.6
Korea	345	51.1	24.6	19.9	0.2	4.3
Malaysia	238	16.2	42.6	34.8	1.1	5.3
The Philippines	120	28.5	46.4	3.2	8.4	13.7
Singapore	221	7.6	44.8	40.1	2.7	4.8
Taiwan	141	28.0	45.5	3.3	5.4	17.8
Thailand	167	8.2	51.9	24.1	6.3	9.5

Source: Claessens et al. (1999).

A share is a share in the share capital of the company. Each share entitles the holder to exercise one vote at the annual general meeting. If this is true, then the value of the share should be the same for all shareholders irrespective of how many shares one is holding—one million or 100 shares. Glance through the financial dailies and magazines. Company after company is acquired for hefty premium. Majority shareholders (i.e., promoters) control many of these firms. Why do they pay hefty premium? Does the benefit accrue to all the shareholders? Unlikely. The answer lies in the benefits of being in control which accrue to the majority shareholder but not to minority shareholders.

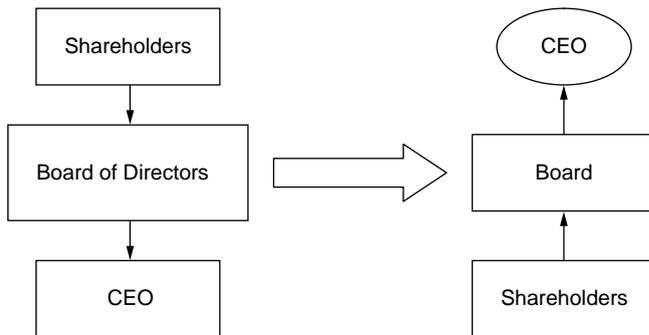
The next logical question to ask would be: What are those benefits and how are minority shareholders affected? The obvious benefits are the status bestowed upon the head of the company by society, love and affection bestowed by family and friends, ability to buy larger than optimal size computer to play with, plush carpets, corporate jets, etc. The sum of these benefits will not add up to the premium paid. The less obvious benefits are: the value of benefits arising out of access to information in related businesses and the ability to fix transfer prices between the company and its suppliers and customers.

An example will clarify the point. Let's suppose a foreign parent has two subsidiaries in India, one of which is a wholly owned subsidiary and the other, a 51 percent subsidiary. If the foreign parent transfers profitable brands and businesses from a long established 51 percent subsidiary to a newly formed 100 percent subsidiary at low prices, the minority shareholders of the 51 percent subsidiary suffer a loss. Another form of rip-off is collecting royalties for the use of a brand that the subsidiary has built through years of advertising. The parent takes the earnings pie away leaving the minority shareholders in dismay. Yet another form of rip-off is to acquire a more or less related business where the promoter has business interest through the holding company and further his/her interest without sharing any of those benefits with the minority shareholder. Academic studies suggest that the value of control is about 30 percent of market value of equity in Italy, 10–20 percent in Switzerland, the UK and Canada, and 4 percent of firm value in the US. The value of rip-off by majority shareholders is at least partly reflected in the premium paid for the target company. Maximizing shareholders' wealth is fine, but which shareholder: majority or minority?

When the risk of expropriation is high, investors either refrain from investing in closely held firms or demand a discount on the company's securities. When the risk of expropriation is very high, the discount can be as high as 60 percent. But concentrated ownership in itself is not a bad thing. An obvious advantage of concentrated ownership is that it gives the owners better incentives to monitor firms and make necessary changes in management. Diffused ownership, in contrast, does not provide adequate incentives. If concentrated ownership indeed leads to better oversight by managers, we would expect positive correlation between

ownership concentration and profitability and firm value. This is indeed the case in some central and Eastern European countries.⁹ A study of 700 Czech firms between 1992 and 1995 finds that the more concentrated the ownership of a firm the higher is its market value and profitability.

Rip-off by Chief Executive Officer (CEO)/majority shareholder



INVESTOR PROTECTION

Shareholders provide equity in exchange for dividend and voting rights. Likewise creditors lend money in exchange for interest and principal payments and the right to possess collateral when the company defaults on its payments. The difference in governance in different parts of the world is partly due to the differences in the rights of shareholders and creditors.¹⁰ A shareholder, as a residual claimant, has the right to attend annual general meetings and vote on various corporate matters such as asset sales, mergers and acquisitions, election of directors, etc. Often widely dispersed shareholders do not actively take part in the governance process. In those countries where voting by mail is not allowed, the company's management can get away uncontested. In some countries like Italy and Belgium whose legal systems are based on the French Civil law, shareholders are not allowed to vote by mail. In general, countries following the common law tradition (US, UK, Australia, Canada, etc.) provide the best investor protection. Likewise, the creditor rights vary from country to country. Some countries allow possession of collateral whereas some do not. Again, the common law tradition provides the best protection to creditors. Further, in many countries companies can issue shares with different voting rights. The one-share, one-vote rule is followed in the US, the UK, and many other countries. But it is common in countries like Brazil and Chile to issue shares with different voting rights. Some companies restrict the voting rights of foreign investors. For example, some companies from Latin America and Europe have issued (depository) shares with differential voting rights.¹¹

The shareholders of B-class shares of Saga Petroleum, a Norwegian company, have no voting rights but holders of A-class shares have full voting rights. Mexican companies have issued L shares that provide

⁹ Claessens, Stijn, Simeon Djankov, and Gerhard Pohl (1997). 'Ownership and Corporate Governance—Evidence from the Czech Republic', Private Sector.

¹⁰ La Porta et al. (1998), Shleifer and Vishny (1997).

¹¹ Pinegar, Michael and R Ravichandran (2001). 'The Idiosyncratic Nature of Sibling ADRs Issued by Mexican Firms: A Clinical Study', Unpublished Working Paper, Northern Arizona University.

limited rights to elect the number of directors and such other matters. Two Swedish firms—Astra and Scania—have issued two classes of shares—A and B. The A class shares have one vote each and B shares carry one-tenth vote each. ABB has 24,345,619 shares with 0.1 vote per share and a par value of 5 SEK, as well as 66,819,757 shares with one vote per share and a par value of 5 SEK. Investors, in general, are better protected in countries where the one-share, one-vote rule is enforced. In the absence of such a law, the insiders of the company can have disproportionate control on the company in relation to their investment.

MAXIMIZE EQUITY VALUE OR FIRM VALUE?

There is a misconception that maximization of equity value and maximization of firm value are the same. They are not the same. Even though equity is a part of the firm's capital structure, there is also debt and many financial instruments with both debt and equity features that managers should take into account. As described in earlier sections shareholders can increase their wealth at the expense of other investors. To illustrate, suppose there is a way in which managers could increase the value of equity by Re 1 if they could reduce the value of debt by Rs 3. This would reduce the value of the firm by Rs 2. What should the managers do now? Should they go ahead with the rip-off?¹² The answer is no; although managers are supposed to act on behalf of shareholders who have voted them to power.

CORPORATE GOVERNANCE

The term governance refers to exercise of power; authority, direction, and control. A firm is a collection of physical assets that are jointly owned. Corporate governance refers to the allocation of ownership. It explains how power is shared, contracts are written and enforced, the role of Board of Directors and CEO, management compensation, and so on. The root of the problem lies in the separation of ownership and control. Modern corporations are run by managers on behalf of shareholders. In many companies the senior executives hold little or no equity stake. How do you make someone who has no stakes in a company behave like a true representative of the shareholders? The obvious answer is to force the top executives to buy stocks. In many companies the Board spends less than a few hours (!) in decision making. The CEO and other Board members who are employees of the company wield substantial power. The outside directors who have no experience in related businesses cannot make meaningful contribution to the company. It is important to appoint competent outside directors to balance the power and let decision making to the CEO. The CEO would be the only insider on the Board. The outside directors should spend a minimum number of hours on the company's affairs, spend time with the customers and employees

Does Corporate Governance Matter?

Do good governance practices lead to an increase in market value of the firm? One set of studies conducted in the US finds that the correlation between corporate governance attributes and firm performance is either

¹² Assuming that bondholders will not recognize this ex-ante and demand compensation for the loss of wealth.

weak or zero. For example, the proportion of independent directors on a company's board has no significant effect on performance. Likewise, other attributes like institutional shareholding or a firm's committee structure are not correlated with performance. This weak correlation between governance attributes and performance is probably because the differences in practices between firms (in the sample) are negligible. But we would expect the correlation to be much higher in a country where investor protection rights are weak, expropriation by insiders the maximum and so on. A study of correlation between performance and corporate governance in Russia suggests that a one-standard-deviation improvement in governance ranking¹³ leads to eight-fold increase in firm value and a worst-to-best improvement in ranking leads to 600 fold increase in firm value.¹⁴ Studies have shown that companies in which management has a stake tend to perform better than those in which they don't.¹⁵ Another study conducted by McKinsey in conjunction with *Institutional Investor* found that many large private money managers are willing to pay a higher stock price for companies with good, independent boards.¹⁶ McKinsey surveyed 50 money managers representing about \$850 billion in assets and found they were willing to pay a premium of 11 percent on average for good governance. Another survey by McKinsey (results of which are shown in Exhibit 1.4) of institutional investors from around the world suggests that investors are willing to pay a premium of up to 28 percent for good governance.¹⁷

Exhibit 1.4 The value of good governance around the world

(Premium, in percent)

Asia		Europe/US		Latin America	
Indonesia	27	Italy	22	Venezuela	28
Thailand	26	France	20	Colombia	27
Malaysia	25	Germany	20	Brazil	23
South Korea	24	Spain	19	Mexico	22
Japan	20	Switzerland	18	Argentina	21
Taiwan	20	UK	18	Chile	21
		US	18		

Ranking of Investors' Priorities (in percent)

	First priority		Second priority	
	Latin America investors	Foreign investors in Latin America	Latin America investors	Foreign investors in Latin America
Shareholder rights	36	71	28	22
Disclosure	56	48	39	36
Board of directors	42	12	26	57

¹³ The ranking takes into account factors like transparency, asset stripping, limit on foreign ownership, dilution through share issuance to construct an index and rank companies.

¹⁴ Black, Bernard (2000). 'Does Corporate Governance Matter? A Crude Test using Russian Data', Working Paper No. 209, Stanford Law School. Another study in the US finds that a group of attributes are correlated with firm performance: Gompers, Paul A, Joy Ishii, and Andrew Metrick (2001). 'Corporate Governance and Equity Prices', Unpublished Working Paper, Harvard University.

¹⁵ Branch, B (1973). 'Corporate Objectives and Market Performance', *Financial Management*, Summer, pp. 24–29.

¹⁶ Hawkins, J A (1997). 'Why Investors Push for Strong Corporate Boards', *McKinsey Quarterly*, No. 3.

¹⁷ Coombes, Paul and Mark Watson (2000). 'Three Surveys on Corporate Governance', *McKinsey Quarterly*, No. 4.

Euromoney conducted a survey (results of which are shown in Exhibit 1.5) of the biggest companies from emerging markets.¹⁸ It considers the following factors in ranking:

- Ownership transparency
- Financial transparency
- Board structure and processes
- Shareholder relations
- Alignment of managerial and shareholder interests

Exhibit 1.5 Corporate governance rankings

Rank	Company	Country	Final score
1	Infosys Technologies	India	89 percent
2	Pohang Iron & Steel	South Korea	88 percent
3	Global Securities	Turkey	86 percent
4	Gujarat Ambuja Cement	India	83 percent
5	Silverline Technologies	India	83 percent
6	Dr Reddy's Laboratories	India	83 percent
7	GAZPROM	Russian Federation	83 percent
8	Thai Farmers Bank	Thailand	82 percent
9	British American Tobacco	Malaysia	81 percent
10	CTC	Chile	81 percent

Some companies have embraced the shareholder wealth maximization philosophy in the recent years. Here is an excerpt from the EID Parry 1997–98 annual report:

At EID Parry, value creation is central to operations. It is the force that drives our highly focussed agenda for growth. It is the insight to find better, more effective ways of doing business. Maximizing Value is more than a slogan. It is the cornerstone of our corporate culture.

But believing is not the same as achieving. Exhibit 1.6 presents the market price to Book Value (P/BV) ratios of stocks of some well-known companies.

Exhibit 1.6 P/BV ratios of some well-known companies

Company	Market price	P/BV
Arvind Mills	65.20	0.60
Atul Products	19.50	0.28
Ballarpur	32.25	0.25
Ceat	23.50	0.27
Videocon	44.15	0.24
Voltas	23.40	0.73

Source: *Business Today* (April 1998).

If you were to give one buck to Arvind Mills, it was worth 60 paise in 1998. Why is it that some companies trade below their book values? Is it that investors do not recognize the intrinsic value of these companies? Finance theorists argue that stock markets react rationally to corporate strategies at least in the long-run.

According to a recent McKinsey study, the return on capital employed during 1993–97 was lower than the cost of capital—9.5 percent in the public sector, 16.7 percent in the private sector. A half of the top

¹⁸ *Euromoney* (July 2002).

100 companies earned less than the cost of capital, against 20 percent in the US. The study indicates that highly capital-intensive industries—steel, cement, chemicals, oil, etc.—received 79 percent of the investment and earned 11 percent on it. The medium capital intensive industries—consumer durables, auto ancillaries, agro industries, etc.—received 16 percent of the investment and earned 20 percent on it. So much for the productivity of Indian industry and orientation towards wealth creation.

Until recently, the primary focus of Japanese companies was on growth—growth in sales and assets, growth in earnings and market share. In pursuing growth at any price, no consideration was given to the cost of capital. Implicit in this strategy was the assumption that capital was an unlimited and free resource. But all this is changing. Competitive challenges are forcing all companies, including Japanese companies, to establish pay-for-performance incentive plans. The seniority system that has existed in Japan for many years is being replaced by alternate promotion systems.¹⁹

SHAREHOLDER ACTIVISM

Any large corporation is dependent on a large number of small investors for capital as it is not possible for any single investor or a small group of investors to provide the necessary capital because, by definition, large companies have large requirements. Further, the law in some countries prevents financial institutions (e.g., banks) from holding equity or cross a certain threshold (e.g., mutual funds are prevented from holding more than a certain percentage of shares in any one company). Due to the wide dispersion of shareholding no single investor will have an incentive to monitor a company. Since diversification can be achieved by holding a dozen stocks it is possible for institutional investors to hold a small number of stocks and actively monitor the portfolio companies.

Shareholder activism comes from two sources: institutional shareholders and wealthy individuals. Activism may take on two approaches:

- Presenting a proposal at a shareholders' meeting
- Prod the company's management to change strategy and/or CEO.

Institutional investors discipline erring managers in the US and now in some parts of Europe. This trend is spreading to other parts of the world. For example, in India, the Unit Trust of India (UTI) is seeking initiatives on corporate governance from companies. UTI is communicating to all its nominees on company boards about what they should seek from the companies in which they are directors. UTI's list on corporate governance initiatives being sought include setting up board level committees, having a majority of non-executive directors on the board, appointment of quality outside directors, proper disclosure norms and succession planning at the top, including quality selection processes for CEOs. UTI is in the process of appointing its nominees on boards of companies in which it is a majority shareholder. The UTI is in the process of drawing up a list of eminent people who will serve as its representative on the boards of various companies.²⁰

William Browder, the CEO of Hermitage Capital (a foreign institutional investor in Russia), for example, is battling against Gazprom's (a Russian company) famously opaque bureaucracy for around three years now. The latest incident in the saga is his attempt to win a place on the company's board. Gazprom has

¹⁹ Roundtable on Shareholder Value in Japan, *Journal of Applied Corporate Finance*, Winter 1997.

²⁰ *Business Standard*, March 20, 1999.

been accused of asset stripping and other irregularities. Is shareholder activism good? I mean does it lead to improvement in performance? The results of academic studies are mixed. One study in the US reports positive long-term stock price returns to firms targeted by CalPERS, a large state pension plan.²¹

FIRM AND THE FINANCIAL MARKET

A financial market is a market where financial assets are traded. Financial assets are marketable financial claims issued by government and companies. Financial markets enable effective allocation of capital among competing uses. Financial markets perform four important economic functions. First, they enable individuals to choose more effectively between current and future consumption. Borrowing enables individuals to consume more whereas lending enables them to postpone consumption. The interest rate is the price of exchange. The units that have a surplus of capital invest in those that have a deficit. This provides producers with resources in excess of those generated by income. Second, the interaction between buyers and sellers in a financial market determines the price of a traded asset, say stocks, or alternatively, return demanded by investors to invest in a company. Firms can raise capital if the return on their investment exceeds the return demanded by investors. Third, financial markets provide liquidity to investors. That is, the owner of the asset can sell off the asset in the marketplace to realize cash whenever required. The degree of liquidity may vary according to the nature of the asset and the financial market in question. Fourth, stock markets process the opinion of all market participants and place a value on the company's stock. If you wish to find the value of HLL's (Hindustan Lever Limited's) equity, you may take a financial daily, note the prevailing price of HLL stock and multiply it by the number of outstanding shares. Thus financial markets aid the process of price discovery. It would be very difficult to assess the performance of companies in the absence of active stock markets.

Are Financial Markets Short-Sighted?

A manager is successful if s/he is able to raise the price of the firm's stock. The problem is that financial markets may not react rationally to corporate actions while setting the price of the stock. This could be due to:

- Non-availability of information
- Inefficiency of the stock market

In many countries including India, the disclosure norms are inadequate. It is quite possible that managers may not disclose adequate information or give a biased picture. It is the job of roving security analysts to dig deeper and unearth information required for fair pricing. The usual argument is that investors and analysts are shortsighted placing too much weight on current profits and dividends. This obliges managers to cut long-term investments. For, if managers invest in projects without an immediate payoff, their profits and share price fall. As financial markets are myopic; managers should not pursue the increase-the-stock-price rule, because long-term value maximization would be subordinated. If financial markets are indeed myopic, we should expect share price to fall when companies announce increase in capital expenditure. This, in general, does not happen. On the contrary, cuts in capital investments are considered bad news. Perhaps financial

²¹ Nesbitt, S L (1994). 'Long-term Rewards from Shareholder Activism: A Study of the CalPERS Effect', *Journal of Applied Corporate Finance*, Vol. 7, No. 6.

markets are not too short-sighted after all. If the markets are not short-sighted, what is the real reason for under investment? Managerial 'short-termism,' perhaps? Most executive incentive systems link rewards to short-term profits. If managers are rewarded on the basis of current profits they would have little incentive to invest for the long run. There is a popular belief that companies in the US invest too little in intangible assets and capabilities required for competitiveness because of short-termism on the part of managers, shareholders, lenders and investment managers and the inability of the capital market to deploy capital to most productive uses.²²

Broadly there are two types of capitalism—arm's length system (e.g., the US and the UK) and relationship-based system (e.g., Germany, Korea). In an arm's length (market-based), Anglo-Saxon system a financier is protected by explicit contracts as opposed to a relationship-based system, which is largely self-governing; parties honor agreements to maintain their reputation. In market-based system relationship matters less. In a relationship-based system the lending bank has a close long-term relationship with the borrower. The lender often belongs to the same group. The *chaebol* in Korea or the *Keiretsu* in Japan exhibit close relationship with their lenders. For some time now, academicians have argued whether one type of capitalism is better than the other. Until the late-1980s the East Asian economies were relationship-based systems. The relationship-based system works well when contractability is low and the amount of capital available is low. In other words, relationship-based systems are suitable if legal enforcement and investor protection norms in the country are weak and the amount of capital available relative to opportunities is low. Financiers (banks) in these countries tend to form long-term relationships with business. Over a period of time, many of these countries (e.g., Korea) attracted large amounts of foreign capital to fund opportunities created from opening up of the economy even when the institutional infrastructure was inadequate. The businesses in these countries needed capital, which the foreign investors readily supplied. Korean companies like Daewoo funded much of their investment with debt. The debt ratios of some Korean companies were more than 300 percent. Most Korean companies had taken on huge amounts of debt to diversify into hi-tech businesses like computers and telecom. Since the investors from Anglo-Saxon, market-based systems do not find extensive contracting and legal enforcement in these countries they tend to lend short so that they can pull out if there is a problem. When the East Asian financial crisis was triggered due to the depreciation of the Thai Baht, Korean investors pulled out leading to a capital shortage. Relationship-based systems are now under attack for being inefficient and corrupt and everybody is praising the merits of the arm's length system.²³

Are Financial Markets (In)Efficient?

News and information reach financial markets every hour of the day. Companies may report higher or lower earnings than what was expected, acquire companies, restructure assets and liabilities, and so on. Investors and market intermediaries try to digest the information and price the share consistent with what they heard and understood. But do they react rationally? The Efficient Market Hypothesis (EMH) states that the price of a stock at any given point in time fully reflects all available information relevant to the value of the stock at that time. BPL's share, for instance, according to EMH, should fully reflect at all times the prevailing prospects for India and consumer electronic industry as well as the prospects specific to BPL. The share-price of BPL should equal its intrinsic value at all times. Is market efficiency a fact? If not, does this invalidate the wealth

²² Porter, M E (1992). 'Capital Disadvantage: America's Failing Capital Investment System', *Harvard Business Review*, Sep–Oct.

²³ Rajan, R and L Zingales (1998). 'Which Capitalism? Lessons from the East Asian Crisis', *Journal of Applied Corporate Finance*, Vol. 11, No. 3.

maximization rule? In other words, is maximization of shareholders' wealth an operational concept? If shares are undervalued, the managers of a company, acting in the interest of existing shareholders, will not sell stock cheaply. If the company has exhausted its borrowing capacity, the company may have to forgo profitable projects. Likewise, if shares were overvalued, managers would want to sell shares even when the project is unprofitable thereby transferring wealth from new shareholders to old shareholders. Ask any CEO what s/he considers the stock price. Chances are that s/he thinks the stock is under priced. It is possible that managers may have superior information compared to outside analysts. This does not imply that stock markets do not reward value-maximizing strategies. The difference of opinion between managers and investors is not on whether the company is profitable or not but *how much profitable* and for *how long*. The increase or decrease in share price at the time of annual earnings announcements is not due to the short-sightedness of investors. It is merely an indication of revision of investor expectations. Managers will benefit from interacting with prominent analysts and eliciting their views on the company's stock market performance. Even in countries like India, analysts do a fairly good job of price discovery. Financial markets may not be efficient at all times. It is enough if they are frequently efficient.

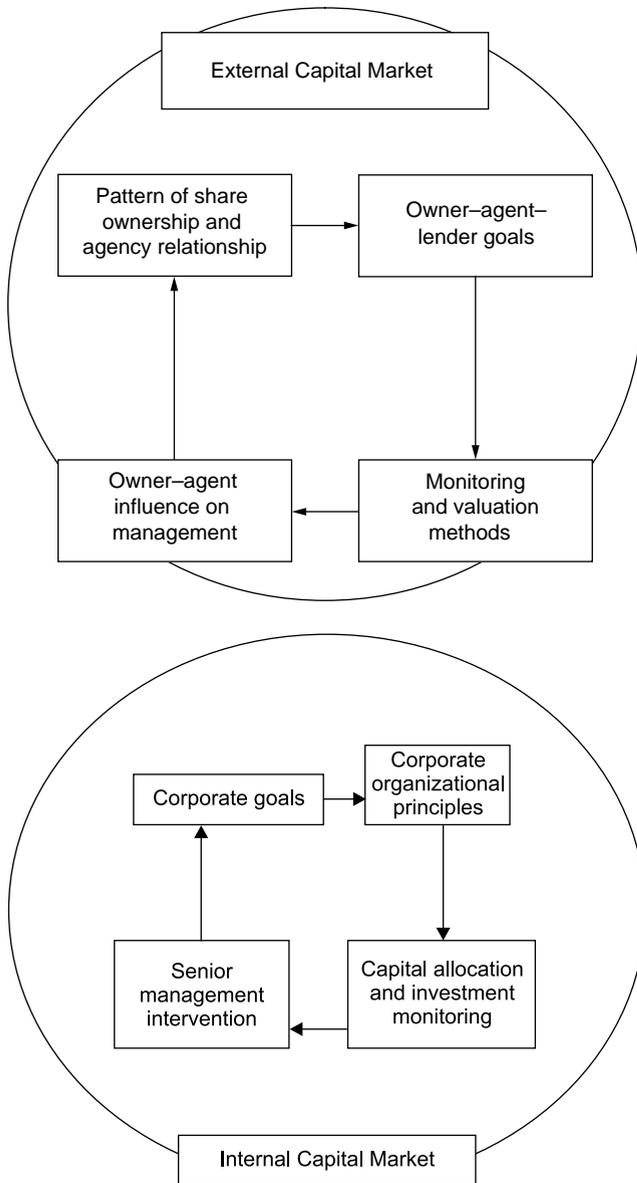
FINANCE THEORY AND FINANCIAL PRACTICE

Many executives and students find finance theory 'impractical.' This prompts me to clarify the relationship between theory and practice. There is a popular feeling that 'theory' is opposed to 'practice' and that the merits lie with the latter—this is a false conclusion, based on a false supposition. The theorist essentially attempts to explain 'what's going on.' If practice has been long successful and does not conform to theory, the theory is bad and needs to be revised. The distinction should not be between theory and practice; it should be between good theory and bad theory, between good practice and bad practice. Both are essential and both must be good.

IN CONCLUSION

The objective of a firm should not be to make a profit or even maximize profit, increase market share or sales, but to maximize shareholders' wealth. But this should not be achieved at the expense of other investor groups. Executives should quit complaining about the rationality of stock markets in pricing securities and work towards a sustainable increase in the price of the stock. In any company of reasonable size, hundreds and thousands of decisions are taken every year. How should one establish a link between corporate decisions and stock prices? Are there some significant decisions, which if handled carefully would lead to increased shareholder value? In the chapters that follow, four major decision areas in corporate finance—i.e., investment, financing, dividend and working capital decisions—are described. There is plenty of potential for increasing shareholder value by improving project choice, debt and dividend policy, working capital decision and mergers and acquisitions. The interplay between a firm's macroeconomic environment and the internal 'capital market' is shown in Exhibit 1.7:²⁴

²⁴ Porter (1992).

Exhibit 1.7 Interplay between the firm's macroeconomic environment and the internal 'Capital Market'

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Chapter 2

Time Value of Money

OBJECTIVES

- ◆ Calculate the future value of a single cash flow at a given interest rate.
- ◆ Calculate present value of a single cash flow occurring at some point in time in the future.
- ◆ Calculate the future value of a series of cash flow.
- ◆ Calculate the present value of a series of cash flow.
- ◆ Compare interests quoted on a different basis.
- ◆ Prepare loan amortization schedule.

Consider the following situations:

- You expect a liability of Rs 100,000 in 5 years and you wish to know how much you should set aside today to meet the liability.
- Your car dealer offers you two schemes: A and B. Under scheme-A, you can borrow the entire amount at an interest rate of 15 percent. Under scheme-B, the car dealer gives a discount of 10 percent on the sticker price but the interest charged on the amount borrowed would be 19 percent. You have to decide on the scheme.
- You come across advertisements inserted by two banks in a daily. Bank-A offers 13 percent interest per annum on deposits. Bank-B offers 12 percent semiannual interest. You have to choose between these banks.

These are some of the financial decisions you may have to make in your personal or executive life. This chapter answers questions like: Why is a rupee available today not the same as a rupee available in the future? What amount should you set aside today so as to receive a specified amount in the future? When can you be indifferent between some amount available today and some amount available in the future?

BASIS FOR TIME VALUE OF MONEY

A cash flow available in the future is worth less than a similar cash flow today, because of:

- **Inflation.** Due to inflation, the value of money decreases over time. Higher the inflation, lower the value.
- **Preference for current consumption.** Individuals prefer current consumption to future consumption. So they have to be offered more in the future to give up current consumption.
- **Riskiness of the cash flow.** The uncertainty of the cash flow reduces the value of the cash flow. Higher the uncertainty, lower is its value of today.

Lastly, money can be invested profitably in some productive activity. In short, money has time value. A rupee available now cannot be compared to a rupee available, say, a year from now.

Future Value and Compound Interest

Suppose you deposit Rs 1,000 in Global Trust Bank for one year, and the bank pays 13 percent interest.

$$\begin{aligned}\text{Interest} &= 0.13 \times 1000 = \text{Rs } 130 \\ \text{Amount at the end of 1 year} &= \text{Principal} + \text{Interest} \\ &= \text{Rs } (1000 + 130) = \text{Rs } 1310\end{aligned}$$

It is easy to see that:

$$\text{Value of investment after 1 year} = \text{Initial investment} \times (1 + r)$$

where ' r ' is the interest rate in decimal form.

Now, if you wish to keep the balance in the bank, the principal for the second year would be Rs 1,310 (and not 1,000) and interest would be paid on this amount.

$$\begin{aligned}\text{Interest for the second year} &= 0.13 \times 1310 = \text{Rs } 170.30 \\ \text{Amount at the end of second year} &= \text{Rs } (1310 + 170.30) = \text{Rs } 1480.30\end{aligned}$$

An investment of Rs 1,000 grew to Rs 1,310 in one year and Rs 1,480.30 in two years. The amount available at the end of the investment horizon is called future value and the process of multiplying the investment is called compounding. Note that the interest earned in the first year also earned interest in the second year.

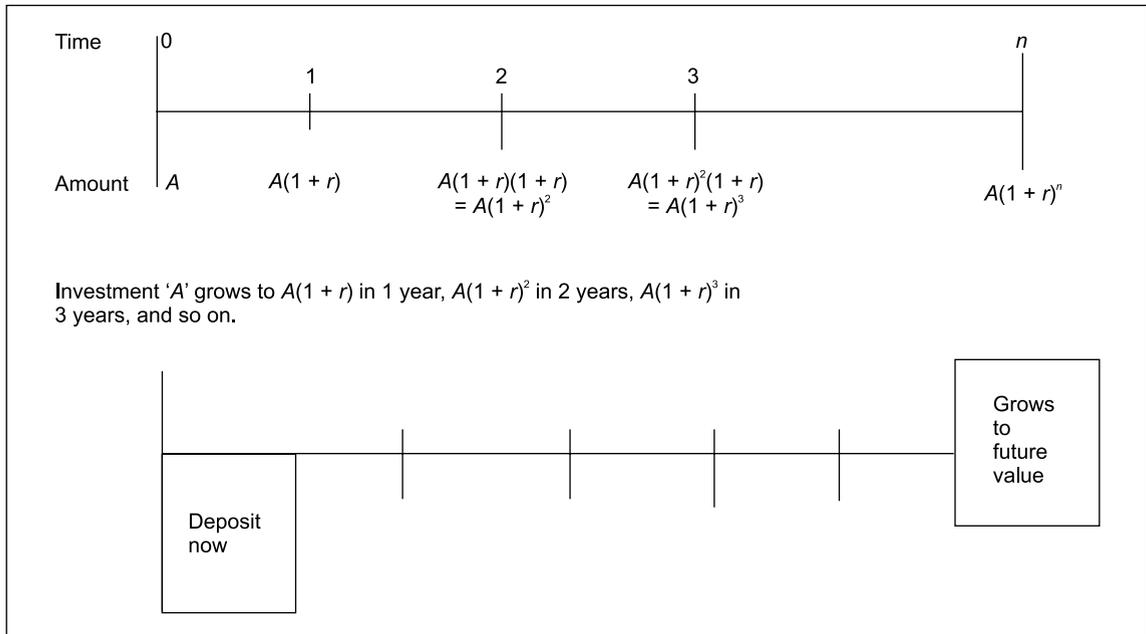
In general,

$$\boxed{\text{Future Value of an amount, } FV = \text{Amount } (1 + r)^n} \quad (1)$$

where r = interest rate, and

t = investment horizon.

The term $(1 + r)^n$ is called the Future Value Interest Factor (FVIF). It is the value of Re 1 interest at ' r ' percent after ' n ' years. Exhibit 2.1 illustrates the future value of an amount A at the end of 1, 2, 3, ..., n years.

Exhibit 2.1a Future value interest factor

An Illustration

Suppose you open a bank account with Rs 5,000. The bank pays 9 percent interest p.a. What would be the account balance at the end of 6 years; and, after 8 years? The answers:

$$\text{Balance at the end of 6 years} = 5000(1.09)^6 = \text{Rs } 8385.50$$

$$\text{Balance at the end of 8 years} = 5000(1.09)^8 = \text{Rs } 9963$$

The concept of compounding could be used in several other areas. Here's one:

The current production of Steel Company of India is 3 million tons.

The output is expected to grow at 8 percent p.a.

The output would grow to $3(1.08)^5 = 4.4$ million tons in 5 years.

The annual growth rate is called compound growth rate.

In the earlier example of the bank, we calculated the interest on the outstanding balance and not on the original principal of Rs 1,700. We assumed that interest receipts would also be reinvested. If interest were to be calculated on the original principal year after year, the amount would not compound. The interest in this case is called simple interest. Whenever we say interest, we keep in mind the compound interest—not simple interest.

The value of Re 1 for different interest rates and time periods is available in the form of the Future Value Interest Factor table (Table A.1 at the end of this book). A section of the same table is reproduced in Exhibit 2.1.

Exhibit 2.1b Future value interest factor

Year (n)	Interest rate r (percent)				
	8	9	10	11	12
1	1.080	1.090	1.100	1.110	1.120
2	1.166	1.188	1.210	1.232	1.254
3	1.260	1.295	1.331	1.368	1.405
4	1.360	1.412	1.464	1.518	1.574
5	1.469	1.539	1.611	1.685	1.762

To find the value of Re 1 at 10 percent for 5 years, go to the Cell at the interaction of the 5th row and 3rd column. The value is 1.6111. Similarly, try 12 percent and 4 years. Now find the future value of Rs 282 at 10 percent for 3 years:

$$\text{Future Value} = A(1 + r)^n = 282 \times \text{FVIF}_{10,3} = 282 \times 1.331 = \text{Rs } 375.50$$

Present Value

We saw that Rs 100 grows to Rs 108 at an interest rate of 8 percent p.a. Let us do the reverse now. How much do we need to set aside today in order to produce Rs 108, a year from now? The amount is referred to as present value of Rs 108.

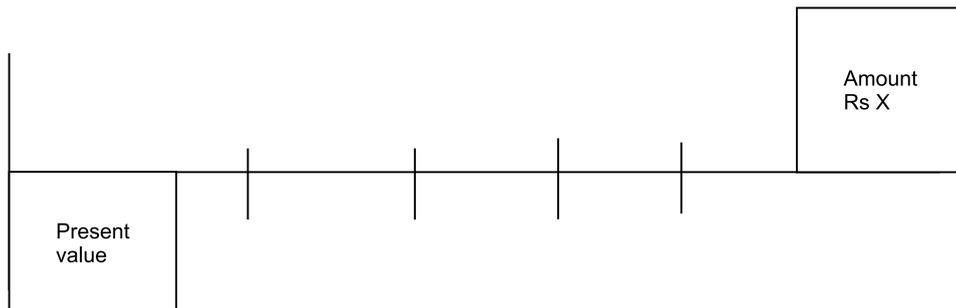
$$\text{Future Value (FV)} = A(1 + r)^n$$

$$A = \frac{\text{FV}}{(1 + r)^n}$$

i.e.,

$$\boxed{PV = \frac{\text{FV}}{(1 + r)^n}} \quad (2)$$

The process of bringing a cash flow to the present is called discounting. The rate of interest is called the discount rate—at which present and future values are traded off. The term $[1/(1 + r)^n]$ is called Present Value Interest Factor or PVIF.



An Illustration

Suppose you are pursuing an MBA program: the second year fee is Rs 45,000, and is not expected to change. The interest rate is 10 percent.

$$\text{Present Value} = [45000/(1.10)] = \text{Rs } 40909$$

Now, try discounting Rs 1,000 available 5 years from now at 8 percent.

$$\text{Present Value} = [1000/(1 + 0.18)^5] = \text{Rs } 681$$

The value of $[1/(1 + r)^n]$ for various combinations of r and n is given in the Present Value Interest Factor Table (Table A.3 at the end of this book). A section of the same is reproduced in Exhibit 2.2.

Exhibit 2.2 Present value interest factor

PV of Re 1 to be received after n years = $[1/(1 + r)^n]$

Year (n)	Interest rate r (percent)				
	8	9	10	11	12
1	0.926	0.917	0.909	0.901	0.893
2	0.857	0.842	0.826	0.812	0.797
3	0.794	0.772	0.751	0.731	0.712
4	0.735	0.708	0.683	0.659	0.636
5	0.681	0.650	0.621	0.593	0.567

For given ' r ': higher the discount rate, lower is the present value; and for a given ' r ', longer the time period, lower the present value. Given three terms out of PV, FV, r and a , the fourth could be found out using equation 1. For example:

Rs 5,000 invested in a savings scheme grows to Rs 10,000 in 6 years.

The implicit interest rate, $r = (10000/5000)^{1/6} - 1 = 0.122 = 12.2$ percent

Future Value of a Series

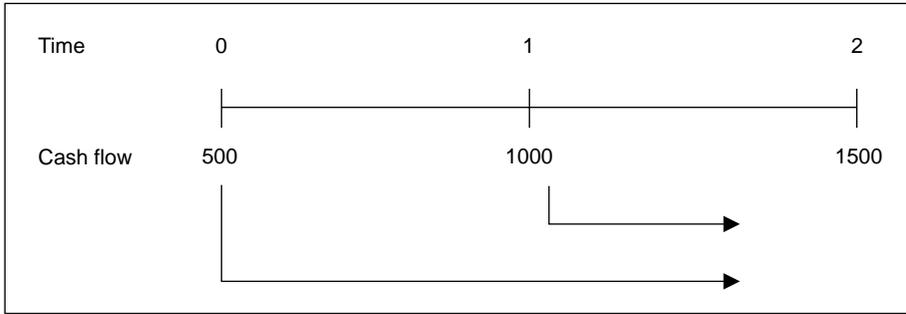
So far, we found the present or future value of a single amount at some interest rate and time period. Consider the following situation:

You invest Rs 500 today, Rs 1,000 at the end of the 1st year, and Rs 1,500 at the end of the 2nd year. You have to find the future value at the end of the 2nd year; assuming 8 percent interest. The future value of this series is nothing but the sum of the future values of each cash flow:

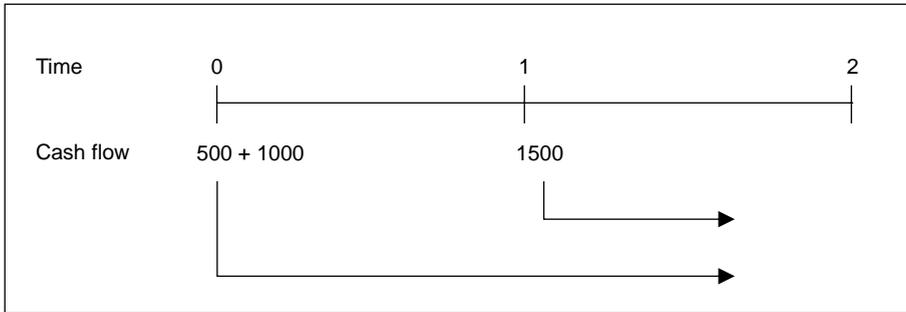
$$\text{Future Value} = \text{FV of Rs } 500 + \text{FV of Rs } 1000 + 1500$$

Note that 1500 itself is the future value of cash flow occurring at the end of the 2nd year.

$$\begin{aligned} \text{FV} &= 500 (1.08)^2 + 1000(1.08) + 1500 \\ &= 500 \times \text{FVIF}_{8,2} + 1000 \times \text{FVIF}_{8,1} + 1500 \\ &= \text{Rs } 3163 \end{aligned}$$



What would happen to the future value if the cash flow was to occur at the beginning of the year? Beginning of year-1 is same as year-0 (i.e., today) and the beginning of year-2 is same as end of year-1. The cash flow would be:

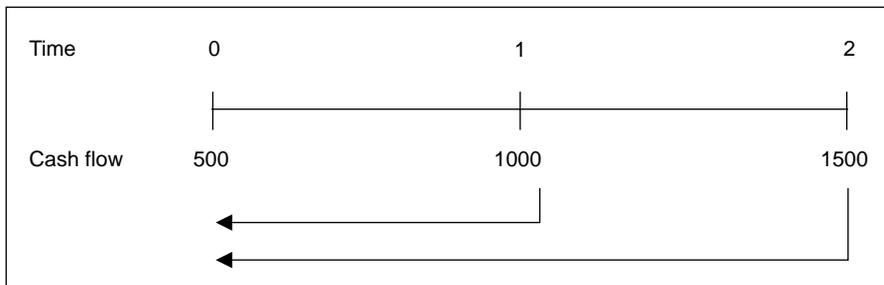


$$FV = (500 + 1000)(1.08)^2 + (1500 \times 1.08) = \text{Rs } 3369$$

It should be clear by now that the time interval between two cash flows considered so far have been exactly one year and cash flows cannot be aggregated across years. But they can be moved to any particular year and then added.

Present Value of a Series

Consider the same cash flows again. The present value of this series is the sum of present values of each of these cash flows.



$$PV = 500 + \frac{1000}{1.08} + \frac{1500}{(1.08)^2}$$

Notice that Rs 500 is in current rupees. So we are not finding its present value.

$$PV = \text{Rs } 2711.50$$

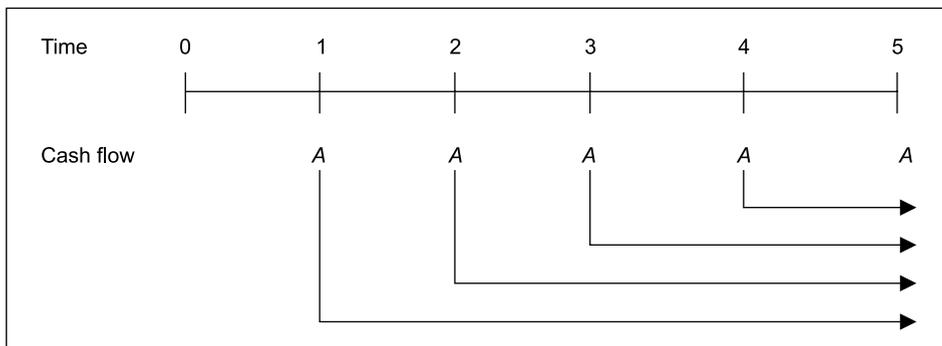
Try finding the present value of this series if the cash flow were to occur at the beginning of the year.

Types of Cash Flows

Cash flows can exhibit different patterns. In the given example, the periodic amounts are different and the series had a finite life. A series of periodic flows of equal amounts is called an *Annuity* and a series of periodic flows of equal amounts but with an infinite life is called *perpetuity*. Thus investing or receiving Rs 500 as dividend forever is perpetuity.

Future Value of an Annuity

Consider this example: You require Rs 250,000 at the end of 5 years to buy a car. Assume that this is the price that would prevail 5 years from now, for the model you have in mind. You wish to invest a fixed (constant) sum every year to accumulate Rs 250,000 at the end of 5 years. The series of cash flows would be:



The future value of an annuity for a period of ' n ' years, at ' r ' rate of interest, is given by:

$$FVA_n = A \left[\frac{(1+r)^n - 1}{r} \right] \quad (3)$$

where A = amount invested at the end of every year for ' n ' years,
 r = rate of interest in decimal form, and
 n = time period in years.

The term within brackets, $\frac{(1+r)^n - 1}{r}$ is called the Future Value Interest Factor of an Annuity or FVIFA.

It is the future value of an annuity of Re 1 for various values of r and n . To make our life simple, the value of FVIFA for various r and n are presented in the form of a Table (Table A-2 at the end of this book). A section of the table is shown in Exhibit 2.3. The FVIFA corresponding to, say, 6 percent; and 3 years is 3.184. Assuming an interest rate of 13 percent, the amount to be invested every year in the given example is:

$$250000 = A \times \text{FVIFA} (13 \text{ percent}, 5)$$

$$A = 250000/6480 = \text{Rs } 38580$$

Exhibit 2.3 Future value interest factor of an annuity

Year (n)	Interest rate r (percent)				
	5	6	7	8	9
1	1.000	1.000	1.000	1.000	1.000
2	2.050	2.060	2.070	2.080	2.090
3	3.152	3.184	3.215	3.246	3.278
4	4.310	4.375	4.440	4.506	4.573
5	5.526	5.637	5.751	5.867	5.985

Present Value of an Annuity

The present value of an annuity 'A' receivable at the end of each year for a period of 'n' years at an interest rate of 'r' is given by:

$$PVA_n = A \times \frac{(1+r)^n - 1}{r(1+r)^n} \quad (4)$$

The term in the bracket $\left[\frac{(1+r)^n - 1}{r(1+r)^n} \right]$ is called Present Value Interest Factor of an Annuity or PVIFA. It

is the present value of an annuity of Re 1 for the given values of r and n . The values of PVIFA (K, n) for various combinations of r and n are given in Table A-4 at the end of the book. A section of the same is shown in Exhibit 2.4.

Exhibit 2.4 Present value interest factor of an annuity

Year (n)	Interest rate r (percent)			
	6	7	8	9
1	0.943	0.935	0.926	0.909
2	1.833	0.873	0.857	0.826
3	2.673	0.816	0.794	0.751
4	3.465	0.763	0.735	0.688

The PVIFA for 8 percent and 2 years is 0.857. Note that PVIFA is not the reverse of FVIFA, although PVIF is the reverse of FVIF. Also, the cash flows in all the cases occur at the end of the year.

An Illustration

On December 31, you buy a car for Rs 200,000—paying 20 percent upfront and agreeing to pay the balance in five equal annual installments. The rate of interest is 15 percent. Now:

$$\begin{aligned}\text{Amount payable} &= 0.8 \times 200000 = \text{Rs } 160000 \\ \text{PVA}_n &= A[\text{PVIFA}_{r,n}] \\ A &= [160000 / 3352] = \text{Rs } 47732.70\end{aligned}$$

Sometimes annuities grow at a constant rate. Retirement and pension benefits, for example, increase every year with a cost of living adjustment. The present value of a series of growing annuity can be estimated using the following equation:

$$\text{PV} = \frac{A}{r - g} \left[- \left\{ \frac{(1 + g)^n}{1 + r} \right\} \right]$$

If $A = \text{Rs } 6,600$, $r = 5$ percent, $n = 30$ periods, $g = 3.5$ percent
 $\text{PV} = \text{Rs } 154,251$

Loan Amortization

Consider an example similar to the above example. Assume that you have borrowed Rs10 lac from a financial institution at an interest rate of 14 percent per annum. The loan is to be cleared in equal annual installments.

$$\begin{aligned}\text{Annual installment} &= \text{Rs } 1000000/\text{PVIFA}(14, 5) \\ &= \text{Rs } 1000000/3433 = \text{Rs } 291290\end{aligned}$$

This installment contains interest and principal components. The principal is retired partially every year, and the interest is paid on the outstanding balance. The loan amortization schedule is presented in Exhibit 2.5.

Exhibit 2.5 Loan amortization schedule

Year (1)	Annual installment (Rs) (2)	Interest component (Rs) (3)	Principal component (Rs) (4) = (2) – (3)	Loan outstanding (Rs) (5)
1	291,290	140,000	151,290	1,000,000
2	291,290	118,819	172,470	848,710
3	291,290	94,673	196,616	676,239
4	291,290	67,147	224,142	479,622
5	291,290	35,767	255,500*	255,480*

*These two figures do not coincide due to rounding off errors.

Working:

$$\begin{aligned}\text{Interest for 1st year} &= 0.14 \times 1000000 = \text{Rs } 140000 \\ \text{Principal component for 1st year} &= \text{Annual installment} - \text{Interest for 1st year} \\ &= \text{Rs } 151290\end{aligned}$$

$$\begin{aligned}
\text{Loan outstanding for 1st year} &= \text{Rs } 1000000 \\
\text{Loan outstanding for 2nd year} &= \text{Rs } (1000000 - \text{Loan repaid}) = 10L - 151290 \\
&= \text{Rs } 848710 \\
\text{Interest for 2nd year} &= 0.14 \times 848710 = \text{Rs } 118819 \\
\text{Principal component} &= \text{Annual installment} - \text{Interest for 2nd year} \\
&= 291190 - 118819 = \text{Rs } 172470
\end{aligned}$$

All other entries could be worked out similarly.

An Illustration: Making sense out of housing loans

Assume that you are in the process of borrowing Rs 10 lac to construct a house. The repayment period is 15 years. Bank A charges 14 percent annually; bank B charges 14.5 percent. Verify that equated *monthly* installment is Rs 13,600 for bank A, and Rs 14,000 for bank B. A reduction of 0.5 percent interest will save Rs 400 every month, Rs 4,800 a year and Rs 72,000 by the time the loan is cleared. Interest rates on housing loans are calculated either on a monthly reducing or an annual reducing basis. In the former case, interest is computed on the reducing outstanding balance on a monthly basis whereas in the latter case, interest is levied on the annual principal, which reduces annually.

HDFC charges 15.5 percent p.a. on a loan of Rs 10 lac; GIC Housing Finance (HF) charges 16.5 percent. On the face of it, HDFC is cheaper. However, since GIC HF calculates its interest on a monthly reducing basis, the EMI for a 5 year loan works out to Rs 24,585, against Rs 25,200 for HDFC which calculates interest on an annual reducing basis. By the way, calculation of EMIs is similar to calculation of EAI's.

EFFECTIVE AND NOMINAL RATES

In all the examples considered so far, compounding was done annually. This may not be true of all situations. For instance, a fixed deposit scheme may offer quarterly compounding; a car dealer may quote an interest rate on a monthly basis. How should we compare interest rates that are quoted for different periods? Let's look at a numerical. A car dealer offers two schemes—A and B. Under the first scheme you have to pay an interest of 12 percent compounded monthly and under the second scheme you have to pay an interest of 12 percent compounded annually. You are required to choose between the two.

The trick is to convert both of them into the same basis. There is a simple formula to do this:

$$(1 + \text{Annual rate}) = (1 + \text{Monthly rate})^{12}$$

For the first scheme, the annual rate is 12 percent. So the rate per month is $12/12 = 1$ percent. Substitute in the above equation:

$$\begin{aligned}
(1 + \text{Annual rate}) &= (1 + 0.01)^{12} \\
\text{Annual rate} &= 12.68 \text{ percent}
\end{aligned}$$

From the numerical it must be clear that the shorter the compounding period, the higher will be the interest rate. The rate quoted on an annual basis (12 percent) is the simple annual rate and the rate that considers more frequent compounding is called effective rate (12.68 percent in the above example).

In general,

$$\boxed{\text{Effective rate} = [1 + (r/m)]^m - 1} \quad (5)$$

where r = nominal annual rate and
 m = number of times compounding is done in a year.

Try calculating the effective rate in the above example when compounding is done daily, quarterly, and semi-annually.

Let us extend the idea a little bit. Following data is available for a fixed deposit scheme:

Investment = Rs 5000
 Rate of interest = 13 percent
 Compounding = Semi-annual
 Term = 5 years

The future value would be:

$$\text{FV} = A[1 + (r/m)]^{m \times n} \quad (6)$$

where n = number of years

$$\text{FV} = 5000 [1 + (0.13/2)]^{2 \times 5} = \text{Rs } 9385$$

Had the compounding been annual,

$$\text{FV} = 5000 (1 + 0.13)^5 = \text{Rs } 9212$$

The difference of Rs (9385 – 9212) = Rs 173 is due to semi-annual compounding.

Perpetuities

Some investments make a regular income for ever. Suppose Company-X declares a dividend of Rs 2 per share. It is expected to remain at this level for ever (the firm is a going concern). If the appropriate discount rate is 13 percent, the present value of this perpetual stream = (Rs 2/0.13) = Rs 15.40.

In general,

$$\boxed{\begin{array}{l} \text{PV of a perpetuity} = \text{Per period amount} / \text{Discount rate} \\ \text{PV} = A/K \end{array}} \quad (7)$$

If an amount is to grow at a constant rate for ever it is called a growing perpetuity. The present value of a growing perpetuity can be estimated using the following formula.

$$\text{PV} = \frac{A}{k - g}$$

where k is the discount rate and g is the growth rate.

IN CONCLUSION

1. Money has time value. It is to be explicitly recognized in financial analysis.
2. A rupee available today is more valuable than a rupee available sometime in the future because:
 - (a) Individuals prefer current assumption for future consumption
 - (b) Of inflation
 - (c) Of uncertainty in realization of future cash flows
3. A series of cash flows may be uneven or even. In case of the latter, when the amount is the same, the series is called an annuity.
4. The present value of an uneven series of cash flows is the sum of the present values of individual amounts.

$$PV(CF)_t = PV(CF_1) + PV(CF_2) + \dots + PV(CF_n)$$

5. The present value of an annuity

$$PV(CF) = A \times [PVIFA_{r,n}]$$

6. The future value of an uneven series of cash flows is the sum of future values of the individual amounts:

$$FV(CF) = FV(CF_1) + FV(CF_2) + \dots + FV(CF_n)$$

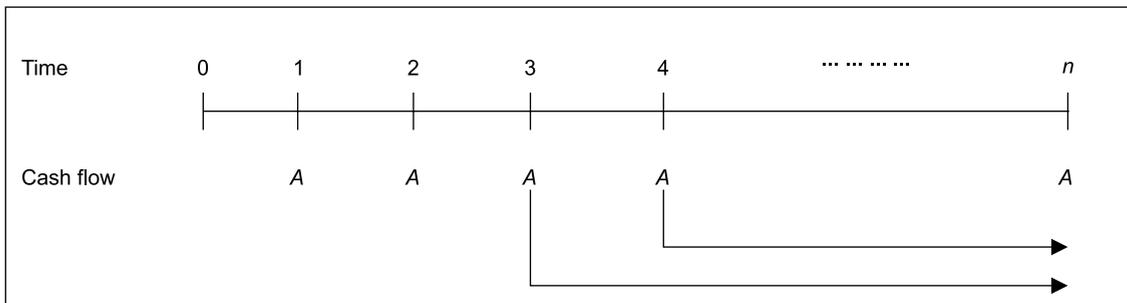
7. Future value of an annuity = $A[FVIFA_{r,n}]$
8. Present value of an amount is the discounted value at the given discount rate.
9. Future value of an amount is the compounded value at the given compound rate.

APPENDIX

Derivation of Future Value of an Annuity (Cash flows occur at the end of each period):

Let

A = constant periodic cash flow,
 r = interest rate,
 n = duration of the annuity,
 FVA_n = Future value of an annuity, and
 PVA_n = Present value of an annuity.



Future Value,
$$FVA_n = A(1+r)^{n-1} + A(1+r)^{n-2} + \dots + A \quad (2A)$$

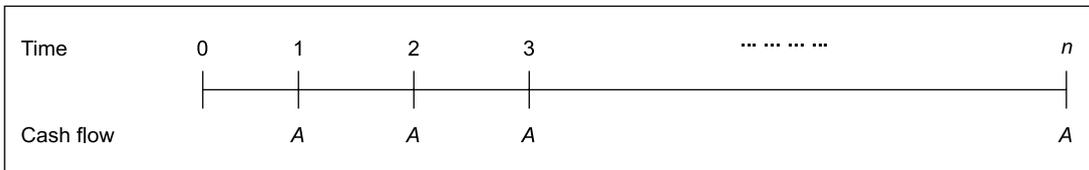
Multiply both sides of the equation by $(1+r)$:

$$FVA_n(1+r) = A(1+r)^n + A(1+r)^{n-1} + \dots + A(1+r) \quad (2B)$$

Subtract equation (2A) from (2B):

$$\begin{aligned} FVA_n \cdot r &= A(1+r)^n - A \\ FVA_n \cdot r &= A[(1+r)^n - 1] \\ FVA_n \cdot r &= A \left[\frac{(1+r)^n - 1}{r} \right] \end{aligned}$$

Derivation of Present Value of an Annuity (Cash flows occur at the end of the period):



$$PVA_n = \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \dots + \frac{A}{(1+r)^n} \quad (2C)$$

Multiply both sides of the equation by $(1+r)$:

$$PVA_n(1+r) = A + \frac{A}{(1+r)} + \dots + \frac{A}{(1+r)^{n-1}} \quad (2D)$$

Subtract equation (2C) from (2D):

$$\begin{aligned} PVA_n \cdot r &= A - \frac{A}{(1+r)^n} \\ PVA_n \cdot r &= A \left[1 - \frac{1}{(1+r)^n} \right] \\ PVA_n \cdot r &= A \left[\frac{(1+r)^n - 1}{(1+r)^n} \right] \\ PVA_n \cdot r &= A \left[\frac{(1+r)^n - 1}{(1+r)^n \cdot r} \right] \end{aligned}$$

Derivation of Future Value of an Annuity (Cash flows occur at the beginning of the period):

Time	0	1	2				$n-1$	n
Cash flow		A	A				A	A

$$FVA_n = A(1+r)^n + A(1+r)^{n-1} + \dots + A(1+r) \quad (2E)$$

Divide equation (2E) by $(1+r)$

$$\frac{FVA_n}{(1+r)} = A(1+r)^{n-1} + A(1+r)^{n-2} + \dots + A \quad (2F)$$

Subtracting equation (2F) from (2E), we get

$$\text{i.e.,} \quad FVA_n[1 - \{1 - (1+r)\}] = A(1+r)^n - A$$

$$r(1+r) \cdot FVA_n = A[(1+r)^n - 1]$$

$$FVA_n = A \left[\frac{(1+r)^n - 1}{r} \right] (1+r)$$

Note that the FVA of this series is FV of regular annuity multiplied by $(1+r)$.

Derivation of Present Value of an Annuity (Cash flows occur at the beginning of the period):

$$PVA_n = A + \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \dots + \frac{A}{(1+r)^{n-1}} \quad (2G)$$

Multiply both sides by $(1+r)$:

$$\frac{PVA_n}{(1+r)} = \frac{A}{(1+r)} + \frac{A}{(1+r)^2} + \dots + \frac{A}{(1+r)^n} \quad (2H)$$

Subtract equation (2G) from (2H):

$$PVA_n [1 - \{1/(1+r)\}] = A - \frac{A}{(1+r)^n}$$

$$PVA_n [r/(1+r)] = A \left[\frac{(1+r)^n - 1}{(1+r)^n} \right]$$

$$PVA_n = A \left[\frac{(1+r)^n - 1}{r(1+r)^n} \right] (1+r)$$

= Present value of a regular annuity $Y(1+r)$.

CONCEPT TEST

State whether the following statements are true or false:

1. A series of periodic cash flows of equal amounts occurring at the end of each period is called an annuity.
2. The Inverse of PVIF factor is FVIF factor.
3. The present value of a series of cash flows occurring at the beginning of the year is the same as that occurring at the end of the year.
4. The amount that must be set aside periodically to accumulate a stated amount in the future is called sinking fund.
5. Nominal rate of interest = Effective rate when compounding is done annually.
6. $PVIFA/PVIF = FVIFA$

Answers: 1–T, 2–T, 3–F, 4–T, 5–T, 6–T.

EXERCISE

SBI Housing Loan Scheme: A Caselet

State Bank of India offers a housing loan scheme to those who have regular monthly income. Loans are available for the purchase of construction of new flat or house, repairs to the existing house, or purchase of an already constructed house normally not more than 5 years old.

Loans are sanctioned depending upon the repayment capacity and the area as follows:

- | | |
|--------------------------|--------------------|
| (a) Rural and semi-urban | Rs 25,000 to 5 lac |
| (b) Urban | Up to Rs10 lac |

The individual is required to bring in margin money (contribution) depending on the loan amount:

- | | |
|---|------------|
| (a) Up to Rs 25,000 | 20 percent |
| (b) Rs 25,000 – 50,000 | 25 percent |
| (c) Over Rs 50,000 and up to Rs 100,000 | 30 percent |
| (d) Over Rs 100,000 | 35 percent |

The processing charges are:

- | | |
|---|--|
| (a) Up to Rs 25,000 | Nil |
| (b) Above Rs 25,000 and
up to Rs 200,000 | 0.5 percent loan amount
Rs 500 more |
| (c) Above Rs 200,000 | 0.5 percent loan amount |

The prevailing interest rate is:

- | | |
|--|---------------|
| 1. Up to Rs 25,000 | 12 percent |
| 2. Above Rs 25,000 and up to Rs 200,000 | 13.5 percent |
| 3. Above Rs 200,000 and up to Rs 300,000 | 15.5 percent |
| 4. Above Rs 300,000 | 16.25 percent |

The loan is to be repaid in equated monthly installments depending on the amount of loan, the applicable rate of interest and period of the loan. The maximum repayment period is 15 years, including initial moratorium period of 18 months.

Prepare a repayment schedule, assuming a loan amount of Rs 500,000.

QUESTIONS

- The current Earnings per Share (EPS) of the Hindustan Engineering Company is Rs 3.80. Analysts expect it to grow at an annual rate of 8 percent. What will be the EPS in 5 years time?
- You have the option of a lump-sum today as against an annuity of Rs 3,000 for 8 years. How large will the lump-sum have to be, to make you indifferent between the options if current interest rate is 12 percent?
- You know that the following liabilities must be satisfied:

<i>Year from now</i>	<i>Liability (Rs in crore)</i>
1	2
2	3
3	4
4	5

How much should be invested today to satisfy this stream? You can earn an annual interest rate of 11 percent on your investments.

- What is the implied growth rate, if:
 - Production Target for 1997 = 5 million tons
 - Current Production (for 1991) = 2 million tons
- What annual percentage rate is equal to 12 percent compounded monthly?
- Suppose you open a savings account with Rs 1,500. The account's stated interest rate is 12 percent. Calculate the account's balance after 2 years if interest is paid:
 - annually;
 - semi-annually; and
 - quarterly.
- You need Rs 150,000 at the end of 15 years. You decide to make equal annual payments into a bank account. Current interest rate is 11 percent (compounded annually). The first payment is to be made at the end of the first year.
 - What must be year annual payment to meet your need?
 - How would your answer change if the payments are made at the beginning of the year?
 - Instead of making annual payments if you were to decide to make one lump-sum payment today, how big should the lump-sum be?
- Your company has established a sinking fund to meet an obligation of Rs 8 lac, coming due in 10 years. If the fund can earn 10 percent a year, what annual contributions must be made to accumulate the amount?
- Bank-A pays 13 percent interest compounded annually on deposits. Bank-B pays 12 percent compounded monthly. In which bank would you prefer to deposit your money?
- Vindhyachala Financial Services Company offers loans at an annual rate of 10 percent. If the interest is compounded monthly, what is the effective rate?
- An advertisement by Vijayashri Bank claims that your money will double in 6 years. What is the implied interest?
- You have taken a 30-year loan for Rs 3 lac. The annual interest on the loan is 12 percent. Estimate your yearly payments.
- Find the present value of the series. Discount rate = 10 percent.

<i>Year</i>	<i>Amount (Rs)</i>
1–5	125,000
6–10	28,000
11–15	136,000

- You are 55 years old and expect to work for 5 years more, saving Rs 1.25 lac a year. Appropriate interest rate = 10 percent.
 - If you wish to withdraw Rs 75,000 a year for the following 15 years, how much would you need in the bank 5 years from now?
 - What is its current worth?
 - If you already have Rs 2 lac in your bank account, what would be your bank balance when you retire?

- (d) From the bank balance calculated above, how much cash can you withdraw for 10 years?
- (e) If current savings are Rs 2.5 lac, how much of your income would you need to save each year for the next 5 years in order to be able to withdraw Rs 75,000 a year for 5 years after retirement?
15. Find the future value of the following series at the end of the 5th year at 13 percent interest:

<i>Year</i>	<i>Cash flow (Rs)</i>
1	100
2	200
3	300
4	400

16. Find the present value of the cash flows at 13 percent interest:

<i>Year</i>	<i>Cash flow (Rs)</i>
1	-
2	20,000
3	-
4	900

Chapter 3

Risk and Return

OBJECTIVES

- ◆ How to measure security return for single and multiple periods.
- ◆ Different measures of risk for a single and a portfolio of stocks.
- ◆ The relationship between risk and return.
- ◆ The intuitive reasoning behind the Capital Asset Pricing Model.
- ◆ What are the competitors to CAPM.

In the summer of 2002, the fund manager of ING Savings Trust was reviewing the mix of securities in their INP Growth portfolios. ING operates three schemes in India. The ING Income Portfolio is an open-ended scheme that seeks to generate attractive income by investing in a diversified portfolio of debt and money market instruments of varying maturity and at the same time providing continuous liquidity along with safety. The total assets under this scheme, as on March 2002, were Rs 196.08 crore.

The ING Growth Portfolio scheme seeks to provide long-term capital appreciation by investing predominantly in a portfolio of high quality equity and equity related securities. The scheme has the choice of dividend and growth options. The total assets under management under this scheme, as on February 2002, were Rs 79.60 crore.

The ING Balanced Portfolio is an open-ended scheme that seeks to generate long term growth of capital and current income from a Portfolio of equity and fixed income securities. The scheme has the choice of dividend and growth options. The total assets under management under this scheme, as on February 2002, were Rs 41.71 crore.

THE MUTUAL FUND INDUSTRY

A mutual fund is a trust that pools the savings of a number of investors who share a common financial goal. The money thus collected is invested by the fund manager in different types of securities depending upon the objective of the scheme. These could range from shares to debentures to money market instruments. The income earned through these investments and the capital appreciation realized by the scheme is

shared by its unit holders in proportion to the number of units owned by them. Thus a mutual fund is the most suitable investment for an investor as it offers an opportunity to invest in a diversified, professionally managed portfolio at a relatively low cost. There are two types of schemes: open-ended and closed-ended. An open-ended fund is available for subscription throughout the year. These do not have a fixed maturity. Investors can buy and sell units at NAV (net asset value) related prices. A closed-ended fund, in contrast, has a fixed maturity, typically 3–15 years. The fund is open for subscription only for a specified period of time. Investors can invest in the scheme at the time of floatation and thereafter buy and sell units of the scheme on the stock exchange where the scheme is listed. Some funds repurchase units from investors from time to time at NAV related prices.

From a total of Rs 3.08 crore investors in the mutual funds industry, 2.44 crore—or 79.15 percent—of the total number of investors are in the Unit Trust of India (UTI). A new era in the mutual fund industry began with the entry of private sector funds in 1993, posing a serious competition to the existing public sector funds. The entry of foreign companies has upgraded the sophistication and service levels of the mutual fund industry in general; Exhibit 3.1 gives a partial list of schemes operating in India.

Exhibit 3.1 Mutual funds in India

<i>Name of AMC</i>	<i>Asset under management (Rs in crore) in Sep 2002</i>
UTI	44,255
Kotak Mahindra AMC	2,525
HDFC Asset Management	6,245
Birla Sun Life	4,885
Alliance Capital	3,646
Prudential ICICI	8,926
Templeton Asset Management	8,193
Zurich AMC	4,193

The ING Group

The ING group is a prominent player in the European market and one of the world's largest providers of diversified financial services, combining banking, insurance and asset management. The ING group resulted from the merger of NMB, a leading Dutch corporate and retail banking organization with Nationale Nederlanden, Holland's largest insurance company. ING asset management delivers schemes and solutions that are just right. The ING group has floated ING Investment Management Ltd, for the purpose of asset management.

As of 2002 the ING growth portfolio had Rs 80 crore. One of the important tasks of the fund manager is to construct a portfolio to maximize returns for a given level of risk or minimize risk for a given level of return. Broadly speaking, equity funds fall into four categories; in descending order of volatility, these are aggressive growth, long-term growth, growth and income, and equity income. Some funds concentrate exclusively on certain sectors (for example, software) while others on the basis of size (mid-market companies); some invest in fixed income securities alone; some in both equity and debt and so on. A fund manager can choose to invest in any stock listed on a stock exchange. But as a matter of policy ING invested only in Index stocks (i.e., stocks which comprise the Bombay Stock Exchange Sensitive Index). The closing prices of the Sensex stocks are presented in Exhibit 3.2 (see inside back cover). Which of these is a good bet? In other words, which stock has yielded the highest return? Which of them can be expected to do well?

Measuring Return

Suppose an investor purchased 100 shares of XYZ Industries at the rate of Rs 120 each, received dividends amounting to Rs 600 during the year, and then sold the shares at Rs 140 at the end of the year. The rate of return an investor receives from buying shares and holding them for a given period of time is equal to the cash dividends received plus the capital gain (or minus the capital loss) during the holding period divided by the purchase price of the security.

Expressed as a formula, realized return would be:

$$R = [D_1 + (P_1 - P_0)]/P_0 \quad (1)$$

where

D_1 = Dividend received,

P_1 = Selling price, and

P_0 = Purchase price.

The rate of return on XYZ investment = Rs 2600/12000 = 21.6 percent.

Now consider a multi-period situation. The investor has a 3-year investment horizon.

Purchase price = Rs 200
 Dividend receipts = Rs 5, Rs 6, and Rs 10 respectively.
 Selling price = Rs 225



One measure of return is the arithmetic average of returns in these three years.

$$R = [R_1 + R_2 + R_3]/3$$

where

R is the investment return and

R_1, R_2, R_3 are periodic returns.

Another measure is the geometric mean of returns.

$$R_g = [(1 + R_1)(1 + R_2)(1 + R_3)]^{1/3} - 1$$

In general, the geometric mean of returns

$$R_g = [(1 + R_1)(1 + R_2)(1 + R_3) \dots (1 + R^N)]^{1/N} - 1 \quad (2)$$

where N is the number of periods.

In the given example, the investor had a 3-year horizon. The holding period could be in months as well, say, January, February, and March. The principle remains the same except that the rate of return will have to be converted to an annual rate. Exhibit 3.3 presents the returns from all the Sensex stocks.

MEASURING PORTFOLIO RETURN

The return on a portfolio of stocks, as opposed to a single stock, could be written as:

$$R_p = [D_p + (V_1 - V_0)]/V_0 \quad (3)$$

where

R_p = Portfolio return,

D_p = Dividend receipts,

V_1 = Value of the portfolio at the end of the period, and

V_0 = Value of the portfolio at the beginning of the period.

To illustrate, if an investor were to purchase shares of RIL, Colgate Palmolive and Hindustan Lever Limited (HLL) @ Rs 10 lac, and sell them when the value of the portfolio is Rs 12 lac, the return on the portfolio (ignoring dividends) would be:

$$(12 - 10)/10 = 20 \text{ percent}$$

The above formulation is based on the assumption that the investor does not withdraw any portion of initial investment or inject fresh investment during the period or dividend receipts are not reinvested. If any of these occur, the formula may have to be modified suitably. The portfolio return in case of a multi-period situation may be written as:

$$V_0 = [D_1/(1+r)^1] + [D_2/(1+r)^2] + \dots + [(D_N + V_N)/(1+r)^N] \quad (4)$$

where

D_1 , D_2 , and D_N are dividend receipts, and

V_0 and V_1 are portfolio values at the beginning and end of the holding period.

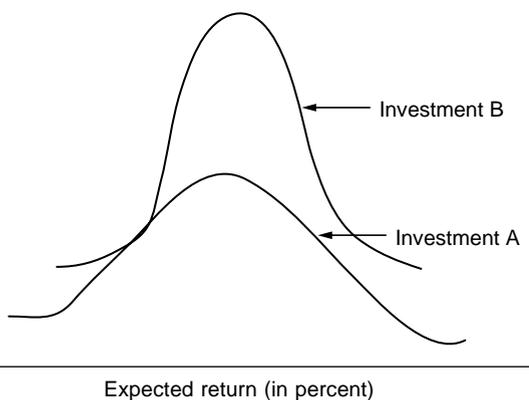
The rate r that equates cash inflows and cash outflows is the return on the portfolio. The concept is similar to the YTM of a bond.¹ The calculation is based on the assumption that dividend receipts are reinvested at r percent. Although the above example considers a stock portfolio, the concept can be extended to portfolios of other assets as well.

¹ YTM is the yield to maturity of a bond. It is the rate that equates periodic coupon receipts and principal repayments and the market price of the bond. YTM is explained later in the chapter on debt markets.

MEASURING RISK

Investors buy shares in anticipation of a particular return but the fluctuation in stock prices results in fluctuating returns. Therefore, shares are considered risky. As the returns from government securities like Treasury bills do not deviate from their expected returns, they are considered risk-free. Financial theory defines risk as the possibility that actual returns will deviate from expected returns. The degree of potential fluctuations determines the degree of risk. More specifically, the risk in holding a security is the variance in expected returns. The variance in returns measures the disparity between actual and expected returns. Modern finance theory hypothesizes that investors choose securities on the basis of expected return and standard deviation (square root of variance). So given a choice between two investments with the same expected return, the investor would choose the one with lower standard deviation (two such investments are shown in Exhibit 3.4). Investment B is preferable as its variance is lower.

Exhibit 3.4 Expected returns of two investments



The mean and standard deviation of returns of some Sensex stocks are presented in Exhibit 3.5. The past realized return is taken as a proxy for future expected returns. Obviously, the forecast will almost never be accurate. So we need a measure of upside potential and downside risk. The variance of returns is supposed to measure how uncertain our forecast is. It is the breadth of the distribution of returns. In short, an investor is supposed to think of future returns as a probability distribution. The variance of such a distribution is the measure of risk. But how do we get the variance of *future* returns? Look at the past.

Another measure of variability is the square root of the variance—the standard deviation. Note that the distribution of returns (Exhibit 3.3) is normal, i.e., the upside potential and downside risk are of the same magnitude. Returns from securities, in real life situations, may not be normal. To make life easy we assume normality.

Exhibit 3.5 Mean and standard deviation of returns

	Mean (monthly) return	Standard deviation
ACC	0.00361	0.13159
BSES	-0.00051	0.08815
Bajaj Auto	-0.00599	0.08600
BHEL	-0.00426	0.1327
Castrol	-0.00197	0.0875
Cipla	0.02508	0.11182

One good thing about normal distribution is that it can be described with only two parameters—mean and standard deviation. The latter captures both upside potential and downside risk. But the investor is considered with only the former. The downside risk is simply half the total variability. So measuring standard deviation serves our purpose. The annualized real returns on equities, bonds and bills in different countries are presented in Exhibit 3.6.

Exhibit 3.6 Annualized real returns on major asset categories worldwide, 1990–2000 (in percent)

Country	Equities	Bonds	Bills
Australia	7.5	1.1	0.4
Belgium	2.5	-0.4	-0.3
Canada	6.4	1.8	1.7
Denmark	4.6	2.5	2.8
France	3.8	-1.0	-3.3
Germany	3.6	-2.2	-0.6
Japan	4.5	-1.6	-2.0
The Netherlands	5.8	1.1	0.7
Spain	3.6	1.2	0.4
Sweden	7.6	2.4	2.0
UK	5.8	1.3	1.0
US	6.7	1.6	0.9

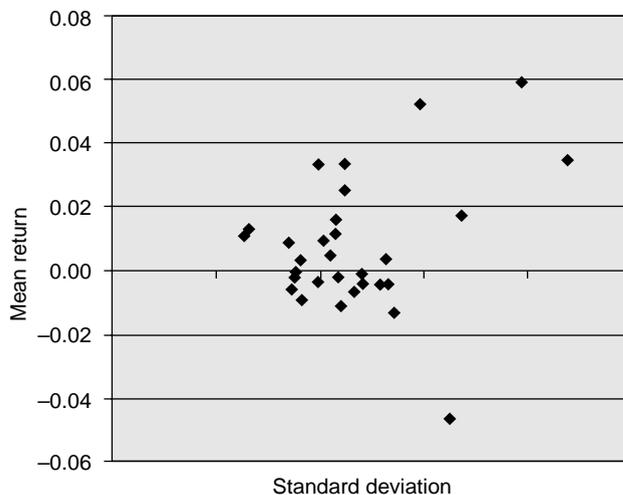
Source: Dimson et al. (2002).

Note: The equities have outperformed bonds and bills in virtually every country. Annual stock return in the US is 6.7 percent versus 1.6 percent for bonds and 0.9 percent for bills. That's not the end of the story. The standard deviation of annual stock returns is usually more than that for bonds or bills, which suggests that returns are in line with risk.

TYPES OF RISK

The above data suggests that the riskier the asset class, the greater the return. The argument is that investors are compensated with a risk premium for holding riskier securities. This relation does not hold true for the Sensex stocks. A scatter plot is displayed in Exhibit 3.7. This scatter plot does not indicate a positive relation

Exhibit 3.7 Risk and return of Sensex 30



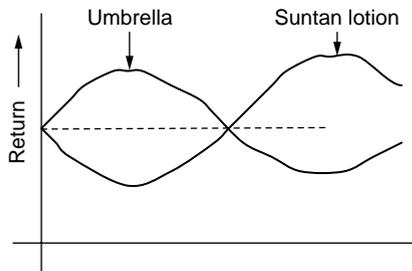
between the mean monthly return and standard deviation as would be suggested by the risk premium hypothesis. Some of the risk investors assume is specific to the individual stocks in their portfolio. For example, a company's earnings may come down due to a strike. On the other hand, because stock prices and returns move in tandem to some extent, even investors holding widely diversified portfolios are exposed to the risk inherent in the overall performance of the stock market. So the security's total risk can be divided into *unsystematic risk*, the portion specific to the company or a small group of assets, which can be diversified away, and *systematic risk*, the non-diversifiable portion that is related to the movement of the stock market.

$$\text{Total risk} = \text{Unsystematic risk} + \text{Systematic risk}$$

Examples of unsystematic risk factors are: a lower cost, foreign competitor unexpectedly enter a company's product market or labor unrest disrupting production in the company. Examples of systematic risk factors are: increase in long-term interest rates, RBI stepping up its restrictive monetary policy.

MEASURING PORTFOLIO RISK

The risk of a portfolio of securities is not the sum of variances of returns of individual securities. To demonstrate risk in a portfolio context, consider a primitive economy where there are only two firms—one makes umbrellas and the other, suntan lotion. Suppose the returns from these two stocks follow a cyclical pattern, as is illustrated here:



The return from holding shares of both companies is the weighted average of returns from the two stocks.

$$R_p = \sum_{i=1}^n X_i R_i \quad (5)$$

where

X_i = proportion of money invested in asset i , and
 R_i = expected return of asset i .

But the risk of the portfolio is not the sum of individual variances. It would be smaller than that of holding individual stocks. As illustrated, the investor is *assured* of return R (the horizontal dotted line) however volatile individual stocks may be. This happens because of negative correlation between the returns. The returns from stock exactly counterbalance the returns from the other stock. As the cliché goes, not putting all eggs in one basket reduces risk. But is it always so? A moment's reflection tells us that it is not true. When stock returns are perfectly positively correlated, losses can coincide. So diversification does not reduce risk in this case.

We established the fact that diversification reduces risk. But you need to know how. To illustrate risk in a portfolio context, consider two stocks: Bajaj Auto and Bombay Dyeing. Assume that the expected annual returns are 21.48 percent and 16.56 percent respectively. Suppose you invest 60 percent of your initial investment in Bajaj Auto and 40 percent in Bombay Dyeing:

$$\begin{aligned}\text{Expected portfolio return} &= (0.6 \times 21.48) + (0.4 \times 16.56) \\ &= 19.5 \text{ percent}\end{aligned}$$

The standard deviation of past returns is 18 percent and 27 percent respectively. The portfolio variance is *not* the weighted average of individual variances.

Portfolio variance:

$$\sigma_p^2 = X_1^2 \times \sigma_1^2 + X_2^2 \times \sigma_2^2 + 2X_1 \times X_2 \times \text{Cov}_{12} \quad (6)$$

where

- X_1 = Proportion of money invested in stock 1,
- X_2 = Proportion of money invested in stock 2,
- σ_1 = Standard deviation of returns from stock 1, and
- σ_2 = Standard deviation of returns from stock 2.

The portfolio standard deviation is the square root of equation (6). Note the third term in the equation. Covariance is a measure of the extent to which the two stocks covary. A positive covariance suggests that the returns (prices) move in the same direction and a negative covariance indicates that prices move in opposite direction most of the time.

$$\text{Cov}(1, 2) = \rho_{12} \times \sigma_1 \times \sigma_2$$

where ρ_{12} is the correlation coefficient, and the three situations suggest themselves.

Situation 1

The stock returns are perfectly positively correlated, i.e., ρ_{12} is 1.

$$\begin{aligned}\sigma_p^2 &= (0.6 \times 18)^2 + (0.4 \times 27)^2 + 2 \times 0.6 \times 0.4 \times 1 \times 18 \times 27 \\ &= 466.56 \\ \sigma_p &= 21.6 \text{ percent}\end{aligned}$$

Situation 2

ρ_{12} is -1

$$\sigma_p^2 = 116.64 + 116.64 - 233.28 = 0$$

Yes! The portfolio variance is 0. But it is unlikely that you'll find perfectly negatively correlated stocks in real life.

Situation 3

ρ_{12} is less than 1 (say 0.5)

$$\begin{aligned}\sigma_p^2 &= 349.92 \\ \sigma_p &= 18.7 \text{ percent}\end{aligned}$$

Negative or less than perfect correlation (covariance) reduces the risk of the portfolio, positive covariance does not.

We have arbitrarily chosen 60 percent and 40 percent as weights. Suppose we alter it to 50 percent and 50 percent. Let ρ_{12} be 0.3:

$$\begin{aligned}\sigma_p^2 &= (0.5 \times 18)^2 + (0.5 \times 27)^2 + 2 \times 0.5 \times 0.5 \times 0.3 \times 18 \times 27 \\ &= 336.15 \\ \sigma_p &= 18.3 \text{ percent} \\ E(R_p) &= (0.5 \times 21.48) + (0.5 \times 16.56) \\ &= 19.02 \text{ percent}\end{aligned}$$

We can construct a large number of portfolios with different weighting schemes. But is there one best portfolio that minimizes portfolio variance?

$$\begin{aligned}\sigma_p^2 &= X_1^2 \times \sigma_1^2 + X_2^2 \times \sigma_2^2 + 2X_1 \times X_2 \times \text{Cov}_{12} \\ &= X_1^2 \times \sigma_1^2 + (1 - X_1)^2 \times \sigma_2^2 + 2X_1 \times (1 - X_1) \times \rho_{12} \times \sigma_1 \times \sigma_2\end{aligned}$$

Differentiating the above equation with respect to X_1 and equating to zero:

$$\delta\sigma_p^2/\delta X_1 = 2X_1 \times \sigma_1^2 + (2 \times 1 - 2)\sigma_2^2 + 2\rho_{12} \times \sigma_1 \times \sigma_2 - 4 \times \rho_{12} \times \sigma_1 \times \sigma_2 = 0.$$

Solving for X_1 :

$$X_1 = [\sigma_2^2 - \rho_{12} \times \sigma_1 \times \sigma_2]/[\sigma_1^2 + \sigma_2^2 - 2\rho_{12} \times \sigma_1 \times \sigma_2]$$

where

$$\begin{aligned}\sigma_1 &= 18 \text{ percent,} \\ \sigma_2 &= 27 \text{ percent, and} \\ \rho_{12} &= 0.3.\end{aligned}$$

On substitution we get $X_1 = 76$ percent and $X_2 (= 1 - X_1) = 24$ percent.

An Illustration

Exhibit 3.8 presents the average portfolio (weekly) return and standard deviation for various compositions of the stocks of HLL and Colgate Palmolive. The correlation between the returns from the two stocks is 0.5. The portfolio variance is the least when 60.40 percent of the money is invested in HLL stock. The portfolio variance decreases at a faster rate than the portfolio return in line with our expectation.

	HLL	Colgate
Average weekly return (percent)	0.974	0.073
Standard deviation (percent)	4.012	4.463
Covariance	8.743	
Correlation coefficient	0.0493	

Three-asset and N asset portfolios

The variance of a three-asset portfolio can be written as:

$$\sigma_p^2 = X_1^2 \times \sigma_1^2 + X_2^2 \times \sigma_2^2 + X_3^2 \times \sigma_3^2 + 2X_1 \times X_2 \times \text{Cov}_{12} + 2X_2 \times X_3 \times \text{Cov}_{23} + 2X_1 \times X_3 \times \text{Cov}_{13}$$

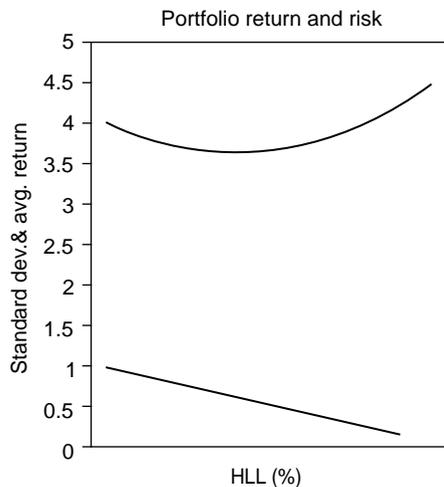
where X_i are weights; σ_i^2 are variances.

Similarly, for an N asset portfolio:

$$\sigma_p^2 = \sum \sum X_i X_j \sigma_i \sigma_j \sigma_{ij}$$

There are gains from diversification. But how large should the portfolio be? In other words, how many stocks should an investor hold before marginal costs exceed marginal benefits of diversification? As the number of assets in the portfolio increases, the variance of the portfolio approaches the covariance or the average systematic risk of the stocks, i.e., unsystematic risk is diversified away. The marginal benefits from

Exhibit 3.8 Portfolio return and risk



diversification diminish beyond a certain limit. Most textbooks conclude that 10–12 stocks are adequate to reap the benefits of diversification. The marginal costs (like transaction and information costs) offset the gains from diversification thereafter. More recently, Statman (1987)² proves that for a borrowing investor at least 30 stocks are required and for a lending investor at least 40 stocks are required. When one plots the distribution of historical returns of a diversified portfolio (of, say, 100 stocks) and compares it with the distribution of returns of a single security, one finds that the standard deviation of returns of a single stock is much more than that of the portfolio; yet the average return of the stock is lower than that of the portfolio. What does this imply? Does the market not reward the higher riskiness of a stock with higher returns? The answer lies in the benefits of diversification.

HLL	Colgate	Standard deviation (percent)	Portfolio return (percent)
100 percent	0 percent	4.012	0.974
90	10	3.848	0.884
80	20	3.728	0.794
70	30	3.654	0.704
60	40	3.63	0.614
50	50	3.657	0.524
40	60	3.734	0.433
30	70	3.857	0.343
20	80	4.023	0.253
10	90	4.227	0.163
0	100	4.463	0.073

Realized returns will be more in line with *systematic* risk rather than *total* risk. Wagner and Lau (1971) divided 200 New York Stock Exchange (NYSE) stocks into six subgroups based on Standard & Poor stock quality rating (from highest to lowest); randomly selected portfolios from each of the subgroups containing from 1–20 stocks. Exhibit 3.9 presents the average monthly returns and standard deviation for the first subgroup. It can be seen that although average return is unrelated to the number of stocks in the portfolio, the standard deviation declines as the number of stocks increases. Almost 40 percent of risk can be eliminated by holding 20 stocks.

Exhibit 3.9 Effect of diversification on risk

No. of stocks	Avg. monthly return	S.D. per month (percent)
1	0.88	7.0
2	0.69	5.0
3	0.74	4.8
4	0.65	4.6
5	0.71	4.6
10	0.68	4.2
15	0.69	4.0
20	0.67	3.9

² Statman, Meir (1987). ‘How Many Stocks Make a Diversified Portfolio?’, *Journal of Financial and Quantitative Analysis*, Vol. 22, No. 3.

RISK AND RETURN: THE INTERNATIONAL EVIDENCE

Financial markets around the world can be broadly classified as developed or emerging. Emerging markets typically yield higher returns, but their standard deviation is higher as well. Exhibit 3.10 presents the mean returns and standard deviation of returns around the world. International investors have the option of investing in securities from around the world. A major argument for investing internationally is that it increases profit opportunities while providing risk diversification. Just as investors can diversify away unsystematic risk by holding a portfolio of stocks, they may also benefit from international diversification. As long as there are benefits from international diversification, a portion of what seems to be systematic risk in a domestic context may be diversifiable country risk at a global level. If markets are completely integrated there would be no benefit from international diversification. Although the tendency of markets to move together has increased in the recent years, the correlation is still less than 1 (Exhibit 3.11). So there are still opportunities to reduce risk. In other words, portfolios may be formed out of stocks from many countries to reduce risk further. As an assignment construct an equal value weighted portfolio of Japan and Germany.

Markowitz Model

Modern portfolio theory is based on the premise that an investor chooses from all possible investments on the basis of expected portfolio return and portfolio variance. If an investor is rational, s/he will choose that investment which provides the highest return for a given level of risk or the least risky investment for a given level of return. Thus, these *efficient* portfolios dominate other combinations. The curved line that connects all the efficient portfolios is called efficient frontier. Exhibit 3.12 depicts an efficient frontier.

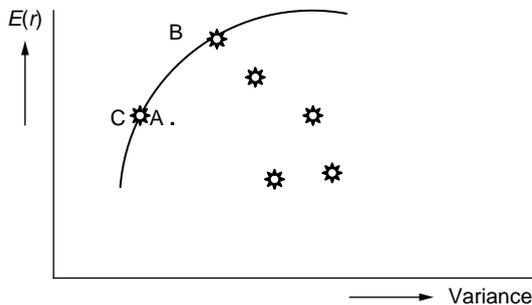
Exhibit 3.10 Characteristics of emerging and developed markets

Country	Market cap \$ m Sep 1995	Standard deviation (percent)	Mean return annualized (percent)
Emerging markets			
Argentina	18,783	93.1	42.0
Brazil	106,821	64	33.1
Colombia	9,079	31.4	39.7
India	66,772	29.5	17.4
Indonesia	26,995	30.8	3.3
Mexico	65,585	46.5	20.8
The Philippines	32,829	37.4	42.9
Developed markets			
Australia	137,352	26.6	15.1
Canada	193,156	19.6	9.7
Germany	344,087	22.4	14.1
Japan	2,050,510	25.1	17.8
Switzerland	285,171	19.2	14.2
UK	842,965	21.5	16.4
US	3,540,304	15.0	14.8

Source: Erb et al. (1996).

Exhibit 3.11 Global correlations

US/UK	0.67
Canada/Switzerland	0.59
Japan/Germany	0.34
Italy/France	0.69
India/Singapore	-0.18
Sweden/South Africa	0.35
Finland/Denmark	0.34

Exhibit 3.12 Efficient frontier

Investment B is superior to A as it offers higher return for the same level of risk. Similarly, Investment C is superior to A as it offers the same return for lower level of risk. But how does an investor choose among the efficient portfolios? That depends on the risk-taking ability of the investor.

To calculate the variance of a two-stock portfolio we need individual variances and correlation between the stock returns. As the number of assets in the portfolio increases, the number of inputs increases considerably. For a N asset portfolio we would need $N(N-1)/2$ correlation estimates. This is the drawback of the Markowitz model.

THE CAPITAL ASSET PRICING MODEL

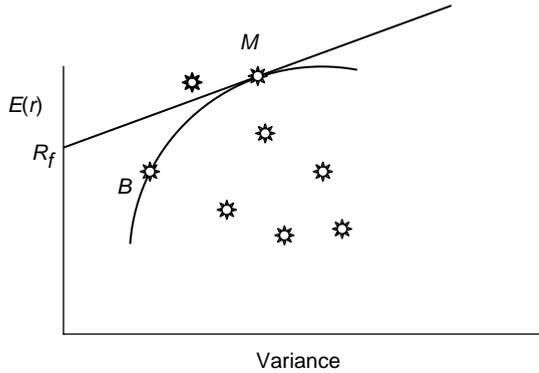
The Capital Asset Pricing Model is an extension of the Markowitz Portfolio theory. The Markowitz technique involves too many calculations. The CAPM, on the other hand, tries to correlate the returns from the stock with a market index rather than with other stocks. For instance, for a portfolio of 30 stocks, we would have calculated 30 SDs and $30 * 29/2$ correlations under the Markowitz technique but only 30 SDs and 30 correlations with the market under the latter technique. Both the methods help delineate efficient portfolios. The beauty is that both give the same results.

Introducing Riskless Lending

Suppose an investor has identified an efficient portfolio. Let us call it M . Further the investor has the opportunity to invest in a risk-free asset. S/he can choose to invest in M or in the risk-free asset or in some combination. We can think of investing in a risk-free asset as lending at risk-free rate (buying government

securities). So the investor can take any position on the line $R_f - M$ (Exhibit 3.13). Note that the line is tangential to the efficient frontier meaning that the portfolio M gives the highest return per unit of risk.

Exhibit 3.13 Capital market line



All the points on the line R_fM are combinations of investment in a risk-free asset and M . You might be wondering how or why this risk-free asset is significant. Going back to the case of the two-stock portfolio:

$$\sigma_p^2 = X_1^2 * \sigma_1^2 + X_2^2 * \sigma_2^2 + 2X_1 * X_2 * \text{Cov}_{12} \quad (7)$$

where

- X_1 = Proportion of money invested in risk-free asset,
- X_2 = Proportion of money invested in portfolio M ,
- σ_1 = Standard deviation of returns from risk-free asset, and
- σ_2 = Standard deviation of returns from M .

By definition, the variance of returns from a riskless asset is 0, and the returns do not covary with the returns from other assets. So the first and the last terms become 0:

$$\begin{aligned} \sigma_p^2 &= X_2^2 \times \sigma_2^2 \\ &= (1 - X_1)^2 \times \sigma_2^2 \end{aligned}$$

As is evident, by investing partly in a risk-free asset, the investor can reduce the risk further. Given a chance to invest in a riskless asset, an investor would always hold a combination of R_f and M and not an efficient portfolio alone. The combinations yield higher returns for the same level of risk (Exhibit 3.13). In short, the efficient frontier has been transformed into a straight line.

What could be the *composition* of M ? If the investor has superior information vis-à-vis other investors in the market, then M is that portfolio which offers superior returns for its risk level (that is, the portfolio is undervalued). Otherwise, it is that portfolio which any other investor can hold. The logical limit is to include all risky assets in the economy. The portfolio of all risky assets is called the market portfolio. Since the market portfolio is unobservable, a market index such as the BSE 30 index is taken as a proxy. The line joining R_f and M is called Capital Market Line.

Deriving the Capital Market Line

The expected return of a portfolio consisting of the risk-free asset and M :

$$R_p = X_1 R_f + X_2 E(R_M) \quad (8)$$

That is

$$\begin{aligned} R_p &= (1 - X_2)R_f + X_2 E(R_M) \\ &= R_f + X_2[E(R_M) - R_f] \end{aligned} \quad (9)$$

We know that

Or,
i.e.,

$$\begin{aligned} \sigma_p^2 &= X_2^2 * \sigma_M^2 \\ \sigma_p &= X_2 \times \sigma_M \\ X_2 &= \sigma_p / \sigma_M \end{aligned}$$

Inserting these values in equation (9):

$$= R_f + \sigma_p / \sigma_M [E(R_M) - R_f]$$

This is the equation for the CML. The slope of the line is given by:

$$[E(R_M) - R_f] / \sigma_M$$

This is the market risk premium. Earlier, it was pointed out that the total risk consists of two components: systematic and unsystematic risk. Unsystematic risk can be diversified away by holding a portfolio of securities; what remains is the systematic risk. As well-diversified investors are exposed to only systematic risk, the relevant risk in a Capital Asset Pricing Model (CAPM) universe is the systematic risk. Beta (β) is the standard measure of systematic risk. It measures the tendency of the returns of a security to move in line with the stock market as a whole. Beta gauges the sensitivity of security returns vis-à-vis market returns. A stock with a beta of 1.0 rises and falls at the same percentage as the market. Stocks with a beta greater than 1.0 (aggressive stocks) tend to rise and fall by a greater percentage than the market. That is they are very sensitive to market swings. Stocks with beta less than 1.0 (defensive stocks) are less sensitive to market swings. The market, by definition, has a beta of 1.0.

$$\text{Beta} = [\text{Cov } R_j, R_m] / \sigma_M^2$$

Estimates of beta for the Sensex stocks are presented in Exhibit 3.14.

Security Market Line

The CAPM establishes the relationship between risk and expected return. In a CAPM world, securities are priced such that

Exhibit 3.14 Beta estimates for some Sensex stocks

Company	Beta
ACC	1.31
BSES	0.69

Exhibit 3.14 contd.

Exhibit 3.14 contd.

Company	Beta
Bajaj Auto	0.47
BHEL	1.28
Castrol	0.64
Cipla	0.64

$$R_j = R_f + \text{Risk premium}$$

$$R_j = R_f + \beta[E(R_M - R_f)]$$

This relationship between risk and expected return is called the Security Market Line. The risk premium of a security is a function of the risk premium on the market, $R_M - R_f$, and varies directly with beta. The higher the beta, the higher the expected return.

$$\text{Expected return} = E(R) = R_f + \text{Amount of risk} \times \text{Market price of risk}$$

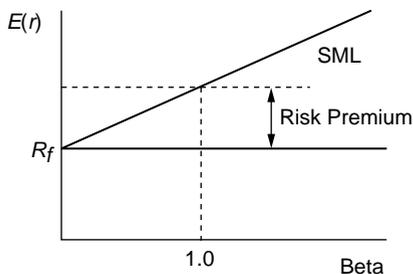
In a financial market described by CAPM no security can sell for long at prices low enough to yield more than its appropriate return on the SML. The security would then be very attractive compared with other securities of similar risk and investors would bid its price up until its expected return falls to the appropriate position on the SML. Conversely, investors could sell off any stock selling at a price high enough to put its expected return below its appropriate return.

To reiterate, security return can be divided into components: one dependent, and the other independent of market return.

$$\text{Security return} = \text{Systematic return} + \text{Unsystematic return}$$

Systematic return can be measured by multiplying market return and beta of the stock.

Security Market Line



The CAPM is based on certain assumptions:

- Investors make choices on the basis of risk (i.e., variance) and return.
- Investors have homogeneous expectations of risk and return.
- Investors have identical time horizons.
- Information is freely available to investors.
- There is a risk-free asset and investors can borrow and lend at risk-free rate.
- There are no taxes or transaction costs.

DO INDIVIDUAL INVESTORS HOLD DIVERSIFIED PORTFOLIOS?

Studies conducted in America indicate that a typical investor's stock portfolio contains only a small fraction of the available securities and the number of stocks in a portfolio range from 9 to 12. Why do investors forgo the benefits of diversification? Is it because they don't know the benefits of diversification? What does under-diversification imply for pricing of risky financial assets? Some academicians observe that due to under-diversification even unsystematic risk may be priced in markets. Investors might not hold diversified portfolios; it's enough if they price securities as though they are diversified. This reinforces CAPM.

Is There a Risk-free Asset?

Investors hold assets in anticipation of returns from them. The actual return may deviate from the expected return. The variance in actual return from the expected is the risk in holding that asset. For an asset to be risk-free the actual return from the asset should always equal the expected return. For instance, an investor may buy a T-bond that promises to pay 12 percent. Since sovereign governments are usually free of default risk, the actual return will be 12 percent. For an asset to be classified as risk-free, the first qualification is that it should be free of default risk. Even the highest rated companies will have some default risk in them. This precludes them from being classified as risk-free. The second qualification is that the asset should not have any reinvestment risk. Reinvestment risk arises from reinvesting coupon payments at rates below that prevailing at the time of buying. To illustrate, if interest rates decline from 10 to 8 percent after buying, the investor can reinvest coupon payments only at 8 percent. So he will not realize the YTM promised at the time of issue. For this reason even treasury securities cannot be considered risk-free.

Some Observations on Risk Premium

The risk premium, $R_m - R_f$, is usually estimated by looking at the historical premium earned by stocks over government bonds over long periods (over 60 years in the case of the US). In India, however, due to non-availability of data, 18 year period is used.³ The historical risk premium is used as proxy for future (Exhibit 3.15 presents the risk premium for countries around the world).

Exhibit 3.15 Risk premia for select countries

Country	Annual equity return (percent)	Bond return (percent)	Risk premium (percent)
Australia	8.47	6.99	1.48
Canada	8.98	8.30	0.68
France	1.51	9.17	2.34
Germany	11.30	12.10	-0.8
Italy	5.49	7.84	-2.35
Japan	15.73	12.69	3.04
Singapore	15.48	6.45	9.03
Hong Kong	20.39	12.66	7.73
Switzerland	13.49	10.11	3.38
UK	12.42	7.81	4.61

³ As on the date of the book.

Some countries have low and some countries have negative risk premium. What factors affect risk premium? Why are risk premia so high in some countries? Can we expect future premia to be high as well? Can we predict short term (say, one month) and long term (say, 30 years) of equity premia?

Several factors (such as the following) might affect risk premium.

Extent of Globalization

Due to increasing globalization of companies, the reliance on any one nation is decreasing leading to reduced sensitivity of economies and hence systematic risk. The flip side is that, due to increasing mobility of capital across national boundaries stock markets are increasingly getting integrated. Due to integration of capital markets, volatility in one market gets propagated to other countries as demonstrated in the Asian financial crisis.

Market Sophistication

Individuals now invest in stock markets through professional investors like mutual funds. Fund managers, as informed investors, are better equipped to assess and manage risk. Consequently, stock market volatility in sophisticated markets is usually lower than underdeveloped capital markets.

Shareholder Activism

The pressure on managers to increase shareholder value is increasing. One way to increase value is to reduce systematic risk.

State of the Stock Market

Larger stock markets such as the US market are more liquid, less volatile and hence less risky. The less developed markets like Latin American markets are more volatile and risky.

Riskiness of Stocks Relative to Bonds

Over time the risk of investing in stocks may decrease while the risk of investing in bonds may increase thereby reducing risk premium. Since equity premia occupies an important place in modern finance theory, academicians are struggling to devise a method to estimate future premia.⁴ Academic studies indicate that a simple regression predicting equity premia one year ahead with dividend yields works quite well.

DOES THE CAPM WORK?

The Capital Asset Pricing Model implies that each security's expected return is linear in its beta. A possible strategy for testing the model is to collect securities' beta at a particular point in time and to see if these betas can explain the cross sectional differences in average returns. Consider the following cross sectional regression.

⁴ Campbell, John and Robert Shiller (1988). 'The Dividend-Price Ratio and Expectations of Future Dividends and Discount Factors', *Review of Financial Studies*, Vol. 3; Fama, Eugene and Kenneth French (1988). 'Dividend Yields and Expected Stock Returns', *Journal of Financial Economics*, Vol. 22, No. 1.

$$R - R_f = \gamma_0 + \gamma_1 \beta + \epsilon$$

In this regression, R represents the returns of many securities at a particular cross section of time and beta represents the betas of many firms. According to the CAPM, γ_0 should be equal to zero and γ_1 should equal the expected excess return on the market portfolio. The earliest tests of the CAPM were carried out by Black et al. (1972) and Fama and MacBeth (1973). Both of these tests were cross sectional tests. To test the theory, B-J-S created portfolios on the basis of beta (high to low). A cross sectional regression was run to see if the betas were able to explain the differences in the returns across securities.

$$R - R_f = \gamma_0 + \gamma_1 \beta + \epsilon$$

The results were:

$$R - R_f = 0.0036 + 0.0108\beta$$

[6.53] [20.77]

The t -statistics are in parenthesis. The CAPM suggests that $\gamma_0 = 0$ and $\gamma_1 > 0$ (and is equal to the expected market return less the risk-free rate). The regression evidence does not support this.

Gupta and Sehgal (1993)⁵ conducted one such study in India for the period April 1979–March 1989, using monthly returns of 30 stocks included in the Bombay Stock Exchange Index (Sensex). They found that the model seems to perform well in explaining returns on the BSE for the period 1979–86. Interestingly, the relationship between risk and return is not linear as suggested by CAPM. They conclude that the model may not be rejected on the basis of their findings as the time period studied was limited and the number of stocks sampled was small. Another recent study suggests that there is a significant relationship between quarterly portfolio returns and beta.

Criticisms of CAPM

The CAPM is based on certain restrictive assumptions such as investors can borrow and lend at risk-free rate, etc. Clearly, some of these assumptions are unrealistic. It is not the assumptions that one should question but the predictive ability of the model. In a CAPM universe, high beta portfolios are supposed to yield high returns and low beta portfolios should yield low returns. But empirical evidence does not support this hypothesis, at least for the time period chosen by some researchers. A number of studies have found that betas of stocks do not adequately explain cross sectional differences in stock returns. Instead, other variables with no presence in current asset pricing models seem to have a more significant predictive ability than beta. The most prominent is the size effect noticed by Banz (1981). He finds that market equity adds to the explanation of the cross section of average returns provided by β s. Average returns on small cap stocks are too high given their beta estimates and average returns on large stocks are too low. Another contradiction is the positive relation between leverage and average return. Fama and French (1992) argue that a multi-dimensional model of risk and return is necessary to explain differences in stock returns. Their model incorporates company size (as measured by market capitalization), the ratio of book to market value (B.V. of equity divided by market capitalization).

⁵ Gupta, O P and Sanjay Sehgal (1983). 'An Empirical Investigation of Capital Asset Pricing Model in India', *Finance India*, Vol. 7, No. 4.

The Fama–French Three Factor Model is estimated by running a time series multiple regression for each company. The dependent variable is the company’s monthly excess stock returns over Treasury bill returns. The independent variables are as follows:

- The monthly excess return on the market over Treasury bills.
- SMB (‘small minus big’)—the difference between the monthly return on small-cap stocks and large-cap stocks.
- HML (‘high minus low’)—the difference between monthly returns on high book-to-market stocks and low book-to-market stocks.

In the Fama–French (FF) model, beta measures the sensitivity of a stock to movements in the market.

The *SMB premium* represents the return premium that companies with small market capitalization usually experience relative to companies with large capitalization. It is computed by multiplying the coefficient for the SMB factor in the multiple regression by the difference between the historical average annual returns on the small-cap and large-cap portfolios.

The *HML premium* represents the return that investors expect from companies that have a high book equity to market equity ratio. The Fama–French model predicts that a company with a high book equity-to-market equity ratio has an excess return that is not captured in the market return. The number presented is the coefficient for the HML factor multiplied by the difference between the historical average annual returns on the high market-to-book and low market-to-book portfolios.

The beta provided by the Fama–French model is similar to the beta provided by the capital asset pricing model; it is a measure of the risk of a stock relative to the market. By multiplying the Fama–French beta by the equity risk premium, and adding the HML and SMB premiums and the risk-free rate, the expected return for a company is obtained.

For the HML and SMB factors, the regression coefficients have been multiplied by the premium for each of the factors. The data presented is the percent premium over the market return which each stock receives because of the small company premium and the value premium. An example is in order.

FF beta = 0.70, SMB premium = 2.53 percent, HML premium = 4.17 percent

Expected return = Risk-free rate + (Equity risk premium × FF beta) + SMB premium + HML premium

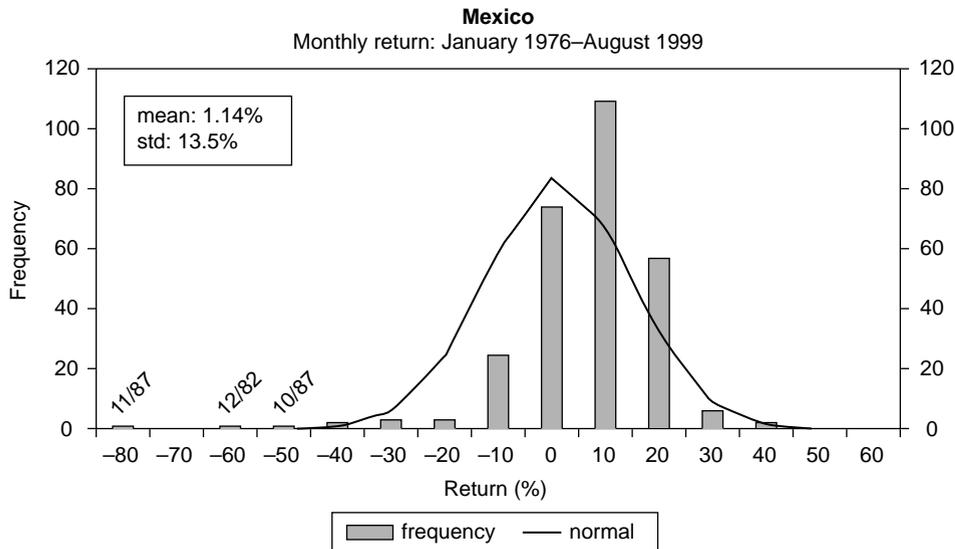
The expected return for the company assuming a risk-free rate of 5.9 percent and a risk premium of 7.8 percent is:

$$5.9 \text{ percent} + (7.8 \times 0.70) \text{ percent} + 2.53 \text{ percent} + 4.17 \text{ percent} = 18.06 \text{ percent}$$

The Case of Emerging Markets

The risk-return analysis presented so far is appropriate if the portfolio returns can be completely characterized by the mean and standard deviation. A large number of studies have shown that emerging market returns are non-normal and hence cannot be described by mean and variance.⁶ Exhibit 3.16 presents an example of Mexico. There are many small returns and a large number of negative returns in the case of Mexico. If the Mexican returns were generated from a normal distribution, we would not expect so many negative returns of the magnitude shown in the graph. Thailand is similar to Mexico with some extreme negative observations.

⁶ Erb, Claude B, Campbell Harvey, and Tadas Viskanta (1996). ‘Expected Returns and Volatility in 135 Countries’, *The Journal of Portfolio Management*, Vol. 21, No. 2.

Exhibit 3.16 Monthly returns—Mexico

The same is true of many other countries. Emerging market returns are not only higher than returns from developed markets but also far more volatile due to economic shocks, military coups and many such factors. In addition, the mean and variance of returns change over time. One recent study of emerging market returns suggests that there is no relation between expected returns and beta measured with respect to the world market portfolio.⁷ Further, according to CAPM, expected return is a function of beta. The beta is measured by analyzing the way the equity returns covary with a benchmark return. In many countries beta cannot be estimated because the equity market does not exist! One solution to this problem is to establish a relationship between expected returns and, say, country credit ratings.

ARBITRAGE PRICING THEORY

CAPM is based on the concept of diversification. By holding sufficient number of stocks an investor can diversify company specific risk. Even if the investor were to hold all stocks in the market, s/he will still be exposed to market risk. The Arbitrage Pricing Theory, APT, a competitor to CAPM, suggests that a small number of systematic factors affect the long term returns of securities and the beta alone does not explain differences in security returns. Consider two portfolios: one comprising stocks of financial services companies and the other, of food products companies. Would you expect both the portfolios to react in the same manner to rising interest rates and inflation? Obviously not. Financial services companies are more sensitive to increase in interest rates. The betas of the portfolios may be the same but investors may not expect the

⁷ Harvey, Campbell R (1995). 'Predictable Risk and Returns in Emerging Markets', *Review of Financial Studies*, Vol. 8. He found that the regression of average returns on average betas produces an R^2 of zero.

average returns from these portfolios to be the same due to their differential sensitivity to macroeconomic factors. The APT tries to capture these significant factors. The trick is to incorporate multiple sources of economic risk by having more than one beta. Each beta (called factor beta) measures the sensitivity of the stock to the corresponding factor. The APT model does not tell us what those factors are. It assumes that the investor knows which systematic factors affect stock returns.

The investors can construct his/her model, unlike in CAPM where the beta is thrust upon us. The APT model can be written as:

$$\text{Expected return} = \text{Risk-free rate} + [(\text{sensitivity to factor 1}) \times (\text{risk premium on factor 1})] + [(\text{sensitivity to factor 2}) \times (\text{risk premium on factor 2})] + \dots$$

$$E(R) = R_f + \beta_1[E(R_{M1}) - R_f] + \beta_2[E(R_{M2}) - R_f] + \dots$$

If the stock market index is the sole factor explaining security returns, we would get back to our CAPM. Studies in America have shown that about 5–6 factors affect US stock prices. One important study by Chen, Roll and Ross (1980) suggests that growth in industrial production, unexpected changes in the term structure of interest rates, spreads between high and low grade bond portfolio returns and unexpected inflation determine security returns.

Assume that a portfolio's returns are dependent on two factors—say, industrial production and inflation. Any unexpected change in the industrial production from the current levels would change the expected returns in the same direction, while changes in inflation from current levels would change expected returns in the *opposite* direction. Assume that there are four stocks whose returns and sensitivities are as follows:⁸

Stock	Expected return (percent)	Prod. sensitivity	Inflation sensitivity
1	13	0.2	2.0
2	27	3.0	0.2
3	16	1.0	1.0
4	20	2.0	2.0

This is not possible because one can buy the first two stocks and short sell the remaining stocks (so investment is zero) and still generate a positive return. This cannot happen in competitive markets. To construct an arbitrage portfolio the following equations must be satisfied:

1. $INV\ 1 + INV\ 2 + INV\ 3 + INV\ 4 = 0$, i.e., no investment.
2. $INV\ 1 [Sensit\ (P)\ 1] + INV\ 2 [Sensit\ (P)\ 2] + INV\ 3 [Sensit\ (P)\ 3] + INV\ 4 [Sensit\ (P)\ 4] = 0$, i.e., no production risk.
3. $INV\ 1 [Sensit\ (I)\ 1] + INV\ 2 [Sensit\ (I)\ 2] + INV\ 3 [Sensit\ (I)\ 3] + INV\ 4 [Sensit\ (I)\ 4] = 0$, i.e., no Inflation risk.

⁸ Bower et al. (1992).

Set the level of investment in Stock 1 at Re 1 and solve for the rest.

$$\begin{aligned} \text{INV 1} &= \text{Re } 1 \\ \text{INV 2} &= \text{Re } 0.624857 \\ \text{INV 3} &= \text{Re } -1.157143 \\ \text{INV 4} &= \text{Re } -0.485714 \end{aligned}$$

The arbitrage portfolio would be:

<i>Stock</i>	<i>INV</i>	<i>Expected return INV * expret</i>	<i>Prod. sens INV * sensit (P)</i>	<i>Infl. sens INV * sensit (I)</i>
1	1.0	13.0	0.20	2.0
2	0.643	17.361	1.929	0.129
3	-1.157	-18.512	-1.157	-1.157
4	-0.486	-9.720	-0.972	-0.972
	0	2.129	0	0

The activity of buying the first two stocks will drive up their prices and bring their returns in line with their sensitivities. Similarly short-selling the remaining will drive down their prices. In other words, arbitrage will bring returns of stocks to their equilibrium levels. The factors that affect security returns themselves are identified through factor analysis.

WHAT ABOUT BONDS?

Although the Capital Asset Pricing Model is used to estimate expected return from stocks, it is supposed to be applicable to any asset. What about bonds? Would the CAPM explain the cross section of bond returns? Gebhardt et al. (2001) find that both bond market factors like default risk beta and term risk beta and bond characteristics like bond rating and duration largely explain the variation in the cross section of bond returns.⁹ One source of risk for corporate bonds arises from unexpected changes in the term structure of interest rates. The other source of risk arises from changes in default risk in response to changing economic conditions. They take the difference between the monthly return on a portfolio of long term government bonds and 1 month T-bill return as proxy for term risk and the difference between the monthly return on a value weighted market portfolio of all investment grade bonds with at least ten years to maturity and the monthly return on long term government bonds as proxy for the default risk. To estimate default and term betas they run the following two-factor regression:

$$r_{it} - r_{ft} = \alpha + \beta_d \text{DEF}_t + \beta_t \text{TERM}_t + u_t$$

where

$r_{it} - r_{ft}$ = excess return on corporate bonds,
 DEF_t and TERM_t are default risk and term risk factors, and
 β_d and β_t are factor loadings (beta) for the two risk factors.

⁹ Some of these concepts are discussed in the chapter on debt markets.

Their model also captures firm specific default risk. They use bond ratings, Altman's Z score and duration to measure default risk and maturity risk. Credit risk refers to the chance that the expectation will not be met. One approach to estimating default risk is to compute a composite risk measure based on a firm's financial ratios advocated by Altman (1968).¹⁰ His Z -score model combines select financial ratios to arrive at a score as follows:

$$\begin{aligned} Z = & 0.012 \times \text{Net working capital/Total assets} \\ & + 0.014 \times \text{Retained earnings/Total assets} \\ & + 0.033 \times \text{EBIT/Total assets} \\ & + 0.006 \times \text{Market value of equity/Book value of liabilities} \\ & + 0.999 \times \text{Sales/Total assets} \end{aligned}$$

A high Z score represents a low probability of default and a low Z score represents a high probability of default. The model's classification accuracy was 95 percent one year before bankruptcy and 72 percent two years before. Accuracy of the model decreases as the time period is extended (it may also be unreliable in its predictive ability). Based on the study, it was concluded that firms with a Z score less than 1.81 are all bankrupt, while those with Z scores greater than 2.99 fall into the non-bankrupt group. Those falling into the area between 1.81 and 2.99 require more analysis to determine their solvency status. The non-liquid asset ratios like total debt to total assets and cash flow to total debt are, in general, better predictors of bankruptcy than the liquid assets ratios like quick ratio or net working capital to total assets.

In sum, a model containing default beta, term beta, ratings and duration could be used to calculate cost of debt.

BACK TO ING

What should ING do? I mean how should the fund manager choose stocks? That depends not only on the returns from a stock but also its *systematic* risk. That is, the risk it adds to the portfolio. If the fund manager wants to construct an aggressive portfolio, a portfolio that is more volatile than the market as a whole, he may choose high beta stocks. Such a portfolio would do well in a bull market. If the manager is not interested in active management, he may simply replicate the index and sit tight. His portfolio will do as well or as bad as the index.

The fund manager would also want to measure the performance of a stock. To do the same he will have to compare the stock's performance with what is expected out of it. Assume that a stock's one-year return is 12 percent. Is this good or bad? We can answer this question only by comparing with the return on a benchmark index. Assume that the stock has a beta of 1.2 and the index return for the same period is 10 percent. Although the raw return is more than that from the index, the beta adjusted return ($1.2 \times \text{index return}$) exactly equals the index return. In other words, the stock did as well as the index.

Another measure of security performance is the Jensen's Alpha. The standard procedure for estimating beta is to regress stock returns against market returns.

$$R_j = a + bR_m \quad (\text{A})$$

¹⁰ Financial ratios and bankruptcy prediction is discussed in greater detail in the chapter on Financial Statements.

where

a = intercept from the regression, and

b = slope = beta of the stock.

The intercept of the regression provides a simple measure of performance during the period of the regression relative to CAPM.

$$\begin{aligned}R_j &= R_f + \beta(R_M - R_f) \\ &= R_f(1 - \beta) + \beta R_m\end{aligned}\tag{B}$$

Thus, a comparison of the intercept (a) to $R_f(1 - \beta)$ provides a measure of performance relative to CAPM (Jensen's Alpha).

If $a > R_f(1 - \beta)$, stock did better than expected during the period

$a = R_f(1 - \beta)$, stock did as well as expected

$a < R_f(1 - \beta)$, stock did worse than expected.

Jensen's alpha, thus, measures the difference between the actual returns on an asset and the return expected from it during the period.

IN CONCLUSION

The CAPM is a forward-looking model although past returns and betas are taken as proxies for future. It is supposed to give us *expected* return. In this chapter different asset pricing theories were outlined. The simple CAPM is intuitive and easy to use. But it might not be the best. An analyst has the liberty to construct his/her framework for establishing relationship between risk and return. A riskless asset is one whose actual return equals expected return, i.e., variance is zero. Its covariance, by definition, with other assets is also zero. No asset is truly risk-free in reality. Since government securities are default risk-free, we take the T-Bond rate as proxy for risk-free rate. Variance is a measure of total risk. Total risk can be split into two components—systematic risk and unsystematic risk. The portion of risk which cannot be diversified is called systematic risk or non diversifiable risk and that which can be diversified is called unsystematic risk.

The portfolio of all risky assets in the economy is called market portfolio. The systematic risk of an asset is the risk it adds to the market portfolio. Beta is the standard measure of systematic risk. It measures the sensitivity of stock returns to changes in market returns. Since the market portfolio is unobservable, a broad stock market index such as the BSE Sensex is used as a proxy. By definition, the beta of the market is 1.0. Stocks with betas greater than 1 are considered aggressive; those with betas less than 1.0 are considered defensive.

The risk of a well-diversified portfolio mainly reflects the market risk of individual securities because the unsystematic risk is diversified. Portfolio beta is simply the weighted average of individual stock betas.

Investing partly in a risk-free asset reduces risk for the same level of return as demonstrated by the Capital Market Line.

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EXERCISE

1. Refer to the following data:

	<i>ACC</i>	<i>Indian Hotels</i>
Mean weekly returns	0.52	0.08
Standard deviation	6.98	3.78

If the correlation coefficient = 0.31 and covariance = 8.30, calculate portfolio return and standard deviation for various compositions and plot a graph. Identify the minimum risk portfolio.

- Calculate the expected return for a stock whose beta is 0.8. The T-Bond rate is 12 percent. The monthly return on the market index is 1.7 percent.
- You are holding stocks of Ashok Leyland, TELCO, and Grasim. Their individual betas are 0.8, 0.96, and 0.81 respectively. Assuming equal investment, calculate the portfolio beta.
- List five stocks that you think are highly correlated.
- What factors do you think will affect the beta of a stock? Why do different stocks have different betas?
- Suppose that the government defaults on sovereign borrowings. So T-Bond rate cannot be considered risk-free. How would you come up with a risk-free asset?
- Suppose in a country only 3–4 stocks (in the index) account for 75 percent of market capitalization. What would be its effect on beta estimate?
- What factors do you think will affect market returns?
- Many stocks have yielded negative returns in the recent past (1994–98). Do you think it is correct to extrapolate them into the future? How would you alter your estimate?
- Given here is the correlation matrix for three stocks:

	<i>A</i>	<i>B</i>	<i>C</i>
<i>A</i>	1.0	0.37	0.49
<i>B</i>	0.37	1.0	0.66
<i>C</i>	0.49	0.66	1.0

Other information:

$E(R)$	0.04	0.10	0.09
Variance	0.02	0.03	0.008
Standard deviation	0.14	0.17	0.089

Calculate expected portfolio return and variance for various compositions.

- Given here are stock and market returns. Calculate mean and standard deviation of returns, correlation and covariance.

<i>Year</i>	<i>Stock return (percent)</i>	<i>Market return (percent)</i>
1987	7.64	14.31
1988	16.98	-8.50
1989	-11.36	4.01
1990	21.12	18.98
1991	-30.01	-26.48
1992	-22.14	-14.66
1993	37.68	37.20
1994	28.27	23.84

12. The following data is available for three stocks:

<i>Stock</i>	<i>Variance</i>	<i>Covariance (i, m)</i>	<i>Correlation (i, m)</i>
1	114.4	52.58	0.84
2	72.50	42.50	0.85
3	283.73	28.0	0.30

If market variance = 34.30, which of the stocks is the riskiest? Rank the same.

Chapter 4

Estimation of Cost of Capital

OBJECTIVES

- ◆ Be able to apply CAPM, DCF, Risk Premium, and Fama-French approaches to estimate cost of equity for firms.
- ◆ Be aware of estimation issues in applying CAPM to estimate divisional required returns.
- ◆ Be able to estimate cost of debt, preferred stock and cost of capital for listed and unlisted firms.
- ◆ Be able to calculate beta for listed and unlisted firms/projects.
- ◆ Be aware of factors influencing a firm's cost of capital.
- ◆ Be aware of practices in select, large, international companies.

Welspun India Ltd is one of the largest manufacturers of terry towels in Asia. Its manufacturing plant is situated at Morai, Vapi, in Gujarat; and its office is in Mumbai. It was established to manufacture terry towels. Later it started its own spinning division to prepare cotton yarn, which is one of the major raw materials for making terry towels. Recently the spinning division was spun off into a separate entity called Glofame Cotspin Industries Ltd. Welspun has a total annual production capacity of 7,800 MT. The Welspun portfolio encompasses five companies. They are:

- Welspun India Ltd, manufacturer of terry towels.
- Welspun Gujarat Stahl Rohen Ltd, a manufacturer of submerged arc welded pipes.
- Welspun Syntex Ltd, manufacturer of specialty polyester filament yarn.
- Glofame Cotspin, manufacturer of cotton yarn.
- Welspun Zucchi Textiles Ltd, a JV with Vincenzo Zucchi which owns such brands as Calvin Klein, Tommy Hilfiger.

The Terry Towel Industry

There was a huge demand for terry towels made in 100 percent cotton yarn in the early-1990s in the US and UK. But the recent economic slowdown in the US and Europe and its spillover to other countries has posed a threat of recession. The global production capacity has increased only marginally. A number of renowned

retailers have started sourcing their requirement of towels from India, and the major share goes to Welspun. Welspun India is a vertical manufacturing plant and has four types of technologies to produce towels:

- Plain dyed
- Dobby designed
- Jacquard designed
- Sheared beach towels

The input of the spinning division is cotton bales, which are processed, cleaned, combed and converted into threads of required length and then winding the same on spindles, a part of which is transferred to the terry towel division and the rest is marketed. The yarn is re-wound on beams, dyed and converted into terry towels by weaving machines in the terry towels division.

In 2002, the managers of Welspun India were considering an investment. They had to decide whether the investment was worthwhile. Whether an investment is worthwhile or not depends on what the investment earns and how the return compares with that expected by the company. In other words, the managers need to know if the investment meets the minimum return expected out of similar investments. How do companies set minimum return requirements? Common sense in general, and the introduction to risk and return provided in the last chapter in particular, tells us that return is a function of the riskiness of the investment.

The previous chapter provided a framework for pricing risky assets. The only relevant characteristics for pricing a risky asset are its risk and return. Other characteristics like liquidity are expected not to have any bearing on value. In a CAPM universe, only systematic risk as measured by beta matters. This chapter describes the application of CAPM in estimating divisional required returns. The investor's expected rate of return on investment is the cost of equity for the firm. Thus, the expected return for the equity investor in a CAPM universe,

$$E(R) = R_f + \beta[E(R_M) - R_f],$$

is also the cost of equity for the firm.

It is important to understand that cost of equity is not the same as dividends. The cost of equity incorporates both dividends and capital gains expected by investors. Estimation of cost of equity using CAPM involves estimation of risk-free rate, beta and market risk premium.

Estimation of Risk-free Rate

An investor's expected rate of return consists of two components—the time value of money and risk premium. A risk-free asset rewards the investor for time value of money alone. Further, a risk-free asset is one whose returns are certain (i.e., variance is zero) and unconnected with that of the market (i.e., covariance is zero). Generally finance theorists agree that long T-bond rate can be used as proxy for risk-free rate. Sometimes the 365-day T-bill rate is also used. Obviously, what you choose as ' R_f ' has a bearing on the cost of equity estimate as it appears twice in the equation. As the T-bill rate tends to be volatile, the long-term T-bond rate might be chosen. The T-bill rate is proposed when the investor has a short-term investment horizon. From a finance manager's perspective, the T-bond rate might be the appropriate rate. It must be understood that there is no such thing as risk-free asset. The government securities do not have default risk¹ but reinvestment risk remains. The current 10-year T-bond rate is 12.15 percent, and 365 day T-bill rate is 8 percent.

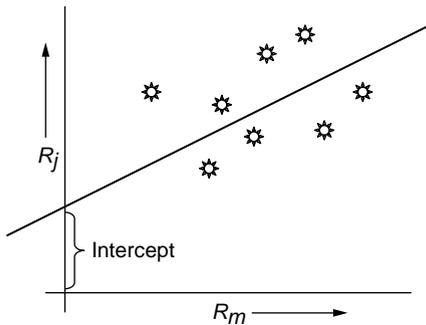
¹ This is not true of those countries that default on sovereign borrowings. In such a situation we can probably take a rate, which is slightly lower than the rate on AAA rated debt instruments as risk-free rate (say 50 basis points).

Academic studies in the US and Canada have shown that the long-term bonds are not completely riskless. The government bond returns are positively correlated with stock market returns. That is, government bonds have systematic risk (beta). The beta of T-bonds in the US is about 0.25. To arrive at riskless rate, the systematic component of bond yield should be deducted from the prevailing bond yield. To illustrate, suppose risk premium = 6.7 percent, beta of T-bonds = 0.25, and current bond yield = 5.5 percent.

$$\begin{aligned}\text{True risk-free rate} &= \text{Current bond rate} - \text{Systematic component} \\ &= 5.5 - (0.25 \times 6.7) = 3.81 \text{ percent}\end{aligned}$$

Estimation of Beta

In the Capital Asset Pricing Model, beta is the sole company specific factor. The estimates of risk-free rate and market premium are same for all stocks. Beta is the only link between investor's expected return from the stock with the expectations of market returns. So the estimate of beta should be accurate. Often academics and practitioners estimate the historical beta and use it as proxy for the future. The CAPM is supposed to be a forward-looking model. So, what we really need is ex-ante beta. The standard practice is to regress stock returns against returns from an index representing the market portfolio. The plot of security returns versus market returns is called a security characteristic line (a typical characteristic line is illustrated here).



Each dot corresponds to return from the stock and the market return in that period. A line can be fitted to the array of points to explain the relationship. The line of best fit minimizes the distance from the dot and the line.

The regression equation we obtain is of the form:

$$R_j = a + bR_m$$

where

'a' is the intercept,

'b' is the beta of the stock,

R_j is the return on the stock, and

R_m is the return on the market index.

To estimate beta, calculate the holding period return for both the stock and the market for some interval of time.

$$\text{Holding period return for the stock} = \frac{(P_t - P_{t-1}) + \text{Div}}{P_{t-1}}$$

where P_t and P_{t-1} are current and prior period prices, and Div is the dividend received.

Similarly,

$$\text{Index return} = \frac{\text{Value of index at the end} - \text{Value at the beginning}}{\text{Beginning value} + \text{Dividend yield on index}}$$

The estimate of beta depends on four factors:

1. **The period over which the beta is estimated.** The model does not specify the time period over which betas have to be estimated. An analyst has the liberty to choose an appropriate time period. Typically, analysts use 2-year and 5-year data. The latter is more popular. The longer the period, the more the number of observations and more meaningful the estimate. But macroeconomic changes may be better reflected in recent data. Further, the company itself might have changed in risk complexion. So there is a trade off between number of data points and accuracy.
2. **The starting and ending points of the estimation interval.** One could randomly choose a starting and ending point or choose some deliberate interval. Some start with January, some with July. There are no rules except that an analyst should avoid data that are abnormal. For instance, for some reason if the returns in January are consistently more than returns in other months, one could avoid January data.
3. **The market proxy used.** A stock market index is generally used as a proxy for the market portfolio that is supposed to cover all risky assets in the economy. The beta estimate is sensitive to the market proxy used. We could use the Bombay Stock Exchange sensitive index (Sensex), National Stock Exchange 50 (NIFTY), CRISIL 200 or BSE 200 or any other market proxy. As long as these indices are highly correlated, it doesn't really matter which index is chosen. But the problem is that none of these indices might be good proxies for the market portfolio. This issue will probably never be resolved. The beta estimates for some well-known companies are shown in Exhibit 4.1.

Exhibit 4.1 Beta estimates with different market proxies

<i>Company</i>	<i>BSE 200</i>	<i>NIFTY</i>	<i>Sensex</i>
Ashok Leyland	0.78	0.89	0.77
Bajaj Auto	0.90	0.92	0.85
TELCO	0.97	1.04	1.00
SBI	1.59	1.20	1.30
ACC	1.28	1.23	1.23
Colgate Palmolive	0.76	0.68	0.68
Reliance	1.42	1.24	1.38

The differences in beta estimates are not dramatic although different proxies do give different results.

4. **The choice of return interval.** The analyst can choose weekly, monthly, quarterly, or annual data to estimate beta. The normal practice is to use weekly returns. The choice is made depending on whether weekly or monthly returns have significant correlation with beta. CAPM can be applied only if there is correlation between holding period returns and beta. A recent study suggests that there is significant correlation between quarterly returns and beta. As usual, the beta estimate is sensitive to the return interval chosen. Exhibit 4.2 presents the beta estimates of the same companies for various return intervals with Sensex as proxy.

Exhibit 4.2 Beta estimates for different return intervals

<i>Company</i>	<i>Weekly</i>	<i>Monthly</i>	<i>Quarterly</i>
Ashok Leyland	0.77	0.80	1.02
Bajaj Auto	0.85	0.86	1.18
TELCO	1.0	0.96	1.11
SBI	1.3	2.04	2.72
ACC	1.23	1.31	1.18
Colgate Palmolive	0.68	0.54	0.35
Reliance	1.38	1.60	1.67

In the case of SBI, the beta estimate jumps from 1.30 to 2.72 when weekly returns are replaced by quarterly returns. Obviously, this affects the cost of equity estimate. One could conveniently choose that interval which gives the lowest estimate. This leads to erroneous investment decision as we shall see later.

The beta estimates come with statistical noise. The quality of regression can be determined by some simple statistical parameters like standard error and R^2 . If the beta estimate is 0.8 and the standard error of beta is 0.30, we could be more than 99 percent confident that the true beta lies in the range of -0.10 and 1.7 (i.e., $\pm 3\sigma$ limit). R^2 provides an estimate of the proportion of risk (variance) of the stock that can be traced to the systematic factors. The balance $(1 - R^2)$ is the unsystematic risk.

An Illustration

The weekly returns of Reliance Industries Limited (RIL) were regressed against Sensex returns for the period 1994–97. The results of the regression are:

$$\alpha = 0.3197$$

$$\beta = 1.54$$

Standard error of beta = 0.177

$$2\sigma \text{ limit} = 1.54 \pm (2 \times 0.177)$$

So, we can be 95 percent confident that the true beta lies in the range of 1.186–1.894.

The R^2 of the regression is 0.44. That is, 44 percent of total risk is systematic and the rest is unsystematic.

The beta of 1.54 suggests that RIL stock is riskier than average stock. This estimate may be compared with publicly available estimates such as the one provided by *Dalal Street Journal*. They may not match due to estimation issues outlined earlier. There are two more pitfalls in India. First, the data may not be available on all days (may be due to lack of trading). This leads to non-trading bias. Second, prices may be rigged up in some cases. The resulting estimate of beta will be biased.

The holding period return is the sum of capital gains yield and dividend yield. Dividends are paid semi-annually or annually. To calculate returns, dividends are added to the capital gain/loss in the month in which the stock goes ex-dividend. That is, dividends are not added in all the months but only in that month in which dividends are announced.

Estimation of Market Return and Market Premium

Market return is the average of past realized return on market index. Weekly or monthly intervals are chosen and the average return is calculated for the period. The average could be arithmetic mean or geometric mean.

Some theorists argue that arithmetic mean is consistent with the mean—variance framework of CAPM. There are some pitfalls in using arithmetic mean. Suppose the price of an asset increases from Rs 100 to Rs 200 and then falls to Rs 100. Holding period returns are 100 percent and –50 percent. The arithmetic mean is 25 percent. Clearly, the return is zero.

$$\text{The geometric mean} = [(1 + 1)(1 - 0.5) - 1]^{1/2} = 0$$

Consequently some suggest that the geometric mean of returns be used. Exhibit 4.3 presents the mean and standard deviation of returns of some popular indices in India.

Exhibit 4.3 Mean and standard deviation of return on indices

	Mean return (percent)			Standard deviation (percent)		
	Weekly	Monthly	Quarterly	Weekly	Monthly	Quarterly
BSE 200	0.29	0.94	4.46	4.17	11.01	25.68
Sensex	0.39	1.23	4.92	4.47	10.25	22.44
NIFTY	0.34	1.88	3.87	4.22	9.9	17.33

Exhibit 4.4 shows the arithmetic and geometric mean returns in stock markets around the world.

Exhibit 4.4 Returns around the world

Country deviation	Source	Sample start	Mkt. cap (\$ in million)	Monthly		
				A.M. (percent)	G.M. Returns (percent)	Std. Returns (percent)
Argentina	IFC	Oct 1979	17,939	42.0	7.9	93.1
Brazil	IFC	—	81,800	33.1	14.0	64.0
India	IFC	—	71,904	17.4	14.1	29.5
Indonesia	IFC	Oct 1990	21,841	3.3	–1.4	30.8
Mexico	IFC	Oct 1979	47,962	20.8	9.1	46.5
Taiwan	IFC	Oct 1985	147,472	35.8	25.9	51.3
Thailand	IFC	Oct 1979	90,882	22.1	20.1	27.1
Venezuela	IFC	Oct 1985	2,992	21.7	11.5	46.1

Source: Erb et al. (1996).

The actual returns earned by stocks (i.e., index) over a long period of time over and above the actual return earned on a default free security is the market premium, $R_m - R_f$. The arithmetic average of returns on government bonds is deducted from the average returns from stocks. This historical premium is used as proxy for future risk premium. The choice of index, obviously, affects the market premium estimate. In India five indices are available: Sensex, BSE Natex, BSE 200, NSE 50, CRISIL 500. Sensex is popular because it has the longest history. Sensex data is available for 18 years whereas other indices have a shorter history. A study by ICICI Securities and Finance suggests that the market premium for 1980–96 is 10 percent. This could be used as the market premium. Another study by CS First Boston indicates that the market premium is 8 percent. The premium in the case of the US and UK are 5.5 percent, and 8–9 percent respectively. The risk premia for some Asian countries and the US are presented in Exhibits 4.5 and 4.6.

Risk premium as measured by the historical difference between stocks and bonds usually suffers from statistical noise. Further, risk premiums may change over time. So adding a constant risk premium to the T-bond rate might be inappropriate.

The CAPM parameters can be estimated individually, as demonstrated in the preceding sections, and then plugged into CAPM to arrive at the cost of equity.

Exhibit 4.5 Risk premia for select Asian countries

Country	Index	MRP (percent)	R_f (percent)	Historical premium (percent)	Measurement period
Singapore	STI	6	4	8	1987–95
Taiwan	TWSE	6.5	7	10	1986–96
Korea	KOSPI	6.5	10	6	1985–96
Malaysia	KLSE	8	7	8.5	1985–96
Hong Kong	HIS	7.5	8	8.8	1969–96
Thailand	SET	9	13.5	14	1986–96
India	BSE 100	8	13	10.5	1991–96

Source: C S First Boston.

Exhibit 4.6 Equity premia (in percent)—US data, 1802–1998

Period	Equity premium with bonds		Equity premium with bills	
	Arithmetic	Geometric	Arithmetic	Geometric
1802–1998	3.5	4.7	5.1	5.5
1802–70	2.2	3.2	1.9	2.9
1871–1925	2.9	4.0	3.4	4.6
1926–98	5.2	6.7	6.7	8.6
1946–98	6.5	7.3	7.2	8.6

Source: Siegel (2001).

An Illustration

The cost of equity for Reliance is estimated below:

$$\begin{aligned}
 R_f &= 12.15 \text{ percent} \\
 \text{Market premium, } R_m - R_f &= 10 \text{ percent} \\
 \beta &= 1.54 \\
 \text{Cost of equity} &= 12.15 + 1.54(10) \\
 &= 27.55 \text{ percent}
 \end{aligned}$$

If we were to use the short term T-bill rate,

$$\begin{aligned}
 \text{Cost of equity} &= 8 \text{ percent} + 1.54(10) \\
 &= 23.4 \text{ percent}
 \end{aligned}$$

The difference is of about 4 percent. There is no total consensus on how the CAPM parameters are to be estimated.

OTHER APPROACHES FOR ESTIMATION OF COST OF EQUITY

There are two other popular methods for calculating cost of equity: DCF approach and Risk premium approach.

DCF Approach

The price of a stock, P_0 , on the day the most recent dividend, D_0 , is paid, is the present value of future dividend stream.

$$P_0 = D_0 \sum_{t=1}^{\infty} (1+g)^t / (1+r)^t$$

where

- g = per period growth in dividends, and
- r = investor's expected rate of return.

The rate of return that equates the current market price and future dividend payments is the cost of equity for the firm.

The model is based on some assumptions:

- The future rate of growth, g , is constant.
- The rate at which the investor discounts future cash flows, r , is constant.
- Dividends are paid annually.
- The cost of equity is calculated on the day the most recent dividend is paid.

If we assume that the dividends grow at constant rate forever,²

$$P_0 = [D_1 / k - g]$$

$$K = [D_1 / P_0] + g$$

Cost of equity = Next period dividend yield + Growth in dividends

The normal practice is to use a two-stage dividend growth model as shown below.

The expected future dividend stream can be split into two periods—non-constant growth period (say 4 years) and constant growth period thereafter.

$$P_0 = \frac{D_1}{(1+k)^1} + \dots + \frac{D_4}{(1+k)^4} + \frac{D_4(1+g)}{(k-g)} [1/(1+k)^4]$$

² This is the famous Gordon Model.

With a forecast of D_1, D_2, D_3, D_4 , and g , the cost of equity can be found by trial and error. Elsewhere in the world, analyst forecasts of dividend and constant growth rate is used to estimate the cost of equity. Such services are not popular in India.

The constant growth rate in dividends can be calculated by multiplying the expected retention ratio in year 4 with Return on equity.

$$g = (\text{Retention ratio in year 4}) * (\text{ROE})$$

The Gordon Model could also be used for estimating risk premium.

$$P = [D_1 / (k - g)]$$

Extending the concept to the market as a whole:

$$\text{Market value} = \frac{\text{Expected dividends next year}}{\text{Required return on stocks} - \text{Expected growth rate}}$$

Given the current market value, expected dividends and growth rate in earnings and dividends in the long run, one can solve for required return on equity. Subtracting the risk-free rate from the required return on equity yields risk premium.

To illustrate, if index value = 3,500, dividend yield on the index = 8 percent, expected growth rate = 7 percent:

$$3500 = [(0.08 \times 3500) / (r - 0.07)]$$

Required return on equity = 15 percent

If the risk-free rate is 12 percent, the premium is 3 percent.

Risk Premium Approach

Under the risk premium approach, a risk premium is added to the yield (YTM) on the company's bonds (to reflect the higher risk borne by shareholders) to estimate cost of equity.

That is, Cost of equity = Bond yield + Risk premium.

The equity risk premium can be calculated in two ways: historic yield spread method and ex-ante yield spread based on DCF analysis.

The historic risk premium is the difference between the average of annual returns on a stock index in the past (say 10 years) and the average of annual returns on a bond index over the same period.

$$\text{Historic yield spread} = \text{Average return on stock index} - \text{Average return on bond index}$$

The ICICI bond index could be used for estimating yield spread. But the problem is that I-Bex is fairly young. So the data would be available for a short period of time.

The normal practice is to use geometric return on the indices. The historic premium is then added to company's bond yield to obtain an estimate of cost of equity. The shortcoming of this method is that the estimate is affected by the period chosen and end points of the period.

Under the ex-ante (expected) risk premium method, the average expected future return on a group of stocks, say index stocks, is calculated and the concurrent risk-free rate is subtracted from it. The yield on long term T-bond could be taken as R_f :

$$RP_M = R_M - R_f$$

The DCF model may be used to estimate expected return on stocks. A survey of analysts' forecast of growth rate in dividends may be used as surrogate for 'g' in the equation.

$$K_e = (D_1 / P_0) + g$$

The simple logic underlying risk premium approach is that if the premium is expected to remain constant overtime, then the constant premium may be added to the prevailing interest rate to obtain cost of equity. The risk premium should be estimated for fairly long periods of time. Academic studies make use of data for few decades.

Estimating Cost of Debt

Debt is of two types: term loans from financial institutions and debentures sold to investors. The cost of debentures is the investor's required rate of return. Recollect that from the bond pricing equation:

$$P = \sum_{t=1}^n [C / (1 + k_d)^t] + [F / (1 + k_d)^n]$$

where

P is price,

C is coupon in rupees,

F is redemption price, and

k_d is the investor's expected rate of return.

The discount rate that equates the current market price and coupon and principal payments is the cost of debt. Note that cost of debt is not the same as interest paid by the company. At the time of issue, the company would set the interest rate equal to the investor's expected rate, which is the yield on comparable instruments. As time passes, the yield (YTM) may increase or decrease. In other words, if you have to find the cost of debt, don't take the interest rate payable by the company. Call up your Investment Banker and ask him the prevailing yield on your company's bond. You may point out that yields fluctuate. That's precisely the point. Why do yields change? Mainly for two reasons: changes in general interest levels and changes in default risk of the issuer. When the interest rates in the economy increase, the investor's expected rate of return on this company's bond increases. This increases the cost of *both* old and new bonds. Similarly, the required yield may change due to changes in default risk of the instrument. Bondholders would have set the interest rate at the time of issue after assessing the default risk. If the default risk increases later on, the required rate of return (or yield or YTM or cost of debt) also increases. In sum, the cost of debt is in the *denominator* and not in the numerator. This is the pre-tax cost of debt. Since, interest payments are tax deductible, the post-tax cost of debt is $k_d(1 - T)$, where T is the marginal tax rate.

Going by the above reasoning, we should not take the interest rate on non-traded debt like term loans as cost of debt. The interest rate on comparable debt instruments is the cost of debt (or the yield on traded debt, if the company has issued debentures). The yields on debentures issued by some well-known companies are shown in Exhibit 4.7.

Exhibit 4.7 Prevailing yields

<i>Company</i>	<i>Yield (percent)</i>	<i>Coupon rate (percent)</i>
IPCL	15.24	16.0
MRPL	16.03	17.5
Nirma	15.18	17.0
Tata Chemicals	10.09	12.5
Indian Rayon	15.47	16.50

Source: *Business Standard*, August 1998.

Assume that a company issues Rs 150 crore of bonds due in 10 years. The bond carries a coupon of 12 percent. The company's marginal tax rate is 35 percent. Coupon on bonds is usually paid semi-annually. The effective after-tax cost of debt is:

$$[1 + (0.12/2) \times (1 - 0.35)]^2 = 1.0795 \text{ or } 7.95 \text{ percent}$$

The semi-annual tax shield from interest expense on these bonds (Rs crores) is:

$$0.35 \times (0.12/2) \times \text{Rs } 150 \text{ crore} = \text{Rs } 3.15 \text{ crore}$$

The present value of tax shields can be estimated by discounting semi-annual debt tax shields of Rs 3.15 crore at the pre-tax semi-annual cost of debt as the discount rate that best captures the riskiness of these tax shields:

$$= 3.15 \text{ crore} \times \text{PVIFA (6 percent, 10)}$$

Cost of Preferred Stock

Preference shares share characteristics of both debt and equity. Like interest on debt, dividend on preference shares is fixed. But preference dividends are not tax deductible, like dividends on ordinary shares. Preference dividend is to be paid from after-tax profits.

Cost of preferred stock could be found by calculating the discount rate k_p that equates current market price and dividends and principal, similar to debentures.

$$P = \sum_{t=1}^n [D / (1 + k_p)^t] + [F / (1 + k_p)^n]$$

If the preferred stock is perpetual, the cost of preferred stock = Preference dividend per share / Market price of preferred stock = D / P .

The Weighted Average Cost of Capital (WACC)

The weighted average cost of capital is the weighted average of costs of various sources of finance.

$$\text{WACC} = K_e [E/V] + K_d (1 - T) [D/V] + K_p [PS/V]$$

where

K_e = cost of equity,

K_d = pre-tax cost of debt,

K_p = cost of preferred stock, and

T = tax rate.

E , D , and PS are the amounts of equity, debt, and preferred stock in the capital structure.

$$V = \text{Market value of all securities } (E + D + PS)$$

Note that the weights used in WACC calculation are target, market value weights and not book value weights. Market value reflects the value of the firm better than the book value. Book value reflects the historical value of assets in place whereas market value reflects the value of both assets in place and present value of future growth opportunities. Moreover, securities are issued at market values and not book values. Further, the proportions are the target proportions the company intends to maintain. The concept of target capital structure will be taken up later. The weighted average cost of capital is the hurdle rate to be applied to projects that have similar risk characteristics (and financing) as the firm. That is, investments should earn the hurdle rate to meet investors' expectations. Otherwise investors will be worse off.

An Illustration

Infosys Technologies stock had a beta of 1.48 in 1998. The prevailing long term T-bond rate was 12.15 percent. Plugging a market premium of 10 percent, the cost of equity for Infosys works out to be:

$$12.15 + 1.48(10) = 26.95 \text{ percent}$$

Infosys does not have debt in its capital structure. So cost of capital and cost of equity are the same. The WACC for the company during 1995–98 is given in Exhibit 4.8.

Exhibit 4.8 WACC for Infosys Ltd

	1998	1997	1996	1995
R_f	12.15	13.6	14.0	14.0
$R_m - R_f$	10.0	10.0	10.0	10.0
β	1.48	1.48	1.48	1.48
Cost of equity	26.95	28.40	28.80	28.80
Post tax		7.7	7.7	7.7
Cost of debt				
WACC	26.95	27.97	27.36	27.36

In 2002, Welspun had the following capital structure:

	<i>March 31, 2002</i> (Rs lac)
Equity capital	15,778.43
Preference capital	2,332.00
Debentures	2,405.93

Loans

• From financial institutions	9,284.56
• From banks	3,476.08
	33,277.00

To calculate WACC we need to estimate the market value of equity.

No. of shares outstanding	=	460,223,000
Share price on 31.03.2002	=	Rs 75.30
Market value of equity	=	Rs 346,547.92 lac
Book value of debt	=	Rs 15,166.58 lac
Tax rate	=	20 percent
Cost of preferred stock	=	13 percent
Beta	=	0.469
M.R.P	=	10 percent
R_f	=	10 percent

CARE has rated Welspun BBB+. The yield on such bonds is 15.99 percent.
The after-tax cost of debt = $15.99(1 - 0.2) = 12.80$ percent.

Source	Cost	Amount	Weight ³
Equity	15.46	346,547.92	0.952
Preference	13.00	2,332.00	0.006
Debentures	12.80	2,405.93	0.007
Loan	12.80	12,760.65	0.035

WACC = 14.98 percent

AN INTERNATIONAL EXAMPLE: JOHNSON & JOHNSON (J&J)

J&J is the world's most comprehensive and broadly based manufacturer of health care products, as well as a provider of related services, for the consumer, pharmaceutical and medical devices and diagnostics markets.

³ Actually the weights are supposed to be *target*, market value weights, and not current weights. Second, the beta estimate reflects *current* leverage. It should be relevered at the *target* debt ratio.

Johnson & Johnson has 198 operating companies in 54 countries around the world employing 108,300 employees and selling products in more than 175 countries.

Stock Information

Industry: Pharmaceuticals
 Common stock quote (March 28, 2003): \$56.96
 Price/earnings ratio: 24.21
 Earnings per share: \$2.18
 Indicated annual dividend: 0.82
 Yield (percent): 1.55
 Beta coefficient: 0.47
 Market cap (billion): 174.248
 Shares outstanding: 2,969,972,000

J&J's marginal tax rate is estimated to be 28 percent. This calculation is based on the average effective tax rates for J&J between 1996 and 2002.

J&J's cost of debt can be estimated by the average effective interest paid on its debentures and notes payable, which is calculated to be 5.85 percent before taxes.

To calculate J&J's cost of equity we will use as the risk-free rate $r_f = 3.907$, the prevailing yield on long-term bonds (i.e., US 10-year bonds), the latest value of the firm's beta = 0.47, and the market risk premium ($r_m - r_f$) = 5.9 percent, which is the geometric mean of historical risk premiums (for the period 1926–99).

$$\begin{aligned} \text{Thus,} \qquad \qquad \qquad Ke &= 3.907 + 0.47(5.9) \\ &= 6.68 \text{ percent.} \end{aligned}$$

J&J's market value of debt as per its December 29, 2002 balance sheet includes (in millions) loans and notes payable of US\$ 2,117 and long-term debt of US\$ 2,022, for a total of US\$ 4,139 million.

The market value of equity can be calculated by multiplying the current share price times the number of current shares outstanding,

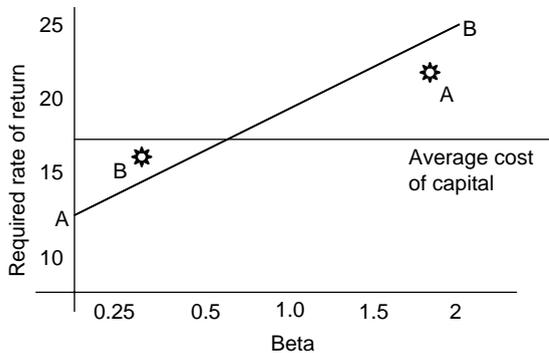
$$\text{or} \qquad \qquad \qquad \text{US\$ } 56.96 \times 2,969,972,000 = \text{US\$ } 169,169.6 \text{ million.}$$

Thus, we find that $W_d = 2.38$ percent and $W_e = 97.62$ percent.

J&J's WACC can be determined by using the WACC formula:

$$\begin{aligned} \text{WACC} &= (1 - .28)(2.38 \text{ percent} \times 5.85 \text{ percent}) + (97.62 \text{ percent} \times 6.68 \text{ percent}) \\ &= 6.62 \text{ percent} \end{aligned}$$

Some companies use a single company wide discount rate for all projects and divisions even though the divisions have different risk complexion. Obviously, this leads to inappropriate investment decisions.



Note: Line AB shows the required rate of return for projects with different betas. Project B, a low risk proposal, would be incorrectly rejected since it is compared with the average cost of capital for the company. Project A, a high-risk venture, will be incorrectly accepted.

Industry Beta

The beta of any individual asset is:

$$\beta_i = \frac{\text{Cov}(R_i - R_m)}{\text{Var}(R_m)}$$

Now consider a portfolio with weights W_p . The beta of the portfolio is:

$$\beta_p = \frac{\text{Cov}(R_p - R_m)}{\text{Var}(R_m)}$$

$$= \sum_{i=1}^n W_i \beta_i$$

The betas of individual stocks tend to be fickle. They change quite rapidly. Portfolio betas, on the other hand, are more stable. Their standard errors are generally lower than those of individual betas. The weighted average of betas of stocks in the same industry group—say, pharmaceutical—is called industry beta; the weights are market capitalization (number of shares outstanding multiplied by market-price) of individual companies. What purpose does industry beta serve? Suppose Reliance is in the process of appraising a banking project. So its executives are interested in estimating cost of equity for the project. They can use either the Reliance beta or the banking industry beta. Common sense tells us that the banking industry beta is more indicative of what investors expect from *that* project. In other words, cost of equity and cost of capital are project-specific. The WACC for the company cannot be applied across the board to all projects. The cost of equity estimated for the parent company can be applied only if the project has the same riskiness as the parent company and financing mix. The industry beta for some major industry groups is shown in Exhibit 4.9. Thus, RIL should use the banking beta of 1.84 for the banking project and not its own beta of 1.54. Given here is the cost of capital for several industry groups in the US:

<i>Industry</i>	<i>Industry lev. Beta</i>	<i>Cost of equity (percent)</i>	<i>Cost of debt (percent)</i>	<i>Debt/capital (percent)</i>	<i>Cost of capital (percent)</i>
Aerospace	0.68	8.6	9.1	38.6	7.3
Airlines	0.89	10.8	9.8	70.4	7.4
Beverages	0.89	10	8.1	45.7	9.3
Cars and trucks	1.03	12.4	8.5	46.6	8.7
Computers and peripherals	1.36	12.9	8.6	30.7	12.7
Electronics	1.51	14.1	10.6	39.1	13.5
Oil and gas (integrated)	0.60	7.9	8.6	46.7	6.9
Restaurants	0.80	9.5	10	46.4	8.6

Source: Stern Stewart & Co.

Exhibit 4.9 Industry betas

<i>Industry</i>	<i>Beta</i>
Steel	1.17
Banking	1.84
Power	1.17
Cement	1.04
Pharmaceuticals	1.02
Automobiles	0.99
Textiles	0.84
Tyres	0.92
Paints	0.50
Cosmetics	0.80

Fundamental Beta

Since firm characteristics change over a period of time we would expect beta to change. So putting too much emphasis on history might be unwise. Consequently some academicians like Beaver et al. (1970) and Rosenberg and Marathe (1975) have attempted to establish relationship between systematic risk and its determinants like payout ratio, growth, leverage, liquidity ratio, size of the firm, EPS variability. Studies have shown that the beta obtained from such ‘fundamental factors’ is more stable. About 54 factors in six categories are supposed to influence beta. A growth-oriented strategy implies large capital investment plans. Such long-term investments typically translate into higher uncertainty about the eventual outcome and hence risk. So we would expect growth to be a consistent predictor of beta. Likewise earnings variability is another important predictor of beta. An important research by Robert Hamada shows that the beta of a stock depends on operating and financial leverage of a firm. An increase in either of them or both will lead to an increase in beta, and hence the cost of equity.

The relationship between levered and unlevered beta is:⁴

$$\beta_L = \beta_U [1 + (1 - T)D/E]$$

⁴ The effect of leverage on beta is not too clear in the Indian context. But it is better to be vaguely right than precisely wrong!

where

- β_L = levered beta (beta at the current level of debt), and
- β_U = unlevered beta (beta when there is no debt in the capital structure).

We know that:

$$V = D + E$$

That is, the value of the firm equals the sum of values of debt and equity.

Multiplying both sides by their respective beta,

$$\beta_A V = \beta_D D + \beta_E E$$

Dividing both sides by V

$$\beta_A = \beta_D D/V + \beta_E E/V$$

That is, asset beta is the weighted average of debt and equity beta.

If the beta of debt is assumed to be zero (a somewhat restrictive assumption),⁵

$$\begin{aligned} \beta_A &= \beta_E E/V \\ \text{or} \quad \beta_E &= \beta_A (V/E) \end{aligned}$$

The beta that we estimate by regressing stock returns against market returns should not be directly plugged into CAPM. It should be relevered using the above relationship at the target debt ratio and then plugged. Assume that a company currently has a D/V ratio of 0.3. So E/V is 0.7. The target D/V is 0.5. Let the current equity beta be 0.50:

$$\begin{aligned} \beta_A &= \beta_E E/V \\ \text{Asset beta} &= (0.50)(0.7) = 0.35 \end{aligned}$$

$$\begin{aligned} \beta_E \text{ at the target debt ratio} &= \beta_A (V/E) \\ &= (0.35)(1/0.7) \\ &= 0.5 \end{aligned}$$

As you can see, the estimate is more than the current beta, for obvious reasons.

Roger Ibbotson Associates, run by Prof. Roger Ibbotson of Yale University, is an authentic source of beta and cost of capital for US firms. Ibbotson Associates' *Beta Book* uses the following methodologies for estimating betas from historical return data, estimating industry betas, and combining regression betas and peer group betas to form adjusted betas. A company from the *Compustat* database is included in his publication if it meets three conditions. First, a company must have at least 36 months of return data. (Any company with less than 60 months of return data is marked with an asterisk.) Second, it must have sales greater than \$100,000 in the most recent year. Third, a company must have a market capitalization greater than \$10,000 for the most recent month. They use the S&P 500 as market portfolio in the beta calculations.

⁵ The beta of debt is assumed to be zero because debt is priced on the basis of *unsystematic*, firm-specific, default risk.

To estimate the beta of a company, monthly total returns of the company's stock in excess of the risk-free asset are regressed against the monthly total returns of the stock market in excess of the return on the risk-free asset.

In all of the CAPM regressions used in *Beta Book*, the total returns of the S&P 500 are used as the proxy for the market returns. The series used as a proxy for the risk-free asset is the yield on the 30-day T-bill. Total returns for both individual stocks and the market proxy are determined by calculating price appreciation and dividend reinvestment. A 60-month time frame is used for the regression. If less than 60 months of data are available for a company, the beta is then calculated using the months of data that are available, with a minimum of 36 months as acceptable.

The Raw Beta of a company is computed by running a simple regression with the company's monthly excess stock returns over Treasury bill returns as the dependent variable and the monthly excess returns of the market over Treasury bill returns as the independent variable. If a Raw Beta estimate is greater than five in absolute value, it is reported as 'NMF' for 'not meaningful.'

A levered beta measures the systematic risk for the equity shareholders of the company. No adjustment is made for the debt financing undertaken by the company. A levered equity beta incorporates the business and financing risks undertaken by the company and born by the equity shareholders.

For each company and for each composite, they calculate the Raw Ordinary Least Squares Beta and the Ibbotson Adjusted Ordinary Least Squares Beta, estimates of systematic risk, as described earlier.

The unlevered beta (also known as asset beta) removes a company's financing decision from the beta calculation. The unlevered beta reflects a company's business risk. The unlevered beta is computed as follows:

$$\beta_{ui} = \frac{\beta_{Li}}{1 + D/E(1 - T)}$$

where

β_{ui} is unlevered beta,

β_{Li} is levered beta,

D is book value of debt and preferred stock, and

E is the equity capitalization.

Based on the theory that over time a company's beta tends toward its industry's average beta, *Beta Book* presents an adjusted beta for each company. The adjusted beta is a weighted average of the company's regression beta and its peer group beta. In earlier editions of the *Beta Book*, adjusted beta has been calculated by applying a weight of two-thirds to the regression beta and one-third to the peer group beta. In this way, all regression betas were 'shrunk' to industry averages by the same amount.

The amount of shrinkage is calculated using a formula first suggested by Vasicek. With Vasicek's formula, the greater the statistical confidence of the regression beta the closer is the weight on it to 100 percent. The motivation behind calculating an adjusted beta is to make a forecast of the true beta in the future, which can be used to estimate the expected return.

The adjusted beta calculation can be written as follows:

$$\sigma^2 = \ln[1 + \{S/1 + E\}^2]$$

where

$$\text{Weight} = \frac{(\text{Cross sectional standard error})^2}{(\text{Cross sectional standard error})^2 + (\text{Time series beta standard error})^2}$$

This adjustment equation reflects the theory that, over time, company betas will tend toward their industry average beta. For example, the betas of public utility companies tend to be less than one. Therefore, when adjusting the beta of a public utility company, it is appropriate to adjust its beta towards the average beta of the other companies that make up its industry group.

The formula for *weight* is based on the formula suggested by Vasicek. The greater the statistical confidence in the regression beta, the closer that *weight* is to one.

The *peer group* beta calculated by Ibbotson Associates takes into consideration the industry betas of all industries in which a company is involved. It is the sales-weighted average of the betas for each industry in which a company has sales.

Assume that Company A has a peer group beta of 0.71. It lists sales in four different segments. The peer group beta is calculated in the following manner:

Segment	Industry OLS beta	Sales in industry (\$ in millions)	Percentage of sales in industry	Sales-weighted OLS beta component
A	0.56	9,396	26.17 percent	0.15
B	1.05	5,698	15.87 percent	0.17
C	0.68	20,767	57.84 percent	0.39
D	0.38	44	0.12 percent	0.00
Total		35,905	100.00 percent	0.71

An estimate of beta for Procter and Gamble in 2003 is given here:

	Levered	Unlevered
Raw beta	0.0 (0.00) ⁶	0.0
Peer group beta	0.51	
Ibbotson beta	0.02	0.01

Note: Raw beta is the Ordinary Least Squares estimate of levered and unlevered beta. Peer group beta is the sales-weighted average of industry betas. Ibbotson beta is the weighted average of regression beta and peer group beta.

Ibbotson Associates report cost of equity calculated using the Fama-French, three-factor model as well. An estimate of the model's factors for P&G is given below:

Fama-French beta (Coefficient on excess market return) = 0.02,

R-square = 0.01,

SMB premium = -0.17, and

HML premium = 0.46.

Cost of equity (Fama-French) = Risk-free rate + (FF beta × Equity risk premium) + SMB premium + HML premium.

Cost of Capital for Unlisted Divisions

The CAPM can be used to estimate the cost of equity for a listed firm. An unlisted division, by definition, does not have stock market data. So CAPM cannot be applied directly. The accepted procedure is to follow

⁶ R-square in parenthesis.

the ‘pure play’ technique. Since the beta for the division is unobservable in the marketplace, a proxy beta derived from a publicly traded firm whose operations are as same as possible to the division in question is used as the measure of the division’s systematic risk. The pure play approach attempts to identify firms with publicly traded securities that are solely engaged in the same line of business as the division. These comparable firms are called pure play firms. A firm should satisfy the following characteristics to qualify as a pure play firm:

- The firm should have only one business line and no miscellaneous revenue.
- The pure play should be in the same industry or business line as the division in question.
- The revenues of the pure play should be roughly the same as those of the division.
- When more than one firm can be identified as a potential pure play, the firm with the median beta could be chosen as pure play.

The important insight to be gained from the preceding discussion is that for multi-division firms WACC is a meaningless concept. It is necessary to calculate the cost of capital for each division separately.

Survey Results

Gitman and Forrester (1977) conducted a survey of cost of capital estimation techniques in *Fortune* 1000 companies. The summary of their findings is shown in Exhibit 4.10. As can be seen, a majority of them use a WACC based on target capital structure in line with theory. About 16.40 percent of them use book value weights, which is conceptually weak.

Exhibit 4.10 Approach/weighting scheme in cost of capital estimation

<i>Approach/weighting scheme</i>	<i>Percentage of 177 respondents</i>
Use cost of specific source of financing planned for funding the alternative	16.90
Use WACC based on book value weights	16.40
Use WACC based on target capital structure weights	41.80
Use WACC based on current market value weights	28.80
Some other weighting scheme	0.60

The survey also included cost of equity calculation procedure. The summary of their findings is given in Exhibit 4.11. A majority of the companies use current market-based costs of similar obligations when measuring cost of debt and/or preferred stock consistent with theory. About one-third of the respondents indicated the use of historical cost of the obligation, which is inconsistent with theory. A majority of the companies revise cost of capital estimation when environmental conditions change sufficiently to warrant it or make revisions annually. More recently Graham and Harvey (2001) conducted a survey of practices in 392 firms in the US. Their survey had questions on how firms estimate the cost of equity capital. Each question was to be rated on a four-point scale. They explore whether firms use the CAPM, a multi-beta CAPM, average historical returns or a dividend discount model. They find that CAPM is by far the most popular method. The result of their survey is presented in Exhibit 4.12.

Exhibit 4.11 Cost of equity estimation procedure

<i>Procedure</i>	<i>Percentage of 177 respondents</i>
Historical dividend yield plus estimate of growth	3.4
Return required by investors	35.60
Current dividend yield plus estimate of growth	26.0
Dividend yield estimate only	1.70
Cost of debt plus risk premium	13.0
<i>E/P</i> ratio	15.80
Market return adjusted for risk	22.60

Exhibit 4.12 Survey responses to the question: Does your firm estimate the cost of equity capital? If yes, how?

	<i>Percentage always or almost always</i>	<i>Size</i>		<i>Industry</i>	
		<i>Small</i>	<i>Large</i>	<i>Manufacturers</i>	<i>Others</i>
1. CAPM	73.49	2.49	3.27	3.02	2.87
2. Average historical return on common stock	39.41	1.80	1.65	1.60	1.84
3. Multi-beta CAPM	34.29	1.39	1.70	1.69	1.49
4. Dividend discount model	15.74	0.96	0.87	0.98	0.80
5. Whatever our investors tell us	13.93	1.22	0.86	0.80	0.97
6. By regulatory decisions	7.04	0.37	0.50	0.44	0.44

Liquidity and the Cost of Capital

Although modern finance theory hypothesizes that only systematic risk matters for pricing risky assets, one study in America indicates that portfolios of less liquid stocks provide investors with significantly higher returns, on average, than highly liquid stocks even after adjusting for risk.⁷ Why? Investors price securities after considering transaction costs. Given two stocks with same cash flows but with different liquidity, the less liquid stock will trade at lower prices. Thus, a liquidity premium is attached to illiquid stocks. What this implies is that managers of these companies must earn higher returns than that suggested by CAPM or any asset pricing model to increase shareholder value.

This also means that managers can increase the value of their companies by increasing the liquidity of the company's stocks and bonds. But increasing liquidity is not costless. For instance, one way to increase liquidity is an initial public offering, which involves underwriting costs. Voluntary disclosure of information is another way to increase liquidity and lessen cost of equity.

Disclosure and the Cost of Capital

CFOs considering whether they should gratuitously provide corporate information to the capital markets must weigh the costs and benefits of disclosure. Among the potential costs are the risks of a shareholders' lawsuit or a weakened competitive position, which could impact the company's future earnings and the price of the stock. On the other hand, providing certain types of information may lower the cost of equity capital for a given level of earnings, and thus enhance the stock price. Voluntary disclosure of information can also provide some benefits. It might lower investors' estimation of risk by defusing their uncertainty about the

⁷ Amihud, Yakov and H Mendelson (1988). 'Liquidity and Asset Prices', Implications', *Financial Management*, Vol. 17 (Spring).

stock. Armed with adequate knowledge, investors feel more confident about their estimates of the company's value.

Only certain types of companies and certain kinds of information are able to lower the cost of capital. Research in America shows that companies with a high market beta and larger analytical following, generally pay more for the equity capital than others do.⁸ Those results apply without regard to size or disclosure level. On the other hand, companies that have little or no analytical coverage and that maintain a generous disclosure policy enjoy 9 percent reduction in cost of equity when compared to the firm with the least amount of disclosure. The results suggest that investors find the information a company provides to be most valuable when they cannot turn to any outside analytical coverage. Which kind of information lowers the cost of capital will depend largely on the extent of analytical coverage. Companies with little following enjoy the largest decrease in the cost of equity when they disclose forward-looking information such as sales or earnings forecasts. Companies with low analyst coverage might consider disclosing the impact of industry trends on profits and sales, since these areas bear the greatest potential to improve the company's cost of equity.

Cost of Capital Estimation in Select Companies⁹

Digital Equipment Corporation is in the business of design, manufacture, sales and service of networked computer systems, associated peripheral equipment and related network communication and software products. The company applies hurdle rates based on a matrix concept shown here:

Risk associated with product development	High			
	Low			
		Product development (Low risk)	Advanced development (Moderate)	Basic research (High risk)

Risk associated with development →

Any new product development effort along traditional lines (low risk) of the firm is evaluated at the company's weighted average cost of capital with no additional risk adjustment. As a project moves from normal risk to areas of less traditional products or markets, or toward the more speculative (basic research) end of the R&D spectrum, the company tries to quantitatively differentiate between different levels of project risk by adjusting the hurdle rate to correspond to the level of systematic risk of the project risk. The pure play technique is used to estimate the beta of a non-normal risk project. The proxy beta from a publicly traded, single product line firm that competes in the targeted market place is used after adjusting for leverage (using Hamada formulation). The CAPM and WACC formulas are then used to determine risk adjusted hurdle rate.

⁸ Botosan, Christine (2000), 'Evidence that greater disclosure lowers the cost of equity', *Journal of Applied Corporate Finance*, Vol. 12, No. 4.

⁹ FMA round table discussion on cost of capital, *Financial Management*, Spring 1989.

Southwestern Bell is a large manufacturer of telecom equipment. The company publishes a required rate of return for each of its subsidiaries and for particular projects. WACC based on market value weights is the most popular hurdle rate for capital investments. Sometimes the company uses a modified multistage dividend discount model. The company uses pure play betas in some of its businesses where pure play firms are available. The pure play beta is adjusted for leverage. The concept of divisional cost of capital is applied wherever possible.

Vulcan Materials Company is an international producer of industrial materials, industrial chemicals, and construction aggregates. The company reviews hurdle rates periodically—once in three years or whenever there is a need for revision. Not much importance is given to hurdle rates. The company uses leverage-adjusted beta to estimate cost of equity. Usage of pure play and average industry beta is also in vogue.

A DECISION CASE: AUSTRALIAN GAS TRANSMISSION AUTHORITY

Utility services like gas transmission lines and electricity distribution are regulated in many countries. The regulators in these countries have to fix the price per unit of output (e.g., electricity that the company can charge) and hence the return on equity (assuming that expenses are constant or increase in a definite fashion). The idea is to add a constant spread to the cost of equity to calculate the allowable return on equity and work backwards to calculate price per unit. So these regulators are required to calculate cost of equity for the utility in question. They examine betas of individual listed firms and industry beta in arriving at a proxy beta.

Australian regulators of gas transmission lines use the CAPM to calculate cost of equity. They calculate beta using the following formula:

$$\beta = \beta_U \left(1 + (1-t) \frac{D}{E} \right) - \beta_D \frac{D}{E}$$

The asset beta is relevered at a target D/V ratio of 0.6. They use a proxy beta of 0.7 to estimate the cost of equity.

There are four listed Australian entities: AGL, Australian Pipeline Trust, Envestra, and United Energy. ACG, AGL, and United Energy are multi-utilities, with strong profiles in both gas and electricity. The Australian Pipeline Trust is the only member of this group whose principal business is gas transmission pipelines. The Australian Pipeline Trust has the highest equity beta of the group, at above 1. Envestra has the lowest beta at between 0.40 and 0.47, depending upon the choice of debt beta and levering formula. Further, four-year stock market data is available for only two firms.

The following is the asset beta range for gas distribution companies and other related industry groups:

<i>Industry</i>	<i>Asset beta range</i>
Gas distribution (listed companies)	0.46–0.47
Electricity generation (listed companies)	0.88–1.22
Electricity distribution (listed companies)	0.46
Gas distribution (regulatory decisions)	0.40–0.60
Electricity distribution (regulatory decisions)	0.35–0.50

The actual range of asset beta for Australian gas distributors is 0.09–0.47. However, for Envestra (asset beta of 0.09) the equity beta was estimated using only 46 observations, and the company had a leverage ratio

of 0.8328. Envestra has a highly unusual capital structure in the sense that other companies have a leverage ratio in the range of 0.1736–0.2988.

The Allen Consulting group, the advisor to the regulator, examines betas of similar firms from the US, Canada, the UK and Australia before coming up with an estimate of beta for Australian firms. ACG estimates of beta for companies in the US, UK, Canada, and Australia are given here:

<i>Equity beta estimates for 60 percent debt to value</i>	<i>Tax term included in leveraging formula, Debt beta = 0.15</i>	
	<i>Negative beta included</i>	<i>Negative beta excluded</i>
Australian companies	0.66	0.66
US companies	0.10	0.20
Canadian companies	0.02	0.26
UK companies	0.05	0.18

The consultants then varied the debt beta and recalculated the equity beta at the target D/V ratio:

<i>Equity beta estimates with 60 percent D/V with negative beta firms excluded</i>	<i>Tax term excluded from leveraging formula</i>		<i>Tax term included</i>	
	<i>Debt beta</i>		<i>Debt beta</i>	
	<i>Zero</i>	<i>0.15</i>	<i>Zero</i>	<i>0.15</i>
Australian companies	0.69	0.66	0.68	0.66
US companies	0.25	0.19	0.26	0.20
US diversified pipelines	0.92	0.86	0.91	0.86

The regulatory authority sets beta value for a period of five years.

1. Is the *average* Australian proxy beta a good proxy in estimating cost of equity? Why? Or, why not?
2. Is it correct to include Envestra in the sample? Why or why not?
3. Is it correct to derive proxy beta from other industry groups like electricity distribution?
4. In general, when would asset beta be high?
5. In general, when would the debt beta be positive? High?
6. Should American, Canadian, and UK firms be examined before deriving a proxy beta? Why? Or, why not?
7. Some American firms have negative beta. When would beta be negative?
8. What is the impact of including for excluding firms with negative beta?
9. Why is beta for US firms low compared to firms in Australia? What bias, if any, could have resulted in a low value?
10. Should Australian firms be worried that the beta estimate will not be revisited for five years?
11. Is the estimated beta (0.7) biased? Is it high or low?

IN CONCLUSION

The cost of capital is an important idea in finance theory. This chapter introduced several approaches for estimation of cost of capital for both listed and unlisted firms. It is inappropriate to apply the weighted average cost of capital as the hurdle rate for all the projects and divisions across the board. Cost of capital is

specific to the project in question. The methodology for estimating pure play betas and making appropriate adjustments for leverage will be introduced at a later stage.

The cost of equity can be estimated in three ways:

- The CAPM approach
- Dividend discount model
- Risk premium approach

CAPM is the most widely used method.

The systematic risk of a stock, among other factors, depends on operating and financial leverage. The higher the leverage, the higher is the beta.

The weighted average cost of capital is the hurdle rate for an average risk project undertaken by the company. It can be applied only if the project is a mirror image of the company's activities. Any project which deviates from the parent's operating and financial characteristics should be subjected to a different hurdle rate. WACC is a meaningless concept for well diversified groups like the Tata group or the Birla group.

The hurdle rate is the minimum return a project should earn to satisfy the investors expectations.

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QUESTIONS

1. Estimate α , β , standard error of α and β , R^2 for the following stocks. Establish 95 percent confidence interval for beta.

Stocks

Tata Chemicals
HLL
Cadbury's

Use monthly returns for the last 5 years. Take Sensex as market proxy. The data is available on CMIE Prowess.

2. Draw characteristic line for the same stocks. Interpret the line. Classify the stocks as aggressive, defensive and neutral.
3. Estimate BSE 30 returns (weekly and monthly) for the last two years. Convert them into annual returns.
4. Estimate cost of equity and cost of capital for HLL, TVS Suzuki, and Tata Chemicals.
5. Estimate the beta for the following portfolio. Use the data given in the chapter or other sources.

<i>Company</i>	<i>Weightage</i>
Bajaj Auto	0.2
L&T	0.1
Grasim	0.1
TISCO	0.15
TELCO	0.05
RIL	0.15
Indian Rayon	0.10
Arvind Mills	0.10
Asian Paints	0.05

6. Estimate the industry beta for cement, steel, and pharmaceuticals.

7. You are in the process of coming out with a public issue. So you are interested in cost of equity. This is the first public issue. So there is no stock market history for your company. How would you estimate the cost of equity if:
- There are comparable firms.
 - There are no comparable firms in the country.
8. Using the data given below estimate cost of capital.
Beta = 1.2, Rf = 12.15 percent, market premium = 10 percent. The company has stated that it intends to maintain a debt to value ratio of 0.40. The yield on the company's bonds is 13.5 percent. The company's marginal tax rate is 35 percent.
9. Given the following book and market value data calculate WACC based on book value weights and market value weights. Assume suitable CAPM parameters.

	<i>Book value</i>	<i>Market value</i>
Long term debt (12 percent)	600,000	650,000
Preferred stock (15 percent)	150,000	180,000
Equity	250,000	470,000

10. Sushill Shyam Sundar is the finance manager of a biotechnology company. His company shares characteristics of *both* companies: pharmaceutical and specialized chemicals. So obtaining a pure play proxy beta is difficult. He reasoned: The beta of a company is dependent on fundamental factors like sales growth, investment in R&D, etc. He ran a regression program between unlevered betas of publicly traded pharmaceutical, specialty chemicals and biotechnology companies and the determinants of beta. The following regression result was obtained:

$$\beta_u = 2.348 + 0.214 * \text{Sales growth} + 0.687 * \text{R\&D/Sales} - 0.081 \ln(\text{capital}) + 0.394 (\text{NOPAT margin}) - 0.205 (\text{Sales/Capital})$$

His company has the following characteristics:

$\ln^{10} \text{Cap}$	<i>Sales growth</i>	<i>R&D/Sales</i>	<i>NOPAT margin</i>
10	25 percent	15 percent	25 percent

Estimate beta for the company.

11. The Electricity Regulatory Commission is in the process of estimating cost of equity for electric companies. The commission regulates the price per unit of electricity the electric company can charge and hence the return on equity (assuming that expenses are constant or increase in a definite fashion). The idea is to add a constant spread to the cost of equity to calculate the allowable return on equity and work backwards to calculate price per unit. The Commission decided to use the Gordon Model. The model requires estimation of constant dividend growth in the long run. Either the historic dividend growth rate or a forecast might be used. The officials reasoned that the growth rate in earnings and dividends is a function of: CPI inflation, yield on long term T-bond and growth rate in GDP. Using macroeconomic data the commission obtained the following regression results:

$$\text{Divgro} = 0.9671 + 0.7028 \text{ CPI inflation}$$

The other factors were found to be uncorrelated. If the forecast of inflation is 7 percent, what is the expected growth rate in dividends? Do you think this method is appropriate for other types of businesses?

¹⁰ Natural log.

Chapter 5

Financial Statements and Firm Value

OBJECTIVES

- ◆ Calculate all the significant financial ratios for firms and interpret them.
- ◆ Perform DuPont Analysis.
- ◆ Draw up funds flow and cash flow statements.
- ◆ Use financial information to predict financial distress.
- ◆ Prepare financial and cash flow forecasts.
- ◆ Understand the role of financial statement information in asset pricing.

Financial statements are reports of business performance of the company during the year, and are used by different groups of people for different purposes. Lenders are interested in financial statements, to assess the creditworthiness of the company; investors are interested in assessing the profit potential, bankers in fixing the working capital limit, academic researchers in the quality of disclosure, etc. Nobody would be as much interested as the managers of the company simply because their personal fortune and jobs are tied to the performance of the company. They would be interested, for example, in assessing the indebtedness of the company and when they come due in relation to cash flow available or the impact of extending credit to customers on the financial condition of the company. The set of analytical tools available is the same regardless of who you are; only the emphasis changes.

A company's management is responsible for anticipating future imbalances in the company's financial system before its severity is reflected in the company's financial statements. The starting point for a financial forecast is the formulation of management goals and product market strategy, which in turn determines the outlook for sales. The firm's strategy and sales growth will determine the investment in fixed assets and working capital to support these strategies. The effectiveness of these strategies coupled with competitive reaction will influence the company's financial performance and future need for finance. Needless to say future profitability is necessary for access to capital markets.

This chapter introduces introductory techniques like ratio analysis, funds flow and cash flow analysis and financial forecasting commonly used by managers and analysts to assess a firm's financial health.

HLL was formed in 1956 by the merger of Hindustan Vanaspati Manufacturing Company Ltd, Lever Brothers India, and United Traders.¹ The company offered 10 percent shares to the public in 1956. In the 1970s, Unilever diluted its stake to 51 percent to comply with FERA and other regulations.

¹ This section is drawn from CMIE's Prowess database.

The company diversified into chemicals and fertilizers in the 1980s. In 1993, Hindustan Lever acquired TOMCO, a manufacturer of soaps and detergents; and acquired Brooke Bond and Ponds India in 1996 and 1998 respectively. Here is a break-up of HLL's business:

- Soaps and detergents (43 percent)
- Personal products (11 percent)
- Beverages (tea and coffee) accounts for 20 percent
- Oils and vanaspati (7 percent)
- Animal feed stuff (3 percent)
- Dairy products (1 percent)
- Others (15 percent)

HLL has more than 100 brands and 50 manufacturing units. Its financial statements are presented in Exhibits 5.1(a) and 5.1(b).

Exhibit 5.1(a) Financial statements of Hindustan Lever Ltd

(Rs crore)

<i>Balance sheet</i>	<i>2000</i>	<i>2001</i>
Assets		
Gross fixed assets	1,669.75	1,889.45
Net fixed assets	1,158.24	1,302.55
Revalued assets	0.67	0.67
Leased assets	0.00	0.00
Investments	1,832.24	1,668.93
Marketable investment	935.61	586.83
In group/associate cos.	81.84	81.82
Quoted investment	935.61	586.83
Market value of Q.I.	969.97	593.85
Deferred tax	0.00	349.61
Inventories	1,182.09	1,240.05
Receivables	1,055.05	1,268.70
Cash and bank balance	522.09	913.15
Miscellaneous expenses		
Not written off	47.32	22.38
Total assets	5,797.03	6,765.37
Liabilities		
Net worth	2,488.24	3,043.69
Share capital	220.06	220.12
Bonus equity capital	131.69	131.69
Reserves and surplus	2,268.18	2,823.57
Direct addition to reserves	0.01	5.08
Total borrowings	111.60	83.73
Bank borrowings	55.54	24.70
Short-term	55.54	24.70
Other borrowings	56.06	59.03

Exhibit 5.1(a) contd.

Exhibit 5.1(a) contd.

	<i>(Rs crore)</i>	
<i>Balance sheet</i>	<i>2000</i>	<i>2001</i>
Current portion of long-term		
Debt	11.04	3.33
Secured loans	69.21	43.04
Unsecured loans	42.39	40.69
Deferred tax	0.00	103.13
Current liabilities & provisions	3,197.19	3,534.82
Total	5,797.03	6,765.37

Exhibit 5.1(b) Income statement of HLL

	<i>(Rs crore)</i>	
	<i>2000</i>	<i>2001</i>
Income		
Sales	11,458.30	11,861.77
Other income	305.99	283.14
Change in stocks	-83.85	-4.63
Non-recurring income	47.84	310.93
Expenditure		
Raw materials, stores, etc.	6,388.85	6,381.54
Indirect taxes	870.12	920.66
Excise duties	788.35	817.75
Repairs & maintenance	64.01	68.44
Selling and distribution expenses	1,161.85	1,302.27
Misc. expenditure	532.36	538.57
Non-recurring expenses	20.79	146.01
EBDIT	1,826.42	2,195.12
Interest	13.15	7.74
Depreciation	130.94	144.66
Tax	355.00	402.42
PAT	1,327.33	1,640.30

Published financial statements are an important source of financial information for investors, researchers, and analysts. Suppose you are an analyst—tracking HLL—and you have to find out whether HLL is a good ‘bet’. In other words, your assignment is to find if HLL is worth investing in at the prevailing market price. To ascertain a company’s financial performance, analysts calculate a number of financial ratios.

Financial Ratios and Financial Analysis

A ratio is a relationship between two numbers. Managers and analysts use a variety of balance sheet and income statement ratios to assess the financial health of a company. These ratios can be classified as:

- Liquidity ratios
- Coverage ratios
- Leverage ratios

- Operating ratios
- Profitability ratios

Ratios Measuring a Company's Liquidity and Indebtedness

Liquidity is a measure of the quality and adequacy of current assets to meet current obligations of the firm as they mature. Some liquidity ratios are discussed here:

Current Ratio

Computation: Total current assets divided by current liabilities:

$$\text{Current ratio} = \frac{\text{Total current assets}}{\text{Total current liabilities}}$$

This ratio is a rough indication of a firm's ability to service its current obligations.

Generally, the higher the current ratio, the greater is the cushion available to the firm. A higher ratio reflects the numerical superiority of current assets over current liabilities. However, it is prudent to look at the quality and composition of current assets in analyzing the firm's liquidity. Bankers normally impose a current ratio of 1.33 on companies.

Quick Ratio

Computation: Cash and equivalents plus trade receivables divided by total current liabilities:

$$\text{Quick ratio} = \frac{\text{Cash and equivalent} + \text{Trade receivables}}{\text{Total current liabilities}}$$

Quick ratio, a variant of the current ratio, measures the degree to which a company's current liabilities are covered by the most liquid current assets. Inventory is generally considered not too liquid and hence not included in the numerator. However, the portion of inventory that can be converted to cash fairly quickly can be included in the numerator. A ratio of less than 1 implies dependency on other current assets to liquidate short-term debt. This ratio is also called 'acid test' ratio. Highly liquid securities that can be converted to cash easily and bank deposits are considered cash equivalents.

COVERAGE RATIOS

These ratios measure the ability of the firm to service contractual financial commitments like debt. They make use of balance sheet and/or income statement numbers to estimate the cushion available (in earnings) to the firm before it defaults on contractual payments.

Interest Coverage Ratio

Computation: Earnings before interest and taxes divided by interest.

Meaning: This ratio measures the firm's ability to meet its interest (expense) obligation. A high ratio indicates a comfortable position as regards debt servicing ability. The figure in the denominator is the actual

interest expense taken from the income statement. It is to be noted that these ratios do not measure risk of default. The riskiness is measured by volatility of earnings (EBIT) which is dependent on the industry condition, profitability, etc. So a high ratio in one industry or during economic boom may be 'low' in another industry or during economic recession. Put differently, these ratios are forward looking in nature

Fixed Charges Coverage Ratio

Computation:
$$\frac{\text{Earnings before interest and taxes} + \text{Fixed charges like lease payments and current portion of long-term debt}}{\text{Fixed charges}}$$

Meaning: Fixed charges coverage ratio, a variant of interest coverage ratio, takes into account other fixed financial obligations of the firm while measuring the (financial obligation) servicing ability. It might be better to take cash flows rather than earnings in the numerator. Cash flow from operation = Profit after tax + non-cash charges like depreciation, amortization, and depletion.

DEBT RATIOS

These ratios measure the indebtedness of the firm. Firms with high amount of debt relative to equity are considered highly levered and are vulnerable to business downturns. It must be remembered that they vary according to the capital requirements of the business, stability of earnings, etc.

Debt/Net Worth

Computation:

Variant 1: Long-term debt divided by tangible net worth
(Share capital plus reserves and surplus).

Variant 2: Total liabilities divided by net worth.

Meaning: This ratio measures the amount of debt employed by the firm. It is a measure of financial risk. A high ratio is generally viewed as risky since the firm is vulnerable to recession. When earnings fall, the firm may have difficulty in servicing debt. The higher the equity contribution (owner's capital), the greater is the protection provided to creditors.

Debt/Total Assets

Computation: Long-term debt divided by total assets (balance sheet total).

Meaning: This ratio measures the amount of debt as a fraction of total capital employed.

Total Assets/Equity

Computation: Total assets (balance sheet total) divided by net worth.

Meaning: This ratio measures the extent to which equity has been invested in total assets. A variant of this ratio: Net fixed assets divided by equity.

Usually, only long-term debt is used in computation. A variant of this ratio incorporates short-term bank borrowings also.

Ratios Measuring Funds Management Turnover Ratios

These ratios are useful in ascertaining the efficiency of funds management. Some of the popular ratios are discussed here:

Sales/Receivables

Computation: Net sales divided by trade receivables.

This ratio measures the number of times trade receivables turn over during the year. The higher the turn-over of receivables, the shorter the time elapsed between sales and cash collection. Obviously, a firm should try to squeeze the lag between sales and cash collection. If the ratio is less than the industry average, quality of receivables should be examined. When sales are seasonal, as in the air cooler industry for instance, it may be inappropriate to take the figure for receivables on one date as the figure may not be representative of the pattern during the entire year.

Days' Receivables

Computation: Number of days in a year divided by sales/receivables ratio

$$= \frac{365}{\text{Sales / Receivables ratio}}$$

The figure expresses the average time in days that receivables are outstanding. Generally, the longer the time, the greater is the possibility of default. A comparison between the day's receivables ratio and the credit period offered by the company to customers will throw light on the efficiency of the collection process. As pointed out earlier, the ratio should not be calculated mechanically.

Cost of Sales/Inventory

Computation: Cost of sales divided by average inventory held.

This ratio measures the number of times inventory is turned over during the year. A higher ratio indicates better liquidity. A low inventory turnover ratio indicates poor liquidity and possible overstocking. It is to be noted that taking the value of inventory on one date may be inappropriate as the figure may not be representative of inventory held during the period at various points in time. When the inventory figure is small (the denominator), the ratio will be high leading to wrong conclusions.

Days' Inventory

Computation: No. of days in a year divided by (cost of sales/inventory) ratio.

It measures the period of time for which the items are in inventory. It is expressed in days.

Cost of Sales/Payables

Computation: Cost of sales divided by trade payables.

It measures the number of times payables turned over during the year. The higher the ratio, the shorter is the time between purchase and payment. Conversely, the smaller the ratio, the longer is the time between purchase and payment. It could be either because the firm is enjoying good credit terms or deliberately extending the credit period. As usual, the problem of seasonal fluctuations (of payables) is present in this ratio also.

Days' Payables

Computation: No. of days in one year divided by (Cost of sales : Payables) ratio.

$$= \frac{365}{(\text{Cost of sales / Payables})}$$

Meaning: It measures the average length of time for which average payables (debt) is outstanding.

Sales/Working Capital

Computation: Net sales divided by (current assets minus current liabilities)

$$= \frac{\text{Net sales}}{\text{Net working capital}}$$

Meaning: It measures the efficiency with which working capital is employed. A low ratio may indicate inefficiency and a high ratio may indicate efficient usage of working capital or over trading.

OPERATING RATIOS: HOW EFFICIENT IS THE COMPANY?

These are measures of financial efficiency, with which the firm employs capital—be it owner's capital or the total capital. Accordingly, there are two, commonly used measures: Return on Equity (ROE) and Return on Investment (ROI), depending on whose viewpoint you are analyzing.

Return on Equity

Computation: Earnings available for shareholders divided by Net worth.

i.e.,

$$\text{ROE} = \frac{\text{Profit after tax} - \text{Preference dividend (if any)}}{\text{Net worth}}$$

Meaning: This ratio measures the efficiency with which the firm employs owner's equity. It estimates profits per rupee of shareholder's funds.

Return on Assets

Computation:

Variant 1: Earnings before interest and taxes divided by total assets.

Variant 2: Earnings before interest and taxes (1 – tax rate) divided by total assets.

PROFITABILITY RATIOS

These ratios relate profit to sales. Some of the profitability ratios are:

1. Operating profit margin = $\text{EBIT} \div \text{Sales}$
2. Net profit margin = $\text{PAT} \div \text{Sales}$

Coming back to HLL, the ratios for HLL are presented here along with their definitions:

	2000	2001	Industry
A. Profitability ratios			
Profit margin (PAT/net sales)	12.28	13.48	
Return on assets (EBIT/total assets)	29.24	30.30	
Return on equity	56.66	53.35	

Table contd.

Table contd.

	2000	2001	Industry
B. Activity ratios			
Asset turnover	8	11	
Inventory turnover	6.86	6.60	
C. Leverage ratios			
Debt ratio (total debt/equity)	0.04	0.03	
Times interest earned	126.88	243.61	
Days' payable	91	96	
D. Liquidity ratios			
Current ratio	1.02	1.04	
Quick ratio	0.49	0.61	

Note: HLL operates on a very thin margin of working capital which often turns negative. This means that while it demands credit of anywhere between 60 and 90 days from its suppliers, it does not extend any credit and insists on immediate payment by its stockists and dealers. All the ratios for select companies are given in Appendix 1 at the end of this chapter.

Definitions of Ratios Used

ROA = [Net earnings + Interest (1 – Tax rate)]/Total assets (average)

ROE = Net earnings/Total stockholders' equity (average)

Asset turnover = Net sales/Total assets (average)

Days' receivable = Accounts receivable (average) × 365/Net sales

Inventory turns = COGS/Inventory (average)

Days' payables = Accounts payable (average) × 365/[COGS + This year's inventory
– Last year's inventory]

Current ratio = Current assets/Current liabilities

Quick ratio = [Cash + Accounts receivable]/Current liabilities

Debt-to-equity ratio = Total liabilities/Total shareholders equity

Debt to capitalization = Non-current liabilities/(Non current liabilities + Shareholders' equity)

Interest coverage = Income before interest and taxes/Interest expense

COMMON-SIZE FINANCIAL STATEMENTS

Common-sized balance sheet and income statements are prepared by dividing each entry with a common denominator such as total assets and sales respectively. The objective of preparing common size balance sheet and income statement is to ascertain the trends in proportions. For instance, if total currents have grown from 10 percent of total assets to 15 percent between the last year and the current year, one can investigate the reasons for changes in proportion. Exhibit 5.2 presents the common sheet financial statements for HLL.

Exhibit 5.2 Common size financial statements

	2000	2001
A. Common size balance sheet (as percentage of total assets)		
Total current assets (cash + receivables + inventory)	0.48	0.50
Gross fixed assets	0.28	0.27
Total borrowings	0.019	0.012
Total current liabilities	0.55	0.52
Total equity	0.42	0.44
B. Common size income statement (as percentage of total sales)		
Sales	1.00	1.00
SG&A	0.10	0.10
Depreciation	0.01	0.01
Interest	0.001	0.00
PAT	0.115	0.138

DuPont Analysis

The ROI is a function of operating profit margin and turnover. By decomposing major ratios, a more meaningful analysis of the underlying business drivers can be made. For instance, the figure representing total assets can be broken down into its components such as current assets and fixed assets to investigate why these ratios are what they are:

$$\begin{aligned}
 \text{ROE} &= \frac{\text{Net income}}{\text{Equity}} \\
 &= \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} \\
 &= [\text{Profit margin}] \times [\text{Asset turnover}] \times [\text{Financial leverage}]
 \end{aligned}$$

ROE can increase if any of these ratios increase. Decomposing ROE into its components throws light on the behavior of each of the component ratios over a period. As we shall see later, increasing financial leverage is beneficial only up to a certain extent. Reckless borrowing will destroy shareholder value.

$$\text{ROE} = [\text{ROA} + D/E\{\text{ROA} - i(1 - T)\}]$$

where

i = interest rate on debt,

T = tax rate,

D/E = debt–equity ratio, and

$\text{ROA} = \text{EBIT} (1 - T) / \text{Book value of total capital}.$

Injecting debt will increase the actual return on equity as long as ROA is greater than the after-tax cost of debt by an amount:

$$D/E[ROA - i(1 - T)]$$

This equation links ROE, ROA, D/E , tax rate and interest on debt:

$$\frac{\text{EBIT}}{\text{Assets}} = \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Asset}}$$

The key ratios for the companies in the automotive segment are shown in Exhibit 5.3.

Exhibit 5.3 Key ratios for automotive companies (in 1996)

Company	Turnover ratio	PM*	ROI	ROE
Ashok Leyland	1.06	0.1137	0.1208	0.1285
Bajaj Auto	1.68	0.2228	0.3750	0.4225
Eicher Motors	3.19	0.0826	0.2637	0.3299
Escorts Limited	1.13	0.1330	0.1508	0.1760
Hero Honda	4.21	0.0756	0.3181	0.4360
Hindustan Motors	2.26	0.0825	0.1861	0.2072
Kinetic Engg.	2.11	0.1002	0.2113	0.2696
M&M	2.08	0.1209	0.2511	0.3005
TELCO	2.09	0.1216	0.2544	0.3147
TVS Suzuki	5.29	0.1061	0.5612	0.7269

* Profit margin.

Performing DuPont Analysis is not that simple. How should ROA be measured? That is, what variables should be used in the numerator and denominator? EBIT, EBIAT, PBT, PAT are all candidates for the numerator. Likewise total assets and net assets (net of current liabilities) are candidates for the denominator. Further, the ratio itself has been referred to by a number of different names—return on assets, return on capital employed, return on investment, and so on. The most consistent definition of return on assets is:

$$ROA = \frac{\text{EBIT}}{\text{Net assets}}$$

where, Net assets = Fixed assets + Net working capital (excluding short-term debt).

The financial data of a hypothetical company is given in Exhibit 5.4. The rates of return on assets and equity have been tabulated thus:

$$\text{Return on assets} = \frac{\text{Pre-tax profit}}{\text{Sales}} \times (1 - \text{Tax rate}) \times \frac{\text{Sales}}{\text{Assets}}$$

	1997	1996	1995	1994	1993	1992	1991
ROA	6.49	7.02	7.16	6.85	5.30	4.72	6.32
ROE	16.4	17.3	17.1	16.8	12.8	11.5	14.8

As can be seen from the data, the rise and subsequent drop in ROE is due to decreasing tax rate, variability of asset turnover ratio and profit margin and an increase in leverage.

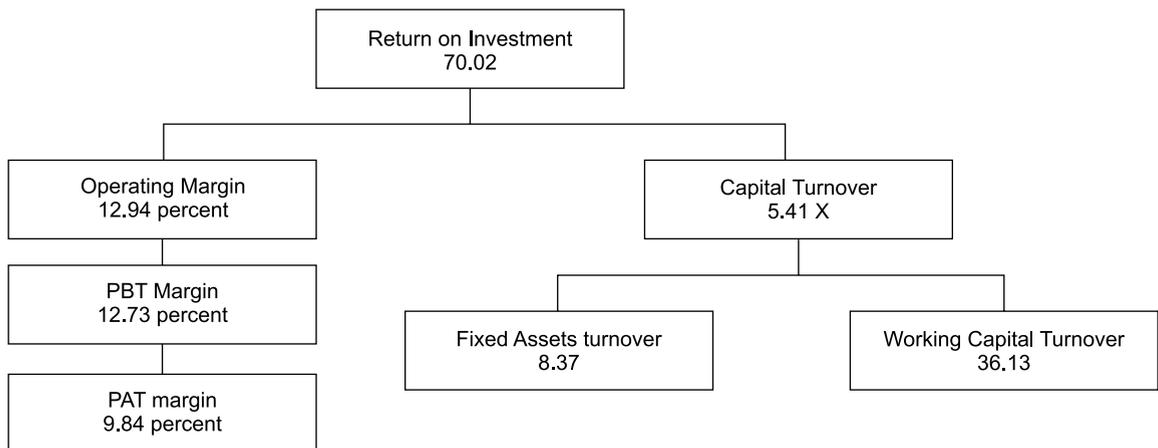
Exhibit 5.4 Financial data for Vishy Corp.

	1997	1996	1995	1994	1993	1992
Net income/ sales percent	4.53	5.05	5.18	5.0	3.76	3.29
Pretax profit/sales percent	7.46	8.73	8.76	8.4	6.35	6.0
Asset turnover ratio (X)	1.43	1.39	1.38	1.37	1.41	1.43
Total assets/ equity	2.53	2.47	2.40	2.46	2.43	2.43
Dividend payout ratio percent	47.9	46.5	47.9	52.9	71.6	84.5
Tax rate percent	38.2	41.3	40.6	40.0	39.7	45.7

PREDICTING DISTRESS

Lenders lend money in exchange for interest and principal payments over a specified period of time. Credit risk refers to the chance that the expectation will not be met. One approach to estimating default risk is to compute a composite risk measure based on a firm's financial ratios advocated by Altman (1968). His Z score model combines select financial ratios to come up with a score as follows:

DuPont Analysis of Hindustan Lever in 1999



$$\begin{aligned}
 Z = & 0.012 \times \text{Net working capital/Total assets} \\
 & + 0.014 \times \text{Retained earnings/Total assets} \\
 & + 0.033 \times \text{EBIT/Total assets} \\
 & + 0.006 \times \text{Market value of equity/Book value of liabilities} \\
 & + 0.999 \times \text{Sales/Total assets}
 \end{aligned}$$

A high Z score represents a low probability of default and a low Z score represents a high probability of default. The model's classification accuracy was 95 percent one year before bankruptcy, and 72 percent two years before that. Accuracy of the model decreases as the time period is extended (it may also be unreliable in its predictive ability). Based on the study, it was concluded that firms with a Z score less than 1.81 are all bankrupt, while those with Z scores greater than 2.99 fall into the non-bankrupt group. Those falling into the area between 1.81 and 2.99 require more analysis to determine their solvency status. The non-liquid asset ratios like total debt to total assets and cash flow to total debt are, in general, better predictors of bankruptcy than the liquid assets ratios like quick ratio or net working capital to total assets.

Managers may use distress prediction models as a first step to understand the solvency status of their firms. A low Z score (below 1.81) itself does not suggest that bankruptcy will occur. A firm may avoid bankruptcy by cash infusion and/or waiving of loan covenants by lenders.

Funds Flow Statement

A balance sheet gives us the snapshot of the financial condition of a firm measured on a particular date (say financial closing date). It is a stock concept. An income statement, on the other hand, is a flow concept. It tells us how the owners' equity changed during the accounting year. A third statement, called the funds flow statement, shows the sources from which funds were raised between two balance sheet dates and how they were deployed. Funds flow statement is also called statement of changes in financial position. It enables us to answer such questions as:

- How did the firm finance capital expenditure? Was it by way of equity or debt or some combination?
- How is the firm financing its dividend payments? How was it possible to distribute dividends in excess of profits for the current year?
- Is the company building up or slashing down inventory?

Preparation of Funds Flow Statement

All increases in liabilities and decreases in assets are sources of funds and all decreases in liabilities and increases in assets are uses (application) of funds. Source of funds will always be equal to uses of funds. To prepare a funds flow statement, place two balance sheets of two dates side by side and note down all changes. Then segregate them into sources and uses of funds.

The sources of funds are:

1. Net income
2. Funds from depreciation
3. Issue of capital stock in cash
4. Term loans from FIs, proceeds from selling debentures, public deposits
5. Sale of fixed assets and investments
6. Reduction in other assets (current and non-current)
7. Decrease in marketable securities
8. Increase in notes/accounts payable/deferred tax/employee benefits/deferred credits

The uses of funds are:

1. Cash loss, i.e., loss before providing for all non-cash expenses
2. Capital expenditure
3. Investment in other companies
4. Dividends paid
5. Redemption of term loans and repayment of other liabilities
6. Liquidation of other liability (current and non-current)
7. Acquisition of other assets (current and non-current)

The funds flow statement has two portions—one that tracks the movement of funds in the long-term account comprising non-current assets and non-current liabilities, and the other tracks the movement of funds in the short-term account, i.e., amongst current assets and current liabilities. Ideally, there should be a surplus in the long-term account which is used as margin money towards working capital. A deficit in the long-term account may mean that the management has diverted short-term funds to long-term uses, which is a bad practice. Of course, it could be temporary. For instance, a company may be awaiting the proceeds of a sale of debenture or term loan. In the interim some short-term sources may be tapped to bridge the gap. A company should match long-term sources and long-term uses. For instance, capital expenditure may be financed by equity or long-term debt or some combination. Funds flow analysis throws light on major corporate financial policies like dividend policy, capital investment, financing mix, etc. The funds-flow statement should be coupled with other techniques like ratio analysis to make meaningful judgment about the company's performance.

The prediction of business failure on the basis of financial ratios has its limitations in the sense that the choice of ratios is not based on some theory of financial failure and hence the model cannot be generalized. Consequently, some researchers have developed cash based funds flow model since financial value is dependent on future cash flow.² In other words these studies have tried to find out if the pattern of a firm's cash inflows and outflows can differentiate between financially successful and failing firms. In these models each component of funds flow (e.g., inventory or accounts receivable) is expressed as fraction of total net flow (= inflows = outflows) to determine the percentage of each component to the total. The mean and standard deviation of funds flow components of failed and non-failed firms are compared to see if there is any pattern. The standard deviation of failed firms is usually substantially larger than non-failed firms. These studies have found that funds flow components provide a reliable signal for discriminating between failed and non-failed firms.

Cash Flow Statement

A funds flow statement is a broader concept than the cash flow statement in the sense that it reflects changes in all accounts including cash. A cash flow statement tries to explain the change in cash position between two balance sheet dates. Thus, an increase in plant and machinery will be recorded as a use in funds flow statement but may not be recorded in cash flow statement if it does not involve a cash outlay during the

² Gentry, James, Paul Newbold, and David Whitford (1987). 'Fundflow Components, Financial Ratios and Bankruptcy', *Journal of Business Finance and Accounting*, Vol. 14, No. 4.

period. In short, non-cash transactions do not enter the cash flow statement. The net cash flow is simply the net of all inflows and outflows during the period. The cash flow statement is helpful in a number of situations where cash flows are important. These include:

- Analysis of credit proposals.
- Firm's need for external financing and the use of its long-term debt.
- Firm's ability to meet current and long-term cash obligations.
- Ability of the firm's operations to generate cash.

Thus,

$$\begin{aligned} \text{Cash balance at the beginning of the year} + \text{Net cash flow during the year} \\ = \text{Cash balance at the end of the year.} \end{aligned}$$

There are two ways of arriving at the net operating cash flow: direct and indirect methods. Under the direct method all cash inflows are recorded during the period and all outflows are deducted to arrive at the net cash flow. The net cash flow could be either positive or negative depending on whether the company has generated or consumed cash. Consider a hypothetical company that starts with Rs 1,000 in hand. During the period, the company pays its suppliers, workers, etc., amounting to Rs 600. Customers pay Rs 700 during the period.

$$\begin{aligned} \text{Net cash flow} &= -600 + 700 = \text{Rs } 100 \\ \text{Cash balance at the end} &= \text{Rs } 1,100 \end{aligned}$$

The cash flow statement is usually prepared for the year although any other duration may be chosen. Net profit is not the same as cash flow. The financial statements are prepared on the accrual basis of accounting. For instance, sales are recorded when products are sold even if customers do not pay cash immediately or salaries are recorded as expense even when in reality the actual cash outflow is in the next period (say, the beginning of next month). The cash flow statement is designed to analyze the underlying cash flow position. Cash flow might be higher or lower than the net profit figure. The direct method illustrated above is simple and straightforward but time consuming. Managers of the company who have intricate details of the transactions can use it. The indirect method arrives at the same result in a circuitous way. Starting with the net income figure, a series of adjustments are made to transform the net income into cash flow from operations.

To arrive at the cash flow (from operation) from net income:

- Add back expenses that do not involve cash outflow.
For example, depreciation, amortization.
- Subtract cash outflows not treated as expenses.
For example, capital expenditure (machines, land, etc.).
Increase in inventory involves outflow but not recorded as expense.
- Subtract revenues that do not involve cash inflow.
For example, sales on credit, i.e., increase in a/c rec.
Increase in accrued interest earned.

It is useful to classify cash flows on the basis of activities. The standard practice for preparing the cash flow statement is to classify activities—into operating, investing, and financing activities—and record cash flow under each heading. A manager or an analyst can make useful interpretations like: Where is the

cash coming from? How is it being used? What are the levels of and trends in cash flows from the three types of activities?

Cash flow from operations
 + Cash flow from investment activities
 + Cash flow from financing activities
 + Net effect of exchange rate changes on cash
 = Net increase (decrease) in cash.

Operating activities are related to the firm's ongoing ability to generate cash from operations. This includes information on cash receipts from customers for sales and service, cash payments related to vendors, employees, taxes and interest. The net of all these, gives the cash flow from operations.

Investment activities relate to change in non-current assets. This includes information on capital expenditure to acquire fixed assets and proceeds from sale of non-current assets. Only cash transactions get reflected. Financing activities relate to changes in borrowings and owners' equity. This includes information on cash proceeds from issuing equity and short-term and long-term debt, and cash outflow due to repurchase of shares. Dividend payment is also a financing activity. Exhibit 5.5 shows a pro forma cash flow statement.

Cash flow from operating activities shows the result of cash inflows and outflows due to the fundamental operations of the company like cash receipts from sale of goods and services, payment of rent and taxes, purchase of inventory, etc. Note that cash from operating activities is arrived at in the 'indirect format'—in the sense that, it starts with the net income figure and adjustments are made. The direct format for preparation of cash flow from operations is prepared by deducting cash outflows from cash inflows to arrive at net cash flows. Cash flows from investing activities are cash flows associated with purchases and sales of non-current assets such as building and equipment, etc. The section also contains purchase and sale of short-term investments. Cash flows from financing activities include issuance and repayment of debt, issuance of common stock, the payment of dividends. Interest on debt, however, is clubbed under cash from operating activities. The cash flow statements of three companies are given in Exhibit 5.6; look at them, before reading further, and rank them on a 5 point scale—with 1 being the worst position, and 5 being the best. Cash flow from operating activities provides cash necessary for replacement of assets and payment of dividends. The cash flow pattern depends on the nature of business and the life-cycle of the company. Start up companies in high growth industries will have negative cash flow because of high capital expenditure in relation to the level of earnings. The gap is to be met by selling debt or equity. Established growth companies can meet their investment requirements from internally generated funds. Mature companies will have modest capital expenditure requirements.

Exhibit 5.5 Statement of cash flows

Cash flow from operating activities

Net income	xxxxx
Adjustments to reconcile net income to net cash provided by operating activities:	
Depreciation and amortization	
Changes in other accounts affecting operations	
(Increase)/decrease in accounts receivable	
(Increase)/decrease in inventories	
(Increase)/decrease in prepaid expenses	

Exhibit 5.5 contd.

Exhibit 5.5 contd.

(Increase)/decrease in accounts payable	
(Increase)/decrease in taxes payable	
Net cash provided by operating activities	xxxx
Cash flow from investing activities	
Capital expenditures	
Proceeds from sale of equipment	
Proceeds from sale of investments	
Investment in subsidiary	
Net cash provided by financing activities	xxxx
Cash flow from financing activities	
Payments of long-term debt	
Proceeds from issuance of long-term debt	
Proceeds from issuance of common stock	
Dividends paid	
Purchase of treasury stock	
Net Cash provided by (used in) financing activities	xxxx
Increase (decrease) in cash	xxxx

Their cash flow from operations will be slightly more than the reinvestments. Firms in the declining phase will have surplus cash from operations, which could be returned to shareholders, and to pay off debt for revitalized product lines. Turnarounds are characterized by cash inflows due to freeing up of assets and income statement losses. Thus, the cash flow pattern indicates the position of a company in its business life-cycle the nature of its model. To start with, cash flow from operations should be positive and growing.

Second, see whether the company is investing to grow, i.e., whether investments are more than depreciation. Healthy companies typically purchase more assets than they sell. So cash flow from investing will usually be negative. To judge whether a company is doing well or not one must use evidence from all pieces and put them together. Let us apply what we have learnt so far to the three companies presented in Exhibit 5.6. If we were to choose Company-3 for the sake of illustration: What are the major sources and uses of cash for this company? What does the company do with the cash? Does it invest adequately? Here are some salient features:

	1999	2000	2001
Major source	Loan proceeds Revenue inflow Decrease in working Capital	Decrease in W.C. Non-op. Income	Dec. in W.C. Revenue inflow
Major uses	Purchase of fixed assets Interest	Purchase of F.A. Interest Repayment of loans	Purchase of F.A. Interest Repayment of loans
CFO > NI	Yes	Yes	Yes
Trends in Income	–	Losses have increased	Decrease in loss
CFO	–	Up	Down
Dividends	Yes	No	No
Net borrowing	Borrowed	Repaid	Repaid
Working capital	Decreasing	Decreasing	Decreasing

Exhibit 5.6(a) Cash flow statement of Company-1

(Rs crore)

	Company-1		
	1999	2000	2001
Opening balance	4.06	6.84	378.66
Revenue inflow	50.63	73.59	81.98
Non-operating income	1.7	2.63	19.45
Sale of fixed assets	0.12	0.53	28.73
Sale of investments	0	0	7.99
Capital proceeds	0	372.15	0
Loan proceeds	57.93	88.92	0
Decrease in working capital	8.58	33.95	0
Trade receivables	4.24	0	0
Inventories	0	0	0
Trade payables	4.34	33.95	0
Total cash inflow	123.02	578.61	516.81
Application of cash			
Purchase of fixed assets	72.45	95.7	59.36
Purchase of investments	6.53	2.04	172.74
Repayment of loans	0	0	176.85
Loans to group companies	0	0	0
Loans to other companies	0	0	0
Interest paid	6.69	17.45	14.27
Tax paid	2.87	6.77	6.58
Dividends	12.69	1.45	15.57
Other cash expense	0.03	13.27	0
Increase in working capital	14.92	63.27	29.57
Trade receivables	0	55.17	7.58
Inventories	14.92	8.1	13.04
Trade payables	0	0	8.95
Closing balance	6.84	378.66	41.87
Total cash outflow	123.02	578.61	516.81
Increase/decrease in cash	2.78	371.82	-336.79
Balance			

Exhibit 5.6(b) Cash flow statement of Company-2

(Rs crore)

	Company-2		
	1999	2000	2001
Opening balance	51.14	416.65	508.37
Revenue inflow	194.74	335.9	785.65
Non-operating income	10.73	36.62	38.47
Sale of fixed assets	0.02	0.1	0.23
Sale of investments	6.06	0	0
Capital proceeds	279.53	1.76	2.38
Loan proceeds	0	0	0
Decrease in working capital	33.82	42.26	60.93
Trade receivables	0	0	0
Inventories	0	0	0
Trade payables	33.82	42.26	60.93

Exhibit 5.6(b) contd.

Exhibit 5.6(b) contd.

	<i>Company-2</i>		
	<i>1999</i>	<i>2000</i>	<i>2001</i>
Total cash inflow	576.04	833.29	1396.03
Application of cash			
Purchase of fixed assets	71.68	159.87	463.35
Purchase of investments	0.75	13.08	26.65
Repayment of loans	0	0	0
Loans to group companies	0	0	0
Loans to other companies	0	0	0
Interest paid	0	0	0
Tax paid	16.79	35.52	85.18
Dividends	10.2	19.93	42.2
Other cash expense	0	3.36	0
Increase in working capital	59.96	93.16	200.91
Trade receivables	59.96	93.16	200.91
Inventories	0	0	0
Trade payables	0	0	0
Closing balance	416.66	508.37	577.74
Total cash outflow	576.04	833.29	1396.03
Increase/decrease in cash	365.52	91.72	69.37
Balance			

Exhibit 5.6(c) Cash flow statement of Company-3*(Rs crore)*

	<i>Company-3</i>		
	<i>1999</i>	<i>2000</i>	<i>2001</i>
Opening balance	620.88	383.9	392.68
Revenue Inflow	1,327.11	728.45	1,933.98
Non-operating income	0.21	646.18	75.28
Sale of fixed assets	6.43	32.61	37.96
Sale of investments	171.18	9.82	0
Capital proceeds	0	0	0
Loan proceeds	1,002.64	0	0
Decrease in working capital	811.01	2,782.03	1,125.44
Trade receivables	0	249.69	65.33
Inventories	768.19	2,172.08	104
Trade payables	42.82	360.26	956.11
Total cash inflow	3,939.46	4,582.99	3,565.34
Application of cash			
Purchase of fixed assets	1,361.08	814.23	326.77
Purchase of investments	0	0	-332.31
Repayment of loans	0	1,367.84	831.73
Loans to group companies	0	0	0
Loans to other companies	0	0	0
Interest paid	1,938.83	2,004.66	2,072.32
Tax paid	-44.67	0	0
Dividends	45.43	0	0
Other cash expenses	73.2	3.58	-0.6
Increase in working capital	181.69	0	0

Exhibit 5.6(c) contd.

Exhibit 5.6(c) contd.

	Company-3		
	1999	2000	2001
Trade receivables	181.69	0	0
Inventories	0	0	0
Trade payables			
Closing balance	383.9	392.68	667.43
Total cash outflow	3,939.46	4,582.99	3,565.34
Increase/decrease in cash balance	-236.98	8.78	274.75
PAT	-1,617.32	-2,221.53	-1,057.46

Despite a whopping loss in all the three years (Rs -1,617.32 crore, Rs -2,221.53 crore, Rs -1,057.46 crore), the cash flow is positive due to non-operating income, loan proceeds and a decrease in the working capital. Much of the cash generated is paid off as interest and principal. Further, the company has skipped dividends because of cash flow difficulties. The liquidation of working capital may mean two things: the company is improving efficiency or it is not able to sell goods. What is your assessment of the company: Good? Bad? Ugly? Bad, perhaps. We are talking about the Steel Authority of India (SAIL), the public sector giant, considered a model public sector unit (PSU) at one time, now struggling to regain lost ground. After Independence, in 1947, the Government of India (GoI) assumed responsibility of developing the core sectors such as steel, setting up three plants in the 1950s and one in the 1960s. SAIL is one such government owned PSU, formed as a holding company in January 1973, for other companies manufacturing steel and related products. The shares held by the GoI in various steel companies—such as Hindustan Steel, Bokaro Steel, Hindustan Steelworks Construction, Salem Steel, and National Mineral Development Corporation—were transferred to SAIL. In October 1976, the Durgapur, Rourkela, and Bhilai steel plants were transferred from Hindustan Steel to become fully-owned subsidiaries of SAIL. SAIL currently operates four integrated steel plants (one each at Bhilai, Rourkela, Bokaro, and Durgapur), one alloy steel plant (at Durgapur) and one stainless steel plant (at Salem). Currently (at the time of writing this) SAIL is the world's 11th largest steel company. During the early-1980s, the company faced several problems and incurred losses. V. Krishnamurthy, the then Chairman of SAIL, turned the company around between 1985 and 1990, through massive modernization aimed at enhancing the proportion of steel made by the more efficient basic oxygen furnace method instead of the older, open-hearth method.

SAIL incurred an expenditure of Rs 9,850 crore between 1988 and 1992, for this modernization. During the initial years of liberalization, the company performed very well and was often cited as an example of a PSU which did well post-liberalization. However, this did not last long and, by 1997–98, SAIL was back into the red; one of the worst performers among all PSUs. Ironically, the modernization programs at two of its plants became a drain on SAIL. The most important was the implementation delay of 4–6 years that led to huge cost overruns, and resulted in high interest and depreciation costs. For instance, the expenditure at both Durgapur and Rourkela plants shot up by over 100 percent (to approximately Rs 100 crore) each.

That forced SAIL to raise resources through market borrowings. Consequently, its debt burden catapulted from Rs 100 crore in 1989–90, when the two programs were finalized, to Rs 400 crore a decade later; interest costs rose by seven times, to more than Rs 50 crore. The second reason for the modernization programs to become a drain on SAIL was that they were based on wrong assumptions. One report revealed that the requirement of hot metal in the post-modernization period would be 2 million tonnes per annum but no attempt was made to increase the annual capacity of the blast furnaces, assessed at 1.35 million tonnes per annum. So the

entire downstream investment proved to be futile. Currently SAIL is undergoing massive restructuring, under the guidance of McKinsey & Co.

What is your assessment of Company-1 and Company-2? Company-1 is Cadila Healthcare, a pharmaceutical company manufacturing cardio-vascular drugs, antibiotics, etc. The company made an initial public offering of shares in the year 2000. Company-2 is Infosys Technologies, one of the best known corporate success stories so far.

The Link between Cash Flows and Firm Value

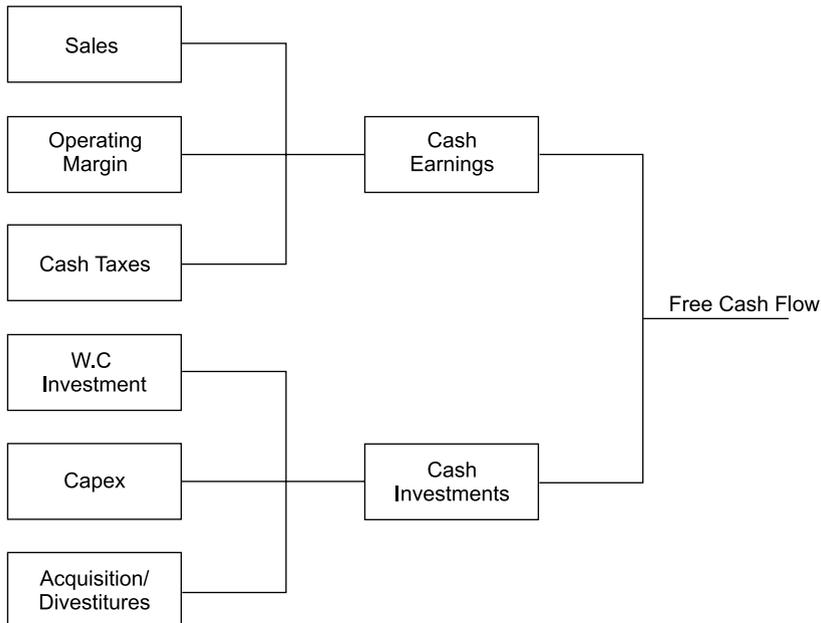
The value of a firm is equal to the present value of future cash flows.³

$$V = \sum_{t=1}^{\infty} (\text{Cash flow}_t) / (1+k)^t$$

where, cash flow = $\text{EBIT}(1 - T) + \text{Depreciation} - (+) \text{ increases (decreases) in working capital} - \text{Capital expenditure}$; and $k = \text{Discount rate} = \text{WACC}$.

Since the value of the firm is determined by the cash flow it generates, an analysis of the drivers of cash flow (Exhibit 5.7) would be useful. The value of the firm can also be rewritten as present value of free cash flows, discounted at cost of unlevered equity plus the present value of debt tax shields discounted at cost of

Exhibit 5.7 Drivers of cash flow



³ These concepts will be explained in greater detail in the chapters that follow.

debt. While sales growth, gross margin expenses and tax rate determine NOPAT, the incremental working capital investment can be determined by days' receivable, days' inventory, and days' payable. Investors care about the cash economics of the business because they determine the magnitude, timing and riskiness of future cash flows. Because New Economy companies like Amazon.com and Yahoo! have dramatically different cash flows than Old Economy companies like Unilever, we would expect them to have dramatically different valuations as well. This is indeed the case. Other things being equal: larger the cash inflow from cash investments, more valuable the company. Conversely, a larger cash outflow from cash investments translates into lower valuation. Internet companies usually have significantly less investment needs than their Old Economy counterparts.

Financial Forecasting

Techniques like ratio analysis and funds flow analysis are used to evaluate past performance. Financial forecasting involves development of financial models to look into the future. There are three principal components of financial planning:

- Preparing proforma financial statement
- Preparing cash flow estimates
- Preparing cash budgets

We shall discuss the first two, in this section. Financial planning is essential to all companies regardless of their sizes. Since the common denominator in business is money and money needs to be managed well, it is imperative for not only the finance manager but also all concerned executives to plan and prepare for the future. A financial plan is only one part of the story. The other components of the overall plan include marketing strategy, production plan, etc. A financial plan is supposed to throw light on the capital investment and financing needs of the firm given its growth objective (and try to match the two). The preparation of proforma financial statements is one of the most widely used financial forecasting techniques. As the name suggests, it is the projection of what the financial statements look like at the end of the forecast period, say, 1–5 years. The projection (of financial statements) involves prediction of each of the variables that you find in the balance sheet and income statement. The simplest way to forecast financial statement would be to express all income statement and balance sheet numbers as percentage of sales and given the sales forecast for the next period find the values of all variables using the historic relationship between the variable and sales. Obviously, not all variables will have a strict, direct relationship to sales.

For instance, the level of current assets may have a relationship with sales but depreciation may not. A better strategy is to use a combination of individual forecasting and percentage of sales forecasting. Once the projected financial statements are ready, a sensitivity analysis could be conducted to test the implication of variation in sales. It should be noted that when we find the ratio of, say, current assets and sales, we are assuming that there is a direct, linear relationship between the two. In real life situations, it might be prudent to generate intensive discussion among concerned executives rather than blindly extrapolate ratios.

The following steps are involved in percent-of-sales forecasting:

- Prepare a sales forecast.
- Establish relationship between sales and other relevant financial variables (hence the name percent-of-sales forecasting) and extrapolate.
- Estimate the values of variables that do not have a direct relationship with sales individually.

The following guidelines would be useful in financial forecasting.

1. Forecast the volumes (in terms of the number of units) and average price realization for the planning horizon. The product of the two gives sales in rupees. It might be useful to bifurcate domestic and export sales wherever applicable.
2. Retained earnings in year t = $RE_{t-1} + PAT_t - Div_t$
3. Raw materials and consumables, cost of power, selling expenses generally vary as percentage of sales.
4. Wages and salaries, factory overheads; administration, selling and distribution overheads are fixed in nature.
5. Forecast the percentage increase in fixed costs beyond the first year.
6. Estimate the current asset requirements as percentage of sales. The individual components of current asset, viz., cash, inventory may be expressed as percentage of current asset (or the company may have a policy of maintaining, say, 30 days inventory, etc. Use this information to forecast).
7. Estimate current liabilities as a percentage of current assets.
8. Depreciation schedule of fixed assets needs to be drawn up to estimate the amount of depreciation in each of the years.
9. Use the marginal tax rate to calculate profit after tax.
10. Ending equity = Beginning equity + Retained earnings for the year + Share capital issued if any.
11. Draw up the loan amortization schedule and then calculate the value of long-term liabilities for each of the years.
12. Calculate interest on the outstanding amount at the stated percentage rate.

The percent-of-sales forecasting model provides an estimate of the amount of external financing that is needed in the coming year to support the expected growth of the company.

External funding requirement = Increase in assets required to support the increase in sales – [Additional funds provided by spontaneous current liabilities like accounts payable + Proforma increase in retained earnings]:

$$= [(A_t/S_t) \Delta S_{t+1}] - [(L_t/S_t) (\Delta S_{t+1}) + E_{t+1} - D_{t+1}]$$

where

A/S is asset intensity, ΔS_{t+1} = increase in sales,

E is the expected increase in earnings after taxes,

D is total dividends, and

$(L_t/S_t) (\Delta S_{t+1})$ is the additional funds provided by spontaneous current liabilities.

This formulation assumes that a company's capital investment is closely associated with the next year's sales. The capital budgeting process defines expected increase in fixed assets as the sum of capital expenditures plus other necessary expenditures and there need not be a proportional relationship between fixed assets and sales. Consequently, the formulation can be rewritten as:

$$\text{External funding requirement} = [(CA_t/S_t) (\Delta S_{t+1}) + \Delta FA_{t+1}] - [(L_t/S_t) (\Delta S_{t+1}) + E_{t+1} + \text{Dep}_{t+1} - D_{t+1}]$$

where

$(CA_t/S_t) (\Delta S_{t+1})$ is the forecast of change in current assets,

ΔFA_{t+1} is the total capital expenditure planned for $t + 1$, and

Dep_{t+1} is the depreciation expense expected in the forecast period.

Cash Flow Forecasting

A cash flow statement is an ex-post statement of net cash flows from operating, investing, and financing activities of a company prepared from two balance sheets. A cash flow forecast is a forward looking financial planning tool. To prepare a cash flow forecast, predict the cash proceeds and cash disbursements during the period. The excess of cash outflow over cash inflow is the external funds requirement.

$$\text{External fund requirement} = \text{Total uses} - \text{Total sources}$$

Whether a company has external financing need depends on sales growth, length of cash cycle and future level of profitability and profit retention. Those companies with high sales growth, long cash cycle and low profitability will have to seek external financing frequently. (Why?) High growth in sales need not always result in a need for external finance. A company that extends no credit to customers or carries few current and fixed assets can experience rapid sales growth without seeking external finance as long as it is reasonably profitable. Because the company has few assets, the increase in total assets is largely offset by a corresponding increase in current liabilities.

To fix the idea consider an example. In order to equip itself with high-tech capabilities, a telecom company is making massive capital investments. The forecast of the same is given here:

<i>(Rs crore)</i>			
<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998–2001</i>
121	115	89	270

The company currently earns Rs 46.4 crore after-tax (PAT). The company expects PAT to grow at 25 percent per annum for the next three years, and decline to 15 percent for the next four years. The company is currently paying 80 percent of its earnings as dividend and feels that the same payout should be continued. Assume the following figures for depreciation: Rs 20 crore, Rs 26 crore, Rs 30 crore for the next three years; and Rs 150 crore for the following four years (cumulative).

$$\text{Sources of funds} = \text{Net income} + \text{Depreciation}$$

$$\text{Uses of Funds} = \text{Capital expenditure} + \text{Incremental net working capital} + \text{Dividends}$$

$$\text{External fund requirement} = \text{Sources} - \text{Uses}$$

The forecast of sources and uses of funds and the external funding requirement is given here:

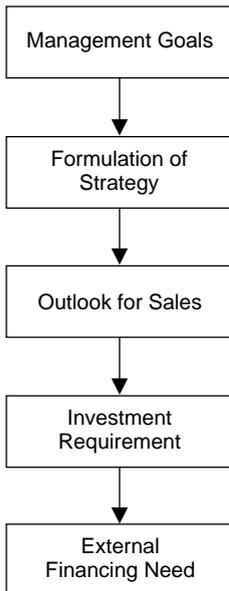
Sources				
Profit after tax	58	73	91	522
Depreciation	20	26	30	150
Total	78	99	121	672
Uses				
Capex	121	115	89	270
Inc. W.C. ⁴	15	20	30	50
Dividends ⁵	46	58	73	418
Total	182	193	192	738
External funding need (annual)				
	104	94	71	66

⁴ Assume the following figures. In reality you will have to estimate working capital on the basis of target current ratio, lending bank's norms and sales growth.

⁵ Eighty percent profit after tax.

The company needs close to Rs 335 crore in the next seven years. Having estimated the future financing need, the management must identify the sources of finance and establish financial policies that will ensure continuous access to capital markets on acceptable terms. The last step involves analysis of viability of the plan, determination of debt—equity mix consistent with the company’s debt policy and stress testing the plan. Sensitivity analysis refers to the analysis of sensitivity of profitability and other financial variables to changes in sales. Sensitivity analysis involves observation of changes in financial forecast for changes in underlying variables. For instance, if the growth in profit after tax for the company mentioned in the previous example were to be only 15 percent throughout, what would happen to EFR? Financial ratios?

The steps involved in forecasting and planning is summarized in the following diagram:



Financial Statements and Asset Pricing

The value of a company’s equity is a function of cost of equity which in turn depends on beta. As pointed out in chapter 5, some studies in America have reported theoretical links between financial leverage and beta and variance of security returns. The higher the financial leverage, the higher is the beta. Likewise few other studies have shown that the higher the operating leverage (ratio of fixed to variable costs), the higher the beta. Other factors like debt: equity ratio, preferred stock to equity ratio, sales to equity ratio, current ratio, standard deviation of earnings to price ratio also seem to be highly correlated with estimates of beta derived from security returns. Stock markets price a company’s securities on the basis of financial information released to the market. A manager would be interested in knowing, for instance, how stock markets react to earnings announcements. Does the release of financial information have any influence on trading volume and so on? Studies in America suggest that:

- The release of interim and annual earnings is associated with both increased trading volume and increased return variability.

- The sign and magnitude of the unexpected earnings change is positively correlated with the sign and magnitude of security returns in the two trading days immediately surrounding the earnings announcements.
- Significant positive association exists between magnitude of forecast deviation and magnitude of abnormal returns in the period immediately around forecast disclosure date.
- Firms that increase dividends or announce special or extra dividends or initiate dividend payments for the first time experience positive abnormal returns.

IN CONCLUSION

This chapter was designed to introduce you to the use of ratio analysis, preparation of cash flow and funds flow statements. These tools find extensive application in appraising credit risk, capital structure planning and financial planning. The funds flow statement is a country cousin of the cash flow statement. The following format is prescribed for preparation of cash flow statement:

Net income
Add: Depreciation
Less: Capital expenditure
Less: Increase in non-cash working capital
Add: Decrease in non-cash working capital
Less: Principal (loan) repayments
Add: New borrowings
Add: Increase in short-term debt and notes payable
<hr/>
Net change in cash
Add: Beginning balance
<hr/>
Closing balance

APPENDIX 1: KEY FINANCIAL RATIOS FOR SELECT COMPANIES IN 2000

	<i>HLL</i>	<i>Wipro Ltd</i>	<i>RIL</i>	<i>TISCO</i>	<i>TELCO</i>
R.M. turnover	7.16	9.21	36.34	9.49	22.15
F.G. turnover	13.62	23.67	23.03	9.88	15.28
Debtors turnover	51.46	6.22	24.39	5.62	7.14
Creditors turnover	4.30	9.16	5.24	4.0	4.33
Net sales/ total assets	2.12	1.90	0.68	0.61	0.83
Quick ratio	0.47	0.82	0.90	0.42	0.29
Current ratio	1.12	1.27	1.65	0.98	0.82
D/E	0.08	0.09	1.03	1.69	1.01
W.C./sales (percent)	3.26	6.81	14.53	0	0

Table contd.

Table contd.

	HLL	Wipro Ltd	RIL	TISCO	TELCO
EBIT/interest	63.16	11.23	3.36	1.64	0.99
PAT/net sales (percent)	10.67	12.91	13.24	6.46	-2.75
PAT/net worth (percent)	56.61	53.47	22.60	13.78	-6.62
EBDIT/capital employed (percent)	76.37	72.43	22.31	16.52	12.23

Source: Prowess Database.

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CONCEPT TEST

State whether the statements are true (T) or False (F):

1. A firm with high ROE is necessarily better than that with low ROE.
2. $ROA = \text{Gross profit margin (percent)} \times \text{Asset turnover}$.
3. $ROE = ROA \times \text{Financial leverage}$.
4. Return on equity measures the efficiency with which the firm employs total capital.
5. Return on assets is a basic measure of the efficiency with which a company allocates and manages its resources.
6. $\text{Asset turnover} = \frac{\text{Sales}}{\text{Assets}}$.
7. Financial leverage refers to employing debt in the capital structure.
8. Return on equity increases as long as the return on assets is more than the post tax interest cost of debt.
9. Interest or fixed charges coverage measures the cushion available to the firm in servicing fixed financial obligations.

QUESTIONS

1. The balance sheets and income statements for Avon Granites (identity has been disguised) are given here:

(Rs crore)

	<i>Income statement</i>		
	<i>1996</i>	<i>1997</i>	<i>1998</i>
Net sales	180.0	283.50	297.68
Cost of sales other than depreciation	118.16	157.95	165.50
Depreciation	5.50	10.50	10.50
Add: Opening stock	–	9.01	9.35
Deduct: Closing stock	9.01	9.35	9.74
Cost of production	114.65	168.11	175.61
Cost of sales	105.64	167.77	175.22
Gross profit	74.36	115.73	122.46
Selling, general and administrative expenses	40.20	55.44	58.21
EBIT	34.15	60.29	64.25
Interest	6.00	10.63	7.86
PBT	28.15	49.66	56.39
Tax	13.56	24.71	30.99
Net profit	14.59	24.95	25.40
Retained earnings	14.59	24.95	23.40

	<i>Balance sheet</i>		
	<i>1996</i>	<i>1997</i>	<i>1998</i>
Liabilities			
Equity	24.0	24.0	24.0
Reserves and surplus	15.53	40.48	63.88
Term loans	66.94	46.86	33.47
Unsecured loans	3.31	3.31	3.31
Current liabilities	42.80	29.37	30.83
Total	152.58	144.02	155.49
Assets			
Gross block	95.60	95.60	95.60
Depreciation	5.91	16.41	26.91
Net block	89.69	79.19	68.69
Current assets	62.89	64.83	86.80
Total	152.58	144.02	155.49

Calculate all the ratios and interpret them. Prepare a cash flow statement.

2. Classify as sources and uses:

Fixed assets	–500
Long-term debt	2,000
Cash	–300
Accounts payable	1,000
Net profit	–600
Cash dividends	800
Public issue of shares	1,000

3. Refer to the following data:

	<i>Balance sheet</i>	
	<i>1994</i>	<i>1995</i>
Assets		
Net fixed assets	14,000	14,800
Current assets		
Cash	1,200	1,800
Marketable Securities	2,000	2,500
Inventory	3,600	3,900
	6,800	8,200
	20,800	23,000
Liabilities		
Equity	12,800	13,400
Long-term debt	5,000	500
Bank loan	2,000	3,000
Accounts payable	1,000	1,600

Other information: Depreciation = 1,600, and Profit after tax = 1,400. Prepare a statement of sources and uses.

4. On January 2, 1991, Vivek Singh, a young MBA, set up a manufacturing unit. 500,000 shares were issued at par (Rs 10). During the period—January through June—the company made the following expenditure:

- Jan 15: paid Rs 7,500 in legal fees, printing expenses, etc., associated with the incorporation of the company.
- June 15: spent Rs 62,500 on machinery.
- June 20: purchased Rs 75,000 worth of plastics and chemicals for use in production.

The company started full production during the second-half of 1991. In early July, a consulting engineer was paid Rs 23,750.

During July–December, the company sold goods worth Rs 754,500. A large customer still owed Rs 69,500 at the end of the year. All other customers were paid in full. Additional chemicals and plastics were purchased for a total of Rs 175,000. All of these purchases were paid in cash.

During the year the company spent Rs 22,500 on television and trade journal advertising.

The company expended Rs 350,000 on direct labour and other manufacturing related overhead. An additional Rs 80,000 was spent on corporate salaries and other corporate expenses.

In early July, a further Rs 150,000 was spent on machinery.

During the year the company had borrowed Rs 50,000 for a short time, and repaid the loan by the year end. The interest paid amounted to Rs 750.

On December 31, the company had Rs 55,000 worth of plastics and chemicals in the warehouse. However, there were no finished goods.

The machinery used in the production was expected to last 10 years, six months of which had already passed.

Prepare a summary of cash transactions and a statement of cash flows for the year.

5. The historical balance sheets of a company are given here:

	<i>1982</i>	<i>1983</i>	<i>1984</i>
Liabilities			
Equity	34,650	33,056	33,032
Long-term liabilities	13,542	11,909	18,143
Current liabilities	15,554	11,915	15,647
Total	63,746	56,880	67,092
Assets			
Net fixed assets	11,138	12,437	11,246

Table contd.

Table contd.

	1982	1983	1984
Others	736	1,571	2,066
Current assets	–	–	–
Total	63,746	56,880	67,092

If sales amount to Rs 75,000, express all variables as (average) percentage of sales. If current assets grow at 14 percent, current liabilities at 22 percent, and fixed assets at 21 percent, forecast balance sheet for the next year.

6. From the following data calculate the Collection Period, Payables Period, and Inventory Turnover respectively:

A. Sales	Rs 150,000
Accounts receivable	Rs 12,000
B. Sales	Rs 900,000
Cost of sales	Rs 500,000
Purchases	Rs 360,000
Ending inventory	Rs 420,000
Accounts payable	Rs 90,000
C. Sales	Rs 1,400,000
Beginning inventory	Rs 120,000
Ending inventory	Rs 310,000
Cost of sales	Rs 900,000

7. A company with a current ratio of 2.5 has current liabilities of \$130,000. Indicate whether the transactions increase or decrease the current ratio, the working capital and if yes, to what extent.

- The company purchased Rs 10,000 worth of goods on account.
- The company collects accounts receivables amounting to Rs 8,000.
- The company purchases a machine worth Rs 40,000 by paying Rs 10,000 in cash and the balance on credit to be paid after 15 months.
- Company pays dividends amounting to Rs 10,000 in cash.

8. Calculate the return on assets for the two companies given here:

	Alpha	Beta
Net sales	Rs 25,375,000	–
Total assets	–	Rs 4,250,000
Net profit on sales	5 percent	20 percent
Turnover of assets	6X	–
Gross margin (percent)	35	Rs 460,000 (25 percent)

9. Given below is a company's quarterly balance sheet. Prepare the funds flow statement and comment on the movement of funds.

	Q4	Q3	Q2	Q1
A/C payable	159	126	42	98
Notes payable	115	89	39	154
Preferred stock	75	75	75	75
Share capital	150	150	150	150
Retained earnings	149	128	133	136
Total	648	568	439	613
Cash	2	1	47	23
A/C receivable	79	34	128	214
Inventory	430	389	113	218
Net plant and equipment	137	144	151	158
Total	648	568	439	613

Chapter 6

A Case Study: Financial Statements and Industry Structure

OBJECTIVES

- ◆ Introduce students to the art and science of financial statement analysis.
- ◆ Demonstrate how financial statements reflect industry characteristics.

Bala Balasubramani, after graduating from a premier business school, joined a prominent investment bank as an equity analyst. In the first year of training he was given an assignment on financial statement analysis. He was given the financial statements of six companies drawn from six different industry groups. Exhibit 6.1 presents the balance sheets (in percent form) and select financial data. He was then asked to match the six companies with the (six) set of financial data. The companies in the set belong to one of the following groups:

1. Advertising
2. Airline
3. Software
4. Commercial banking
5. Utility
6. Pharmaceuticals

He was told that in order to disguise the identity of the bank, loans/advances were classified as receivables and deposits as accounts payable.

Your assignment is to help Bala identify the companies.

Exhibit 6.1 Balance sheet (in percent) and financial data

	A	B	C	D	E	F
Structure of total assets (%)						
Net fixed assets	27.96	63.85	32.2	0.83	46.87	30.74
Capital WIP	0	0	9.85	0	5.27	3.24
Investments	0	1.05	3.26	39.21	20.61	7.45
Inventories	0.38	6.01	0	0	4.06	14.78
Cash & bank balance	8.74	10.63	22.23	19.37	13.49	1.82
Receivables	54.56	18.24	42.3	40.57	14.25	36.04
Sundry debtors	16.64	12.24	17.46	0	7.46	26.72
Intangible assets	8.36	0.21	0	0	0.73	9.16
Advances	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total of assets	100	100	100	100	100	100
Structure of total liabilities (%)						
Net worth	78.17	6.23	80.24	3.57	50	47.2
Capital	74.9	2.63	1.91	0.17	2.6	3.26
Reserves & surplus	3.27	3.59	78.33	3.4	47.41	43.94
Free reserves	3.27	0.89	77.99	3.4	32.36	42.4
Borrowings	17.29	54.74	0	4.83	34.07	39.44
Current liabilities & provisions	4.54	39.04	19.76	91.6	15.93	13.36
Deposits	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total of liabilities	100	100	100	100	100	100
Composition of total borrowings (%)						
Bank borrowings	6.45	100	0	N.A.	0	62.96
Short-term bank borrowings	0	48.45	0	N.A.	0	62.96
Institutional borrowings	0	0	0	70.71	24.32	21.67
Loans from corporate bodies	92.17	0	0	0	1.67	0
Group/associate companies	0	0	0	0	0	0
Debentures	0	0	0	29.29	27.48	7.83
Fixed deposits	0	0	0	N.A.	2.96	0
Govt/sales tax deferrals	0	0	0	N.A.	0	2
Other borrowings	1.38	0	0	N.A.	43.57	5.54
Total borrowings	100	100	100	100	100	100
Relevant ratios						
Current ratio	14.7	0.51	2.7	1.97	2.41	1.44
Quick ratio	4.77	0.32	2.01	1.66	1.75	0.71
Debt equity ratio	0.22	8.79	0	1.35	0.68	0.84
Interest coverage ratio	2.81	0.94	336.53	1.14	2.69	5.07
Net profit/net sales	14	-0.61	33.67	4.92	8.56	14.67
Debtors collection (days)	108.04	49.92	42.11	135.39	46.85	76.06
Creditors payables (days)	33.45	69.89	5.53	784.56	73.55	43.67
Working capital cycle (days)	5.11	N.A.	568.54	N.A.	917.49	113.96
R&D/sales	N.A.	N.A.	0.9%	N.A.	0.04%	4.2%
Return on investments	12.00%	19.00%	64.19%	N.A.	13.94%	43.8%
Fixed assets turnover	N.A.	N.A.	4.15	N.A.	1.08	2.83
Working capital turnover	N.A.	N.A.	3.34	N.A.	3.68	8.70
Solvency ratios		N.A.	8.03	5.13	2.07	2.63

The Solution

A good way to segregate companies is to classify them as service and manufacturing companies. The service companies include:

- Advertising agency
- Commercial bank
- Airline
- Computer software

Note that service companies have little or no inventory. Companies A, B, C, and D match the description. Company D has mostly financial assets and its liabilities are payables (deposits) and it has a thin net worth typical of a commercial bank. So company D must be a bank.

Company A has relatively high accounts receivable, payable, intangible assets and relatively low fixed assets. This is typical of an advertising agency. Accounts payables are high for an advertising agency because the agency does not pay for its media purchases on behalf of a client until the funds required to purchase the media is collected from the client.

We are left with Airline and Computer software. Company B has relatively high investment in fixed assets (63.85 percent) and borrowings (54.74 percent). This company has to be an airline. Airline companies invest heavily in property, airplanes, and so on. What distinguishes an airline from a software company is the structure of liabilities. Software companies derive their value from intangible assets because of which the value of hard asset collateral is low. Consequently software companies either do not borrow or borrow very little. These companies finance their operations from equity. Company C is a software company. We are left with E and F that are to be matched with:

- Electric Utility
- Pharmaceutical Manufacturer

Company E has high investment in fixed assets, negligible investment in R&D, very low inventory. Company F on the other hand has significant investment in R&D, relatively high level of intangible assets. So company E must be an electric utility and company F must be the pharmaceutical manufacturer. The companies are:

- A. Vision Technology Ltd., an advertising agency
- B. Air India Ltd.
- C. Infosys Technologies
- D. State Bank of India
- E. Tata Power Ltd.
- F. Dr Reddy's Laboratories Ltd.

Chapter 7

A Case Study: Financial Performance of Pharmaceutical Companies

OBJECTIVES

- ♦ Introduce students to the Pharmaceutical Industry in India.
- ♦ Demonstrate the application of financial statement analysis in a real life setting.

Pharmaceuticals are chemicals (bulk drugs) that are converted into formulations. Bulk drugs are derived from plant derivatives, animal derivatives, synthetic chemicals, and biogenetic derivatives. Pharmacists disburse certain formulations (the so called ethical drugs) only upon medical prescription, whereas others are obtained over-the-counter.

The pharmaceutical industry is segmented into two types of firms—those that carry out basic research to manufacture products that are patent protected, and those that manufacture generic drugs. Manufacturers of generic drugs manufacture and market pharmaceutical products that are not subject to patent protection. Manufacturers of generic drugs may also manufacture even patented products when the patent expires. Generic drugs are less expensive than the patented products because companies would not have spent money on R&D, all else being equal.

In 1995, India became a signatory to the Uruguay Round Agreement—Trade Related Intellectual Property Rights that requires the signatories to enforce product patents. It comes into effect in 2005.¹ Historically drug prices in India have been controlled by the central government. The Drug Price Control Order (DPCO) established in 1985 enables the government to control drug prices for 143 basic drugs. The number of drugs covered under DPCO has been brought down from 90 percent to 50 percent and is likely to be reduced further. The aim of the DPCO was to ensure that certain drugs were available at affordable prices to all. The obvious disadvantage of the system is that it does not provide adequate incentives to manufacturers to invest in research and development to produce new molecules because the prices of the end product are low. Indeed the prices of many drugs in India are among the lowest in the world.

¹ The Indian Patents Act recognizes only process patents. Parts of the pharmaceutical industry background are from *India Infoline*.

The Indian pharmaceutical market was estimated at \$3 billion in 1997 in terms of volume consumed. From the composition of the global pharmaceutical market given in Exhibit 7.1, we can see that the US market is the fastest growing. The Indian market itself was growing at 15 percent per annum in terms of sales revenue in 1999. The relaxing of the DPCO, economic liberalization and increases in health care spending is likely to have a favorable impact on the pharmaceutical industry. The domestic formulation market has the following segments:

- Analgesics that relieve pain
- Antacids
- Antibiotics
- Anti-tuberculosis products
- Anti-parasitic and anti-fungal products
- Cardiovascular drugs
- Corticosteroids that cure skin problems, asthma, etc.
- Anti-rheumatic products that relieve joint pain
- Vitamins
- Others

Exhibit 7.1 Global pharmaceutical market

<i>Country</i>	<i>Sales-1999 (\$ billion)</i>	<i>Percentage share</i>	<i>Percentage growth</i>
US	81.8	41.3	11
Europe	46.5	23.5	7
Japan	31.5	15.9	-1
Latin America	12.9	6.5	2
South East Asia and China	13.5	6.8	8

Source: India Infoline.

The Indian pharmaceutical industry, like the global counterpart, is highly fragmented with no company holding a substantial market share. Ranbaxy, Cipla, Glaxo, Dr Reddy's Laboratories, and Sun Pharma are some of the dominant pharmaceutical companies in India.

A couple of years back Glaxo India held a 7 percent market share followed by Ranbaxy (5 percent) and Cipla (4 percent). Currently, Ranbaxy is the market leader. It has strengths in many therapeutic segments and has operations in 40 countries with international sales accounting for 50 percent of total sales. Ranbaxy is currently the 11th largest generics company in the world. Glaxo is a subsidiary of Glaxo-Wellcome in the UK and has about 20 brands. Glaxo merged with SmithKline Beecham worldwide to create a dominant pharmaceutical company in the world. Dr Reddy's Laboratories is another dominant company. Sun Pharma is ranked 8th in the domestic formulation market. It has a major presence in certain segments like cardiac care, psychiatry, etc.

Company Backgrounds

In 1935 Khwaja Abdul Hameid, a doctorate in chemistry from Berlin University, set up the Chemical, Industrial & Pharmaceutical Laboratories, which came to be popularly known as Cipla. On August 17, 1935, Cipla was registered as a public limited company. In 1944, the company bought the premises at Bombay

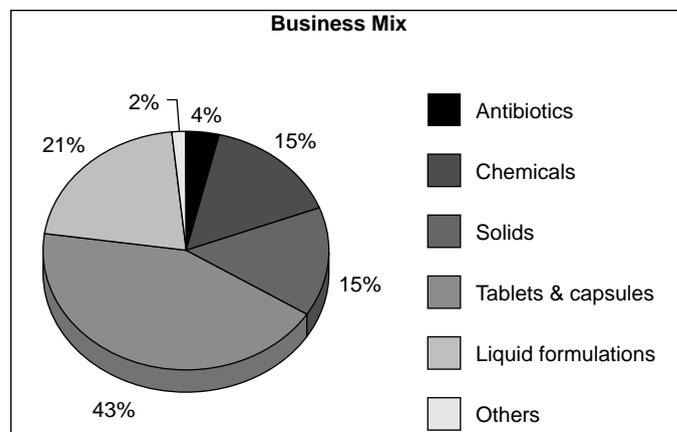
Central and decided to put up a first class modern pharmaceutical works and laboratory. Cipla has been awarded the Chemexil Award in 1978–79 and 1981–82, the National Award for successful commercialization of publicly funded R&D. More details of the company can be accessed at www.cipla.com.

India's largest pharmaceutical company, Ranbaxy Laboratories Ltd, is a research based international pharmaceutical company. Rated the 11th largest generic company worldwide, Ranbaxy exports its products to over 70 countries with ground operations in 25 and manufacturing facilities in seven countries. It has emerged as a leading pharmaceutical company in India with the third largest share of the domestic market. Ranbaxy has a joint venture agreement with Eli Lilly & Co of the US, to market select Eli Lilly products. The company's GDR is listed in Luxembourg Stock Exchange. It entered the US market in 1998 to market its products. In 1997 the company's sales crossed the Rs 10 billion mark. More details of the company can be accessed at www.ranbaxy.com.

Glaxo India is a 51 percent subsidiary of Glaxo-Wellcome of the UK. The no. 1 pharma company in terms of market share, it has a market share of 4.2 percent in the prescription drugs and an overall market share of 7.2 percent. It was incorporated in 1924 as H.J. Foster & Co., which later became a wholly owned subsidiary of Joseph Nathan & Co. in 1926. Initially Glaxo was established to sell processed baby foods. It sold off the baby foods business to Heinz in 1994. Pharmaceuticals remain the main business of Glaxo India. Burroughs Wellcome acquired the parent company of Glaxo India in 1995. Glaxo merged with SmithKline Beecham Pharmaceuticals in 2001. The major chunk of revenues comes from formulations that constitute around 85 percent of the total sales with the rest coming from bulk drugs. Exhibit 7.2 presents the business mix of Glaxo. More details about the company can be accessed at www.glaxowellcome.co.in.

Sun Pharmaceutical Industries manufactures and markets specialty medicines and active pharmaceutical ingredients for chronic therapy areas such as cardiology, psychiatry, neurology, and gastroenterology. Sun Pharma began operations in 1983, with just five products to treat psychiatry ailments. Sales were initially limited to West Bengal and Bihar and later on expanded nation-wide in 1985. In 2001, ORG Retail Chemist Audit ranked Sun Pharma among the top five pharma companies in India. The company established a research center in 1993 and a bulk drugs plant in 1994. Sun Pharma has used a combination of organic growth and acquisitions to drive growth; prominent among several mergers that it completed were those of the USFDA approved Caraco Pharm Labs and the UKMCA approved M J Pharma. More details of the company can be accessed at www.sunpharma.com.

Exhibit 7.2 Business mix of Glaxo



Source: Glaxo.

Dr Reddy's Laboratories (DRL) was incorporated in February 1984, by promoters Dr Anji Reddy and Mr M.P. Chary.² Since inception, DRL has pioneered reverse engineering of many popular under-patent drugs, broad basing its therapeutic presence. Production of bulk drug Methyldopa (for cardiac patients) commenced at its Hyderabad plant in July 1985. Within a year DRL became the first Indian company to export the drug to Europe. DRL was converted into a public limited company in 1985 and had an IPO of equity linked debentures aggregating Rs 24.6 million in May 1986. In 1986, the company acquired Benzex Labs, a bulk drug company in Hyderabad. This factory was modernized and is now DRL's unit II. In the same year, DRL started manufacturing formulations. FDA approval was received in 1987 and exports to the US commenced. In 1993, it purchased facilities of Krishna Alchemy in Hyderabad—upgraded it and made it unit III. During the late-1980s, DRL took up production of quinolone antibiotics and stopped earlier lesser profitable drugs. After launching Norfloxacin (its first quinolone drug) in 1988, DRL increased presence in this segment—Ciprofloxacin in 1989, Pefloxacin in 1991, etc. In FY94, 70 percent of sales were quinolones. Mounting competition led to steep price decline over 20–25 percent per annum in quinolones since FY94. Also, DPCO 1995 included Ciprofloxacin and Norfloxacin, increasing DRL's coverage from 5 percent to 50 percent. But, DRL's overdependence on quinolones continued in the absence of major new launches till FY96. DRL plans to strengthen its position in the domestic formulations market, including the OTC segment. In FY2001, the company merged with Cheminor Drugs to become a broad based pharmaceutical giant.

In 2001, Dr Reddy's became the first Asian company outside of Japan to be listed on the New York Stock Exchange (NYSE). More details of the company can be accessed at www.drreddys.com.

Exhibits 7.3–7.7 present the financial statements and relevant financial data of these companies.

Exhibit 7.3 Pharmaceutical firms—balance sheet

(Rs crore)

	Glaxo		Ranbaxy		Cipla		Sun		DRL	
	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000
Assets										
Net fixed assets	125.5	87.05	580.29	644.37	187.18	161.75	158.78	140.9	327.85	189.49
Cash in bank	56.74	16.26	59.38	15.15	5.82	4.27	10.56	4.35	19.44	21.91
Receivables	217.84	182.33	853.79	894.59	352.8	257.15	165.49	171.46	384.39	199.7
Inventory	180.75	171.32	459.67	417.42	275.36	212.19	147.97	72.38	157.61	69.83
Deferred tax	41.33	4.15	27.25	0	0	0	0	0	0	0
Investments	151.69	124.87	343.55	291.07	222.93	194.99	64.45	50.12	79.45	141.27
Intangible/misc.	12.61	14.33	198.02	127.31	0.23	0.3	39.42	42.01	97.73	55.7
Total	786.46	600.31	2,521.95	2,389.91	1,044.32	830.65	586.67	481.22	1,066.47	677.9
Liabilities										
Total borrowing	9.71	34.85	125.99	255.83	24.01	19.47	35.71	48.62	383.31	174.65
Sundry creditors	138.47	99.91	338.61	339.26	109.01	79.71	32.14	35.9	95.03	45.01
Other current liabilities	13.24	14.99	85.16	66.44	57.81	26.92	27.71	25.13	11.06	11.19
Provisions	51.26	56.1	209.43	145.73	128.83	129.04	25.76	6.85	23.8	11.89
Deferred tax	13.21	0	160.57	0	0	0	0	0	0	0
Share capital	74.48	59.78	115.89	115.89	59.97	59.97	79.49	64.98	31.65	26.49
Reserves & surplus	486.09	334.68	1,486.3	1,466.76	664.69	515.54	385.86	299.74	521.62	408.67
Total	786.46	600.31	2,521.95	2,389.91	1,044.32	830.65	586.67	481.22	1,066.47	677.9

² This section is based on a report by *India Infoline*.

Exhibit 7.4 Pharmaceutical firms—income statement

(Rs crore)

	<i>Glaxo</i>		<i>Ranbaxy</i>		<i>Cipla</i>		<i>Sun</i>		<i>DRL</i>	
	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000
Income										
Sales	1,121.09	955.74	2,362.47	1,983.89	1,400.81	772.14	612.85	479.04	991.24	493.02
Other income	35.74	20.08	25.79	85.47	19.85	17.61	14.41	11.8	8.93	4.87
Change in stocks	-10.06	31.88	28.58	20.06	85.09	34.32	44.82	3.26	28.49	-0.25
Non-recurring income	91.34	20	87.52	3.03	8.2	1.63	1.4	1.79	1.43	0.46
Expenditure										
Raw material, etc.	526.21	497.12	1,269.93	1,120.59	707.57	390.43	289.1	214	349.31	165.33
Indirect taxes	95.04	89.09	94.51	104.89	115.85	67.42	71.24	48.46	74.02	57.01
Excise duty	87.06	83.98	88.72	99.81	111.33	67.24	52.94	36.46	71.35	55.12
Repairs & maintenance	11.8	11.7	14.59	12.49	29.69	14.79	7.4	5.31	30.06	14.94
Selling & dist.	88.74	66.18	343.34	227.41	119.51	51.59	46.64	40.45	106.22	71.63
Non-recurring exp.	111.62	0	129.85	4.94	27.67	0	0.15	0	2.35	0.65
EBDIT	130.88	131.62	258.15	306.35	255.85	188.74	168.39	114.47	261.45	96.24
Less: Depreciation	25.66	16.41	49.16	50.17	15.63	13.34	16.11	13.76	42.52	13.07
Less: Interest	10.49	12.15	47.47	63.47	2.65	2.74	7.65	10.41	43.38	16.35
PBT	94.73	103.06	161.52	192.71	237.57	172.66	144.63	90.3	175.55	66.82
Less: Tax	45.59	32.52	25.81	12.1	58.5	39.6	9.45	6.64	31.08	6.5
PAT	49.14	70.54	135.71	180.61	179.07	133.06	135.18	83.66	144.47	60.32

We start by defining some key ratios.

Liquidity Ratios

Cash and marketable sec. to total assets = (Cash + Marketable sec.)/Total assets
 Acid test ratio = (Cash + Market sec. + Receivables)/CL
 Current ratio = Current assets/Current liabilities

Asset management

Days' receivables = 365/(Sales/Receivables)
 Days' inventory = 365/(Cost of goods sold/Inventory)
 Asset turnover = Sales/Total assets

Financial leverage

Debt to total assets = (CL + L.T. debt + Other liabilities)/T.A.
 Stockholders equity to total assets = Total stockholders equity to total assets
 L.T. debt to stockholders equity = (L.T. Debt + Other liabilities)/Stock equity
 Coverage ratio = Operating profit/Interest expense

Profitability

Gross margin ratio = Gross profit/Sales
 Return on sales = Net income/Sales

Exhibit 7.5(b) Pharmaceutical firms—common size income statement

	(Percentage of sales)												
	Glaxo		Ranbaxy		Cipla		Sun		2001		2000		
	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	
Income													
Sales	100	100	100	100	100	100	100	100	100	100	100	100	100
Other income	3.187969	2.1009898	1.091654	4.308203	1.417037	2.280674	2.351309	2.46326	0.900892	0.98779			
Change in stocks	-0.89734	3.3356352	1.209751	1.011145	6.074343	4.44479	7.313372	0.680528	2.874178	-0.05071			
Non-recurring income	8.147428	2.0926193	3.704597	0.15273	0.585376	0.211102	0.228441	0.373664	0.144264	0.093303			
Expenditure													
Raw materials etc.	46.93736	52.014146	53.75433	56.48448	50.51149	50.56466	47.17304	44.67268	35.2397	33.53414			
Indirect taxes	8.477464	9.3215728	4.000474	5.287087	8.270215	8.731577	11.62438	10.11607	7.467415	11.56343			
Excise duty	7.765657	8.7869086	3.755392	5.031025	7.947545	8.708265	8.638329	7.611055	7.198055	11.18007			
Repairs & maintenance	1.052547	1.2241823	0.617574	0.629571	2.119488	1.915456	1.207473	1.108467	3.032565	3.030303			
Selling & dist.	7.915511	6.9244774	14.53309	11.46283	8.531492	6.681431	7.610345	8.443971	10.71587	14.52882			
Non-recurring exp.	9.956382	0	5.496366	0.249006	1.975286	0	0.024476	0	0.237077	0.13184			
EBDIT	11.67435	13.771528	10.92712	15.44188	18.26443	24.44375	27.47654	23.89571	26.37605	19.52051			
Less: Dep	2.288844	1.7169942	2.080873	2.52887	1.115783	1.727666	2.628702	2.872411	4.289577	2.651008			
Less: Int.	0.935697	1.2712662	2.009338	3.19927	0.189176	0.354858	1.248266	2.173096	4.376337	3.316295			
PBT	8.449812	10.783267	6.836912	9.713744	16.95947	22.36123	23.59958	18.8502	17.71014	13.5532			
Less: Tax	4.066578	3.402599	1.092501	0.609913	4.176155	5.128604	1.541976	1.386106	3.135467	1.318405			
PAT	4.383234	7.3806684	5.744412	9.103831	12.78332	17.23263	22.0576	17.46409	14.57467	12.2348			

Exhibit 7.6 Pharmaceutical firms—statement of cash flows

Cash flow statement (Rs crore)	Glaxo			Ranbaxy			Cipla			Sun			DRL			
	Dec-00	Dec-01	Dec-02	Dec-00	Dec-01	Dec-02	Mar-00	Mar-01	Mar-02	Mar-00	Mar-01	Mar-02	Mar-00	Mar-01	Mar-02	
	mths	mths	mths	mths	mths	mths	mths	mths	mths	mths	mths	mths	mths	mths	mths	
Sources of cash																
Opening balance	19.75	45.82	48.81	84.31	84.31	84.31	3.54	4.27	4.27	8.5	4.35	4.35	18.88	29.54	29.54	
Revenue inflow	108.64	146.95	247.65	345.25	345.25	345.25	169.94	234.99	234.99	115	158.91	158.91	91.91	245.41	245.41	
Non-operating income	31.02	-86.22	38.06	1.7	1.7	1.7	14.83	13.3	13.3	-2	38.24	38.24	-3.95	2.43	2.43	
Sale of fixed assets	1.14	40.98	3.23	0.53	0.53	0.53	3.29	2.75	2.75	1.97	1.16	1.16	0.17	7.09	7.09	
Sale of investments	-3.99	-5.64	0.51	80.08	80.08	80.08	140.03	218.31	218.31	5.95	8.7	8.7	0	0	0	
Capital proceeds	0	0	0	0	0	0	0	0	0	-0.61	0	0	0	0	0	
Loan proceeds	14.15	0	0	0	0	0	0	4.48	4.48	0.84	0.66	0.66	63.7	20.81	20.81	
Decrease in working capital	9.79	65.14	176.51	0	0	0	45.46	60.49	60.49	23.92	0	0	4.76	1.46	1.46	
Trade receivables	0	32.96	0	0	0	0	0	60.49	60.49	23.92	0	0	0.62	0	0	
Inventories	0	26.69	0	0	0	0	0	0	0	0	0	0	4.14	0	0	
Trade payables	9.79	5.49	176.51	0	0	0	45.46	0	0	0	0	0	0	1.46	1.46	
Total cash inflow	180.5	207.03	514.77	511.87	511.87	511.87	377.09	538.59	538.59	153.57	212.02	212.02	175.47	306.74	306.74	
Application of cash																
Purchase of fixed assets	13.61	26.56	59.41	15.04	15.04	15.04	33.44	42.84	42.84	37.33	32.55	32.55	24.95	48.6	48.6	
Purchase of investments	0	0	8.32	60	60	60	193.25	242.2	242.2	0	5.72	5.72	80.76	24.01	24.01	
Repayment of loans	0	25.13	61.16	129.85	129.85	129.85	14.04	0	0	19.27	8.71	8.71	0	40.88	40.88	
Loans to group companies	0	0	0	0	0	0	0	0	0	0	0	0	0	-8.27	-8.27	
Loans to other companies	0	0	0	0	0	0	-17.8	0.42	0.42	0	0	0	0	0	0	
Interest paid	11.52	10.44	63.01	48.93	48.93	48.93	1.14	0.83	0.83	10.41	7.66	7.66	14.07	41.84	41.84	
Tax paid	35.16	42.61	24.12	21.27	21.27	21.27	56.73	66.01	66.01	5.36	10.25	10.25	10.28	27.23	27.23	
Dividend paid	39.41	45.59	86.26	86.47	86.47	86.47	16.64	19.75	19.75	29.82	11.89	11.89	8.82	13.83	13.83	
Other cash expenses	0	0	0	0	0	0	0	0	0	-0.15	16.35	16.35	4.64	0	0	
Increase in working capital	64.64	0	128.18	93.09	93.09	93.09	75.38	160.73	160.73	47.18	108.33	108.33	10.04	99.19	99.19	
Trade receivables	26.57	0	73.39	41.66	41.66	41.66	21.61	0	0	0	26.7	26.7	0	69.74	69.74	
Inventories	38.07	0	54.79	42.25	42.25	42.25	53.77	63.16	63.16	22.27	75.59	75.59	0	29.45	29.45	
Trade payables	0	0	0	9.18	9.18	9.18	0	97.57	97.57	24.91	6.04	6.04	10.04	0	0	
Closing balance	16.16	56.7	84.31	57.22	57.22	57.22	4.27	5.81	5.81	4.35	10.56	10.56	21.91	19.43	19.43	
Total cash outflow	180.5	207.03	514.77	511.87	511.87	511.87	377.09	538.59	538.59	153.57	212.02	212.02	175.47	306.74	306.74	
Increase/decrease in cash balance	-3.59	10.88	35.5	-27.09	-27.09	-27.09	0.73	1.54	1.54	-4.15	6.21	6.21	3.03	-10.11	-10.11	
Cash flow before working capital charges	108.64	146.95	247.65	345.25	345.25	345.25	169.94	234.99	234.99	115	158.91	158.91	91.91	245.41	245.41	
Cash flow from operations	53.79	212.09	295.98	252.16	252.16	252.16	140.02	134.75	134.75	91.74	50.58	50.58	86.63	147.68	147.68	
Cash used in investing activity	16.46	-8.78	63.99	-5.57	-5.57	-5.57	65.57	64.4	64.4	29.26	44.76	44.76	110.18	57.25	57.25	
Cash from financing activity	14.15	-25.13	-61.16	-129.85	-129.85	-129.85	-14.04	4.48	4.48	-19.04	-8.05	-8.05	63.7	-20.07	-20.07	
Net increase in working capital	54.85	-65.14	-48.33	93.09	93.09	93.09	29.92	100.24	100.24	23.26	108.33	108.33	5.28	97.73	97.73	

Exhibit 7.7 Select financial ratios and data

	Glaxo		Ranbaxy		Cipla		Sun		DRL	
	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000
Inventory management										
Raw mat. turnover	5.85	6.46	4.44	4.97	3.68	3.68	5.68	5.82	11.26	7.24
Finished goods turnover	8.81	9.38	11.36	11	5.86	5.33	8.44	11.84	14.96	10.2
Debtors turnover	9.57	8.52	4.66	3.99	9.24	11.02	6.8	6.25	4.8	3.65
Creditors turnover	6.64	7.02	5.46	5.76	7.45	8.27	10.62	8.12	8.36	5.76
Holding period (days)										
Raw material	65	57	83	75	96	95	65	65	46	66
Debtors	38	43	78	91	40	33	54	58	76	100
Creditors	55	52	67	63	49	44	34	45	44	63
Net working capital cycle (days)	112	108	142	153	169	177	151	123	127	163
Asset turnover										
Net sales/total assets	1.3	1.44	0.89	0.78	0.93	0.84	0.92	0.89	0.86	0.64
Net sales/net fixed assets	8.17	9.95	3.9	2.91	5.24	4.35	3.4	3.05	2.79	2.3
Liquidity										
Current ratio	2.02	2	1.87	1.74	2.02	1.9	2.73	1.74	1.44	1.28
Quick ratio	0.78	0.68	0.72	0.49	0.47	0.31	0.77	0.65	0.71	0.6
Operating cash flow to total assets (percent)	30.6	9.44	11.12	13.73	16.97	22.58	9.51	19.88	18.61	15.18
Leverage										
Debt to equity	0.02	0.09	0.09	0.18	0.03	0.03	0.08	0.13	0.84	0.46
Interest coverage (EBIT/Int)	11.96	7.84	5.29	4.07	90.65	64.01	19.74	9.5	5.07	5.1
EBDIT/int	14.14	9.19	6.33	4.86	94.23	68.29	21.85	10.82	6.05	5.9
Total debt/total assets (percent)	1.24	5.81	5.43	11.54	2.66	2.84	6.11	10.14	39.44	28.41
Margin ratios										
EBDIT/net sales (percent)	14.73	12.88	13.25	16.41	25.45	26.55	30.86	26.17	28.6	22.12
EBIT/net sales (percent)	12.23	10.99	11.08	13.74	23.86	24.66	27.89	22.97	23.97	19.12
PAT/net sales (percent)	6.77	5.83	7.85	9.71	17.63	18.65	24.73	19.01	15.85	13.88

Exhibit 7.7 contd.

Exhibit 7.7 contd.

	Glaxo		Ranbaxy		Cipla		Sun		DRL	
	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000
Profitability										
EBDIT/total assets (percent)	21.81	19.59	13.25	14.3	31.44	30.17	31.42	24.42	33.07	16.9
EBIT/total assets (percent)	18.11	16.71	11.08	11.98	29.48	28.02	28.39	21.44	27.71	14.61
PAT/net worth	14.54	13.39	7.85	8.47	27.06	25.89	32.27	24.29	34.62	16.76
Growth percent										
(Net) sales growth (percent)	18.3	6	23.55	6.92	39.2	18	13.67	32.6	110.3	15
Total assets	30.93	11.36	4.63	5.81	31.64	23.57	21.82	8.23	58.09	16.77
Debt (long term)	-45	4.9	-45	196	-7	N.A.	-75.8	N.A.	317	N.A.
Equity (net worth)	42	9.4	-1	3.3	26	N.A.	27	N.A.	20.3	N.A.
PBT	38	0	4.7	-7	35	N.A.	61	N.A.	163	N.A.
PAT	37	-8	-2	-6.8	31.5	N.A.	63	N.A.	140	N.A.
Miscellaneous										
Current assets/total assets	0.52	0.63	0.59	0.59	0.7	0.69	0.55	0.38	0.56	0.44
No. of shares	74,475,000	59,775,000	115,895,478	115,895,478	59,972,343	46,774,537	46,756,018	76,515,948	31,588,780	5
Dividend rate (percent)	55	50	100	75	45	0	50	0	40	5
Price (Rs)	287.7		672.2		1043		538		1272	

Return on assets = EBIT/Assets
 Return on equity = Net income/Equity

Stock market performance

Dividend yield = Cash dividends/Market price per share
 Annual common stock return = $(\text{Price}_t - \text{Price}_{t-1} + \text{Div}_t)/\text{Price}_{t-1}$
 M/B ratio = (Market price/share)/(Book value per share)

DuPont Analysis

ROE = Profit margin \times Asset turnover \times Leverage

In the chapter on financial statements I pointed out that the value of a firm is the present value of free cash flows up till infinity since the firm is a going concern. The value of the company increases if cash flow increases or discount rate decreases. Each of the free cash flow components is driven by a set of financial variables. Mapping variables on to the free cash flow component helps us understand how a company can increase value.

<i>Component</i>	<i>Driver</i>
NOPAT + Depreciation	Sales growth Gross profit margin Growth in pre-tax income Expenses Tax rate
Capital expenditure	Asset turnover Growth in assets
Δ Net working capital	Days' inventory Days' receivable Days' payable

The weighted average cost of capital, the discount rate, itself is a function of leverage, growth in debt and the cost of debt. The cost of debt depends on credit rating, which in turn depends on, among other things, interest coverage. Increasing sales growth, profit margin, pre-tax income and decreasing expenses increases NOPAT. The effective tax rate is usually not influenced by the company. A company can, however, reduce taxes by careful planning. Likewise increasing payables and decreasing inventory/receivables improves the working capital position and hence cash flow position.

Capital expenditure largely depends on asset turnover and the requirements of the industry to stay competitive. A company with higher asset turn can generate a certain level of sales for lower investment. Obviously this is a desirable situation. Increasing asset turnover leads to lower capital expenditure, a higher cash flow and hence firm value. To start with let's evaluate each company in terms of growth in total assets, long-term debt, stockholders equity, sales, operating profit, and pre tax income. The growth rates (percent) are given here:

<i>Variable</i>	<i>Glaxo</i>		<i>Ranbaxy</i>		<i>Cipla</i>		<i>Sun</i>		<i>DRL</i>	
	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000
(Net) Sales growth in percent	18.3	6	23.55	6.92	39.2	18	13.67	32.6	110.3	15
Total assets	30.93	11.36	4.63	5.81	31.64	23.57	21.82	8.23	58.09	16.77
Debt (long term)	-45	4.9	-45	196	-7	N.A.	-75.8	N.A.	317	N.A.
Equity (net worth)	42	9.4	-1	3.3	26	N.A.	27	N.A.	20.3	N.A.
PBT	38	0	4.7	-7	35	N.A.	61	N.A.	163	N.A.
PAT	37	-8	-2	-6.8	31.5	N.A.	63	N.A.	140	N.A.

The data indicates that in terms of total assets the fastest (slowest) growth was reported by DRL (Ranbaxy) with growth rates of 58.09 percent (4.63 percent) in 2001. In terms of long-term debt, the fastest (slowest) growth was experienced by DRL (Sun Pharma) with a growth rate of 317 percent (−75 percent). The fastest (slowest) growth in terms of equity was experienced by Glaxo (Ranbaxy) with a growth rate of 42 percent (−1 percent). Thus, for all firms except DRL, the growth in assets is being financed by equity, either through profit retention or issuing equity. Although Ranbaxy's asset growth was the lowest (4.63 percent) it experienced considerable growth in sales (23.55 percent) because of asset turnover comparable to other firms in the industry group. Although Ranbaxy's sales grew its profits (PBT or PAT) did not grow by the same rate. In fact the profit after tax fell by 2 percent. In terms of overall performance DRL experienced the highest growth rates in sales, PBT and PAT. CIPLA and Sun Pharma experienced moderate growth rates in sales, assets and profits.

The growth rates in sales vary from 18 percent to 110 percent. But is growth necessarily good? Because growth requires additional investments in inventory, receivables, property, plant and equipment, fast growth can result in large outlay of cash, which may impose liquidity constraints on a company. For firms with debt servicing obligations, growth can result in financial distress and ultimately force a company into bankruptcy. Growth also imposes demands on managerial resources as a firm spreads its limited expertise too far.

In the second step, evaluate the current asset position of all the companies. Except for Glaxo and Ranbaxy, all other firms experienced increases in current assets (as a fraction of total assets). In the case of Ranbaxy, current assets remained at the same level whereas for Glaxo current assets declined from 63 percent to 52 percent. The decline was primarily because total assets grew at a faster rate in 2001 than in 2000. Likewise inventory, receivables and debtors (as a fraction of total assets) declined. Cash is one of the important components of current assets. Since idle cash does not generate revenues firms must balance the need to have cash to meet liquidity demand and the opportunity cost. The cash position of all firms in 2001 is given here:

	<i>Glaxo</i>	<i>Ranbaxy</i>	<i>Cipla</i>	<i>Sun</i>	<i>DRL</i>
Cash/current assets (percent)	12.46	4.33	0.92	3.26	3.46
Cash/total assets (percent)	7.61	2.38	0.56	1.8	1.82

As can be noted, apart from Glaxo all other firms maintain relatively low cash balances. But in 2002, DRL had 40 percent cash (as a fraction of current assets). Firms with large cash balances often become takeover targets. Those companies that escape the takeover attempt, initiate stock repurchase program to return cash to shareholders by purchasing shares back from shareholders at a premium.

Companies usually sell goods on credit thereby generating receivables. Some customers do not pay whereas some delay payment. Since receivables do not generate revenue firms try to maintain them at predetermined levels. A high level of receivables indicates that the firm has difficulty in collecting cash or that the firm is generous in granting credit. Given here is the receivables position of all firms in 2001:

	<i>Glaxo</i>	<i>Ranbaxy</i>	<i>Cipla</i>	<i>Sun</i>	<i>DRL</i>
Receivables/total assets (percent)	29.24	34.22	34.13	28.21	36.04

One may express receivables as a fraction of current assets. As can be seen all firms have more or less similar levels of receivables.

All firms decreased their debt levels except for DRL. Glaxo, for example, decreased its debt by 45 percent. DRL, on the other hand, increased its borrowing by 317 percent. In other words, DRL relies more on debt finance than other firms. Low debt levels result in less financial risk because of lower probability that cash flows will be inadequate to meet debt service obligations. However, maintaining low debt levels results in loss of tax shields arising due to interest payments. In addition, managers of such firms can afford to be complacent because of lack of contractual payments on debt.

As far as profitability is concerned, except for Sun Pharma and DRL all other firms experienced a decline in profitability as measured by PAT/Sales (percent). The increase in profitability in the case of Sun Pharma is due to a decrease in interest and Selling and Distribution expenses. Though DRL experienced a decline in cash flow from operations (unlike other firms) its cash flow from investing increased. The gap between the two was met by issuing debt. The summary of cash flow from operations, investing and financing activities for all firms in 2001, is given here:

	<i>(Rs crore)</i>				
	<i>Glaxo</i>	<i>Ranbaxy</i>	<i>Cipla</i>	<i>Sun</i>	<i>DRL</i>
Cash flow from operations	212.09	252.16	134.75	50.58	147.68
Cash used in investing activity	-8.78	-5.57	64.4	44.76	57.25
Cash from financing activity	-25.13	-129.85	4.48	-8.05	-20.07

All firms generate cash flows in excess of that required for investing. Consequently the cash flow from financing is either low or negative.

As an assignment answer the remaining questions.

Stock Market Performance

One way to test whether your analysis is right is to see the company's stock market performance. If we assume that the stock market processes all publicly available information then the stock price of a company is the best indicator of its performance. Exhibit 7.8 presents the stock price movements of all the companies.

We can see (Exhibit 7.8) that all companies have experienced declines in stock price in the last one year, which suggests that the market has revised its expectations about the prospects for the industry and the companies. Sun Pharmaceutical, for example, has experienced an almost 50 percent drop in price. What explains the valuation of a company? In other words, how do investors figure out whether a stock is a good buy at a given price? Analysts look at several indicators like P/E, P/BV, P/Cash flow and PEG ratios in selecting a stock. One commonly used measure of value is the (P/E)/(EPS growth rate) or the PEG ratio. For whatever reason the P/E ratio of high growth companies equals their compound annual growth rate in EPS. If we (arbitrarily) assign a PEG ratio of, say, 1.0, multiplying it with the company's EPS growth rate gives a theoretical P/E multiple. The P/E multiple can be used to derive a price given the company's EPS. Likewise, a company's PEG ratio may be compared to that of its competitors to see whether the ratio is low or high. Although there is no theoretical basis, analysts around the world continue to use it.

As an assignment calculate the following ratios: Price per share/Earnings per share, Enterprise value/EBITDA, Market value of equity/Book value of equity, and Price per share/Cash flow per share. See if there is a correlation between changes (improvements) in EBITDA margins over a three-year period and the stock price performance. Use the data (Exhibit 7.9)—the EBITDA margins for the companies during 1997 and 1998—to calculate the same for other years.

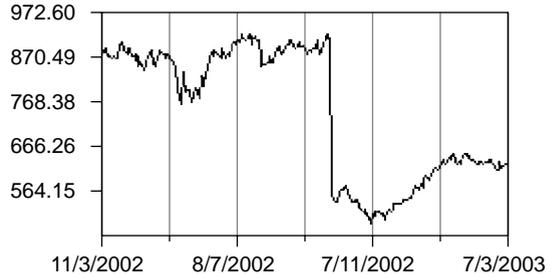
Exhibit 7.8 Stock price histories of pharmaceutical companies

Glaxo SmithKline

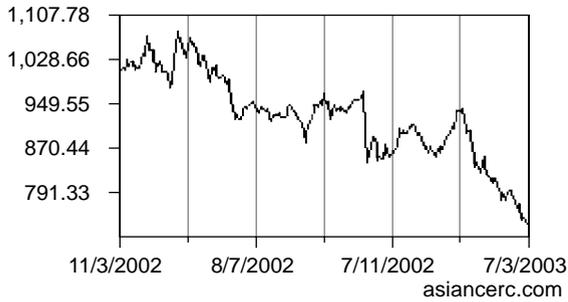


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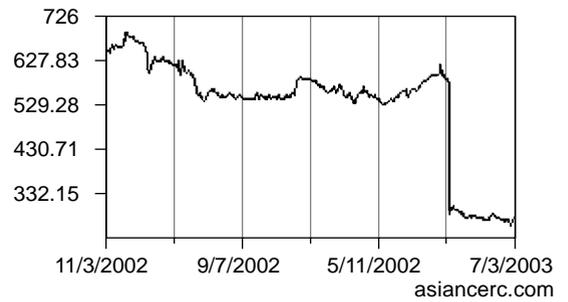
Ranbaxy Laboratories



Cipla



Sun Pharmaceutical Industries



Dr Reddy's Lab



Source: India Infoline.

Exhibit 7.9 EBITDA margins

	<i>(in percent)</i>	
	1997	1998
Cipla	22.6	24.2
DRL	20.6	21.9
Glaxo	13.7	13.5
Ranbaxy	18.6	19.3
Sun Pharma	29.1	25.1

Source: Merrill Lynch.

A few years ago, the analyst community expected these companies to do well because of rising margins, healthy growth in demand, better realization of prices due to the relaxation of DPCO, move toward basic research and formulation sales where the margins are much higher.³ Test whether their predictions turned out to be reasonably accurate.

EXERCISE

1. Evaluate each company in terms of growth in total assets, long-term debt, stockholders equity, sales, operating profit, pretax income, and net income for 2001.
2. See the common size balance sheets. Compare year 2000 to 2001. Why do current assets vary across firms? Why does borrowing vary from 1 percent to 35 percent across firms?
3. See the common size income statements. Compare year 2000 to 2001. Which firm is the most profitable? Why does net income vary from 4 percent to 22 percent across firms?
4. See the cash flow statements. Why did cash flow from operations increase from Rs 53.79 crore to Rs 212.09 crore for Glaxo? Did all the firms experience an increase in cash flow from operations? If not, why not? Is the cash flow from operations more or less than the cash flow from investing activities for these firms? If yes, why? If not, why not? For DRL the cash flow from operations in 2000 was Rs 86.63 crore whereas the cash flow from investing was Rs 110.18 crore. Where did DRL get the additional cash to finance the investment? Can this situation continue indefinitely?
5. Look at the financial ratios for these firms. Which firm has the most (least) liquidity as of 2001? Can a firm have too much liquidity? Which firm is best (worst) at managing assets as of 2001? Which firm is the most (least) financially leveraged as of 2001? Do you expect pharmaceutical firms to be highly leveraged? Why? Can a firm have too much or too little debt?
6. What were the factors that caused the change in return on equity for each company? Perform a DuPont Analysis.
7. Academic studies suggest the take over candidates are often firms with low leverage and poor operating performance. Are any of these firms good takeover candidates? Why?

³ See, for example, Jain, Manish and Paul Woodhouse (1998). 'India: Pharmaceutical Sector', Merrill Lynch, *Equity Research Report*, August.

Section Two

CAPITAL INVESTMENTS

Chapter 8

Overview of Capital Budgeting

OBJECTIVES

- ◆ Introduce students to the Civil Aviation Industry in India
- ◆ The nature of capital investment appraisal
- ◆ The techniques available for evaluating capital investments
- ◆ The limitations of these techniques
- ◆ The capital budgeting practices in select countries

In 1997, The Federal Bank Ltd, a leading private sector bank in Kerala, was evaluating a loan proposal from Cochin International Airport promoted by Cochin International Airport Authority. Federal Bank was incorporated in 1931 as Travancore Federal Bank Ltd to cater to the banking needs of Travancore province by a small group of local citizens. In 1949 the board of directors of the bank was reconstituted and the bank was renamed as The Federal Bank Ltd. The operations of the bank were confined to Kerala till 1972. After 1972, the bank expanded its operations to all the metros. The bank became an authorized dealer in foreign exchange in 1972. Since 1989, the bank has been active in Merchant Banking.

The bank's credit portfolio is well distributed over several sectors and sub sectors within prudential limits. Through careful monitoring of clients and timely initiatives in dealing with delinquency, the bank is able to contain its NPA (non-performing assets) to low levels.

COCHIN INTERNATIONAL AIRPORT LIMITED (CIAL)

The project is a brainchild of the district collector of Ernakulam, Mr V J Kurian. He undertook a program to uplift the infrastructure facilities in Kochy. The increase in the number of non-resident Indians traveling from Gulf countries to Kerala necessitated an airport in Kochy. Although there are two international airports in Kerala to cater to the growing traffic (8 percent) the need for another airport was felt. In particular, a large number of passengers travel to Kottayam and Pathanamthitta districts close to Kochy. The chief promoter of CIAL is Cochin International Airport Society registered under the Travancore Cochin Literary, Scientific and Charitable Society Registration Act of 1955. Other promoters of the venture are Cochin Chamber of Commerce and Industry, Indian Chamber of Commerce and Industry, (late) Sri Madhavan Nair, Sri C V Jacob and Sri B Govinda Rao.

The Civil Aviation Industry in India¹

The Indian aviation industry can be broadly classified into two main segments: civil and cargo. Indeed mail and air cargo played a more important role in air carrier services than passengers. The Indian aviation sector till recently was highly regulated by the government. The government introduced new initiatives like Air taxi in the 1980s to boost tourism. Domestic and international traffic is expected to grow at 12.5 percent and 7 percent respectively over the next decade. By 2005, Indian airports are likely to handle 60 million international passengers and 300,000 tons of domestic and 1.2 million tons of international cargo.

The civil aviation activities can be classified into three areas: operational, infrastructural and regulatory. On the operational front Indian Airlines and Air India provide domestic and international air services. The Airports Authority of India formed in April 1995 by the merger of separate airport authorities that existed till then provides the infrastructure facility. In 1999 the aviation industry's turnover was Rs 9,000 crore. The demand for aviation is seasonal in nature with the demand being high during April-May and again in November–December.

Airport Infrastructure

There are a total of 449 airports/airstrips in the country. Airports are classified as domestic and international. Domestic airports (71)—like those in Bangalore, Hyderabad and Ahmedabad—have customs and immigration facilities for limited international operations by national carriers and for foreign tourist and cargo charter flights. The international airports in Mumbai, Delhi, Chennai, Kolkata, and Thiruvananthapuram are available for scheduled international operations by Indian and foreign carriers. The Airports Authority of India (AAI) was formed after the merger of International Airport Authorities of India and the National Airports Authority in 1994–95. AAI manages 5 international airports, 87 domestic airports and 28 civil enclaves.

The current aviation policy allows the private sector to build airports. Some airports to be developed by the private sector are in Hassan (Karnataka), Mumbai, Goa, and Bangalore.

Public–Private Sector Partnerships

Until recently, much of the financing of infrastructure development in many countries came from government sources, multilateral institutions and export financing agencies. Quite often, governments in emerging markets lack the financial capacity or creditworthiness to support the volume of infrastructure projects required to develop their economies.

In the case of large infrastructure projects it is becoming inevitable for the public and private sectors to come together and jointly apply their skills and strengths to develop the project more quickly and efficiently. The joint venture between Railtrack and British Rail in the UK, to set up a high-speed rail project, is an example of such a partnership. Such partnerships try to involve the private sector in the process of designing, building, financing and operating public utilities. The government defines the services required, makes arrangements, which enables the private sector to be the service provider, and ensures that public services will be delivered at a specified quality at competitive prices. A number of public–private financing structures exist. Some of the schemes which can achieve the objectives are:

- Build–Operate–Transfer (BOT) model
- Build–Transfer–Operate (BTO) model
- Buy–Build–Operate (BBO) model

¹ This section is based on a report prepared by India Infoline.

In a BOT model, a private entity gets the mandate to finance, build and operate the project (which is otherwise a public sector project) for a specified period of time (say, 25 years) at the end of which ownership reverts to the local government. Typically, the sponsoring organization makes an equity investment of 20 to 30 per cent of the project cost and the rest is raised from international banks, multilateral agencies and domestic financial institutions. The host government generally gives a concession to carry out the construction and operation of the project and credit support for project borrowings. The licence agreement clearly spells out the commercial and financial terms. The BOT concept has been used in transportation (e.g., roads), energy (e.g., power projects), sewage and water treatment plants and hospitals.

In a BTO model, the private entity transfers the facility to the government soon after the project clears the completion test and leases it back for a specified period of time. The project company runs the facility and collects revenues during the lease term. At the end of the lease term the title passes on to the government (or the public sector entity).

In a BBO model, a private entity buys an existing facility, modernizes it, and operates it as for profit, public use facility. In many developing countries where existing facilities require modernization/expansion, the BBO model is ideal. Roads and bridges are candidates for this model.

Since the Kochi airport project involves a huge outlay, the Government of Kerala was not keen to set up another airport. Consequently the airport is being set up, on a Build–Own–Operate basis, with equity being contributed by people who will benefit from the project. As a first step a society was formed. Mr Kurian and his team convinced the NRIs in the Gulf that an airport in Kochi is desirable and raised (interest free) deposits from them. The government supported the effort by offering *Indira Vikas Patra* worth 50 percent of the amount deposited. Thereafter, in 1994, a company was formed with an authorized capital of Rs 90 crore, to construct, own, and operate an international airport with public participation and the support of the Government of Kerala.

The airport at Kochi is expected to boost trade and tourism. The interest free deposits provided by people were later converted into shares. Initially the Federal Bank had provided a loan that was later replaced by a loan from the Housing and Urban Development Corporation Limited (HUDCO). The state government contributed Rs 1 crore and the Federal Bank contributed Rs 2 crore in equity. Bharat Petroleum, the airport service provider, contributed Rs 25 lac in equity.

The project is being set up at a cost of Rs 204.48 crore in two phases, the first phase being pre-operative. Further expansion at Rs 89.83 crore has been planned after five years. Exhibit 8.1 provides the break-up of the project cost.

Exhibit 8.1 Project cost

	(Rs lac)		
	<i>Phase 1</i>	<i>Phase 2</i>	<i>Total</i>
Land	5,500		
Civil works	5,965		1,980
Buildings	4,270		6,576
Contingency	511.75		427.8
Preliminary expenses	1,256		
Pre-operative expenses	2,780		
Margin money for working capital	165.36		
	20,448.11	8,983.80	29,431.91

Contingency has been provided at 10 percent of project cost to provide for escalation of prices, change in duty structure, devaluation of currency, and so on. The cost of the CIAL project is lower compared to other airports at Bangalore and Hyderabad because:

- Traffic control and navigational aid systems are being provided by AAI without any cost to CIAL.
- The state government is providing roads and other utilities.
- The aviation fuel hydrant station is being set up by BPCL without any cost to CIAL.

The project is being financed by a mix of debt and equity. Equity is from NRIs and service providers at the airport apart from a few banks and financial institutions. Term loan to the extent of 75.5 percent of fixed assets has been provided by HUDCO and the Federal Bank. The debt-equity ratio for the project is fixed at 1.5. The amount of Rs 89.83 crore required for Phase 2 is being entirely financed from internal accruals.

Will the Project Pay?

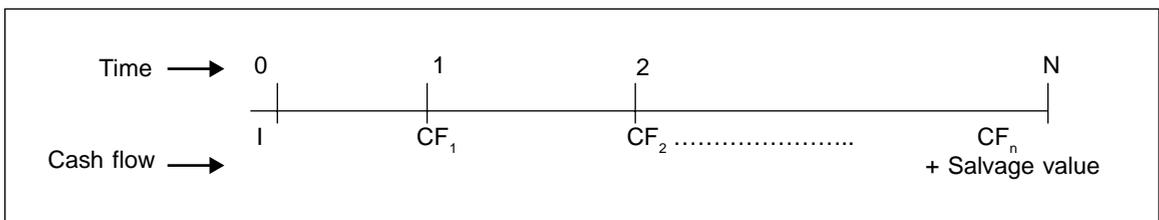
Some of the major responsibilities of top management are in the area of long-range planning. Allocating resources to competing uses is one of the most important decisions a manager has to make. Executives are constantly faced with such questions as:

- Which projects should a firm accept?
- How should the productivity of capital be measured?
- Should the company take care of investments that reduce costs or that maintain profits or that add to profits?
- What happens to the risk complexion and competitive position of the firm if the investment under consideration is accepted as opposed to not choosing it?

After reading this chapter you will know:

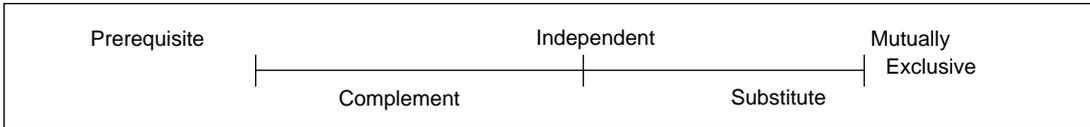
- The nature of capital investment appraisal
- The techniques available for evaluating capital investments
- The limitations of these techniques
- The capital budgeting practices in select countries

A typical capital budgeting decision involves commitment of large, initial cash outlay with the benefits spread out in time. The time to recoup initial investment could be long. This makes it imperative for the firm to carefully plan its investments to attain the corporate objectives. Capital investments are typically irreversible in nature or costly to get out. Unwarranted investments can jeopardize the financial well being of the firm. Capital budgeting deals with investment in real assets. A *project* requires a large, up-front capital investment; generates cash flows for a specified period of time at the end of which the project can be liquidated. The liquidation value of assets at the end of the project life is called Salvage value. It should be noted that the term initial investment is a misnomer. The term is used even when the investment is spread over a number of years. It is indeed the case in many real-life situations. A project is shown by a time-line diagram:



CLASSIFICATION OF INVESTMENTS

Investments can be classified on several bases like importance, size, functional activity, cost reducing versus revenue increasing, profit maintaining versus profit adding, etc. The most appropriate way of classification is on the basis of relationship between investments. The possible relationship between investments can be plotted on a continuum, as shown here:



At one end of the spectrum, one investment might be a prerequisite for the other. At the other end we have investments that are complete substitutes. Accepting one will result in automatic rejection of the other. Two investments are said to be independent if the cash flows from one investment would be the same regardless of whether the second investment is undertaken or not. Thus, buying a lathe for the machine shop and computerizing administration are independent investments. If the cash flows from one investment are affected by the decision to undertake another investment, they are said to be dependent. Dependence can be of four types. If the decision to undertake the second investment increases the benefit expected from the first (or decreases cost), then the second investment is said to be a complement of the first. For example, provide entertainment to visitors in a large clothing shop or manufacturing a primary input if it leads to cost advantage. If the decision to undertake the second investment decreases the benefit from the first investment (or increases costs), the second investment is said to be a substitute of the first. For example, making air-coolers and fans for the same market may lead to product cannibalization and erode profitability. In the extreme case, the benefits from the first may totally disappear if the second investment is accepted or it may be technically impossible to undertake both. Such investments are called mutually exclusive investments. For example, it is not possible to build one plant in two locations. Accepting one will result in automatic rejection of the other.

TECHNIQUES FOR EVALUATING CAPITAL INVESTMENTS

Companies spend a great deal of time and money on new investments. Executives need measures of productivity of capital, which can be applied to distinguish good ones from bad ones. There are broadly two types of measures—some based on accounting income and some based on cash flows. The cash flow-based measures can be further categorized as those that consider time value of money and those that don't. Cash flow-based measures that consider time value of money are called Discounted Cash Flow (DCF) techniques.

Return on Investment (ROI)

ROI is essentially a single period measure. Income is computed for a specified period and then divided by the average book value of assets of the same year:

$$\text{ROI} = [\text{EBIT} (1 - T) / \text{Average BV of investment}]$$

where

$$\begin{aligned} \text{EBIT} &= \text{Earnings before interest and tax} \\ T &= \text{Marginal Tax Rate, and} \\ \text{Average BV} &= (\text{Beginning book value} + \text{Ending book value})/2 \end{aligned}$$

A variant of the above formula is:

$$\text{ROI} = (\text{Net Income}/\text{Average BV})$$

ROI computed by the second method will be higher if equity financing is substituted for debt financing. This is because less interest expense increases net income (PAT). To separate investment and financing decisions it is better to use the first method. Consider a one-year project with an investment of Rs 10 lac. The project is expected to generate Rs 400,000 in pre-tax earnings. The applicable tax rate is 36 percent and the salvage value of the project is Rs 600,000.

$$\begin{aligned} \text{ROI} &= [400000 (1 - 0.36)/800000] \\ &= 32 \text{ percent} \end{aligned}$$

Note that ROI is a percent return measure. Now consider a multi-period project which has a life of 5 years.

$$\begin{aligned} \text{Initial investment} &= \text{Rs 10 lac} \\ \text{Salvage value} &= \text{Nil} \\ \text{Life} &= 5 \text{ years} \end{aligned}$$

Depreciation is provided on straight-line basis.

The project is expected to generate earnings of Rs 40,000 (loss), Rs 60,000, Rs 100,000, Rs 150,000 and Rs 200,000. How should the ROI be computed in this case? Should the ROI be measured for each of the years and averaged out or the average earnings and average book value of assets be used? ROI computed under the two methods is shown here:

Method 1

1. After tax operating earnings	(40,000)	60,000	100,000	150,000	200,000
2. Beginning BV	1,000,000	800,000	600,000	400,000	200,000
3. Depreciation	200,000	200,000	200,000	200,000	200,000
4. Ending BV	800,000	600,000	400,000	200,000	0
5. Average BV	900,000	700,000	500,000	300,000	100,000
6. ROI = (1)/(5)	- 4.5	8.5	20	50	100
	percent	percent	percent	percent	percent

The ROI increases from -4.5 percent in the first year to 100 percent in the fifth year. The average ROI is 35 percent:

$$\text{Average ROI} = [-4.5 + 8.5 + 20 + 50 + 100]/5 = 35 \text{ percent}$$

Method 2

$$\begin{aligned}\text{Average earnings} &= (-40000 + 60000 + 100000 + 150000 + 200000)/5 \\ &= \text{Rs } 94000 \\ \text{Average book value of investment} &= (900000 + 700000 + 500000 + 300000 + 100000)/5 \\ &= \text{Rs } 5 \text{ lac} \\ \text{ROI} &= (94000/500000) \\ &= 18.8 \text{ percent}\end{aligned}$$

It can be seen that ROI computed under first method is almost twice that computed under second method. The rule is to accept the project if $\text{ROI} > \text{Cost of capital}$ and reject if $\text{ROI} < \text{cost of capital}$.

Limitations of ROI

As is evident, ROI is a function of earnings and book value of investment. Both the numerator and the denominator are affected by accounting practices. Changing the method of depreciation or inventory costing will affect earnings and ROI. ROI typically understates return in early years and overstates return in later years. This is because the asset base is getting depreciated. In fact, ROI can increase for the same or lower earnings simply because the asset is being depreciated and becomes infinite when the denominator is zero! ROI does not consider time value of money in case of multi-year projects. No distinction is made between earnings in the first year and earnings in the last year. Further, ROI is an accrual accounting return whereas cost of capital is an economic return based on cash flows demanded by investors. The two cannot be compared.

CASH FLOW-BASED MEASURES

As the name itself suggests, these are based on cash flow rather than accounting income. Accounting earnings suffer from a credibility problem. In the absence of real performance improvement, accountants may accelerate revenues and defer costs, leading to overstatement of true profits. Earnings and cash flows, though related, measure different things. Cash flow is the net of cash inflows and outflows within a time period. Earnings, on the other hand, are the net of inflows and outflows from completed operating cycles. Cash flow measures inflows and outflows within a period regardless of the state of the operating cycle. Earnings measure inflows and outflows from operating cycles that the business has completed regardless of when the cash flow occurs. Put another way, there may be no cash flow even when there is a profit because profit is recorded on an accrual basis.

It is inappropriate to value earnings per se. You must also take into account the investment in fixed assets and working capital required to generate a given level of earnings. It is for this reason cash flows are used to value projects.

To arrive at cash flow from earnings:

- A. Add non-cash charges like depreciation and amortization that reduce net income but do not affect cash flow.
- B. Deduct investment in working capital and capital equipment in that year.

These cash outflows are not reflected in the net income as they are taken to the balance sheet. For instance, investment in inventory is not charged off to arrive at net income. But there is a cash outflow to bring the inventory to its present position. Monies would have been spent on raw materials, wages, etc. Since the inventory has not been sold, no revenue or profit is recorded.

Cash flow = EBIT (1-T) + Depreciation – Capital expenditure – (+) increase (decrease) in Working capital

Note that we have used net operating profit after taxes in the above expression rather than profit after tax in order to separate investment and financing decisions. That is interest is not deducted. The discount rate WACC incorporates after-tax cost of debt. Assume that a project has the following characteristics:

Year	1	2	3	4	5
NOPAT	(40,000)	60,000	100,000	150,000	200,000
Depreciation	200,000	200,000	200,000	200,000	200,000

As there is no capital investment in any year, cash flow = NOPAT + Depreciation.

The cash flow in the last year should include the salvage value of the plant and equipment, working capital, etc. In the above example salvage value is zero and hence not considered.

Payback Period

This is one of the simplest ways of measuring an investment's worth. It is the length of time required to recoup initial investment. Payback period is expressed in years. Thus, the payback period for an investment of Rs 1,000 that generates cash flows of Rs 250 for 5 years, is 4 years. The payback period is determined by adding up the expected cash flows in successive years until the total equals investment.

Assume that you are investing in a project with an initial investment of Rs 10 lac. The cash flows from the project are given below:

Year	Cash flow	Cumulative cash flow
1	160,000	160,000
2	260,000	420,000
3	300,000	720,000
→ 4	350,000	1,070,000 ←
5	400,000	1,470,000

The payback period in this case lies in between the third and fourth years. If we assume that cash flows occur uniformly over the year,

$$\begin{aligned} \text{Payback} &= 3 + [(1000000 - 720000)/(1070000 - 720000)] \\ &= 3.8 \text{ years, or } 4 \text{ years} \end{aligned}$$

The rule is to accept those projects that have a payback period less than the limit set by the management. Although most textbooks on Corporate Finance say that using payback period criterion is Neanderthal, some managers still use it. Some use it as a secondary criterion.

Limitations of the Payback Rule

Although it is based on cash flows, time value of money is ignored. Cash flow in year-1 is considered on par with cash flow in any other year. It considers cash flows until the investment is recouped. But it ignores cash flows that occur after that. So a project that generates substantial cash flows in the later years may be discarded in favor of another project that generates higher cash flows in the initial years even if the former makes more economic sense. Often projects with shorter payback are considered less risky. There is usually not much correlation between riskiness and payback. A project that has a shorter payback may be riskier than a project with a longer payback.

DISCOUNTED CASH FLOW MEASURES (DCF)

The rules considered so far do not take into account the time value of money. Discounted cash flow measures are based on cash flows and explicitly consider time value of money. There are three DCF measures:

- Net Present Value (NPV)
- Internal Rate of Return (IRR)
- Discounted Pay Back

Net Present Value (NPV)

The net present value of a project is the sum of the present values of expected project cash flows and the initial investment.

$$\text{NPV} = \sum_{t=1}^n [CF_t / (1 + K)^t] - \text{Initial investment}$$

where,

CF_t = cash flow in any year t ,

K = appropriate discount rate, *usually* the weighted average cost of capital, and

T = year 1, 2 n .

Thus, NPV is the excess of present value of cash inflows over the initial investment. It is an absolute number expressed in rupees. The rule is to accept the project if NPV is > 0 , and reject it if NPV is < 0 . A firm accepting a negative NPV project will be financially worse off. If the NPV is zero, the firm is neither better off nor worse off. To calculate NPV:

- Estimate project cash flows.
- Choose an appropriate discount rate.
- Calculate PV of project cash flows and deduct initial investment.

The calculation of NPV is based on certain assumptions:

- Cash flows occur at the beginning or end of the period rather than continuously throughout the period.
- Cash flows are certain.

Consider a project that requires an initial investment of Rs 10 lac. The expected cash flows are shown here:

Year	Cash flow (Rs)
1	2.5 lac
2	3 lac
3	4 lac
4	5 lac

Assume that the appropriate discount rate is 15 percent.

$$\text{NPV} = [250000/(1.15) + 300000/(1.15)^2 + 400000/(1.15)^3 + 500000/(1.15)^4] - 1000000$$

$$\text{NPV} = -\text{Rs } 6,500$$

As the NPV is negative, the project should not be accepted.

NPV has certain properties:

- It is in line with shareholder wealth maximization rule.
- It considers all cash flows unlike payback period.
- It is additive, i.e., $\text{NPV}(A+B) = \text{NPV}(A) + \text{NPV}(B)$. The NPV of two or more projects can be added.
- It considers time value of money.
- It assumes that all intermediate cash flows are reinvested at the discount rate (hurdle rate).

Limitations of NPV

Although the NPV rule is conceptually sound, it has some limitations:

1. Since it considers all cash flows, it is biased towards longer term projects.
2. NPV is an absolute number. One can make the mistake of rejecting a project that has a slightly lower NPV by not asking what the initial investment is. A project that has an NPV of 150 might be better when compared to another with an NPV of 200 if the latter requires much higher investment.

Internal Rate of Return (IRR)

The internal rate of return is the discount rate at which the present value of cash flows equals the present value of cash outflows or $\text{NPV} = 0$. The discount rate is calculated by trial and error. Note the similarity between IRR and Yield to Maturity (YTM) of a bond. The YTM of a bond is the discount rate that makes the present value of coupon and principal repayments equal to the market price of the bond.

IRR is the discount rate at which $\text{NPV} = 0$.

$$\text{NPV} = \sum_{t=1}^n [CF_t / (1 + K)^t] - \text{Initial investment}$$

The value of K in the above expression is the IRR.

The IRR for the previous example is shown here:

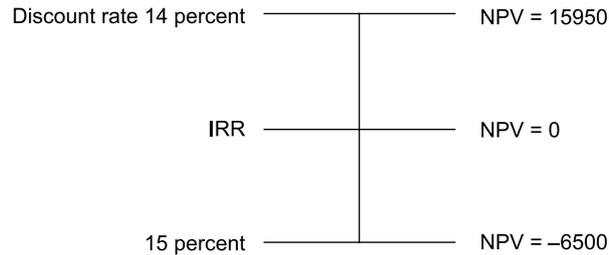
Investment = Rs 1,000,000

$$\text{NPV} = [250000 \times \text{PVIF}(r, 1)] + [300000 \times \text{PVIF}(r, 2)] + [400000 \times \text{PVIF}(r, 3)] \\ + [500000 \times \text{PVIF}(r, 4)] - \text{Rs } 1000000 = 0$$

At $r = 14$ percent, $\text{NPV} = \text{Rs } 15950$

At $r = 15$ percent, $\text{NPV} = -\text{Rs } 6500$

IRR lies in the range of 14–15 percent

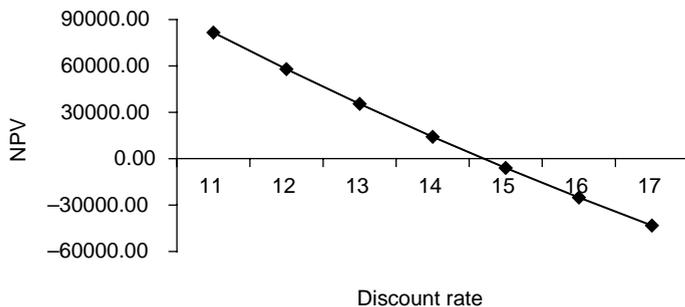


By trial and error, $\text{IRR} = 14 + [15950 / (15950 + 6500)]$ percent
 $= 14.71$ percent

NPV Profile

The relationship between NPV and discount rate can be shown in a graph. The graph, called NPV profile, has NPV on the Y-axis and discount rate on the X-axis. The NPV profile for the previous example is shown in Exhibit 8.2. The point at which the profile cuts the X-axis is the IRR ($\text{NPV} = 0$). Note the similarity between the bond price sensitivity to changes in YTM and the sensitivity of NPV to changes in discount rate. As can be expected, the NPV profile has a negative slope. The NPV decreases as the discount rate increases. There is an exception to this. All the examples considered so far were of the conventional kind—an initial outflow followed by inflows. When the signs of cash flows alternate or change during the life of the project, *NPV can increase when discount rate increases*.

Exhibit 8.2 NPV profile



Moral: NPV is dependent on timing, magnitude, sign of cash flows, discount rate and investment. NPV *can* be increased by simply understating investment/discount rate and overstating cash flows.

The rule is to accept the project if $\text{IRR} > \text{cost of capital}$ and reject if $\text{IRR} < \text{cost of capital}$. IRR, unlike NPV, is a scaled measure. It is expressed in percentage terms.

Limitations of IRR

Since IRR is a scaled measure, it is biased towards smaller projects. IRR assumes that intermediate cash flows are reinvested at IRR ($>COC$) during the life of the project. Competition may drive down earnings in the long run to normal levels. At times more than one IRR is obtained making decision difficult.

Discounted Payback

It measures the time required for discounted cash flows to cover initial investment. Unlike the payback period, discounted payback period considers time value of money. The discount rate is the firm's cost of capital.

Consider a project has an initial investment of Rs 700,000:

Year	Cash flow	PV @ 15 percent	Cumulative PV
1	160,000	139,200	139,200
2	260,000	196,560	335,760
3	300,000	197,400	533,160
4	350,000	200,200	733,360
5	400,000	198,800	932,160

Discounted payback = 4 Years (approximately).

CAPITAL BUDGETING PRACTICES: SURVEY RESULTS

The results of the survey conducted in some countries (Exhibit 8.3) are slightly old. Management practices might have changed in the meantime. Nevertheless, they do throw light on what firms do in real life. Payback and IRR seem to be the favorite methods in the US, Australia, the UK, Canada, and Japan.

Exhibit 8.3 Capital budgeting practices in select countries

	<i>(in percent)</i>						
	US	Australia	Canada	Ireland	Japan	UK	Korea
Payback	59	61	50	84	52	76	75
IRR	52	37	62	84	4	39	75
NPV	28	45	41	84	6	38	60
ARR	13	24	17	24	36	28	68

Source: Horngren et al. (1997). *Cost Accounting: A Managerial Emphasis*, PHI, 9th Ed.

IRR and average rate of return seems to be the favorite methods in the US. More recently, Graham and Harvey (2001) conducted a survey of 329 CFOs in the US.² In the summary of their findings (Exhibit 8.4), they find that NPV and IRR are more popular than other approaches in line with theory.

² Graham, John R and Campbell Harvey (2001). 'The Theory and Practice of Corporate Finance: Evidence from the Field', *Journal of Financial Economics*, Vol. 61.

Exhibit 8.4 Survey responses to the question, 'How frequently does your firm use the following techniques when deciding which projects or acquisitions to pursue?'³

	(percent) <i>always</i> or <i>almost</i> <i>always</i>	<i>Mean</i>	<i>Company size</i>	
			<i>Small</i>	<i>Large</i>
IRR	75.61	3.09	2.87	3.41
NPV	74.93	3.08	2.83	3.42
Payback	56.74	2.53	2.72	2.25
ROI	20.29	1.34	1.41	1.25
Discounted payback	29.45	1.56	1.58	1.55

Another survey of capital budgeting practices in Asia-Pacific suggests that DCF techniques are considered important in Australia, Malaysia, the Philippines, and Indonesia whereas Payback and IRR are considered important in Singapore and Hong Kong.⁴

Going back to the Cochin International Airport: Will the project pay? I intend to answer this question in the next chapter.

IN CONCLUSION

In this chapter we considered several capital budgeting techniques. Each has its limitations. Which is the right technique then? In other words, what are the characteristics of the 'right' technique?

- It should distinguish between good and bad investments.
- It should summarize what the investment will do to the profitability of the organization.
- It should factor in time value of money.
- It should be unambiguous.
- It should be in line with the corporate objective—maximization of shareholders wealth.
- It should be applicable to a wide range of business situations.
- It should not be biased and permit realistic comparison of one investment proposal with another.
- It should permit simple adjustments to allow for ranges of uncertainty.
- It should take into account the life pattern of cash flows.

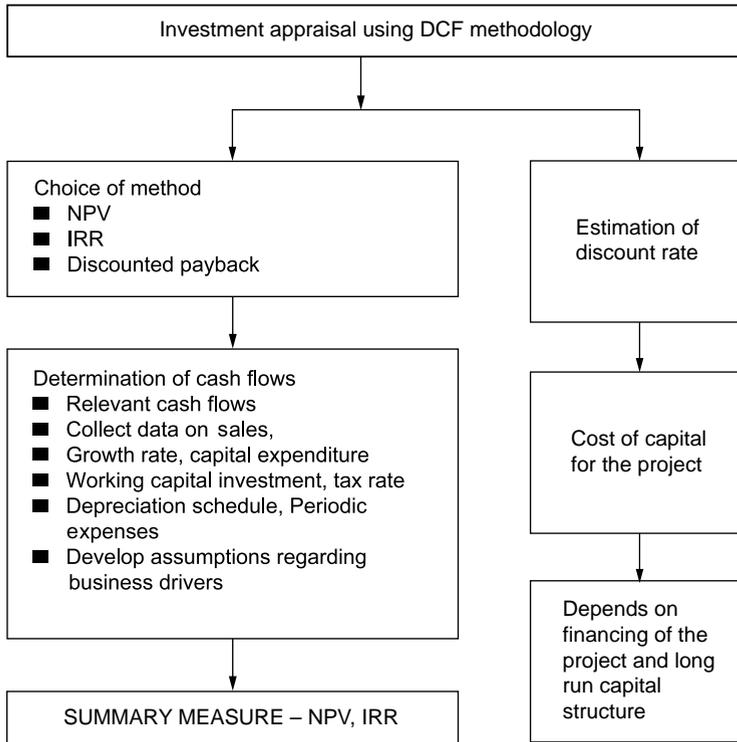
Clearly NPV is the only criterion that satisfies most of these. So NPV is recommended. NPV is not an abstract concept. A company accepting a negative NPV project will *really be* worse off.⁵ Many managers do not buy this argument either because they don't know or don't care. The second reason is more likely. Managers are appraised on the basis of current earnings and profits. Naturally, any manager would be biased towards those projects that generate revenues during *his/her* tenure even if the NPV is negative. Why should

³ Respondents are asked to rate on a scale of 0 (never) to 4 (always). They report the overall mean as well as the percentage of respondents that answered 3 (almost always) or 4 (always).

⁴ Kester, George, Rosita Chang, Erlinda Echanis, Shalahuddin Haikal, Mansor Isa, Michael Skully, Kai-Chong Tsui, and Chi Jeng Wang (1999). 'Capital Budgeting Practices in the Asia-Pacific Region: Australia, Hong Kong, Indonesia, Malaysia, Philippines and Singapore', *Financial Practice and Education*, Spring–Summer.

⁵ Well, not really. NPV has its limitations too. The chapter on real options deals with it.

anyone care about investments that are likely to generate returns during another executive's regime? Finally, note that the discount rate used in the NPV calculation is *usually* the weighted average cost of capital. We'll get back to project discount rate at a later stage. Till such time keep using WACC.



EXERCISE

1. A Caselet: Nirmal Chemical Company

The Nirmal Chemical Company is planning to invest in a new plant. The team of analysts responsible for investment appraisal has arrived at the following information:

Estimated investment	—	10 lac
Estimated life of the plant	—	7 years
Annual Cash flows: Years 1–3	—	Rs 1.5 lac
Years 4–7	—	Rs 2 lac
Appropriate discount rate	—	15 percent

Now:

- Find the present value of all cash flows.
 - How would your answer change if cash flows were to grow at 40 percent per year after year 3 up to the seventh year?
 - Now reduce the life of the plant to 6 years. Keeping the other data constant, find the present value.
 - Recalculate the present value using a discount rate of 14 percent.
2. A fuel injection company has four investments:
- A project to implement ERP software in the company.
 - A proposal to start a software subsidiary.

- c. Repairing an old assembly line.
- d. A proposal to manufacture spark plugs.

Classify them as cost reducing, revenue expanding (related business) and revenue expanding (unrelated business).

3. The initial investment and NOPAT for three projects is given here:

<i>Investment</i>	<i>Outlay</i>	<i>Years</i>			
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
A	10,000	2,000	3,000	4,000	4,000
B	7,500	1,500	2,000	2,500	5,000
C	5,000	2,000	1,500	1,000	500

Salvage value is zero for all the projects. Depreciation is provided on straight-line basis. Calculate average return on investment for the projects. If the cost of capital is 20 percent which of the projects (if any) would you choose? Is it meaningful to calculate ROI for the projects? Why or why not? Calculate ROI by the second method and compare it with that obtained from the first method.

4. Calculate the payback period for each of the investments. If the maximum acceptable payback period is 3 years, which of the investments would be accepted?

<i>Investment</i>	<i>0</i>	<i>Years</i>			
		<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
A	(1,000)	500	300	300	900
B	(1,000)	(100)	200	500	600
C	(1,000)	250	250	250	250

- 5. A project requires an initial investment of Rs 1,000,000. The first year cash flow is expected to be Rs 100,000. It is expected to grow at 20 percent per annum for five years and remain at year 6 level for four more years. Calculate the payback.
- 6. Calculate the discounted payback for question (2) if the discount rate is 13 percent.
- 7. The Primitive Car Company is evaluating a project which requires an initial investment of Rs 20 lac. The project cash flows are given here:

<i>Year</i>	<i>Cash flow</i>
1	100,000
2-5	200,000
6-10	400,000

Calculate the Net Present Value if the discount rate is 14.5 percent. Draw the NPV profile.

8. You are evaluating a project that has the following characteristics:

Initial investment = Rs 2 million.

Cash flows are expected to remain constant for 5 years, double in the sixth year and remain at that level for 4 years, and then grow at 5 percent per annum forever after that.

The discount rate is 11 percent.

Calculate the cash flows that make NPV = 0.

9. Calculate IRR for the two mutually exclusive projects given here:

<i>Year</i>	<i>Project A Cash flow</i>	<i>Project B Cash flow</i>
0	500,000	1,500,000
1-4	100,000	200,000
5-10	150,000	250,000

If the cost of capital is 18 percent which of the projects (if any) would you choose?

Calculate NPV if cost of capital is 14 percent.

10. A growth company has Rs 4 crore to invest in any or all of the following projects:

(in Rs '000)

Project	Type of cash flow	Years			
		0	1	2	3
i.	Investment	(10,000)			
	Revenue		21,000		
	Operating expenses		11,000		
ii.	Investment	(10,000)			
	Revenue		15,000	17,000	
	Operating expenses		5,833	7,833	
iii.	Investment	(10,000)			
	Revenue		10,000	11,000	30,000
	Operating expenses		5,555	4,889	15,555
iv.	Investment	(10,000)			
	Revenue		30,000	10,000	5,000
	Operating expenses		15,555	5,555	2,222

Assume that all expenses are on cash basis.

Tax rate = 35 percent.

Depreciation will be on a straight-line basis.

Ignore salvage value.

Rank projects on the basis of Payback, NPV, IRR, and ROI.

The cost of capital for the company is 15 percent.

Chapter 9

Free Cash Flow Valuation

OBJECTIVES

- ◆ How to estimate truly incremental cash flows.
- ◆ How to estimate free cash flow to firm and free cash flow to equity.
- ◆ What are some accepted principles in estimating free cash flow and NPV?
- ◆ What is the impact of debt financing and inflation on NPV?
- ◆ Why do alternate measures of project profitability like NPV and IRR give conflicting results and how to deal with them?
- ◆ How should projects with unequal lives be evaluated?

As mentioned in the last chapter, the DCF methodology is widely used to evaluate capital projects. In the DCF approach, the value of the project is the future expected cash flows discounted at a rate that reflects the riskiness of the projected cash flows. The DCF methodology is founded on the principle that it is inappropriate to capitalize earnings per se. One must also take into account the investment required to generate those earnings. Consequently, cash flows are obtained by deducting net capital expenditure and incremental working capital investment from net operating profits after taxes. The steps involved in the valuation are:

Step 1: Determine Free Cash Flow

Free cash flow is the cash flow available to all investors in the company—both shareholders and bondholders—after consideration for taxes, capital expenditure and working capital investment.

$$\begin{aligned} \text{Free cash flow} &= \text{NOPAT} + \text{Depreciation} - \text{Capital expenditure} \\ &\quad - (+) \text{Increases (Decreases) in Working capital investment} \end{aligned}$$

where

- NOPAT = Net operating profit after tax
 - = Earnings before interest but after taxes
 - = EBIT (1 – Tax rate); and
- EBIT = Revenue – Cost of goods sold – Operating expenses – depreciation.

Estimation of cash flows requires NOPAT, Capital expenditure and Net working capital. In calculating NOPAT, interest is not deducted because the discount rate, WACC, incorporates after-tax cost of debt.

The physical assets of a company depreciate and need to be replaced to maintain a certain level of growth in sales. Usually Capex is estimated as a constant percentage of revenues. Capex can be either positive or negative depending on whether the company is making or liquidating investments. If Capex is negative, it is a source of funds. To gain an estimate of capital investment required per rupee of sales increase, take the sum of all capital investments less depreciation over the last five or ten years in similar projects and divide this total by the sales increase from the beginning to the end of the period.

The working capital investment should not include cash and other equivalents. That is, non-cash working capital is to be taken into consideration. Free cash flows thus obtained can be either positive or negative depending on whether the business is generating a surplus or a deficit under a specific plan of growth. Due care must be taken in estimating working capital investment. Actual year-to-year balance sheet changes often do not reflect the average or normal needs of the business during the year.

Operating working capital is defined as:

	Transaction cash balance
Plus:	Accounts receivable
Plus:	Inventory
Plus:	Other current assets
Less:	Accounts payable
Less:	Taxes payable
Less:	Other current liabilities

$CF_t =$ Cash flow in year

$$t = S_{t-1} (1+g_t) (p_t) (1 - T) - (S_t - S_{t-1}) (C_t + W_t)$$

where

$S =$ Sales,

$p =$ Profit margin = EBIT as a percentage of sales,

$T =$ income tax rate

$C =$ Capital investment required (net of depreciation) per rupee of sales increase,

$W =$ net working capital per rupee of sales increase, and

$g =$ growth rate.

Estimate the most likely incremental cash flows to be generated by the project. Note that financing is not incorporated in the cash flows. Suitable adjustments for the specific financing will be made in the discount rate. The forecast of free cash flows requires the following inputs:

1. Initial sales before the starting of the forecast period.
2. Growth rate in sales for the entire forecast period. The growth rate may remain constant or change.
3. The ratio of EBIT/Sales (profit margin) for the entire period.
4. The ratio of total operating capital (i.e., Capex + working capital investment) to sales for the period.

Thus

$$\text{Sales}_t = \text{Sales}_{t-1} \times (1 + g_t)$$

$$\text{EBIT}_t = \text{Sales}_t (p_t)$$

$$\text{Asset Requirement} = a_t = [(\text{FA} + \text{WC})/S]_t$$

$$(\text{FA} + \text{WC})_t = \text{Sales}_t \times [(\text{FA} + \text{WC})/S]_t$$

Step 2: Estimate a Suitable Discount Rate for the Project

A company can use its weighted average cost of capital based on its target capital structure only if the project has the same (systematic) risk as the parent. If the company has a different capital structure in mind, suitable adjustments for the discount rate should be made. The discount rate should reflect the capital structure of the project. To calculate the discount rate:

- Estimate the asset beta for the project using the relationship.
 $\beta_A = \beta_E (E/V)$ where E/V is the equity-to-value ratio and β_E is the equity beta. The asset beta may also be obtained by taking the average asset betas of comparable firms in the industry.
- Re-lever the asset beta at various debt ratios (say, from 0 to 60 percent using the same relationship and find levered equity beta for the project.
- Estimate cost of equity at various debt ratios.
- Similarly, estimate cost of debt at various debt ratios.
- Calculate WACC as the weighted average of costs of debt and equity, the weights being target, market value debt-to-value and equity-to-value ratios respectively.

Step 3: Calculate the Present Value of Cash Flows

Since the project is usually a going concern,

$$\text{Value of the project} = \text{PV of cash flows during the forecast period} + \text{Terminal value}$$

We can set the forecast period in such a way that the project reaches a stable phase after that. In other words, we are assuming that the project will grow at a constant rate after the forecast period. The period of high growth can be anywhere from 3–20 years (may be even more for some computer software firms) depending on the type of business, size of the market, entry barriers, availability of substitutes, number of players in the market and so on.

Step 4: Estimate the Terminal Value

The terminal value is the present value of cash flows occurring after the forecast period. If we assume that cash flows grow at a constant rate after the forecast period, the terminal value:

$$T.V = [CF_t (1 + g)] / k - g$$

where

- CF_t = cash flow in the last year,
- g = constant growth rate, and
- k = discount rate.

Step 5

Add present value of terminal value.

Step 6

Deduct the value of initial investment to arrive at NPV. One might calculate IRR given a forecast of free cash flows and initial investment.

The viability of an airport depends primarily on domestic and international traffic. Exhibit 9.1 presents the number of passengers carried since 1992. As can be seen, the number of passengers carried is decreasing.

Exhibit 9.1 All passengers carried since 1992 in the domestic sector

<i>Year</i>	<i>Total domestic (million)</i>	<i>Growth (percent)</i>
1992	8.47	5.1
1993	8.84	4.3
1994	10.51	18.9
1995	11.98	14.0
1996	11.01	(0.6)
1997	11.51	(3.3)
1998	11.86	1.9

Source: India Infoline.

One study found that the international traffic is expected to grow at 6.88 percent at Mumbai, 10.69 percent at Thiruvananthapuram and 12.36 percent at Chennai airports; the weighted average for all airports being 8.1 percent.

Kochi has the potential to develop into a maintenance and refueling base due to its geographic location. The runway and terminal facilities at Thiruvananthapuram are inadequate. Further, the Kerala-bound traffic at Mumbai is estimated to be 5.9 percent, of which 65 percent is Kochi bound, and 25 percent of traffic handled at Thiruvananthapuram is Kochi bound. Likewise other airports at Chennai, Bangalore and Hyderabad also handle Kerala-bound traffic. All these factors led to the conclusion that there is a need for an international airport at Kochi.

Development of any project involves the following steps:

- Preparation of techno-economic feasibility
- Site selection
- Formation of a company
- Statutory clearance
- Acquisition of land
- Presentation and discussion with financial institutions for funding
- Invitation and finalization of bids for civil works
- Tendering and award of electrical works
- Commissioning and testing
- Commercial operation

FINANCIAL EVALUATION

Common sense suggests that a project should generate adequate revenues to be financially viable. Airports generate revenues from two sources: traffic and non-traffic. Traffic revenue comes from:

- Terminal navigational handling
- Parking
- Cargo handling
- Fueling
- Watch hour services

Non-traffic revenue comes from:

- Passenger service fee
- Visitors admission fee
- Car parks
- Advertisements
- Land lease
- Duty free shops
- Ground services
- Turnaround maintenance

The total number of passengers handled in the first year of operations was expected to be 1.55 million and that domestic and international traffic would grow at 10 percent and 8.5 percent respectively.

The forecast of income and expenditure for the first 15 years (Exhibit 9.2) is based on the assumption that domestic and international traffic will grow at 10.6 percent and 8.5 percent respectively. It also assumes that 66 percent of the cargo from the Thiruvananthapuram airport, 30 percent of the cargo from Chennai airport, and 20 percent of traffic from other airports would be diverted to Kochi. Exhibit 9.3 presents the forecast of free cash flows.

Exhibit 9.2 Forecast for 15 years

	<i>(Rs lac)</i>					
	1	2	3	4	5	15
A. Income	5,551.02	7,402.97	9,138.18	10,394.78	11,751.57	24,265.31
B. Expenditure	3,643.52	3,684.61	3,741.87	3,794.71	3,750.14	4,511.94
Profit(A – B)	1,907.5	3,718.36	5,396.31	6,600.07	8,001.43	19,753.37
Preliminary expenses						
Written off	125.6	125.6	125.6	125.6	125.6	0
PBT	1,781.9	3,592.76	5,270.71	5,474.47	7,875.83	19,753.37
Tax	0	0	0	0	0	7,873.39
PAT	1,781.9	3,592.76	5,270.71	5,474.47	7,875.83	11,879.93
Dividend	0	817.91	1,226.87	1,635.82	1,835.82	1,635.82

Exhibit 9.3 Forecast of free cash flow

	<i>(Rs crore)</i>						
Year	0	1	2	3	4	5	16
Investment	204.48						
Free cash flow		1.65	3	-1.37	9.22	23.4	105.72

IRR = 26.2 percent.

ACCEPTED PRINCIPLES

Estimation of project cash flows involves some generally accepted principles.

After Tax Incremental Cash Flows

The first principle in investment analysis is to consider only incremental cash flows. The idea is to arrive at cash flows, either inflows or outflows, which can be traced to the project. To arrive at incremental cash flows subtract the expected cash flows without the project from the expected cash flows with the project. Thus, if you are evaluating two alternatives, subtract the cash flows from one alternative from the cash flows of the second alternative to arrive at incremental cash flows. The NPV of the incremental cash flows should be positive for the project to be accepted.

Income tax should be computed by applying the expected tax rate for each period to the taxable income, excluding interest charges, of that period and all projects should be compared on the basis of after tax cash flows and NPV. The tax rate used is the marginal tax rate applicable for the next rupee of earnings. The depreciation for the purpose of reporting taxable income is calculated on the written down value method, although the straight-line method may be used for accounting purposes. It is likely that in the initial years a firm may incur losses and not absorb depreciation. The unabsorbed depreciation and losses may be carried forward and set off in later years.

Opportunity Cost

In many cases, some of the resources, including human, needed for a project may be a part of the already existing business. Such resources have alternative uses. These alternative uses create opportunity cost—the cost for the existing business due to the new project. For instance, some executives may be transferred to render analytical support to a project or the project may make use of already owned building. Are these resources cost free? Obviously they are not free. The project has to be charged for these. Assume that a company has transferred some executives to the new project temporarily. These executives have to be replaced by suitable personnel and incur an additional salary expenditure of Rs 13.5 lac. The opportunity cost for this resource is Rs 13.5 lac. Similarly cost may be attached to other resources like buildings, plant and equipment, vehicles, etc. based on the next best use or expenses incurred. The opportunity cost charged should measure net cash flows that could have been earned had the project under consideration not been undertaken. In real life situations it may be difficult to attach opportunity cost to all resources especially those that do not have an alternative use.

An example is in order: A project under consideration will use an already owned office space in a commercial complex for 4 years. The office could be let out for an annual rent of Rs 125,000 and the depreciation tax shield lost per year is Rs 1,400. Assume a discount rate of 15 percent.

$$\begin{aligned}\text{Opportunity cost} &= \text{PV of rent forgone} + \text{PV of tax-shield lost} \\ &= \text{Rs } [125000 \times \text{PVIFA } (15,4) + 1400 \times \text{PVIFA } (15,4)] \\ &= \text{Rs } 360872\end{aligned}$$

Note that the depreciation tax shield is simply depreciation expense per year multiplied by tax rate. The opportunity cost should be added to the initial investment.

Sunk Costs

Some expenses related to the project may be incurred before the investment analysis is considered. For instance, the sponsors of Cochin Airport might have hired a consultant to assess the viability of an airport and spent some money on the feasibility study. Such expenses are called sunk costs. Since sunk costs cannot be recovered if the project is rejected, they have to be ignored. Thus, the money spent on research and development should be ignored. Then who should pay for sunk costs? The cumulative NPV of all successful projects should cover the sunk costs of all projects undertaken.

Working Capital Investment

Apart from investment in fixed assets, a firm will have to invest in current assets like inventory and book debts for day-to-day running of the business. Part of current assets can be funded by non-interest bearing current liabilities like accounts payable, and salaries and wages payable. The excess of current assets over current liabilities, which is to be funded by other sources, is called net working capital. Often, executives either ignore or understate working capital investment. The new project causes sales to rise which leads to higher accounts receivable and inventory; the NPV is overstated. Usually the spontaneous rise in accounts payable and other accrued liabilities will not cover the increase in current assets. The gap comes from new debt, which increases risk. Executives usually do not notice this. Many projects end up with substantial cost over runs. As a rough estimate working capital can be expressed as a function of the level of activity, i.e., number of units sold or sales revenue. To illustrate, working capital for a project may be 15 percent of revenues.

Impact of Depreciation

$$\begin{aligned} \text{Cash flow} &= \text{EBIT} - \text{Tax on EBIT} + \text{Depreciation} - \text{Capital expenditure} \\ &\quad - (+) \text{increase (decrease) in working capital} \end{aligned}$$

NPV is a function of cash flows and cash flow is a function of depreciation. The higher the depreciation, the higher is the cash flow and hence NPV—other things remaining constant.

Assume the following data:

Initial investment = Rs 4500

Project life = 4 years

Salvage value = 0

Discount rate = 15 percent

	1	2	3	4
EBIT	1,000	2,000	3,000	4,000
– Tax @ 35 percent	350	700	1,050	1,400
+ Depreciation	1,125	1,125	1,125	1,125
Cash flow	1,775	2,425	3,025	3,725

$$\text{NPV} = -4500 + \text{PV of cash flows} = \text{Rs } 2,998.70$$

If the method of depreciation were to be changed:

	1	2	3	4
EBIT	1,000	2,000	3,000	4,000
– Tax @ 35 percent	350	700	1,050	1,400
+ Depreciation at 33.3 percent of WDV	1,500	1,000	667	444
Cash flow	2,150	2,300	2,617	3,044

$$\begin{aligned} \text{NPV} &= -4500 + \text{PV of cash flows} \\ &= \text{Rs } 2572 \end{aligned}$$

The total amount of depreciation might be the same in both the cases but there is a timing difference. In the second case more depreciation is provided in the initial years. This results in a change in NPV

The Tax Benefit of Depreciation

Depreciation is a tax-deductible expense. The higher the depreciation (an expense), the lower will be the income and hence tax paid on income.

Assume the following data:

Investment = Rs 400

Tax rate = 35 percent

Discount rate = 12 percent

Tax shield = $D \times T$

$$= 100 \times 0.35 = 35$$

Year	Depreciation	Tax shield
1	100	35
2	100	35
3	100	35
4	100	35

$$\text{PV of tax shield} = 35 \times \text{PVIFA}(12,4) = \text{Rs } 106.30$$

If the depreciation were to change:

Year	Depreciation	Tax shield
1	200	70
2	100	35
3	50	17.50
4	50	17.50

$$\text{PV of tax shield} = \text{Rs } 114$$

Increase in depreciation will result in higher NPV, but reported earnings come down as an expense item has increased. This may send wrong signals to the stock market resulting in lower stock prices. So there is a trade off between reported earnings and higher NPV due to higher tax benefits.

Schedule XIV of the Companies Act 1956

Schedule XIV of the Companies Act 1956 prescribes rates of depreciation for various classes of assets. An extract from the same is shown in Exhibit 9.4. The Income Tax Act of 1961 prescribes rates of depreciation for the computation of taxable income. The Act is amended by yearly Finance Acts that prescribe the rate to be applied. An extract from the Finance Bill is shown in Exhibit 9.5.

Exhibit 9.4 Depreciation rates as per Schedule XIV

Nature of asset	Single shift		Double shift		Triple shift	
	WDV	SLM	WDV	SLM	WDV	SLM
1. A. Buildings (other than factory buildings)	5 percent	1.63 percent	—	—	—	—
B. Factory buildings	10 percent	3.34 percent	—	—	—	—
C. Temporary erection	100 percent	100 percent	—	—	—	—
2. Plant & machinery						
A. General rate	15 percent	5.15 percent	22.5	8.09	30	11.31
B. Special rate as applicable						
3. Furniture & fittings (general rate)	10 percent	3.34 percent	—	—	—	—
4. Ships/Fishing vessels	27.05 percent	10 percent				

Exhibit 9.5 Rates at which depreciation is admissible

Block of assets	Depreciation allowance as percentage of written down value
1. Buildings for residential purpose	5
Buildings used as hotels	20
Temporary erections	100
2. Furniture & fittings	10
Those used in hotels, etc.	15
3. Machinery & plant	25
Pollution control equipment	40
Cogeneration systems	100

Salvage Value of Investment

The price at which fixed assets and working capital can be liquidated, called salvage value, should be estimated and added to the last year's cash flows. Excluding salvage value will under state the true NPV of the project. In real life situations, it is difficult to extrapolate asset values far into the future. Typically advice from professional estimators (engineering) is sought.

A subsidiary of BEL was setting up a black and white picture tube project in the early 1990s. The company had estimated the salvage value of fixed assets and net working capital to be Rs 8 crore. The forecast of free cash flows for the project is given here:

Year	0	1	2	3	4	5	6	7	8	9	10
Cash flow (Rs)	-1,410	128	180	389	365	342	307	288	268	248	227

NPV without salvage value = -Rs 72.80

NPV with salvage value = Rs 124

Much of the project's value comes from salvage value. Without it, the project would become unviable.

The Impact of Debt Financing on NPV

To arrive at cash flows we did not deduct interest charges. The reason is that the discount rate (WACC) already considers debt financing. WACC is calculated by taking weighted average after-tax costs of equity and debt. The cost of debt in the WACC formula already accounts for project specific debt financing. Deducting interest from EBIT would lead to double counting.

$$\text{WACC} = K_d (1 - T) (D/D + E) + K_e (E/D + E)$$

A project can be analyzed from the perspective of all investors or just equity investors. In the former case, the cash flows do not consider interest charges and the discount rate is the WACC. While analyzing from the equity investors perspective some changes need to be made. The initial investment would be equity investment and not total investment; the discount rate would be cost of equity and the cash flow would be the residual cash flow to equity investors.

$$\begin{aligned} \text{Cash flow to equity} = & \text{EBIT} - \text{Tax} + \text{Depreciation} - \text{Capital expenditure} - \text{Increase in working capital} \\ & - \text{After tax interest payment} - \text{Principal repayment} + \text{New borrowing} \end{aligned}$$

Cash flow to equity is the residual cash flow after meeting investment requirements and contractual payments. It should be noted that cash flow to equity is more meaningful for a growing firm that borrows all the time to invest. For a typical growing firm cash flow from operations would be negative.

In case of Leveraged Buyouts (discussed in a subsequent chapter) the leverage changes every year. So using a constant discount rate (WACC) would be inappropriate. Valuing equity cash flows would be much easier.

An Illustration

Investment = Rs 3000

Discount rate (WACC) = 15 percent

(in Rs)

Year	Cash flow	Interest expense	Cash flow after deducting interest
1	1,000	150	850
2	2,000	150	1,850
3	3,000	150	2,850

$$\begin{aligned} \text{NPV without deducting interest} = & -3000 + [1000 * \text{PVIF}(15,1) + 2000 * \text{PVIF}(12,2) \\ & + 3000 * \text{PVIF}(15,3)] \\ = & \text{Rs } 1356 \end{aligned}$$

$$\begin{aligned} \text{NPV after deducting interest} = & -3000 + [850 * \text{PVIF}(15,1) + 1850 * \text{PVIF}(12,2) \\ & + 2850 * \text{PVIF}(15,3)] \\ = & \text{Rs } 1016 \end{aligned}$$

The Impact of Inflation on NPV

In chapter 2, we learnt about the concept of real and nominal rates of return which are linked by the equation:

$$(1 + k) = (1 + i) (1 + r)$$

where

- k = nominal rate,
- i = inflation, and
- r = real rate expressed in decimal form.

It is evident from the above equation that the nominal discount rate used in calculating NPV would go up if the inflation rate increases. The increase in the discount rate would lead to a lower NPV.

An example is in order. An investment has the following cash flows:

Year	Cash flows (Rs)
0	-1,000
1	200
2	300
3	400
4	400

The firm uses a discount rate of 10 percent, which includes an expected inflation of 4 percent. So the real rate:

$$\begin{aligned} r &= [(1 + k)/(1 + i)] - 1 \\ &= (1.10/1.04) - 1 \\ &= 5.76 \text{ percent} \end{aligned}$$

NPV of the project using a discount rate of 10 percent is $-1000 + [1003.48] = 3.5$

Suppose the expected inflation was 8 percent. Then the nominal rate would be:

$$\begin{aligned} (1 + k) &= (1.08) (1.0576) \\ k &= 14.22 \text{ percent} \end{aligned}$$

The NPV decreases due to an increase in discount rate.

REAL VERSUS NOMINAL CASH FLOWS

Cash flows can be stated either in nominal terms or in real terms. If cash flows incorporate expected inflation they are said to be nominal. Nominal cash flows can be adjusted for inflation and stated in real terms. The relationship between nominal and real cash flows is:

$$\text{Real cash flow} = \text{Nominal cash flow} * [\text{Price index in next period}/\text{Price index this year}]$$

An investment is expected to return Rs 100 the next year and the price level is expected to increase by 4 percent during the period.

$$\text{Real cash flow} = 100/1.04 = \text{Rs } 96.10$$

Consider another example:

Year	Nominal cash flow	Real cash flow
1	1,000	952.3
2	2,000	1,818
3	3,000	2,593
4	4,000	3,292

Real cash flows have been calculated using an expected inflation of 5 percent, for all the years using the relationship:

$$\text{Real } CF_t = [\text{Nominal } CF_t / (1 + i)^t]$$

where t is the time period.

$$\text{Real cash flow in year 2} = \text{Nominal cash flow} / (1.05)^2$$

$$\text{Real cash flow in year 3} = \text{Nominal cash flow} / (1.05)^3, \text{ etc.}$$

It is to be noted that nominal rate should be used to discount nominal cash flows, and the real rate should be used to discount real cash flows. If there is a mismatch between cash flows and discount rate, the result will be erroneous. Another subtle effect of inflation is that asset values get eroded very fast in high inflation environments. The depreciation provided on historical cost basis will be much lower than that on replacement cost basis leading to fictitious earnings.

Inflation is the rise in the average price level, generally measured as the increase in the consumer price index during the period. The increase in prices of goods and services that are of importance to the decision maker may or may not have correlation with that in the general price rise. So taking the general inflation in the economy as proxy for increase in the price of the firm's inputs may be erroneous.

The implicit assumption in matching cash flow and discount rate is that the actual price increases equal the inflation rate included in the discount rate. The price behavior may not have much correlation with general inflation in the economy as measured by the increases in the consumer price index. Secondly, the tax shield arising out of interest and depreciation affects the value of the project. The amount of depreciation and interest charges under both the approaches might be the same but the relative value is greater with constant prices. So the project will be undervalued in the constant price approach. Similar difficulties arise when a company sells goods on credit and when dealing with hard currencies where inflation rates are not exactly offset by currency depreciation.

CONFLICTS IN RANKING

The recommendation to accept or reject a project in case of conventional projects is that if $NPV > 0$; else reject. Similarly, accept if $IRR > \text{cost of capital}$; else reject. Both give similar results. A project that is unacceptable on the basis of NPV would be unacceptable on the basis of IRR as well. But there are some situations in which conflicts arise. A project acceptable on the NPV standard may have to be rejected on the basis of IRR.

Consider the following example:

There are two mutually exclusive investments: A and B. Investment A needs an outlay of Rs 100,000 and returns Rs 120,000 a year later. Investment B needs an outlay of Rs 150,000 and returns Rs 177,000 a year later. The cost of capital is 13 percent.

$$\begin{aligned} \text{NPV}_A &= [120000/1.13] - 100000 \\ &= \text{Rs } 6194.69 \\ \text{NPV}_B &= [177000/1.13] - 150000 \\ &= \text{Rs } 6637.16 \end{aligned}$$

Based on NPV, project B is better.

$$\begin{aligned} \text{IRR}_A &= [120000/100000] - 1 \\ &= 20 \text{ percent} \\ \text{IRR}_B &= [177000/150000] - 1 \\ &= 18 \text{ percent} \end{aligned}$$

Based on IRR, project A is better. Why did this happen? The answer lies in the outlay (size) of the project. IRR does not control for the size of the investment. The outlay for the second project is more. To find out which investment is more profitable, we need to figure out if the incremental outlay of Rs 50,000 on project B is profitable.

(in Rs)		
	<i>Investment</i>	<i>Cash flow</i>
A	100,000	120,000
B	150,000	177,000
Increment	5,000	5,700

$$\begin{aligned} \text{IRR} &= [57000/50000] - 1 \\ &= 14 \text{ percent} > \text{cost of capital.} \end{aligned}$$

So investment B can be accepted. Since the two projects are mutually exclusive, A has to be rejected. If the discount rate was 15 percent:

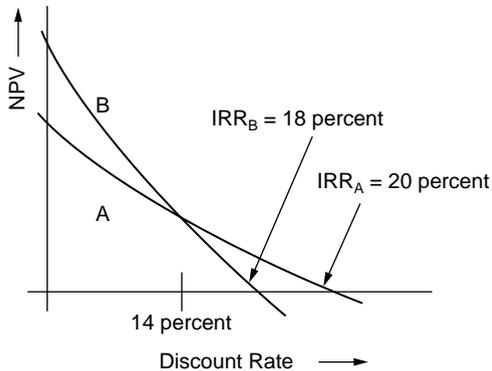
$$\begin{aligned} \text{NPV}_A &= [120000/1.15] - 100000 \\ &= \text{Rs } 4347.80 \\ \text{NPV}_B &= [177000/1.15] - 150000 \\ &= \text{Rs } 3913 \end{aligned}$$

Project A is better on both measures. The result can be plotted on a graph (Exhibit 9.6).

For discount rates less than 14 percent, project B has a higher NPV and, for discount rates greater than 14 percent, project A has a higher NPV. In any case, NPV is a better decision rule.

Reinvestment Assumption

Now consider an example where the cash outlay for both the projects is the same. Discount rate = 9 percent.

Exhibit 9.6 NPV vs discount rate

	Investment	Cash flows		IRR percent	NPV
		1	2		
A.	100,000	20,000	120,000	20	19,350
B.	100,000	100,000	31,250	25	18,045

Based on IRR rule, project B is better while on the basis of NPV, project A should be accepted. Why does this conflict arise? The answer lies in the reinvestment assumption. The NPV rule assumes that intermediate cash flows are reinvested at hurdle rate of 9 percent whereas the IRR rule assumes that intermediate cash flows are reinvested at IRR of the project. If the cash flows were reinvested at the IRR of the project, the balance at the end of the second year would be:

$$I(1 + \text{IRR})^2$$

For project A, the balance would be Rs 100,000 $(1.2)^2 =$ Rs 140,000

For project B, the balance would be Rs 100,000 $(1.25)^2 =$ Rs 156,250

We are assuming that the firm will continue to reinvest at IRR ($>$ cost of capital) year after year. We can relax this assumption and consider a reinvestment rate equal to cost of capital in the future periods. This is possible if we assume that super normal profits get wiped out in the long run due to entry of competitors.

Modified Internal Rate of Return (MIRR)

The IRR obtained by assuming that intermediate cash flows are reinvested at cost of capital is called MIRR. To calculate MIRR:

1. Find the future value of all cash flows by compounding at the hurdle rate.
2. Add the future value of all cash flows.
3. Find the implied return.

Consider a project with the following cash flows:

Year	Cash flow Rs
0	-1,000,000
1	300,000
2	400,000
3	500,000
4	600,000

Discount rate = 15 percent

1. Calculate the future value of project cash flows at the discount rate of 15 percent.

$$\begin{aligned}
 300000 \times 1.15^3 &= \text{Rs } 456262.50 \\
 400000 \times 1.15^2 &= \text{Rs } 529000.0 \\
 500000 \times 1.15 &= \text{Rs } 575000 \\
 600000 &
 \end{aligned}$$

2. Add them

$$= \text{Rs } 2,160,262.50$$

3. Calculate the implied return

$$\begin{aligned}
 \text{Investment } (1 + r)^n &= \text{Future value of cash flows} \\
 1000000(1 + r)^4 &= \text{Rs } 2160262.50 \\
 r &= 21 \text{ percent} \\
 \text{That is, Modified IRR} &= 21 \text{ percent}
 \end{aligned}$$

Multiple IRR_s

In a conventional project a cash outflow is followed by cash inflows. Such projects will have a unique IRR. Consider the following example. A project requires an outlay of Rs 1 lac. The cash flows from the project are given here:

Year	Cash flow (Rs)
0	(100,000)
1	310,000
2	(220,000)

The project has a cash outflow in the second year. The project has two IRRs:

$$\begin{aligned}
 \text{IRR}_1 &= 10 \text{ percent} \\
 \text{IRR}_2 &= 100 \text{ percent}
 \end{aligned}$$

When there is more than one change in sign of cash flows, there will be more than one IRR. The number of IRRs equals the number of sign changes. There are two ways of tackling the problem.

Approach 1

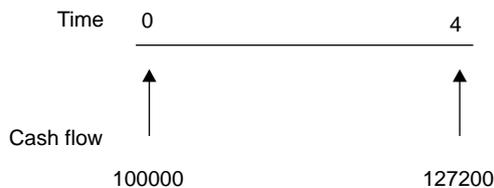
Discount the negative cash flows to year 0 and then to the initial investment. It becomes a conventional project. In the above example, discount the last year cash flow of Rs 220,000 to year 0, using the hurdle rate, and add it to the initial investment of Rs 1 lac. If the IRR of the new series of negative cash flows followed by positive cash flows is greater than cost of capital, the project can be accepted.

Approach 2

Move the positive cash flows to the year in which the negative cash flow occurs so that it becomes a positive flow. The IRR of the conventional series is easy to find. In the above example, move the positive flow to the second year, and add it to the negative cash flow. Assuming that the hurdle rate is 12 percent:

$$= 310,000 (1.12) - \text{Rs } 220,000 = \text{Rs } 127,200$$

This is a conventional series with an initial outflow followed by a positive inflow of Rs 127,200 in year 2. Find the IRR of this series. If it is greater than the cost of capital, the project can be accepted.



$$\frac{127200}{(1+r)^2} = \text{Rs } 100000.$$

CAPITAL RATIONING

In some circumstances, in choosing a set of investments, firms may be faced with limited amounts of capital. As a result, some projects with positive NPV may be rejected. The situation where companies are constrained to obtain funds to invest in all available positive NPV projects is called capital rationing. Capital rationing is of two types: internal and external. External capital rationing occurs due to capital market imperfections like ill-pricing of securities, flotation costs, etc. Internal capital rationing occurs from self-imposed restrictions by top management. A company may decide not to raise additional capital—either debt or equity—and place an arbitrary limit on the amount to be invested. The reluctance to go to the capital market could be due to the fear of scrutiny by financial intermediaries or the fear of loss of control. In another type of internal capital rationing, the company sets a cut off rate higher than the cost of capital due to which profitable projects may have to be forgone. Recently a survey of *Fortune* 500 firms (results shown in Exhibits 9.7–9.9) was conducted to find out whether capital rationing is internal or external, how firms decide on the budget amount and so on.¹

Quite often, the Profitability Index is suggested as the solution to dealing with capital rationing. PI is a scaled measure. It is the NPV of an investment for every rupee of investment.

¹ Mukherjee, T and V Hingorani (1999). 'Capital Rationing Decisions of *Fortune* 500 Firms: A Survey', *Financial Practice and Education*, Summer.

$$\text{Profitability Index} = \text{NPV}/\text{Initial investment}$$

Profitability index is sometimes specified as Present Value of Cash inflows divided by present value of cash outflows.

Exhibit 9.7 Implementing the capital-rationing decision—who makes allocation and selection

<i>Allocation and selection decisions</i>	<i>Frequency</i>	<i>Percentage</i>
Capital is allocated to each division, which then prioritize investment opportunities within the allocation	35	54 percent
Each division submits all positive NPV proposals and project selection is done at the central management level	26	40.6 percent
A combination of the above two	4	6.0 percent
Total	65	100.0 percent

To calculate a Profitability Index:

1. Estimate the investment required for each project.
2. Identify the total amount of funds available for investment.
3. Calculate PI for all projects and rank them from highest to lowest.
4. Start from the project that has the highest PI and move downwards. Accept those projects that can be funded by available capital.

A company has a capital constraint of Rs 1 crore. It has the following projects:

<i>Project</i>	<i>Investment</i>	<i>NPV</i>
1	1.0	1.0
2	2.0	2.2
3	3.0	3.3
4	3.0	2.4
5	1.0	0.7
6	4.0	4.8

Exhibit 9.8 Why internal capital rationing?

<i>Statement</i>	<i>SD</i>	<i>D</i>	<i>NS</i>	<i>A</i>	<i>SA</i>	<i>Score</i>
Capital rationing is used to discourage biased cash flow forecasts	4	7	8	34	12	0.66
Rationing is more severe when managers have a job mobility	8	25	23	8	1	-0.48
When senior managers cannot trust project forecasts and when the project's downside risk is large	1	7	4	40	13	0.88
Firms are more likely to reject a +ve NPV project when it is non routine/unique in nature	2	16	5	33	9	0.48
Firms impose rationing and avoid low NPV projects in order to preserve borrowing capacity to finance potentially high NPV projects in the near future	1	8	6	40	10	0.78

Note: SD = Strongly disagree, D = Disagree, NS = Not sure, A = Agree, SA = Strongly agree. Their points are -2, -1, 0, 1, and 2 respectively.

The profitability index and ranking are shown here:

<i>Project</i>	<i>PI</i>	<i>Ranking</i>
1	1.0	3
2	1.1	2
3	1.1	2
4	0.8	4
5	0.7	5
6	1.2	1

Projects 6, 3, 2, and 1 can be chosen to exhaust the capital budget of Rs 1 crore. The cumulative NPV is Rs 1.13 crore.

Exhibit 9.9 Flexibility of the investment ceiling

	<i>Ceiling</i>	<i>Percent</i>
Circumstances under which a firm would lower the original ceiling		
Never lower the ceiling	6	9
When it currently has low NPV projects	22	34
When it has better prospects in future	14	22
When actual cash flows are lower than predicted	18	27
Other reasons	5	8
Total	65	100
Circumstances under which initial allocation is increased		
Never raise the ceiling	6	9
When it has to give up high NPV projects	28	43
When it doesn't impair future ability to issue debt	14	22
When actual cash flows are better than predicted	8	12
Other reasons	9	14
Total	65	100

Limitations of Profitability Index

If the objective is to choose that investment whose PI is greater than 1, calculation of PI is unnecessary as NPV is positive! Second, PI is a function of NPV and investment. It penalizes those projects that have higher cash outlays even if the incremental investment is worthwhile. This 'scale problem' was demonstrated earlier. Third, the implicit assumption in calculating PI is that the capital rationing constraint applies to current period and not future periods.

The cumulative investment need not exactly equal capital constraint. A portion may be left unutilized. The unutilized portion may be used to accept a fractional project (that is, staggering the investment). Sometimes another combination of projects may yield a higher NPV.

Projects with Unequal Lives

One of the limitations of the NPV rule is that it is biased towards longer-term projects. So it is likely that a shorter term project may be discarded without considering the fact that the proceeds of the project can be reinvested at termination. Consider the example here:

Project	Investment	NPV	Life
A	5m	6.0	7 years
B	3m	4.0	4 years

Based on NPV if we were to choose A, we would be ignoring the project lives.

Under the *replacement chain* method, both the projects are replicated till their lives become equal. If, for example, two projects have lives of 2 years and 3 years, the first project is replicated thrice and the second project is replicated twice so that their lives become six years. Consider two projects given below:

Year	Project 1 Cash flow	Project 2 Cash flow
0	-1,000	-1,500
1	750	800
2	750	800
3		800
NPV	337	489
Discount rate	8 percent	10 percent

The NPV after replicating the projects are 875 and 857 respectively. Based on RC NPV, we would choose Project 1.

Under the equivalent annuity method, the NPV of the projects are converted into their annual equivalent and then compared.

The equivalent annuity is the annuity that produces the same NPV as that of the project.

$$\text{Equivalent Annuity} = \text{NPV} / \text{Annuity factor } (r, n)$$

where

r = discount rate and n is the project life.

Consider the following projects:

Project	Investment	NPV	Life
A	50 lac	6.0	7 years
B	30 lac	4.0	4 years

If the discount rate is 15 percent, equivalent annuity for the two projects would be:

$$6.0 / \text{PVIFA } (15, 7) = 1.44$$

$$\text{and } 4.0 / \text{PVIFA } (15, 4) = 1.40$$

Based on the equivalent annuity, we would choose project A. Note that this technique can be applied only if the projects can have the same risk complexion and, hence, discount rate. What if the risk complexion is different? The correct way to implement the equivalent annuity method is to find the annuity over the *replicated life* of the project, 12 years in the given example.

Consider the example given under the RC method. The EA for the two projects are:

$$337 / \text{PVIFA } (8 \text{ percent}, 2 \text{ years}) = \text{Rs } 189 \text{ p.a.}$$

$$489 / \text{PVIFA } (10 \text{ percent}, 3 \text{ years}) = \text{Rs } 197 \text{ p.a.}$$

The correct procedure is to calculate PVs of the EAs over the least common multiple of the project lives as in the RC.

$$189 \times \text{PVIFA} (8 \text{ percent}, 6 \text{ years}) = 875$$

and

$$197 \times \text{PVIFA} (10 \text{ percent}, 6 \text{ years}) = 857$$

Back to Kochi International Airport

The Kochi airport has shown the maximum progress among all airport projects with private participation. In 2002, the project costs were estimated as:

First phase	Rs 160 crore (\$ 45.7 million)
Second phase	Rs 300 crore (\$ 87.5 million)

In the first phase equity will account for Rs 64 crore; of which 26 percent is held by the government of the state of Kerala, and the rest is held by NRIs, banks, users (airline firms) and contractors. Term loans and short-term borrowings for working capital from banks are expected to fund the rest. The airport was formally inaugurated on May 25, 1999.

IN CONCLUSION

In this chapter, we learnt the descriptions of the process of arriving at cash flows and discount rate. More specifically, only after tax, incremental cash flows attributable to the project need to be considered. This is not a trivial exercise. Assume that a company is increasing its plant capacity from 125 tons to 250 tons. Current sales are 75 tons. Sales for the first two years are expected to be 90 tons and 120 tons respectively. Since the increase in sales can be handled with existing capacity, one should not attribute the investment made to upgrade the capacity to the new project although the investment is made now. Further, in many situations, the investment itself is not made in one year at the beginning of the project. That is, the investment is not 'initial'. If the Capital Investment is spread over, say, 3 years, the same may be deducted in the year in which it occurs from cash flow from operations. Alternatively, the present value of capital investment may be deducted from present value of cash inflows to arrive at NPV.

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QUESTIONS

1. The cash flows from two investments are:

Investment	Years			
	0	1	2	3
A	100,000	70,000	70,000	
B	120,000	60,000	60,000	60,000

Which of them would you choose if the cost of capital is 17 percent?

2. The rates of *The Indian Management Journal* are as follows:

1 year	–	Rs 215
2 years	–	Rs 395
3 years	–	Rs 540

Assuming that subscription rates do not change, which offer would you choose? Assume an opportunity cost of capital of 16 percent.

3. A company has the following investments:

Project	(Rs million)	
	Investment	NPV
A	2.50	1.75
B	1.0	0.8
C	1.5	1.5
D	2.0	2.0
E	2.0	2.4

If the company has a capital constraint of Rs 50 lac, which set of projects would you choose?

4. You are evaluating two alternative machines for your machine shop. They have the following characteristics.

Machine	Cost	Operating cost per year	Expected life
A	800,000	40,000	8 years
B	1,000,000	32,000	5 years

If the discount rate = 16 percent, which machine would you choose?

5. A project has the following cash flows:

<i>Year</i>	<i>Cash flow</i>
0	(100,000)
1	80,000
2	100,000
3	(200,000)
4	120,000

Find the IRR. Would you accept the project at a hurdle rate of 16.5 percent?

Chapter 10

A Case Study: Detergents India Limited

OBJECTIVES

- ◆ Introduce the student to the FMCG and Detergents industry.
- ◆ Introduction to manufacturing practices in the detergents industry.
- ◆ Evaluating a standard capital budgeting decision.
- ◆ Introduction to make or buy decision.

In 1995–96, Detergents India Limited (DIL) was evaluating the feasibility of putting up a 1,500 mt detergent cake plant and a 500 mt detergent powder plant, and an indent from Hindustan Lever Limited (HLL) to manufacture its product called 501 Bar. DIL, a company belonging to the Shaw Wallace Group, was set up in 1974 and commenced operations in 1977. The company manufactures synthetic detergents (cake and powder). The company has a principal-to-principal agreement with Shaw Wallace and HLL to cater to their needs. DIL has a capacity of 3,800 metric tonnes of which 1,400 mt is in Kodur (Andhra Pradesh), 750 mt in Coimbatore (Tamil Nadu) and 550 mt in Gulbarga (Karnataka). The company also has processing agreements for 700 tonnes with Jayanthi Detergents Limited and the Calcutta Chemicals Company. Apart from these, DIL uses third party operations as and when required. Exhibit 10.1 presents an executive summary of DIL's financial performance in the last four years.

Exhibit 10.1 Executive summary of financial performance of DIL

(Rs crore)

	1998	1999	2000	2001
Net Sales	43.01	39.05	49.11	45.08
EBDIT	0.9	0.55	0.36	-0.54
PAT	0.35	0.15	0.03	-0.74
Gross fixed assets	6.97	7.37	7.83	8.34
Current Assets	5.9	6.45	9.52	6.19
Long term borrowings	0.27	0.0	0.03	0.02
Capital Employed	1.6	1.42	1.48	-0.53
PAT/Net worth	27.03	10.91	2.09	N.A.
Current Ratio	1.06	1.06	1.06	0.81
Net working capital	2	0	4	1
Cycle (days)				

Source: Prowess, Centre for Monitoring Indian Economy (CMIE) database.

THE FMCG INDUSTRY

The consumer products' industry comprises personal care, cosmetics, and home products. The sector is subdivided into dental care, soaps, detergents, surface cleaning products, skin care, and hair care products. The market size and penetration of different products is provided in Exhibit 10.2.

Exhibit 10.2 Market share of consumer products

Segments	Market size (Rs in billion)	Penetration (percent)	
		Urban	Rural
Toilet soaps	46.0	95 percent	85.0 percent
Detergents	38.0	95 percent	85.0 percent
Hair color	2.4	20 percent	10.0 percent
Skin care	7	40 percent	10.0 percent
Oral care	21	75 percent	20.0 percent

Source: equitymaster.com.

FMCG products like detergents are of low value but the cumulative budget allocated to these products by the consumers is significant. The price and income elasticity of demand varies across products. FMCG products are backed by heavy advertising and sales promotion to induce consumers to buy. FMCG products are neither capital intensive nor technology intensive. That is, technology is easily available and stable. One of the key features of the FMCG industry is third party manufacturing (TPM). TPM used to offer fiscal advantages, especially excise duty, that has now been rationalized. It provides other benefits like:

- Allowing the company (say, HLL) to concentrate on marketing and liberate manufacturing and the associated overheads and inventory.
- Reduction in labor costs. Third party manufacturers are usually small because of which overheads and labor costs are low. These companies do not have the problems arising out of unionization that big companies face.
- Greater control over logistics. It is often necessary to get the product manufactured near the market to control logistics. A company may enter into agreements with many third party manufacturers instead of setting up plants all over the country.

Detergents India acts as a third party manufacturer to HLL in addition to catering to the parent (to manufacture Chek and Regal). Just as DIL acts as a TPM to HLL, other companies like Venkateshwara Detergents and Naga Oil Mills have agreements with DIL. Third party operations are of two types:

- Processing arrangements
- Principal to principal arrangements

In a processing arrangement, the raw material and packing material is provided to the third parties and they are paid a processing charge for processing the raw material into the finished product. DIL has a processing arrangement with HLL for its product, 501 Bar.

In a principal to principal arrangement, the third party would be completely responsible for all operations from procurement of raw materials to conversion into finished product. DIL has this agreement with Shaw Wallace for all their branded products and with Hindustan Lever for its product Wheel.

The market for detergents is dominated by HLL and Procter & Gamble with four other companies in the organized sector—Godrej Soaps, Shaw Wallace, Colgate Palmolive, and Nirma. In addition there are numerous players in the unorganized sector. In 1995 the detergent market was estimated at Rs 6,500 crore. Exhibit 10.3 presents a snapshot of the detergents market. The soaps and detergents industry does not face shortages of raw material as major ingredients like soda ash, vegetable oils, linear alkyl benzene and sodium triphosphate are available. The capacity and production of detergents for the period 1990–94 is given here:

	<i>(in lac tonnes)</i>	
	<i>Capacity</i>	<i>Production</i>
1990–91	4.4	2.47
1991–92	4.4	4.54
1992–93	6.61	4.20
1993–94	6.05	4.06

HINDUSTAN LEVER LIMITED

Hindustan Lever, belonging to the Unilever Group, is one of the best known and best-managed companies in India. HLL enjoys leadership position in soaps, detergents, cosmetics, ice cream, and packed tea. HLL had more than 100 brands; lately the company has pruned its brand portfolio to 40. HLL has a strong distribution network which includes 3 million retail outlets and 7,500 distributors.

Exhibit 10.3 Snapshot of the detergent industry in 1995

Market size	Rs 6,500 crore	
Major competitors	HLL, P&G	
Other players in the organized sector	Godrej, Shaw Wallace, Colgate, and Nirma	
Market structure	Organized sector: 70 percent Unorganized sector: 30 percent	
Market growth	Soaps: 10–15 percent Detergents: 7–8 percent	
Market share	Detergent cake: 55 percent Powder: 45 percent	
Segment growth	Detergent cake: 13–14 percent Powder: 5–6 percent	
	<u>Organized sector</u>	<u>Small scale sector</u>
Laundry soaps	75,000 tonnes	7.5 lac tonnes
Toilet soaps	95 percent	5 percent
Synthetic detergents	45 percent	55 percent

Given here is the break-up of the HLL portfolio and the contribution of each business:

Soaps and detergents	44.4 percent
Personal products	22.0 percent
Beverages	10.9 percent
Foods	6.4 percent
Ice creams	1.6 percent
Exports	11.2 percent
Other (chemicals, agriculture, etc.)	3.4 percent

HLL'S PERSPECTIVE: MAKE OR BUY?

The make or buy analysis essentially involves comparing the cost of manufacturing (making) in-house and the cost of buying. To illustrate, assume that a company requires 10,000 units of a product for the next 20 years, and the demand is expected to be constant. A supplier is currently making it for Rs 20.¹ A brief calculation suggests that it can be made in-house for Rs 15. The calculation:

	<i>(in Rs)</i>	
<i>Cost of making</i>	<i>Per unit</i>	<i>Total</i>
Labor and material	5	50,000
Depreciation	10	100,000
Total	15	150,000
Cost of buying	20	200,000
Saving	5	50,000

The depreciation expense results from the machine that is purchased to produce the part for Rs 20 lac. The machine is expected to have a life of 20 years and the interest cost of the borrowed funds is 10 percent. The analysis is incomplete because it ignores time value of money. Assume that the labor material expense will be incurred at the end of the year and the payment for the machine is made at the beginning. The present value (@ 10 percent) of making 10,000 units for 20 years is:

	<i>Outlay (in Rs)</i>	<i>PV factor</i>	<i>PV (in Rs)</i>
Labor & material	5,000	8.5136	425,680
Equipment cost	2,000,000	1.00	2,000,000
Cost of making		2425680	
Cost of buying	200,000	8.5136	1,702,720

This analysis suggests that it is cheaper to buy.

How should HLL decide whether to produce in-house or buy from DIL? That depends on several factors:

- Price quoted by DIL.
- Cost of setting up a plant.
- Impact of increased complexity on the organization (HLL) (and hence on profits).
- Cost of materials. It is possible for HLL or DIL to have comparative advantage in purchasing raw materials. If HLL indeed has economies of scale in purchasing it makes sense to get into a processing agreement with DIL rather than allow DIL to purchase on its own and bear the inefficiency in the sense that DIL would pass on the benefit to HLL.
- Labor expenses and other variable expenses per unit of output at HLL.
- Savings arising out of reduction in logistics.

¹ This numerical is adapted from Bierman, Harold and Seymour Smidt (1993). *The Capital Budgeting Decision*, Macmillan Publishing Company, New York.

DIL'S PERSPECTIVE

In 1995 the detergents market was growing at 6.7 percent. HLL was outsourcing 2,300 MT from DIL. HLL was expected to increase orders at a rate reflecting the overall growth in sales/market or at least maintain it at 2,300 MT. The processing charge for 501 was Rs 1,400 per MT and DIL in turn would pay Rs 800 per MT to its third party manufacturers like Jayanthi Detergents and Calcutta Chemicals. The decision to take up the HLL indent essentially involves offloading the Shaw Wallace indent to a 3P manufacturer and allocating the in-house capacity to HLL. In addition, DIL was evaluating the possibility of putting up a 1,500 MT detergent cake plant and a 500 MT powder plant at Ambattur (Tamil Nadu) to cater to Shaw Wallace.

A. Putting up a 1,500 MT Cake Plant

It involves the following outlay:

Land & buildings	Rs 56 lac
Machinery	Rs 96 lac
Vehicles	Rs 6 lac
Furniture	Rs 5 lac
Total	Rs 163 lac

Land and building are funded by a bank loan carrying an interest rate of 17.5 percent, and plant and machinery would be funded by the deferred payment guarantee scheme of IDBI (@16 percent) which requires that 10 percent of the investment requirement be brought in by the company. Interest on working capital was expected to be 21 percent. The total annual interest payable amounts to Rs 398,116.60.

The break up of expenses per MT is:

	(in Rs)
Labor	175
Electricity	100
Repairs & maintenance	110
Consumables	45
Total	Rs 430

Shaw Wallace pays DIL a processing charge of Rs 850 per MT.

So, total revenue for 1,500 MT = $1500 \times 850 = \text{Rs } 1,275,000$

Depreciation is calculated at the following rates:

	(In Rs)
Plant & machinery @ 10.34 percent	992,640
Building @ 1.88 percent	105,280
Vehicle @ 7.07 percent	42,420
Furniture @ 3.34 percent	16,700
Total	1,157,040
Revenues	1,275,000

Table contd.

Table contd.

Expenses	645,000 (@ 430 per MT)
Depreciation	96,420
Overheads	100,000
Interest @18 percent ²	1,239,536
PBT	35,463.40

Working capital is calculated under the following assumptions:

7 days of raw material, 15 days of packing material, and 3 days of finished goods.

The level of current assets and current liabilities for the 125 gm and 250 gm categories is:

	125 g	250 g
Current assets (in Rs)	2,4321,750	2,3854,100
Current liabilities (in Rs)	2855,500	1,2623,000
Net working capital (in Rs)	1,1466,250	1,1231,100

One might calculate the return on investment for the plant. It works out to 31 percent. As mentioned in an earlier chapter, ROI is a single period measure. It does not allow the decision-maker to draw meaningful inferences. Assuming that the revenue and expenses grow at some rate (or estimate explicitly at forecasted prices), if we calculate working capital as a percentage of revenues (or assume that it remains constant) we can calculate the NPV of the plant by finding the PV of free cash flows and subtracting the initial investment.

The infrastructure required for the manufacture of 1,500 MT and 2,000 MT are the same, which suggests that DIL would have 500 MT of spare capacity. This spare capacity could be provided to HLL. HLL pays DIL a processing charge of Rs 1,125 per MT. So the NPV calculated earlier would be understated, the NPV of this investment should be added to it.

Revenue @ Rs 1,125 for 500 MT	Rs 562,500
Less: Variable cost @ Rs 430	Rs 215,000
Less: Interest on additional working cap	Rs 55,902.77
Profit	Rs 3,499,166

$$\begin{aligned} \text{Total profit} &= \text{Profit from SWC operations} + \text{Profit from HLL operations} \\ &= \text{Rs } 425,560 + \text{Rs } 3,499,166 = \text{Rs } 3,924,726 \end{aligned}$$

The return on investment goes up to 51 percent.

B. 500 MT Powder Plant to Cater to a SWC Indent

SWC pays a processing charge of Rs 450 per MT. The powder plant was expected to be constructed in the existing Ambattur works because of which additional land and building was not required. The executives of DIL indeed did not consider the opportunity cost of using existing resources. This will obviously inflate NPV. The break up of outlay is:

² As mentioned earlier, different interest rates are applicable to different components depending on the source of finance. One may explicitly calculate interest, as I have done, and calculate PBT/PAT.

Land and building	—
Machinery	Rs 15.3 lac
Net working capital	Rs 2,943,291
Revenues @ Rs 450 per MT	Rs 225,000
Expenses @Rs220	Rs 110,000
Interest	Rs 23,500
Overheads	Rs 50,000
Profit	Rs 498,000

The ROI works out to 50 percent.

THE CONSEQUENCES OF TAKING UP THE HLL INDENT

HLL pays a processing charge of Rs 1,125, providing the existing facility to HLL yields an EBIT of Rs 10,392,000. The break up of plant capacity (in MT) available to DIL is:

Existing factories		
Kodur	1400	
Coimbatore	750	
Gulbarga	550	2700
Processing Arrangements		
JDPL	450	
Calcutta Chemicals	250	700
Existing third parties		
NAMCO	200	
VDPL	200	400
Total		3800

The profitability of the HLL indent is worked out as follows:

Processing charges received:			<i>(in Rs)</i>
Kodur	1400 × 1125	1,575,000	
Coimbatore	750 × 1125	843,750	
Gulbarga	550 × 850	467,500	
JDPL	450 × 1125	506,250	
CCC	250 × 850	212,500	
Total		3,605,000	
Less: Variable cost			
Kodur	500 × 1400	700,000	
Coimbatore	750 × 430	322,500	
Gulbarga	550 × 430	236,500	
JDPL	450 × 800	360,000	
CCC	250 × 800	200,000	1,819,000
Less: Overheads			
Factory overheads			
Kodur	300000		
Coimbatore	130000		
Gulbarga	100000		

Table contd.

Table contd.

Administrative overheads			
Kodur	100,000		
Coimbatore	50,000		
Gulbarga	50,000		
Depreciation			
Kodur	100,000		
Coimbatore	50,000		
Gulbarga	40,000	EBIT	10,392,000

Assume that a company is adding capacity. Exhibit 10.4 presents a general format for estimation of 'truly' incremental free cash flows.

Post Script: In January 1999, Shaw Wallace & Co, holding 60 percent of the equity capital in DIL through its subsidiaries, divested its holding through a share purchase agreement in favor of Henkel Spic India. In November 2000 Henkel acquired more than 90 percent and 95 percent of the fully paid up equity share capital of The Calcutta Chemical Company and DIL respectively.

Exhibit 10.4 Estimation of free cash flows

Years →	
Sales	
1.	Total market volume
2.	x company's market share
3.	= company's volume
4.	– existing capacity
5.	= incremental tonnage from new capacity
6.	x price/ton
7.	= incremental sales
Profits	
1.	Price/ton
2.	– cost/ton
3.	= pre-tax profit per ton
4.	x incremental tonnage
5.	= incremental profit
6.	– tax @ X percent
7.	= Incremental NOPAT
Capital expenditure	
1.	Cost of plant/ton capacity
2.	x tons capacity added
3.	= incremental expenditure

Incremental FCF = Incremental NOPAT + Depreciation – Capex – Δ W.C

Chapter 11

Risk Analysis in Capital Investments

OBJECTIVES

- ◆ What are the risks involved in investments?
- ◆ What are the techniques of measuring risk?
- ◆ What are certainty equivalent cash flows and risk adjusted discount rates?
- ◆ How should risk be incorporated into capital budgeting analysis?
- ◆ Introduce simulation through Crystal Ball®.

So far, we conducted investment analysis under the assumption that cash flows are certain and known. This is unlikely in real life situations. The value of NPV, which we computed in many of the earlier examples, is really one of the many values it can take on due to uncertainty in the underlying variables. In this chapter, I describe methods of assessing risk in investment decisions. We will answer such questions as:

- What are the risks involved in investments?
- What are the techniques of measuring risk?
- What are certainty equivalent cash flows and risk adjusted discount rates?
- How do we apply these techniques in real life situations?

MEASURING RISK

Uncertainty about a situation can often indicate *risk*, which is the possibility of loss, damage, or any other undesirable event. Most people desire low risk, which would translate to a high probability of success, profit, or some form of gain. For example, if sales for next month are above a certain amount (a desirable event), then orders will reduce the inventory, and there will be a delay in shipping orders (an undesirable event). If a shipping delay means losing orders, then that possibility presents a risk. Almost any change, good or bad, poses some risk. Your own analysis will usually reveal numerous potential risk areas: overtime costs, inventory shortages, future sales, geological survey results, personnel fluctuations, unpredictable demand, changing labor costs, government approvals, potential mergers, pending legislation.

Once the risks have been identified, a model can help you quantify the risks. Quantifying risk means putting a price on risk, to help you decide whether a risk is worth taking. For example, if there is a 25 percent

chance of running over schedule, costing you Rs 100 out of your own pocket, that might be a risk you are willing to take. But if you have a 5 percent chance of running over schedule, knowing that there is a penalty of Rs 10,000, you might be less willing to take that risk.

Firms worry about the absolute level of cash flow because it affects their ability to service debt, invest and grow. To measure risk a firm has to forecast the distribution of cash flows. A firm can set a threshold below which it will experience financial distress, and use the cumulative distribution of cash flows to find out the probability of a cash flow below this level. The cash flow shortfall corresponding to the probability level, chosen by the firm, is called *cash flow at risk* at that probability level.¹ A *cash flow at risk* of Rs 200 crore at 5 percent means that there is a probability of 5 percent that the firm's cash flow will be lower than its expected cash flow by at least Rs 200 crore. If there is a probability that the level of cash flow will be less than the threshold, the company should take actions to reduce the risk of cash flow and ensure that it earns the cash flow corresponding to the threshold level 95 percent of the time.

There are two approaches to incorporating risk in capital budgeting. The first approach is to estimate the changes in decision criteria like NPV and IRR to changes in underlying business drivers like sales growth, market-share, etc. The second approach is to adjust the cash flows or discount rate for riskiness of the project. Before we go on to measurement of risk a brief description of risks is in order. There are essentially two types of risk—diversifiable and non-diversifiable. Risks can also be classified as business and financial. Some of the risks that affect a project are: completion risk, raw material supply risk, technological risk, economic risk, financial risk, currency risk and political risk. Executives commonly make ad hoc adjustments to cash flows and discount rates to account for the unique risks in the project. Modern finance theory hypothesizes that only systematic risk is rewarded in stock markets and project specific risk is not relevant as investors can diversify their portfolio. In a CAPM universe, only systematic factors like changes in inflation, interest rates, etc. are relevant. But this does not mean that managers should not manage unsystematic or project specific risk because systematic risk is a function of total risk.² In the following sections, some methods of assessing risk are described.

BEST CASE–WORST CASE ANALYSIS

A popular way of assessing risk is to assume conservative, most likely and optimistic values for key drivers of NPV like sales growth rate, operating profit margin and incremental investment in fixed assets and working capital during the project life, and compute NPV. The range of NPV represents the riskiness of the project.

The most likely, pessimistic and optimistic values of key variables for a hypothetical project are shown here: Cash flows are estimated for pessimistic, most likely and optimistic scenarios. The NPV is computed for the three scenarios, say, (50,000), 100,000, and 400,000. The limitation of the 'best case–worst case' analysis is that what constitutes the worst case remains subjective. In real life situations, worst case estimates tend to be optimistic because of executives' faith in the business and strategy. So the usefulness of the tool is limited.

¹ This concept is similar to Value at Risk for financial firms. A good book on the subject is: Philippe Jorion (1997). *Value at Risk: The New Benchmark for Controlling Derivatives Risk*, McGraw-Hill, New York.

² Remember the formula for beta?

Variable	Years		
	1	2	10
Sales growth rate (percent)			
Pessimistic	11	11	10
Most likely	13	13	12
Optimistic	15	15	14
Operating profit margin (percent)			
– Pessimistic	11.5	11.5	11
– Most likely	12	12	11.5
– Optimistic	12.5	12.5	12
Market growth rate (percent)			
– Pessimistic	10	10	9
– Most likely	11	10.5	10
– Optimistic	12.5	12	11.15

The ‘best case–worst case’ analysis does not tell us about the likelihood of the best case or the worst case. The worst case, as many executives assume, is one in which competition is the greatest, input costs are the highest, selling price is the least—and so on. The probability of all these happening together is very low.

SENSITIVITY ANALYSIS

Cash flow used for the computation of NPV is based on assumptions regarding selling price, sales quantity, market share, market growth, capacity utilization—and so on. The NPV corresponding to the most likely values of these variables is referred to as the base-case. Due to the uncertainty, variables can take on a range of values rather than a single value. For instance, for the picture tube project mentioned in an earlier chapter, BEL assumed a selling price of Rs 500 each for a 20-inch picture tube. But the selling price can vary between Rs 475 and Rs 525. The management has estimated Rs 500 as the most likely value. The sensitivity of NPV (or IRR or ROI) can be found for various likely values of selling price or any variable that can affect the decision rule significantly.

Sensitivity analysis refers to the process of changing variables or assumptions to determine their impact on a project’s profitability. It does not involve the use of probabilities. To conduct a sensitivity analysis:

1. Estimate the base case NPV or IRR based on most likely values of variables.
2. Identify the key variables (those that are expected to affect the project profitability significantly).
3. Change one variable, say selling price, at a time keeping all others unchanged and compute NPV or IRR. Carry out the exercise for all the possible values of the variable.
4. Repeat for all variables.

Executives of BEL, who were setting up a black and white picture tube project in the early 1990s, calculated the NPV for the picture tube project based on the following assumptions:

1. Sales price per unit:
 20" picture tube = Rs 500
 14" picture tube = Rs 325
2. Output as percentage of plant capacity = 60 percent, 76.24 percent, and 100 percent for the first, second and third year respectively, for both the sizes. The output is expected to remain at third year level for the remaining years.

3. Project life = 10 years.
 4. Number of units sold in lac (No.).

<i>Years</i>	<i>20"</i>	<i>14"</i>
1	1.5	2.7
2	1.875	3.375
3	2.5	4.5

5. Average EBIT as percentage of revenues = 10.5 percent.

With this set of assumptions, the NPV for the base case is Rs 124 lac. We shall determine the sensitivity of NPV and IRR to changes in selling price—keeping other variables constant.

Selling price for a 20" tube = Rs 475
 Selling price for a 14" tube = Rs 300

The revenues and cash flows are shown here:

(Rs lac)

<i>Years</i>	<i>Revenue</i>	<i>Cash flow</i>
1	1,522.5	-112.45
2	1,903.12	-48
3	2,537,050	233.5
4	2,537,050	185
5	2,537,050	176.5
6	2,537,050	167.5
7	2,537,050	156
8	2,537,050	145
9	2,537,050	132
10	2,537,050	916

Initial investment = Rs 1410 lac
 NPV = -Rs 754.60 lac

When the price decreases by 5 percent for a 20" tube, and by 7.7 percent for a 14" tube, then the NPV decreases to -Rs 754.60 lac. The change in NPV for changes in selling price could be calculated for the likely range as shown here; N_1 being the NPV when prices are Rs 475 and 300 respectively and N_2 being the NPV when prices are Rs 490 and 315—and so on.

(Rs lac)

<i>Selling Price</i>	<i>NPV</i>
*475,300	N_1
490,315	N_2
500,325	N_3
525,350	N_4
550,375	N_5

* for 20" and 24" picture tubes respectively

Similarly, the sensitivity of NPV and IRR to changes in other variables like sales growth rate, market growth could be ascertained individually and in combination. For instance, we can find the sensitivity of NPV to a combination of:

Project life = 8 years
 Price = Rs 475 and Rs 300 respectively
 No. of units sold = 10 percent less than the base case

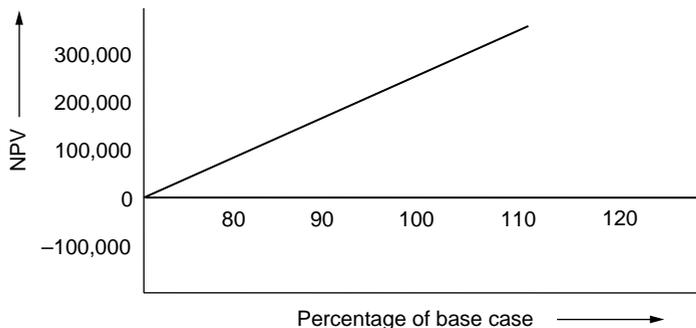
Exhibit 11.1 shows the sensitivity of NPV for changes in operating profit margin and sales growth rate for a hypothetical project.

Exhibit 11.1 Sensitivity of NPV

		Base Case ↓			
		Sales growth rate			NPV (Rs in million)
		-1 percent	0	+1 percent	
Operating profit margin (percent)	+1 percent	9.50	17.5	25.5	
	0	2.6	10.6	18.6	← Base case
	-1 percent	(4.3)	3.7	11.7	

It is useful to show the results of sensitivity analysis in a graph. The graph can have the profitability criterion (say NPV) on the Y-axis and the variable (expressed as a percentage of the base case) on the X-axis. The sensitivity of NPV to the changes in selling price for a hypothetical project is shown in Exhibit 11.2. Note that when the level of activity (No. of units produced) comes down, other related inputs like working capital, variable material costs, etc. have to be changed before estimating cash flows. A greater slope indicates higher sensitivity.

Exhibit 11.2 Sensitivity of NPV to the changes in selling price



We assumed a project life of 10 years for the BEL picture tube project. If the life shrinks to 8 years, cash flows and NPV would be:

Year	Cash flow
1	-1,410

Table contd.

Table contd.

Year	Cash flow
2	128
3	180
4	389
5	365
6	342
7	307
8	1,068

*8th year cash flow includes salvage value of Rs 800 lac

$$\text{NPV} = -\text{Rs } 199.50$$

The sensitivity of NPV to changes in cash flows is shown in Exhibit 11.3. When cash flows drop by 10 percent, the project becomes unviable.

The end-result of the sensitivity analysis is a range of NPVs. The management should take the decision to accept or reject the project, based on the riskiness of the project. Sensitivity analysis gives us the range of NPV but it does not tell us which NPV is more likely to occur.

BREAK-EVEN ANALYSIS

As the name suggests, break-even point (BEP) refers to the level of activity at which profitability is zero. Depending on whether the measure of profitability is net income or NPV, the breakeven point is called accounting breakeven point or financial breakeven point respectively. At the accounting BEP, net income is zero. The firm neither makes profit nor loss.

Break-even point is calculated for a single year:

$$\begin{aligned} \text{Sales revenue} &= \text{Total costs} \\ (\text{No. of units sold} \times \text{Selling price per unit}) &= \text{Fixed cost} + \text{Total variable costs} \\ &= \text{Fixed cost} + (\text{Variable cost per unit} \times \text{No. of units sold}) \end{aligned}$$

$$\text{No. of units sold} = \frac{\text{Fixed cost}}{\text{Selling price per unit} - \text{Variable cost per unit}}$$

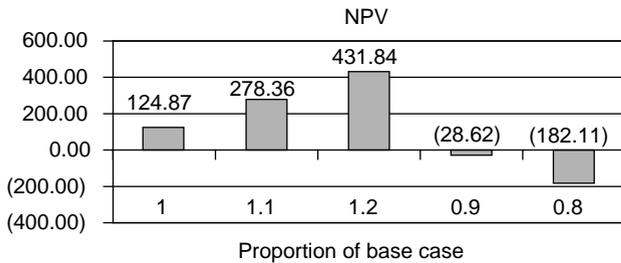
Exhibit 11.3 Sensitivity of NPV to cash flows

Year	1	1.1	1.2	0.9	0.8
0	-1,410	-1,410	-1,410	-1,410	-1,410
1	128	140.80	153.6	115.20	102.4
2	180	198.00	216	162.00	144
3	389	427.90	466.8	350.10	311.2
4	365	401.50	438	328.50	292
5	342	376.20	410.4	307.80	273.6
6	307	337.70	368.4	276.30	245.6
7	288	316.80	345.6	259.20	230.4

Exhibit 11.3 contd.

Exhibit 11.3 contd.

Year	1	1.1	1.2	0.9	0.8
8	268	294.80	321.6	241.20	214.4
9	248	272.80	297.6	223.20	198.4
10	1,027	1,129.70	1,232.4	924.30	821.6
	124.87	278.36	431.84	(28.62)	(182.11)



Within the relevant output range, some expenses like depreciation or managerial remuneration remain whether the firm makes use of the capacity or not. Such costs are fixed costs. Some costs (like the cost of raw material) vary with the level of activity. Such costs are called variable costs. Note that, over an extended period of time, all costs are variables. For example, managers can be relieved from service or equipment could be disposed off. The denominator in the above equation (Selling price – Variable cost/unit) is called contribution (towards recovering fixed cost and profits). Accounting the BEP for the BHEL project is shown in Exhibit 11.4. The higher the breakeven point, the higher is the risk that the firm will incur a loss.

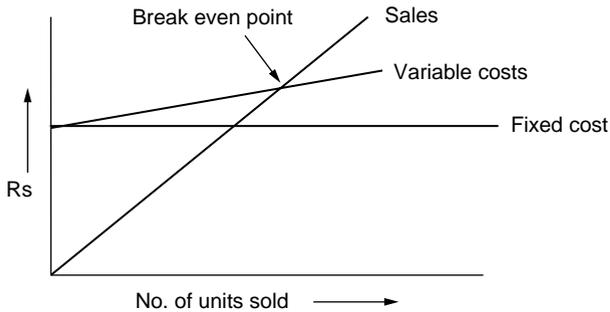
Exhibit 11.4 Accounting BEP as percentage of the installed capacity

	(Rs lac)
Sales	2,713
Less: Variable costs	
– Raw materials, dyes & chemicals, stores & spares	1,839
– Utilities	127
– Interest of working capital borrowing	101
	2,158
Contribution = Sales – Variable costs	555
Fixed costs:	
– Wages & salaries	82
– Factory & plant overheads	25
– Administrative expenses	35
– Interest on term loan	101
– Other bank charges	7
– Depreciation	118
	368
BEP = $\frac{\text{Fixed cost}}{\text{Contribution}} \times \text{Capacity utilization (percent)}$	
	$= \frac{368}{555} \times 100 \text{ percent}$
	$= 66.33 \text{ percent}$

Note: All figures relate to a normal year of operation.

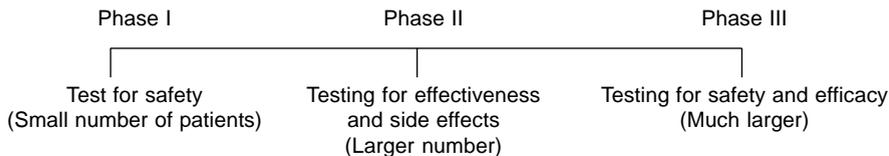
A typical B-E chart is shown in Exhibit 11.5. Financial BEP refers to the level of activity at which $NPV = 0$. At that level, Present value of revenues = Present value of costs. Since at any level below the BEP the company will be financially worse off, BEP serves as a useful check.

Exhibit 11.5 Break-even chart



DECISION TREES

Pharmaceutical companies like Merck typically license drugs from smaller companies. Under the agreement, the pharmaceutical company is responsible for the approval of the drug from the concerned authorities, its manufacture and its marketing. The company pays an initial fee and a royalty on all sales, and makes additional payments as the licensor completes each stage of the approval process. In the US, each drug goes through a three-phase approval process as shown here:



The whole process takes about 7 years to complete.

There is 60 percent, 10 percent, and 85 percent chance that the product will successfully complete phases 1, 2, and 3 respectively.

Consider another business situation. The management of a company must decide whether to build a small plant or a large plant to manufacture a new product with an expected market life of 10 years. The decision depends on what the market size will be for the new product.

The demand for the product could be:

- High during the first two years and then drop off to a low level if customers do not find the product satisfactory.
- High followed by sustained high demand if the product is well accepted.
- Low during the introductory period in which case the company can abandon the project.

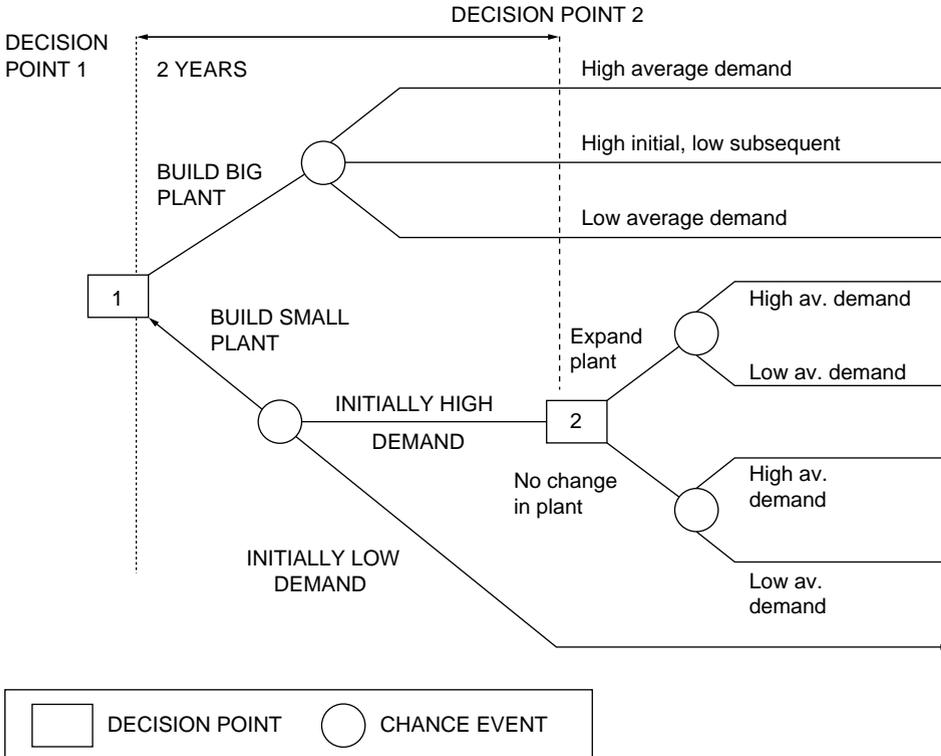
The company has three options:

- Build a small plant during the introductory period, and expand quickly if the demand shoots up. Otherwise, competitive products will eat into the company’s market share.
- Maintain the small plant, if the demand is low during the introductory period.
- Build a big plant no matter what the market size. Furthermore, the new product is the company’s first major breakthrough, and the management is not sure what course of action is optimal.

This given example has an important message: the decision problem is not in terms of an isolated decision or a sequence of decisions, but is a problem in terms of a tree of decisions. We can either define and describe decision trees, and then draw one for a business situation; or we can show a decision tree and then describe the method of drawing. Here we resort to the second method. The decision tree for the given problem is shown in Exhibit 11.6. The tree is made up of nodes and branches. The action or decision forks are indicated with square nodes, and chance events with round ones. Each branch represents an alternative course of action or decision. So, a decision tree has action choices and results of action. The company’s executives have estimated probabilities, costs and benefits of each course of action as follows:

Initially high demand, sustained high:	60 percent
Initially high demand, long term low:	10 percent
Initially low and continuing low:	30 percent
Initially low and subsequently high:	0

Exhibit 11.6 Decision tree



The cash flows for each alternative outcome are:

1. A large plant with high volume would yield Rs 10 lac annually in cash flow.
2. A large plant with low volume would yield Rs 1 lac.
3. A small plant with low demand would yield Rs 4 lac.
4. A small plant during an initial period of high demand, would yield Rs 4.5 lac per year and drop to Rs 3 lac per annum in the long run because of the competition.
5. If the small plant were expanded to meet sustained high demand, it would yield Rs 7 lac cash flow annually as it would be less efficient than a large plant built initially
6. If the plant was expanded but high demand was not sustained, estimated annual cash flow would be Rs 5 lac.

Cost of large plant = Rs 30 lac

Cost of small plant = Rs 13.1 lac

Cost of expansion = Rs 22.1 lac

The decision tree shown in Exhibit 11.6 has to be modified to incorporate the financial and probability data. The modified decision tree is shown in Exhibit 11.7 at the end of the chapter. Seven outcomes (1 through 8) are possible.

The firm has to make a decision whether to build a big plant or a small one now (time t_0). We can answer this question by computing the expected NPV of each strategy.

Expected NPV of Building a Big Plant

1. Calculate the expected present value of cash flows at chance node A. (upper-half of Exhibit 11.8)

$$E(\text{PV}) = \text{PV} \times \text{Probability}$$

$$\begin{aligned} \text{PV} &= [(10 \text{ lac} \times \text{PVIFA}_{15,10}) 0.6 + \{1 \times \text{PVIFA}_{15,2} + 1 \text{ lac} \times \text{PVIFA}_{15,8}\} 0.1 \\ &\quad + (100000 \times \text{PVIFA}_{15,10}) \times 0.30] \\ &= \text{Rs } 2164880 \end{aligned}$$

2. Deduct the initial investment of Rs.3 m to get NPV

$$\begin{aligned} &= 2164880 - 3000000 \\ &= - \text{Rs } 164880 \end{aligned}$$

Expected NPV of Building a Small Plant

1. Calculate the expected value at C & D.

$$\begin{aligned} \text{Expected value at } C &= [(700000 \times \text{PVIFA}_{15,8}) 0.86 + (50000 \times \text{PVIFA}_{15,8}) 0.14] \\ &= \text{Rs } 2732583 \end{aligned}$$

Deduct investment of Rs 2.2 m to get NPV

$$= \text{Rs } 532583$$

$$\begin{aligned} \text{Expected value at } D &= [(300000 \times \text{PVIFA}_{15,8}) 0.86 + (400000 \times \text{PVIFA}_{15,8}) 0.14] \\ &= \text{Rs } 1408918 \end{aligned}$$

Since there is no investment,

$$\text{NPV} = \text{Rs } 1408918$$

2. Add the two to get the expected value at Decision Point 2
= Rs 1941501
3. Calculate expected value at *B*.
= $[(450000 \times PVIFA_{15,2}) + (\text{Expected value at Decision Point 2})] 0.7 + (400000 \times PVIFA_{15,10}) 0.13]$
= Rs 2473520.70
4. Deduct investment of 1.3 m to get NPV
= Rs 1173520
5. NPV of building small plant
= Rs 1173520

On comparison, building a smaller plant seems to be a better proposition, as its NPV is higher.

STEPS IN DRAWING A DECISION TREE

A decision tree is a presentation of various decisions, possible outcomes and their probabilities at various stages of a project. The steps involved in drawing a decision tree are:

1. Identify decision points and alternative actions available at each point.
2. Identify the points of uncertainty and the range of alternative outcomes at each point.
3. Estimate the probabilities, costs and benefits of various events and actions.
4. Analyze and choose a course of action.

The information about investment requirements, market conditions, etc., may come from many sources like operations research, market research department, R&D, finance and sales personnel. A cross-functional team may be entrusted with the task of developing all alternatives and developing them. The team should identify what alternatives and uncertainties exist now and in the future, estimate costs, demand, prices and competitive action anticipated under alternatives. It may not be possible to identify all future possibilities, but we can do a reasonable job of it.

In drawing decision trees, we assumed that the outcome could take on discrete values. In reality, the outcome may not be discrete but continuous. Second, it might be hard to estimate subjective probabilities for all the outcomes.

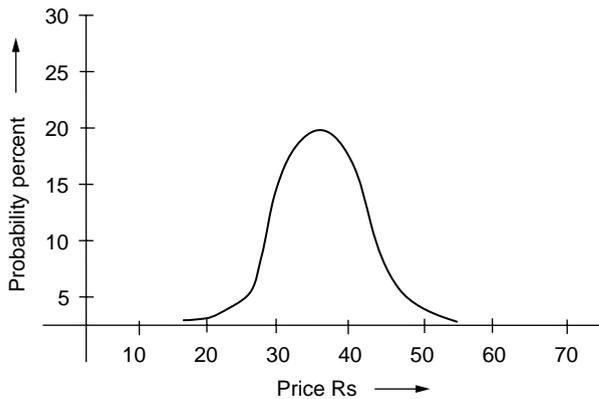
SIMULATION

Since each of the factors that enter into investment analysis is subject to some amount of uncertainty (in isolation and in combination), *Simulation*, a method of risk analysis, tries to combine the variability inherent in each of the factors under consideration and assess the odds of earning a healthy return. Monte Carlo simulation is a technique in which the uncertainty encompassing the main variable is processed in a forecasting model in order to estimate the impact of risk on the projected results. The model is subjected to a number of simulation runs usually with the aid of a computer. Simulation involves the following steps:

Step 1

Construct an ‘uncertainty profile’ for each key input factor like market size, market share, price per unit, selling costs, variable costs, etc. The uncertainty profile is constructed by attaching probability of occurrence to different values it can take on. The profile has probability on Y-axis and values of factor on the X-axis. For instance, let us suppose, the price can take any value ranging from Rs 30 to Rs 50. Let us further suppose there is a 5 percent chance of the realized price being Rs 30, a 10 percent chance of the price being Rs 35, a 20 percent chance of the price being Rs 40... and so on. The uncertainty profile for the price factor could be constructed as shown in Exhibit 11.7 (page 233). The probabilities are set subjectively based on expert opinion and past experience. Uncertainty profiles are constructed for all key factors similarly.

Exhibit 11.8 Uncertainty profile



Step 2

One value is chosen from each of the profiles randomly and combined to compute NPV, or IRR.

Step 3

The process is repeated several hundred times. Each time NPV and IRR are noted.

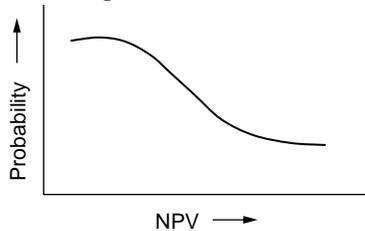
Step 4

Each result is listed from highest to lowest and the percentage of total situations falling within a given range of NPV or IRR is determined as shown below:

<i>NPV Range (Rs)</i>	<i>Percentage of situations = probability of occurrence (percent)</i>	<i>Cumulative probability (percent)</i>
150,000–200,000	28	28
100,000–150,000	14	42
50,000–100,000	21	63
0–50,000	16	79
–50,000–0	21	100

Step 5

The risk profile for the decision rule could be plotted using the result obtained in Step 4.



Step 6

Risk profiles are constructed for all investments in hand. Those projects that offer a greater probability of achieving any level of return or NPV are chosen (within capital constraints).

Step 7

The expected value and standard deviation of the risk profile are computed and a summary is presented.

SIMULATION USING CRYSTAL BALL³

Crystal Ball 2000[®] works with spreadsheet models, specifically MS Excel spreadsheet models. A model is a spreadsheet that has taken the leap from being a data organizer to an analysis tool. A model represents a process with combinations of data, formulas, and functions. As you add cells that help you better understand and analyze your data, your data spreadsheet becomes a spreadsheet model.

Traditionally, spreadsheet analysis tried to capture this uncertainty in one of three ways: point estimates, range estimates, and what-if scenarios.

Point estimates are when you use what you think are the most likely values (technically referred to as the mode) for the uncertain variables. These estimates are the easiest, but can return very misleading results.

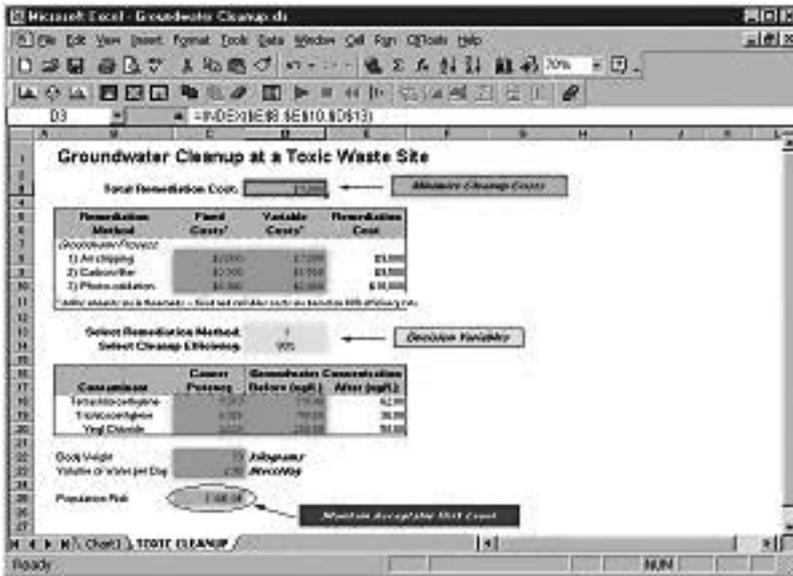
For example, try crossing a river with an average depth of three feet. Or, if it takes you an average of 25 minutes to get to the airport, leave 25 minutes before your flight takes off. You will miss your plane 50 percent of the time.

Range estimates typically calculate three scenarios: the best case, the worst case, and the most likely case. These types of estimates can show you the range of outcomes, but not the probability of any of these outcomes.

What-if scenarios are usually based on the range estimates, and calculate as many scenarios as you can think of. What is the worst case? What if sales are the best case but expenses are the worst case? What if sales are average but expenses are the best case? What if sales are average, expenses are average, but sales for the next month are flat? As we can see, this form of analysis is extremely time consuming, and results in lots of data, but still doesn't give you the probability of achieving different outcomes.

³ This section is based on a product description prepared by Decisioneering, Inc., the producer of *Crystal Ball*. *Crystal Ball* is the registered trademark of Decisioneering.

We can perform a risk analysis in several ways, but one method involves building a spreadsheet model. A good spreadsheet model can be very helpful in identifying where your risk might be, since cells with formulas and cell references identify causal relationships among variables.



Source: www.decisioneering.com.

One of the drawbacks of conventional spreadsheet models, however, is that you can only enter one value in a cell at a time.

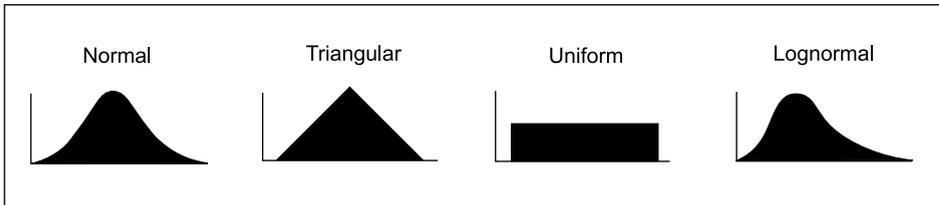
Remember those uncertain values that you could represent either with point estimates, range estimates, or what-if scenarios? A spreadsheet will not allow you to enter a range or multiple values for a cell, but only one value at a time. So, calculating the range requires you to replace the uncertain value several times to see what effect the minimum, most likely, and maximum values have.

Calculating more realistic 'what-if' scenarios is the same, except it requires you to change your spreadsheet even more. And don't forget to keep track of all the results somewhere or you will have to repeat the scenario!

Crystal Ball 2000 helps you define those uncertain variables in a whole new way—by defining the cell with a range or a set of values. So you can define your business phone bill for future months as any value between \$2,500 and \$3,750, instead of using a single point estimate of \$3,000. It then uses the defined range in a simulation. In addition, *Crystal Ball 2000* keeps track of the results of each scenario for you.

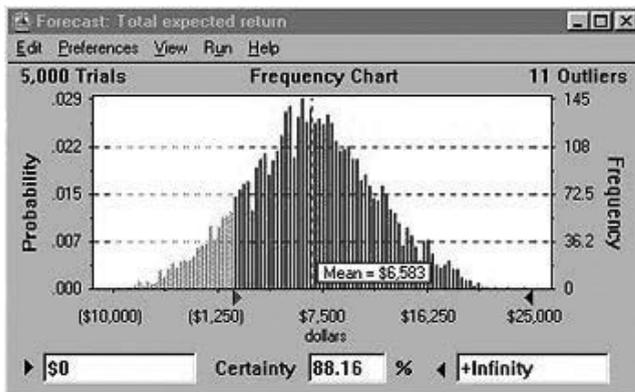
When we use the word simulation, we refer to any analytical method meant to imitate a real-life system, especially when other analyses are too mathematically complex or too difficult to reproduce. Without the aid of simulation, a spreadsheet model will only reveal a single outcome, generally the most likely or average scenario. Spreadsheet risk analysis uses both a spreadsheet model and simulation to automatically analyze the effect of varying inputs on outputs of the modeled system. One type of spreadsheet simulation is Monte Carlo simulation, which randomly generates values for uncertain variables over and over to simulate a model. Monte Carlo simulation was named for Monte Carlo, Monaco, where the primary attractions are casinos containing games of chance. Games of chance such as roulette wheels, dice, and slot machines exhibit random behavior. The random behavior in games of chance is similar to how Monte Carlo simulation selects variable values at random to simulate a model.

On rolling a dice, we know that 1, 2, 3, 4, 5, or 6 will come up, but we do not know which one exactly will come up for a particular roll. It is the same with the variables that have a known range of values but an uncertain value for any particular time or event (e.g., interest rates, staffing needs, stock prices, inventory, and phone calls per minute). For each uncertain variable (one that has a range of possible values), you define the possible values with a probability distribution. The type of distribution we select is based on the conditions surrounding that variable. Distribution types include:



Source: Decisioneering.

To add this kind of function to an MS Excel spreadsheet, we would need to know the equation that represents this distribution. With *Crystal Ball 2000*, these equations are automatically calculated for us. It can even fit a distribution to any historical data that we may have. A simulation calculates multiple scenarios of a model by repeatedly sampling values from the probability distributions for the uncertain variables and using those values for the cell. *Crystal Ball 2000* simulations can consist of as many trials (or scenarios) as we want—hundreds or even thousands—in just a few seconds. During a single trial, it randomly selects a value from the defined possibilities (the range and shape of the distribution) for each uncertain variable and then recalculates the spreadsheet. For every spreadsheet model, we have a set of important outputs, such as totals, net profits, or gross expenses that you want to simulate and analyze. *Crystal Ball 2000* lets us define those cells as forecasts. A forecast is a formula or output cell that you want to simulate and analyze. We can define as many forecasts as you need, and when you run a Monte Carlo simulation with *Crystal Ball 2000*, the latter remembers the values for each forecast, for each trial. During the simulation you can watch a histogram of the results referred to as a Frequency Chart develop for each forecast. While the simulation runs, we can see how the forecasts stabilize toward a smooth frequency distribution. After hundreds or thousands of trials, we can view the statistics of the results (such as the mean forecast value) and the certainty of any outcome. The following example is a forecast for total expected return.



Source: Decisioneering.

Certainty is the percent chance that a particular forecast value will fall within a specified range. For example, in the given chart, we can see the certainty of breaking even (results better than \$ 0) by entering the \$ 0 amount as the lower limit. Of the 5,000 trials that were run, 4,408 (or 88.16 percent) of those had a positive total expected return, so our *certainty* of breaking even is 88.16 percent. Therefore, the forecast results not only show us the different result values for each forecast, but also the probability of any value. Other charts allow us to examine different facets of our model.

The Sensitivity Chart lets us analyze the contribution of the assumptions (the uncertain variables) to a forecast, showing us which assumptions have the greatest impact on that forecast. What factor is most responsible for the uncertainty surrounding our net profit? Which geological assumptions are most important when calculating oil reserves? Sensitivity analysis lets us focus on the variables that matter most.

The Overlay Chart lets us display multiple forecasts on the same axis, even when the forecasts are from separate spreadsheet models. Which of six potential new projects has the highest expected return with the least variability (smallest range of values) surrounding the mean? With the Overlay Chart, we can compare and select the best alternatives.

The Trend Chart lets us stack forecasts so that we can examine trends and changes in a series. How do our risks change over time?

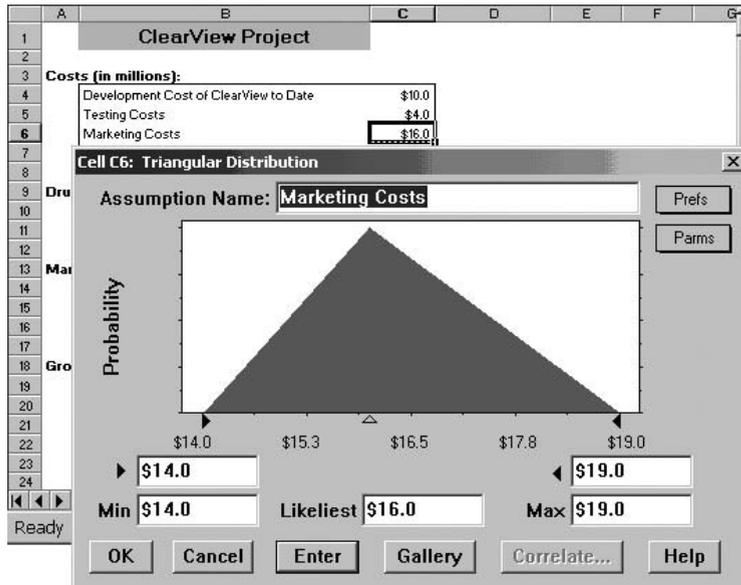
Crystal Ball 2000 Standard is an easy-to-use simulation program that helps us analyze the risks and uncertainties associated with MS Excel spreadsheet models that are deterministic, which means that the inputs are fixed (one value to one cell). We can only see one solution at a time. If we want to view alternative results, we need to manually change the inputs in the model. Simulation is a way to quickly generate and analyze many possible results. Excel by itself cannot run simulations, so we need an add-in program like *Crystal Ball* to make MS Excel do this. Because *Crystal Ball* is an analysis tool, we can use it to simulate existing or new spreadsheets in any industry and for any application. For example, if a researcher in the pharmaceutical industry develops the given spreadsheet to analyze the financial success of our project.

Without simulation, we calculate a net profit of \$9,200,000. Not bad, but we have no sense of the likelihood of this result. Are we 75 percent sure this will happen? How about being 100 percent sure? A simulation can show us the probability of a given outcome. The first step to using *Crystal Ball* is to determine which model inputs are uncertain. Which values are estimates? Which are averages? Once these are identified, we use knowledge of the uncertainty around the input to create a probability distribution for that cell (what we call an **assumption**). *Crystal Ball* lets us define these distributions.

	A	B	C	D
1		ClearView Project		
2				
3		Costs (in millions):		
4		Development Cost of ClearView to Date	\$10.0	
5		Testing Costs	\$4.0	
6		Marketing Costs\$16.0	
7		Total Costs	\$30.0	
8				
9		Drug Test (sample of 100 patients):		
10		Patients Cured	100	
11		FDA Approved if 20 or More Patients Cured	TRUE	
12				
13		Market Study (in millions):		
14		Persons in U.S. with Nearsightedness Today	40.0	
15		Growth Rate of Nearsightedness	2.00%	
16		Persons with Nearsightedness After One Year	40.8	
17				
18		Gross Profit on Dosages Sold:		
19		Market Penetration	8.00%	
20		Profit Per Customer in Dollars	\$12.00	
21		Gross Profit if Approved (MM)	\$39.2	
22				
23		Net Profit (MM)	\$9.2	
24				

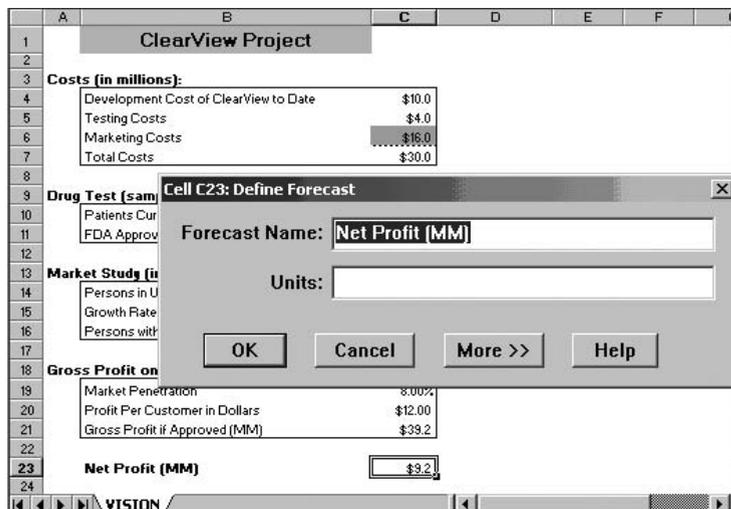
Source: Decisioneering.

In this case, we know that ‘Marketing Costs’ (cell C6) can vary between \$14,000,000 and \$19,000,000, but are most likely to be \$16,000,000. We then use *Crystal Ball* to define a triangular distribution with these parameters, as shown here:



Source: Decisioneering.

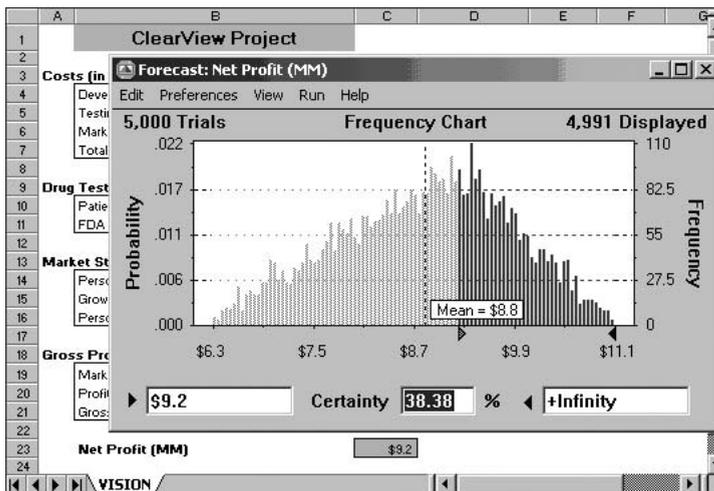
The width of the triangle represents the range of possible costs, and the height of the triangle represents the likelihood of the value actually happening. The highest point of the triangle is \$16,000,000, the most likely value. The next step is to identify a forecast. A **forecast** is a formula cell that you want to measure and analyze. In this model, we select the ‘Net Profit’ (cell C23).



Source: Decisioneering.

We can define multiple assumptions and forecasts. Once that is done, the *Crystal Ball* command or toolbar icon can be used to run a simulation. For each trial in this simulation, *Crystal Ball* enters a random value into the 'Marketing Cost' cell based on the values we used to define the triangular distribution. For trial No. 1, the random value might be \$15,000,000, followed by \$17,500,000 for trial No. 2, \$16,875,000 for trial No. 3... and so on. Each time *Crystal Ball* enters a random value, it recalculates the spreadsheet and saves the forecast value in its memory for analysis later. If we run a simulation for 5,000 trials, then we have created 5,000 forecasts (or possible outcomes), compared to the single outcome you started with in the deterministic spreadsheet. Simulation results are displayed in interactive histograms, or frequency charts. The given chart shows the results of 5,000 trials of 'Net Profit'.

Note that the range of possible net profit values is \$6,300,000 to \$11,100,000, with a mean (average) value of \$8,800,000. There is only a 38 percent certainty that we receive a net profit of \$9,200,000 as we originally predicted.



Source: Decisioneering.

INCORPORATING RISK INTO CAPITAL BUDGETING DECISIONS

There are two ways of incorporating risk into capital investment appraisal. One way is to adjust the discount rate to reflect the riskiness of the cash flow and the other approach is to adjust the cash flow for risks and use a *risk free rate* as discount rate.

Adjusting Discount Rate

The discount rate is adjusted to reflect the riskiness of the project cash flows. The risk-adjusted discount rate is arrived at by adding suitable risk premiums to a risk free rate of return to adjust the discount rate for each factor contributing to the riskiness of the project. The higher the risk, the higher is the discount rate. Modern finance theory tells us that only systematic risk (as measured by beta of the stock) is relevant since all other forms of risk could be diversified away. Thus,

$$\begin{aligned}\text{Return expected by equity investors} &= \text{Risk free rate} + \text{Risk premium} \\ &= R_f + \beta [E(R_m) - R_f]\end{aligned}$$

But investors may demand a premium for other risks like country and currency risk, project risk. So the discount rate may have to be adjusted upwards/downwards to reflect these as well. The net present value of the project:

$$\text{NPV} = \sum_{t=1}^N \frac{E_t}{(1+k)^t}$$

where

- k = risk adjusted discount rate
= $I + Q$ (i.e., risk free rate + premium),
- E_t = risky cash flow in period t , and
- N = life of the project.

To calculate NPV we used the firm's WACC as the discount rate. The underlying assumption is that the project has the same business and financial risk as that of the parent company. Stated in another fashion, WACC can be applied only when the project is a carbon copy of the firm's assets. At times, the project may have a different operating risk profile and more or less leveraged than the parent. So it is improper to apply the firm's WACC as the discount rate. To arrive at the project discount rate:

- a) Estimate the project beta
- b) Plug it into the capital asset pricing model (CAPM) to arrive at cost of equity
- c) Estimate cost of debt
- d) Calculate the WACC *for the project*

Since the beta for the project is unobservable in the marketplace, a proxy beta derived from a publicly traded firm whose operations are as similar as possible to the project in question is used as the measure of the project's systematic risk. The pure play approach attempts to identify firms with publicly traded securities that are engaged solely in the same line of business as the division. This comparable firm is called a 'Pure play' firm. The characteristics of a pure play firm are:

- The firm should have only one business line and no miscellaneous revenues.
- The pure play should be in the same industry or business line as the division in question.
- The revenues of the pure play should be roughly the same as those of the division in question.
- When more than one firm could be identified as a potential pure play, the firm with the median beta could be chosen as the pure play.

After obtaining the proxy betas, estimate the asset betas for each of these firms. The idea is to remove the effect of capital structure on beta. The asset beta reflects only operating risk.

$$\beta_A = \beta_E (E/V)$$

The average of these serves as an estimate of asset beta for the project. Re-lever the project beta to reflect the project's financing mix using the same equation. Assume that a company is setting up an engineering services company. The project will have a D/V ratio of 0.3. The company has identified four pure plays:

Pure play	β_L	D/V
A	1.1	0.3
B	0.9	0.25
C	0.95	0.35
D	1	0.3

The asset betas for the pure plays are:

Firm	$A\beta$
A	0.77
B	0.675
C	0.6175
D	0.7

Average $\beta_A = 0.7$.

This is taken as proxy asset beta of the project.

$$\begin{aligned}\text{Now, levered beta for the project} &= \beta_E = \beta_A/(E/V) \\ &= 0.70/0.7 = 1.0\end{aligned}$$

If

$$\begin{aligned}R_f &= 11 \text{ percent} \\ (R_M - R_f) &= 10 \text{ percent} \\ \text{Cost of equity for the project} &= R_f + \beta_L [E (R_M) - R_f] \\ &= 11 + 1.0[10 \text{ percent}] \\ &= 21 \text{ percent} \\ \text{WACC} &= \frac{D}{V} K_d (1-T) + \frac{E}{V} K_e\end{aligned}$$

The project's debt to value ratio is to be used in WACC calculation.

Certainty Equivalent

Under the Certainty Equivalent method, the risky cash flows are adjusted downwards by a risk adjustment factor and converted into a series of certain cash flows. The series is to be discounted using a *risk free rate*. The higher the uncertainty regarding the realization of the cash flow, the lower is its value today, that is, the lower the certainty equivalent:

$$\text{NPV} = \sum_{t=1}^N \frac{L_t E_t}{(1+i_t)^t}$$

where

L_t = Certainty equivalent factor

$$= \frac{1+i_t}{1+K_t}$$

i_t = risk free rate of return in period t , and

K_t = risk adjusted discount rate in period t .

The discount rate used in capital budgeting has the time value of money and an adjustment for risk. It is difficult to separate the two. So, some finance theorists suggest that the Certainty Equivalent method is better (and hence be used). Instead of making ad hoc adjustments to cash flow and/or discount rate, an analyst can selectively choose the appropriate method as and when the situation warrants. For instance, political risk, in case of international projects, is one of the significant sources of risk. Most multinationals buy insurance from international agencies like OPIC and Lloyds. In this case it is easier to adjust cash flow than discount rate. In other words, the adjustment depends on the risk in question.

SURVEY RESULTS

Gitman and Mercurio (1982) conducted a survey of *Fortune 1000* companies and found that 39 percent respondents (118) risk-adjust cash flows of project, 32.2 percent risk-adjust the cost of capital applied to each project, 19.5 percent risk-adjust both the cash flows and the discount rate and the rest use some other technique. The summary of their findings is shown in Exhibit 11.9.

Exhibit 11.9 Risk-adjustment procedure in *Fortune 1000* companies

<i>Procedures</i>	<i>Percentage of 118 responses</i>
Risk-adjust cash flows of each project	39 percent
Risk-adjust cost of capital of each project	32.2 percent
Risk-adjust both	19.5 percent
Use some other technique	9.3

Their study indicates that almost one-third of the respondents (177) do not differentiate project risk specifically in sharp contrast to financial theory.

PROJECT VALUATION IN EMERGING MARKETS

The DCF methodology for evaluating a project involves estimation of cash flows and discount rate. If the NPV is positive, the project can be accepted; if negative, the project should be rejected. Estimating cash flows for a foreign project is just an extension of domestic counterpart except that the cash might be more variable or volatile. More specifically, international capital budgeting involves:

- Estimation of cash flows specific to *that* project
- Estimation of discount rate specific to *that* project.

Managers evaluating an international project need to address two questions: Should the project be evaluated from the perspective of managers in the country in which the project is located or that of the parent company? Should the cash flows be adjusted downwards or should the discount rate be raised to account for differential political and economic risks? An international project can be evaluated in two stages. In the first stage, the project is evaluated from the subsidiary's perspective. In the second stage, the amount and timing of profits repatriated (after paying taxes) to the parent company is estimated. It is common practice to make ad hoc adjustments to cash flows or discount rates. For instance, if a company were to use 15 percent discount rate

for a domestic project, it might raise it to 20 percent for foreign projects. Such adjustments, obviously, do not have a sound basis. Some academics suggest that it is better to adjust cash flows to account for risks (and not discount rate) because international risks are unsystematic in nature and hence diversifiable. Remember that only systematic risk matters in a CAPM universe. Whether or not the discount rate for foreign projects should be revised depends on how managers view risks in international projects. If the risks are adequately reflected in the project beta then it is inappropriate to add an additional risk premium to the discount rate. There are two alternative approaches for valuing overseas investments.

Approach 1

1. Forecast foreign currency cash flows using host country tax rate and inflation rate.
2. Estimate foreign currency discount rate using project specific capital structure and beta.
3. Calculate PV of the free cash flows in foreign currency.
4. Convert to home currency using spot exchange rate.

Approach 2

1. Forecast foreign currency cash flows using host country tax rate and inflation rate.
2. Forecast future exchange rates using parity relationships and convert cash flows to home currency
3. Estimate home currency discount rate using project specific capital structure and beta.
4. Calculate PV in home currency.

Usually, both the approaches give the same answer.

Adjusting Cash Flows

The effect of international risk can be incorporated by charging a premium for political and economic risk against each year's cash flows. That is, incorporate the cost of buying insurance to cover the political risk from an agency like Overseas Private Investment Corporation or Lloyd's, of London, and the cost of covering economic risk by a forward cover in the currency market. Another approach is to estimate the probability of expropriation and the expected value (mean) of cash flows. Once the cash flow in the host country's currency is estimated, probabilities are attached to different exchange rates (between local currency and home currency) forecast by the analyst to translate cash flows into home currency.

Adjusting Discount Rate

Whether or not the discount rate for a foreign project should be adjusted depends on how one views international risk. Modern finance theory suggests that only systematic risk of a project matters as unsystematic risk can be diversified away.

A multinational, due to its global focus, can diversify country specific risk as long as cash flows from these countries are not perfectly positively correlated. Beta is the standard measure of systematic risk; it measures the sensitivity of asset returns to market returns. What is the appropriate proxy for the market portfolio in case of multinational investment? Is it the portfolio in the country of operation or that in the home country? Or may be a *global* portfolio? In many emerging countries, the stock markets lack depth. More than half the market capitalization is accounted for by a handful of companies. So the stock market index would be a poor proxy for market portfolio, which is supposed to represent the portfolio of all risky assets held by the marginal investor in the company.

The resulting beta estimate would be biased. The investor, in this case, is a multinational company. As there is no international index,⁴ one could use the home country stock market index as a market portfolio. If we assume that the systematic risk of a project in, say Chile, is about the same as that elsewhere (which is not true), the problem boils down to finding the beta in the home country.⁵

The risk premium for a foreign project could be expressed as:⁶

$$\begin{aligned} \text{Risk premium} &= \text{base premium for a mature market} + \text{country premium} \\ \text{Cost of equity} &= R_f + \beta (\text{base premium for mature market like the US}) + \text{country premium} \end{aligned}$$

where

$$R_f = T - \text{bond rate, a proxy for risk free rate.}$$

Base premium is the geometric average premium (i.e., $R_m - R_f$) earned by stocks over bonds over a long period of time, 6.1 percent in case of the US. The country premium is added on the assumption that country risk cannot be diversified due to cross market correlation. Put differently, a major portion of the country risk is systematic. The equity risk premium of a country is a function of country default risk and the volatility of equity market relative to the country bond market.

$$\text{Country equity risk premium} = \text{Country default spread} * [\sigma_{\text{equity}} / \sigma_{\text{country bond}}]$$

The country risk can be measured by the credit rating given by international credit rating agencies like Standard & Poor and Moody's.⁷ These agencies publish default spread over the T-bond rate and spread over corporate bonds with similar rating in the US. Exhibit 11.10 presents Moody's country ratings and the default spread. Either the corporate spread or the country spread could be used as default risk premium. The default risk premium should be translated into equity risk premium.

$$\text{Country equity risk premium} = \text{Country default spread} \times [\sigma_{\text{equity}} / \sigma_{\text{country bond}}]$$

where

σ_{equity} is the standard deviation of returns on the country's stock market index, and

$\sigma_{\text{country bond}}$ is the standard deviation of country bond prices.

Assume the following data:

$$R_f = T - \text{bond rate in the US} = 5.1 \text{ percent}$$

$$\text{Beta} = 0.7$$

$$\text{Base premium} = 6.1 \text{ percent}$$

$$\text{Country default spread over US companies with same rating} = 1.75 \text{ percent}$$

$$\sigma_{\text{equity}} / \sigma_{\text{country bond}} = 3.2$$

⁴ We can probably take the Morgan Stanley Capital Index as the best proxy.

⁵ Shapiro (1983) points out that the systematic risk would not be much higher for a project in LDC vis-à-vis those in industrialized countries.

⁶ See Aswath Damodaran, 'Estimating Risk Premiums', Working Paper, Stern School of Business. Also see, Godfrey S and R Espinosa (1996). 'A practical approach to calculating cost of equity for investments in emerging markets', *Journal of Applied Corporate Finance*, Vol. 9, No. 3

⁷ See www.moody.com.

$$\begin{aligned}\text{Country premium} &= 1.75 \times 3.2 = 5.6 \text{ percent} \\ \text{Cost of equity for the project} &= 5.1 + 6.1 + 5.6 \text{ percent} \\ &= 16.8 \text{ percent}\end{aligned}$$

Cost of equity can be used to discount free cash flow to equity investors to value the project.

Exhibit 11.10 Country ratings and default spread

Country	Long term bond rating*	Country risk premium
Argentina	Ba3	4 percent
Australia	Aa2	0.65 percent
Austria	Aaa	0.00
Belgium	Aaa	0.00
Brazil	B2	5.5 percent
Canada	Aa2	0.65 percent
Chile	Baa1	1.2 percent
China	A3	0.95 percent
India	Ba2	3 percent
Indonesia	B3	6.5 percent
Japan	Aa1	0.60 percent
Pakistan	Caa1	7.5 percent
Sweden	Aa2	0.65 percent
Switzerland	Aaa	0.00

* Spread between interest on foreign currency country bond and that on US corporates with similar rating.
 Source: Aswath Damodaran, 'Estimating Risk Premiums', Working Paper, Stern School of Business.

Converting Discount Rates

Some academics suggest that the discount rate be calculated in home currency and then translated to host currency. The conversion of home currency discount rate to host country discount rate involves application of interest rate parity condition. Interest rate parity stipulates that the expected rate of change in the spot exchange rate equals the ratio of the prevailing interest rates in the two currencies.

$$(1 + \Delta s) = \frac{(1 + R_1)}{(1 + R_2)}$$

where

Δs = expected change in spot rate.

R_1 and R_2 are yields on comparable government bonds denominated in the currencies in question. The weighted average cost of capital in one currency can be converted into another by multiplying by the expected annual change in the exchange rate. While changes in exchange rates may correspond with changes in the differential in national inflation rates in the long run, there are sharp deviations from this parity relationship for shorter intervals. The inflation rate in many emerging markets is much higher than that in stable economies. So discounting foreign cash flows with interest rate in that country would be inappropriate. Likewise, managers in low interest rate economies like Japan should not use the Yen rate. This will inflate the NPV of the investment.

One school of academics suggests that the discount rate is the interest rate which the home government would pay in the host country plus a premium that reflects the spread over treasuries the company will have to pay when at home. The average of interest rates over a cycle might be used to discount cash flows. It is important to understand that the interest rate used to discount should be distinguished from the currency borrowed to finance the project to keep valuation and financing separate.

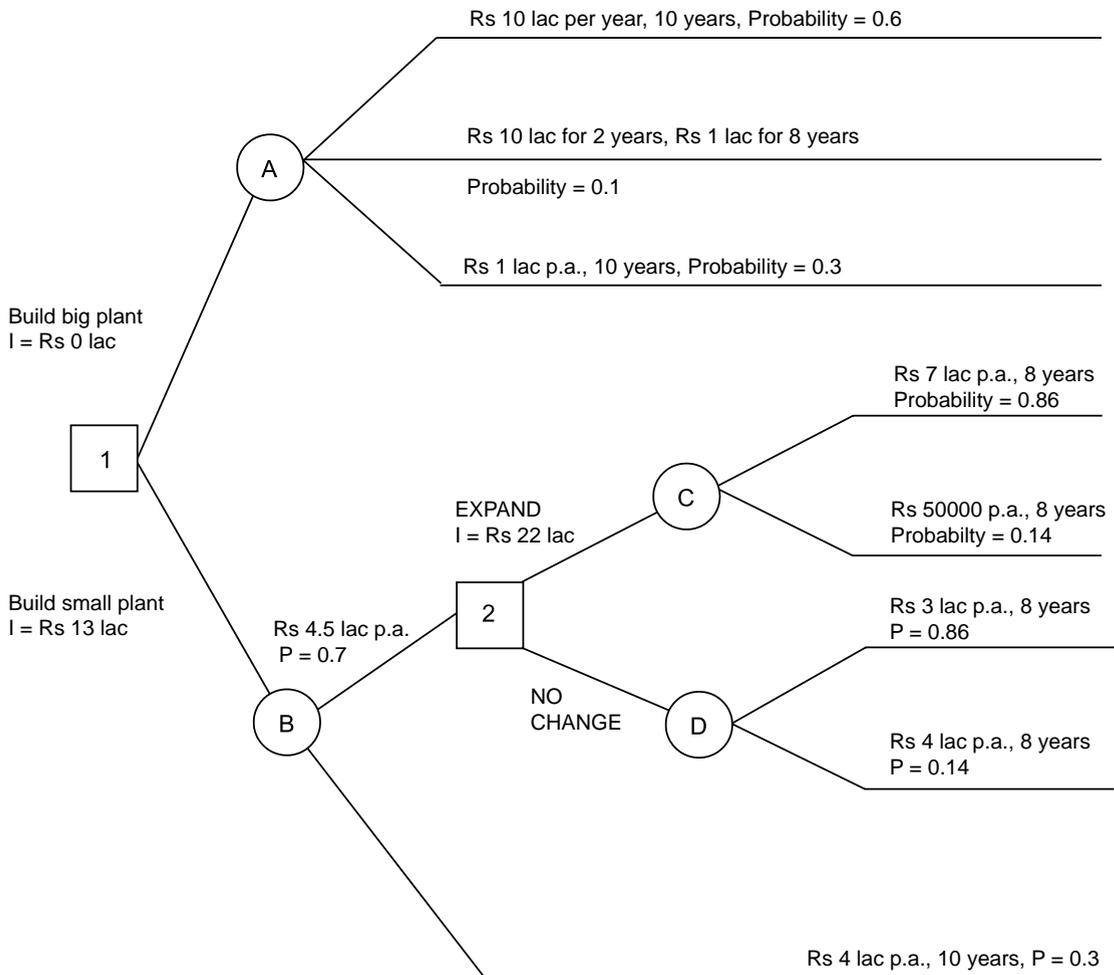
Thus, the discount rate for an Indian company that pays 3 percent over treasuries, when at home, for a project in UK:

= Rate at which the Indian government borrows from UK + 3 percent premium.

IN CONCLUSION

The riskiness of a project can be captured either by adjusting the cash flow or the discount rate. The discount rate should be adjusted if the risk is systematic in nature. The pure play technique might be employed to estimate the project discount rate. In any case, the corporate cost of capital should not be applied indiscriminately to all projects. There are three principal methods for risk analysis. They are: sensitivity analysis, simulation and best case–worst case analysis. An analyst has the freedom to choose from these methods.

Exhibit 11.7 Modified decision trees



APPENDIX 1: ESTIMATING DISCOUNT RATES IN EMERGING MARKETS

In recent years, a great deal of research has been done on asset pricing in emerging markets. This appendix explains three such studies.

Godfrey–Espinosa Approach

The Godfrey–Espinosa model to estimate the cost of equity in emerging markets suggests:

$$K_i = R_{f, \text{u.s.}} + \text{Credit spread}_i + 0.6 [\sigma_i / \sigma_m] [\text{Risk premium}_{\text{u.s.}}]$$

where,

$R_{f, \text{u.s.}}$ = risk free rate in the US = 6 percent,

σ_i = annualized equity market volatility of the country in question,

σ_m = annualized equity market volatility of the US, and

Credit spread = Difference in yields on the public debt of two countries denominated in common currency.

Given here are the credit spread and other inputs for estimating cost of equity in India and other countries in 1996:

Country	Credit spread	Annualized volatility beta	Adjusted	Cost of equity
Argentina	4. percent	54.74 percent	3.39	28.7
Brazil	4.1 percent	53.75 percent	3.33	28.4
Mexico	3.8 percent	36.56 percent	2.26	22.3
Philippines	2.0 percent	32.05 percent	1.99	18.9
India	1.6 percent	29.95 percent	1.86	17.8
Indonesia	1.0 percent	27.19 percent	1.68	16.3

Source: Godfrey and Espinosa (1996).

Goldman Sachs Model⁸

The Goldman Sachs model is specified as

$$R = R_{\text{us}} + \text{premium}$$

where,

R_{us} = risk free rate in the US.

They calculate premium in two steps:

- The country risk spread, R_s , the spread over treasuries for sovereign, dollar denominated emerging market bonds of similar maturity.
- A leveraged measure of the US equity risk premium (E_u) defined as the equity risk premium in the US, adjusted by the ratio of daily volatility (S_b) over the volatility of the US market (S_u).

⁸ Jorge Mariscal and Kent Hargis (1999). 'A Long-term Perspective on Short-term Risk', Goldman Sachs Research, Oct.

$$\text{Premium} = R_s + (S_b/S_u)E_u$$

So cost of equity

$$R = R_{us} + [R_s + (S_b/S_u)E_u]$$

The components of the risk premium are not independent leading to a problem of double counting. To obtain a realistic discount rate, the equity risk premium is adjusted by subtracting the correlation of dollar returns between the stock market and sovereign bond as follows:

$$\begin{aligned} \text{Adjusted premium} &= [R_s + (S_b/S_u)E_u] [1 - \text{corr}(S,B)] \\ \text{And cost of equity} &= R_{us} + [R_s + (S_b/S_u)E_u] [1 - \text{corr}(S,B)] \end{aligned}$$

International Cost of Capital and Risk Calculator (ICCR)

The Erb-Harvey-Viskanta model, unlike the other models, which calculate expected equity returns using stock market or economic data, focuses on country credit ratings. The result of credit risk ratings of 75–100 bankers conducted bi-annually by *Institutional Investor* is the basis for their model.⁹ Since the country ratings take into account macroeconomic factors like political and expropriation risk, exchange rate volatility, sensitivity to global economic shocks, E-H-V take country risk ratings as proxy for fundamental risk and try to model equity data and associated credit ratings for some 135 countries.

That is,

$$R_j = a_0 + a_1 \text{Log}(\text{CCR}_j) + \varepsilon_j$$

where,

R = semi-annual return in US dollars for the country,
 $\text{Log}(\text{CCR})$ = natural logarithm of the country credit rating, and
 ε_j = regression residual.

The log of the credit rating is used to capture non-linear relationship between CCR and the expected return. Further, the E-H-V study indicates that country credit ratings also pick up ‘country risk’ and that higher rating (lower risk) leads to lower expected returns.

Their study established the following regression model:

$$\text{Country Hurdle Rate} = \text{Risk free rate} + 0.944 - 0.177 \text{Log}(\text{CCR})$$

Given here are the risk ratings and expected returns for some countries:

⁹ These bankers rate each country on a scale of 0–100, with 100 representing the lowest risk of default. The relationship between levered and un-levered beta is:

$$\beta_L = \beta_U [1 + (1 - T) D/E]$$

Country	Credit rating (Sep 1995)	Expected return percent
Australia	71.2	18.1
Belgium	79.2	15.9
Brazil	34.9	33.0
China	57.0	22.8
Germany	90.9	13.0
Hong Kong	67.0	19.4
India	46.1	27.2
Indonesia	52.4	24.5

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QUESTIONS

- The ACME company is in the oil business. It has a transferable short-term option to drill on a certain plot of land. The company has three options.
 - Drill immediately.
 - Pay to have a seismic test run in the next few days, and then, depending on the result of the test, decide whether or not to drill.
 - Let the option expire.

How would you draw the decision tree for the problem?

2. In trying to decide whether to approve a development budget for an improved product, you are urged to do so on the grounds that the development, if successful, will give you a competitive edge. But if you do not develop the product, your competitor may—and may seriously—damage your market share. Draw a decision tree.
3. (a) In the BHEL case, if the project cash flows falls by 5 percent what would be the NPV and IRR? What would be the percentage change in NPV?
 (b) If the initial investment is equally spread over 2 years, what would be the new NPV?
 (c) If the discount rate remains constant for the first 5 years and then rises by 2 percentage points, calculate the new NPV and IRR.
4. The following data is available for a project:

Initial investment	= Rs 10 crore (incl. working capital of Rs 2.5 crore)
Expected life	= 8 years
Salvage value	= 50 percent of initial investment
First year sales	= Rs 6 crore
Growth rate in sales	= 7.5 percent
Operating profit margin	= 10 percent
Tax rate	= 35 percent
Cost of capital	= 17 percent
Increase in W.C.	= 5 percent

Depreciation is provided on a straight-line basis. Estimate cash flows and NPV. Conduct a sensitivity analysis by changing key assumptions.

5. Find the financial break-even point for the example given above.
6. Find the accounting break-even point for a project that has the following characteristics:

Fixed cost	= Rs 50 crore
Sales revenue/unit	= Rs 1,000
Variable cost/unit	= Rs 800

7. For two mutually exclusive investments, the management of the company has developed cash flow estimates as pessimistic, most likely, and optimistic.

	<i>A</i>	<i>B</i>
Investment	5,500	5,500
Pessimistic	200	700
Most likely	800	800
Optimistic	1,400	900

Both projects have a life of 15 years. Cost of capital = 14 percent. Which project is more risky? Recalculate NPV if the probabilities of the three situations are 30 percent, 50 percent and 20 percent respectively.

A MINI CASE: VALUATION OF FOREIGN DIVISIONS

In 1997, a US multinational requested a 'bulge bracket' investment bank to value two of its divisions in Argentina and Brazil. Will Smith, an analyst with the bank, was asked to forecast free cash flow and estimate suitable discount rates for each of these divisions. Exhibit 1 presents the forecast of free cash flow for the two divisions:

Exhibit 1 Forecast of free cash flow

(\$ '000)

	1998	1999	2000	2001	2002
Argentina	6,930	7,117	7,331	7,617	7,990
Brazil	10,920	11,215	11,551	12,002	12,591

Cash flows are expected to grow at 6 percent per annum, after 2002, in perpetuity. The cash flows from local currency were translated into US dollars, using the estimated exchange rate for each period. The only task remaining is the estimation of discount rate. Smith discovered that the businesses in Latin America had no pure play proxies. Most of the competitors were subsidiaries of large, diversified companies. So, the determination of beta for each country operation was difficult. In addition, the efficiency of the local stock markets was questionable and so was the estimate of risk premium. The analyst obtained the dollar borrowing rate, tax rates and target capital structure information from relevant sources (displayed in Exhibit 2).

Exhibit 2

Subsidiary	Borrowing rate (percent)	Tax rate (percent)	Target D/V (percent)
Argentina	8	35	20
Brazil	12	35	20

To calculate the cost of equity, the analyst can choose between two approaches under the CAPM method. The first approach involves usage of local CAPM parameters. The second approach involves estimation of parameters (and cost of equity) for the US, which would then be adjusted, for individual country risk, to yield estimates for these subsidiaries. Other relevant data are given here:

Foreign currency debt rating:

Moody's	S&P
Argentina	B1
Brazil	B1

US treasuries are yielding:

	YTM (percent)
1 year T-Bill	5.92
10 years	6.80
30 years	7.0

Median beta and capital structure information for comparable US industries:

	1	2	3	4
Un-levered median beta ¹⁰	0.86	0.79	0.74	0.76
Mean D/V ratio (market value)	0.2	0.18	0.17	0.19

Refer to other data in this chapter. Estimate an appropriate discount rate for, and the value of, each of the divisions.

¹⁰ beta when leverage is zero. The relationship between levered and un-levered beta is:

$$\beta_L = \beta_U [1 + (1 - T)D/E]$$

Chapter 12

A Real Option's Perspective of Capital Budgeting

OBJECTIVES

- ◆ Introduction to financial options.
- ◆ Bring out the analogy between financial and real options.
- ◆ Introduction to types of real options.
- ◆ Valuation of real options.

A derivative is a financial instrument or contract between two parties that derives its value from some underlying asset or reference price, interest rate, or index. Options, futures, swaps, and forwards are derivative instruments. Underlying assets include interest rates, exchange rates, commodities, stocks, stock indices, and bonds. Derivatives are traded both on recognized exchanges and in the over-the-counter market.

Companies, financial institutions, individuals and institutional investors use derivatives for a variety of reasons. Companies may use derivatives to manage interest rate and foreign exchange rate risk. Investors in stocks may trade in derivatives to manage exposure to equity prices. People may trade in derivative instruments either to hedge risk or to speculate. Derivatives enable individuals to allocate economic risks efficiently by transferring risks from risk-averse individuals to those who are willing to bear.

Options are derivative instruments that can be used as a means to hedge or speculate. Options are written on both financial and real assets. Option contracts on foreign currency, stocks, stock indices, interest rates, commodities and Treasury bonds.

An option is a contract between the buyer of the option and the seller (writer). The contract gives the buyer of the option the *right* but not the *obligation* to buy the underlying asset at a specified price (strike price) at a specified time in the future (expiration date or maturity date). The buyer of the option pays an option *premium* to the seller for obtaining the right. The seller of the option is however obligated to honor the contract. The option to buy an asset is called a *call* option and the option to sell an asset is called a *put* option. Here is an example of call and put option written on ACC stock:

Options traded on ACC stock, March 20, 2003 (Rs per share)

Stock price	Rs 139
Exercise price	Rs 135
Maturity date	24/04/2003
Call option premium	Rs 5.15
Put option premium	Rs 2.70

The underlying asset in the given case is a stock. Options are of two types: European and American. European options can be exercised only on the maturity date whereas American options can be exercised any time up to maturity. The given example is an American type option. The buyer of a call option on ACC stock could have purchased it at Rs 135, any time before the maturity date. Likewise, the holder of a put option could sell ACC stock at Rs 135 by exercising the option.

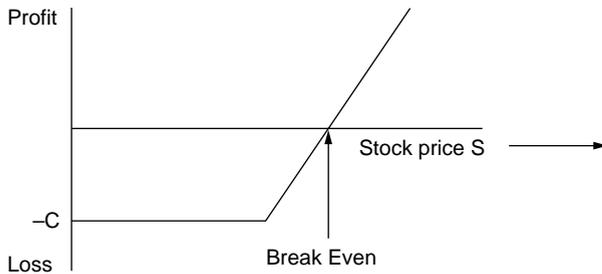
Options have premium value and intrinsic value. The premium value of the call option mentioned above is Rs 5.15 and that of the put option is Rs 2.70. The premium is simply the market value of the contract, the price at which buyers and sellers of the option are willing to enter into a contract. Each option contract is for 100 shares. Therefore, an investor would have to pay Rs 515 to buy a call option and Rs 270 to buy a put option. The intrinsic value is the price an investor would pay for the option if it were to mature immediately. Assume that you buy a call option on the ACC stock at Rs 5.15. If the price of the stock were to decline to Rs 132 you would not exercise the option because it is cheaper to buy in the market rather than exercise. So the option expires worthless. In other words, the value of an option can be—at worst—zero. Suppose the price increased to Rs 140. The intrinsic value of the option is Rs 5, the profit you make by exercising the option and selling the share simultaneously in the open market. In general, the intrinsic value of a call option is the maximum of zero and the difference between the current market price of the underlying asset and the option's exercise price.

The opposite is true of put options. They gain value when the price of the underlying asset decreases because the holder of the option can sell the asset at a higher price than the prevailing market price. The intrinsic value of a put option is the maximum of zero and the difference between the put option's exercise price and the current market price of the underlying asset. An option is *in-the-money* if its intrinsic value is positive and *out-of-the money* if its intrinsic value is negative. A call option is *in-the-money* if the price of the underlying asset exceeds exercise price. The converse is true for a put option. An option is *at-the-money* when the asset price and the strike price are equal. If the asset price is far above the exercise price for a call option, the option is *deep in-the-money*. If the asset price is far below the exercise price for a call option, the option is *deep out-of-the-money*. The converse is true for a put option. Assume that on January 6, 2003 you purchased a call option to buy 100 shares of Hindustan Lever at a strike price of Rs 180. Each option has a premium of Rs 5. The options expire on January 30, 2003. At the time of entering into the contract the buyer has to pay a premium of Rs 5×100 for each contract. The value of the call option for various exercise prices is:

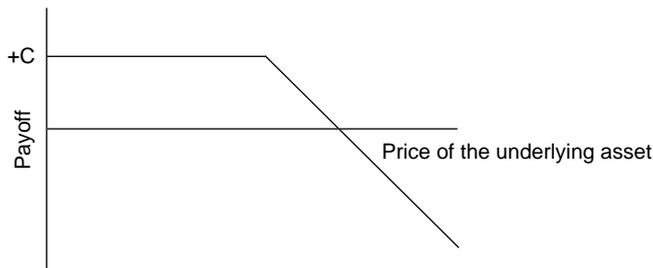
(in Rs)

Exercise price	Stock price (spot price)	Premium	Value of call option
180	170	5	-5
180	175	5	-5
180	180	5	-5
180	185	5	0
180	190	5	5
180	195	5	10

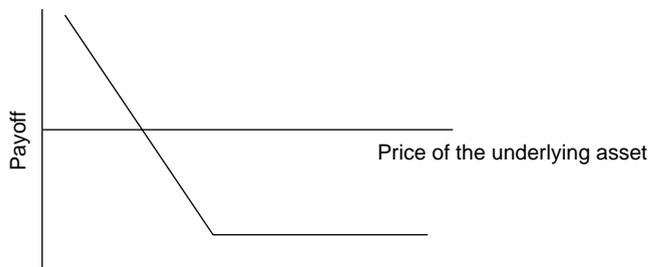
The option is worthless as long as the strike price exceeds the exercise price by an amount equal to the premium paid. The payoff can be plotted on a diagram as shown:



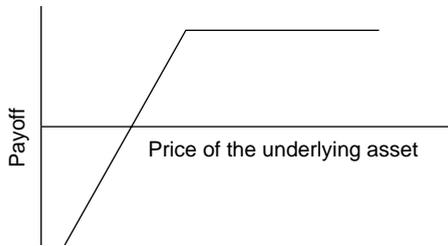
The maximum that an option holder loses is the premium paid whereas the upside potential is unlimited. The value of the option increases one-to-one for any increase in price above the break-even price. Since each option is for 100 shares, the strike price, exercise price and the premium have to be multiplied by 100 to arrive at the aggregate payoff. If the holder of the option decides to exercise the option he should pay Rs 180×100 (i.e., exercise price \times 100 shares). Those options worth exercising are called in-the-money, and those that are not are considered out-of-the-money. The payoff from the perspective of a seller is as shown:



Note that the seller (writer) of the call option gets the premium as long as the strike price is lower than the exercise price. While the upside is fixed, the downside is unlimited. Also note that the payoffs are mirror images—what the buyer gains the seller loses and vice versa. That is, they sum to zero (zero sum game). The value of a put option on the expiration date = $P = \text{maximum}(0, X-S)$. The payoff to a *long* put option position is as shown:



Note that the buyer of the put option makes money if the ending spot price of the underlying asset is lower than the exercise price. Likewise, the payoff to the writer of a put option is as shown:

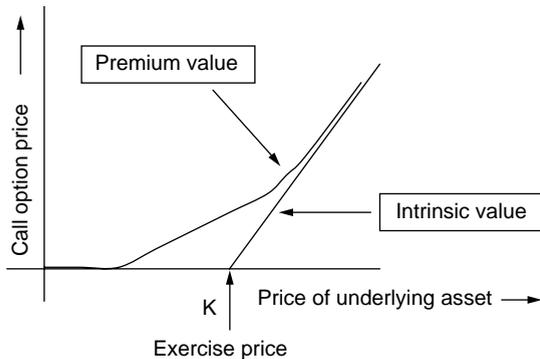


Like call options, the payoff for the put option holder and writer sum to zero.

DETERMINANTS OF OPTION VALUE

Note from the data on option prices of ACC stock that the market value of the option is more than the intrinsic value. That is, the market value of the call option on March 20 was Rs 5.15, whereas the intrinsic value was Rs 4 (i.e., Rs 139–Rs 135). Likewise, the put option was worthless (i.e., out of the money). Yet it has value: –Rs 2.70. This is true of all options that have time remaining to maturity. Exhibit 12.1(a) is a graph of a call option's premium relative to intrinsic value.

Exhibit 12.1(a) Call option premium relative to intrinsic value



How much the premium exceeds the intrinsic value depends on six factors:

- Underlying asset price,
- Exercise price,
- Risk free rate,
- Volatility of the asset price,
- Time to expiration, and
- Cash distributions from the underlying asset (i.e., dividends in case of stock).

Asset Price

For an American or European call option, an increase in the asset price leads to an increase in the option's intrinsic value because the option becomes more valuable. The premium, therefore, increases with an increase

in the asset price. The opposite is true for a put option: the higher the asset price the less valuable is the put option.

Exercise Price

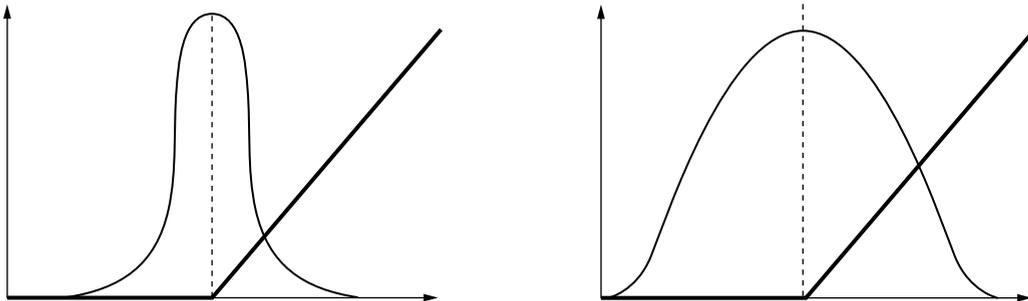
An increase in a call option's exercise price decreases the intrinsic value. The higher the exercise price for American or European type options, the lower will be its premium. The opposite is true for a put option. The higher the exercise price, the more valuable is a put option.

Risk-Free Interest Rate

Since buyers of options do not receive the option's exercise price until later, interest rates play a role in the determination of option value. A call option value increases with interest rates because the present value of the strike price falls. A put option value falls with an increase in interest rates because the present value of cash received decreases.

Volatility of Asset Price

An increase in the volatility of asset price increases the value of call option because of asymmetrical payoff of options. That is, the upside is unlimited whereas the downside is limited to the premium paid. Although the holder of a put option experiences limited potential gains, the holder can limit loss by simply not exercising the option if the asset price rises above the exercise price. In sum, an increase in volatility leads to an increase in the value of call and put options.



Time to Expiration

For both American and European type call options, an increase in the time to expiration has a positive impact on the option value because the probability of the ending up in-the-money is more and the present value of the exercise price is less. An American type put option also gains in value because of the chances of ending up in-the-money. For European type options the impact of lengthening time to expiration is not known. If the option is in-the-money, a longer time to maturity will have a negative impact because the present value of cash receipt from exercising falls. If the option is deep out of the money, a longer time to maturity will increase the option value because a longer time provides a greater opportunity for the stock price to drop far enough to make the option valuable.

Cash Distributions (Dividend)

A cash dividend paid on the stock decreases the stock price because of which the call option value declines. The opposite is true for a put option because a fall in stock price increases the value of a put option.

Exhibit 12.1(b) is a summary of the effect of each factor on option value.

Exhibit 12.1(b) The impact of factors determining option value

<i>Variable</i>	<i>Call</i>	<i>Put</i>
Asset price	↑	↓
Exercise price	↓	↑
Maturity	↑	?
Volatility	↑	↑
Interest rates	↓	↑
Dividends	↓	↑

PUT-CALL PARITY

Consider again the ACC stock option illustrated earlier. The options—put and call—have identical strike price and maturity date written on the same underlying asset: the ACC stock. Since the options have identical characteristics we would expect them to be related in some way. There is a condition known as *put-call parity* that describes the relation between the call and put option values.

Assume that you have purchased a European call option and sold a European put option on the same asset (S) with the same exercise price X and expiration date. The investment required to establish this position is the difference between call and put values.

That is, $C - P$

The pay off to this position is $S - X$. On the expiration date if the spot price is less than the expiration price, the call option expires worthless and the put option will be exercised against the position. Consequently, the payoff will be negative.

Consider another investment in which an investor borrows the present value of X to purchase the asset. The investment required is:

$$= S - \frac{X}{(1+r)^T}$$

And the payoff to this position on the expiration date, T , is $S - X$ since the investor owns the asset (S) and owes X .

Since the payoff to these two investment positions is the same their initial investment must also be the same to prevent arbitrage opportunities.¹

$$C - P = S - \frac{X}{(1+r)^T}$$

¹ A standard text on derivatives would explain put-call parity in greater detail. Refer to Hull, for example.

As an assignment test whether the put–call parity held for the ACC stock assuming a suitable annual risk free rate.²

VALUATION OF OPTIONS

The Black-Scholes model is widely used in pricing options. The Black-Scholes formula values a European call or put option as follows:

$$\begin{aligned}\text{Value of call} &= S e^{(b-r)T} N(d_1) - X e^{-rT} N(d_2) \\ \text{Value of put} &= -S e^{(b-r)T} N(-d_1) + X e^{-rT} N(-d_2)\end{aligned}$$

where

$$\begin{aligned}S &= \text{stock price} \\ X &= \text{strike price or exercise price,} \\ b &= \text{cost of carry defined as risk-free rate} - \text{dividend yield } (q), \\ T &= \text{time to maturity in years, and} \\ \sigma^2 &= \text{variance in returns from the underlying stock.} \\ d_1 &= \frac{\ln(S/X) + (b + \sigma^2/2)T}{\sigma\sqrt{T}} \\ d_2 &= d_1 - \sigma\sqrt{T}\end{aligned}$$

The function N (parameter) used in the formula is a mathematical notation for the cumulative normal distribution function.

An Example

A call option has the following properties:

$$\begin{aligned}S &= \text{Rs } 50 \\ X &= \text{Rs } 40 \\ R_f &= 5 \text{ percent} \\ q &= 3 \text{ percent} \\ b &= r - q = 0.05 - 0.03 = 0.02 \\ T &= 5 \text{ years} \\ \sigma &= 30 \text{ percent} = 0.3 \\ e &= 2.7183, \text{ a constant} \\ d_1 &= \frac{\ln(50/40) + (0.02 + 0.3^2/2)5}{0.3\sqrt{5}} = 0.8171 \\ d_2 &= 0.8171 - 0.3\sqrt{5} = 0.5582 \\ N(d_1) &= N(0.8171) = 0.7931 \\ N(d_2) &= N(0.5582) = 0.5582 \\ \text{Value of call} &= S e^{(b-r)T} N(d_1) - X e^{-rT} N(d_2) \\ &= 50 e^{(0.02 - 0.05)5} 0.7931 - 40 e^{-0.05 \times 5} 0.5582 = \text{Rs } 16.74\end{aligned}$$

² Convert the annual rate into a compound daily rate.

Note that the value of the option is more than its intrinsic value ($50 - 40 = 10$) because of time value.

A call option should be exercised if the stock price exceeds the strike price at expiration. That is if $S > X$. For the sake of convenience let's express it as a ratio. The option has value if $S/X > 1$. If S/X is less than 1, the option should not be exercised as it is out of the money.

The variability (per unit of time) of returns is measured by variance. Multiplying the variance per unit of time by amount of time to maturity gives the cumulative variance. The higher the cumulative variance, the more valuable is the option. The Black–Scholes value of a European call option as a percentage of value of underlying asset is available in a table form to make our life simple. A portion of the same is given here:

Share price/PV of exercise price	Option value (percent) Annual $\sigma \times$ Square root of time			
	0.25	0.5	0.75	1.0
0.5	0	3	10	19
0.6	0	5	14	24
0.7	1	8	18	28
0.8	3	12	22	32
0.9	6	16	26	35
1.0	10	20	29	38

Consider the following data.

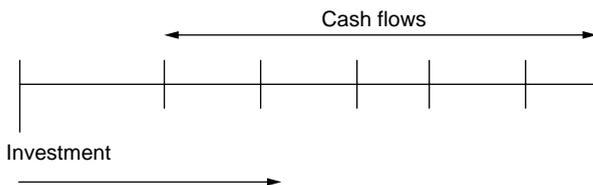
$$\begin{aligned}
 &\text{Stock price} = \text{Rs } 50 \\
 &\text{Annual volatility} = 25 \text{ percent} \\
 &\quad r = 5 \text{ percent} \\
 &\text{Exercise price} = \text{Rs } 60 \\
 &\quad T = 4 \text{ years} \\
 &\text{PV of exercise price} = 60/(1.05)^4 = \text{Rs } 49.36 \\
 &\text{Share price/PV}(X) = 50/49.36 = 1.01 \\
 &\quad \sigma(\sqrt{4}) = 25 \text{ percent} \times 2 = 50 \text{ percent}
 \end{aligned}$$

The cell at the intersection of row 6 and column 2, 20 percent, gives the call option value as a percentage of value of underlying asset.

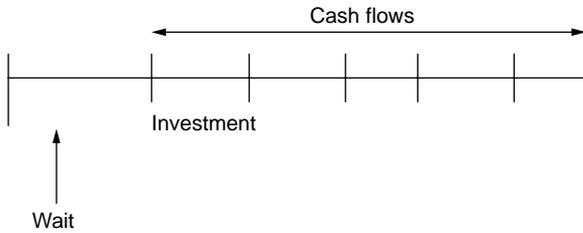
$$\text{Option value} = 20 \text{ percent of stock price} = 0.2 \times \text{Rs } 50 = \text{Rs } 10.$$

REAL OPTIONS

The traditional DCF methodology is based on the assumption that managers make an investment and then wait to see what happens.



It does not, for example, consider why managers cannot wait and *then* invest.



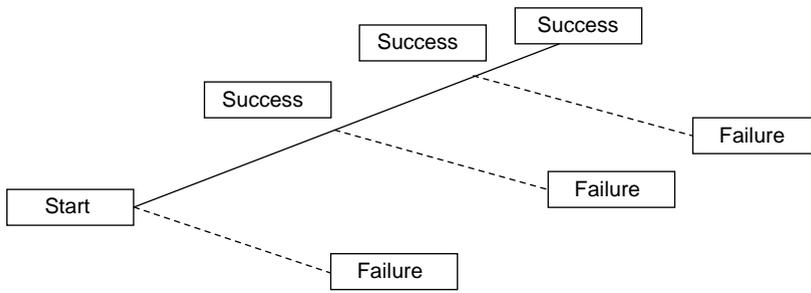
If the price for the product turns out to be weak, they may choose to abandon the project or wait for some time. The DCF methodology does not account for managerial flexibility in making mid-course corrections. For instance, as pointed out above, the managers of a company mining gold could stop digging if gold prices fall. The NPV calculated using the DCF methodology is a complex average of many outcomes—both positive and negative. Managers, of course, have the option to avoid downside by limiting investment. Real options are options on capital projects implicitly held by companies. Just as a bond-warrant package is to be valued separately and added up, the option component of capital projects has to be valued separately and added to the DCF value.

Real Options analysis extends financial option theory to options on real assets. Investment examples include new plants, line extensions, joint ventures, and licensing agreements. Real options analysis is a complement to DCF analysis, not a substitute. The DCF methodology falls short of real options analysis on several counts:

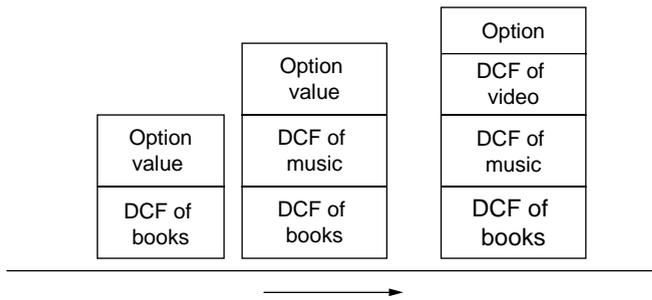
- *Flexibility* is the ability to defer, abandon, expand or contract an investment. Because the NPV rule does not factor in the value of uncertainty, it is less robust than real options approach. For instance, a company may choose to defer an investment for some period of time until it has more information about the market. The NPV rule does not assign value to the investment whereas the real options approach would.
- In standard finance, higher *volatility* means higher discount rates and lower NPV. In options theory, higher volatility leads to higher option value because of asymmetric payoff.
- In many situations future investments are contingent on the success of current investments. Managers may make investments today, even if they are negative NPV projects, to access future investment opportunities. Pharmaceutical companies are a good example. Future spending on drug development is often contingent on the product clearing hurdles. This is valuable because investments can be made in stages, rather than up-front.

Capital projects are like options; in the sense that managers have the right but not the obligation to cultivate them. An R&D investment may, for example, may open up new markets and products. So a valuation of the R&D investment should take into account the value of future products as well. Likewise while making natural resource investments (e.g., gold mining) managers may have the option but not the obligation to wait for certain number of years by paying a fee.

Jeff Bezos, a computer science and electrical engineering graduate from Princeton University founded *Amazon.com* in July 1994. *Amazon.com* opened its doors in 1995 with the mission to become a leader in selling books online. Initially it offered 10 lac titles. Bezos believes that retail would become the Internet's most important application. Although *Amazon.com* started out with selling books, the same infrastructure could then be used to sell music cassettes and videos. In other words, *Amazon.com* holds an option on the second generation products like music and video. If *Amazon.com* is successful in selling books on the Internet, it could expand the product offering to music and video.

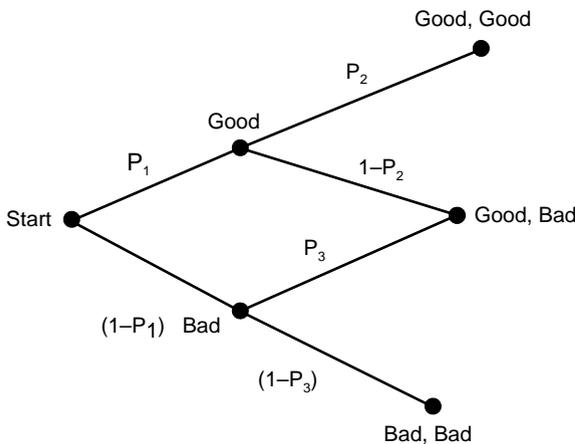


So, it would be incorrect to value *Amazon.com* on the basis of sales from books alone. The valuation should take into account its option to expand into music and video. The correct approach is as depicted here:



Valuation of Real Options

The binomial option-pricing model is currently the most widely used real options valuation method. The binomial model describes price movements over time, where the asset value can move to one of two possible prices with associated probabilities. Given here is a binomial process through a decision tree:



Consider a project that has a best outcome of Rs 1.3 crore and a worst outcome of Rs 90 lac. Each outcome is equally likely to occur (probability is 0.5). Expected value of the project, the weighted average of outcomes, is Rs 1.1 crore. The discounted value at a discount rate—of, say 10 percent—is Rs 1 crore. If the initial

investment is Rs 97.1 lac, the NPV is Rs 3 lac. Based on the NPV, most managers would go ahead with the project. But the NPV does not deal with the management's ability to time the project. Suppose the management has the option to wait for 1 year, at which time they can decide to invest. If the demand for the product turns out weak, the management can decide not to invest as it does not make sense to invest Rs 97.1 lac and receive Rs 90 lac a year later. However, if the product turns out to be popular, the project would yield Rs 130 lac for an investment of Rs 97.1 lac. The NPV in this case is Rs 21.2 lac. Since there is a 50:50 chance of a good outcome (NPV 21.2 lac) and a bad outcome (don't invest; 0 NPV in year 1), the expected value is $(0.5 \times 2.12 + 0.5 \times 0)$ Rs 10.6 lac. The present value at year 0 is Rs 96.1 lac. The moral is: there is a value attached to the option to defer. By not considering the option managers will miss out on a chance to add value by waiting. In other words, options are exercised only if they have value and are left unexercised if worthless. A brief study of the decision tree shows that time and the range of outcomes are key to option value.

The Black–Scholes model is a narrow case of the binomial model. It applies when the limiting distribution on asset and assumes a continuous price process.

TYPES OF REAL OPTIONS

The first step in real options analysis is to identify them. Exhibit 12.2 presents a list of some common real options we would encounter.

Exhibit 12.2 Common real options

Real Option Category	Real Option Type	Description	Examples
Invest/grow	Scale up	Well positioned businesses can scale up later through cost-effective sequential investment as market grows	<ul style="list-style-type: none"> • High technology • R&D intensive • Multinational • Strategic acquisition
	Switch up	A flexibility option to switch products, process on plant given a shift in underlying price or demand of inputs or outputs	<ul style="list-style-type: none"> • Small-batch goods producers • Utilities • Fanning
	Scope up	Investments in proprietary assets in one industry enables company to enter another industry cost-effectively. Link and leverage.	<ul style="list-style-type: none"> • Companies with lock-in • De facto standard bearers
Defer/learn	Study/start	Delay investment until more information or skill is acquired	<ul style="list-style-type: none"> • Natural resource companies • Real estate development
Disinvest/shrink	Scale down	Shrink or shut down a project part way through if new information changes the expected payoffs	<ul style="list-style-type: none"> • Capital-intensive industries • Financial services • New product introduction • Airframe order cancellations
	Switch down	Switch to more cost-effective and flexible assets as new information is obtained	<ul style="list-style-type: none"> • Small-batch goods producers • Utilities
	Scope down	Limit the scope of (or abandon) operations in a related industry when there is no further potential in a business opportunity	<ul style="list-style-type: none"> • Conglomerates

Source: Copeland, Thomas E and Philip T. Keenan (1999). 'How Much is Flexibility Worth?', *The McKinsey Quarterly*, No. 2.

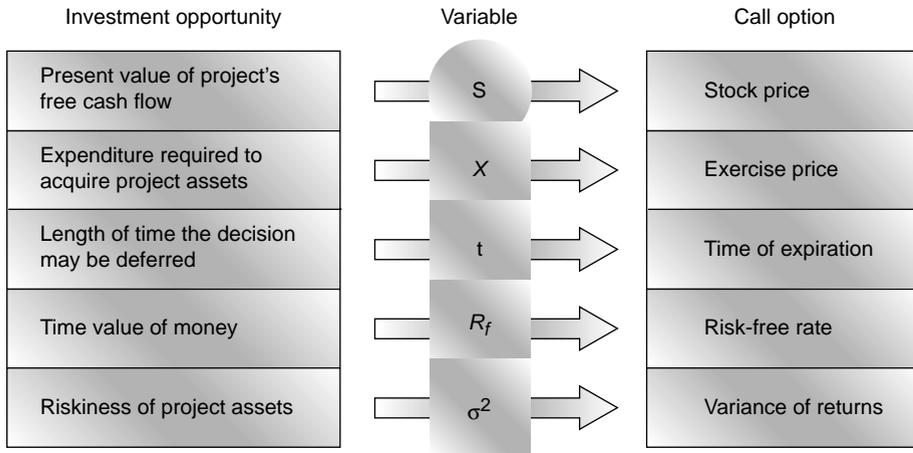
There are six categories of real options:

- Timing option,
- Growth option,
- Abandonment option,
- Option to expand scale,
- Option to switch inputs and outputs, and
- Option to contract scale.

Timing Option

Capital projects are like call options; in the sense that both involve the right but not the obligation to acquire an asset at a specified price on or before a certain date. The analogy between characteristics of a capital project and call option is given in Exhibit 12.3.

Exhibit 12.3 The analogy between capital projects and a call option



The amount spent on the project is the exercise price. The present value of cash flows from the project is the stock price. The length of time the company can defer the investment decision without losing the investment opportunity corresponds to time to maturity. The uncertainty in the project's cash flows corresponds to the standard deviation of returns. The cash flows lost due to competitors who have fully committed corresponds to dividends.

The impact of changes in option variables on the value of the option is as shown:

Variable	Value of real option
Increase in the PV of the project	Increase
A higher investment cost	Decrease
A longer time to maturity	Increase
Increase in uncertainty (Volatility of cash flows)	Increase
Increase in risk-free rate	Increase
Increases in cash flow lost	Decrease

Timing option enables managers to defer investment for a certain period of time without losing the opportunity. In other words, managers would always want to spend later rather than sooner. If an investment

can be deferred for 1 year, one could put the investment in a bank for 1 year and withdraw it when the time is ripe to invest. That is, the investment X would be invested at r_f for 1 year. So, the amount now is the present value of X discounted at r_f .

$$PV(X) = X/(1 + r_f)^t$$

Since our objective is to refine NPV to incorporate other option variables like r_f , t and σ let's redefine NPV as $S - PV(X)$. As with financial options, this can be expressed as a ratio:

$$= S/PV(X)$$

Cumulative variance = $\sigma^2 t$ (cumulative volatility is the square root of cumulative variance).

We can use these two values to estimate the value of the option as percentage of value of underlying assets.

An example is in order. A company is investing Rs 300 crore in a project. The project is expected to generate cash flows of Rs 75 crore per annum, for five years. A company has the option of investing in the project (i.e., develop the product) in the next five years. That is, the company can delay the project for a period of five years without seriously jeopardizing the value of the project. A simulation of project cash flows suggests that the standard deviation of cash flows is 40 percent. The risk-free rate is 6 percent and the cost of capital for the company is 12 percent.

$$\begin{aligned} X &= \text{Investment} = \text{Rs } 300 \text{ crore} \\ S &= \text{PV of cash flows @ 12 percent} \\ t &= 5 \text{ years} \\ \sigma &= 40 \text{ percent} = 0.4 \end{aligned}$$

$$\begin{aligned} PV(X) &= 300/(1.06)^5 = 300/1.338 = \text{Rs } 224.2 \\ S &= 75 \times \text{PVIFA (12 percent, 5 years)} = 75 \times 3.605 = \text{Rs } 270.375 \text{ crore} \end{aligned}$$

Traditional NPV = Rs 270.375 – Rs 300 crore = Rs –29.625 crore. This analysis does not take into consideration the possibility of deferring the investment and the volatility of the returns.

$$\begin{aligned} S/PV(X) &= 270.375/224.2 = 1.2 \\ \sigma \sqrt{t} &= 0.4 \times \sqrt{5} = 0.89 \end{aligned}$$

The value of the call option as percentage of value of underlying asset from the table is 40.8 percent. That is,

$$0.408 \times 270.375 = \text{Rs } 110 \text{ crore.}$$

Growth Option

A growth option is characterized by an early investment (in, say, R&D) which leads to a chain of inter-related projects opening up future new generation products and processes, access to new markets, oil reserves, etc. Any investment that creates new investment opportunities can be characterized as a growth option. Companies derive their value from two sources: assets in place and present value of growth opportunities. Stock markets realize it when pricing securities.

Just as a package of bond and warrants are valued separately, the option component embedded in projects should be evaluated separately and then added to the value obtained from the DCF methodology. Assume that a project is expected to lead to a second-generation investment. The NPV of the entire proposal may be written as:

$$\text{NPV} = \text{NPV (Phase 1)} + \text{Call Value of Phase 2.}$$

To evaluate growth options embedded in projects:

- Segregate discretionary expenditure and its associated cash flows of phase-2 project from phase-1 project.
- Find the NPV of phase using the traditional DCF approach.
- Discount the discretionary spending to the present using an appropriate *risk free rate*. If the discretionary spending that leads to phase-2 project is Rs 30 crore to be made in the third year, discount it to the present by using a three-year risk free rate. This constitutes X .
- Find the present value of cash flows (net of inflows and *routine* expenditure on working capital and fixed assets) using WACC. This is S .
- Find $S/PV(X)$.
- Estimate cumulative volatility ($\sigma\sqrt{t}$); t is 3 years in this case. Volatility can be estimated in several ways. One approach is to estimate the historical volatility of the company's stock and take it as proxy for the volatility of returns from the project undertaken by the company. Another approach is to use implied volatility of options on the company's stock traded in exchanges. The third approach is to simulate project cash flows and find the standard deviation of NPV using a standard package like *Crystal Ball*.³
- Find the value of the call option and add it to the NPV of phase-1.

An example is in order. Cox Communications, a cable company based in the US uses real options analysis to value additional capacity. Of the 750 MHz available in upgraded cable systems, approximately 648 MHz are being used for four streams: analog video, digital video, high-speed data and telephone. The remaining 102 MHz is a future tier of interactive services like video telephone, interactive e-commerce, interactive games and other applications that require high bandwidth that does not exist today. The value of the growth option is not reflected in the DCF methodology.

Abandonment Option

If market conditions deteriorate severely, management can abandon operations and realize resale value of project assets in second-hand markets. Abandonment options are important in capital-intensive industries, financial services and new product introduction in uncertain markets.

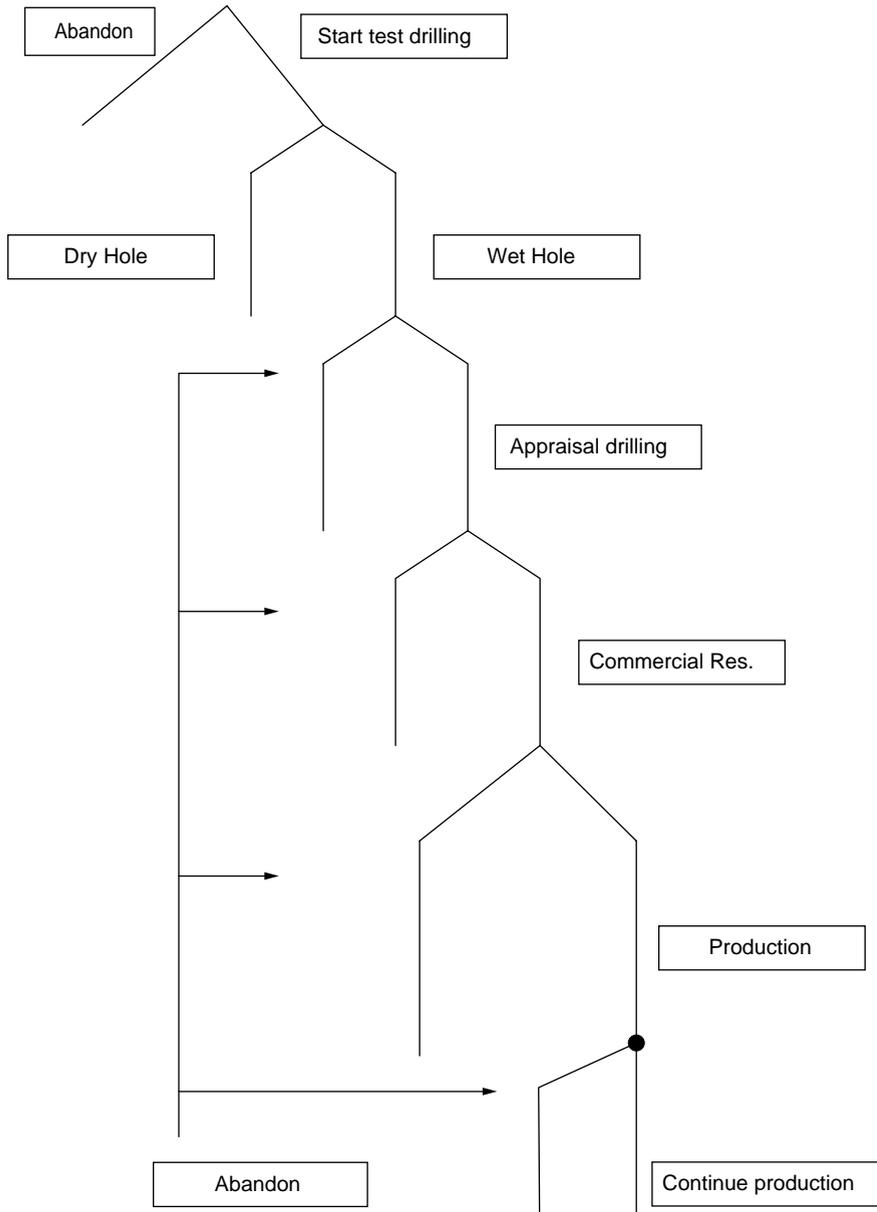
In a competitive industry with over capacity management has to continuously consider whether to stay or get out. The actual decision depends on the value of the project below which the management may choose to abandon and the value above which extension could take place. An abandonment option is a put option.

$$\text{Value of put} = -S e^{(b-r)T} N(-d_1) + X e^{-rT} N(-d_2)$$

³ *Crystal Ball* is a product of Decisioneering, Inc.; visit www.decisioneering.com.

The development of an oil field consists of sequential investments in test drilling, evaluation drilling, and production capacity. The investment in test drilling is a first step in a series of investments. The decision tree is shown in Exhibit 12.4.⁴

Exhibit 12.4 Decision tree for an oil exploration project



⁴ Smit, T J Han (1997). 'Investment Analysis of Offshore Concessions in The Netherlands', *Financial Management*, Vol. 26, No. 2.

IN CONCLUSION

Corporate investments are like options. The DCF methodology invariably breaks down while evaluating investments that can be timed or phased out. But real options analysis is a complement to the DCF approach, not a substitute. The examples cited in the chapter are simple call and put options. As shown in the case of oil exploration, for example, some investments are a series of options. These are compound options. That is, these are options on options. They cannot be treated as simple call or put options. Since compound options are complex we do not deal with them here. The objective of this chapter was to provide a flavor of real options theory. Serious readers must refer to advanced books on real options cited in the Bibliography.

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EXERCISE

1. A company is investing in a project. The project requires an outlay of Rs 100 crore, and the present value of cash flows is Rs 120 crore. This project is expected to lead to a second-generation project in 5 years that requires an investment of another Rs 200 crore. The second generation would generate cash flows with a present value of Rs 170 crore, if developed right now. The standard deviation of cash flows is 0.8. Assuming a risk free rate of 6 percent, estimate the value of option. Would you undertake the project?
2. A company has a project that requires an outlay of Rs 100 crore. The present value of cash flows from the project is Rs 110 crore. The company has the option to sell the stake in the project to the other sponsor of the project for Rs 60 crore, anytime in the next 8 years. The variance in project cash flows is 0.6. What is the value of the option to abandon? What is the true NPV of the project?
3. Can equity be treated as an option held by shareholders? Why? Likewise, can debt be treated as an option held by creditors? Why or how?
4. A company is in the process of acquiring another company.⁵ The forecast of free cash flows are prepared on the basis of the following assumptions:
 - Current sales are Rs 5 crore.
 - Expected growth rate in sales is 6 percent, for the next 10 years.
 - Cost of goods sold is 65 percent of the sales.
 - Selling, general and administrative expenses are 15 percent of the sales.
 - Depreciation is 4 percent of the sales.
 - Capital investment to support sales is 8 percent of the sales.
 - Tax rate is 35 percent.
 - WACC for the company is 9.5 percent.
 - The book value of the company's debt is Rs 1 crore.

The target has an excellent distribution system that has value to the acquirer. The acquirer plans to set up a new plant if the acquisition goes through. The new plant requires an initial investment of Rs 60 lac in year 0, and Rs 80 lac one year later.

⁵ Diane, Lander (Fall/Winter 2000). 'Do Foregone Earnings Matter When Modeling and Valuing Real Options?: A Black–Scholes Teaching Exercise', *Journal of Financial Practice and Education*.

If plant construction is delayed, construction costs are expected to increase 10 percent per annum. Sales are expected to increase to 11 percent per annum from 5 percent, one year after the investment is made. Due to increased efficiency cost of goods sold will decrease from 65 percent to 60 percent of the sales. S, G & A, depreciation and capital investment remain the same. Capital expenditure required to maintain only the plant will equal depreciation expense of the plant. The new plant has the same risk complexion as the firm itself.

The managers of the company have decided to wait for three years before building the plant. In other words, the managers have a three-year real option starting three years from now. The standard deviation of project returns and risk-free rate are 45 percent and 5 percent respectively.

- Estimate the value of the target company's equity without the new plant.
- Estimate the value of the real option assuming managers defer the construction of the plant for 3, 4, and 5 years.

Chapter 13

A Follow-up Note on Capital Budgeting

OBJECTIVES

- ◆ Potential pitfalls in capital budgeting.
- ◆ Introduction to the administrative process surrounding capital budgeting.
- ◆ Issues in selecting hurdle rates.
- ◆ The link between capital budgeting and corporate strategy.
- ◆ Capital budgeting practices in Japan and the US.
- ◆ Current thinking in capital budgeting.
- ◆ Designing a capital budgeting system.

The focus of capital budgeting should not be on the result of calculation but on the important assumptions on which the calculation is based. The use of unrealistic assumptions is a more significant source of bad investment decisions than the use of unscientific techniques. The project can still fail if the result is based on unrealistic assumptions, however refined the technique may be. Measurement techniques like ROI and NPV do not consider the subtle behavioral aspects of capital budgeting or the problems of single point estimates. Quite often the strategic aspects of individual investments are not considered or an ad hoc evaluation of alternatives is made. It is important to consider *all* alternatives before a decision is made. A firm can segregate its businesses into three categories: those in which it wants to expand; those in which it wants to maintain position; and those which no longer fit into the firm's portfolio and, hence, need to be liquidated. The firm can set different standards for different businesses. The upshot is that one project may be accepted despite low returns and another project may be rejected despite high returns. This is indeed the case in some companies as we will see later. The DCF approach breaks down when hurdle rates are arbitrarily chosen, especially while evaluating unconventional technology. Executives tend to focus on a set of numbers while trying to be 'practical' in evaluation. It is hard to believe that a truth as simple as '1 rupee today is worth more than 1 rupee tomorrow' (the essential logic of DCF methodology) cannot be applied in real-life situations.

Selecting Hurdle Rates

Often, the hurdle rate in investment analysis is the firm's cost of capital. The reason is quite simple: unless a firm can earn at least what it costs to raise the necessary capital there is no justification for that investment. The problem lies in measuring the cost of equity. The cost of equity is the return expected by investors,

which is their opportunity cost (the return they can earn on comparable investments). Theoretically it is correct to take the investors' expected return as the cost of equity. An equity investor has many alternatives and can diversify in a broad range of investments. But a company cannot diversify, at least in the short run, from say, paper to steel to aircraft. In fact, it might not be possible to diversify at all due to technical reasons. So Donaldson (1972) argues that the relevant opportunity cost for the company is not that of the shareholder but that of the company itself. The hurdle rate could be what the company can earn on the company's alternatives. It is often argued that if the company cannot find attractive investments it should return cash to stockholders. But this does not happen in reality. A company in a declining market will not return cash, but will strive to revitalize product lines and grow. It is useful to classify investments as tactical and strategic. Tactical investment decisions are concerned with the near future and strategic decisions are concerned with change for a major transformation. He suggests that a tier of hurdle rates be constructed and applied to investments depending on their nature. For tactical decisions, the appropriate standard could be the performance of the most efficient competitor. For strategic investments, the hurdle rate could be the return a competing division with the best track record is earning or the return the company can earn on new businesses.

Administrative Process

Success in investment decisions depends not only on techniques but also on people and the process of generating, evaluating and implementing investments. The starting point for an organization is a long-term plan. The long-term plan can be exploded into investment ideas. The planning period typically spans five years. The plan integrates sales and cost projections, operating and capital investment needs. Specific guidelines translate long-term goals into specific investment proposals. Guidelines provide a frame of reference for everyone in the organization. They reflect the organization's policy and strategic thrust, what the firm intends to do in terms of both internal and external expansion, what product markets it intends to serve, etc. Guidelines should ensure adherence from all executives. At the same time, it should not discourage unconventional thinking. Guidelines can be classified as long term and short term. Long-term guidelines deal with growth objectives whereas short-term guidelines deal with projections regarding sales, input prices, etc.

Preparing Budgets

Executives are typically asked to put their ideas on paper, with specific capital investment plans. The result is a capital budget. It serves as an initial screening device, and those that pass through the initial screen are taken up for greater scrutiny. If a time-limit is given for capital expenditure plans, ideas that arrive later in the budget cycle may be rejected. So a budget should be flexible enough. Project proposals typically go through several levels before they are accepted. Decentralization reduces the time spent on project approval.

Allocating Funds

Appropriate allocation of funds is essential as it decides the future of the company. So a sound basis for allocating funds should be evolved. The allocation could be based on mission, product portfolio, geographic area of operations and competence.¹ Mission is fundamental to any company. It reflects the fundamental

¹ Tiles, Seymour (1966). 'Strategies for Allocating Funds', *Harvard Business Review*, Jan–Feb.

purpose the company is trying to achieve. A firm can be viewed as a portfolio of products. This gives us another basis for allocation. Those products that hold promise would receive more funds than those that need to be milked. Geographic scope of operations can also be used as a basis as it defines the competitive arena within which a company intends to compete. An international company has a different set of competitive rules and problems when compared to a domestic company. Finally, competence could be a basis for allocation since success comes from abilities rather than product characteristics. The current management fad is to view a firm as a portfolio of skills and the general prediction is that those firms that align their businesses along those skills will win. Prahalad and Hamel (1990) define core competencies as the collective learning in the organization, especially how to co-ordinate diverse production skills and integrate multiple streams of technologies. Core competence is not to be confused with core business. Core competence is communication, involvement and a deep commitment to working across organizational boundaries. Core competence is about harmonizing streams of technology. Sony's competence is in miniaturization; Philip's expertise is in optical media. Companies need to stop viewing themselves as portfolios of businesses. Successful companies, even while holding seemingly unrelated businesses, are integrated by a set of common skills.

Post Completion Audit

Post completion audit is the most important phase in capital budgeting. It permits the comparison of projected and actual performance and the analysis of variance. Most importantly it helps in judging whether the assumptions, policies and analyses have been sound. The advantages of post completion audits are:

- Management can learn from past mistakes.
- Management can identify weaknesses in the existing projects and revise estimates.
- The audit process can be used to distinguish between good performance and bad performance. Executive compensation can also be designed to encourage good performance.
- Post completion audits discourage executives from being over-optimistic.
- They can lead to group learning due to identification of mistakes.

It should be noted that post completion audits should not be used for petty politicking. A firm can set quarterly or half-yearly reviews.

Communicating Investment Decisions

As organizations grow, it becomes increasingly difficult for the top management to have the technical knowledge of all the decision situations that arise at the branch or divisional level. The ideal situation is one in which both the technical expert and the decision-maker are the same. This is rarely the case. Information flows upwards through many layers before it reaches the decision-maker. The senior management will have to rely on information provided by lower level executives who have first-hand knowledge of business drivers. Often, the top management may end up with information that executives never intended to convey. Distortions can occur due to:

- Difficulty in conveying uncertainty that surrounds an estimate.
- Difference of opinion as to what constitutes uncertainty!
- Differences in risk-taking ability among executives (what's safe for one might be risky for another).
- Ad hoc estimation of risk.

Executives report best estimates or expected values; say, for instance, sales of Rs 30 crore. The question is: What does the executive have in mind when s/he refers to 'a best estimate of Rs 32 crore'? What probability does s/he have in mind: 90 percent or 75 percent? The argument can be extended to pessimistic or optimistic estimates also. Moreover, the executives might have reported what they considered a pessimistic estimate but the top management may misconstrue it as an expected value. The screen for accepting or rejecting investment proposals may be coarse or fine depending on the risk aversion of the top management. The normal practice is to accept those proposals that meet a predetermined financial standard such as 17 percent ROI or 18 percent IRR, and so on. This policy is not effective since the range of tolerance is not specified. A better policy would be to specify how top management would prefer to trade off risk and return. An illustration will clarify the point. Given here are two policies communicated by the top management to the executives:

<i>Policy-1</i>	<i>Policy-2</i>
<ol style="list-style-type: none"> 1. All projects should be evaluated on the basis of IRR 2. Accept all projects with IRR > 17 percent 	<ol style="list-style-type: none"> 1. All projects should be evaluated on the basis of IRR 2. Accept those projects that have an expected value of 17 percent or more <ol style="list-style-type: none"> a. A probability of 10 percent that IRR will be greater than 16 percent b. A probability of 90 percent that IRR will be greater than 14 percent

Clearly, policy-2 is better as it articulates the risk-taking ability of the top management. Policy-1 gives a point estimate, which is meaningless in an uncertain world.

Capital Budgeting and Corporate Strategy

The emphasis in most capital budgeting analysis is on estimating and discounting future project cash flows. Projects with positive NPVs are accepted; those that fail this test are rejected. It should be understood that generating projects likely to yield positive excess returns is as important as the investment analysis. It is unlikely that a firm will encounter positive NPV projects by luck all the time; they have to be *created*. Creating and taking advantage of product market imperfections is at the heart of corporate strategy. Top down capital budgeting is not corporate strategy. Competitive Strategy concerns how to create competitive advantage in each of the businesses a company operates. A good understanding of corporate strategy will help unearth potentially profitable projects. Shapiro (1985) provides a framework for analyzing the source of positive NPV projects. Successful investments involve creating, preserving and enhancing competitive advantage that serve as barriers to entry. There are five major sources of barriers to entry: economies of scale, product differentiation, cost disadvantages, access to distribution channels and government policy. Economies of scale exist whenever a given increase in the scale of production results in less than proportional increase in cost. The existence of scale economies means that there are advantages in being big. The more significant the scale economies, the greater the cost disadvantage faced by new entrants to the market. Companies like HLL take advantage of highly developed marketing skills to differentiate their products, and to keep out potential competitors by increasing entry costs. Investments aimed at achieving low cost position in the industry coupled with a pricing policy to expand market share are likely to succeed. Akai, the consumer electronics company, follows this strategy.

Sound financial analysis ties the details of strategy to financial implications. It is hard to convince executives from non-financial backgrounds that it is possible to capture the value of any strategy in rupee terms and that it is nothing qualitative. Capital budgeting in many companies is simply an exercise in finding an input value that gives the required output.² Strategic investments usually open up *options* that extend beyond the original projects. Options stemming from investment in R&D, brand names have value beyond the initial investment period as they open up opportunities to create subsequent products that complement existing ones. The usual DCF methodology breaks down when applied to multi-stage options on real assets. In fact, the option pricing formula doesn't resemble DCF formula in any way. This explains why strategic investments, most of the time, fail to pass the DCF test leading to conflict between marketing and finance.

*Capital Budgeting in Japanese firms*³

It is interesting to note that most Japanese manufacturers including large sophisticated firms make little or no use of NPV or IRR in evaluating investments. Apparently, they are more willing to undertake risky, long term investments. Instead of the standard DCF procedures, a vast majority of Japanese firms use a one-year ROI calculation. The project's accounting income for a typical year is calculated and then divided by the initial investment. Many firms calculate payback period. These calculations are relatively crude. The reason for the simplified approach might be the emphasis on consensus decision-making in Japan. The process involves discussions among executives from different areas and levels within the firm. The process helps in identifying questionable assumptions, different project structures and strategies. Since the managers who actually run the project are involved in the investment analysis, they tend to be aware of the critical factors for success. Many Japanese firms use a relatively low discount rate. The prime rate or the before-tax cost of borrowing is commonly used as discount rate. There is no use of risk-adjusted discount rates.

*Capital Budgeting in US firms*⁴

Managers in the US use multiple evaluation techniques. For instance, ROI may be supplemented with DCF procedure. Analyses are done using nominal discount rates. Using risk adjusted discount rates for projects with different risk characteristics is also quite popular. It is common practice for hurdle rates to be specified on a divisional or company wide basis using a current cost of capital. Unlike Japanese managers, US firms do not subscribe to the consensus decision-making practice. The detailed project analysis is typically done by a small group of executives who then forward results and recommendation to top management. In many firms there is relatively less outside inputs for project evaluation. Many firms apply a discount rate of 30 percent for long-term projects.

² Barwise, Patrick, Paul R Marsh, and Robin Wensley (1989). 'Must Finance and Strategy Clash?', *Harvard Business Review*, Sep–Oct.

³ Hodder, James E (1986). 'Evaluation of Manufacturing Investments: A Comparison of US and Japanese Practices', *Financial Management*.

⁴ Survey results of practices in America could be found in: Oblak, D J and R J Helm (1980). 'Survey and Analysis of Capital Budgeting Methods used by Multinationals', *Financial Management*, Winter; Schall, L D, G L Sundem, and W R Geijsbeek Jr (1978). 'Survey and Analysis of Capital Budgeting Methods', *Journal of Finance*, March.

Capital Budgeting in Select Large Companies⁵

E I du Pont is a manufacturer of freon and a variety of industrial chemicals. At DuPont, corporate planning department, an arm of the executive committee staff, provides broad guidelines for capital spending. The company publishes a hurdle rate internally which is used as a first screen to sift out bad ideas. The planning process works not decision by decision but business by business. Business plans will be drawn up to look ahead one, two, and five and ten years into the future for each major business segment and this plan may or may not involve major capital investment. If it does, the capital investment will be studied and preliminary numbers drawn up. The net result is that the business plan has to make sense and the individual appropriations within the business plan also have to make sense. There is greater emphasis on examining business plans in general rather than individual projects. So, attractive businesses may not get funded.

EG&G has a strategic planning system that keeps track of entities called business elements—well-defined businesses that have a strategy. The company has about 160 elements and 40 divisions. These elements cover a variety of businesses. The company is managed through a planning and control process that consists essentially of developing a strategic plan in spring. Each of the divisions prepares a strategic plan within which they define business elements, their competitors, the competitive advantages and disadvantages, any emerging new technology that might impact the business, etc. The company has review teams of two senior operating managers, a planning executive and a financial executive, who review all of these operations in this process. In addition to the spring planning process, in the fall, the company develops a plan that looks ahead into the calendar year. The idea is to communicate the primary interests in the one-year plan. Most capital investments appear in the strategic plan. Major projects are specifically listed in the one-year plan. Decisions to actually proceed with a capital investment are documented and approved with a capital expenditure request. Approval authority is delegated very low in the organisation for projects of \$ 0.5 million or less. There is a corporate office review for projects greater than \$ 0.5 m.

Ameritech uses Modified Internal Rate of Return and profitability index as decision criteria. Executives are asked to come up with three estimates: the best case, the worst case and the most likely. The company communicates to the people in the field to risk—adjust cash flows and not play with discount rate.

Hershey Foods Corporation uses a category system for classifying projects. The three major categories are conventional capital, new products, and R&D. Projects are taken upon a priority basis. Each project is individually reviewed. Major decision criteria used by the company are NPV and IRR.

The important point that emerges from the foregoing discussion is that a project has to pass through several ‘tollgates’ before being accepted as the concept of a dynamic project evaluation system (Exhibit 13.1).⁶

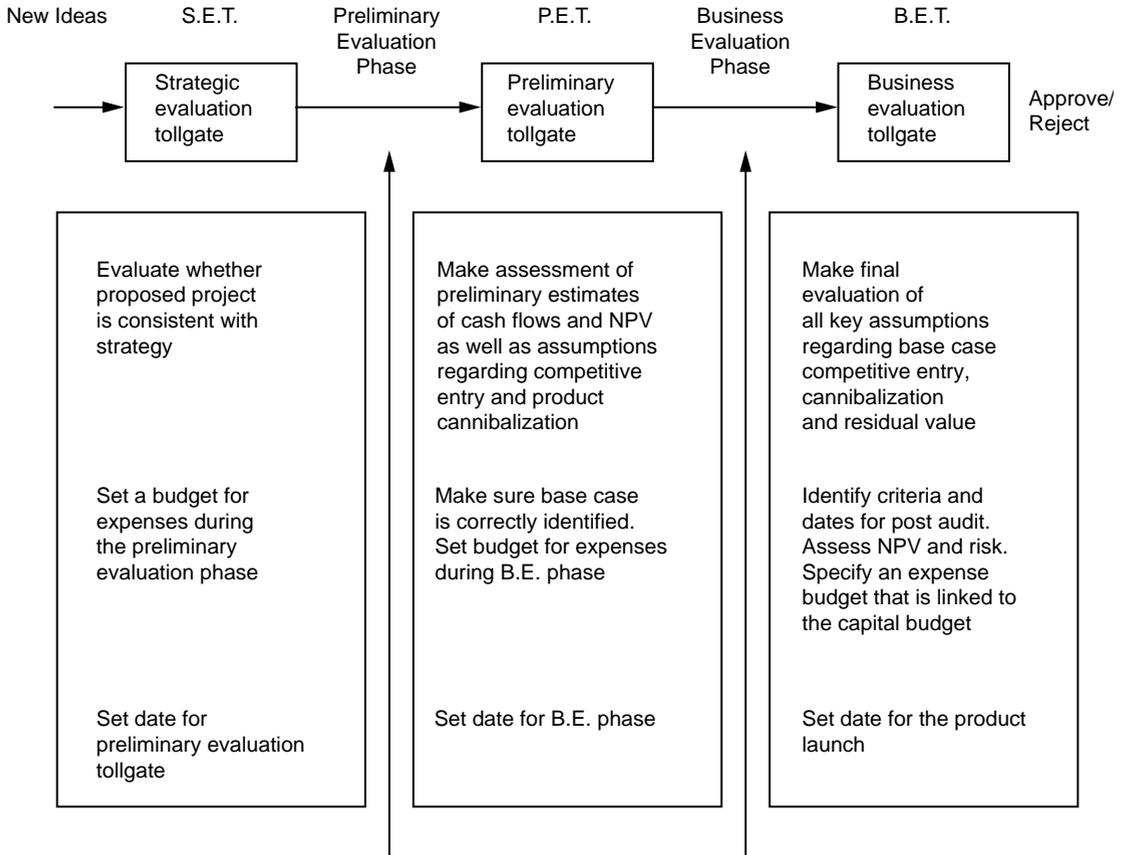
SmithKline Beecham (SB) is a global pharmaceutical company with operations around the world. It competes in a high-risk technically complex business. At any given time, the company’s dozens of projects spread across both therapy areas and continents. SB wanted to overhaul its investment process in 1993.⁷ Before the implementation of the new system executives rarely evaluated alternatives to a plan. Under the new system, each project is to be evaluated under at least four alternatives: the current plan (the team would follow the existing plan of activity), a ‘buy up’ option (the team would be given more to spend on the project), a ‘buy down’ alternative (the team would be given less to spend on the project) and a minimal plan

⁵ FMA Round Table Discussion (1989). *Financial Management*, Spring.

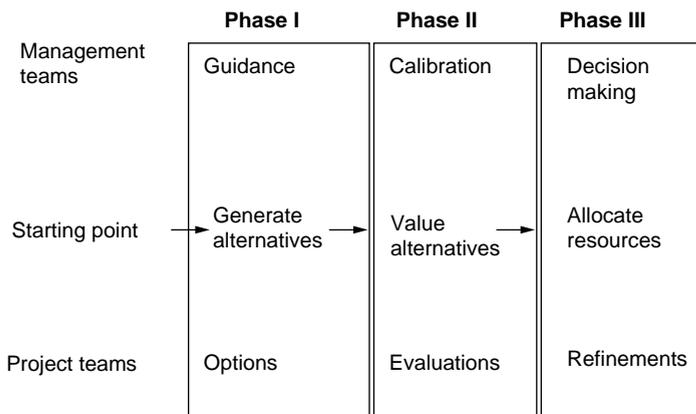
⁶ Boquist, John A, Todd T Milbourn, and Anjan Thakor (1996). ‘How do You Win the Capital Allocation Game?’, IFA Working Paper, 234.

⁷ Sharpe, Paul and Tom Keelin (1998). ‘Smithkline Beecham Makes Better Resource–Allocation Decisions’, *Harvard Business Review*, Mar–Apr.

Exhibit 13.1 Dynamic project evaluations



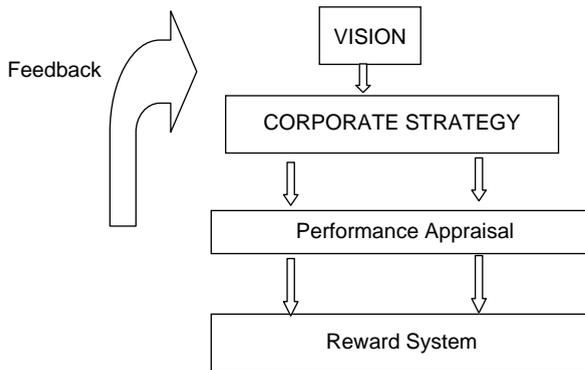
(the team would abandon the project while preserving as much of the value earned to date as possible). Each of these alternatives is evaluated and the best course of action is chosen. The three-phase process followed by SB is as shown:



Following a System

It pays to follow a well-defined system of capital budgeting. The following guidelines may be borne in mind, while establishing a capital budgeting system:

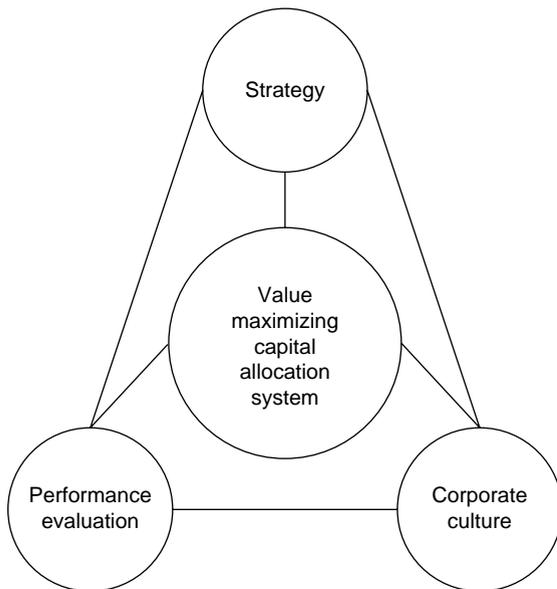
- Start with the end in mind. The process of capital allocation should be driven by the strategic thrust of the company. Establish long and short range plans, and translate them into short-term objectives and specific capital expenditure proposals. Evaluate investments in the context of company objectives and plans for the future.
- Personnel at all levels can often turn their experience into ideas for new and better ways of doing jobs. Management should not have monopoly on ideas. Be open for discussion—both formal and informal. The organization climate should be conducive for such an experiment. Involve operating personnel in preparing short-term guidelines. Prepare them for meaningful evaluation of capital projects. Inadequately trained executives often mix up expenses, capital expenditure and sunk costs. This leads to a bias in the estimation of initial investment and NPV.
- Avoid over centralization. Develop general definition of types of projects for which authority approval can safely be delegated to junior officials. For instance, a manager at the shop floor level could be authorized to spend up to Rs 50,000. The amount and degree of delegation depend on size of the company and importance of the project.
- Evolve your own methods of analysis and decision criteria. Estimating divisional hurdle rates is as much an art as a science. Evolve criteria for allocation of funds to projects with different risk levels
- Avoid spending money on a first-come-first-serve basis. Be receptive to investment proposals throughout the year. A great investment idea that surfaces later in the budget period may not get funded if the budget is exhausted.
- Check whether a decision from one division affects other divisions, quantify the effect and factor into analysis. Incorporate product cannibalization, competitive advantages and disadvantages in the analysis.
- Use the post-implementation appraisal as feedback for fine-tuning both analysis and administrative processes. Continuous improvement in the capital budgeting system can be expected in companies where post-implementation appraisal is seriously implemented.
- Do not hold executives responsible for narrow deviations from forecasts. Establish a band of acceptable tolerances. Otherwise, there will be scope for downward biasing. Initially, the forecast will be set below the expected value, resulting in ‘happy surprises’ later on.
- There should be as few guidelines as possible to ensure that they are well-known and fully understood by everyone in the organization.
- Create an organization climate conducive for trying innovative product ideas and processes. The best way to drive home the message—that the top management is serious about the strategy adopted by the company or about the ideas from employees—is to *spend* money on such projects.
- Finally, the objective of creating wealth for shareholders should be the guiding post for acceptance of project proposals. Executives prepare summary measures, like payback period and IRR for project evaluation. These measures, along with ROI, may be used for performance appraisal. But, from the shareholders’ perspective, NPV is the most consistent measure. So there is a conflict of interest between managers and shareholders. Tying executive compensation to measures of shareholder value can reduce the conflict. Measures like EVA, total shareholder return, etc. will be taken up at a later stage. The management process starts with the Chief Executive Officer’s vision for the company, gets translated into a set of strategies, and ends with appraisal of those strategies at the end of the planning period.



Bringing Them All Together...

Strategy, performance evaluation and corporate culture are three components of a value maximizing capital allocation system (Exhibit 13.2).

Exhibit 13.2 Value maximizing capital allocation system



The balanced scorecard popularized by Kaplan and Norton⁸ could serve as the focal point for the organization's efforts, communicating priorities to managers, employees, investors and customers. It is important to understand that performance measurement is an important aspect of strategy. What gets measured gets done. The balanced scorecard tries to measure the capital allocation efficiency of executives from various perspectives. From a purely financial perspective, ROI, cash flow, project profitability and sales

⁸ Kaplan, Robert and David Norton (1993). 'Putting the Balanced Scorecard to Work', *Harvard Business Review*, Sep–Oct.

booking might be the relevant measures whereas from a customer's perspective, customer satisfaction index, customer ranking survey, and market share might be the relevant measures. A company can start by assessing its current position on these perspectives and arrive at the priority areas where attention is required. Companies can often create lot of value for shareholders by fine-tuning project choice.

IN CONCLUSION

Capital budgeting rules like NPV are based on several questionable assumptions. For instance, NPV is calculated by discounting cash flows at WACC. The standard procedure for estimating cost of equity is the capital asset pricing model. As pointed out in the chapter on risk and return, the CAPM has been challenged by many recent studies. Likewise, hurdle rates are calculated on the basis of the market price of stock. The implicit assumption is that the market is efficient. This is usually not true. So capital budgeting when prices are inefficient and managers are fully rational is more complex than in the rational world.⁹ Modern capital budgeting suggests that only systematic risk matters. This approach ignores the impact of the new project on the firm's total risk and therefore leads to an inappropriate assessment of the value of the project. Total risk is often costly and it is necessary to take total risk into account in capital budgeting to make capital budgeting and capital structure decisions consistent.¹⁰

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⁹ Stein, Jeremy (1996).

¹⁰ Stulz, Rene (1999). 'What's Wrong with Modern Capital Budgeting?', *Financial Practice and Education*, Fall–Winter. This will be explained in greater detail at a later stage.

Section Three

MANAGING CURRENT ASSETS

Chapter 14

Estimation of Working Capital

OBJECTIVES

- ◆ Know the components of working capital.
- ◆ Be able to measure working capital requirement and the length of operating cycle.
- ◆ Know the link between operating cycle and sustainable growth.
- ◆ The impact of working capital investment and shareholder value.
- ◆ Know the determinants of working capital.
- ◆ Know the different approaches to working capital lending adopted by banks.

A firm requires funds to acquire two types of assets: fixed assets and current assets. Fixed assets include land, building, plant and machinery, vehicles, equipment, etc. These assets are relatively permanent in nature and are necessary for carrying on the business. Current assets, on the other hand, are kept for supporting day-to-day operations and keep changing during the course of the business. They are liquidated within a short period of time during the operating cycle of the industry and not normally exceeding one year. Current assets include cash, debtors, inventory of raw material and finished goods, etc. Current assets constitute gross working capital.

The excess of current assets over current liabilities is called net working capital or, simply, working capital. Current liabilities, as you know, are to be paid in the ordinary course of business, (normally within one year) out of the income generated by the company or from the proceeds from sale of current assets. Fixed assets are to be financed by owners' equity and long-term liabilities while current assets are partly financed by long-term sources and partly by current liabilities and short-term loans given by banks. The concept of working capital is shown as a diagram:

Liabilities	Assets
Share capital	
Reserves and surplus	Net fixed assets
Long-term liabilities	
<hr/>	
→ Working Capital	
Current liabilities	Current assets

Net working capital is also called liquid surplus. To sum up, working capital is the funds required to carry the required levels of current assets to enable the company to carry on its operations at the expected level without any disruption. Working capital is a function of the level of activity (i.e., sales), and the type of business. Working capital for a trading company will be generally more than that for a manufacturing company.

$$\text{Net working capital} = \text{Current assets} - \text{Current liabilities.}$$

The deficit (CA – CL) is to be financed by bank borrowings and long-term funds.

$$\begin{aligned} \text{Current assets} &= \text{Current liabilities} + \text{Margin from long term sources} \\ &+ \text{Working capital limit from banks.} \end{aligned}$$

In the given equation, current assets are more than current liabilities. Is this always true? When current liabilities are more than current assets—i.e., working capital is negative—one can infer that short-term funds have been diverted to long-term uses, or the value of current assets have shrunk (may be due to obsolescence of stocks, book debts turning bad, etc.). Obviously this is not a satisfactory situation and the company is said to be facing liquidity crunch. We have discussed financial ratios earlier. The current ratio and the quick ratio are measures of liquidity. How high should the liquidity be? Is a large liquid surplus a desirable situation? We will answer these questions as we go along. Before that, let us take a quick look at the components of the working capital.

Components of Working Capital

The components of working capital are:

- Cash
- Inventory
- Accounts receivable
- Marketable securities
- Loan from bank

Cash

It is the most liquid component of the working capital. Holding cash enhances liquidity. But this is not cost free. Cash can be invested in business to earn a return. There is an opportunity cost involved—the cost of not investing in available alternatives of the company. But why do companies hold cash? Cash balances are necessary to meet day to day expenses like raw materials, wages, salaries, etc., to meet (random fluctuation) contingencies or take advantage of business opportunities that may arise. Accordingly, these motives are classified as: Transaction Motive, Precautionary Motive, and Speculative Motive.

Marketable securities are temporary investments that the company intends to liquidate when cash is required. They are a substitute for holding idle cash balance, say, after a sale of long-term security, as there is a lag between raising and deployment of funds. Marketable securities can also be held to ‘ride’ the seasonality of operations—that is, hold during lean periods, sell off during high demand phase to free up cash for normal business.

Inventory

It normally constitutes a major portion of current assets. Inventory is simple insurance against fluctuations in demand for the firm's product. Inventory is of three types: raw material, work-in-progress, and finished goods. Inventory, like any other asset, needs to be managed well. Too much of inventory results in lower profitability as money is locked up in redundant assets which earn no return, and too little inventory results in loss of sales or customer goodwill. So there is a trade-off between profitability and liquidity.

Accounts Receivable

Most businesses sell goods on credit. When goods are sold, inventories are reduced and accounts receivable are created. A firm may not have an option regarding its credit granting decision, depending on the product market condition. In industries that are fiercely competitive—like cement, abrasives, cutting tools, etc.—a company may have to simply match industry standards to protect sales. Thus, accounts receivable is an essential investment. Like other components of current assets, there is an optimal level of investment in accounts receivable beyond which profits deteriorate. In other words, the marginal profits from increased sales should be greater than the marginal cost of credit.

The credit policy of a firm has four components:

- Credit period
- Credit standards
- Discount policy
- Collection policy

Each of these will be discussed in the subsequent chapters.

Accounts Payable

As the name suggests, it is the credit accepted from suppliers of raw material, components, etc. It is one of the sources of short-term financing. There is no explicit cost involved with trade credits although the supplier may lead the cost of money tied up in the price that he charges. It can be easily arranged unlike a loan but one should be careful not to stretch trade credits too far because it may result in loss of suppliers.

Measuring Working Capital

Net working capital is defined as the difference between current assets and current liabilities. Consider the following figures:

<i>(Rs crore)</i>					
<i>Current assets</i>	<i>1999</i>	<i>2000</i>	<i>Current liabilities</i>	<i>1999</i>	<i>2000</i>
Cash	10	29	A/C payable	70	125
Receivables	140	196	Current portion of L.T debt	10	53
Inventory	170	306	Accrued expenses	125	155
			Taxes Payable	15	20
	320	531		220	353

$$\text{Working capital in 1999} = 320 - 220 = 100$$

$$\text{Working capital in 2000} = 531 - 353 = 178$$

$$\text{Change in working capital between 1999 and 2000} = 178 - 100 = 78$$

The net working capital thus calculated may be compared with other companies in the industry group and find out if the company is generating enough sales for the investment in working capital and take necessary action to correct the situation. Remember that cash flow from operations is affected by investment in working capital. The higher the investment in working capital, the lower is the cash flow.

$$\text{Cash flow from operations} = \text{PAT} + \text{Depreciation} + \text{amortization} -/+ (\text{increases})/(\text{decreases in NWC})$$

Another subtle impact is that the company will have lower level of cash available for debt service since $\text{CADS} = \text{cash flow from operations} + \text{existing interest expense}$.

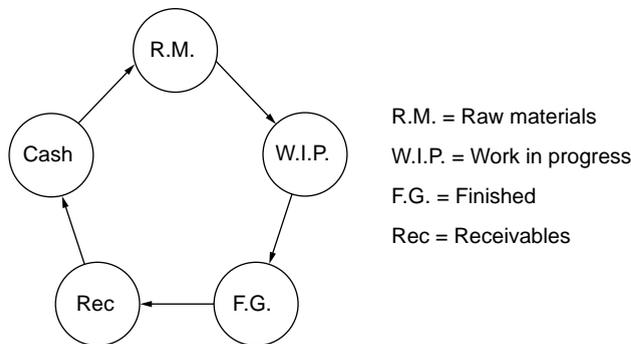
Operating Cycle

A manufacturing activity is characterized by a cycle of operations consisting of:

- Procurement of raw material, components, stores and spares for the manufacture of the product,
- Conversion of raw material into finished goods,
- Storage of finished goods before they are sold,
- Sales on credit to customers, and
- Collection of cash from customers.

The time elapsed between cash outlay and cash realization by the sale of finished goods is the length of an operating cycle (Exhibit 14.1).

Exhibit 14.1 Operating cycle



Operating cycle is also called cash-to-cash cycle. At any given point in time, a firm will have several operating cycles at various stages of completion.

$$\text{Total working capital} = \frac{\text{Total expected operating expenses for the year}}{\text{No. of operating cycles in a year}}$$

Operating cycles will be relatively long in construction and machine tool business and relatively short in trading companies.

To illustrate, if

Raw material holding period	=	40 days
Conversion time	=	10 days
Finished goods storage period	=	15 days
Average collection period	=	30 days

Operating cycles = 40 + 10 + 15 + 30 = 95 days. This means that there are (365/95) 3.84 operating cycles in a year.

If operating expense is Rs1 crore,

$$\text{Working capital requirement} = \frac{1 \text{ crore}}{(365/95)} = \text{Rs } 26 \text{ lac}$$

As is evident from the above illustration, working capital is a function of operating expenses and length of operating cycles. Reducing either of them (or both) will lead to reduction in working capital requirement and hence increases efficiency. To illustrate, if the operating cycle is reduced to 75 days, the working capital turn-over ratio would be (365/75) 4.80.

$$\text{So, working capital requirement} = \frac{1 \text{ crore}}{4.80} = \text{Rs } 21 \text{ lac}$$

Managing the components of the operating cycle, viz., raw material holding period, conversion time, finished goods storage period, and average collection period more efficiently can reduce operating cycle.

If the accounts payable period is included we get net operating cycle.

$$\text{Net operating cycle} = \text{Operating cycle time} - \text{Average payables period}$$

The calculation involved in the estimation of the components of working capital is shown in Appendix 2.

An Illustration

Whirlpool of India Ltd is a manufacturer of refrigerators, deep freezers, and compressors. Shown here is the estimation of net working capital cycle for Whirlpool.

	(in days)		
	1998	1999	2000
Raw material holding period	34	38	41
Production	4	4	4
Finished goods	36	52	39
Debtors	65	70	51
Gross working capital cycle	140	164	135
Less: Credit available from creditors	69	80	67
Net working capital cycle	70	83	68

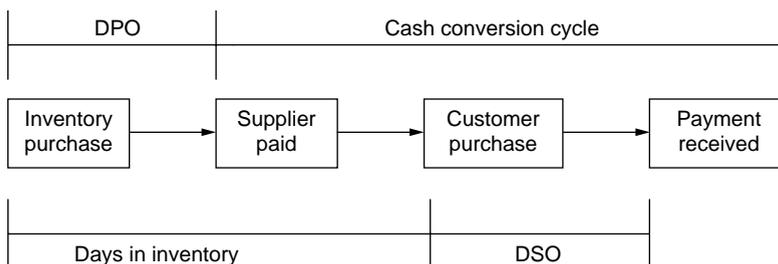
The operating cycle of some prominent companies is as shown:

	(in days)	
Company	Gross operation cycle	Net operation cycle
Hindustan Lever	89	4
Wipro Ltd	119	79
Reliance Industries	60	0
TISCO	182	91
TELCO	107	23

The cash conversion cycle is a good measure of how well management is employing its tangible capital base. Rising cash conversion cycle often indicates deterioration in cash flows, while declining cash conversion cycle generally signals improving cash flows.

The cash conversion cycle not only highlights the drivers of working capital, but also sheds light on the dynamics of the supply chain. It quantifies the time between the cash payment to suppliers and cash receipt from customers. The three components of cash conversion cycle are:

- Days sales outstanding
- Days in inventory
- Days payable outstanding



Dell Computer sells and services personal computers. The company markets directly to its customers and builds computers *after* receiving a customer order. This model enables Dell to have much smaller investment in working capital than its competitors. Given here is the days' supply of inventory for Dell and its competitors:

	1993	1994	1995
Dell Computer	55	33	32
Apple Computer	52	85	54
Compaq Computer	72	60	73
IBM	64	57	48

The efficient usage of working capital helps in providing internal funding for growth and also avoids the costs of obsolete inventory that companies face when the technology changes. Amazon.com, like Dell, receives cash payments upfront for its products but pays its suppliers about two months later. Further, Amazon has modest inventory requirements because it carries only popular titles and its distributors like Ingram and Baker & Taylor are responsible for carrying inventories of less popular items. Traditional booksellers like Barnes & Noble must carry substantial inventories spread across warehouses and in each store. This is a source of competitive advantage for Amazon.¹

To illustrate the impact of reduced inventory on a company's competitive position, assume that a company's cost of sales is Rs 100 crore, its days' supply of inventory is 30 days and that for the nearest competitor is 60 days. The additional inventory the company would have to hold if it were to have as long a DSI as its competitor:

$$\begin{aligned}
 &= (\text{Cost of sales}) \times (\text{Competitor's DSI} - \text{DSI}_{\text{self}}) / 360 \text{ days} \\
 &= \text{Rs } 100 (60 - 30) / 360 \text{ crore} \\
 &= \text{Rs } 8.33 \text{ crore}
 \end{aligned}$$

Improvements in the components of the cash conversion cycle can be translated into cash equivalents by multiplying the improvements in the components (in days) by daily savings.

Cash conversion cycles of some international companies (for 1999, in days)

Company	DSO	DII	DPO	CCC
Exxon	28.37	15.52	44.54	(0.65)
Microsoft Corp	35.05	0.0	117.58	(82.52)
Bethlehem Steel	26.48	90.13	35.38	81.22
Nucor	30.89	39.09	21.69	48.29
Compaq	62.64	26.75	49.93	39.45
Dell	35.52	6.32	56.52	(14.69)

Source: C S First Boston.

THE LINK BETWEEN OPERATING CYCLE AND SUSTAINABLE GROWTH

Define self-financeable growth rate as the rate at which a company can sustain its growth through the revenues it generates without seeking outside capital.² As pointed out earlier, operating cash cycle is the length of time a company's cash is tied up in working capital before that money is collected from customers. Other things remaining constant, the shorter the cycle, the faster a company can redeploy its cash and grow from internal

¹ Of course, if Barnes & Noble also launch an online outfit, the advantage would not be unique to Amazon.com

² Churchill, Neil and John Mullins (2001). 'How Fast Can Your Company Afford to Grow?', *Harvard Business Review*, May.

sources. The extra money generated from each rupee of sales over and above that invested in working capital and operating expenses can be re-invested in additional working capital and operating expenses to generate more revenue in the next cycle. There are three ways to increase growth rate:

- Speeding cash flow by accelerating receivables collection and improving inventory turnover.
- Reducing cost of sales.
- Raising prices without hurting demand.

Theoretically, it is possible for the components of an operating cycle to assume any value, including zero. This does not happen in practice. For instance, not maintaining any inventory or forgoing credit sales may not be advisable. So there is a trade-off between liquidity risk and opportunity loss. Liquidity risk refers to the non-availability of cash when a liability falls due. This may hurt reputation and in the extreme case, further credit may be stopped. Opportunity loss is the risk of losing potential sale due to non-availability of inventory or cash to support credit sales. The firm will be losing out on potential business.

Assume that the current sales are Rs 100 crore, and the company expects the sales to increase to Rs 150 crore. Current asset efficiency (assets/sales) is 0.50. Therefore, additional assets required to generate an additional Rs 50 crore of sales equal $0.5 \times 50 = \text{Rs } 25$ crore. This can be partly funded by profits. Assume that the current return on sales is 5 percent, the next year profit will be $0.05 \times 150 = \text{Rs } 7.5$ crore. The funding shortfall is, therefore, $\text{Rs } (25 - 7.5) = \text{Rs } 17.5$ crore.

The funding shortfall can be met by improving asset efficiency (because of which the actual assets required would be less), improving profit margins (because of which actual profits would be higher than expected) and incurring liabilities (including new equity).

The Impact of Working Capital Investment on Shareholder Value

The value of a company or a project is the present value of free cash flows discounted at WACC.

$$\begin{aligned} \text{Free cash flow} &= \text{NOPAT} + \text{Depreciation} - \text{Capital expenditure} - \text{NWC} \\ &= [(\text{Sales in a year}) (1 + \text{sales growth rate}) (\text{operating margin}) (1 - \text{tax rate})] - \text{Capex} - \text{NWC} \end{aligned}$$

Since free cash flow is a function of net working capital, reducing investment in working capital for a given level of sales (growth) increases cash flows and, hence, the stock price. An example will clarify the point. A company currently has sales of Rs 1.7 crore. Sales are expected to grow at 15 percent for the next 5 years; profit margin is expected to be 12 percent; tax rate is 35 percent; incremental capital expenditure and working capital are expected to be 25 percent and 15 percent of the increase in sales respectively. Free cash flows are expected to grow at 7 percent after the fifth year in perpetuity. WACC is 12 percent.

(in Rs million)

	Sales					
	2000	2001	2002	2003	2004	2005
Sales	17	19.55	22.50	25.90	29.80	34.30
Operating profit	2.35	2.70	3.10	3.58	4.12	
Taxes	0.82	0.95	1.08	1.25	1.44	
Capex	0.64	0.74	0.85	0.975	1.125	
NWC	0.384	0.444	0.51	0.585	0.675	
Free cash flow	0.506	0.566	0.66	0.77	0.88	

The value of the firm = PV of free cash flows during the first five years + PV of terminal value of free cash flows, the discount rate being 12 percent.

$$\begin{aligned}\text{Value of equity} &= \text{value of firm} - \text{value of debt outstanding} \\ \text{Value of a share} &= (\text{value of equity}/\text{number of shares outstanding})\end{aligned}$$

Assume that working capital investment increases to 20 percent, cash flows will be reduced to that extent and stock price will fall.

DETERMINANTS OF LEVEL OF WORKING CAPITAL

Bankers provide finance for holding an acceptable level of current assets for achieving a pre-determined level of production and sales. So, each of the components of working capital needs to be estimated to quantify the funds required for working capital.

Raw Materials

A company has to necessarily stock a minimum quantity of raw materials to ensure smooth running of operations. The factors that should be considered while estimating the required inventory of raw material are:

- Average consumption of raw materials,
- Availability of raw materials,
- Lead time between ordering and receipt of materials,
- Cost of holding stocks,
- Transportation charges, and
- Seasonality of the item in question.

Work-in-Progress

Generally there is a time lag, only after which raw materials get converted into finished product. The time taken for processing varies from industry to industry. The factors affecting the inventory of WIP are:

- Processing time,
- Batch quantity—the average quantity of each product processed, and
- Number of shifts in a day and plant capacity.

Finished Goods

Normally a certain quantity of finished goods may have to be held in inventory awaiting sale. The quantity to be stored depends on:

- Variation in demand,
- Transportation delay,

- Nature of business—manufacture against order (e.g., machine tools) or manufacture against anticipated sales (e.g., soaps), and
- Seasonality (of availability).

Accounts Receivable

Goods or services are sold either against advance payment (e.g., airline) or against cash (e.g., fast food) or on credit (e.g., computers). In the first two cases there is no investment in accounts receivable, but in the third case a company will have to invest in book debts. Further, the entire sales may not be on credit: a part could be on cash basis. The extent of credit granted to customers depends on:

- Industry practices,
- Market condition, and
- Quantity purchased by the customer.

While arriving at the average credit period, the transit time should also be taken into account.

Expenses

Normally one month's expenses (direct and indirect) are included in the working capital requirement to provide a cushion to take care of temporary bottlenecks. When the operating cycle is relatively short, the provision may be reduced. Similarly, when the operating cycle is relatively long, the provision may be increased. The credit available on purchases and advance payment received from customers will have to be deducted from the working capital as estimated above to arrive at the net required working capital. The working capital investment in some of the prominent companies (Exhibit 14.2) varies from industry to industry, size, and, of course, productivity. The format for assessment of working capital is shown in Appendix 3. The working capital requirement calculated as above will have to be financed from a long-term source (like capital and borrowings) and short-term borrowings from banks. Banks provide working capital finance by way of advance against stocks and debtors. They, however, do not provide the full amount and normally insist that the promoter bring in a margin to ensure that the promoter has a stake in the business. For this reason, what can be financed and what will be financed do not coincide. The permissible limit of bank finance can be derived from the working capital requirement (Appendix 4).

Exhibit 14.2 Working capital investment and its productivity in some companies (1998–99 and 1997–98)

Company	W.C. (Rs crore)		Percentage change over		Net sales/W.C.	
			previous year			
Reliance	4194.12	1222.35	243.1	303.8	2.99	9.39
L&T	2004.36	1577.23	27.1	10.2	3.44	3.38
Tata Chemicals	946.72	850.89	11.3	0.3	1.43	1.79
Century Textiles	738.78	806.69	-8.4	4.2	2.59	2.4
Bajaj Auto	667.59	549.45	21.5	46.8	4.55	4.95
Infosys Technologies	472.96	97.23	386.4	79.4	1.07	2.65
Nirma	194.76	281.7	-30.9	39.8	6.27	3.57
Raymond Synthetics	48.97	55.38	-11.6	25.4	7.31	6.48

Source: *The Economic Times*, Sept. 13, 1999.

An Illustration

Whirlpool of India assessed its working capital requirement for 1998 is as shown: the company had a working capital gap of Rs 250.76 crore, of which the margin money is Rs 56.80 crore.

(Rs crore)

	Current assets			Current liabilities	
	Norms	Amount		Norms	Amount
Raw material					
• Imported	37 days	8.56	Sundry creditors	45 days	53.42
			Other current liabilities		74.51
• Indigenous	21 days	22.54			
Work-in-progress	2 days	4.30			
Finished goods	56 days	84.37			
Receivables	73 days	175.69			
Consumables & spares		8.79			
Other current assets		74.44			
		378.69			127.93

Working Capital Gap 250.76

Margin money 15 percent of total current assets 56.80

APPROACHES TO LENDING

Banks adopt three methods for assessing working capital limit:

- a) Operating cycle method for working capital limits up to Rs 25,000.
- b) Tandon/KB Chore committee norms for working capital limits above Rs 10 lac.
- c) Cash budget method for seasonal industries like sugar, tea, etc.

The first method has been explained earlier. The Tandon committee was set up in 1974 by RBI to study the defects of the prevailing system of bank lending. The cash credit/overdraft system wherein the borrower paid interest only on the amount drawn and not on the cash credit limit was tilted towards the borrower rather than the banks. Many borrowers abused the bank finance to acquire inventory more than that warranted and the prevailing system made credit planning extremely difficult for the lending bank. The terms of reference of the Tandon Committee were:

- To prescribe norms for assessing working capital to be financed by banks,
- To prescribe norms for carrying current assets in different industries,
- To make recommendation for obtaining operational data, business forecasts, production plans and credit needs, and
- To make recommendation as regards the criteria to be used to measure a unit's financial health.

The committee norms for inventory for receivable were initially applicable to 15 major industries but later on the scope was enlarged and the norms substantially revised. The norms were applicable to all units

in the specified groups of industries including small scale industries (SSI) with fund-based working capital limits in excess of Rs10 lac and public sector units were also covered. The norms cover major industries accounting for 50 percent of industrial advance by banks. The norms take geographical location of the units and seasonality of demand into account. They represent the levels of units with average efficiency. There can be temporary deviations from inventory norms for reasons such as bunched receipt of raw materials, power cuts, strikes, transport delays, etc.

The group suggested that the level of bank finance may be determined by the working capital gap arrived at after taking into account the projected levels of current assets and current liabilities (other than bank borrowings). So the items that can be classified under current assets and current liabilities need to be defined. The list of items is given in Appendix 5.

Current assets comprise cash and other assets or resources commonly identified as those which are expected to be realized in cash or sold or consumed or turned over during the operating cycle of the business usually not exceeding one year.

Current liabilities include items payable or expected to be turned over within one year from the date of balance sheet and the item is used principally to designate obligations whose liquidation is reasonably expected to require the use of existing resources properly classified as CA or the creation of other liabilities.

NORMS FOR LENDING

The norms recommended by the Tandon Study Group for inventory and receivables for 15 major industries are reviewed from time to time by the Committee of Direction constituted by the Reserve Bank of India (RBI). These norms pertain to raw materials, stock-in-progress, finished goods and receivables. They are not absolute and deviations are permitted under certain circumstances. These norms indicate maximum levels for holding inventory and receivables in each industry and are not to be taken as entitlements to hold inventory or receivables up to the prescribed levels. Inventory and receivables, suggested by RBI from time to time, are only broad indicators and banks are free to decide the norms based on their own experience.

In the case of industries where no norms have been fixed, levels of inventory and receivables may be computed on the basis of process/lead time, trade practices, past trends, etc. It should be noted that since sundry creditors are taken as a source of current assets, it is necessary to project them correctly, while calculating the need for bank finance for working capital.

Computation of Maximum Permissible Bank Finance

Once the estimation of the reasonable level of current assets required for the operation of the unit is completed, the source of financing the same is decided. A part of the total current assets can be financed by credit for purchases and other current liabilities. The funds for financing the working capital gap are bridged from the borrower's own funds and long-term borrowings and partly from bank borrowings.

The Tandon Study Group suggested the following three alternatives for arriving at the MPBF:

- First method of lending: Finance a maximum of 75 percent of the working capital gap (total current assets minus total current liabilities other than bank borrowings), with the balance to come out of long-term funds, namely owned funds and term borrowings.

$$\text{MPBF} = 0.75 (\text{CA} - \text{Other current liabilities})$$

This method ensures a current ratio of 1.

- Second method of lending: Borrower to provide for a minimum of 25 percent of total current assets out of

their long term funds, i.e., owned funds and term borrowings. Credit for purchases and other current liabilities will be available to finance a part of the remaining amount of current assets with banks financing the remaining portion. Thus, total current liabilities inclusive of bank borrowings will not exceed 75 percent of the current assets.

$$\text{MPBF} = (0.75 \times \text{CA}) - \text{CL}$$

This method ensures a current ratio of 1.33

- Third method of lending: Methodology is the same as above, but core current assets are excluded from total current assets. Core current assets are expected to be financed by long-term funds. Under this method, long-term funds are required to finance core current assets and an additional 25 percent of the remaining current assets. RBI did not accept this method for implementation.

$$\text{MPBF} = 0.75 (\text{CA} - \text{CCA}) - \text{CL}$$

The borrower's contribution from long-term funds would be 25 percent of working capital gap under the first method of lending, and 25 percent of total current assets under the second method of lending. The borrower's contribution of long-term funds described is called the minimum stipulated net working capital (NWC), which comes from owned funds and term borrowings.

Banks generally calculate MPBF using the second method of lending. The exceptions include where fund based limits are less than Rs 1 crore (turnover based method), sick/weak units, etc. Borrowing units engaged in exports need not bring 25 percent contribution from long-term funds in respect of export receivables.

Other methods of assessing working capital requirements are:

- Turnover method: The working capital requirements are estimated at 25 percent of the projected turnover. Of the working capital requirement, banks can finance to the maximum extent of 20 percent of the projected turnover, and the balance 5 percent is the net working capital to be brought in by the borrower as his margin.
- Cash budget method: The borrower submits cash budgets for the future period. Bank finance is limited to cash deficit, i.e., the excess of payments over receipts. While assessing under this method, the profitability statement, balance sheet for the future period is taken into account to prepare the cash budget. The operating cycle is also considered for cash flow assessment. Generally, this method of assessment is used for seasonal industries like tea, sugar, construction, etc.

STYLE OF LENDING

The Tandon committee suggested that the total credit limit be bifurcated into a loan component and cash credit component. The loan component corresponds to the minimum level of borrowing that the party will use during the year. The fluctuating part is the cash credit component. The obvious reason for bifurcating credit limit is to ensure financial discipline from the borrower. The committee also suggested that bill financing, wherever possible, be encouraged.

Another working group was set up in 1979, under the chairmanship of K B Chore, to recommend modification to the existing system. Here is a summary of the committee's recommendations:

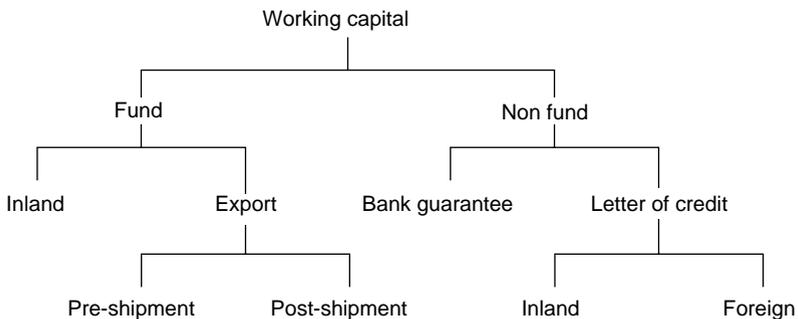
1. The three types of lending—loan, cash credit and bill finance—to continue.
2. The dependence of medium and large size borrowers to be reduced by inducing them to use surplus cash generated by the unit.
3. Second method of lending to be made compulsory for all units with fund-based working capital limit of Rs 50 lac and above.

4. Projected statement of production/sales/CA/CL to be submitted quarterly within a week prior to commencement of quarter. This statement is used for fixing the quarterly drawing level.
5. Actual statement of production/sales/CA/CL to be submitted quarterly within 6 weeks from the closure of the quarter it relates to.
6. The actual and projected operating statement for the earlier half-year and the current half-year to be submitted within 2 months after the close of the earlier half-year.
7. The actual and projected funds flow statement for the earlier half-year and the current half-year to be submitted within 2 months after the close of the earlier half-year.

Appendix 6 contains the Quarterly Information Statements—1 and 2. A real-life illustration is shown in Exhibit 14.3 (at the end of the chapter).

Under the old system, the borrower could draw upon the sanctioned limit at his own option. Under the new system, quarterly operative limits are fixed on the basis of quarterly budget and performance data. RBI has introduced two forms. Form 1 contains estimates of production, sales, level of current assets and liabilities for the ensuing quarter based on which operative limits are fixed for the quarter. Form 2 contains actual achievement of production, sales and level of current assets and current liabilities. In addition, half-yearly operating and fund flow statements are to be submitted.

The working capital assistance provided by banks can broadly be classified as fund and non-fund based. The difference between the fund and non-fund based assistance lies mainly on the cash outflow. Fund-based assistance involves an immediate cash outflow. The latter may or may not involve cash outflow from the bank. The grant of any of the fund-based facilities to a borrower would result in depletion of actual liquidity of the bank, whereas the grant of non-fund based facility may or may not affect the bank's liquidity.



Consistent with the liberalization of the financial environment in the country, greater operational freedom has been progressively provided to banks in dispensation of credit. In April 1997, RBI decided to withdraw the prescription pertaining to the assessment of working capital needs based on the MPBF concept. Banks are required to lay down, through their boards, a transparent policy and guidelines for credit dispensation. However, most banks continue to follow the erstwhile RBI guidelines based on the concept of MPBF, to assess working capital requirements of borrowers. The proper assessment of working capital requirements is described here.

Credit Monitoring Arrangement

In 1975, RBI prescribed the format to obtain the necessary data from borrowers, assess working capital requirement under the credit authorization scheme. This scheme was changed to credit monitoring arrangement

(CMA) in 1988. Banks continue to obtain CMA forms for funded working capital limits of Rs 1 crore and above, as these facilitate computation of MPBF.

The CMA comprises of six forms:

Form I: This form contains particulars of existing credit from the entire banking system including term loan facilities availed from banks/financial institutions.

Form II: Also called as operating statement, Form II contains data relating to gross sales, net sales, cost of raw materials, power and fuel, direct labor, selling and administration expenses, interest, etc. It also covers information on operating profit and net profit.

Form III: A complete analysis of various items of last year's balance sheet, current year's estimate and following year's projections are given in this form. The details of current liabilities, term liabilities, net worth, current assets, fixed assets, non current assets as per classification accepted by banks are included.

Form IV: This form provides details of various items of current assets and current liabilities as per the classification explained above. The figures given in this form must tally with those given in Form III, where details of all liabilities and assets are given.

Form V: On the basis of the details of current assets and current liabilities provided in Form IV, the calculation of MPBF is done in this form to obtain the fund-based credit limits to be granted to the borrower.

Form VI: This form provides the details of fund flow of long-term sources and uses to indicate whether long-term funds are sufficient to meet the borrower's long-term requirements. The increase/decrease of current assets is also indicated in the form.

Once the MPBF is arrived at, on the basis of inventory and receivable norms and the appropriate method of lending, banks decide the various fund and non-fund based limits. The fund-based limits should not exceed the MPBF. In the loan system for delivery of bank credit devised by RBI in April 1995, borrowers having working capital limits of more than Rs 10 crore or above from the banking system, the cash credit component should not be more than 20 percent. The balance 80 percent may be provided as demand loan. RBI has since done away with this bifurcation and has left the decision of cash credit and demand loan components of the working capital to be decided mutually between the bank and the borrower.

ASSESSMENT OF OTHER LIMITS

Letter of Credit (L/C)

While sanctioning the letter of credit limits, the following particulars are required to be estimated:

- Value of raw materials projected to be consumed during the year.
- Value of raw materials to be purchased on credit out of the above.
- Time taken for advising establishment of L/C to the beneficiary.
- Time for shipment and the consignment to reach the location of the customer for whom the L/C is to be opened. Credit (usage) period agreed between the beneficiary and the customer.
- Credit period projected as available by the borrower in the CMA format and reckoned for calculation of MPBF during sanction of fund-based limits.

Bank Guarantee

There is no standard formula for the assessment of bank guarantee limits. The details pertaining to the nature of the guarantee, purpose, particulars of the contract, period for which the bank guarantee is sought and the amount of guarantee, are to be obtained. This information, along with the view on creditworthiness of the borrower and the relationship with the bank, would comprise the major inputs towards deciding the sanction of limits required by the borrower.

Margins

The bank, in its assessment of working capital requirement of the borrower, stipulates limits up to which it would extend finance against each component of working capital. This is done after the assessment of levels of raw material, stock-in-process, finished goods and bills receivable to be held at any one point by the borrower to reach the desired production. Banks thus stipulate margins, which the borrower should bear as its contribution to finance working capital. The bank's objective for demanding margin from the borrower:

- Ensure a degree of stake of the borrower in his own enterprise.
- A security measure to ensure commitment of borrower in times of adversity.
- Hedge against price level changes in the event of distress sale to recover advance.

Margins applied by banks vary but the range of margins on different kinds of working capital assets is usually 10 percent to 40 percent. They basically convey the extent of marketability of the particular asset in the event of distress sale.

Banking Arrangement

The assessed working capital is made available to the borrower under the following arrangements:

Consortium Banking Arrangement

RBI, till 1997, made it obligatory for availing working capital facilities beyond a threshold limit (Rs 50 crore in 1997), through the consortium arrangement. The objective of the arrangement was to jointly meet the financial requirements of big projects by banks and also share the risks involved.

While the consortium arrangement is no longer obligatory, some borrowers (especially large ones) continue to avail working capital finance under this arrangement. The major features of this arrangement are as follows:

- Bank with maximum share of the working capital limits usually takes the role of 'lead bank'.
- Lead bank, independently or in consultation with other banks, appraises the working capital requirements of the company.
- Banks at the 'consortium meeting' agree on ratio of sharing the assessed limits.
- Lead bank undertakes the joint documentation on behalf of all member banks.
- Lead bank organizes collection and dissemination of information regarding conduct of account by borrower.

Multiple Banking Arrangement

This is an open arrangement in which no bank takes the lead role. Most borrowers are shifting their banking arrangement to multiple banking now. The major features of this arrangement are:

- Borrower needs to approach multiple banks to tie-up entire requirement of working capital.
- Banks independently assess the working capital requirements of the borrower.
- Banks independent of each other do documentation, monitoring and conduct of the account.
- Borrower deals with all financing banks individually.

Syndication

A syndicated credit is an arrangement between two or more lenders to provide a borrower credit facility using common loan agreement. It is an internationally practiced model for financing credit requirements, wherein banks are free to syndicate the credit limits irrespective of the quantum involved. It is similar to a consortium arrangement in terms of dispersal of risk but consists of a fixed repayment period.

Under this arrangement:

- The borrower intending to raise resources awards mandate to a bank to raise the resources (referred to as lead manager).
- Lead manager prepares as information memorandum and distributes the same amongst prospective lenders. Information memorandum provides basis for each lending bank for making independent valuation of borrower.
- A meeting of prospective lenders is convened by the lead manager to finalise deal-timing, cost of credit, share of participating banks, etc.
- Loan agreement is prepared and signed by all participating banks. The borrower gives prior notice to lead manager for drawing loan amount (to enable tie-up disbursement with other lending banks)

It is easy to arrange syndication for borrowers that are rated strong by rating agencies regarding payment of principal and interest.

IN CONCLUSION

It should be understood that the focus of working capital management should not be on ratios but on the important, underlying business drivers. Working capital policy should be aligned with the strategic thrust of the company. A decision to pursue product differentiation strategy may be frustrated if the executives are forced to cut inventory and/or credit period. Likewise, a firm pursuing cost leadership strategy should make an all-out effort to squeeze the extra flab of inventory to stay competitive. Some of the action areas have already been mentioned earlier under different components of working capital like lot size, batch run, etc. Working capital management is not the job of finance managers alone. It is the joint effort of production, marketing, and finance departments. The finance function will only provide required (decision making) financial inputs. The actual implementation rests with other line executives.

Exhibit 14.3 Estimation of working capital at Spar (I) Limited

Spar (I) Limited (identity has been disguised) is a south Indian company engaged in granite manufacturing. The break-up of current assets and current liabilities is as shown:

<i>CL</i>	<i>(Rs lac)</i>	<i>CA</i>	<i>(Rs lac)</i>
Short term bank borrowings	1,070	Cash & Bank balances	311.67
Sundry creditors	405	Receivables other than exports	844.44
		Export receivables	520.83
Advance payments from customers	120	Inventory:	
		Raw Materials:	
		— imported	132.0
		— indigenous	191.35
		Stock in progress	420.37
		Finished goods	722.62
		Trade goods	120.00
		Consumable spares	
		— imported	179.00
		— indigenous	178.26
Provision for taxation	50	Advance to suppliers	390.00
Dividend payable	141	Advance payment of taxes	30.00
Other statutory liabilities	8.51	Other current assets	501.72
Deposits/installments of term loan/DPGs/debentures etc.	888.74		
Other current liabilities and provisions			
Total	2,880.76		4,542.26
Current ratio	1.58		

Computation of MPBF

1. Total current assets	=	Rs 4,542.28 lac
2. Total current liabilities (other than bank borrowings, debentures, deposit, etc.)	=	Rs 926.03 lac
3. Working capital gap (1 – 2)	=	Rs 3,616.25 lac
4. Minimum stipulated networking capital, i.e., 25 percent of WCG/ 25 percent of total current assets depending on method of lending	=	1,135.57
5. Projected net working capital	=	2,546.25
6. (3)–(4)	=	2,480.68
7. (3)–(5)	=	1,070.00
8. MPBF (item 6 or 7 whichever is lower)	=	1,070.00

APPENDIX 1: CLASSIFICATION OF WORKING CAPITAL*Fund Based*

These facilities may be categorized into advances towards meeting domestic (inland) working capital requirement of a borrower and the funding working capital required for exports. The assessed bank finance is made available to borrowers through any one of the following facilities:

(a) Cash Credit

It is a running account facility and is extended for a short period, usually not more than 18 months, and the same is reviewed. It is a pre-sale finance against stock of inventory consisting of raw materials, semi-finished goods and finished goods of a borrower. This also constitutes the primary security for the bank. The bank fixes the drawable limit under the cash credit account after application of security margin over the value of the stock declared in the monthly statement given by the borrower. The security margin is determined at the time of assessment of working capital, taking into account the margin contribution expected of the borrower. The borrower is at his liberty to draw funds under the drawable limit, subject to availability of stock and maintenance of security margin. Withdrawals from the cash credit account are made by means of cheques issued from the account. The borrower is also required to deposit its sale proceeds into the cash credit account. Therefore, in a cash credit account, there would be a number of transactions (both debits and credits) in a single day and the balance outstanding would fluctuate on a day-to-day basis.

The principle advantages of a cash credit account are:

- It enables the borrower to operate the account within the stipulated limit, as and when required.
- It helps the borrower to reduce interest payment by reducing the debit balance in the account as and when it is able to do so.
- The lender can monitor by tracking the debits and credits in the account.

Working Capital Demand Loan (WC DL) Under the cash credit system, by allowing the borrower to draw and replenish the cash credit account at will, the burden of the borrower's cash management is thrust on the bank. Also, on account of the nature of the facility, banks incur a carrying cost, as the funds have to be made available, irrespective of the borrower utilizing the sanctioned limit or not.

In order to bring some financial discipline and free the banks from having to take care of the borrower's cash management, RBI modified the loan delivery system in 1995. Under the new delivery system, wherever the working capital (fund-based) limits of Rs 10 crore or above were granted to borrowers, it was mandatory to bifurcate the same into loan component and cash credit component in the ratio of 80:20. The loan component was designated as 'WC DL' as it was repayable on demand, unlike a term loan, which gets paid at the fixed scheduled points of time.

For fund-based limits below Rs 10 crore RBI did not fix the level of loan and cash credit components, which may be settled between the bank and the borrower. Banks are also allowed to price cash credit and demand loan components differentially.

In tune with the liberalization in the financial sector, RBI has since done away with the bifurcation of working capital limits and has left the decision of loan delivery to individual bank's discretion. However, most banks continue to use the bifurcation system in their loan delivery system to borrowers.

Overdraft A form of credit akin to cash credit, it is also a running account facility where the borrower could remit and draw funds freely, subject to the limit granted. The credit limit is normally granted against lien/pledge of assets—like government securities, units of mutual funds, shares and debentures, bank's fixed deposits. Overdraft facility could be temporary or regular. It may be secured or unsecured. Interest is charged in the overdraft account based on the debit outstanding at the end of each day, at regular (monthly, quarterly) intervals. Borrowers are free to repay by means of deposits into the account. They can overdraw again, up to the sanctioned limit.

Bills They are a means of payment used by companies to finance trade transactions. A bill is an instrument in writing containing an unconditional order, signed by the maker, directing a certain person to pay a specified

amount of money only to or to the order of a certain person or to the bearer of the instrument. The maker of the bill is the drawer and the person on whose name the bill is drawn is the drawee, who has to discharge his liability under the bill.

Demand/Usance Bills Bills are mainly of two types, namely, demand and usance. Demand bills are payable at sight and usance bills are payable after a certain period. Other forms of lending cash credit are documentary/clean bills, which provide for an advance against bills, commercial paper, short-term loans, FCNR(B) loans, export finance, advances against receivable from government, etc.

Non-fund Based

Letters of credit and bank guarantees are the two ways that a bank offers non-fund based credit facilities to banks.

(b) Letters of Credit

It is a banker's undertaking on behalf of a constituent to pay to a third party against compliance of stipulated conditions. A letter of credit (L/C) facilitates settlement of trade payments and is used for both local and international trade. The seller is promised payments in his own country and the buyer is assured that the seller makes the payment against submission of universally acceptable title to goods.

Types of Letters of Credit

Revocable Letter of Credit It is a credit that can be revoked. That is, cancelled or amended by the bank issuing the credit; without the notice of other parties. A revocable letter of credit is rarely used.

Irrevocable Letter of Credit It is a firm undertaking on the part of the issuing bank and cannot be cancelled or amended without the consent of the parties to the L/C, particularly the beneficiary.

Confirmed Letter of Credit It is an L/C to which another bank has added its confirmation or guarantee. Thus, there is a double guarantee in such credit and it is more favorable to the beneficiary.

Sight Credit and Acceptance Credit It is a demand draft drawn by the exporter, and paid on presentation to the negotiating bank—provided all the terms of the credit have been strictly adhered to. In case of an acceptance credit, drafts are drawn on the issuing bank or the correspondent bank at a specific usance period.

Red Clause Letter of Credit It is also called countervailing credit. When an L/C is opened with the security of another L/C, the credit thus opened is called 'back-to-back letter of credit'. The practical purpose is that when an L/C is opened by the ultimate buyer in favor of a particular beneficiary who may or may not be the actual supplier or manufacturer, the beneficiary may open another L/C with near identical terms in favor of the actual supplier/manufacturer offering the main credit opened in his favor, as security and will be able to obtain reimbursement by presenting the documents received under back-to-back credit under the main L/C.

Transferable Letter of Credit The original beneficiary in favor of a second beneficiary or several second beneficiaries can transfer this type of credit.

Standby Letter of Credit These credits are generally used as a substitute for performance guarantee or for securing secured loans.

Effectiveness of L/C as an Assured Payment Mechanism An L/C deals only with documents. If the documents are submitted exactly as per the L/C terms, the L/C opening bank is duly bound to make the payment.

Payment of L/C Liability The payment for the L/C on the due date is the responsibility of the customer and has to take place through his own sources. However, in case the customer is unable to arrange for the payment on the crystallization date, the L/C is deemed as 'devolved'. The bank has to payoff the L/C amount and recovers the same from the customer.

(c) Bank Guarantee

A contract of guarantee is a contract to perform the promise or discharge the liability of a third person in case of his default. There are three parties to a contract of guarantee. The person who guarantees the performance of a promise or the liability of a third person is called the guarantor (surety). The person, on whose behalf the guarantee is given is the principal debtor, and the person to whom the guarantee is given is called the creditor.

The obligation of the surety, under a guarantee issued, arises when there is a default to perform the promise by the person on whose behalf the guarantee is given. The liability of a surety runs parallel to the liability of a principal debtor towards the creditor. On failure of the principal debtor to perform the obligation under the contract, the liability of the surety with respect to the guarantee starts. The bank may be called to perform its obligation under a bank guarantee issued by it the moment the customer, on whose behalf the guarantee is given, defaults. Therefore, though bank guarantees are non-fund credit supports initially, the probability of their turning into fund-based credit is high.

In order to ensure that the guarantee executed by the banker does not remain in force for an indefinite period, it is stipulated that the guarantee would remain in force for the period specified therein, on the expiry of which no claims would be entertained by the banker.

Types of Bank Guarantees

Bank guarantees, issued by the banks, are principally of three types:

Financial Guarantee Under this type of guarantee, the bank undertakes only the financial liability. The bank undertakes to pay the beneficiary of the guarantee, an amount not exceeding the sum stated, on default of promise by the customer. These are guarantees issued in respect of purely monetary obligations.

Performance Guarantee The bank guarantees that the customer, on whose behalf the guarantee is given, will perform the contract undertaken. If the customer fails on performing the same, the banker shall make good the loss caused to the beneficiary, by limiting him financially to a sum not exceeding the amount undertaken in the guarantee.

The important difference between the financial and performance guarantees lies in the additional factor. That is, performance by the customer guaranteed by the banker in case of the latter. The commonality between the two is that both result ultimately in financial liability only.

Deferred Payment Guarantee The banker guarantees payment of the amount to be paid by his customer, which has been spread or deferred over a period of time. This type of guarantee is normally required when the customer desires to purchase machinery or goods on credit. Deferred payment guarantees are usually the non-funded substitutes for term loans.

APPENDIX 2: ESTIMATION OF COMPONENTS OF WORKING CAPITAL

$$\text{I. Average raw material, stores \& spares storage period in days} = \frac{\text{Average stock of raw material (RM)}}{\text{Average monthly consumption of raw material during the year}}$$

where

$$\text{Average stock of raw material} = \frac{\text{opening stock of RM} + \text{closing stock of RM}}{2}$$

and

$$\text{Average monthly consumption of RM during the year} = \frac{\text{opening stock of RM} + \text{Total purchases of RM} - \text{closing stock}}{2}$$

$$\text{II. Conversion time in days} = \frac{\text{Average stock of WIP}}{\text{Average daily cost of production}}$$

where

$$\text{Average stock of WIP} = \frac{\text{opening WIP} + \text{closing WIP}}{2}$$

Cost of production (COP) = Opening stock WIP + consumption of RM, stores and spares + other manufacturing costs – closing WIP

and

$$\text{Average daily COP} = \text{COP}/365.$$

$$\text{III. Finished goods storage period in days} = \frac{\text{Average stock of finished goods}}{\text{Average daily cost of sales}}$$

where

Annual cost of sales = Opening stock of finished goods + COP + Selling and distribution expenses + Administrative expenses + Financial charges + Excise duty – Closing stock of finished goods

$$\text{Average daily cost of sales} = \text{Cost of sales}/365$$

and

$$\text{Average stock of finished goods} = \frac{\text{Opening stock} + \text{Closing stock}}{2}$$

$$\text{IV. Average collection period in days} = \frac{\text{Average balance of sundry debtors}}{\text{Average daily credit sales}}$$

where

$$\text{Average balance of sundry debtors} = \frac{\text{Opening balance} + \text{Closing balance}}{2}$$

and

$$\text{Average daily credit sales} = \text{Annual credit sales}/365.$$

$$\text{V. Average accounts payable period (in days)} = \frac{\text{Average balance of sundry creditors}}{\text{Average daily credit purchases}}$$

where

$$\text{Average daily credit purchases} = \text{Annual credit purchases}/365$$

and

$$\text{Average balance of sundry creditors} = \frac{\text{Opening balance} + \text{Closing balance}}{2}$$

APPENDIX 3: FORMAT FOR ASSESSMENT OF WORKING CAPITAL

_____ month's raw material requirement	Rs	_____
_____ week's/month's consumable stores & spares	Rs	_____
_____ week's stock in process at any time	Rs	_____
_____ month's finished goods at cost	Rs	_____
_____ week's/month's receivables	Rs	_____
One month's manufacturing & administrative expenses	Rs	_____
Total working capital requirement	Rs	_____
Less: Credit available on purchase	Rs	_____
Advance payment received from customers	Rs	_____
	Rs	_____

APPENDIX 4: ESTIMATION OF PERMISSIBLE LIMIT

	Rs	Permissible limit
Raw materials	Rs	
Less: percent margin	Rs	
	_____	_____ (A)
Stock-in-progress	Rs	
Less: percent margin	Rs	
	_____	_____ (B)
Sundry debtors	Rs	
Less: percent margin	Rs	
	_____	_____ (C)

Finished goods	Rs	
Less: percent margin	Rs	
		_____ (D)
Total permissible limit	(A + B + C + D)	

The margin varies from 25–40 percent.

APPENDIX 5: CLASSIFICATION OF CURRENT LIABILITIES AND CURRENT ASSETS

Current Liabilities

1. Short-term borrowings including bills purchased and discounted from banks (and others).
2. Unsecured loans.
3. Public deposits maturing within one year.
4. Sundry creditors for raw material and consumable stores and spares.
5. Interest and other charges accrued but not due for payment.
6. Advance/progress payments from customers (see *Note 6*).
7. Deposits from dealer, selling agents, etc. (see *Note 7*).
8. Installments of term loans, deferred payment credits, debentures, redeemable preference shares and long-term deposits payable within 1 year.
9. Statutory liabilities
 - Provident fund dues.
 - Provision for taxation (see *Note 2* and *Note 8*).
 - Sales Tax, Excise, etc. (see *Note 9*).
 - Obligation towards workers considered as statutory.
 - Others.
10. Miscellaneous current liabilities
 - Dividends (see *Note 2*).
 - Liabilities for expenses.
 - Gratuity payable within one year.
 - Other provisions.
 - Any other payments due within 12 months.

Current Assets

1. Cash and bank balances.
2. Investment (see *Note 3*)
 - Government and other trustee securities other than for long-term purposes.
 - Fixed deposits with banks.
3. Receivables arising from sales other than deferred receivables, including bills purchased and discounted by banks (see *Note 10*).

4. Installments of deferred receivables due within 1 year.
5. Raw materials and components used in the process of manufacture including those in transit (see *Note 4*).
6. Stocks in process including semi-finished goods.
7. Finished goods including goods in transit.
8. Other consumable spares (see *Note 4* and *Note 11*).
9. Advance payment for tax.
10. Pre-paid expenses.
11. Advances for purchase of raw materials, components, and consumable stores.
12. Monies receivable from contracted sale of fixed assets during the next 12 months.

Notes

1. The concept of current liabilities would include estimated or accrued amounts which are anticipated to cover expenditure within the year for unknown obligations, viz., taxes, accrued bonus payments, provisions, etc.
2. In cases where specific provisions have not been made for these liabilities and will be eventually paid out of general reserves, estimated amounts should be shown as current liabilities.
3. Investments in shares and advance to other firms/companies, not connected with the business of the borrowing firm should be excluded from current assets.
4. Slow moving or obsolete items should not be classified as current assets.
5. Amounts representing inter-connected company transactions should be treated as current only after examining the nature of transactions and merits of the case. For example, advance paid for suppliers for a period more than the normal trade practice, regardless of any other consideration such as regular and assured supply should not be considered as current.
6. Advance payments from customers are to be classified as current liabilities where deposits are required.
7. These deposits may be treated as term liabilities irrespective of their tenure if such deposits are accepted to be repayable only when the dealership/agency is terminated after due verification by banks. Deposits which do not satisfy the above condition should continue to be classified as current liabilities. Security deposits/tender deposits may be classified as non-current assets irrespective of whether they are classified as non-current assets or whether they mature within the normal operating cycle of one year.
8. Netting of tax provision and advance tax paid may be effected for all the years uniformly and as such for the current year also the advance tax paid can be set off against the provision, if any, made for that year.
9. Disputed excise liabilities shown as a contingent liability or by way of note to the balance sheet need not be treated as a current liability for calculating the permissible bank balance unless it has been collected or provided for in the accounts of the borrower.

Provision for disputed excise duty is invested separately, say in fixed deposits with banks, such provision may be set off against the relative investment.
10. Export receivables may be included in the total current assets for arriving at the Maximum Permissible Bank Finance but the minimum stipulated net working capital may be reckoned after excluding the quantum of export receivables from the total current assets.
11. Projected levels of spares on the basis of past experience but not exceeding 12 months' consumption for imported items and 9 months' consumption for indigenous items may be treated as current assets for the purpose of assessment of working capital requirements.

APPENDIX 6: QUARTERLY INFORMATION SYSTEM

Form I

Name of Borrower _____		(Amount Rs lac)
A. Estimates for the current accounting year indicated in annual plan	(a) Production: (b) Gross sales: (1) Domestic _____ (2) Exports _____	_____
	(c) Net sales:	_____
B. Estimate for the ensuing quarter ending _____	(a) Production: (b) Gross sales: (1) Domestic _____ (2) Exports _____	_____
	(c) Net Sales:	_____
C. Estimates of current assets and current liabilities for the ensuing quarter ending.		

Form II

A. Estimates of current accounting	(a) Production (b) Gross sales	
B. Actual production/sales	During the quarter	Cumulative
1st quarter _____	_____	_____
2nd quarter _____		
3rd quarter _____		
4th quarter _____		
C. Data relating to the latest completed quarter ending	Estimate	Actuals
(a) Production	_____	_____
(b) Gross sales		
(c) Total		
D. Current assets and current liabilities	Estimate	Actuals

APPENDIX 7: SELECT ACCOUNTING RATIOS OF WORKING CAPITAL MANAGEMENT AT VST

	1993	1994	1995	1996
Current ratio	2.08	2.76	3.98	3.88
Quick ratio	0.73	0.90	2.66	2.82
Working capital turnover ratio	6.59	5.58	4.24	3.32
Inventory turnover	10.16	8.32	12.78	12.11
Debtors turnover	41.06	136.36	19.2	9.98
Average collection period (days)	9	3	19	37

QUESTIONS

1. Refer to the data given below and calculate MPBF.

A. Inventory:	(Rs lac)
Raw material	35.00
WIP	90.00
Finished goods	285.00
Stores & spares	61.00
B. Book debts	300.00
C. Other current assets	90.68
D. Current liabilities other than bank borrowings	245.00
E. Minimum net working capital is 25 percent of current assets	

2. Calculate the operating cycle.

Raw materials	0.96 months
Stock in progress	1.44 months
Finished goods	5.27 months
Stores and spares	3.63 months
Receivables	4.66 months

- Discuss the salient features of the Chore Committee recommendations.
- What are the drawbacks of the cash credit—overdraft system?
- Describe the four methods used by banks for working capital lending.
- What are the limitations of the cash budget approach to working capital lending?
- The current assets and current liabilities of a company are Rs 30 crore and Rs 18 crore respectively. Calculate the maximum permissible bank finance under the three methods, assuming that the core component of current assets is Rs 24 crore.
- A company stores 3 weeks of raw material (Rs 10 lac), 2 weeks of work in process (Rs 15 lac), and 4 weeks of finished goods (Rs 20 lac). The company has outstanding credits of Rs 25 lac. Expense for one month is Rs 3 lac. The company does not receive any credit from suppliers. Assume appropriate margin on each of the components and calculate working capital requirement and bank finance.

Chapter 15

A Case Study: Bharti Dredging and Construction Limited

OBJECTIVES

- ◆ Reinforce material covered under bank loans.
- ◆ Demonstrate a generic situation in which a corporation seeks a bank loan.
- ◆ Demonstrate the preparation of credit grading sheet in a real life setting.

Bharati Dredging and Construction Limited (BDCL) enjoys working capital facilities from ICICI Bank under sole banking. The company's limits were reviewed by the executive committee on March 6, 2002, and restrict the non-fund limits accordingly, from Rs 10 crore to Rs 7 crore, in view of the existing order book position and marked for exit. The existing working capital sanctions available would be adequate for the company's present level of operations. BDCL received a work order from Paradip Port Trust on April 6, 2002. The work involves hydraulic dredging of oil jetty at Paradip Port. The value of work is Rs 13.85 crore to be completed in four months time. That is, the work is to commence by April 20, 2002, and to be completed latest by end of September 2002. In view of the large work the order to be undertaken in a period of four months, the company requested ICICI Bank to provide an ad hoc limit. To undertake the work, BDCL has to procure pipeline, HSD oil and import standby spares and a sudden surge in operational expenses, therefore the company requested an ad hoc limit involving cash credit of Rs 1 crore and LC of Rs 2 crore. The proposed limit was for a period of six months.

BDCL was founded as a wholly owned subsidiary company of M/s TEBMA Shipyards Limited (TSL) in 1993. TSL, during the early-1990s, decided to branch off the business of carrying out dredging and civil engineering works and make a separate corporate entity to deal with the same. Thus BDCL was born. It commenced full-fledged business in 1994–95 and that year it had a turnover of Rs 6.94 crore and a net profit of Rs 1.57 crore (see Exhibit 15.1 for the company's financial details). It carries out dredging activities besides value added services like civil and structural engineering.

Since its inception, BDCL has been a wholly owned subsidiary and remained so till mid-1995. Fourteen lac shares of Rs 10 each were issued on private placement at a premium of Rs 60 per share to subscribers like

Morgan Stanley, Birla Advantage Fund, India Special Situation Fund, and our bank. TSL still holds 48.75 percent equity in BDCL as on date.

BDCL is considered one of the top dredging companies in the mid-volume segment and has built a good reputation in dredging and related civil structural works over the years. At present, it has eight cutter suction dredgers of annual capacity of 5.00 million cubic meters. The company has also taken on lease/rent, three cutter suction dredgers from:

- Garuda Carriers and Shipping Limited
- Ocean Dredging Limited.

During 1999–2000, BDCL had undertaken a specialized work for Mumbai Port Trust through M/s Hyundai Heavy Industries Limited (HHIL) for the trenching work of replacement of submarine pipeline from MOT Jawahar Dweep to Pirapau. HHIL has given repeat orders like dredging for excavating a trench for 24-inch submarine pipeline at locations on the pipeline route for CIEL-Lakshmi Field Development Phase I at Gulf of Cambay, West Coast of India and trench back filling work at Lakshmi Field Phase-I Development and HV well platform project.

Exhibit 15.1 Financial details of Bharti Dredging and Construction Limited

(Rs crore)

Sl. No.	For year ended/ending June 30, No of Months	2000 Actual 12	2001 Actual 12	2002 Estimate 12	2003 Projection 12
1	Net sales	35.45	37.85	25.69	31.84
2	PBILDT	8.05	10.19	9.42	9.72
3	PBT	1.37	1.69	1.10	2.90
4	PAT	1.01	1.58	1.02	2.68
5	Net cash accruals	3.69	4.90	4.34	5.55
6	PBILDT/Net sales (percent)	22.71	26.92	36.67	30.53
7	PAT/Net sales (percent)	2.85	4.17	3.97	8.42
8	Dividend/PAT (percent)				16.79
9	Gross block	43.64	44.97	45.47	45.97
10	Net block	35.32	33.33	30.51	27.69
11	Paid up capital	4.47	4.47	4.48	4.48
12	Tangible net worth (TNW)	12.98	14.66	15.73	17.96
13	Group investments	0.01	0.01	0.01	
14	Adjusted TNW	12.97	14.65	15.72	17.96
15	LTD/TNW	1.19	1.00	0.82	0.56
16	DFS/TNW	1.41	1.05	0.88	0.69
17	TOL/TNW	3.00	2.44	1.83	1.47
18	Current assets	20.50	19.94	13.19	17.06
19	Current liabilities	14.57	13.59	9.72	12.24
20	Net working capital	5.93	6.35	3.47	4.82
21	Current ratio	1.41	1.47	1.36	1.39

The company has recently been granted the Paradip Port dredging work, valued at Rs 13.85 crore. Apart from which, other works in hand are valued at Rs 8.70 crore. The present proposal is for consideration of ad hoc limits for a period of six months for the Paradip Port dredging work. The details of total facilities availed with banks and financial institutions are as follows:

Total Facilities Availed with the Banks and Financial Institutions

Working Capital as on 16/04/2002 (Rs crore)

Name of bank	Facility	Limit	(percent)	Balance	Overdue, if any
ICICI Bank	Fund	2.00	100		
	Non-fund	11.00	100		
Total	Fund	2.00	100		
	Non-fund	11.00	100		

Term loans as on 31/03/2002 (Rs crore)

Name of bank/ institution	Facility	Purpose	Limit	Balance (31/03/02)	Maturity date	Overdue, if any
SIDBI	Direct discounting scheme	Purchase of dredger	2.34	0.18	13.01.00	0.18
IDBI-1	Term loan	Purchase of dredgers	9.30	7.90	01-07-05	Nil
IDBI-2	Term loan	Purchase of dredger	8.00	8.00	01-04-06	Nil
Indbank Merchant Banking	Hire purchase	Purchase of dredger	2.80		June 02	
Sundaram Finance	Hire purchase	Purchase of construction equipment	1.45		March 03	
IIBI	Term loan	Purchase of dredger	4.00	1.50	15-02-02	Nil
Magma Leasing Ltd.	Hire purchase	Purchase of dredger	2.00		March 05	
Srei International	Hire purchase	Purchase of dredger	0.68		Dec 03	
Harita Finance	Lease	Purchase of asset	2.99		June 02	
Total			33.55			0.18

The existing and proposed limits with ICICI Bank are as follows:

Facility	Limits	Existing	
		Balance 31/03/2002	Proposed limits
Fund-based	1. Cash Credit	2.00	2.00
	2. Ad-hoc		1.00
	Sub total	2.00	3.00
Non-fund based	1. LC	1.00	1.00
	2. Ad-hoc		2.00
	3. BG	7.00	7.00
	Sub total	8.00	10.00
Total fund and non-fund based facility		10.00	13.00
Treasury investments—Tradeable		0.44	0.44
Grand total of exposure		10.44	13.44

Given here is ICICI Bank's exposure to the company and industry:

<i>Percentage of ICICI Bank's net worth as on March 31, 2001</i>	<i>To the company</i>	<i>0.47 percent</i>
	<i>To the group</i>	<i>1.09 percent</i>
Industry exposure as percentage of gross customer assets as on December 31, 2001*		Construction (Industry) 1.07 percent

* Last day of every quarter.

MARKET AND INDUSTRY SCENARIO

In General

The dredging and construction market is growing. Forecasts say that this growth will continue in the next decade. The government's continuous focus on infrastructure development has led to the current market situation. The government is emphasizing on overall infrastructure development in all aspects of the economy and, thus, construction, dredging and civil works are given primary importance.

Dredging involves the process of excavation of soils, sand, stones, clay, etc. Dredging is mainly required in the following areas:

Major and minor ports	To provide navigational depths
Inland waterways	For navigation
Irrigation canals, lakes	To prevent floods
Irrigation & hydroelectric reservoirs	To increase storage capacities
Land development	For reclamation of land
Industries	To desalt cooling water canals and storage tanks

Domestic Market

The size of the Indian dredging industry is estimated at about \$130 billion.¹ The domestic dredging industry is broadly segmented into two divisions: high volume segment, consisting of large players, such as Dredging Corporation of India Limited (DCIL); and other big, foreign majors. The mid-volume segment consists of medium-sized dredging companies, among which BDCL occupies a prominent position. Most of the capital dredging jobs are given to private dredging companies. BDCL operates in a niche market where the dominant player DCIL cannot easily penetrate. The former, over a period of time, has developed a committed workforce to operate and maintain its fleet of cutter suction dredgers—which is something its competitors have not been able to do. Moreover, the dredgers of BDCL are all portable and dismountable and can be transported to all parts of the country—and this enables it to secure most of the works under the category of inland dredging.

The Outlook

The demand for sea transportation is increasing tremendously every day, because the road and rail traffic is becoming increasingly crowded and insufficient for the transportation of food and cargo. Also, water transport is cheaper by about 90 percent and 50 percent when compared to road and rail respectively. To develop sea transport, development of ports is the prime requirement. For this, infrastructure facilities have to be created.

¹ The approximate values of \$1, \$1 million, and \$1 billion are Rs 46, Rs 4.6 crore, and Rs 4,600 crore respectively.

Dredging is one of the primary infrastructure facilities in the development and operation of ports. Capital dredging is to create the requisite water depths; regular maintenance dredging ensures the availability of depths so created—at all times and for the smooth and safe navigation of vessels. With the vast need and scope for expansion of port facilities, India envisages a spurt in dredging requirements, both capital and maintenance.

COMMENTS ON THE FINANCIAL POSITION

Given here is an analysis of the financial performance of the company.

Profitability

<i>Particulars</i>	<i>1999–2000</i>	<i>2000–2001</i>	<i>2001–02</i>
Gross profit	6.58	8.18	7.47
Percentage of GP to sales	18.58	21.6	29
Operating profit	101.16	149.74	87
Percentage of OP to sales	2.85	3.95	3.38
PBT	137.24	169.85	109.58
Percentage of PBT to sales	3.87	4.48	4.26
PAT	100.72	158.44	101.58
Percentage of PAT to TNW	4.92%	7.15	4.37
Cash accruals	3.69	4.90	4.34
Percentage of cash accruals to sales	10.41	12.96	16.88

The percentage of gross profit to sales was 29 percent for financial year 2001–02, and 21.6 percent for the previous year. Though this is the case, the year 2001–02 was not as the promoters had forecast. BDCL's sales were estimated at Rs 38.69 crore but, in reality, the figure stood at Rs 25.69 crore only. The percentage of operating profit to sales remained at the same level, but there was a decrease in the percentage of PAT to tangible net worth—4.37 percent in 2001, and 7.15 percent in the previous year.

As on April 5, 2002, BDCL received a contract from Paradip Port for hydraulic dredging of an oil jetty at the port. The value of this work stood at Rs 13.85 crore. The work, to be completed in four months' time, was to commence on April 20, 2002. There was need for an increase in working capital, which can be seen thus:

The operating expenditure for 4 months, starting April, was estimated at Rs 7.04 crore; and that for spares and capital was estimated, in June, at Rs 0.5 crore and Rs 1 crore respectively. Margin money from the LC and bank guarantee (BG) for April were Rs 0.3 crore and Rs 0.16 crore respectively. The estimated total expenditure for the contract for 4 months was Rs 9 crore; receipts in the form of mobilisation charges, dredging charges, demob charges totalled Rs 13.85 crore. The surplus from this cash flow statement stood at Rs 4.85 crore.

In April, BDCL incurs expenditure to the tune of Rs 0.93 crore with no receipts. And, in May, it incurs expenditure amounting to Rs 1.5 crore with receipts totalling Rs 0.63 crore, leading to an imbalance in the cash flow. To tide over this gap, additional working capital needs to be provided.

Long-term Solvency The tangible net worth (TNW) this year when compared to the previous year has increased by Rs 1.07 crore. This increase in TNW can be attributed to the profits that have been ploughed back into the business, as no dividends were declared. BDCL planned on giving dividends to its shareholders, but has postponed the same to next year due to the company's performance this year. BDCL wants an

increase in the working capital limits for cash credit (CC) and LC to the tune of Rs 3 crore totally (Rs 1 crore and Rs 2 crore respectively). As BDCL does not require the current bank guarantee limit of Rs 10 crore, the same can be reduced to Rs 7 crore. The overall gearing of BDCL with the additional ad hoc working capital limits is within acceptable range.

Short-term Solvency The current ratio has decreased from 1.47 in 2000–2001 to 1.36 in 2001–02. The gross block has increased by Rs 0.5 crore, whereas the long-term funds have reduced by Rs 3.17 crore.

The composition and quality of current assets is as shown:

Type	1999–2000		2000–2001		2001–02	
	Amount	Percentage to TCA	Amount	Percentage to TCA	Amount	Percentage to TCA
Inventory	0.43	2.13	0.66	3.32	0.5	3.78
Work In progress	2.47	12.07	1.09	5.5	1.68	12.76
Other current assets	5.05	24.61	3.18	15.94	3.18	24.13

Inventories, as a percentage, remained at about the same level; whereas work in progress and other current assets increased over the previous year for the financial year 2001–02.

Funds Flow Analysis The analysis shows that there is a deficit of Rs 2.89 crore for the current year, which would have to be met from the working capital. The reason for this deficit being that, compared to the previous financial year, net profit for 2001–02 dipped by Rs 0.5 crore. Also, decrease in long-term liabilities has gone up by Rs 0.92 crore—meaning, more long-term liabilities have been paid off. There is a substantial increase of Rs 2.63 crore in other current assets, over the previous year. Thus, the sources which have reduced have been deployed to a greater extent towards long-term liabilities and increasing other current assets leading to a deficit.

Year ended/Ending June 30	(Rs crore)		
	2000–2001	2001–02	2002–03
Long-term sources	4.91	4.35	7.19
Long-term uses	4.49	7.24	5.83
Surplus/deficit	0.42	–2.89	1.36
Surplus/Incremental build-up of current assets (percent)	–2.73	–33.85	29.34

Significant Accounting Policies The revenue expenditure on contracts has been accounted for, on percentage completion basis and on the basis of progress payments and advances received from customers. Accordingly, value of work-in-progress has been accounted for on accrual basis. However, the method of accounting adopted for income tax purpose is ‘cash based’.

Performance in the Current Year 2001–02 For the period ended March 2002 (9 months) (Rs crore):

	Current year (2001–02)	Previous year (2000–2001)
Sales	25.69	37.85
PBILDT	9.42	10.19
PBT	1.10	1.69
PAT	1.02	1.58
PBILDT/Net sales (percent)	36.67	26.92
PAT/Sales (percent)	3.97	4.17

Presently the company has the following jobs at hand:

<i>Sr. No.</i>	<i>Description of work</i>	<i>Name and address of the employer</i>	<i>Value</i>
1.	Hydraulic dredging of oil jetty	Paradip Port Trust, Paradip	13.85
2.	Back filling of trench for Lakshmi oil field Phase-1 project	Hyundai Heavy Industries Co. Ltd.	0.92
3.	Area grading and filling at DJB's 635 MLD Water Treatment Plant and associated works at Sonia Vihar, Delhi	Delhi Jal Board through M/s Simplex Concrete Piles (India) Limited	1.5
4.	Time charter of dredger in national waterway No.1	Inland Waterways Authority of India, Noida	2.37
5.	Dredging underneath the berth and also in front of the berth at Mundra port for GAPL	M/s Skanska Cementation India Ltd, Kolkata	1.11
6.	Hydraulic landfill area near main Yamuna bridge on Delhi-Noida toll bridge	Noida Toll Bridge Co. Ltd., Noida, UP	1
7.	Construction of flyover at the intersection of NH24-Noida road. Construction of embankment and area filling by dredging of sand from Yamuna river bed including stone pitching and filling of earth on top of sand for slip roads and filled up area	Delhi Development Authority, Delhi	1.78

Bankers typically perform a sensitivity analysis of the performance. Shown here is a sensitivity analysis of BDCL's performance under various scenarios (Rs crore):

	<i>Scenario I base case estimates for 2001–02</i>	<i>Scenario II (drop in sales by 10 percent)</i>	<i>Scenario III (drop in sales by 20 percent)</i>
Sales	25.69	23.12	20.55
PBILDT	9.42	8.15	7.11
PBT	1.10	-0.39	-1.43
PAT	1.02	-0.475	-1.515
PBILDT/Net sales (percent)	36.67 percent	35.25 percent	34.59 percent
PAT/Net sales (percent)	3.97 percent		

PRESENT PROPOSAL

BDCL's working capital credit facilities were reviewed through a short review note on March 6, 2002. In view of the same anticipated order, ICICI's executives did not take up a detailed proposal. Accordingly, the following limits were proposed for sanction:

(Rs crore)

<i>Name of the bank</i>	<i>Present limits</i>			<i>Proposed limits</i>		
	<i>FB</i>	<i>NFB</i>	<i>percent</i>	<i>FB</i>	<i>NFB</i>	<i>percent</i>
ICICI Bank	2.00	8.00	100	3.00	10.00	100
Total	2.00	8.00	100	3.00	10.00	100

ASSESSMENT AND JUSTIFICATION OF LIMITS

Fund Based BDCL enjoys regular working capital limits of Rs 2 crore. Based on the cash flow statement for the Paradip Port Trust order, the company's peak requests are to the limit of Rs 1.80 crore. The present cash credit provides a liquidity of Rs 0.80 crore. Therefore, a gap of Rs 1 crore is assumed. Thus an ad hoc cash credit of Rs 1 crore is justified.

Non-Fund Based

Bank Guarantee: Keeping in view the order book position of March 2002, and the requirements of the anticipated order, ICICI had restricted the BG limit to Rs 7 crore. It proposed to continue the BG limit of Rs 7 crore, for a further period of one year.

Letter of Credit: BDCL's existing LC limit is Rs 1 crore. The company, to undertake the Paradip Port Trust order of Rs 13.85 crore, is in urgent request to procure:

Stand by spares	Rs 0.50 crore
Pipeline for dredging	Rs 1 crore
HSD oil	Rs 3 crore

Under the arrangement with IOCL/HPCL, the company procures HSD oil against the LC. The usance permitted by the oil companies is for 60 days. Thus an LC request for procuring HSD oil is for Rs 1 crore, on revolving basis, for a period of six months. Therefore the total LC request is for Rs 2.50 crore. The existing limits provided can absorb Rs 0.50 crore. Thus the ad hoc LC request is Rs 2 crore.

RISK ANALYSIS

A risk assessment matrix of M/s Bharati Dredging and Construction Limited is as shown:

<i>Sl. No.</i>	<i>Nature of risk</i>	<i>Remarks</i>	<i>Rating (H/M/L)</i>
1.	Promoters	The promoters have been with the company since its inception. They are technically qualified and have wide experience in the industry	Low
2.	Product obsolescence	This company is in the service sector and as such does not produce any products. The risk of product obsolescence is minimal. Its services are likely to be increasingly of use considering the potential of growth in the infrastructure industry	Low
3.	Technology	The company has successfully undertaken the projects and technical competencies are proven	Low
4.	Market	With the government increasing its focus on infrastructure development, there is expectancy of high growth in the next decade	Medium
5.	Raw Materials	The company has adequate machinery and manpower. But new machinery may be needed if the level of work increases.	Medium
6.	Payment delays	The employees of DDCL are government agencies/public sector undertakings wherein payment delays are expected. Though the agreement terms provide for liquidated damages, but in such contracts, the matter takes longer time due to procedural/arbitration issues.	Medium

Table contd.

Table contd.

<i>Sl. No.</i>	<i>Nature of risk</i>	<i>Remarks</i>	<i>Rating (H/M/L)</i>
7.	Funding	The company's financial position is stretched thus any additional funds given may be with stiff conditions.	Medium
8.	Liquidity	The current ratio is 1.36, which is within the acceptable limits.	Medium
9.	Leverage	The company's TOL/TNW was 1.62 as on June 30, 2001, which is on the higher side in view of the activity of the company.	High
10.	Exchange Risk	Not Applicable	
Overall Risk Rating		Medium Risk at 4 (1–2: Low Risk, 3–4: Medium Risk, 5–6: High Risk)	

RECOMMENDATIONS

The executive committee was requested to renew the existing facilities for a period of one year and to sanction ad hoc facilities for a period of six months, as detailed here, to BDCL:

<i>(Rs crore)</i>		
	<i>Facility</i>	<i>Proposed limits</i>
Fund-based	1. Cash credit	2.00
	2. Cash credit (ad hoc)	1.00
	Sub total	3.00
Non-fund based	3. LC	1.00
	4. LC(ad hoc)	2.00
	5. BG	7.00
	Sub total	10.00
Total fund and non-fund based facility		13.00
Treasury Investments—Tradable		0.44
Grand total of exposure		13.44

Chapter 16

Cash Management

OBJECTIVES

- ◆ To know the determinants of corporate cash holdings.
- ◆ To be able to measure cash flow time line.
- ◆ To be aware of cash management techniques.
- ◆ To be able to prepare cash forecasts and budgets.
- ◆ To be aware of cash management services available in India.

Executives worry about the cash balances they hold. This is not without reason. Holding an excess cash balance of Rs 10 lac is tantamount to *not* investing in other available profitable outlays. Add the implicit cost of capital. To illustrate, a company would be incurring a cost of Rs 1.5 lac at a cost of capital of 15 percent on Rs 10 lac. Cash is an asset only when used; idle cash is a liability. To borrow Rs 10 lac for a day at 12 percent costs Rs 333. In addition, the borrower will have to maintain a compensatory balance of, say, 10 percent. So the cost of holding cash is higher. Cash management involves control and analysis of cash flows during a particular period. Corporate cash management aims to:

- Track and control cash flows,
- Provide adequate liquidity, and
- Optimize usage of cash, and manage short-term borrowing and investment activities.

This chapter has three parts:

1. Measuring and managing cash flow timeline.
2. Strategies for accelerating cash receipts and decelerating disbursements.
3. Cash forecasting and cash budgeting.

Cash management can be viewed as a system with interrelationships between a company and its banks, as well as the headquarters (treasury function) and different operating units.

WHY DO FIRMS HOLD CASH?

In *General Theory of Employment, Interest and Money*, John Maynard Keynes wrote, ‘There is no necessity to hold idle cash to bridge over intervals if it can be obtained without difficulty at the moment when it is actually required.’ Yet, we do not see it in actual practice. Companies continue to hold cash (see Exhibit 16.1).

Exhibit 16.1 Corporate cash holdings in 2001

(Rs crore)

Company	Cash in hand	Bank balance	Total
HLL	913.15	1.41	914.56
Infosys	0.01	385.05	385.06
Reliance Industries	1.30	99.33	100.63
TELCO	0.96	114.50	115.46
TISCO	128.68	111.10	239.78
Colgate Palmolive	0.13	74.93	75.06
P&G Hygiene	0.03	48.61	48.64

Source: Prowess.

In the case of a perfect market it does not matter whether the firm retains the cash or disburses it to shareholders through dividends or cuts debt, since there is no difference between cash inside the firm and that outside. When markets are not perfect, cash inside and outside are not equivalent. One of the most commonly cited reasons for holding cash is the transaction motive. A firm may hold cash to enable it to fund projects if the cash flow in that period is low. The company may raise external finance if available. This is not possible for firms that face information asymmetry or agency costs. A cash reserve would enable the company to tide over the deficit. In other words, firms that have volatile cash flow are more likely to hold greater amounts of cash. Likewise, those firms subject to higher distress costs may hold greater amounts of cash to act as a buffer. The length of the cash conversion cycle also determines the amount of cash a company holds. Firms with relatively shorter cash conversion cycles are likely to hold less liquid assets. Other determinants of scope and nature of cash management in an organization include:

- Size of the company,
- Extent of decentralization of operations, and
- Geographical scope.

Size Larger companies can justify the cash management efforts by the magnitude of savings whereas smaller companies cannot. Larger companies, almost by definition, have larger cash flows to track, have greater number of bank relationships. This calls for sophisticated cash management practice. This is especially true of businesses that are cash intensive. For instance, the need to hold cash is more in companies that sell through retail outlets such as FMCG companies than in those that sell on a wholesale basis.

Extent of Decentralization If the company has a decentralized structure, it might delegate at least a part of the cash management responsibility to the operating units. In many companies, the corporate treasury function is restricted to headquarters with minimal freedom given to divisional counterparts. The headquarters may exercise control on short-term investing and borrowing activities whereas divisions may be responsible for cash flow they generate. This type of allocation of responsibilities leads to sub optimization of efforts. The philosophy is to let someone do what one is good at. This is not an easy process. At times, centralization of key activities leads to heartburn.

Geographical Scope A global company would have a different set of reporting needs vis-a-vis a domestic company. Due to its dispersion of activities beyond national boundaries, it is affected by economic and political risks as local regulations on repatriation of income, exchange rate risk, etc. change. So a cash manager needs to have a global view of cash management function, the reporting relationships among different operating units, the choice of currency, etc.

Motives for Holding Cash

Transaction Motive It refers to the requirement of cash for day-to-day running of the business.

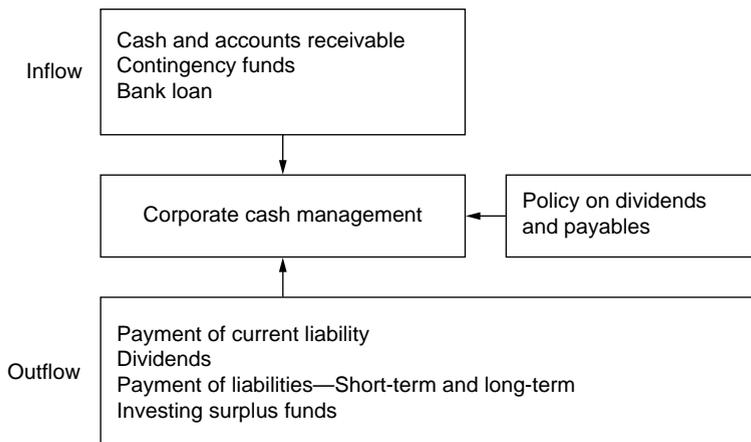
Precautionary Motive Companies may also hold cash to meet contingencies. This is known as precautionary motive.

Speculative Motive Companies may also hold cash to speculate in business opportunities.

State of the Art of Banking System

Cash managers can reduce time involved in transferring funds only if the banking system is developed and if bankers are willing to extend cash management services. The check clearing system exerts considerable influence on the controllability of cash. Without technological upgradation, there is little a cash manager can do. Innovations such as electronic fund transfer, automated payment system, are possible due to technological advances. The corporate cash management process (Exhibit 16.2) essentially involves policy decisions regarding disbursement of funds and use of bank services. The corporate philosophy regarding disbursements has the most significant impact on cash management. Centralized handling of payables would provide greater control on outflow as opposed to a decentralized system.

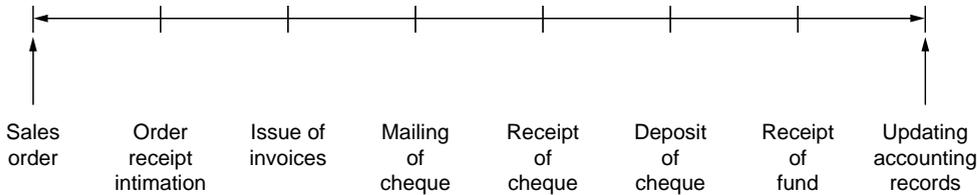
Exhibit 16.2 Cash management process



CASH FLOW TIMELINE

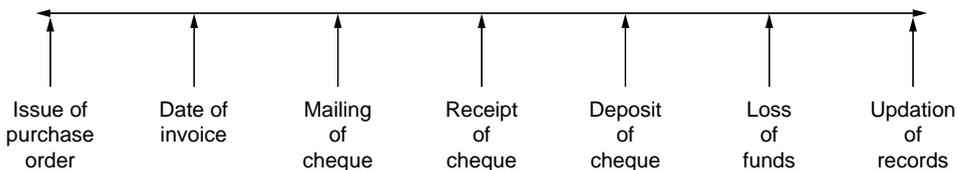
Cash flows can be categorized into three types: inflows, outflows, and intra-firm flows. Examples of inflows are cash collected from customers, cash received on sale of investments, etc. Outflows go to suppliers, creditors, government (tax), employees and shareholders. Intra-firm flows refer to movement of funds from bank to head office, between divisions and special account. Cash management involves accelerating inflows and decelerating outflows. Cash inflow is shown on a timeline diagram in Exhibit 16.3.

Exhibit 16.3 Cash inflow timeline diagram



The length of the components of the cash flow timeline could range from few minutes, to days or even months. For instance the segment (2), the production and billing interval, could range from one month to several months—depending on the company’s business. Cash managers typically concentrate on accelerating the receipt of checks and encashing them. With technological improvements, the savings in the activity decreases. The real savings come from managing the other components of the timeline, such as sales order processing and production billing process. These obviously do not fall under the domain of the cash manager. Often, executives from different departments neither share information nor talk with each other. Coordination among departments leads to improved efficiency and savings. The other strategy is to decelerate outflows. The outflow timeline diagram is shown in Exhibit 16.4.

Exhibit 16.4 Cash outflow timeline diagram



The cash outflow timeline begins with the initiation of the purchase requisition. Again, the focus of managing disbursements should not be on the banking activities involved but on the other segments. The objective of cash flow timeline management is to reduce the overall cost.

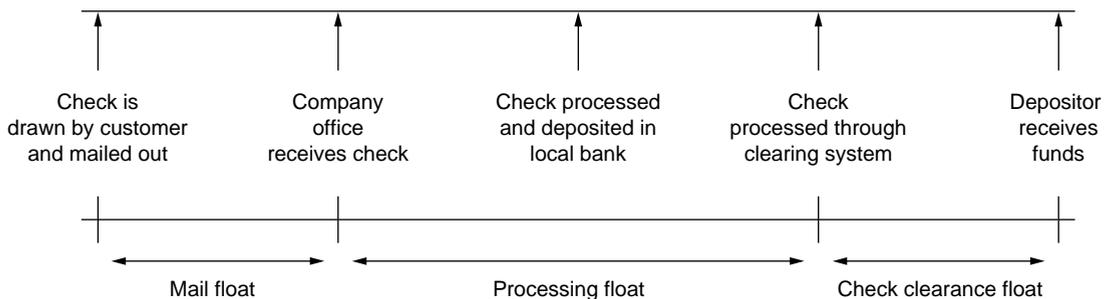
FLOAT

The cash balance shown in the company’s books of accounts need not coincide with the balance in the books of the bank. The reason could be that the bank has not collected the checks presented by the company, or

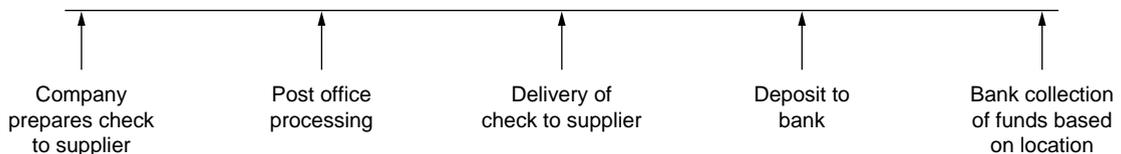
that the customers have not yet presented the checks issued by the company. As soon as the checks are deposited in the bank, the company debits the cash account. But the bank credits the account only when the amount is realized from the bank of the customer. This time lag is called deposit float. The deposit float is the time-lag between drawing of a check by the customer, and the receipt of funds by the company. The deposit float consists of mail float; processing float and check clearance float—it is important to monitor these three components of the deposit float for accelerating receipts. Similarly, checks issued by the company but not yet presented by the suppliers results in *disbursement float* (see Exhibit 16.5). The company credits the cash account (bank account) as soon as checks are drawn and sent to suppliers, but the bank debits the company's account only when the banks of the suppliers present the check. For instance, the balance in the bank account may be Rs 10 lac, but the balance in the company's books may only be Rs 5 lac, because it has issued checks worth Rs 5 lac in payments. The disbursement float is available to the company until these cheques are presented for payment. Disbursement float is affected by mail delivery time, check processing time and collection of fund. Since the objective of cash management is to accelerate inflows and decelerate outflows, the company can 'ride the float' by increasing the disbursement float and decreasing the deposit float. Disbursement float can be increased by issuing the payable checks against a distant bank or mailing from a remotely located post office! Playing the float requires the cash manager to think in terms of the bank balance in the bank book, and not that in the company's book of accounts. A cash manager should be careful not to overdo it, and incur penalty from the bank if the manager draws on uncollected funds. Add to that the cost of losing credibility in the eyes of the supplier. Although playing the float sounds smooth sailing, it could be as risky as tight-rope walking. Moreover, one party's disbursement float is another party's deposit float. Each manager works at reducing the floats that work against his/her company and extending those that work for the company. So the effort of the manager may go in vain—in the sense that the benefits gained somewhere may be offset by costs incurred elsewhere. Nevertheless, it pays to monitor the cash flow timeline.

Exhibit 16.5 Deposit and disbursement float

DEPOSIT FLOAT



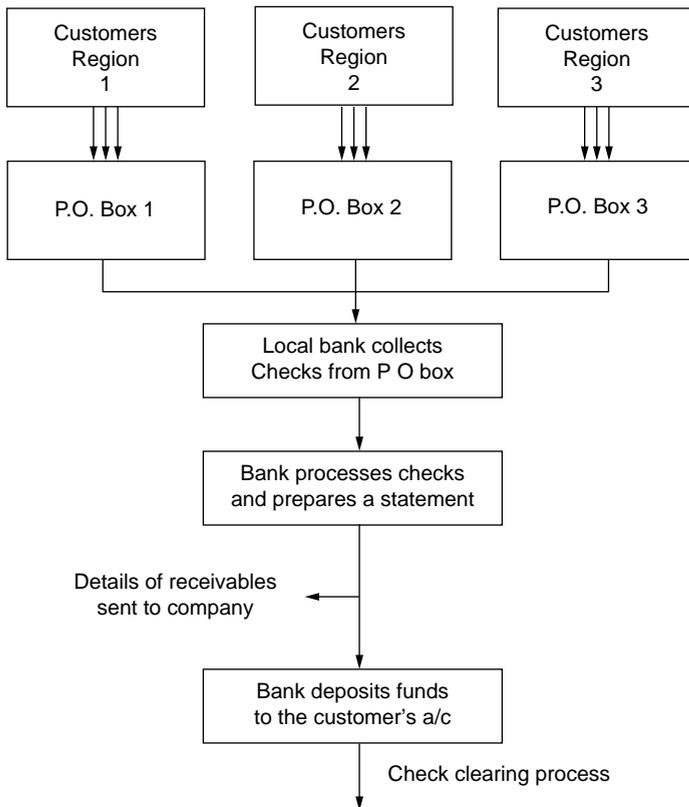
DISBURSEMENT FLOAT



ACCELERATING INFLOWS: LOCK BOX SYSTEM

Lock boxes are centrally located collection post office boxes meant for intercepting receivables from customers. In a lock box system (Exhibit 16.6), the customers mail their remittances to a post office box number rather than to the company. The company's bank collects the lock box receipts from the post office several times a day and processes them on behalf of the company. The bank deposits the checks received directly to the company's account. The obvious advantage of a lock box system is that, the mail processing and check collection time is drastically reduced provided the lock boxes are located at optimum distance from the customers. The company receives a hardcopy of detailed information regarding customer name, account number, amount paid, and the funds processed by the bank at regular intervals.

Exhibit 16.6 Lock box system



Lock box system is efficient in accelerating receivables and reducing clerical work for the company. Since the processing work is delegated to a bank, the company may have to follow up from time to time to reconcile any differences. It might be uneconomical to operate a lock box if high value transactions are not experienced.

The choice of a new lock box location depends on:

- Cost of lock box service,
- Number and frequency of daily mail pickups, and
- The bank's expertise in operating the box and the presence or absence of allied services.

CASH FORECASTING

Since cash management is a forward-looking activity, sound predictions of demands and trends are a necessity to cope with seasonality in demand. Forecasting can be qualitative or quantitative. Qualitative forecasting involves eliciting expert opinion on the future states of the world and their influence on the item under consideration. Qualitative forecasting is usually restricted to identifying basic long-term trends rather than short-term and intermediate forecasts. Moving averages, exponential smoothing and regression analysis are some of the quantitative techniques used in forecasting. Forecasting techniques vary in their costs, as well as in scope and accuracy. The cash manager must decide what accuracy is required or what inaccuracy is tolerable. This allows trade-off between cost and value of accuracy. Increased accuracy may lead to lower cash levels and hence carrying costs. One should weigh the savings against the cost of more sophisticated and expensive techniques.

The following guidelines might prove useful while selecting a forecasting technique:

- The forecasting technique should be relevant for decision-making.
- It should not rely too much on the past.
- It should make best use of available data with reasonable degree of accuracy.
- It should not be too expensive vis-à-vis the benefit arising out of the analysis.
- It should not require maintenance of a large amount of data.
- It should incorporate all relevant cause and effect relationships.
- Finally, it should work.

Often, cash forecasting is mistaken for planning and budgeting. A forecast is just an estimate. A budget emerges when suitable actions are suggested and planned to achieve specific objectives. The given illustration describes simple cash forecast.

An Illustration

The actual sales and credit purchases for the first quarter are as shown:

<i>Month</i>	<i>Sales</i>	<i>Credit purchases</i>
January	2 crore	65 lac
February	2.2 crore	52 lac
March	2.5 crore	30 lac

The firm sells goods on credit. Historically, 20 percent of the credit sales are realized in the month of sales, 60 percent in the subsequent month and 18 percent in the third month. Bad debt losses are 2 percent of the sales. The goods purchased in January have been purchased on 2 months' credit; the goods purchased in

February and March have been purchased on 2 months' and one month credits respectively.

The expected sales and purchases for the second quarter are:

Month	Sales	Cash purchases	Credit	Credit period
April	Rs 2.4 crore	Rs 12 lac	Rs 37 lac	2 months
May	Rs 2.3 crore	Rs 17 lac	Rs 35 lac	1 month
June	Rs 2.6 crore	Rs 20 lac	Rs 40 lac	1 month

Other Details:

Salaries for April through June:	Rs 45 lac, Rs 50 lac, Rs 55 lac
Interest on term-loan to be paid in April:	Rs 7.5 lac
Principal repayment in June:	Rs 100 lac
Utility charges:	Rs 80,000 p.m.

The cash forecast is as shown:

	Month		
	April	May	June
Inflow			
<i>Sales collections:</i>			
20 percent of April	Rs 48 lac		
60 percent of March	Rs 1.5 crore		
18 percent of February	Rs 0.4 crore		
20 percent of April		Rs 46 lac	
60 percent of March		Rs 1.44 crore	
18 percent of February		Rs 45 lac	
20 percent of April			Rs 0.52
60 percent of March			Rs 1.38
18 percent of February			Rs 0.432
	Rs 2.38 crore	Rs 2.35 crore	Rs 2.332 crore
Outflow			
Cash purchases	Rs 12 lac	Rs 20 lac	
<i>Credit purchases</i>			
February purchases	Rs 52 lac		
March purchases	Rs 30 lac		
April purchases			Rs 37 lac
May purchases			Rs 35 lac
Salaries	Rs 0.45 crore	Rs 0.5 crore	Rs 0.44 crore
Interest	Rs 0.075 crore		
Principal repayment			Rs 1.0 lac
Utility charges	Rs 80,000	Rs 80,000	Rs 80,000

The summary of inflows and outflows is as shown:

	<i>(Rs lac)</i>		
	<i>April</i>	<i>May</i>	<i>June</i>
Inflow	238	235	233
Outflow			
Purchases	94	17	92
Salaries	45	50	55
Interest	7.5		
Principal repayment			100
Utility charges	0.8	0.8	0.8
Net	90.70	167.2	(14.8)

CASH BUDGET

Cash forecasting involves estimation of cash inflows and cash outflows for a period in the future. From the forecast of all cash receipts and payments cash surpluses or shortages are determined for each sub period (say, a month). Once the estimate is in place, the concerned executive is expected to initiate appropriate action to synchronize inflows and outflows. It is unlikely that they will balance on their own. This imbalance necessitates appropriate action to tide over cash deficit whenever there is one (by borrowing) and plan short-term investments whenever there is a surplus. A cash budget is a document prepared after effecting these adjustments. The primary distinction between a cash forecast and cash budget is that the former is an as-is document while the latter reflects the actions that management plans to take in order to manage future events. The cash budget contains forecasted figures of receipts and disbursements of cash over a certain period of time—usually one year. A typical cash budget has four sections: receipts, payments, deficit/surplus, and adjustments.

The receipts section lists out all anticipated cash receipts from all sources such as cash collected from customers, sale of plant and equipment, scrap sales, advance payment by customers, etc. The payment section records all anticipated cash payments like repayment of term loans, salaries and wages, purchase of raw material, fuel, excise duty, etc. The deficit or surplus section gives the difference between receipts and payments. If the inflow is more than the outflow, a surplus results—else, the result is a deficit. The cash budget also reveals the opening cash balance, ending cash balance and the desired cash balance. The adjustment section reveals the actions the management intends to take in periods of deficit or surplus.

An Illustration

Dalmia Cement (Bharat) Ltd. (DCBL) was incorporated in 1951. It has a cement plant at Dalmiapuram in Trichy, Tamil Nadu. Cement comprises the larger portion of DCBL's turnover. The company also has business interests in electronics, sugar and travel. DCBL has an installed capacity of 10.34 lac tpa of cement at Trichy. The company manufactures several grades of cement such as portland, portland pozzolona, portland blast furnace slag, super sulphate, etc. However, it does not manufacture white cement. The company prepares cash budget for the entire year (a portion of the budget prepared in for the year 1997–98 is shown in Exhibit 16.7).

Exhibit 16.7 Cash budget for Dalmia Cement (Bharat) Limited

(Rs lac)

	Budget		Cash budget for the year 1997-98												
	Full year		Apr 97	May 97	Jun 97	Jul 97	Aug 97	Sept 97	Oct 97	Nov 97					
1. Opening cash and bank Balance as on 01.04.97	654		654	654	654	654	654	654	654	654	654	654	654	654	654
2. Unutilised cash credit limit with banks	32		32	32	32	32	32	32	32	32	32	32	32	32	32
3. Receipts:															
a. Sale of cement	23,000		1,790	3,691	5,593	7,450	9,418	11,342	13,020	14,586					
b. Sale of scrap materials	50		5	9	14	10	30	34	40	45					
c. Sale of unserviceable assets	1		1	1	1	1	1	1	1	1					
d. Others	10		1	2	3	4	5	6	7	8					
4. Term loan from banks	1,800		0	0	1,000	1,000	1,000	1,500	1,500	1,500					
5. Interest receipts	15		2	4	6	8	10	12	14	16					
Total (A)	25,562		2,485	4,393	7,303	9,158	11,150	13,581	15,268	16,842					
6. Payments:															
a. Additions to fixed assets (land, building machinery, etc.)	1,500		5	15	25	125	500	700	900	1,100					
b. Repayment of term loans	330				75	75	75	150	150	150					
c. Salaries, wages, & benefits to employees	1,450		120	240	360	480	615	735	850	1,000					
d. Purchase of raw materials	1,050		85	165	245	331	412	503	587	670					
e. Purchase of packing bags	1,300		107	215	322	428	536	642	749	857					
f. Purchase of fuel (coal lignite, etc.)	3,600		302	608	909	1,213	1,515	1,819	2,121	2,424					
g. Purchase of stores & spares	700		55	112	168	216	278	328	390	441					
h. Payment of electricity board (Power)	2,400		201	406	594	791	968	1,188	1,486	1,680					

Exhibit 16.7 contd.

Exhibit 16.7 contd.

	Cash budget for the year 1997-98												
	Budget	Apr 97	May 97	Jun 97	Jul 97	Aug 97	Sept 97	Oct 97	Nov 97				
	Full year												
i. Excise duty	3,000	232	479	725	957	1,218	1,479	1,711	1,885				
j. Sales tax	3,600	296	583	884	1,177	1,449	1,732	1,909	2,192				
k. Other taxes	125	9	19	27	35	42	51	61	69				
l. Interest	500	0	0	80	80	123	203	203	302				
m. Advertisement expenses	150	5	10	15	25	65	70	85	105				
n. Repairs & maintenance (Outside services)	125	12	20	33	41	50	59	66	72				
o. Royalty for limestone	425	35	70	105	141	181	216	250	285				
p. Insurance premium	30	14	14	14	14	14	26	26	26				
q. Travelling expenses	60	5	11	14	19	23	28	33	39				
r. Freight & transportation	1,300	102	209	317	421	515	630	735	820				
s. Expenses on export sales	70	0	0	9	18	28	36	42	50				
t. Depot maintenance expenses	325	25	58	81	108	135	161	186	209				
u. Donations	30	5	8	12	17	19	19	21	25				
v. Bank charges	30	2	4	5	8	10	12	14	16				
w. Legal expenses	25	1	5	7	7	9	11	11	18				
x. Postage, telegram telephones, & telex	65	4	7	15	21	24	30	33	38				
y. Conveyance expenses	35	3	7	10	13	15	18	21	24				
z. Business/Sales promotion expenses	20	1	3	5	8	11	11	12	14				
aa. other expenses	150	13	28	36	49	58	71	89	102				
5. Surplus remitted to head office	2,500	200	400	800	1,300	1,500	1,800	2,000	2,100				
Total (4 + 5) (B)	24,895	1,839	3,696	5,892	8,118	10,388	12,728	14,741	16,713				
6. Closing cash and bank balances (A)-(B)	667	646	697	1,411	1,040	762	85,2.5	527	129				

The first column gives the total amount for the particular item for the entire year.

Reviews are conducted every quarter and remedial actions are taken. As can be seen, DCBL is a cash rich company.

The contents of the cash budget can be thus grouped: operating, financing and investment activities just like the cash flow statement.

Operating activities are the principal revenue producing activities of an enterprise (and those activities that are not investment and financing activities). Examples are:

- Cash receipts from the sale of goods and the rendering of services.
- Cash payments to suppliers of goods and services.
- Cash payments to and on behalf of employees.
- Income tax.

Investing activities include acquisition and disposal of long-term assets required to facilitate operating activities. Examples are:

- Cash payments for acquiring fixed assets.
- Cash receipts from disposal of fixed assets.
- Cash payments to acquire shares, warrants and debt instruments of other companies.
- Cash receipts from disposal of warrants and debt instruments of other companies.

Financing activities are activities that result in changes in the size and composition of the owners' capital and borrowings of the enterprise. Examples are:

- Cash proceeds from issuing shares or other similar instruments.
- Cash payments to owners to acquire or redeem the enterprise's share.
- Cash repayments of amounts borrowed.
- Cash proceeds from issuing debt instruments.

Cash Management Services in India

Management of cash flow is an important function for every business organization. An efficient cash flow management requires faster conversion of receivables into cash. Banks play a crucial role in cash management of companies. Indeed, banks are partners in managing working capital. Many banks offer cash management services (CMS) to companies. A bank's main activity is collection and payment of cheques. The introduction of electronic banking services has provided faster delivery mechanism. The general requirements for the cash management system to succeed are that checks deposited at the bank to be realized faster, the collected funds to be pooled at a required center for better utilization and a strong management information system (MIS) support for reconciliation.

The traditional banking system requires an organization to open accounts at various locations, deposit cheques in these accounts, monitor collections, transfer excess funds to corporate treasury on regular basis, reconcile accounts, and control operations.

Some of the limitations and disadvantages of traditional system are thus outlined:

- Organizations are deprived of timely access to funds of their own for profitable deployment, for reasons such as:

- Delay in realization
 - Funds not cleared
 - Irregularity in carrying out standing instructions
 - Poor monitoring of collections
- Higher cost of operation
 - Hassles of operating multiple accounts at various locations
 - Hassles of reconciliation
 - Poor MIS support

The cash management service offered by banks is an effective solution for corporates to overcome the inefficiencies, constraints, costs and hassles involved in the traditional collection system. Banks play a critical role in providing faster turnover of receivables, given the complexity of the clearing system (i.e., banking system) in India, hence it is very important for a cash manager to understand the payment system in India.

The payment or clearing system in India can be understood in the following contexts:

- A. Paper-based payment system
 - (i) Local check clearing system
 - (ii) Outstation clearing system
- B. Electronic payment system

A. Paper-Based Payment System

In India, payments are mainly paper-based and checks are the widely accepted method of funds transfer. Clearing of these instruments is done at respective clearing centers at over 990 locations across India. The Reserve Bank of India (RBI) conducts clearing at 17 centers, SBI at about 975 centers, and the rest are being managed by associate banks and other public sector banks.

High Value Clearing RBI offers this facility at select centers within certain geographical limits of that center. High value clearing represents the instruments of value more than Rs 1 lac, issued and deposited within that limited area of the clearing location. High value instruments are of significant importance to the cash manager as he gets credit for the amount in his account on the same day.

Local Clearing At certain identified clearing centers, having a large volume of transactions, RBI has made Magnetic Ink Character Recognition (MICR) clearing mandatory for automated processing. Checks that cannot be deposited in high value are processed in MICR clearing, the cycle for which is 48 hours. At centers where MICR clearing is not followed, the clearing process takes place in the traditional manual method with the same 48 hour clearing cycle.

The timeline for local clearing of checks is as follows:

- Day 0: Company deposits the cheques in the CMS bank branch before the stipulated clearing cut-off time.
- Day 1: The bank branch presents the check in local clearing.
- Paying bank credits funds to the presenting bank on uncleared basis to allow time for returns.
- Day 2: If the check is not cleared, paying bank returns the instrument to the presenting banker. If the check is cleared the presenting bank makes the funds available to the depositor.

In the case of the depositor availing of the bank's CMS facility, the banker makes the funds available to the depositor on Day 1—on a clear funds basis. In case of high value clearing, the entire procedure takes place on the same day, i.e., Day 0—Day 0 basis. The case can be narrated with an example: The Hyderabad branch of XYZ Ltd. deposits checks (drawn on Hyderabad) in the Hyderabad branch of its CMS banker, the Corporation Bank, on January 1. The bank then sends the check for clearing to the local clearing house. Without waiting for the funds to be cleared, Corporation Bank credits the amount to the account of XYZ Ltd. in Mumbai, on January 2. Thus clear funds are made available to the cash manager for effective utilization.

Out-Station Clearing A check that is not drawn on the same location where it is deposited becomes an out-station check. In such a case, the banker of the company sends the check to the drawee bank on a collection basis. The collection (realization) of these cheques generally takes 5 to 20 days. To improve the collection cycle, the CMS banker arranges for a tie-up with other banks for correspondent banking.

However, the CMS banker makes available the funds to the corporate immediately without waiting for the check to be realized, on the strength of the creditworthiness of the company. The CMS banker discounts the check and gives credit to the client on Day 0—Day 1 basis, thus providing liquidity to the cash manager.

An Example

The Hyderabad branch of XYZ Ltd. deposits a check drawn on Ananthpur at the Hyderabad branch of its CMS banker—Corporation Bank—on January 1. The bank discounts the check and gives credit to the central account of the company at Mumbai on January 2. The Hyderabad branch of Corporation Bank sends the check to its Ananthpur branch for realization through courier. The Ananthpur branch receives the check on January 4 and presents the same in the local clearing on the same day. If the check is not returned by the paying banker within the stipulated period, on January 6 (i.e., Day 2 considering January 4 as Day 0—the day on which the check is deposited for local clearing) the Ananthpur branch of Corporation Bank passes on the credit to the Hyderabad branch, which then marks the check as realized. In case the check is dishonoured, the Ananthpur branch returns the check to the Hyderabad branch and the latter debits the account of the company.

ISSUES CONCERNING THE CASH MANAGER

The CMS banker charges a fee to the company for the service rendered. The fee for collection of local checks is very minimum, which could range from 5 paise to 50 paise per Rs 1,000 collected. The fee varies from location to location—the metro and RBI clearing centers being the cheapest. In case of out-station checks, the fee could range from Rs 2 to Rs 10 per Rs 1,000 collected. The fees are often negotiable on the basis of volume of business provided to the CMS banker. Understanding this complexity of the clearing system is very important to a company. A corporate with a marketing strategy of rural penetration often collects a large volume of out-station checks. The collection of these checks is more costly and the fate of these checks needs to be carefully monitored by the company. A company with a strong brand and with the demand-pull strategy can dictate terms to its C & F agents or dealers, and can get payments done by way of demand drafts (DD). Thus the company can avoid utilizing out-station checks clearing facility to reduce the cost of collection.

A corporate can implement an effective cash management system only with effective coordination of its marketing, finance and accounts functions/departments. Lack of coordination within the company pulls up the cost.

B. Electronic Payment System

The RBI has introduced two prevalent modes of electronic payment service:

1. **Electronic Clearing Service (ECS)** In ECS (credit clearing) the corporates makes multiple payments (single debit, multiple credits) electronically instead of issuing a large volume of paper instruments. The system is well-suited for transactions such as issuing of dividend warrants, interest payments, etc. The minimum volume for payment is 2,500 transactions per settlement and the maximum limit is Rs 50 lac per transaction. This service is available in 46 Indian cities.
The ECS (debit clearing) is well-suited for utility companies, where they collect a large volume of small-value payments (single credit, multiple debits) from their customers. Maximum limit for such transactions is Rs 50 lac. This service is available in 15 Indian cities.
2. **Electronic Funds Transfer (EFT)** It is the most economical and the fastest way for inter-bank, inter-city funds transfer. Though the service is available in 13 cities in India, the usage is limited due to lack of awareness, confidence and resistance from banks.

Euromoney recently conducted a poll among financial officers at 3,000 non-financial corporates, and 415 replied from 40 countries. The respondents were asked to indicate which three banks, in their opinion, provided the overall best cash management services. The banks were asked to rate on a scale of 5, with 1 being excellent and 5 being very poor (results in Exhibit 16.8).

Exhibit 16.8 The Euromoney cash management poll (overall ranking)

Rank	Bank
1	Citigroup
2	Deutsche Bank
3	HSBC Group
4	ABN Amro
5	Bank of America
6	J P Morgan Chase
7	Standard Chartered
8	ING Group
9	BNP Paribus
10	ANZ Bank

Source: *Euromoney*, Jan 2003.

IN CONCLUSION

Cash management is a worthwhile activity; there is no dispute about that. Yet, this needs to be explicitly incorporated in the day-to-day functioning of a company, for which the following guidelines could be useful:

- Measure the cash flow timeline and assess the magnitude of savings that could result from alternative management strategies. Very few executives do this.
- Conduct on-going analysis of whether or not to take cash discount offered by suppliers.
- Release cheques according to payables policy.
- Exploit mail and presentation float by judiciously choosing the day of the week, time of the day, location of release.

- Resolve billing problems quickly.
- Develop regular schedule to follow up delinquent accounts.
- Computerize wherever required.
- Accelerate issue of invoice.
- Improve credit management.
- Negotiate better payment terms.
- Compare the length of timeline with that of other companies in the industry or standards set by the company.
- Assign responsibility to specific individuals and hold them responsible for unfavorable deviation from standards.
- Do not permit cash to stand idle for as much as a day.
- Banks are an important part of the cash system. Develop long term relationships with them.
- Make every effort to speed up the flow of funds.
- Pay bills only when they fall due and instruct personnel in field offices to do the same.

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QUESTIONS

1. Prepare a cash forecast. The sales forecasts for Jan, Feb and March are as shown:

Jan: Rs 26 crore

Feb: Rs 28 crore

March: Rs 24 crore

April: Rs 30 crore

The company has historically experienced the following collection pattern: 50 percent in the month of sales, 30 percent in the following month, and 15 percent in the second month. Bad debt losses are 5 percent. Expenses for raw material are 50 percent of the sales, with 40 percent paid in the month of consumption and the rest in the following month. Salaries and wages amount to Rs 1 crore per month. Expenses for selling, administration and general expenses are Rs 155 lac per month.

2. A company receives cheques worth Rs 8 lac every day, and it issues cheques for Rs 2 lac. If cheque realization periods are 8 days and 5 days respectively, what will be the cash balance after 15 days? Assume that the initial cash balance is Rs 12 lac.
3. How would you quantify the benefits of operating a lock box system?
4. Explain the terms: deposit float, disbursement float, riding the float, and cash flow timeline.
5. How is a cash forecast different from a cash budget?
6. Explain the salient features of a lockbox system.
7. A company collects, on an average, Rs 80 lac every day. The company is contemplating on instituting a lock box system. The new system could reduce its overall collection time by 3½ days. The system costs Rs 2.4 lac. Would you recommend the implementation? What is the saving under the new system? The company can make 15 percent on its investment.
8. A company had sales of Rs 40,000 in February, and Rs 60,000 in March. Forecast sales for April, May and June are Rs 70,000, 100,000 and 90,000 respectively. The current cash balance as on April 1, is Rs 5,000. Estimate the ending cash balance after 3 months after referring to the following data:
 - 10 percent sales is for cash, 60 percent receivables to be collected after 1 month and 30 percent after 2 months.
 - Other income in each month is Rs 3,000
 - Purchases were Rs 50,000, 80,000, 100,000, and 90,000 respectively for February through June. Thirty percent of purchase is for cash, 60 percent will be paid in the following month and 10 percent after two months.
 - Wages and salaries represent 5 percent of the previous month's sales.
 - Monthly rent = Rs 2,500.
 - Dividends amounting to Rs 3,400 to be paid in May.
 - Taxes amounting to Rs 5,800 to be paid in April.
 - Capital expenditure of Rs 500 to be incurred in June.

Excellent Manufacturing receives cheques worth Rs 4 crore from its customers every day, and it takes about 3 days to clear the same. It pays out Rs 3 crore every day, and the customers take 4 days to clear them. Estimate processing and disbursement float for the company.

Chapter 17

Receivables Management

OBJECTIVES

- ◆ Know the motivations for credit sales and their impact on profit.
- ◆ Know how to assess credit risk of selling goods on credit.
- ◆ Know the credit practices in the tourism industry.
- ◆ Know the components of credit policy and how to manage them.

Fort Aguada Beach Resort (FABR) and The Aguada Hermitage (AH) built into the ramparts of a 16th century Portuguese fortress, called Aguada Fort, are part of Indian Resorts Hotels Limited (IRHL). Incorporated in 1972, the company is part of the Taj Group of Hotels. Its main objective is to carry on the business of hoteliering and catering. To achieve this objective the company entered into an operating agreement with its promoter company Indian Hotels Company Limited (IHCL).

IRHL, under the agreement with IHCL, receives support in the areas of recruitment of personnel, operational policies, pricing policy, publicity and advertising, sales and reservations, expansion, etc.

IHCL owns and operates a hotel in Goa, called Taj Holiday Village (THV), which is adjacent to FABR and AH. Though THV is not part of IRHL, they are offered as a package of three hotels in three different price segments—with THV being the least expensive and AH, the most expensive. The three hotels share common facilities like health club, sports facilities, restaurants, etc. Thus these hotels offer a wide range of staying and pricing options to the tourists and, hence, facilitate business rather than act as competitors.

Currently IRHL owns and operates FABR, AH and an air catering unit—all located in Goa. The company's business is highly dependent on external factors relating to the arrival of visitors. Factors such as political instability, disruption in law and order, and regional disturbances could greatly affect international and regional traffic into India/Goa and, consequently, the occupancy of hotels. The government's policies pertaining to the tourism and hotel industry also have a significant effect on the company's business.

THE TOURISM INDUSTRY IN GOA

Tourism is India's third largest export industry after readymade garments, and gems and jewelry. The most significant feature of the tourism industry is its capacity to generate large-scale employment opportunities. From a small beginning in 1961, tourist traffic to Goa has increased by leaps and bounds to now correspond

with the population of the state (12 lac approximately). The luxury beach resort hotels have very good occupancy in the peak tourist season of October–March. Indian tourists and businesses account for the business during the rest of the year. IRHL is the only 5-star luxury beach resort in north Goa. Other hotels/resorts like Majorda Beach Resort, Goa Renaissance, The Leela Beach, etc., have similar facilities in south Goa. With no other beach resort coming up in the vicinity in the near future, the company is uniquely placed to face the competition from other beach resorts.

Credit facilitates sales. It is valuable to customers as it augments their resources. Accounts receivables arise out of selling goods on credit to customers. The value of goods sold on credit appear as accounts receivable under the current assets in the balance sheet at the end of the accounting year and appear as accounts payable on the balance sheet of the customer. Many companies sell goods on credit. Given below is an excerpt from the balance sheet of Reliance Industries Limited (RIL), which had Rs 601.42 crore in receivables in 1996–97.

(1996–97; Rs crore)

<i>Current assets</i>	
Interest accrued on investment	60.33
Inventories	1,085.36
→ Sundry debtors	601.42
Cash and bank balances	863.75
	2,610.86

In many companies receivables management is restricted to phone calls by clerks in the sales department, or to customer enquiry by sales personnel. It is important to understand that a sale unpaid has an implicit cost. If it costs 13 percent for a company to borrow; an unpaid sale of Rs 10 lac costs Rs 13,000 per annum in interest expense or $\text{Rs } 13/12 \times \text{Rs } 10 \text{ lac}$ per month. Yet, executives do not pay attention to receivables management. The reason is simple: sales executives focus on booking sales whereas credit information rests with accounting personnel. They live in different worlds.

Motivations for Credit Sales

Three major motivating factors may be traced to the credit granting decision:

1. Selling on credit usually induces customers to buy more. The growth in sales revenue is usually considered a healthy situation.
2. As sales increase, profits generally increase as long as the benefit of granting credit exceeds costs.
3. Credit sales could be a potential marketing tool. Other things remaining constant, credit terms could be used to differentiate from competitors or match the industry norms.

This chapter has three sections: assessing credit risk, designing a credit policy and impact of extending credit on profit.

Cost of Extending Credit

Three types of costs are involved in maintaining receivables: cost of financing receivables, administrative and collection expenses, and bad debt losses.

Receivables must be financed from current income or new debt or equity. Money doesn't come free. There are costs attached to these. Firms will have to incur capital expenditure on computing equipment to maintain sales ledger, pay salaries to clerks and other personnel for follow up action, pay rent, etc. These are the administrative expenses. All customers may not pay on or before the due date. Some collection efforts are required to prompt them, which involves additional expenditure. Some of the accounts may turn bad resulting in bad debt losses. The effect of granting credit on profits is rarely understood. The following numerical, considering three companies, illustrates the same:

	<i>Company A</i>	<i>Company B</i>	<i>Company C</i>
Sales	1.2 lac	1.8 lac	2.1 lac
Credit period	60 days	90 days	120 days
Debtors	20,000	45,000	70,000
EBIT	6,000	9,000	10,500
Cost of financing @ 13 percent p.a. i.e., 1.08 percent p.m.	2.16 percent or Rs 432	3.25 percent or Rs 1,463	4.33 percent or Rs 3,033
PBT	5,568	7,537	7,967

Company A sells on 60-day credit, B on 90-day credit, and C on 120-day credit. As demonstrated by the illustration, net profit decreases when credit period is extended to 120 days, because the cost of financing outweighs the increase in profit on additional sales.

Credit Terms

These are terms of the sales that define credit variables like number of days of credit, percentage of discount on selling price for prompt payment, and penalty for extension of credit period. A number of factors affect a company's credit terms:

- *Nature of product and industry.* In capital equipment businesses like industrial boilers, customers typically make an advance payment to the company to manufacture a custom-built boiler. At the other extreme, customers get three months' credit or deferred payment in some businesses. Most companies fall in this continuum. In case of hotels, customers pay concurrently as and when they consume service.
- *Credit terms of the company's suppliers.* Companies that get generous credit from suppliers would be able to pass on at least a part of the benefit to their customers.
- *Cash flow position of the company.* A company facing a cash crunch would be working towards accelerating receipts rather than decelerating. So we would expect a company facing cash flow problems to enforce stricter credit terms.
- *Structure of the industry.* In a buyer's market, other things remaining constant, a company may have to extend credit just to match competition.
- *Volume of sales involved.* The higher the offtake, the more generous would be the credit terms.
- *Cost of capital for the company.* A company can offer credit if the cost of capital is less than the benefits of sale. A higher cost of capital would discourage a company from offering credit.
- *Character of the customer.* Previous experiences with a customer tend to get reflected in the attitude of the company. Customers who make prompt payments get better terms than delinquent customers.

The sale may require a company to make payment in advance, or on receipt of invoice/delivery of goods or after delivery at some specified point in future. Cash discounts are generally offered on invoice price if

payment is made within the specified period. For instance, 2/10 Net 30 implies that 2 percent discount is offered if payment is made on or before ten days; otherwise the payment is due in 30 days. The benefit of receiving early payment outweighs the cost of cash discount offered. In other words, the consideration in offering the cash discount is the financing cost saved on the 20 days against the cost of cash discount.

BACK TO FABR: COLLECTION PROCEDURE IN THE HOTEL INDUSTRY

Hotels generate revenue from the following sources:

- Room rent
- Restaurants
- Room service
- Miscellaneous services like:
 - Laundry
 - Telephone/fax
 - Taxi hire
 - Health club
 - Shop
 - Conference

Rooms are reserved on behalf of the guests by travel agents or companies. Very few guests come directly to the hotel. The guests who come through various sources get different rates, depending on the packages offered to them by different travel agents/companies and by FABR's offices in Mumbai. When a guest checks out, a copy of the bill is presented. The bill is sent for collection to the concerned party depending on the mode of payment already decided (travel agent/company and check/credit card). Credit for the rooms is given to almost everyone. Cash sales form around 25 percent of the total income.

Restaurants are where the hotel guests can pay either in cash or by credit card.

Room service is almost similar to that offered in restaurants with respect to its collection process.

If any bill is a credit bill it is sent to the credit section of the accounts department where it is checked for any discrepancy. This usually takes about one to three days. All the bills are sent by courier for collection. By the time the bill reaches the party for payment it takes around four to five days, from the time the guest checked out. Credit sales account for a large chunk of total sales of FABR, similar to any other business. On an average the company has around 75–85 percent of total sales as credit sales. There are some 400+ customers of different categories (airlines, conferences, companies, travel agents, etc.) who constitute the debtor list.

Assessing Credit Risk

In competitive markets it might not be possible to confine to AAA rated customers. If all companies fight for a limited number of high creditworthy customers, who will sell to those who come under the risky category? We need to define risk parameters and conditions under which a company can trade with these marginal customers. Sound assessment of credit risk leads to fair assessment of probability of loss and the follow-up action required. Companies spend a great deal of time and money in follow-up activities. These efforts can be saved if one knows what one is getting into. This point is rarely appreciated or adequately reflected in the

selling decision. Faith in the customer usually blurs the credit granting decision unless the company has a trading history to fall back on. Usually sales executives are appraised on the volume of sales generated and not on the 'successful sales'. A salesman is successful only if he collects dues within the notified period.

Some of the elementary ways of assessing credit risk are:

- Obtaining bank reference (without the customer's knowledge),
- Obtaining reference from other reliable third parties,
- Financial statement analysis, and
- Obtaining formal credit rating from agencies such as Dun & Bradstreet, Duff & Phelps.

Analysis of profitability, solvency and activity ratios can provide useful insight into the financial performance of the customer in question.

Bad Debts

Delinquent accounts are called bad debts. When there is reasonable certainty that a customer will not pay dues, it is prudent to write off the amount as bad debt loss. A company may have a policy of charging off a fixed percentage of credit sales—say 2 percent—as bad debts at the end of the accounting year, or perform an analysis of all the accounts to ascertain the exact amount of bad debts. Selling goods on credit to high-risk customers may increase sales but it will also depress profits if the account terms are bad. It is of course possible that a bad debt may turn good at a later point in time. But conservatism requires a company not to book profits until they are reasonably certain.

The impact of bad debt on profit will not be the same for all companies. It depends on the cost structure, more specifically, the operating leverage. A company that has high amount of fixed costs gains by selling to marginal customers (assuming that fixed costs have been recovered already). Every rupee of sales recovers variable costs and contributes to profits.

A company that has high variable costs doesn't profit much from selling to marginal customers. Any bad debt loss will offset the increase in revenue.

Aging Schedule

Consider a company that has the following receivables pattern:

Month	Receivables (Rs lac)	Rs lac (percent)			
		0	1	2	3
May	35.0	21 (60)*	3.5 (10)	7 (20)	3.5 (10)
June	40.0	26 (65)	6 (15)	5 (12.5)	3 (7.5)
July	42.0	25 (59)	7 (16)	6 (14)	4 (9.5)
August	45.0	28 (62)	9 (20)	5 (11)	3 (7)

* Figures in brackets indicate receivables as a percentage of the total receivables outstanding in that month.

The aging schedule provides a snapshot of receivables outstanding for various periods. As shown in the aging schedule, in May, the total receivable outstanding was Rs 35 lac, of which 10 percent was overdue for 3 months, 20 percent for 2 months and 10 percent for 1 month.

For the purposes of monitoring, the data available in the aging schedule could be converted into measures of effectiveness of credit policy like average collection period and Days Sales Outstanding (DSO).

If the company has annual sales of Rs 486 lac, average daily sales is $(486/365)$ 1.33 lac.

$$\text{DSO in May} = 35/1.33 = 26.3 \text{ days}$$

$$\text{DSO in June} = 40/1.33 = 30 \text{ days}$$

If DSO is within the normal limits specified by the company, the situation is considered normal. Otherwise, follow up action needs to be taken. A variant of DSO, the Average Collection Period (ACP), measures the average number of days required to realize cash.

$$\begin{aligned} \text{ACP} = & (\text{Proportion of customers taking cash discount} \times \text{Discount period}) \\ & + (\text{Proportion of customers not taking cash discount} \times \text{Credit period}) \end{aligned}$$

Thus, under a 1/10 Net 30 credit policy, if 30 percent customers take discount, ACP

$$= (0.3 \times 10 + 0.7 \times 30) = 24 \text{ days}$$

The ACP for Fort Aguada Beach Resort, for the period 1992–97, is shown in Exhibit 17.1.

Exhibit 17.1 Average collection period for Fort Aguada Beach Resort

Particulars	31/03/92	31/03/93	31/03/94	31/03/95	31/03/96	31/03/97
Sales (Rs in lacs)	882	1,074	1,302	1,290	1,727	1,799
Credit sales (Rs in lacs)	661	805	977	968	1,295	1,349
Receivables (Rs in lacs)	223	241	328	226	324	304
ACP (No. of days)	122	108	121	84	90	81

The ACP has come down from 122 days in 1992, to 81 days in 1997; which suggests that collection has improved over the years. But when compared with the target of 30 days, the ACP is still too high. FABR uses the aging schedule to control receivables. The aging schedule is prepared every month and used for follow-up. Exhibit 17.2 presents the aging schedule for 1996 and 1997.

Exhibit 17.2 Aging schedule

	(in Rs)		Percentage value	
	31/03/1996	31/03/97	31/03/96	31/03/97
<=30	13,581,047	13,074,259	40	44
30<CP<=60	8,108,420	7,216,717	24	24
60<CP<=90	6,491,036	4,014,079	19	13
90<CP<=120	566,552	1,333,748	5	4
120<CP<=150	980,771	1,665,463	6	6
150<CP<=180	670,612	327,987	2	1
180<CP<=360	252,287	45,630	1	0
360<CP	720,733	2,347,151	5	8
Total	34,371,458	30,025,034		

The aging schedule shows that about 40 percent of receivables are in the less-than-30-days category (in 1996)—which is a good sign. The schedule also shows that about 37 percent customers are in the less-than-90-days category (in 1997)—which is a cause for concern.

Classification of Customers

Customers can be classified into various risk categories (Exhibit 17.3) on the basis of creditworthiness. Customers may be placed into five or six categories so that credit limit and follow up action may be tailored suitably. A company could follow a credit rating system adopted by agencies like CRISIL.

Exhibit 17.3 Classifications of customers

Category	Symbol	Explanation
Negligible risk	AAA	Companies with reputation for prompt payment. Strong market and financial position Cash rich Governmental organizations
High safety	AA	Credit risk marginally lower than AAA customers
Adequate	BBB	Companies which are normally prompt.
Risky	BB	Companies in extreme volatile businesses, profitability based on dubious schemes, etc.
High risk	C	Companies in distress, financial reorganization

Each customer may be awarded a symbol (Exhibit 17.3). It is quite possible that customers may jump from one category to another due to improvement or deterioration in financial condition. This calls for up-gradation of classification at periodic intervals. Formal guidelines may be developed to guide executive decision-making. For instance, a company may restrict itself to the first two or first four categories—based on its risk-taking ability. It is important to communicate the company's policy to executives who actually transact. In the absence of guidelines executives may grant credit to companies with dubious record. The amount involved in each trade may be small at the individual level. At the aggregate level, the amount is involved could be substantial forcing a company into distress. In 1997, FABR had 409 debtors. In the classification of these debtors into different risk categories on the basis of their standing in the different age group (Exhibit 17.4), customers are classified into four categories: Normal, Low Risk, Medium Risk and High Risk. The classification suggests that about 21 percent customers fall in the high-risk group and another 21 percent fall in the medium risk group.

Exhibit 17.4 Risk classification of the customers of Fort Aguada Beach Resort

Category	Credit period	Percentage
Normal	30 \geq CP	31
Low risk	30 < CP \leq 60	27
Medium risk	60 < CP \leq 120	21
High risk	120 < CP	21
Total		100

Components of Credit Policy

A firm's credit policy has four variables: credit period, cash discount, credit standard and collection effort. Changing any of these variables will require additional investment. For instance, lengthening the credit

period from 30 days to 45 days, with the objective of increasing sales, involves additional investment in receivables. Some customers may not pay dues resulting in bad debt losses. So an analysis of the credit policy essentially involves comparison of incremental benefits and incremental costs of the new policy. Initially, we will treat the four variables as independent and ascertain their impact on profit. Once the impact of altering any of these variables is clear, we would be in a better position to understand their combined impact.

CREDIT PERIOD

Lengthening the credit period will generally induce new customers to buy. Existing customers may increase their offtake. The increase in credit period requires additional investment in receivables. There will be an increase in profits due to increase in sales. There may or may not be additional bad debt losses depending on the creditworthiness of new customers. If we assume that fixed costs have already been recovered or no additional fixed costs will be incurred, each rupee of sales contributes to the recovery of variable cost and profit. Consider the data given here:

$$\begin{aligned}
 &\text{Current sales} = \text{Rs } 100 \text{ crore} \\
 &\text{(ACPo) Credit period} = 30 \text{ days} \\
 &\text{Cost of capital} = 15 \text{ percent} \\
 &\text{(ACPn) Proposed credit period} = 45 \text{ days} \\
 &\text{Anticipated increase in sales} = 10 \text{ percent} = \text{Rs } 10 \text{ crore} \\
 &\text{Contribution/sales} = 0.2 \\
 &\text{Additional profit on new sales} = \text{new sales} \times \text{C/S ratio} \\
 &\quad = \text{Rs } 10 \times 0.2 \text{ crore} \\
 &\quad = \text{Rs } 2 \text{ crore}
 \end{aligned} \tag{i}$$

Increase in receivable on existing sales:

$$\begin{aligned}
 &\frac{(\text{ACPn} - \text{ACPo}) \times \text{current sales}}{360} \\
 &\quad = \frac{15}{360} \times 100 \text{ crore} \\
 &\quad = \text{Rs } 4.2 \text{ crore}
 \end{aligned} \tag{ii}$$

Investment in receivable on new sales:

$$\begin{aligned}
 &= \text{New receivables} \times \frac{\text{Variable cost}}{\text{Sales}} \\
 &= \text{New sales} \times \frac{45}{360} \times \frac{\text{Variable cost}}{\text{Sales}} \\
 \text{But, } V/S &= (1 - C/S) \\
 &= \text{Rs } 10 \text{ crore} \times \frac{45}{360} \times 0.8 \\
 &= \text{Rs } 1 \text{ crore}
 \end{aligned} \tag{iii}$$

$$\begin{aligned}\text{Total new investment in receivables} &= \text{Increase in receivables} \times \text{Cost of capital} \\ &= 5.2 \times 0.16 = \text{Rs } 0.832 \text{ crore}\end{aligned}$$

Since additional profit (Rs 2 crore) is greater than additional cost of maintaining receivables, the lengthening of credit period should be considered. FABR extends a credit period of 15 days. But as competition becomes intense, FABR is forced to give longer credit periods.

CASH DISCOUNT

The purpose of offering cash discount was briefly discussed earlier. A credit term of 1/10, Net 30 implies that 1 percent discount is offered if the payment is made by the 10th day—otherwise the payment is due by the 30th day. The benefits of offering higher discount are:

- Customers may pay up early to avail cash discount. So the cost of maintaining receivable decreases.
- Additional sales may be generated resulting in profits.

The costs are:

- Additional cash discount to be paid.
- Additional investment in receivables arising out of new sales.

If a company's cost of capital is 16.5 percent, the average credit sales is Rs 10 crore.

The terms of sale are: 2/10 Net 45.

The seller will receive:

- Rs 10 crore less discount of 2 percent on day 10; or
- Rs 10 crore on day 45.

The PV of (a) is:

$$\frac{10 \text{ crore } (1 - 0.02)}{[1 + (10/365) \times 0.165]} = \text{Rs } 9.756 \text{ crore} \quad (1)$$

The PV of (b) is:

$$\frac{10 \text{ crore}}{[1 + (45/365) \times 0.165]} = \text{Rs } 9.8 \text{ crore} \quad (2)$$

$$\begin{aligned}\text{Net benefit} &= (2) - (1) \\ &= \text{Rs } 0.044 \text{ crore}\end{aligned}$$

Consider an extended example:

$$\begin{aligned}\text{Current sales} &= \text{Rs } 100 \text{ crore} \\ \text{Current credit policy} &= 1/10, \text{ Net } 30\end{aligned}$$

$$\begin{aligned}
 \text{C/S ratio} &= 0.2 \\
 \text{Cost of capital} &= 16 \text{ percent} \\
 \text{New credit policy} &= 2/10, \text{ Net 30} \\
 \text{Anticipated increase in sales} &= 10 \text{ percent} \\
 &= \text{Rs } 10 \text{ crore}
 \end{aligned}$$

40 percent of customers are availing cash discount now.

60 percent of customers are expected to avail cash discount.

Assume that the average collection period remains the same at 20 days.

$$\begin{aligned}
 \text{Profit on new sales} &= \Delta \text{ Sales} \times \text{C/S} \\
 &= 10 \text{ crore} \times 0.2 \\
 &= \text{Rs } 2 \text{ crore}
 \end{aligned} \tag{3}$$

$$\begin{aligned}
 \text{Current discount} &= 100 \times 0.4 \times 0.01 \\
 &= \text{Rs } 0.4 \text{ crore}
 \end{aligned} \tag{4}$$

$$\begin{aligned}
 \text{New discount} &= 110 \times 0.6 \times 0.02 \\
 &= \text{Rs } 1.32 \text{ crore.}
 \end{aligned} \tag{5}$$

$$\begin{aligned}
 \text{Additional cash discount} &= (3) - (2) \\
 &= 1.32 - 0.4 = \text{Rs } 0.92 \text{ crore}
 \end{aligned} \tag{6}$$

Cost of capital tied up in new receivables:

$$\begin{aligned}
 &= \text{Rs. } 10 \text{ crore} \times \frac{20 \text{ days}}{360 \text{ days}} \times 0.6 \times 0.16 \\
 &= \text{Rs } 0.053 \text{ crore}
 \end{aligned} \tag{7}$$

$$\begin{aligned}
 \text{Incremental cost} &= (4) + (5) \\
 &= \text{Rs } 0.92 \text{ crore} + \text{Rs } 0.053 \text{ crore} \\
 &= \text{Rs } 0.973 \text{ crore}
 \end{aligned}$$

$$\text{Benefit} = \text{Rs } 2 \text{ crore}$$

Since the benefit exceeds cost, the new policy should be adopted. The increase in profit/sale and reduction in collection period should be significant to justify a change in policy.

The benefit of offering a discount, from the seller's perspective, is receiving the funds earlier; while the cost is the discount given to the buyer to encourage early payment. A company offering cash discount would want to know the likely outflow due to cash discount.

$$\begin{aligned}
 \text{Outflow due to cash discount (in rupees)} &= [\text{Percentage of customers opting for cash discount}] \\
 &\quad \times [\text{Credit sales}] \times [\text{Percentage discount}]
 \end{aligned}$$

One could look at past data to assess the percentage of customers opting for cash discount. Suppose, if historically, 40 percent customers have opted for cash discount on a sale worth Rs 1 crore, a 2 percent discount would lead to an outflow of:

$$\begin{aligned}
 &= 0.4 \times \text{Rs } 1 \text{ crore} \times 0.02 \\
 &= \text{Rs } 80,000
 \end{aligned}$$

Buyer's Perspective

Suppose the credit term is 2/10 Net 45. The cost of short-term funds for the company is 11 percent. The terms imply that the buyer can either make payment in 10 days and receive 2 percent discount, or pay within 45 days thereby forgoing cash discount.

$$\text{Cost of forgoing discount in rupees} = \text{Discount} \times \text{Selling price} \quad (\text{a})$$

$$\text{Financing recd. if discount is taken} = (100 - \text{Discount}) \text{ Price} \quad (\text{b})$$

$$\text{Rate per period} = \frac{\text{Rupee cost}}{\text{Financing received}}$$

$$= \frac{D \times P}{(100 - D) P}$$

$$= \frac{D}{100 - D}$$

$$\text{Financing period} = \text{Payment period} - \text{Discount period} \quad (\text{c})$$

$$\text{No. of periods per year} = \frac{\text{Days per year}}{\text{Financing period}}$$

$$= \frac{365}{\text{Payment period} - \text{discount period}} \quad (\text{d})$$

$$\text{Annual interest rate} = \text{Rate per period} \times \text{No. of periods}$$

$$= \frac{D}{100 - D} \times \frac{365}{\text{Pay period} - \text{discount period}}$$

$$\text{Effective cost of discount} = \frac{D}{1 - D} \times \frac{365}{N - T}$$

where

D = Discount in decimal form,

N = Credit period, and

T = Discount period.

$$\begin{aligned} \text{Effective cost of discount} &= \frac{0.02}{1 - 0.02} \times \frac{365}{45 - 10} \\ &= 21.2 \text{ percent} \end{aligned}$$

The company should accept the discount, as the cost of not taking the discount (21.2 percent) is much higher than the cost of short-term funds (11 percent). It will be better off borrowing short-term at 11 percent, and taking the discount.

CREDIT STANDARDS

Credit standards are norms prescribed by the company and pertaining to the creditworthiness of its customers. One company may have the policy of extending credit to only those customers with the highest credit rating.

Another company may be relatively generous in extending credit to the marginal customers. Extending credit to the less creditworthy increases sales volume, but the probability of bad debt loss also increases. The increase in profit on new sales should outweigh the cumulative bad debt losses to justify the relaxation of credit standards.

To illustrate, a company that currently restricts it to the first two categories (described earlier) could relax the standards by selling to customers under the next two categories.

The consequence of relaxing standards, are:

- The incremental profit on incremental sales,
- New investment in additional receivables, and
- Increase in bad debt losses.

Consider the following data:

Current sales = Rs 100 crore
 Anticipated increase in sales = 10 percent
 C/S = 0.2
 Cost of capital = 16 percent
 Anticipated bad debt loss = 10 percent of new sales
 Average collection period = 30 days

(a) Incremental profit on new sales:

$$\begin{aligned} &= \text{New sales} \times C/S \\ &= 10 \text{ crore} \times 0.2 = \text{Rs } 2 \text{ crore} \end{aligned}$$

(b) Cost of financing increment receivables:

$$\begin{aligned} &= \text{Cost of capital} \times \text{Investment in receivables} \\ &= \text{Cost of capital} \times (\text{Receivables} \times V/S) \\ &= \text{Cost of capital} \times \Delta \text{ Sales} \times \text{ACP}/360 \times V/S \\ &= 0.16 \times 10 \text{ crore} \times 30/360 \times 0.8 \\ &= \text{Rs } 10.6 \text{ lac} \end{aligned}$$

(c) Additional bad debt loss:

$$\begin{aligned} &= 0.1 \times \text{Rs } 10 \text{ crore} \\ &= \text{Rs } 1 \text{ crore} \end{aligned}$$

Incremental cost = Rs 110.6 lac

Incremental benefit = Rs 200 lac

Therefore, the new policy should be accepted.

An Illustration

A company currently has a 2/10 Net 35 policy. The marketing executives of the company propose to change the credit policy. Details of current policy are given below.

Current sales = Rs 10 lac
 Current credit terms = 2/10 Net 35
 Current bad debt loss = 1 percent of gross sales
 60 percent of customers who pay take the discount

[i.e. $(0.99 \times 0.6 = 0.594)$ 59.4 percent of all customers]

ACP = 20 days

Variable costs = 70 percent of sales

[i.e., $V/S = 0.7$ ($1 - V/S = C/S = 0.3$)]

Cost of capital = 15 percent

There is productive capacity to support 40 percent increase in sales.

New Policy

The new policy involves more liberal attitude towards granting credit. Here is a summary of the new policy:

- New credit term = 3/10, net 60
- More liberal attitude towards granting credit
- Anticipated increase in sales = 20 percent (Rs 2 lac p.a.)
- New ACP = 35 days
- 50 percent of the paying customers will take the discount
- Bad debt loss = 5 percent of total sales

New sales = Rs 12 lac

The desirability of moving towards a new policy can be assessed by comparing the costs and benefits of relaxing credit standards.

$$\begin{aligned} (a) \text{ Profit on new sales} &= \text{Rs } 2 \text{ lac} \times C/S = 2 \text{ lac} \times 0.2 \\ &= \text{Rs } 0.4 \text{ lac} = \text{Rs } 40,000 \end{aligned}$$

$$\begin{aligned} (b) \text{ Current cash discount} &= \text{Rs } 10 \text{ lac} \times 0.594 \times 0.02 \\ &= \text{Rs } 11,880 \end{aligned}$$

$$\begin{aligned} \text{Cash discount under proposal policy} &= (0.95 \times \text{Rs } 12 \text{ lac}) \times 0.5 \times 0.03 \\ &= \text{Rs } 17,100. \end{aligned}$$

$$\text{Increase in cash discount} = \text{Rs } 17100 - 11850 = \text{Rs } 5,220$$

$$(c) \text{ Current bad debt loss} = 1 \text{ percent of } 10 \text{ lac} = 0.01 \text{ lac} = \text{Rs } 10,000$$

$$\text{New bad debt losses} = 5 \text{ percent of } 12 \text{ lac} = 0.06 \text{ lac} = \text{Rs } 60,000$$

$$\text{Increase in bad debt losses} = \text{Rs } 50,000$$

Old credit period = 35 days

New credit period = 60 days

Old ACP = 20 days

New ACP = 35 days

$$(d) \text{ Additional receivables} = \frac{\text{Increase in revenue} \times \text{collection period}}{360}$$

$$\begin{aligned}
 &= \text{Rs } 2 \text{ lac} \times \frac{35}{360} \\
 &= \text{Rs } 19,444 \\
 \text{Investment in receivables} &= \text{Receivables} \times V/S \\
 &= 19444 \times 0.7 = \text{Rs } 13,610 \\
 \text{Cost of financing} &= 13610 \times 0.15 = \text{Rs } 2041
 \end{aligned}$$

(e) *Increase in receivables on existing sales*

$$\begin{aligned}
 &= (\text{ACP}_N - \text{ACP}_O) \times \text{Sales}/360 \\
 &= 15/360 \times \text{Rs } 10 \text{ lac} \\
 &= \text{Rs } 41,666
 \end{aligned}$$

Cost of financing the increase in receivables on existing sales

$$\begin{aligned}
 &= \text{Rs } 41666 \times 0.15 = \text{Rs } 6,250 \\
 \text{Cost of proposed policy} &= \text{Increase in cash discount} + \text{Increase in bad debt loss} \\
 &\quad + \text{cost of financing additional receivables} \\
 &\quad + \text{cost of financing the increase in receivables} \\
 &\quad \quad \text{on existing sales} \\
 &= \text{Rs } 5220 + 50000 + 2041 + 6250 \\
 &= \text{Rs } 60,511 \\
 \text{Profit} &= \text{Rs } 40,000
 \end{aligned}$$

Since the profit is less than the costs, the new policy should not be accepted.
Suppose there is a compromise policy.

$$\begin{aligned}
 \text{New credit terms} &= 3/10 \text{ Net } 45 \\
 \text{Increase in sales} &= \text{Rs } 1.1 \text{ lac or New sales} = \text{Rs } 11.1 \text{ lac} \\
 \text{Bad debt loss} &= 3 \text{ percent of sales}
 \end{aligned}$$

55 percent of paying customers will take the discount and the remaining 45 percent will pay on the 45th day.

$$\begin{aligned}
 \text{Average credit period} &= (0.55 \times 10) + (0.45 \times 45) \\
 &= 25 \text{ days}
 \end{aligned}$$

$$\begin{aligned}
 \text{(a) Profit on new sales} &= \text{new sales} \times C/S \\
 &= \text{Rs } 1.10 \text{ lac} \times 0.2 = \text{Rs } 22,000
 \end{aligned}$$

$$\begin{aligned}
 \text{(b) Current cash discount} &= \text{Rs } 11,880 \\
 \text{Cash discount under compromise policy} &= (0.97 \times 11.10 \text{ lac}) \times 0.55 \times 0.03 \\
 &= \text{Rs } 17,765.55 \\
 \text{Incremental cash discount} &= \text{Rs } 5,885.55
 \end{aligned}$$

$$\begin{aligned}
 \text{(c) Current bad debt losses} &= \text{Rs } 10000 \\
 \text{On compromise policy} &= 0.03 \times 11.10 \text{ lac}
 \end{aligned}$$

$$\begin{aligned}
 &= \text{Rs } 33,000 \\
 \text{Incremental bad debt loss} &= \text{Rs } 23,300 \\
 \text{Old ACP} &= 20 \text{ days} \quad \text{New ACP} = 25 \text{ days}
 \end{aligned}$$

(d) Increase in receivable on existing sales

$$\begin{aligned}
 &= (\text{ACP}_N - \text{ACP}_O) \times \frac{\text{Sales}}{360} \\
 &= (5 \text{ days}) \times \frac{\text{Rs } 10 \text{ lac}}{360} \\
 &= \text{Rs } 0.13 \text{ lac} \\
 \text{Cost of financing} &= 0.138 \times 0.15 \\
 &= \text{Rs } 0.02 \text{ lac}
 \end{aligned}$$

(e) Additional receivables

$$\begin{aligned}
 &= \text{Increase in revenue} \times \frac{\text{Average collection period}}{360} \\
 &= \text{Rs } 1.10 \text{ lac} \times \frac{25}{360} \\
 \text{Investment in additional receivables} &= [7638.88] \times V/S \\
 &= [7638.88] \times 0.7 \\
 &= \text{Rs } 5,347.20 \\
 \text{Cost of financing additional receivables} &= (5347.20) \times 0.15 \\
 &= \text{Rs } 802
 \end{aligned}$$

Since the costs of policy exceed benefits, the policy should not be accepted.

SURVEY RESULTS

A survey (Exhibit 17.5) of 200 randomly selected credit managers of American firms listed in *Business Week* Global 1000 (1996), suggests that credit scoring is done to determine whether to grant credit and aging schedule is used to monitor receivables.¹

Exhibit 17.5 *Business Week's* global 1000 (1996): Survey results
(Percentage of respondents)

In determining whether to grant credit we use:

Five Cs	2.2
Credit scoring	4.5
Ratio analysis	22.5
Other	11.2
More than one method	54.9
No answer	4.5

Exhibit 17.5 contd.

¹ Ricci, Cecilia Wagner (1999). 'A Survey and Analysis of Receivables Practices in American Corporations', *Financial Practice and Education*, Fall–Winter.

Exhibit 17.5 contd.

We forecast our receivables using

Percent sales	34.8
Receivables balance fraction	3.4
Linear regression	1.1
Internally developed model	23.6
Computer software	1.1
Other	6.7
More than one method	12.2
No answer	16.9

We monitor receivables with

Aging schedule	23.6
Bad debt (percent)	1.1
Exception reports	4.5
More than one	69.2
No answer	1.1

TWO EXAMPLES²

Escorts grants 30 days credit to Indian customers. The company applies ratio analysis, aging analysis while fixing credit limits. The credit terms are based on terms of sales of competitors and the terms followed by the company in the past. Ratios like receivables to sales, receivables to current assets, receivables to sales and average collection period are calculated to monitor receivables. The managing director and the chief of marketing determine the credit granting terms and collection policy.

GlaxoSmithKline (GSK) is a leader in pharmaceuticals/healthcare. Headquartered in the UK and with operations in the US, the company has an estimated 7 percent of the global pharmaceutical market.

GSK has leadership in four major therapeutic areas: anti-effective, central nervous system, respiratory and gastro-intestinal/metabolic. The company also has a consumer healthcare portfolio comprising OTC medicines, oral care products, and nutritional health drinks. Incorporated in 1958, the company went public in 1961 and became a part of the Beecham group in 1969. In March 1995, SKB consumer brands' company worldwide was renamed as SmithKline Beecham Consumer Healthcare (SBCH). In India, the parent operates through three companies: SmithKline Beecham Pharmaceuticals, SmithKline Beecham Consumer Healthcare and a 100 percent subsidiary, SmithKline Beecham Asia Pvt. Ltd.

Part of the SKB group, SBCH has been the market leader in the malted-milk drinks segment—with its Horlicks and Boost brands—for several years. The company purchased Maltova and Viva brands from Jagatjit Industries in 2000. Its other products include biscuits sold under the Horlicks and Boost brand names. SBCH also has the Aquafresh range of oral care products, and Crocin and Eno range of OTC products in its portfolio.

² Khan, M A (1999). 'Working Capital Management at Escorts', *Finance India*, Vol. 13, No. 1. I thank Vasudev Shenoy for his useful inputs on SmithKline Beecham.

The company recorded sales of Rs 858.34 cr in 2000 as opposed to Rs 705.66 cr in 1999. SBCH has two factories at Nabha (Punjab) and Rajahmundry (Andhra Pradesh) and five packing stations at Nabha, Kompally, Chennai, Ballabgarh, and Kolkata. The company operations are divided into four regions of north, south, east and west, with the corporate office located at Gurgaon. Depots and C&F agents fall under the regional offices, with each one catering to a large number of wholesalers.

SmithKline Beecham offers a 15-day credit to an upcountry wholesaler and 10-day credit in case of a metro wholesaler. The given time-line diagram shows the events in the chain:

Invoice Generation	Delivery of stock	Banking of cheque	Payment
Say, Dec 1	Dec 4	Dec 15	Dec 19

The company maintains the database of wholesalers in an ERP package. The system generates a list of wholesalers who need to be banked on a given day. The list specifies the name of the wholesaler, the code, the date of invoice generation, due date and invoice amount. The company's policy stipulates that there should be about 25 blank-and-signed checks from the wholesaler at any given point of time. Its system is configured to stop further release of goods from the depot if the number of checks falls below five.

RECEIVABLES SECURITIZATION

Companies constrained of cash on account of selling goods on credit may resort to what is known as securitization to realize cash. Securitization is a process by which illiquid assets can be transformed into liquid form and distributed to a broad range of investors through the capital market. It involves packaging of loans and receivables and the underwriting and sale of these packages to investors in the form of securities that are collateralized by the underlying assets and their associated income stream. A number of homogeneous receivables are pooled together to form a basket and then sold or 'passed through' to another institution called Special Purpose Vehicle (SPV). The assets are removed from the balance sheet of the originator. The SPV then un-bundles these units and sells them to investors. These securities are called pass-through certificates (PTC). The PTC is designed in such a way that the cash outflow in the form of interest and redemption of PTC synchronize with the aggregate inflow of interest and principal of the basket of loans. The securitization of Hire Purchase (HP) portfolio of TELCO by Citibank is an example of HP securitization.

IN CONCLUSION

It is important to understand the strategic role of credit policy in marketing. Other things remaining constant, credit policy could be used as a differentiating tool to achieve sales objectives. This chapter provides the analytic framework to analyze the impact of changing credit policy on profit. Of course, real-life situations could be more complex than what was outlined. So many things can go wrong in real life: bad debt losses may be higher than anticipated, the increase in sales may not meet projections, and the average collection period may deviate significantly from the estimate. The list can go on. The important message, then, is to work towards making it happen. That calls for communication to all concerned executives. The best way to obtain their consent is to involve them in the credit granting decision.

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QUESTIONS

1. Explain the terms:
 - 2/10 Net 30
 - 1/10 Net 45
 - Net 30
2. Refer to the data in the comprehensive illustration. What should be the level of sales to justify a switch to the new credit policy? At what cost of capital can the company switch to the new policy? Hold other variables constant. Come up with a new policy for the company assuming that the increase in sales will be the same as that under the new policy given in the question. Conduct an analysis of sensitivity of profits to changes in underlying policy variables.
3. What financial ratios would help the most in assessing creditworthiness?
4. Explain the following terms: average credit period, aging schedule, cash discount, and bad debt loss.
5. What does the aging schedule *not* tell you?
6. What factors affect the choice of credit policy variables like cash discount, credit period, and credit standards?
7. Write a two-page essay on 'Assessment of Credit Risk'.
8. A firm currently sells 10,000 all-terrain bicycles each at a price of Rs 4,000 each. The variable cost per cycle is Rs 3,520. The firm makes all sales on credit and average collection period is 36 days. If the firm adopts a more relaxed policy sales would increase by 10 percent and the ACP will increase to 60 days. If the cost of capital is 15 percent, would you recommend the relaxed policy?
9. A company currently sells goods on credit but offers no cash discount. The company is contemplating on offering a discount of 2 percent for payment prior to 15 days. The current ACP is 60 days; sales are 20,000 units; selling price is Rs 22 and variable cost is Rs 18. The company expects 70 percent of its customers to take cash discount if it initiated the new policy; sales to increase to 21,000 units; the ACP to drop to 45 days and bad debt expenses to remain at zero. If the cost of capital is 20 percent, should the company offer discount?
10. A company is contemplating a change in its credit policy that is expected to increase its bad debt expense from 1 percent to 3 percent of sales. Current sales are 25,000 units; selling price per unit is Rs 11 and the variable cost per unit is Rs 7. The firm expects to sell 27,000 units. For the same:
 - a. Calculate bad debts under the present and proposed plan
 - b. If the firm expects savings of Rs 3,500 from the proposed plan, would you recommend its implementation?
11. A company is considering lengthening its credit period from 30 to 60 days. The firm currently sells 15,000 units at Rs 3 each. The ACP is 40 days; bad debts are ½ percent; variable cost is Rs 2.30. The change in credit period is expected to increase sales to 17,000 units; the bad debt expense to 2 percent and increase ACP to 72 days. If the cost of capital is 18 percent, would you recommend the change?
12. A company currently sells 72,000 units at Rs 32 each. Other data:
 - Current bad debt expense = 3 percent
 - Collection expenditure = Rs 20,000
 - ACP = 58 days
 - Variable cost = Rs 25

The company is contemplating on spending an additional Rs 40,000 on collections to reduce bad debt expenses to 1 percent and ACP to 40 days. As a result of stricter collection policy, sales are expected to decrease to 71,000 units. If the cost of capital is 19 percent, would you recommend the new policy?

Chapter 18

A Case Study: SM Electric (India) Limited

OBJECTIVES

- ◆ Demonstrate issues in cash management in a real-life setting.
- ◆ Measuring the impact of credit policy on sales, profits and cash flows.
- ◆ Introduction to factoring as an alternative for selling goods on credit.
- ◆ Preparation of cost-benefit analysis of alternate credit policies.
- ◆ Demonstrate the application of theoretical cash management models in a real-life situation.

SM Electric (India) Limited (SMEL) is a part of Nova Plc, UK, a \$ 2.2 billion,¹ high technology, high growth diversified conglomerate with interests in the areas of intelligent building management systems and aluminum solutions. The Nova group operates in 138 countries spanning North America and Europe and has over 30 companies grouped into three product divisions:

- The security printing services
- The intelligent building systems
- Indalex aluminum systems

SMEL is a part of the Intelligent Business Systems Division of the Novar Group and has a global presence in the electrical switches segment. SM Electric has around 24 percent of the entire electrical accessories market. Prior to 1988 the Indian wiring devices market was characterized by poor quality products and the attempts at product innovation was limited. The entry of SMEI at this juncture, with premium high quality products with previously unheard of modular features put the concept of 'demand generation' into practice. SMEI offers the following products:

- Wiring devices: 'Wrap Around' and 'Antiquity' series of trendy aesthetically designed premium range of switches, sockets and accessories.
- Circuit protection systems: 'Sentry' and 'Sentry Plus' compact and elegant systems designed and engineered to protect electrical installations and human lives.

¹ The approximate values of \$1, \$1 million, and \$1 billion are Rs 46, Rs 4.6 crore, and Rs 4,600 crore respectively.

- Cable management systems.
- Building management systems: fire detection and alarms that offer solutions which enable better management of data, voice, utilities and equipment, making them safe, reliable, convenient and sophisticated.
- Nurse call stations.

Exhibit 18.1 gives a summary of the financials of SMEL, which is in existence in India since 17 years. Eighty-seven percent of the share capital of the company is held by Novar, the holding.

Exhibit 18.1 Financial details of SM Electric (India) Limited

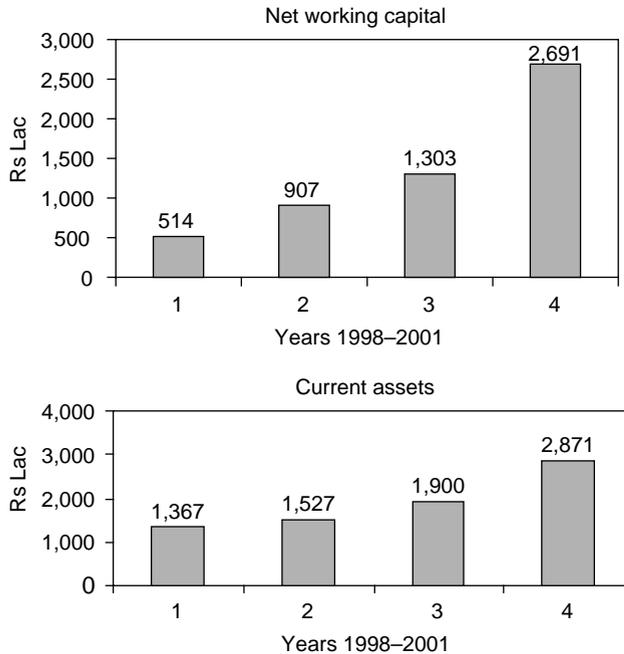
	<i>(Rs lac)</i>			
	2001	2000	1999	1998
Sales and other income	5,327	4,396	3,717	2,909
EBDIT	1,124	1,077	1,105	823
Depreciation	238	218	209	171
Interest	11	16	50	121
PBT	875	843	847	531
PAT	522	526	447	326
Share capital	100	100	100	100
Reserves and surplus	2,986	2,464	1,938	1,488
Working capital	2,208	1,574	1,100	688
(Inclusive of cash and bank balances)				
Cash and bank balances	1,442	1,010	559	619
Sundry debtors	948.5	571.9	696.5	398.3
Inventory	323.26	317.77	272.29	350.29
Total current assets	2,871.8	1,900	1,527.39	1,367.27
Current liabilities	180.76	596.84	6,119.9	852.60
Net working capital	2,691.0	1,303.25	9,074.58	5,146.6

As shown in Exhibit 18.1, the net working capital requirement has increased from Rs 5.14 crore in 1998, to Rs 26.19 crore in 2001. Cash balance has increased from Rs 6.19 crore in 1998, to Rs 14.42 crore in 2001. Increased cash balance accounts for 42.53 percent of the increase in net working capital requirements over the previous financial year (2000). Similarly, increase in sundry debtor balance has resulted in 27 percent of the increase in net working capital requirements. Creditor balance has decreased while inventory balance has been stable. In sum, 70 percent of the increase in working capital has been caused by an increase in cash and debtors (Exhibit 18.2).

Since the overall working capital is increasing and cash balances are very high (Rs 14 crore), the company commissioned a study to analyze the different components of working capital and suggest a suitable course of action.

Exhibit 18.3 presents an aging schedule of sundry debtors. The average daily turnover of sundry debtors has been collected both region-wise and on a country-wide basis. An analysis of sundry debtors suggests that:

- A large number of customers from the western and northern regions take up to (or more than) 180 days to settle dues.
- 67 percent of the book debts are under the 60-day category.
- Book debts worth Rs 2.78 crore approximately fall in the >60-day category. This amounts to nearly 33 percent book debts and a large fraction comes from the western region.
- Only Rs 57.14 lac book debts fall in the >180 days category.

Exhibit 18.2 Trends in net working capital and current assets**Exhibit 18.3** Aging schedule

Region	Current	<30 days	<60 days	<90 days	<180 days	>180 days	Total
South1	7,001,258	1,696,456	3,120,424	1,224,431		1,490,303	14,532,872
South2	7,126,527		264,962	1,317	6,397		7,399,203
North	9,718,905	120,603	3,359,087	779,808	486,419	3,026,841	17,491,663
Western	12,362,615	6,259,131	5,502,823	16,938,743	2,576,311	1,197,627	44,837,250
Eastern	2,654,258	30,472	73,357				2,758,087
Total	38,863,563	8,106,662	12,320,653	18,944,299	3,069,127	5,714,771	87,019,075

This analysis suggests that the company will have to concentrate its efforts on the western region. An analysis of the daily turnover of debtors and average collection period (Exhibit 18.4) suggests that:

- The collection period in the western region is significantly higher than the national average.
- The national average collection period is 62.7 days for the period April 2000–Sep 2001 and 72.2 days for the period Oct 2000–March 2001.

Exhibit 18.4 Average collection period (in days)

	April 2000–Sep. 2001	Oct. 2000–March 2001
South 1	42.28	62
South 2	25.8	34.2
North	58.3	59.8
West	103	123.71
East	46.75	22.24
National	62.7	72.2

Having estimated the average collection period for various zones, we can estimate the opportunity cost of not collecting dues in time by applying a suitable interest rate for the delay in collection exceeding a normal collection period of 30 days. We may either apply fixed deposit rates offered by banks for the appropriate time periods or the returns on debt (mutual) funds. The sum of opportunity costs of all regions works out to Rs 68.68 lac assuming an interest rate of 14 percent, about 13 percent of net profits for the year ended March 2000. The western region accounts for 84.18 percent of the total opportunity costs. The opportunity cost will be much lower if we assume another normal average collection period (say, 60 days) or lower the opportunity cost to 11 percent, say.

IMPACT ON CASH FLOWS

The impact of a slow collection period can also be gauged by its impact on the month-to-month cash flows of the company. The slow collection process might also have resulted in higher cash outflows than cash inflows in certain months, resulting in the company bearing interest costs during the same period. The extent of interest costs borne by the company can be determined by analyzing the pattern of cash flows. To estimate the impact:

- Compute cash inflows on a monthly basis for each region.
- Cash outflows take place only at the corporate level since it is centralised. Apportion these outflows to various regions on a suitable basis, say, turnover.

Exhibit 18.5 presents a statement containing the cash inflows and outflows (at the national level) for the period April 2000–March 2001.

Exhibit 18.5 Cash flows

	<i>(Rs lac)</i>			
	<i>May</i>	<i>June</i>	<i>July</i>	<i>February</i>
Cash inflows	664.69	444.03	311.06	282.73
Cash outflows	685.24	833.53	377.79	271.25
Cash surplus/deficit	-20.54	360.68	-667.29	11.47

The cash outflows exceed inflows in May, July and January. A similar exercise may be done for all the regions.

These analyses suggest that the slow collection process is costing the company about Rs 70 lac. Two possible solutions to this problem are:

- Increasing the collection efficiency, and
- Factoring.

FACTORING

This involves a continuing arrangement between the company and a financial institution, called factor, to assume the credit and collection functions of the company. The factor purchases the client's receivables as

and when they arise, maintains the sales ledger, attends to other book-keeping duties relating to accounts receivable and performs other auxiliary functions.

Factors are usually subsidiaries of banks or private financial companies. The important point is that factoring is a continuing arrangement and not related to specific transactions. This means that the factor handles all the receivables arising out of the credit sales of the company and not just some specific bills or invoices as is done in bill discounting agreement.

Types of Factoring

There are six types of factoring:

1. Full factoring
2. Recourse factoring
3. Maturity factoring
4. Advance factoring
5. Undisclosed factoring
6. Invoice discounting

Full Factoring or Non-Recourse Factoring

The factor has no recourse to the client if the receivables are not recovered, i.e., the client gets total credit protection. In this type of factoring, all the components of service, viz., short-term finance, administration of sales ledger and credit protection are available to the client.

Recourse Factoring

The factor purchases the receivables on the condition that any loss arising out of irrecoverable receivables will be borne by the client. In other words, the factor has recourse to the client if the receivables purchased turn out to be irrecoverable.

Maturity Factoring

Under this type of factoring arrangement, the factor does not make any advance or prepayment. The factor pays the client either on a guaranteed payment date or on the date of collection from the customer. This is as opposed to 'advance factoring' where the factor makes prepayment of around 80 percent of the invoice value to the client.

Advance Factoring

Under advance factoring arrangement, the factor provides an advance against the uncollected and non-due receivables to the firm.

Undisclosed or Confidential Factoring

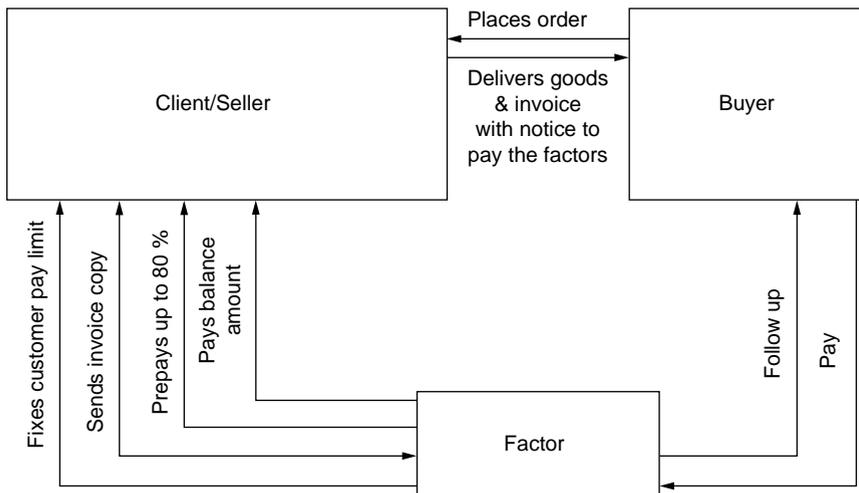
Under confidential factoring, the customer is not informed of the factoring arrangement. The firm may collect dues from the customer on its own or instruct to make remittance at some other address.

The SBI Factors was set up in 1991. Many others have followed suit. The average discount on the face value of receivable range from 17–18 percent. The lack of sophisticated database of default rate and history and repayment performance is a major roadblock to factoring services in India.

Invoice Factoring

This is not exactly a form of factoring, as it does not include the service element of factoring. Under this arrangement, the factor provides a prepayment to the client against the purchase of accounts receivables and collects interest (service charges) for the period extending from the date of prepayment to the date of collection. The sales ledger administration and collection are carried out by the client.

Mechanism



An Illustration

A manufacturing firm sells Rs 10 lac per month on credit with terms of 2/10, Net 60. Historically, 20 percent of the accounts receivable are discounted and paid on the 10th day the bad debt loss rate is 1 percent, and credit department costs Rs 10,000, 2 percent of the face amount of accounts receivable are paid on the 30th day. It is expected that 5 percent of the accounts receivable will be disputed and not paid until the 120th day after sale. A factor offers to buy all of the manufacturer's accounts receivable on a maturity basis charging a 1.5 percent fee. The factor will make a cash settlement on the net date (60th), less 5 percent holdback for non-payment due to product quality disputes. It is expected that all such disputes will be settled and the factor will release the holdback on the 120th day. The manufacturer has a 10 percent opportunity rate of return. The following present value analysis suggests that the manufacturer should factor his accounts receivable. Exhibit 18.6 presents the economics of factoring.

Exhibit 18.6 The economics of factoring

<i>Day</i>	<i>Cash without factoring</i>	<i>Cash with factoring</i>	<i>Δ cash due to factoring</i>	<i>10 percent discount rate</i>	<i>PV</i>
10th discounted payments					
Collect Rs 1 million x 20 percent = Rs 2 lac					
Discounts Rs 2 lac x 2 percent = 4,000	196,000	(196,000)	0.9973	(195,470)	
30th credit department costs	(20,000)	20,000	0.9918	19,835	
60th collection of balance less					
disputed payments					
800,000 - 5 percent (1m)	750,000				
Payment from factor					
Rs 1 million less :					
Rs 15,000 factor fee		181,000	0.9873	178,050	
Rs 4,000 discount					
Rs 50,000 holdback		931,000			
120th collection of disputed accounts					
less bad debt loss					
Rs 50,000 - 1 percent (Rs 1 million)	40,000	10,000	0.9675	9,675	
Factor releases holdback	50,000				
	Present value advantage				
	To factoring				Rs 12,090

Back to SM Electric (India) Limited (SMEL)

Is factoring the answer to SMEL's problems?

The steps involved in evaluating the factoring option are:

1. Calculate the costs as percentage of the total turnover as agreed upon by the collection agency and the company. For the purpose of analysis the costs have been taken at 1 percent, 1.5 percent and 2.5 percent of the total turnover.
2. The benefits would comprise of the gains in terms of opportunity costs, salaries given to the collection staff, cash discounts given to the debtors for early payment of debts and overdraft interest to be paid in cases where outflows exceed inflows.
3. The computation of opportunity costs has been done on the basis of ACP of 30 days and 60 days. In other words it has been assumed that the factor would pay the company in 30 days or 60 days after the sale. The gain to the company is the interest cost saved on the difference between the number of days actually taken to collect the debt and the normal period (30 or 60 days).

The cost-benefit analysis of an agreement has been made under the following assumptions:

- Opportunity costs can be 8 percent, 11 percent, and 14 percent depending on the investment options available to the company. An opportunity cost of 14 percent has been assumed.
- Service charges can be 1 percent, 1.5 percent, and 2.5 percent.
- The normal collection period is 30 days.

Exhibit 18.7 presents the factoring cost benefit analysis.

Exhibit 18.7 Cost benefit analysis (assuming a normal ACP of 30 days)

	Factoring-cost benefit analysis (30 day cycle)											
	Opportunity costs at 14 percent (in Rs)					Factoring costs					Gain/loss	
	Sales	Opportunity costs	Salaries	O/D	Discounts	Total gains	1	1.5	2.5	1		1.5
Western	149,905,000	5,783,169	100,000	55,699.87	0	6,440,169	1,499,050	2,248,575	3,747,625	4,941,119	4,191,594	2,692,544
Northern	93,162,000	1,389,552	100,000	107,276.5	0	1,596,828	931,620	1,397,430	2,329,050	665,208.5	199,398.5	-732,222
South1	68,009,000	537,213	100,000	331,975.8	0	969,188.8	680,090	1,020,135	1,700,225	289,098.8	-50,946.2	-731,036
South2	114,471,000	0	100,000	31,618.06	0	131,618.1	1,144,710	1,717,065	2,861,775	-1,013,092	-1,585,447	-2,730,157
East	25,258,000	45,351	100,000	22,010.43	0	167,361.4	252,580	378,870	631,450	-85,218.6	-211,509	-464,089
National	450,805,000	7,755,285	500,000	1,027,870	10000000	19,283,155	4,508,050	6,762,075	11,270,125	14,775,105	12,521,080	8,013,030

On an aggregate basis the company can gain Rs 80 lac–Rs 1.47 crore for different levels of service charges ranging from 1–2.5 percent assuming an opportunity cost of 14 percent. The savings are lower if an opportunity cost of 11 percent is assumed. The analysis suggests that factoring:

- Is profitable in the western region under all conditions and in the north when the service charges are 1 percent or 1.5 percent.
- Is not profitable in the south and the east.

If the company indeed resorts to factoring, the company's debtor balances would come down and the cash flows would be more stable.

CASH MANAGEMENT

The objective of cash management is to:

- Track and control cash flows
- Provide adequate liquidity
- Optimize usage of cash

SMEI has a cash balance of Rs 10–14 crore, which is too high for its size. What level of cash balance is optimal for the company? There are several theoretical models for calculating the optimal and average cash balance. One such model is the Miller-Orr model,² which seeks to find the optimum level of cash, and the upper limit beyond which the company should not hold cash. The lower limit is left to the discretion of the company. The cash balance fluctuates between the upper and lower limits. When the cash balance reaches the upper limit the company should buy marketable securities amounting to the difference between the upper and optimum level. Similarly when the cash balance reaches the lower limit, the company can either borrow or sell marketable securities amounting to the difference between the optimum and lower limit.

The limits are calculated as follows:

1. The lower limit is set by the company.
2. The optimum level is calculated as follows:

$$C^* = L + (3/4 * F * \sigma^2/R)^{(1/3)}$$

where

L = lower limit,

F = cost per transaction of buying and selling securities, assumed to be fixed,

R = opportunity cost of holding cash, the interest rate per period on marketable securities, and

σ^2 = the variance of net cash flow per period (a day or a week).

Note that the interest rate and the variance are to be based on the same length of time.

² Miller, M H and D Orr (1966). 'A Model of the Demand for Money by Firms', *Quarterly Journal of Economics*, Aug.

Taylor, Walton and James Yoder (1995). 'Using a Sample Estimate of the Variance in the Miller-Orr Cash Management Model', *Financial Practice and Education*, Fall–Winter.

$$3. \text{ Upper limit} = (3 \times C^*) - (2 \times L)$$

$$\text{The average cash balance} = (4 C^* - L)/3$$

To implement the model we need an estimate of F , R and σ . The variance of daily cash balance for sample period of 90 days may be used to avoid seasonality problems. The brokerage costs of transaction can be estimated as 0.01 percent of transaction value. Assume that it works out to Rs 10,000. If we assume that the opportunity cost is 10 percent per annum, a daily rate may be worked out. The lower limit may be set at Rs 10 lac (the company does not face much risk in meeting its commitments. So a lower limit of ZERO might not be outrageous). The optimal level may be calculated by plugging the values into the formula given above. Similarly, the upper limit may be calculated. It so happens that the optimal cash balance and the upper limit for the company, according to the Miller-Orr model, is about Rs 74 lac and Rs 2 crore respectively. The model may be simulated to find the days in which the cash balance exceeds the optimal level and the (number of days) in which the balance hits the lower limit and so on.

What Should the Company do with the Excess Cash?

The average cash balance held by the company currently is Rs 5.15 crore, as opposed to Rs 85.62 lac suggested by the model. If we assume that it will be invested in treasury bills the company can earn an interest income amounting to about Rs 35 lac. More interestingly, why did the company accumulate so much cash? Is there an agency problem? There are numerous indicators, which suggest that there could be agency conflicts. The company has no debt (and hence contractual payments like interest) that could make managers complacent. In the absence of incentive compatibility, the company's managers may entrench themselves. But the company has introduced innovative products, is growing rapidly (growth in sales is about 22 percent) and is quite profitable (ROE = 16 percent) which suggests that there is no agency problem, after all. Any firm generating abundant cash can resort to one of the following means of returning cash to shareholders:

- Start paying dividends if the company is not paying already.
- Repurchase shares from shareholders and extinguish. This brings down equity.
- Do a leveraged recap or a LBO to revitalize the company if the company is a good candidate.
- Use the cash to acquire potential companies and grow. Recent studies in America find that cash rich firms are more likely to become bidders even after adjusting for sales growth.³

While the first two options are discussed in Chapter 30, we discuss the fourth alternative in Chapter 33.

³ Harford, Jarrad (1997). 'Corporate Cash Reserves and Acquisitions', Working Paper, University of Rochester, March.

Section Four

THE FINANCING DECISION

Chapter 19

Optimal Capital Structure

OBJECTIVES

- ◆ How do managers make financing decisions?
- ◆ Does debt policy matter?
- ◆ What is the connection between capital structure and capital costs?
- ◆ What is the impact of taxes on debt policy?
- ◆ What is the impact of debt on investment, financing, and dividend decisions of a firm?
- ◆ How does debt policy vary across countries?
- ◆ What is the impact of changes in capital structure on security prices?

OPTIMAL CAPITAL STRUCTURE

Debt ratios vary across industries and companies. For instance, Colgate had no debt, whereas Videocon was awash in debt (Exhibit 19.1).¹ Is there an optimal level of debt for a company? What are the consequences of borrowing? How do firms figure out whether they have too much or too little debt? The theory of capital structure attempts to explain the mix of securities and financing sources used by corporations to finance investment.

Consider a firm that has no debt in the capital structure. That is, it is all equity financed. Exhibit 19.2 presents the return on equity (ROE) for this company, now and at various debt levels. ROE increases as debt ratio is increased, but is this increase without a cost?

Does Debt Policy Matter?

The theory of capital structure starts with the Modigliani and Miller theorem that debt policy does not matter. The market value balance sheet of a company is given below.

¹ At the time when this book was written.

Exhibit 19.1 Debt ratios of some top companies

<i>Industry</i>	<i>Company</i>	<i>D/E</i>
Automobile	Ashok Leyland	1.10
	Bajaj Tempo	0.40
	Eicher Motors	1.07
	TELCO	0.70
Domestic appliances	Videocon	1.91
	Whirlpool	0.63
	BPL	1.28
	Philips	0.99
Soaps and detergents	Colgate	0.02
	Godrej Soaps	1.45
	HLL	0.22
	Nirma	0.58

Exhibit 19.2 Return on equity at various debt levels*(value in Rs)*

	<i>Debt/capital</i>			
	<i>0 percent</i>	<i>10 percent</i>	<i>20 percent</i>	<i>30 percent</i>
Equity	10,000	9,000	8,000	7,000
Debt	0	1,000	2,000	3,000
Total capital	10,000	10,000	10,000	10,000
EBIT	3,000	3,000	3,000	3,000
Interest @ 15 percent	0	150	300	450
PBT	3,000	2,850	2,700	2,550
Tax @ 35 percent	1,050	997.50	945	892.50
PAT	1,950	1,852.50	1,755	1,657.50
ROE (percentage)	19.5	20.5	21.90	23.60

<i>Liabilities</i>	<i>Assets</i>
Equity	Assets-in place
Debt	Present value of future growth opportunities
Firm value	V

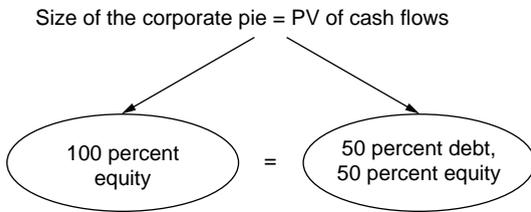
Franco Modigliani and Merton Miller (hereafter referred to as MM) were among the first to analyze the capital structure decision rigorously. They analyzed the effect of a change in the firm's capital structure on the market value of the firm, first in a hypothetical world with no corporate taxes and then in a world with corporate taxes. They proved that the value of the firm, V , is independent of the debt policy of the firm. That is, V is constant regardless of the mix of D and E as long as the right hand side of the balance sheet is held constant. Their theorem is based on certain assumptions:

- Investment opportunities of the firm remain fixed. Corporate real investment and operating decisions are not affected by capital structure.
- The business risk of a firm can be measured by the standard deviation of earnings and firms can be grouped into distinct business risk classes.
- Investors have homogeneous expectations about future corporate earnings and the volatility of these earnings.

- Capital markets are perfect. There are no transaction costs and taxes. Investors can borrow at the same rate as companies.
- Debt is risk free and the interest rate on debt is the risk free rate.
- There are no bankruptcy and reorganization costs.

MM argue that the market value of the firm is determined by the magnitude and riskiness of cash flows generated by the firm's assets. The firm's capital structure merely indicates how this stream of cash flows is divided between shareholders and bondholders. In other words, it is the magnitude and riskiness of cash flow stream and not the partitioning between shareholders and bondholders that determines the market value of the firm. Whether you cut a pizza into six slices or eight does not *increase* the size of the pizza. The same is also true of companies. In other words, companies can make money by good *investment* decisions and not good *financing* decisions.

Since the company has already decided on what projects it should undertake and all investors agree upon the expected cash flows and the appropriate discount rate to discount these cash flows, the firm must sell for the PV of project cash flows whether it is 50 percent debt financed or all equity financed.



Consider two firms that are similar in all respects except for their capital structure. One firm is all equity financed, and the other has 50 percent debt carrying an interest of 12 percent. Both the companies employ Rs 5 lac and generate earnings of Rs 1.25 lac. There are no taxes. The effect of injecting debt on firm value is shown in Exhibit 19.3. In a world without taxes, the decision to borrow will not affect firm value. Suppose the optimal capital structure for a company is 70 percent equity (30 percent debt) that maximizes firm value, say PV. But, managers resort to sub-optimal capital structure due to which the firm value is only 0.9 PV. If this happens, investors can buy the firm for 0.9 PV, repackage securities to attain the optimal capital structure, sell the company for PV. The difference of 0.1 PV is the riskless profit. Under competitive conditions it is not possible to make riskless profit as demonstrated in the given example.

Exhibit 19.3 Effect of leverage on firm value

	(value in Rs)	
	Firm A	Firm B
Equity	500	250
Debt	0	250
Total capital	500	500
EBIT	125	125
Interest @ 12 percent	0	30
PBT	125	95
Tax	0	0
PAT	125	95
Income to Investors		
Dividends	125	95
Interest	0	30
Total	125	125

The weighted average cost of capital for a firm is:

$$r_A = r_D \cdot D/V + r_E E/V$$

Since equity investors bear financial risk in addition to business risk, cost of equity will be more than the cost of debt. Will the inclusion of debt, which has a lower cost, not reduce the weighed average cost of capital? MM argue that an increase in financial leverage increases the systematic risk (of the firm's stock) that equity investors have to bear. Being risk averse, equity investors will demand a corresponding increase in the return on equity. The increase in the cost of equity will exactly offset the effect of lower cost of debt. Likewise, decrease in financial leverage will not increase the WACC, as the reduction will result in an offsetting decrease in the cost of equity due to lower systematic risk. So the weighted average cost of capital is the same at all debt levels.

To prove the proposition let's rewrite the above equation:

$$r_E = r_A + (r_A - r_D) D/E$$

This equation tells us that the cost of equity increases with D/E , and the rate increases with the spread between r_A and r_D .

Yogi Berra on the M&M Proposition

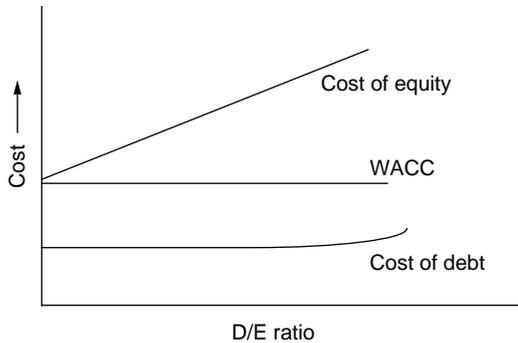
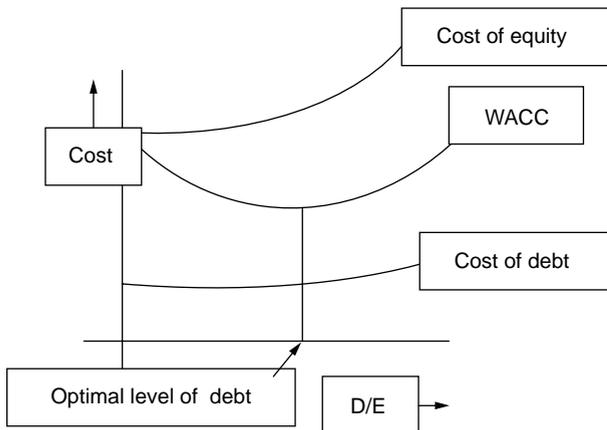
When a waitress asked Yogi Berra (Baseball Hall of Fame Catcher for the New York Yankees) whether he wanted his pizza cut into four pieces or eight, Yogi replied: 'Better make it four; I don't think I can eat eight.'

Yogi's quip helps convey the basic insight of Modigliani and Miller (M&M). The firm's leverage choice 'slices' the distribution of the firm's future cash flows in a way that is like slicing a pizza. M&M recognize that if you fix a company's investment activities, it's like fixing the size of the pizza; no information costs means that everyone sees the same pizza; no taxes means the IRS (Internal Revenue Service) gets none of the pie; and no 'contracting' cost means nothing sticks to the knife. And so, just as the substance of Yogi's meal is unaffected by whether the pizza is sliced into four pieces or eight, the economic substance of the firm is unaffected by whether the liability side of the balance sheet is sliced to include more or less debt.

Source: Michael J Barclay et al. (1995).

In MM proposition II (Exhibit 19.4), the argument sounds plausible but is it credible? If financing is indeed irrelevant why do companies hire management graduates paying them hefty salaries to manage the left hand side of their balance sheets? Why do we see so many new securities? Their critics argue that injecting debt into the capital structure will cause an increase in cost of equity that is less than that predicted by MM. As the firm borrows more, the increase in cost of equity will be greater than that predicted by MM—as a result, the graph of cost of capital vs debt ratio is U shaped (Exhibit 19.5).

In sum, the WACC is independent of leverage in an MM world without taxes. How you finance a project is only a matter of detail. It has no bearing on firm value. If a project is unviable with one package of securities, it'll be unviable with any other package of securities. A firm should look for making money by good investment decisions and not by good *financing* decisions. ROE might increase with leverage but so does cost of equity.

Exhibit 19.4 Modigliani and Miller proposition II**Exhibit 19.5** The graph of cost of capital vs debt ratio

Debt and Taxes

In a world with taxes that allows for deduction of interest payments, MM assert that the value of the firm *increases* with the amount borrowed. Exhibit 19.6 illustrates that the decision to borrow increases the funds available to investors. Since the interest expense is tax deductible, the government provides a subsidy equal to the company's marginal tax rate times its interest expense. Assuming a marginal tax rate of 35 percent, the tax shield is:

$$\text{Interest expense} \times \text{Tax rate} = 30000 \times 0.35 = \text{Rs } 10,500$$

The difference in value of Rs 10.50 (Exhibit 19.6) is the tax advantage of debt. The return to shareholders increases and the market value of the firm rises. The increase in market value is the present value of tax savings generated by debt.

$$\begin{aligned} \text{Tax shield per year} &= \text{Interest expense per year} \times \text{Corporate tax rate} \\ &= r \times D \times T_c \end{aligned}$$

Exhibit 19.6 Borrowing increases value of the firm/funds available to investors
(value in Rs)

	Unlevered firm (A)	Levered firm (B)
EBIT	125	125
Interest @ 12 percent	0	30
PBT	125	95
Tax @ 35 percent	43.750	33.250
PAT	81.250	61.750
Income to Investors		
Dividends	81.250	61.750
Interest	0	30
Total	81.250	91.750

where

- r = interest rate on debt,
- D = amount borrowed, and
- T_c = Marginal tax rate.

If debt is permanent, present value of tax shield:

$$\begin{aligned} PV &= [(r \times D \times T_c)/r] \\ &= T_c \times D \end{aligned} \quad (1)$$

The present value is obtained by discounting the perpetual stream of interest tax shield at the cost of debt. We have used cost of debt as the discount rate on the assumption that tax shields are about as risky as interest payments generating them. The idea is that the discount rate should be commensurate with the riskiness of the cash flow. Assume that a firm borrows Rs 40 lac at 15 percent. The marginal tax rate for the firm is 35 percent. The present value of tax shields assuming perpetual debt is:

$$\begin{aligned} V &= [(0.15 \times 4 \times 0.35)/0.15] \\ &= \text{Rs } 14 \text{ lac} \end{aligned}$$

Likewise, if the debt has a tenure of 7 years, the present value of tax shields:

$$\begin{aligned} PV &= (0.15 \times 4 \times 0.35) \text{ PVIFA } (15,7) \\ &= \text{Rs } 8 \text{ lac} \end{aligned}$$

Extending the above reasoning, the value of a levered firm will exceed that of the unlevered firm by an amount equal to the present value of tax shields. If debt is permanent (or rolled over for ever):

$$V_L = V_U + T^* D \quad (2)$$

where

- V_L = value of a levered firm, and
- V_U = value of an unlevered firm.

The value of the firm increases with debt and reaches a peak when the debt ratio is 100 percent. Of course this is a hypothetical situation. If debt is so valuable, why is it that firms do not resort to 100 percent debt financing? The answer lies in the problems of debt—agency and bankruptcy costs. We shall discuss these later in this book.

THE IMPACT OF LEVERAGE AND TAXES ON WACC

Since interest is a tax-deductible expense, the after tax cost of debt is lower than that stated. To illustrate, if the interest is 14 percent and tax rate is 35 percent, the after tax cost of debt is 14 (1–0.35).

In the absence of debt, shareholders are subjected only to business risk as measured by the volatility of operating earnings. The addition of debt to a firm's capital structure increases the risk borne by the shareholders. The additional risk premium is the financial risk premium.

The expected return:

$$E(R) = \text{Risk free rate} + \text{Business risk premium} + \text{Financial risk premium} \quad (3)$$

If a firm has no debt, the stock's beta reflects only the business risk. This beta is called unlevered beta. With financial leverage, the stock's beta reflects both business and financial risk. This beta is called levered beta. The cost of levered equity can be expressed as a sum of:

Cost of unlevered equity + Premium for additional financial risk
 = Cost of unlevered equity + Premium based on after tax differential between
 cost of unlevered equity and cost of debt and leverage.

Let cost of levered equity = K_{LE}

Cost of unlevered equity = K_{UE}

Cost of debt = K_d

$$K_{LE} = K_{UE} + (K_{UE} - K_d) (1 - T) D/E$$

The cost of equity increases as leverage increases but at a slower rate. The increase in cost of equity is due to the increase in volatility of stock returns. An important research by Robert Hamada shows that the relationship between levered and unlevered beta is:

$$\beta_L = \beta_U [1 + (1 - T) D/E] \quad (4)$$

where

β_L = levered beta (beta at the current level of debt), and

β_U = unlevered beta (beta when there is no debt in the capital structure).

Stated in another fashion, the systematic risk of a stock depends on operating and financial leverage of a firm. An increase in either of them will lead to an increase in beta, and hence the cost of equity.

The revised formula for WACC would be:

$$\text{WACC} = K_{LE} + E/(D + E) + K_d(1-T) D/(D+E).$$

The weighted average cost of capital decreases initially as debt is employed, reaches a low and increases thereafter as the increase in cost of equity offsets the tax advantage of debt similar to the traditionalists' argument.

Personal Taxes

The investor who receives coupon payments or dividends must pay personal tax and therefore cares about after-tax receipts. Hence managers should try to arrange their firms' capital structure to minimize total taxes paid after earnings are distributed to their owners. In real life, not all investors face the same tax rate. Low tax investors pay no or low personal taxes on dividends or interest receipts. High tax investors pay lower taxes when they receive income as capital gains instead of as interest. Since the capital gains tax is applied only when the investor realizes it, the investor can defer the tax payment. The combined effect of corporate and personal taxes is that there should be 'tax clienteles' Consider a hypothetical situation where both debt and equity are taxed at 30 percent at the investors' hands. Exhibit 19.7 illustrates the effect of personal taxes on distributable funds.

Exhibit 19.7 Effect of personal taxes on firm value

	<i>Firm A</i>	<i>Firm B</i>
EBIT	125	125
Interest @ 12 percent	0	30
PBT	125	95
Tax @ 35 percent	43.75	33.25
PAT	81.25	61.75
Income to investors		
Dividends	81.250	61.750
Personal tax @30 percent	24.375	18.525
After tax dividend	56.875	43.225
Interest	0	30,000
Personal tax @30 percent	0	9,000
After tax Interest	0	21,000
Total	56.875	64.225

It can be verified that:

$$V_L = V_U + [1 - \{(1 - T_c)(1 - T_{PE})/(1 - T_d)\}] D \quad (5)$$

where

V_L = value of a levered firm,

V_U = value of an unlevered firm,

T_c = corporate tax rate,

T_{PE} = personal tax rate on equity income,

T_d = personal tax rate on interest income, and

D = Amount of debt in rupees.

We have assumed that the only source of equity income is dividends. We do know that capital gains realized on sale of shares are also a source. The tax rate T_{PE} is a blend of the tax rates on the two. When companies do not pay dividends and investors never sell shares, $T_{PE} = 0$. The term in brackets in equation (5)

is the gain from leverage after considering both corporate and personal taxes. The point is that debt is beneficial if $(1-T_d)$ is more than $(1-T_c)(1-T_{PE})$; otherwise it is not. The relative advantage of debt is:

$$(1-T_d)/(1-T_c)(1-T_{PE})$$

Three scenarios follow from equation (5).

Situation 1

If $T_{PE} = T_d = T_c$
 $V_L = V_U$ as in the original MM proposition without taxes.
 Debt is irrelevant.

Situation 2

If $T_{PE} = T_d$
 $V_L = V_U + [1 - (1 - T_c)] D$
 $V_L = V_U + T_c D$
 This is the MM proposition with corporate taxes.

Situation 3

$T_c = 35$ percent
 $T_d = 35$ percent
 $T_{CG} = 20$ percent (tax on capital gains)
 The company doesn't pay dividends.
 Relative advantage of debt = $(1-0.35)/(1-0.35)(1-0.2)$
 $= 1.25$

Suppose
 $T_c = 0$
 $T_d = 35$ percent
 $T_{PE} = 0$
 Value of the firm = $V_U + [1 - \{1/(1 - 0.35)\}] D$
 $= V_U - 0.53 D$

Borrowing will *reduce* firm value in this case. When the tax rate on income from shares is less than the tax on income from bonds, the gain from leverage will be less than $T_c D$. The relative advantage of debt (with respect to dividends and retained earnings) for the G-7 countries is shown in Exhibit 19.8.

Do MM Propositions Work?

MM propositions are static in nature. If a firm borrows to buy back equity, keeping the size of the balance sheet constant, the firm value is supposed to increase by an amount equal to the present value of tax shields ($T_c D$). The framework can be applied only if the firm is continuing in the same line of business. MM propositions have been criticized on various grounds such as:

Exhibit 19.8 Tax treatment of interest, dividends and retained earnings around the world

		USA	Japan	Germany	France	Italy	UK	Canada
Tax free investor	w.r.t. retained earnings ^a	28.0	37.50	50.0	37.0	36.0	35.0	38.0
	w.r.t. dividends ^b	28.0	37.5	36.0	42.0	36.0	35.0	38.0
Investor in top tax bracket 1990	w.r.t. retained earnings	28.0	22.66	-6.33	-8.0	8.57	35.0	31.67
	w.r.t. dividends	28.0	49.22	12.91	23.66	28.57	13.33	26.15
Investor in top tax bracket 1990, including local taxes	w.r.t. retained earnings	40.25	40.15	14.89	-8.0	23.39	35.0	32.72
	w.r.t. dividends	40.25	60.71	60.32	23.66	40.15	13.33	35.32
Average investor, including local taxes	w.r.t. retained earnings	40.25	40.15	37.50	27.70	23.39	35.0	20.79
	w.r.t. dividends	40.25	59.01	30.34	13.00	28.17	13.33	35.32

Source: Raghuram Rajan and Luigi Zingales (1995). 'What Do We Know about Capital Structure? Some evidence from international data', *Journal of Finance*, Vol. 50, pp. 1421-60.

Note: ^a $[1 - (1 - T_c)(1 - T_{PE})/(1 - T_d)]$ where T_{PE} is the capital gains tax rate; ^b $[1 - (1 - T_c)(1 - T_{PE})/(1 - T_d)]$ where T_{PE} is the tax rate on dividends after dividend tax credit is accounted for.

- Investors may not have access to funds to undo corporate leverage and replace it with 'home made' leverage. Also, they may not be able to borrow at the same rate as a creditworthy company.
- They ignore transaction costs that could be substantial in real-life situations thereby making arbitrage unattractive.
- MM propositions neglect agency and bankruptcy costs.
- The most important assumption underlying the MM proposition is that corporate investment and operating decisions are not affected by capital structure and dividend policies. Regardless of whether the company operates at 10 percent debt or 80 percent debt and whether the company pays all of its earnings or none as dividends, MM assume that a company's investment policy and thus the cash flows of the organization do not change. When companies make drastic changes in debt or investment or dividend policies, there could be dramatic changes in the performance and value of these companies.

Bankruptcy Costs

The costs of bankruptcy are of two kinds: direct and indirect. Direct costs include lawyers' and accountants' fees, other professional fees and the value of managerial time spent on administering bankruptcy. Indirect costs include lost sales (and, hence, lost profits), the possibility that the firm may not be able to obtain additional credit or to issue securities except under strict terms. A firm may lose sales rapidly if the firm is a manufacturer of long lived products that require continuous servicing or replacement parts as customers may use their *perception* of the financial condition of the company to make their purchase decisions. For instance, the value of a computer is not only determined by its hardware but also by the manufacturer's continued provision of hardware and software support. An obsolete software or hardware is worthless. So a customer may settle for an inferior alternative with a lower probability of bankruptcy based on the perception that this firm is risky. Software firms may refuse to support computer firms that have high probability of bankruptcy because these companies are unlikely to be around for long thereby accelerating distress. Likewise,

airlines depend on frequent flier plans to attract business travelers. No amount of advertising may bring credibility to the claim made by those companies. Similarly, retailing companies may not obtain goods or credit from wholesalers. Since these firms do not get credit, their competitiveness will be lost. The indirect cost of bankruptcy can arise from the bankruptcy process itself. The bankruptcy trustee, as an agent of the court, may not run the firm in a value maximizing way as he has no incentive to do so. The firm incurs an opportunity loss due to the sub optimal decision making of the agent. Another possible indirect cost of bankruptcy is the higher compensation that the managers of a highly levered firm will receive because of the higher probability of unemployment they may face. Because indirect costs are mainly lost opportunities, they are difficult to measure.

Based on the foregoing discussion, we would expect firms with large intangible assets to keep their leverage low to reduce the probability of future bankruptcy. Thus, Infosys Technologies, which derives much of its value from growth opportunities, should keep the debt level low. The presence of bankruptcy costs places an upper bound on the debt ratio of a company. Leverage is beneficial as long as the present value of tax shields is more than the expected bankruptcy costs.

From the perspective of a firm choosing a capital structure, it is the expected cost of bankruptcy at the time of decision making that matters.

Expected cost of bankruptcy = Probability of bankruptcy \times Bankruptcy cost in rupees. To illustrate, let probability be 0.3, bankruptcy cost be 20 percent of current market value of the company (which is, say, Rs 100 crore)

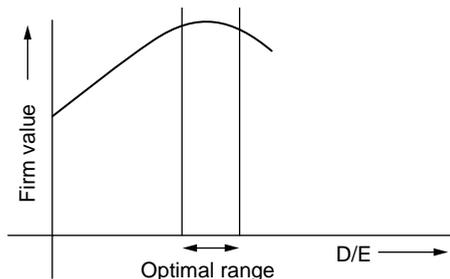
$$\begin{aligned} E(\text{bankruptcy}) &= 0.3 \times 0.2 \times 100 \\ &= \text{Rs } 6 \text{ crore} \end{aligned}$$

Therefore,

$$V_L = V_U + T_c D - PV(\text{bankruptcy costs})$$

The bankruptcy cost is not constant, obviously. It rises with leverage. The debt level at which the present value of tax shields outweighs expected cost of bankruptcy is the optimal debt ratio for the company. The relationship between firm value and leverage when bankruptcy costs are considered is shown in Exhibit 19.9.

Exhibit 19.9 Firm value with bankruptcy cost



How do Managers Make Financing Decisions?

There are four theories that attempt to explain how managers make their financing decisions.

1. Static Trade-off Theory

This theory suggests that firms trade-off tax shields and bankruptcy costs and move towards an optimal debt ratio. That is, they stop borrowing when the present value of bankruptcy costs exceeds the present value of tax shields. In other words, profitable firms that can avail tax shields will borrow relatively more than less profitable firms. But some academic studies conducted in the US and elsewhere do not support this hypothesis. Profitable firms, on the contrary, borrow less. Other studies have found positive relation between taxes and financing decisions.

2. Asymmetric Information Theory

Information asymmetry occurs when the management of a company has valuable information about the earning prospects which investors do not have may be because managers are unwilling to disclose information due to strategic reasons, or the information is too technical and complex to be communicated. Asymmetric information theories explain *changes* in leverage, not *amounts* of leverage.

Consider an all equity firm whose current market value is Rs 20 lac (100,000 shares @ Rs 20). The management believes that the intrinsic value is Rs 22 lac (100,000 @ Rs 22). The company is undervalued to the extent of Rs 2 lac. The company encounters a project that requires an investment of Rs 8 lac and NPV is Rs 10,000. The benefit of raising Rs 8 lac is Rs 10,000; the NPV of the project and the cost is that the firm has to sell the securities for *less than they are really worth*. The company will have to sell 40,000 (i.e., 800,000/20) shares in order to raise Rs 8 lac. Suppose the information asymmetry is removed soon after the issue. The new stock price would be:

$$\begin{aligned} & \frac{\text{New market value} + \text{Investment} + \text{NPV}}{\text{Total number of shares}} \\ &= [22 \text{ lac} + 8 \text{ lac} + 10000]/140000 = \text{Rs } 21.50 \\ \text{New shareholders gain} &= \text{Rs } 21.50 - \text{Rs } 20.0 \\ &= \text{Rs } 1.50 \end{aligned}$$

Old shareholders also gain Rs 1.50 but this is less than what they would have gained (Rs 2 per share) if the project were not taken up and information asymmetry were removed later on. In this sense the loss to old shareholders is Re 0.50.

In the given situation, managers had favorable information. Now consider a situation where managers have unfavorable information: the current market price is Rs 20, but the managers think it is overvalued and is worth only Rs 18. The company decides to sell 100,000 shares at Rs 20. The information asymmetry is removed soon thereafter.

$$\begin{aligned} \text{New price} &= \frac{\text{New market value} + \text{Investment}}{\text{Total number of shares}} \\ &= [18 \text{ lac} + 20 \text{ lac}]/2 \text{ lac} = \text{Rs } 19 \end{aligned}$$

Old shareholders gain. New shareholders lose.

The moral of the story is: if managers act in the interest of *existing* shareholders, they would rather pass up positive NPV projects rather than issue undervalued shares when the inside information is favorable and

always issue shares when the inside information is unfavorable even if the project has 0 NPV. So the general strategy would be to issue debt when investors undervalue the firm and issue equity when they overvalue. In this sense, issuers send signals to financial markets by the security they choose. Debt is good news. Equity is bad news. The better the firm's projects are, the more senior the security the managers will offer for sale.

3. Pecking Order Theory

This theory predicts that:

- Firms prefer internal to external finance.
- If the internal cash flow is less than the investment requirement, companies issue the least information sensitive security first and work downwards.² That is, issue debt, convertibles, preferred stock and then equity in that order.

4. Free Cash Flow Theory

This theory suggests that debt enforces discipline on managers because of the contractual nature of interest and principal payments. According to the theory the higher the debt ratio the better in those industry groups where future growth opportunities are limited and the most optimal strategy is to return cash to shareholders by repurchasing shares from borrowed money.

Agency Costs

So far we have assumed that the interests of managers and investors are perfectly aligned. But is it reasonable to assume that managers are totally altruistic? The shareholder wealth maximization rule is based on the assumption that other investors in the company are unaffected.

An agency relationship is a contract under which one or more persons (the principal/s) engage another person (agent) to perform some service on their behalf that involves delegating some decision-making authority to the agent. If both are utility maximizers there is good reason to believe that the agent will maximize *his* utility. So the principal may have to incur monitoring costs to check his behavior and limit divergences. The principal may suffer reduction in welfare due to this divergence of interest. Agency cost is the sum of monitoring costs and residual loss. Agency cost can arise whenever there is a co-operative effort between individuals even when there is no strict agency relationship such as costs due to conflict of interest between managers and shareholders, and shareholders and bondholders.

Conflicts between Shareholders and Bondholders

The agency cost associated with debt consists of wealth loss caused by the impact of debt on the investment, financing and dividend decisions of the firm. Suppose a firm raises debt for some stated purpose of engaging in business activity. The bondholders would have set the price of the bond after making an assessment of the

² When companies issue securities they have to meet the disclosure norms prescribed by the regulator. The disclosure norms are more for equity than for debt. Consequently, equity is considered more information sensitive.

riskiness of the project. If the firm were to invest in riskier projects later on, bond price decreases because of increase in default risk. The bondholders' loss is the shareholders gain.

To illustrate, assume that a company has a project that can return either Rs 50 or Rs 150 with equal probability. So the expected value today is Rs 100. The company has Rs 60 worth bonds plus equity. If the project bombs bondholders get Rs 50 whereas shareholders get nothing; if the project clicks, bondholders get Rs 60, their claim, whereas shareholders get Rs 90. The summary of payoffs is as shown:

	<i>Project</i>	<i>Bombs</i>	<i>Clicks</i>
Probability	0.5	0.5	Expected value (today)
Payoff	50	150	100
Bonds	50	60	55
Equity	0	90	45

Now, suppose managers of the company encounter a project that either pays Rs 40 or loses Rs 50 with equal probability. That is, the expected value of the project is –Rs 5. The risk of the project is largely borne by bondholders. If the project clicks, shareholders make fixed payment to bondholders, and keep the surplus whereas, if the project fails, they have nothing to lose. It's not their money anyway. The bondholders lose Rs 5 and shareholders gain Rs 5. Bondholders realize the potential expropriation of wealth by shareholders at a later stage. Although, expropriation per se is good for the shareholders, it is bad for both the shareholders and the firm ex-ante, because the bondholders make an estimate of such behavior and demand a premium payment from the managers.

The second source of conflict is the firm's financing decision. Bondholders would have priced the bond, at the time of issue, with an assumption that no additional debt will be issued with the same or higher priority. If the firm sells bonds with higher priority, the bondholders' claim gets diluted as they have to share the proceeds of bankruptcy with another set of bondholders. The old bondholders lose, shareholders win and new bondholders get a fair deal.

The third source of conflict is the firm's dividend decision. Bondholders price their issue after making an assessment of the firm's dividend policy. If dividends are increased or investment is reduced, the collateral value of assets falls and bondholders suffer capital losses. In the extreme case, if the company sells all its assets and pays a liquidating dividend, bondholders would be left with worthless claims.

Underinvestment

Managers acting on behalf of shareholders will ignore positive NPV projects when shareholders have no chance of receiving any proceeds when debt falls due. Because bondholders receive all the proceeds when their payment falls due, managers reject projects thereby reducing firm value. This reduces the value of bondholders and hence the price bondholders would be willing to pay *today*. This is another cost of debt.

Smart bondholders realize the incentives faced by the stockholders and make estimates of the behavior of stockholders. Bondholders may demand higher interest rates to reflect the possibility of subsequent wealth transfers to stockholders. Bondholders try to protect themselves with restrictive covenants. The loan covenants may affect the firm's efficiency leading to a lower firm value. But covenants cannot describe all possible ways of wealth transfer. Further, some good projects may be lost if they do not satisfy the covenants. Writing and monitoring loan covenants entail cash outlay. Add the bankruptcy cost associated with debt. The sum total of all these constitutes the agency cost of debt.

Conflicts between Managers and Shareholders

Free cash flow is cash flow in excess of that required to fund all projects that have positive NPV. Corporate managers, as agents of shareholders, have discretion over spending the residual cash flow. They can increase payout or invest in projects. Increasing payout will not only reduce the resources under their control but also limit growth. Since managers are appraised on the basis of growth from year to year, it is likely that they may invest residual cash flow in projects that do not yield adequate returns. This leads to conflict between shareholders and managers. Conflicts are severe in those organizations that generate substantial free cash flow.

Jensen (1986) argues that forcing managers to borrow could reduce the agency costs of free cash flow. The threat caused by failure to make contractual debt payments serves as an effective motivating force to make organizations more efficient. The ‘control’ hypothesis holds well for those firms that generate large free cash flows but have poor investment opportunities and not for growth firms that have profitable investment opportunities but no free cash flow.

Managerial Entrenchment

Managers have discretion over the level of debt they choose in the absence of corporate control mechanisms such as monitoring by the board, threat of dismissal or takeover and stock option-based incentive plan. Left to their own device, they may resort to less leverage than is optimal (thereby foregoing increase in firm value) to keep the risk of failure low. The point is that managers are worried about *their* welfare rather than that of the shareholders. Often, the personal wealth and career of executives is tied to the performance of the company. This may motivate them to behave in sub optimal ways. The degree to which managers are not subject to discipline is called managerial entrenchment. At the other extreme form of entrenchment, managers may increase leverage beyond the optimal level in order to keep the volume of floating stock low and reduce the possibility of takeover attempt

IN CONCLUSION

Debt has certain benefits and costs as shown here. Debt payments generate valuable tax shields; debt keeps managers on their toes. But debt also has certain disadvantages—the direct and indirect costs of going bankrupt. Debt is beneficial as long as advantages are more than disadvantages.

<i>Benefits</i>	<i>Costs</i>
Tax shield	Bankruptcy cost
Disciplining ability	Agency cost
	Underinvestment problem
	Loss of flexibility

Highly leveraged companies that have exhausted their debt capacity may have to forgo profitable projects whenever encountered. Further, the stricter loan covenants that come with high leverage may restrict their investment activity. For this reason, executives do not borrow to the theoretical limit. They would want to maintain a slack. If those projects never come up—which is generally the case—a company will be losing valuable tax shields.

SOME FACTS ABOUT FINANCING

Based on the foregoing discussion, we would expect the following relationship to hold:

- The higher the variability of earnings (business risk), the higher the probability of default, other things remaining constant. Such firms with volatile earnings should borrow less.
- The greater the separation of ownership and management, the lower the debt ratio.
- A firm derives its value from both tangible assets in place and intangible future growth opportunities. Those firms that have substantial assets in place can borrow more vis-à-vis those that derive value from growth opportunities.
- If tax shelter is the sole motive, those firms that already have other tax shelters should borrow less.

Academic studies in India³ have shown that:

- The degree of operating leverage does not influence the use of debt contrary to what we expected.
- Financial leverage and debt service capacity are negatively related contrary to the thesis that the higher the debt service capacity, the higher should be the leverage.
- There is a significant relationship between ownership structure and financial structure. Where the management stake is high, leverage is low and vice versa.

Likewise studies in America⁴ have shown that:

- Companies are heavily influenced by market conditions and past history of security prices in choosing between debt and equity and companies make their choice of financing instruments based on the target level of debt in mind. The target level of debt is a function of company size, bankruptcy risk and asset composition.
- Companies with specialized assets have relatively low debt ratio; smaller companies tend to use significantly more short-term debt than larger firms.
- Debt ratio is unrelated to a firm's expected growth, volatility of earnings or non-debt tax shields.

The most direct way to find out how managers make their capital structure choice is to ask them. Graham and Harvey (2001) conducted a survey of practices in 392 firms in the US. Their survey had questions on what factors affect the choice of a security. Each question was to be rated on a 4-point scale. The results of their survey are displayed in exhibits 19.10 and 19.11. A large number of respondents consider financial flexibility, volatility of earnings, cash flows and credit rating as important determinants of capital structure whereas tax advantage and bankruptcy costs are considered relatively less important.

³Bhat, Ramesh K (1980). 'Determinants of Financial Leverage: Some Further Evidence', *The Chartered Accountant*, Vol. 29, No. 6.

Venkatesan, S (1983). 'Determinants of Financial Leverage: An Empirical Extension', *The Chartered Accountant*, Jan. Mathew, T (1991). 'Optimal Financial Leverage—The Ownership Factor', *Finance India*, Vol. 5, No. 2.

⁴Marsh P (1982). 'The choice between Debt and Equity: An Empirical Evidence', *Journal of Finance*, Vol. 37, No.1.

Titman, S and R Wessels, (1988). 'The Determinants of Capital Structure Choice', *Journal of Finance*, Vol. 43, No. 1.

Exhibit 19.10 Survey responses to the question: 'What factors affect how you choose the appropriate amount of debt for your firm?'

	<i>Percentage Important or very important</i>	<i>Mean</i>	<i>Size</i>		<i>Industry</i>	
			<i>Small</i>	<i>Large</i>	<i>Manu- facturing</i>	<i>Others</i>
Financial flexibility (we restrict debt so we have enough internal funds available to pursue new projects when they come along)	59.38	2.59	2.54	2.65	2.67	2.52
Our credit rating	57.10	2.46	1.92	3.14	2.52	2.39
Volatility of earnings and cash flows	48.088	2.32	2.29	2.36	2.35	2.31
Tax advantage	44.85	2.07	1.77	2.44	2.30	1.79
Transactions costs & fees for issuing debt	33.52	1.95	2.07	1.81	1.89	1.95
Debt levels of other firms in the industry	23.40	1.49	1.29	1.77	1.38	1.66
Potential costs of bankruptcy	21.35	1.24	1.36	1.10	1.31	1.22
We limit our debt so our customers/suppliers are not worried about our firm going out of business	18.72	1.24	1.20	1.30	1.21	1.40
We restrict our borrowing so that profits from new/future projects can be captured fully by shareholders and do not have to be paid out as interest	12.57	1.01	1.16	0.80	1.08	0.97
We try to have enough debt so that we are not an attractive takeover target	4.75	0.73	0.57	0.91	0.83	0.66
Personal tax on interest income	4.79	0.68	0.59	0.72	0.65	0.63
To ensure that upper management works hard and efficiently	1.69	0.33	0.33	0.32	0.40	0.26

Source: Graham and Harvey (2001).

Exhibit 19.11 Survey responses to the question: 'What other factors affect your firm's debt policy?'

	<i>Percentage Important or very important</i>	<i>Mean</i>	<i>Size</i>		<i>Industry</i>	
			<i>Small</i>	<i>Large</i>	<i>Manu- facturing</i>	<i>Others</i>
We issue debt when interest rates are low	46.35	2.22	2.07	2.40	2.25	2.16
We issue debt when our recent profits are not sufficient to fund our activities	46.78	2.13	2.30	1.88	2.24	1.94
We issue debt when our equity is undervalued	30.79	1.56	1.37	1.76	1.67	1.47
Changes in price of our common stock	16.38	1.08	0.91	1.25	1.14	1.01
We delay issuing debt because of transaction costs and fees	10.17	1.06	1.25	0.83	1.06	1.07
Using debt gives better impression of our firm's prospects than issuing stock	9.83	0.96	0.85	1.05	1.01	0.87

Source: Graham and Harvey (2001).

The same survey (results in Exhibit 19.12) also asked CFOs, 'What factors affect issuance of common stock?'

Exhibit 19.12 Survey responses to the question: 'Has your firm seriously considered issuing common stock?' If 'Yes', what factors affect your firm's decisions about issuing common stock?

	<i>Percentage Important or very important</i>	<i>Size</i>			<i>Industry</i>	
		<i>Mean</i>	<i>Small</i>	<i>Large</i>	<i>Manu- facturing</i>	<i>Others</i>
EPS dilution	68.55	2.84	2.65	3.12	3.03	2.60
Overvaluation or undervaluation of common stock	66.94	2.69	2.67	2.71	2.76	2.50
If our stock price has risen the price at which we can sell is high	62.60	2.53	2.57	2.47	2.79	2.26
Providing shares to employee bonus/stock option plans	53.28	2.34	2.22	2.50	2.16	2.47
Maintaining a target debt-equity ratio	51.59	2.26	2.04	2.58	2.48	1.91
Diluting the holdings of certain shareholders	50.41	2.14	2.30	1.90	1.95	2.20
Stock is our least risky source funds	30.58	1.76	1.93	1.52	1.76	1.69
Using a similar amount of equity as is used by other firms in the industry	22.95	1.45	1.33	1.63	1.36	1.38

Source: Graham and Harvey (2001).

International Comparison

There is a popular belief that companies in bank oriented economies like Germany and Japan enjoy close relationships with financial institutions and banks. Often, the borrower and the bank belong to the same group of companies. So these institutions stand behind the companies when they get into financial trouble and also take active interest in investment decisions. As a result, bankruptcy costs are lower for these companies while the benefits of debt remain thereby giving them a competitive advantage. Companies in these countries can, therefore, borrow more and add more value than their counterparts in market oriented economies like the UK and the US.

A study by Raghuram Rajan and Zingales (1995) suggests that:

- Japanese companies are no more highly levered than companies in the US.
- German companies are significantly less leveraged than those from all the other G-7 countries, with the exception of the UK.
- Companies in the UK raise almost equal amounts from equity and debt issuances.
- Companies in the UK are next only to Japan in the amount they raise externally.

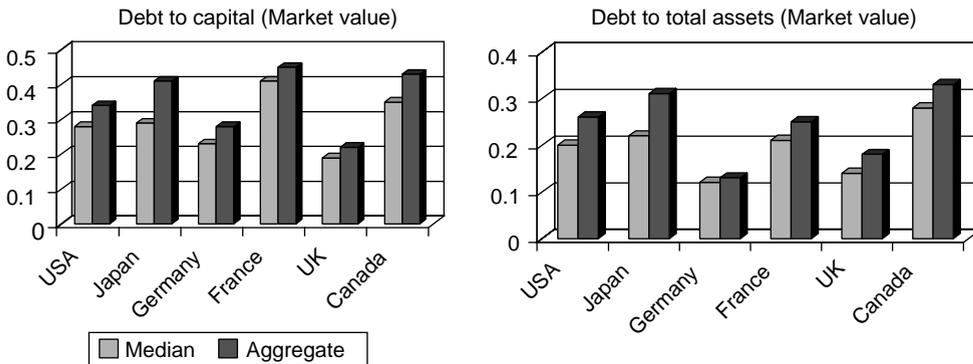
They observe that the differences could be due to differences in creditor rights and tax codes in these countries and that well regulated markets are adequate substitutes for close relationships between companies and financial institutions. The summary of their findings is presented in Exhibit 19.13.

THE IMPACT OF CAPITAL STRUCTURE CHANGES ON FIRM VALUE

In an exchange offer, the firm offers to trade freshly issued securities for seasoned securities in the hands of investors. Thus, a firm that wanted to move to a higher debt ratio could offer to trade new debt for outstanding

Exhibit 19.13 Leverage in the G-7 countries

	<i>Debt to total capital (percent)</i>	
	<i>Book</i>	<i>Market</i>
Canada	39	35
France	48	41
Germany	38	23
Italy	47	46
Japan	53	29
United Kingdom	28	19
United States	37	28



Source: Rajan and Zingales (1995).

shares. A firm that wanted to move to a more conservative capital structure could offer to trade new shares to outstanding debt securities. Ron Masulis (1983) has analyzed the stock price impact of exchange offers of debt for equity or vice versa. He found that debt for equity exchanges was good news (stock price increased on announcement) and equity for debt exchanges was bad news. The summary of his findings are as shown:

<i>Type of capital structure change</i>	<i>No. of offers</i>	<i>Primary announcement period returns</i>
Debt issued/stock retired	52	13.97 percent
Common stock issued/debt retired	9	-9.91
Debt issued/preferred stock retired	24	3.53
Preferred stock issued/debt retired	9	-7.72
Common stock issued/preferred stock retired	23	-2.57

One explanation for the positive reaction to leverage increasing transactions and negative reaction to leverage reducing transactions is that the firm enjoys higher tax shields (adjusted for higher bankruptcy costs, of course) arising out of higher leverage when companies go from a lower debt ratio to a higher debt ratio. This finding *seems* to be consistent with the static trade-off hypothesis, which suggests that firms move towards their target leverage ratio by trading off tax shields and bankruptcy costs. What is not so obvious is that if some firms can move towards their optimum level by increasing leverage other firms may move towards their optimal debt ratio by *decreasing* leverage. So it is not too clear why stock markets react positively when debt ratio goes in one direction and not in the other.

Ron's findings are, however, consistent with information asymmetry theory which suggests that debt is good news and equity is bad news.

IN CONCLUSION

Firms that have large intangible assets should have lower debt ratios vis-à-vis those that have substantial tangible assets in place, as the bankruptcy cost for the former is more. Firms that have taxable income will be better off by borrowing as the company gets valuable tax shields. A casual observation reveals that firms that have specialized assets keep leverage very low. The trade-off theory hypothesizes that firms have target debt ratios and they move towards the target by trading-off tax shields and bankruptcy costs. The survey by Graham and Harvey lends moderate support to it. That is, firms consider interest deductions moderately important, expected bankruptcy costs as not important and 44 percent of the firms in the sample have strict or somewhat strict target/range.

The pecking order theory suggests that firms use securities in the reverse order of asymmetry—use internal funds first, debt second, convertible security third, equity last. To avoid need for external funds, firms may prefer to store excess cash. The survey finds that firms value financial flexibility, issue debt when internal funds are not sufficient.

The survey does not support the free cash flow theory or the under investment problem or asset substitution.

APPENDIX I: MILLER'S THEOREM

Consider a company with constant expected EBIT. The company has a policy of paying out 100 percent of its earnings as dividends. If the company has no debt then the earnings available to investors as dividends are $EBIT(1 - T_c)$. After paying personal tax of T_{PE} , investors will have

$$EBIT(1 - T_c)(1 - T_{PE})$$

where

T_c = corporate tax rate on the marginal rupee of earnings

T_{PE} = tax rate on marginal income as dividends

Now let's suppose the company borrows Rs D at an interest rate i . Let the personal tax rate on interest income be T_d . The company distributes dividends and interest to investor.

$$\text{Distribution} = (EBIT - iD)(1 - T_c) + iD$$

The first term is the profit after tax distributed as dividends to shareholders and the second term is the interest paid in rupees.

After payment of personal taxes, investors will have an amount equal to

$$(EBIT - iD)(1 - T_c)(1 - T_{PE}) + iD(1 - T_d)$$

Expanding terms we get:

$$(\text{EBIT})(1 - T_c)(1 - T_{PE}) - iD(1 - T_c)(1 - T_{PE}) + iD(1 - T_d)$$

The first term is similar to the funds available from an unlevered company. Thus, the value of a levered company is equal to the value of an unlevered company plus the present value of an annuity of $-iD(1 - T_c)(1 - T_{PE}) + iD(1 - T_d)$ with the discount rate being the cost of debt adjusted for personal taxes, i.e., $i(1 - T_d)$.

If the annual flow is assumed to be a perpetuity,

$$\begin{aligned} \text{PV} &= \text{Amount/Discount rate} \\ &= iD [(1 - T_d) - (1 - T_c)(1 - T_{PE})]/i(1 - T_d) \\ &= [1 - \{(1 - T_c)(1 - T_{PE})/(1 - T_d)\}] D \\ V_L &= V_U + [1 - \{(1 - T_c)(1 - T_{PE})/(1 - T_d)\}] D \end{aligned}$$

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EXERCISE

State whether the following statements are true or false:

1. The agency cost of debt is borne by the shareholders.
2. Maximizing firm value is same as minimizing WACC.
3. Maximizing shareholders wealth is same as maximizing firm value.
4. The cost of equity increases linearly with leverage.
5. The cost of debt increases with debt ratio.
6. A hybrid financial instrument like a convertible bond that gives a bondholder an option to buy shares of the company is essentially designed to address the agency problem.
7. There is as much money to be made on the left-hand side of the balance sheet as there is on the right-hand side.
8. If the tax rate on debt and equity are the same and the company doesn't pay taxes, then there is no advantage to debt.
9. Companies that generate lots of cash suffer from a free cash flow problem.
10. Companies that derive much of their value from future growth opportunities should use relatively less debt.

QUESTIONS

1. The Government of India introduced dividend tax in 1998. Dividends, henceforth, will be taxed at a flat rate of 10 percent at the corporate level.⁵ What could be its impact on capital structure and cost of capital?

⁵ It has now been repealed.

2. Marginal tax rate, variability of operating cash flows, creditors' difficulty in monitoring a firm and need for flexibility are some of the factors that affect capital structure. What relationship between these variables and debt ratios do you expect to hold?
3. Suppose the government makes only half the interest expense tax deductible. What will be its impact on capital structure?
4. Borrowing can make an unviable project viable. Explain.
5. Assembling a pie cut into six pieces and buying a whole pie are not the same. Explain.
6. Conventional lending gives recourse to the promoter in case of project failure. Can there be a type of debt where there is *no* recourse? How would your analysis change in case of such a project?
7. Borrowing enforces discipline on the company's management. Explain.
8. A project is expected to generate net operating income of Rs 10,000. The cost of unlevered equity is 18.6 percent and tax rate is 35 percent, what is the value of the project?
9. If the project is financed with debt and equity, what is the value of the project if the increase in debt capacity is Rs 18,000?
10. Is it possible to reduce the risk of insolvency by acquiring a project whose cash flows are less than perfectly correlated with that of the firm?
11. Unlevered beta = 1.4, risk free rate = 8 percent and risk premium is 10 percent. What is the unlevered cost of equity?
12. Cost of unlevered equity = 18.6 percent, cost of debt = 12 percent, tax rate = 35 percent. The project will be financed with Rs 18,000 of debt and Rs 17,600 of levered equity. Calculate cost of equity.
13. Calculate levered betas at various debt levels:

Beta	—	0.8	—	—
D/E	0	0.5	0.6	0.7
14. Calculate cost of equity at all the debt levels assuming suitable CAPM parameters.
15. You are analyzing the debt policy of Ashok Leyland. You have obtained debt ratios of other companies in the automobile industry group. You notice that debt ratios vary among companies. Is it correct to compare debt ratios? Why or why not? What would you do?
16. Explain the terms Managerial Entrenchment and Underinvestment.

Chapter 20

An Overview of Financing Choices

OBJECTIVES

- ◆ Introduction to convertibles as a class of financial instruments.
- ◆ Provide a rationale for financial innovation.
- ◆ Introduction to Warrants and Preferred stock.
- ◆ Estimating the impact of a choice of an instrument on the financial health of the firm.

One of the primary responsibilities of a finance manager lies in selection of an appropriate source of funding. The objective of a financing strategy is to support a long-term business strategy. It is the responsibility of the CFO to maintain contact with public and private sources of capital to make sure that the company has adequate cash to invest and grow. In this chapter I intend to provide an understanding of:

- Characteristics of different types of securities.
- The impact of the choice of a security on the financial health of a firm.

We shall discuss debt markets in greater detail in Chapter 24.

Companies have access to a wide array of instruments, the most prominent being straight debt and equity. The last 20 years have witnessed unprecedented advances in the type and the manner in which securities are offered to the investing public. Debt, as opposed to equity, entitles investors to contractual interest and principal payments. The interest could be at a fixed rate or at a floating rate. The interest rate, in the case of floating rate debt, gets reset at specified intervals—3 months or 6 months according to a formula. The London Interbank Offered Rate is the commonly used benchmark rate in international capital markets. The interest rate on a loan could be specified as LIBOR +10 basis points, say.¹

SECURITY DESIGN OBJECTIVES

The last two decades have witnessed unprecedented innovation in the range of and manner in which firms issue securities. Just as engineers apply scientific principles to design new products and services, financial

¹ 100 basis points = 1 percent.

engineers apply principles of financial economics for the purpose of structuring, pricing and managing the risk of financial contracts.

Financial engineering involves the design, development, and implementation of innovative financial instruments and processes, and the formulation of creative solutions to problems in corporate finance. Innovative instruments make financial markets more complete and efficient. For instance, greater efficiency could be achieved by reducing transaction costs. Financial markets can be made more complete by designing a new security whose contingent after-tax returns cannot be replicated by any combination of existing securities.

Financial engineering involves three types of activities: design of new financial instruments, development of new financial processes and providing creative solutions to problems in corporate finance. Index linked bonds, on-line trading of securities and project finance are examples of the three activities respectively.

Some academics consider financial innovations ‘unpredictable improvements’ that come into being as a result of regulatory and tax impulses, while others consider innovative instruments and processes as attempts by companies to lessen the financial constraints they face. The factors responsible for financial innovation can be classified into 11 categories (Exhibit 20.1). Financial engineering can be used not only in reducing financing costs and creating customized financial instruments but also in advancing a company’s strategic goals.² For instance, a company could control the volatility of output prices using financial engineering principles to differentiate its products when customers attach importance to reduced uncertainty in prices. Similarly, a company could hedge its exchange rate exposure and hence the volatility of the expected revenue stream to reduce uncertainty in returns to shareholders.

Exhibit 20.1 Factors affecting financial innovation

1. Tax asymmetries that can be exploited to produce tax savings for the issuer or investors, or both.
 2. Transaction cost.
 3. Agency cost.
 4. Opportunities to reduce some form of risk or to reallocate risk from one market participant to another who is either less risk averse or else willing to bear the risk at a lower cost.
 5. Opportunities to increase an asset’s liquidity.
 6. Regulatory and legislative changes.
 7. Level and volatility of interest rates.
 8. Level and volatility of prices.
 9. Academic work that resulted in advances in financial theories or better understanding of the risk–return characteristics of existing class of securities.
 10. Accounting benefits.
 11. Technological factors and other factors.
-

Source: John D Finnerty (1988).

New instruments can be classified into debt, equity, convertible or preferred stock categories. New securities can add value in several ways:³

Reduction in Agency Cost

Puttable bonds, for instance, enable investors to sell the bond back to the issuer if the issuer increases leverage beyond a certain level or when the control changes. Similarly, rating sensitive notes bear interest rates that change with the credit standing of the issuer.

² Tufano, Peter (1996). ‘How Financial Engineering Can Advance Corporate Strategy’, *Harvard Business Review*, Jan–Feb.

³ Finnerty, John (1992). ‘An Overview of Corporate Securities Innovation’, *Journal of Applied Corporate Finance*, Vol. 4.

Managing Exchange Rate Risk

Dual currency bonds are bonds offered in one currency while the interest payments and redemption are made in another currency. The issuer offers to make interest and principal payments in some specified list of currencies. The investor has the option to choose the currency DCBs, thus reallocate currency risk. Dual currency bonds can be issued in India after the rupee becomes fully convertible on the capital account

Likewise, commodity indexed bonds, bear coupon and principal payments tied to the price of a commodity to which the issuer has an exposure. When the price of the commodity falls, the issuer's revenues will decline. So does debt service. In other words, such bonds increase the debt capacity of the company.

Reducing Transaction Costs

Corporate bonds usually include a call provision that enables the issuing firm to redeem the issue before maturity by paying the bondholders. When interest rates fall, managers have the option of redeeming the issue and replacing it with a new issue. Because of the call provision the issuer pays a premium over face value called the call premium. The call premium typically follows a declining schedule falling to zero a few years before maturity. Issuers are typically prohibited from redeeming the issue for few years after the issue (call protection period).

Two reasons are commonly cited for including the call provision (Kraus, 1983):

- It enables managers to increase shareholder value by refunding the bond when interest rates decline
- It enables companies to redeem when covenants become too restrictive.

The first reason assumes that managers have special expertise in forecasting interest rates, which is questionable. If they do, bondholders will recognize this over a period of time and price the call option accordingly. Since any gains to issuer from refunding is a loss to the bondholder (because s/he has to accept a lower interest bond), we would expect bondholders to demand higher interest rates on callable bonds when compared to non callable bonds. If the higher interest payment cancels out the value of the call option, the issuer can be indifferent between paying a higher interest and including a call provision, and issuing a non-callable bond. Further, lower quality bonds are more likely to have call provisions because the issuer can replace the bond when credit quality improves (because of which the interest is lower).

Most bond covenants restrict the issuer's investment and financing decisions. For instance, covenants prohibit the issuer from selling another secured bond or a merger. Due to such restrictions a firm may have to pass up a positive NPV project in future. One way to get around the covenants is to include a call provision.

Callable bonds are derivative embedded securities. A callable bond can be viewed as a non-callable bond on which the bondholder has written a call option to the issuer. From the issuer's perspective:

$$\text{Callable bond} = \text{Non-callable bond} - \text{Call option}$$

The option embedded in the bond can be viewed as a call option (sold by the investor to the issuer) on the price of the bond with a strike price equal to the call price with an expiry date equal to the call dates. As is evident, the call option has multiple exercise dates prior to the final maturity of the option. So it is a *Bermudan style* option. The call option in case of a callable bond is an embedded option that cannot be separated from the bond. The value of the call option depends on the current and future levels of interest rates, slope of the term structure, volatility of interest rates, length of the call protection period, bond maturity and

prepayment penalty.⁴ Once an issuer has decided that it will include a call provision, it must then decide on the design of the call features such as the (schedule of) call price and length of the call protection period because the required coupon (the spread over non-callables) depends on these.

Bond refunding involves significant transaction costs. In 1998, Tennessee Valley Authority issued an instrument called Ratchet bond that captures the advantages of callable bonds while at the same time eliminating the undesirable feature—transaction cost.⁵ The coupon on the ratchet bond indexed to the yield on a specified treasury bond resets as long as the resulting rate is lower than the current rate. That is, ratchet bonds ‘ratchet’ only downward (the coupon can only decrease or remain the same). Since the coupon resets automatically the issuer need not have to worry about the call decision or the transaction costs involved.

Reducing Inflation Risk

There are many securities whose cash flows are tied to an index such as a currency index or a general price index. Inflation indexed securities are designed to provide protection against increases in prices. Usually they are tied to a broad measure of prices such as the consumer price index (CPI) although the GDP deflator or a wholesale price index may be used. The choice depends on the needs of the issuer and the investor. The real return on these bonds is certain whereas in an ordinary bond, the nominal return is certain. In other words, inflation indexed bonds offer a fixed real return. There are two common types of bonds: Capital indexed bonds and Interest indexed bonds. Capital indexed bonds pay a fixed real coupon rate and a nominal principal that rises with inflation. Interest indexed bonds pay a fixed coupon and an indexation of the fixed principal every year.

Floating rate instruments are debt securities whose coupon rates vary over time according to a predetermined formula. The coupon rate is pegged to a reference rate such as the prime rate or London interbank offered rate (LIBOR) or T-bill rate. The coupon rate equals the reference rate plus a mark up to reflect the credit risk of the issuer. The coupon rate is reset at regular intervals—say, 3 months. Thus, the coupon on floating rate instruments ‘float’. The coupon is generally semi annual. The premium over the reference rate may decline over time. For instance, the coupon might be reference rate plus 1.05 percent for the first five years, 1 percent for the next five years and so on. There is a maximum and minimum within which the coupon can fluctuate. They can also have call and conversion features, which enable the issuer to redeem the issue on or after a pre-specified date at pre-specified prices and enable the investor to exchange the instrument to a fixed rate instrument with predetermined coupon and maturity.

Floating rate notes make coupon payments that increase with the level of interest rates, while inverse floaters make coupon payments that decrease with the level of interest rates. Inverse floaters or bull floaters have reset formulas at some fixed rate minus the reference rate. The coupon on the instrument rises when LIBOR falls. For instance, the re-set formula may be 15 percent minus LIBOR. These securities attract investors who are bullish on bond prices because the coupon rate moves inversely to the market rate. Bear floaters, on the other hand, reset at a multiple of the reference rate minus some fixed rate. For instance, the reset formula could be two times LIBOR minus 9.12 percent (i.e., deduct 9.12 percent from twice the prevailing LIBOR rate). Investors who are bearish on bond prices would be attracted to such securities because the coupon rate rises by more than the increase in the market rate.

⁴ Pricing of Interest Rate Derivatives is beyond the scope of this book. Interested readers may refer to Ho and Lee (1986), Heath-Jarrow-Morton (1990), and Black-Derman-Toy (1990).

⁵ See Kalotay, Andrew and Leslie Abreo (1999). ‘Ratchet Bonds: Maximum Refunding Efficiency at Minimum Transaction Cost’, *Journal of Applied Corporate Finance*, Vol. 12, No. 1.

One characteristic of inverse floaters is that their prices rise more than those on fixed rate bonds of the same maturity. Likewise, when rates rise, investors receive lower coupon. Who would issue inverse floaters? Those companies that have a floating rate exposure (e.g., finance companies are exposed to rise in deposit rates) would want to issue an inverse floater to smooth out the cost of funds. Combining a floater and an inverse floater cancels the variable reference rate giving rise to a fixed rate liability. In 2002, three companies—Grasim, Hindalco and Cholamandalam Investments—issued inverse floaters.⁶ Cholamandalam is raising an aggregate Rs 122 crore from the market through fixed rate debentures, floaters and inverse floaters. Investors and issuers in inverse floaters often hedge the risk by entering into a swap agreement.⁷

Addressing Investor Clienteles

Limiting availability of securities to only certain classes of investors, usually restricts demand and, hence, the price. State Bank of India offered Resurgent India Bonds amounting to \$4.2 billion and \$5.5 billion in multiple rounds of capital-raising to Indians living abroad at 150 basis points *below* comparable benchmarks leading to savings of \$1.08 billion.⁸ Ownership restriction could enhance value by eliminating the deadweight costs of prolonged negotiation, particularly when a security is restricted to a homogeneous clientele that values the underlying collateral higher than other investors. Restricting the ownership ensures that investment is limited to a homogeneous class of investors that the issuer cares about. It thus serves as a precommitment to ensuring an efficient ex-post bargaining renegotiation in the potential default states, resulting in a lower ex-ante offering yield.

CONVERTIBLE SECURITY TYPES

A convertible bond provides the performance attributes of a common stock and a bond. These securities typically pay a semi-annual coupon of 4–5 percent. The security is typically a subordinated debenture with a fixed principal amount and time to maturity with a right to convert into common stock based on its conversion ratio. The upside of the convertible comes from its common stock component, while the downside protection comes from the cash coupon on the bond component.

A convertible preferred also has features similar to a convertible bond. However, convertible preferred stock is subordinated to debt of the issuing company. It typically offers a coupon of 6–7 percent. A convertible preferred typically pays a cash coupon on a quarterly basis, and is also perpetual (or long tenure).

Mandatory convertibles are equity linked securities that pay a higher dividend (compared to the company's common stock) for a certain number of years and then get converted into common shares on a specified date. These securities have limited capital appreciation potential. In other words, the issuer puts a cap on the appreciation by specifying the conversion terms. Participating equity preferred shares, a type of mandatory convertibles, is designed to provide investors with high current income with high equity-like participation in the underlying stock. PEPS usually provide a coupon which is paid quarterly. These securities mature in 3–5 years, are typically listed, and are usually call protected for most of their life.

⁶ Prasanna (2002). 'Inverse Floaters: Wooing Investors?', *Chartered Financial Analyst*, Oct..

⁷ An interest swap is an agreement between two parties to exchange liabilities denominated in fixed rate to floating rate or vice versa.

⁸ Gande, Amar and Manju Puri (2002). 'Can Ownership Restrictions Enhance Security Value? Evidence from a Natural Experiment', Working Paper, Stanford University and Vanderbilt University, Dec.

Convertible bonds are hybrid instruments. A convertible bond gets converted into shares of the company at a specified price after a specified period of time at one stroke or in installments. The holder of a convert is entitled to receive interest on the convertible portion till conversion. Thus, a convert is a package of straight debt and equity option. The option to convert is usually at the discretion of the holder and will only be exercised when and if the holder finds such an exercise desirable. The features (terminology) of a convertible bond are discussed below.

The stated value or par value of a convertible security is typically \$1,000 in the US, whereas preferred stocks have much lower par values—\$50 or \$25.

The number of shares a holder will receive on exercising the option is called conversion ratio.⁹ The price paid to acquire the underlying shares through conversion is called conversion price.

$$\text{Conversion ratio} = \text{Par value of security} / \text{conversion price}$$

To illustrate, if the par value were to be Rs 100 and conversion price, Rs 20, the investor will receive five shares.

The conversion value of a convert is the value of the bond if it is converted immediately.

$$\text{Conversion value} = \text{Market price of shares} \times \text{Conversion ratio}$$

Conversion premium is the difference between the conversion price and the current market price of the stock at the time of issue. The premium is expressed in percentage. To illustrate, if the conversion price is Rs 50 and the current market price of the stock is Rs 40.

$$\text{Conversion premium} = \frac{50 - 40}{40} = 0.25 = 25 \text{ percent}$$

$$\text{Conversion premium may also be calculated as} = \frac{\text{Convertible price} - \text{Conversion value}}{\text{Conversion value}}$$

Although conversion premiums range from 10–70 percent, a premium in excess of 30 percent is considered too high to attract the traditional convertible bond investors.

The *current yield* of a convert is the coupon payment on the bond expressed as a fraction of the current market price. Thus, if coupon payment is 4 percent and market price is \$100, yield is 4 percent. The current yield is usually set higher than the dividend yield on the company's stock. Break-even measures the time it would take for the added return on the convert to equal the premium paid for the security in excess of its parity.

$$\text{Break-even} = \frac{\text{Convertible market price} - \text{Conversion value}}{\text{Convertible coupon} - (\text{Stock dividend} \times \text{Conversion ratio})}$$

The coupon payments on convertibles are tax deductible for the issuer, and rating agencies assign varying degrees of equity content depending on the structure of the instrument. Coupon typically ranges from 4–6 percent.

⁹ There is a class of convertibles called the death-spiral convertibles, which convert into a fixed dollar amount of common stock (equal to the convert's price). They derive their name from the fact that when stock price falls, the death-spiral owners receive more shares because of which shareholders face severe dilution. The terms of these bonds are so onerous that only companies desperately in need of cash would consider them. Some 23 companies issued death-spirals and raised \$ 123 million in 2001 in the US.

Convertible price is the current market price of the security quoted as a percentage of par for bonds, and an actual dollar price for preferred stocks. The price of the convert changes as the common stock price changes depending on the relationship between the convertible price and its equity value.

The credit spread (over treasuries) reflects the investor perception relating to how likely the issuing company will be able to make timely interest payments and pay off the principal at maturity. The larger the spread, the more concern investors would have regarding the issuing company's ability to make timely interest payments. The smaller the spread, the less concern investors would have.

Since a convertible is a hybrid instrument consisting of bond and option components, we would expect the value of the convertible to increase as the underlying stock price increased and decrease whenever the stock price declined. Although theoretically the price of the stock can be anything, including zero, the downside in case of convertibles is limited because of the straight bond component that provides contractual coupon payments. This serves as an investment floor.

The fixed income component of the convert is determined by discounting coupon and principal payments at an appropriate discount rate. The discount rate is usually the yield on a straight bond of similar maturity and credit rating. This value is termed investment value. The investment value premium is the amount that the market price of the convertible is above its investment value, expressed as a percentage.

All convertible bonds and preferreds with premium over investment value less than or equal to 10 percent are considered credit sensitive.

All convertible bonds and preferreds with conversion premium less than or equal to 10 percent or delta greater than or equal to 75 percent are considered equity sensitive.

The sensitivity to changes in the stock price is called delta. It expresses the change in the convertible price per unit change in the underlying common stock price. The change in delta per unit change in stock price is called gamma.

Convertible bonds also come with call provision that enables the issuer to repurchase the bond from security holders at the option of the issuer. Converts also come with a call protection period during which the issuer cannot call the bond. A bond's call schedule sets out the dates and prices at which the bonds could be called. If the call price is below the conversion value, the issuing company can force conversion by calling the bond. The investor would be forced to convert the bond because s/he gets more by converting than redeeming. Converts also come with what is known as soft call protection which stipulates that a bond be called only if the underlying stock price is at a pre-specified level, say 125 percent of the conversion price.

A list of *Equity Sensitive* convertibles at least \$200 MM in size, at least 6 months of call protection and break-even less than 6 months beyond call protection is given below.

<i>Issuer</i>	<i>Coupon (percent)</i>	<i>Maturity</i>	<i>Current yield (percent)</i>	<i>Conversion ratio</i>	<i>Conversion premium (percent)</i>	<i>Break-even (years)</i>
Prudential	3.38	11-15-04	6.07	1.47	19.5	2.7
MetLife	4.00	05-15-03	4.69	2.97	3.6	0.9
Phelps Dodge	6.75	08-15-05	6.66	2.08	25.0	3.0

A list of *Credit Sensitive* convertibles at least \$150 MM in size, stock price of \$5 or more is as shown:

<i>Issuer</i>	<i>Coupon (percent)</i>	<i>Maturity</i>	<i>Current yield (percent)</i>	<i>Conversion premium (percent)</i>
Xerox Continental	0.57	04-21-18	1.05	990.6
Airlines	4.5	02-01-07	6.73	117.7
Calpine	4.00	12-26-06	5.84	123.8

Source: Morgan Stanley.

It is estimated that the global convertible bond market has a market capitalization of about \$360 billion—with Europe accounting for 28 percent, excluding all domestic markets except for the US and Japan. The US alone accounts for more than \$200 billion in market value. Issuance in Europe is growing at 80 percent for the last few years, whereas the global market is growing at 35–40 percent.¹⁰ Several factors are responsible for this growth. The interest rates in Europe have been falling and equity prices are rising. When interest rates are low, the returns from bonds and money market instruments will be low. Investors may choose to invest in stocks, but this exposes them to the vagaries of the market. A convertible is a good alternative. Companies are taking advantage of the rising equity market by selling convertibles thereby selling stock at a premium. There has also been a boom in the mergers-and-acquisitions activity in Europe. Companies are divesting non-core businesses and convertibles/exchangeables¹¹ are often used in the transaction.

The US convertible bond market is dominated by high growth, hi-tech, start-up firms (e.g., internet and telecom companies) whereas the European market is dominated by large-cap, blue chip companies. This trend is changing now. A large number of stable companies with investment grade rating from the US have started issuing convertibles in the recent past. During the first half of 2001, 111 deals worth \$56 billion had been done in the US alone.¹² Exhibit 20.2 gives the list of lead underwriters of US convertible bonds by volume 2001.

Exhibit 20.2 Lead underwriters by volume, deals in 2001

<i>Underwriter</i>	<i>2001 proceeds (\$ in million)</i>
Merrill Lynch	14,790
Goldman Sachs	9,068
C S First Boston	8,075
Salomon	7,831
Morgan Stanley	6,874
Lehman	4,455
UBS	1,575
Bank of America	1,382
J P Morgan	625
Bear Sterns	425
Deutsche Bank	350
Robertson Stephens	400
CIBC World Markets	150
Total	56,000

Source: *Euromoney.com*.

A fully convertible debenture gets converted into shares of the company at a specified price after a specified period of time at one stroke or in installments. On the other hand, in case of the partly convertible debenture (PCD), only a portion of the principal gets converted into shares with the remaining portion being redeemed at maturity. The holder of PCDs is entitled to receive interest on the convertible portion till conversion and up till maturity on the remaining portion.

¹⁰ Roundtable on Convertible Bonds, *Euromoney* (Nov 1999).

¹¹ Exchangeable bonds grant the bondholder the right to exchange the bonds for the stock of a firm other than the issuer of the bond.

¹² 'Is this love, or a teenage crush?', *Euromoney* (July 2001).

An Example

Birla Global Finance Ltd. issued 18 percent, optionally convertible debentures of Rs 67.50 each at par on a rights basis to the existing shareholders of the company in 1996. The terms of OCDs are:

Part A of Rs 27.50

Part B of Rs 40

Part A was to be automatically and compulsorily converted into one equity share of Rs 10 at a premium of Rs 17.50 on allotment.

Part B was to be converted into one share of Rs 10, as the option of the holder, at:

- Rs 35 per share, if the conversion option is exercised between the date of allotment (Sept 30, 1996) and Dec 31, 1996
- Rs 40 per share, if the conversion option is exercised between Jan 1, 1997 and March 31, 1997
- Rs 42.50 per share if the conversion option is exercised between April 1, 1997 and June 30, 1997
- Rs 45 per share if the conversion option is exercised between July 1, 1997 and Sept 30, 1997.

The OCD would be redeemed at par on the expiry of 17.5 months should the investor choose not to exercise the option. Interest on OCDs was 18 percent per annum, on amounts outstanding from time to time, on a proportionate basis, from the date of allotment, compounded half yearly.

Exhibit 20.3 gives the instrument-wise distribution of capital raised in 1996–97 and 1997–98. As can be seen, although convertibles are a major product elsewhere in the world they are not used frequently by Indian companies.

Exhibit 20.3 Capital raised through debentures

Instrument	<i>(Rs crore)</i>			
	1996–97		1997–98	
	No. of issues	Amount raised	No. of issues	Amount raised
FCD	17	258.55	7	217.64
PCD	3	221.55	0	0
NCD	7	405.79	0	0

RATIONALE FOR CONVERTIBLES

Why do companies issue convertible bonds? Often convertibles are viewed as delayed equity. If the managers of a company expect the firm's stock price to rise and expect investors to exercise their option of conversion, a convertible, as opposed to an outright equity issue will result in lower dilution. Since the investor has an option of conversion, the coupon on convertibles tends to be lower than their non-convertible counterparts. For this reason, some managers consider convertibles 'cheap'. The coupon on convertibles is lower because of the valuable option (of conversion) given to the investor. The option of conversion is a sweetener attached to straight debt.

Moral Hazard

Straight debt suffers from the moral hazard problem. That is, the company's risk can be shifted from equity to debt by taking on riskier projects. Since shareholders have limited liability, they enjoy all the upside potential but lose nothing in case of project failure. Smart bondholders realize this and demand higher coupon. The cost of moral hazard problem is borne by shareholders. Since holders of a convertible have a choice to convert debt into equity, the agency problem is reduced.

Risk Insensitivity

Suppose the managers and investors of a company disagree about the riskiness of a company. If investors believe that the company's riskiness is higher than that projected by managers, they will demand higher interest rates. The equity option in case of a convertible bond makes the value of the convertible insensitive to risk shifting. This is because the value of the straight bond component decreases as risk increases but the value of the equity component *increases*. Thus, the package as a whole is risk neutral. By issuing convertibles, the managers and investors come to an agreement so that the value of the instrument is insensitive to riskiness of a company. Convertibles are often issued by high growth, risky firms for this reason.

Information Asymmetry

At times, the managers of a company may have better information than outside investors about the company's prospects. If the market undervalues the company's shares, the managers of the company have a disincentive to issue equity. They may issue debt. But debt increases the probability of bankruptcy. Convertibles fall in between. Based on this analysis, we would expect convertibles to be issued by those companies that are undervalued but not to a large extent, straight debt by undervalued companies and equity by overvalued companies.

High growth firms may not find straight debt attractive as they may not have an investment-grade rating. So the interest expense will be high. Defaulting on interest payments may lead to restrictions on investment activities of the firm, which curtails growth. Equity financing will be expensive as high growth firms may have to sell equity at lower prices than that implied by growth opportunities. Those managements that have confidence in the future of the company can issue convertibles and use the call provision to force conversion when the stock price rises in the future.¹³

What is the best way to find out why managers issue convertible bonds? Ask them! This is precisely what academic surveys do. A recent survey by Graham and Harvey (2001) finds that most issuers consider convertibles delayed equity and issue them when the stock is undervalued.

The stock price and, hence, the conversion premium changes over time. Holding the convertible bond enables the investor to earn interest on the bond component while at the same time retaining the option of conversion if it is desirable. Given this advantage, an investor would prefer to hold the bond rather than convert it into shares. While an investor prefers to hold the convertible bond rather than convert because of the downside protection offered by the bond, the opposite is true for the corporation. Issuers would want to force conversion so that the legal obligation to pay interest and principal is replaced by the non-contractual, more flexible commitments (dividends) to common stock.

¹³ Brennan and Schwartz (1988).

One of the prime assumptions in issuing convertibles is that the company's stock price will rise in future. If, for some reason, the stock price falls after issuing the convertible, investors will not convert and straight debt remains. This situation is called 'debt overhang'. Often managers cite the debt overhang problem for not issuing convertibles. If the company issues convertibles when the chief alternative is debt, one need not crib when investors do not convert because the interest rate on convertibles is lower than that on straight debt resulting in cash savings. In fact, an issuer should rejoice. But the overhang problem is not solved. One should fix the root cause of a problem, not its consequences. Managers are constantly under pressure to get the best immediate financing deal. This prompts them to take a short-term view. Companies implicitly hold valuable growth options. So a company's financing should be structured in such a way that financial flexibility to exercise its growth options in future is maintained. The financial plan should ensure future access to capital even if it means a higher price for capital today.¹⁴ Going by this reasoning, high growth, start up firms should choose between convertibles, straight bonds and equity not just on the basis of current cost of capital and debt ratio, but also on the basis of future financing needs and cost of capital. Even though convertibles ordinarily make sense to high growth firms, a company with high operating leverage, high (current) debt ratio and uncertain product market conditions should issue equity even if it implies selling stock at a discount.

Issuers of convertibles face uncertainty in future capital structure of the company in the sense that the company receives equity only if investors convert the bond into shares. To make sure that the company receives shares if and when it is desirable—i.e., to 'control' investors—issuers can do two things:

- Insert a call option
Since the objective of management is to maximize the value of the stock (and not the value of convertibles), the bond could be called as soon as the conversion value reaches the call price. The investor is coaxed to convert because he or she gets more by converting than by holding the bond. In short, the management places a lid on the value of the convertible. Usually investors have 30 days to decide whether to surrender the bond or convert.
- Increase dividends making conversion more attractive
At the time of issue, the coupon on convertible is set higher than dividends on the shares (otherwise the investor will immediately convert). As long as the coupon is higher than dividends, the investor enjoys higher income while at the same time retaining the option of conversion. The issuer can induce investors to convert by raising dividends. When dividends are sufficiently high, bondholders voluntarily decide to convert. But conversion exposes the investor to the risk of common stock.

A diagram of convertible bond value against stock price is shown in Exhibit 20.4.

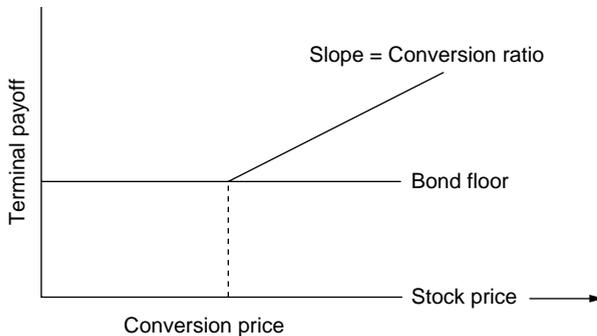
At the time of the issue, a finance manager should decide on the features of the bond such as convertibility, coupon rate, call and put options, exercise price, etc. Investors pay attention to both conversion premium and interest on the bond. The higher the conversion premium, the less attractive is the bond. Converse: the lower the conversion premium, the more attractive is the bond and lower can be the interest. Increasing the coupon raises the bond floor and makes the convertible more attractive, other things remaining constant. Likewise, decreasing the coupon lowers the bond floor.

The higher the coupon, the lower can be the conversion premium and vice versa.

The actual features of the convertible depend on the particular financing problem the company is facing and the general market conditions.

- Interest on convertibles is a tax-deductible expense. So firms with predictable taxable income could issue 'bond like' instruments to take advantage of tax deductibility of interest expense and issue 'equity like' instruments when the prospects of stock price rising is high.

¹⁴ Willigan, Geraldine (1989). 'The Case of the Expensive Expansion', *Harvard Business Review*, Jan–Feb.

Exhibit 20.4 The value of convertible at various stock prices

- Companies suffering from asset substitution and risk shifting can give higher conversion, i.e., issue equity like securities to reduce the agency cost.

High growth companies could issue convertibles with shorter maturities and less call protection, and force conversion when the stock price rises. The call schedule should be designed to provide maximum flexibility to the issuer in forcing conversion as and when it is desirable. Issuers benefit from the call feature because it gives them the opportunity to strengthen their balance sheets by replacing debt by equity.

VALUATION OF CONVERTIBLE BONDS

A convertible is a combination of debt and equity option. So the value of a convertible is the sum of the straight debt and option components. The option embedded in a convertible is an American type option, and not European, because the investor can convert at any time up to maturity. The Black–Scholes or Cox–Ross model takes into account the terms of the convertible, including its coupon, maturity, conversion ratio, call protection and credit spread. The underlying stock's volatility and stock dividends are also taken into account. To find the value of the straight bond component one may use a single discount rate (equal to the yield on comparable bonds) for all the years or one may use the yield curve to calculate spot rates.¹⁵ The Black–Scholes model modified to account for continuous dividends can handle a convertible bond without a call provision. The presence of the call provision makes valuation difficult.

An Example

In 1993, Essar Gujarat issued Euro-Convertible bonds. Here are the terms of the issue:

- Maturity = 5 years
- Currency = US dollars
- Coupon = 5 percent
- Conversion price = Rs 62.21 = \$1.98 (at the prevailing exchange rate)
- Conversion premium = 5 percent
- Conversion right = any time, up to maturity

¹⁵ Yield curve is discussed in the chapter on Bond Markets.

Call Provision = Company can call the bond at any time after 2 years if dollar price of Essar shares exceeds 130 percent of the conversion price. Bondholder can opt for conversion. Otherwise the bond would be redeemed at par.

Valuation of this instrument requires inputs into the Black–Scholes model, i.e., volatility, risk-free rate, dividend yield, etc.

Here is the relevant data:

Volatility of stock returns of Essar stock (in dollars)	=	40 percent
5-year yield on US treasury bonds (in dollars)	=	6 percent
Dividend yield on the underlying stock	=	5 percent
Yield on comparable straight bonds	=	8.5 percent

The value of the straight bond component can be calculated as:

Present value of coupon discounted at 8.5 percent for 5 years + Present value of the principal discounted at 8.5 percent.

$$\frac{5.5 (\text{face value})}{100} \times \text{PVIFA} (8.5 \text{ percent}, 5) + \frac{(\text{face value})}{(1+0.085)^5}$$

The value of the option (ignoring call and put provisions) can be estimated using the Black–Scholes formula:

$$\text{Value of call} = S e^{(b-r)T} N(d_1) - X e^{-rT} N(d_2)$$

where

S = stock price,

X = strike price or exercise price,

b = cost of carry defined as risk-free rate—the dividend yield (q),

T = time to maturity in years, and

σ^2 = variance in returns from the underlying stock.

$$d_1 = \frac{\ln(S/X) + (b + \sigma^2/2)T}{\sigma\sqrt{T}}$$

where

$$d_2 = d_1 - \sigma\sqrt{T},$$

$X = \$1.98$,

$S = \text{Rs } 59.24 = \$1.88$,

$\sigma = 40$ percent,

$T = 5$ years,

$r = 6$ percent,

$q = 5$ percent, and

$e = 2.7183$.

The option value can be estimated by plugging the inputs into the model. As mentioned earlier, the Black–Scholes model does not capture early exercise and call provision. The Cox–Ross model will not be discussed here because of its complexity. Interested readers may refer to Ingersoll [1977(a), (b)], George Philips (1997) and Ho and Pfeffer (1996).

Warrants

A warrant is an option that gives the holder the privilege of buying a specified number of shares of the company at a specified exercise price at any time on or before the expiration date. Warrants usually come as attachments to bonds to make a bond issue more attractive to investors. The debenture holder can exercise a warrant. Warrants can also be detached and separately listed on a stock exchange for trading purposes. The issuer of the warrant receives the price of the warrant at the time of issue and the exercise price when the option is exercised. The company gets equity investment if the investor exercises the option. The uncertainty in the investor's reaction can affect further debt issuance by the company. In other words, if warrant holders do not exercise the option, the company may have to postpone further debt issuance due to inadequate equity base. A company contemplating on issuing equity to build equity may issue debentures with warrants instead of issuing straight equity if the shares are fully priced because issuing shares at a discount to the current market price will result in under-pricing of *all* shares subsequently. The exercise price is determined by market conditions. As a thumb rule, the conversion price may be fixed at a premium of 10–15 percent of the prevailing market price. An issue of warrant at a strike-price lower than that expected by the company's management will not affect a growing company much in the sense that the value of foregone capital in present value terms will not be high.

A comparison between convertibles and warrants is in order:

- The conversion rights are inseparable in case of convertibles. Warrants are separable from the bond and are usually listed on stock exchanges for trading.
- A warrant gives additional cash to the issuer when the holder exercises the right. A convertible does not.
- When convertibles are converted into shares, the associated debt is not repaid unlike in the case of a debt-warrant package.
- Convertibles frequently come with call provision. The issuer can force conversion when the situation so demands. Warrant holders cannot be coaxed to exercise. They may or may not exercise their option depending on what happens to the underlying share price in the interim. The warrant holders will not exercise if share price declines. So there is an element of uncertainty regarding the amount of equity the issuer gets. If cheap debt is the objective regardless of what happens to equity, warrant with debt is a better choice.

Warrants can be exercised with cash or with bonds valued at face value. The units are generally designed so that investors will exercise warrants by turning in debt. Bonds are worth the face value (say, Rs 1,000) in exercising warrants; bonds are worth less than Rs 1,000 as debt instruments because of low coupon, which ensures bonds will be turned in to exercise warrants. Thus, when warrants are called, bondholders will sell their bonds to warrant holders or bondholders will purchase warrants. In either case the bonds will be turned in to exercise the warrants.

Warrants are also callable so that the company can force investors to exercise warrants. For example, if the call price is Rs 5 per warrant and the company's stock price rises to Rs 65, the warrant holder gets Rs 10 by exercising if the strike price is Rs 55. He would get only Rs 5 by receiving the call. Faced with this choice investors are forced to exercise the warrants.

Unlike convertibles, the total issue value (of a bond-warrant package) is split between debt and equity. The accounting rule is that when the warrants are detachable, value is allocated to equity account for the warrants. Assume that the issue size is Rs 1,000 crore. Further, the bond carries a coupon of 7.5 percent to yield the going rate on straight debt—12 percent. The result is an original issue discount debt of Rs 750 crore. If the warrant is not exercised, the debt liability rises to Rs 1,000 crore over the life of the issue and the net worth is reduced by Rs 250 crore.

In sum, at the time of the issue, equity and debt are apportioned. The unit is designed to behave like a synthetic convertible. If the company's stock price rises, it calls the warrants, the bonds are turned in to exercise the warrants, and the company is left with Rs 1,000 crore in equity. If the stock price falls, the warrants expire worthless and the company has to pay off Rs 1,000 crore in debt at the time of maturity.

Preferred Stock

A preference share, as opposed to ordinary shares, entitles investors for fixed dividend payments. The preference dividend paid by the company is not tax deductible. It is paid out of after tax profits. Often, preferred stock is compared with debt as both preference dividends and interest payments are fixed in nature. Since interest is tax deductible, whereas preference dividend is not, preference shares are less popular than straight debt. Executives tend to forget that there is an important distinction between interest payments on bonds and dividend payments on preference shares. While suspension of preference dividend might be unpleasant, default on a legal contract such as bonds can drive a company to insolvency. The management will be more comfortable with preferred dividends than it will be with the same amount of interest. Some favor preferred stock because rating agencies and analysts may view preferred stock as 'equity like', but this benefit is at best illusory.

Preferred stocks often trade at lower yields than straight bonds because preferred stocks are tax advantaged in the sense that corporate investors in America are taxed on only 30 percent of income from preferred stocks. Even in the absence of taxes, other factors like differences in liquidity, the frequency of cash flows (semi-annual versus quarterly) and credit risk account for differences in yield. A preferred stock is more like debt than equity because it does not provide upside potential like equity. In terms of seniority, preferred stock ranks below debt but above common stock. The credit risk of a preferred stock is not the probability of default because issuers can omit dividends without triggering default, unlike debt. Since preferred stock ranks lower than debt in capital structure, it has greater risk of not making scheduled cash flows. This risk will be reflected in a higher yield on preference shares relative to yield on corporate bonds. The credit risk premium over straight bonds will be more for low rated bonds than for high rated bonds. In the chapter on Bank Loans and Debt Markets I discuss the estimation of default risk premium in greater detail.¹⁶

AN EXTENDED EXAMPLE

A company is in the process of investing Rs 24 crore in the next two years. The managers of the company are in the process of selecting a security to be issued. The balance sheet of the company is as shown:

¹⁶ Crabbe (1996); a recent article on the subject.

(Rs crore)		
	1999	2000
<i>Liabilities</i>		
Equity	90.6	92.7
Long-term debt	12.4	12.4
Current liabilities	19.8	18.8
Other liabilities	9.3	9.6
	132.1	133.5
<i>Assets</i>		
Property, plant and equipment	32.6	33.3
Investments	43.0	39.3
Current assets	55.8	59.5
Other assets	0.70	1.40
	132.1	133.5

The company has the following choices:

- Straight bond with a coupon of 12 percent, and four year maturity
- Convertible bonds with the coupon rate of 9.5 percent, 4 year maturity and a conversion price of Rs 834. (The current market price of the company's stock is Rs 814).
- A bond-warrant package with a coupon rate of 8.5 percent, with 4 year maturity and a warrant that entitles the holder to subscribe the same amount of stocks as the bond's par value at the exercise price of Rs 834.

The current cost of debt is 11.5 percent and tax rate is 35 percent. The company's stock has a beta of 0.8. Risk-free rate is 7 percent; market risk premium is 10 percent. The company currently has an equity/total assets ratio of 69 percent. They intend to bring it down to 60 percent. So there is room for some debt. Evaluation of alternatives involves calculation of debt ratio and cost of capital for all the alternatives. The cost of equity for the company is $7 + 0.8(10) = 15$ percent. The calculation can be made under two scenarios: (i) No conversion of convertibles into shares and with conversion, and (ii) The calculation for the second scenario is as shown:

<i>Alternative 1</i>		<i>Alternative 2</i>		<i>Alternative 3</i>	
<i>Value of debt</i>	<i>Cost (percent)</i>	<i>Value of debt</i>	<i>Cost (percent)</i>	<i>Value of debt</i>	<i>Cost (percent)</i>
Rs 12.4 crore	11.5	12.4	11.5	12.4	11.5
Rs 24 crore	12.0				
New debt					
<i>Value of equity</i>	<i>Cost (percent)</i>	<i>Value of equity</i>	<i>Cost (percent)</i>	<i>Value of equity</i>	<i>Cost (percent)</i>
Rs 92.7	15	92.7	15	92.7	15
		24.0	15	24.0	15
		(New equation)		(New equation)	
Total assets					
Rs 157 crore		Rs 157 crore		Rs 157 crore	
Equity/assets					
Rs 58.8		74.12 percent		74.12 percent	

$$\text{Weighted average cost of capital} = K_d(1 - T) \times D/V + K_e \times E/V$$

Compare the cost of capital for the three alternatives. Note that the balance sheet—soon after issuing bond-warrant or any time before maturity—may not (and does not) resemble the one shown. Recollect the discussion of bond-warrant package above. In other words, one should recast the balance sheet in a more dynamic setting under various scenarios.

IN CONCLUSION

The choice of a security depends on current and future capital structure and cost of capital. It is important to understand that one of the key objectives of a financing program is to maintain financial flexibility. A company strapped for cash or saddled with heavy debt may get into financial distress and lose valuable investment opportunities. The objective of this chapter was to provide a good understanding of the choice between debt, equity, convertibles and bond-warrant units. The chapters on initial public offerings and domestic and overseas debt markets discuss the mechanics of issuing equity and debt respectively.

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EXERCISE

1. In December 1988 American Express, Dow Chemical, Pfizer and Sara Lee announced plans to offer 'Unbundled Stock Units' (USUs). Shareholders of these companies could surrender their shares in exchange for USUs. In exchange for shares the shareholders would get three certificates representing ownership of USUs. The units could be unbundled and traded separately. For each USU, the three different claims were: an Equity Appreciation Certificate (EAC), an Incremental Dividend Preferred Share (IDP), and a Priority Income Claim (PIC). The PIC was entitled to quarterly dividends equal to the current dividend on the common. This dividend was to be continued even if the dividend on the common was increased or decreased. The IDP was entitled to dividend equal to any amount by which the common dividend was raised above the current amount. If the dividend on the common was cut the IDP received no dividends. The Equity Appreciation Certificate received no dividend. The trust was to be dissolved after 30 years. At that time the PIC was entitled to a balloon specified

in the contract. The IDP holders were paid a nominal sum. EAC holders would receive excess of the stock price above the PIC and IDP guarantees. Cash flows for the 3 claims are:

PIC: For the 30 years, the PIC would receive quarterly interest payments equal in amount to the current common dividend. It would also get a balloon payment at the end of thirty years. The interest on PIC would be tax deductible for the company.

IDP: For 30 years, the IDP was entitled to quarterly dividend payments equal to the excess of common dividend over the current dividend. After 30 years the IDP would receive a small residual payment.

EAC: No payment for 30 years. After 30 years, EAC would receive the amount by which the stock price exceeded the payments to the PIC and IDP shares.

The American Express USU had the following features. Before the announcement of the issue American Express shares were trading at \$26.875 and had an annual dividend of 84 cents per year (or 21 cents per quarter). The balloon payment was \$75. The IDP terminal payment was \$2 at the end of thirty years.

Other information: Annual interest rate = 9.8 percent compounded semiannually; annual log standard deviation of stock returns = 33 percent.

The PIC is entitled to quarterly payments of 21 cents for 30 years and a final payment of \$75. What is the value of USU? Would you buy it?

2. A company needs Rs 10 lac in new, long-term financing. The firm is considering the issue of shares or convertibles. The current market price of the stock is Rs 20. The new issue could be sold for Rs 19. An alternative would be to issue 11 percent, Rs 1,000 face value convertible at a conversion price of Rs 25 per share. The company currently has 2 lac shares outstanding; current profit after tax is Rs 4 lac. Calculate the EPS for the two alternatives before and after conversion assuming that earnings remain the same.
3. Calculate the conversion price of a bond of Rs 1,000 face value convertible into 50 shares.
4. Calculate the conversion ratio if the bond can be converted to shares at Rs 20 per share.
5. Calculate the conversion premium for the same bond if the conversion ratio is 12.5 and the current market price is Rs 75.
6. The value of a convertible is the sum of the values of the straight bond component and the conversion option (equity component). The value of the straight bond component can be calculated by discounting the coupon (of the convert) at the prevailing yield on comparable straight bonds. An 8 percent, Rs 100 face value convertible has a tenor of 20 years. If the yield on comparable straight bonds is 9 percent, calculate the value of the bond component of the convertible.
7. In 1991, the Republic of Austria offered \$100 million principal amount of stock index growth notes (SIGNs) in the US.¹⁷ The SIGNs mature in 5.5 years and do not make any interest payments prior to maturity. The single interest payment payable at maturity is equal to the greater of zero and

$$10 \left\{ \frac{P_m - 336.69}{336.69} \right\}$$

where P_m denotes the average closing value of the S&P 500 for 30 business days, immediately preceding the second business day prior to the maturity date.

The initial offering price was \$10 per SIGN. If the value of the index is below 336.69 on the maturity date, an investor receives \$10. If the value exceeds 336.69, the investor gets \$10 plus $10 \times$ percentage appreciation in the index above 336.69. When the issue was announced, the value of S&P 500 was 336.07.

The Republic of Austria has issued US dollar denominated zero coupon bonds maturing in 1995. The yield on this bond is 8.05 percent per annum semiannually compounded. The dividend yield on the index is 3.3 percent. The continuously compounded treasury yield is 7.60 percent. The volatility implied by S&P 500 call option of relevant maturity is 17.98 percent. Estimate the value of SIGNs. What other factors would you consider in pricing the instrument?

8. On September 1, 1986 Salomon Brothers issued Standard & Poor's 500 indexed note (SPIN) to the public at par for a total of \$100,000,000.¹⁸ The SPIN is a four-year 2 percent (payable 1 percent every six months), coupon bond which at maturity pays its holder:

¹⁷ Based on Finnerty, John (1993). 'Interpreting SIGNs', *Financial Management*, Summer.

¹⁸ Chen, K C and Stephen Sears (1990). 'Pricing the SPIN', *Financial Management*, Summer.

1. The principal amount of \$1,000 per bond and accrued interest plus
2. The excess, if any, of the S&P 500 index value over the initial (exercise) value of the index times some determined multiplier.

The exercise price of the call option and the multiplier were fixed at 270.38 and 3.6985. The multiplier represents the number of call options on the S&P 500 index that the investor receives for every \$1,000 in bond principal held. The option is European type.

$$\begin{aligned} \text{SPIN} &= \text{Bond} + (\text{Call option} \times \text{Multiplier}) \\ \text{Yield on comparable bonds} &= 8 \text{ percent per annum} \\ \text{S\&P 500 price volatility} &= 18.4 \text{ percent per annum} \\ X &= 270.38 \\ r &= \text{risk free rate} = 6.5 \text{ percent} \\ S &= \text{current value of the S\&P 500 index, adjusted for the present value of the} \\ &\quad \text{expected dividends over the remaining life of the option} \\ \text{Dividend on S\&P 500 index} &= \$8.28 \\ \text{Estimated average annual growth in dividends} &= 5.4 \text{ percent} \\ \text{Current value of S\&P index} &= 250 \end{aligned}$$

Estimate the value of SPIN. Use the Black–Scholes dividend adjusted model, to calculate the value of call option.

Chapter 21

Initial Public Offerings

OBJECTIVES

- ◆ Provide an overview of the security issuance process and the securities market in India.
- ◆ Provide an overview of the banking industry in India.
- ◆ Introduction to the types of equity offers: General and Rights.
- ◆ Introduction to the role of intermediaries.
- ◆ Introduction to the types of issuance—Fixed price versus Book building.
- ◆ Discuss methods of pricing of Initial Public Offerings.
- ◆ Summarize empirical findings on performance of Initial Public Offerings.

In August 2002 Union Bank of India issued 180 million shares at Rs 16 aggregating Rs 288 crore. The issue opened on August 20 and closed on August 28. Union Bank of India started in 1919. With its focus mainly on western India, the bank has about 2,023 branches, about 26,000 employees, and an asset base of Rs 44,300 crore. The initial public offering of shares was partly meant to address the need for more tier-1 capital.

Companies finance part of their investment from retained earnings and sell new equity or debt to make up any shortfall. Companies sell new securities in a number of ways. They can raise money by placing their securities with a small group of sophisticated investors or sell them to the public (including existing shareholders). The former is called private placement and the latter, public issue. Public issues can be made in a variety of ways. At one end of the spectrum, securities may be sold to the highest bidder and at the other end securities may be sold at a fixed price. Generally, first time issues, called initial public offerings (IPOs) are fixed price offers. In a fixed price sale, the company advertises the number of shares on sale and the price. The investors then decide how many shares they wish to apply for. If the investors consider the price attractive, they may apply for more shares than on offer in which case the issue will be oversubscribed. The company then has to decide on an allotment rule, such as proportionate allotment. In some countries IPOs take the form of tender offers. Investors are invited to submit a sealed bid stating how many shares they wish to buy and at what price. The company then determines the price at which the total issue would be sold and all the successful bidders receive shares at that price.

Instead of offering securities to the general public, a company may restrict the offering to existing shareholders who are then free to re-sell the securities to other investors. These are known as rights issues. Suppose a company has issued 8 million shares at Rs 20 each. If the company intends to raise Rs 8 crore, it can offer its shareholders the right to buy 2 new shares for each share they currently hold at a price of Rs 5. In other words, it is a 2:1 rights issue.

In many countries the law requires the company to offer shares to existing shareholders before offering them to the general public. For instance, Section 81 of the Companies Act in India provides that when a company wants to raise further capital from the public, it has to first offer the same to the existing shareholders before issuing shares to other parties. This is based on the principle that the current owners should be given the option to decide whether they want to include new shareholders into the company or not. The company will first specify the size of the issue and the rights ratio. The ratio indicates the number of shares that a shareholder can apply for every share already held by him in the company. For example, a rights issue in the ratio of 1:4 means that for every 4 shares already held by the shareholder in the company, he can apply to buy 1 new share at the rights price.

The share price before the issue is called cum-rights price and the price after the issue is called ex rights price.

Suppose the company is all-equity financed.

$$\begin{aligned}\text{Current value of equity} &= \text{No. of shares outstanding} \times \text{cum rights price} \\ &= 80 \times 20 = \text{Rs } 16 \text{ crore}\end{aligned}$$

The company issues 16 crore shares at Rs 5, with a view to raise Rs 8 crore.

$$\begin{aligned}\text{The total number of shares outstanding} &= 8 + 16 = 24 \text{ crore} \\ \text{Ex-rights price} &= [\text{value of the firm}/\text{no. of shares}] = [(160 + 80)/24] = \text{Rs } 10 \\ \text{Price of right} &= \text{Ex-rights price} - \text{rights price} = 10 - 5 = \text{Rs } 5\end{aligned}$$

To illustrate the effect of rights issue on the wealth position of a shareholder, consider a shareholder who currently holds 10 shares. His investment is worth Rs 200. At the time of the rights issue he is entitled to receive 20 new shares for Rs 5 each. After the issue, his investment is worth $(10 \times 10) + (20 \times 5) = \text{Rs } 200$. The shareholder is in the same position.

Suppose the company sells twice as many shares at half the price, i.e., 32 million shares at Rs 2.50. The shareholder is entitled to receive 40 new shares. The amount raised is the same. The ex-rights price will be Rs 6 each.

$$\begin{aligned}\text{Value of right} &= 6 - 2.50 = \text{Rs } 3.50 \\ \text{Value of shares without rights} &= 10 \times 6 = \text{Rs } 60 \\ \text{Value of shares with rights} &= 40 \times 3.50 = \text{Rs } 140\end{aligned}$$

Total value = 60 + 140 = Rs 200. The investor is in the same position. The message is that the shareholder does not benefit from the discount (to face value) offered to him. Nor is he affected from the fall in price after the issue as long as there are no information effects on the stock price. The theoretical value of a right is presented in Appendix 1. Exhibit 21.1 presents the estimate of funds raised during 1997–2000 by way of public issues and private placements.

Exhibit 21.1 Resource mobilization during 1997–2000

(Rs crore)

From public issues	Number	Amount	Number	Amount	Number	Amount
IPOs	18	404	51	2,719	83	2,032
Issues by listed companies	40	5,182	42	5,098	15	807
Mega issues (>Rs 100 crore)	11		19			
Average Issue size		96		84		
Share of private sector (percent)		98		97		96

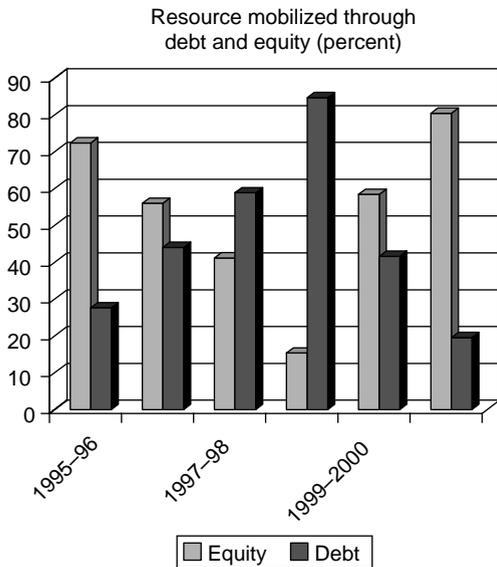
Resource mobilization by the corporate sector

(Rs crore)

Issues	1997–98	1998–99	1999–2000
Public issues	4,657	9,365	7,704
Private placements	30,099	49,679	61,259
Euro issues	4,387	1,148	3,487

A Recent Rights Issue

Private & Confidential For Existing Shareholders of the Company Only	Letter of Offer	
 IDBI BANK LIMITED (A SCHEDULED COMMERCIAL BANK) (Incorporated on 15 th September, 1994 under the Companies Act, 1956) Registered Office : Chaturvedi Mansion, 2nd Floor, 26/4 Old Palasia, Agra Bombay Road, Indore - 452 001 Tel/Fax: (0731) 55 66 66 E-mail: rights_issue@idbank.com Corporate Office : Trade View, Oasis Complex, P. B. Marg, Lower Parel (West), Mumbai 400 013 Tel: (022) 2490 9045 / Fax: (022) 2494 1016		
LETTER OF OFFER		
RIGHTS ISSUE OF 70,105,671 EQUITY SHARES OF RS.10/- EACH FOR CASH AT A PREMIUM OF RS.12, IN THE RATIO OF 1 EQUITY SHARE OF RS.10/- FOR EVERY 2 EQUITY SHARES OF RS.10/- EACH HELD, AGGREGATING RS.154.23 CRORES TO THE MEMBERS OF THE COMPANY		
GENERAL RISKS		
Investment in equity and equity related securities involve a degree of risk and investors should not invest any funds in this issue unless they can afford to take the risk of losing their investment. Investors are advised to read the risk factors carefully before taking an investment decision in this issue. For taking an investment decision, investors must rely on their own examination of the Issuer and the Issue including the risks involved. The securities have not been recommended or approved by the Securities and Exchange Board of India nor does the Securities and Exchange Board of India guarantee the accuracy or the adequacy of this document. The attention of the investors is drawn to the statement of Risk Factors appearing on page nos. ii to vii of the Letter of offer.		
ISSUER'S ABSOLUTE RESPONSIBILITY		
The Issuer, having made all reasonable inquiries, accepts responsibility for, and confirms that this Letter of Offer contains all information with regard to the Issuer and the Issue, which is material in the context of the Issue, that the information contained in this Letter of Offer is true and correct in all material respects and is not misleading in any material respect, that the opinions and intentions expressed herein are honestly held and that there are no other facts, the omission of which makes this document as a whole or any of such opinions or intentions misleading in any material respect.		
LISTING		
The Banks' existing Shares are listed on The Stock Exchange, Mumbai; The National Stock Exchange of India (Designated Stock Exchange) and Madhya Pradesh Stock Exchange. The Equity Shares issued through this Rights Issue would be listed on the above-mentioned stock exchanges. Necessary applications have been made to the stock exchanges in this regard. In-principle approvals for the listing have been obtained from the Stock Exchanges are as under:		
The Stock Exchange, Mumbai : September 12, 2003. The National Stock Exchange of India : August 18, 2003 Madhya Pradesh Stock Exchange : September 8, 2003		
LEAD MANAGER TO THE ISSUE DSP MERRILL LYNCH LIMITED Matatal Centre, 10th Floor, Nariman Point Mumbai - 400 021, Maharashtra, India. Tel.: (022) 5632 8000 Fax.: (022) 2204 8518 E-mail: idbibank_rights@ml.com	REGISTRAR TO THE ISSUE KARVY CONSULTANTS LIMITED Karvy House, 46, Avenue IV, Street No. 1 Banjara Hills, Hyderabad – 500 034 Tel.: (040) 2331 2454 Fax.: (040) 2331 1968 E-mail: idbibankrights@karvy.com	
Issue opens on September 29, 2003	Last date for receipt of requests for split forms October 14, 2003	Issue closes on October 30, 2003



Private placements of securities with institutional investors like insurance companies is ideally suited for companies poorly suited for raising capital in public markets. The IPO activity is at partly dependent on the performance of the stock market. When returns from the market (index) are high, we would expect investors to be more confident of investing in stocks. Exhibit 21.2 presents the returns from Sensex since 1997. For most part the Sensex has yielded negative returns. The IPO activity has been volatile for the same reason.

Exhibit 21.2 Sensex movements during 1997–2002



Source: Equity Master.

Financial Markets

A financial market is a market where financial assets are traded. Financial assets are marketable financial claims issued by government and companies. Financial markets enable effective allocation of real capital among competing uses. Financial markets perform four important economic functions. First, they enable individuals to choose more effectively between current and future consumption. Borrowing enables individuals to consume more whereas lending enables them to postpone consumption. The economic units that have a

surplus (investors) invest in those that have a deficit (borrowers). This provides capital to companies in excess of those generated out of business income. Secondly, the interaction between buyers and sellers in a financial market determines the price of the asset, say stocks, or alternatively, the return demanded by investors to invest in the company. Firms can raise further capital if the return on their investments exceeds the return demanded by investors. Thirdly, financial markets provide liquidity to investors. That is, the owner of the financial asset can sell off the asset in the market place to realize cash whenever required. The degree of liquidity may vary from asset to asset and market to market. For instance, shares of blue chip companies like HLL are highly liquid. Contrast this with stocks of upstart companies listed on over-the-counter exchange. Fourthly, financial markets can discipline underperforming managements. The prevailing stock price of a company reflects the opinion of all market participants regarding the outlook for the company under current management. If another company believes that the company is underperforming, then this company can buy the securities of the under performing company and put the assets of the company to better use. Without a stock market it would have been extremely difficult to value the performance of the company.

Financial markets are classified as capital market and money market. Capital market provides resources for long-term investment purposes whereas money market provides resources for short-term purposes like working capital investment. Commercial paper, Certificate of deposits, T-bills issued by government are some of the instruments in the money market. Debentures, stocks and preferred stocks are some of the instruments in the capital market. The capital market serves the function of channelizing resources from savers of capital to users of capital. The capital market consists of primary market and secondary market. The primary market creates long-term instruments through which companies raise capital. The secondary market provides liquidity to these instruments.

In the pre-liberalization period, raising money through public issues was regulated by the office of the Controller of Capital Issues (CCI). The process of going public took a very long time and the legal formalities were very cumbersome. All these changed in 1992 when the CCI was abolished and the Securities Exchange Board of India was set up under an act of Parliament. The SEBI has gone through various changes since then. The whole process of going public has been made simple and the government encouraged the companies to tap the capital markets. The government also recognized the need for a strong secondary market to support the primary markets. The setting up of the National Stock Exchange in 1992 was the first step in this regard. Foreign equity participation was also encouraged by progressively relaxing the foreign direct investment (FDI) limits in Indian companies and by bringing in full current account convertibility of the rupee. Today public issue and private placements are the two most popular ways of raising capital routes. An issue by an existing company is termed as a seasoned equity issue and an issue by a new company or an existing company for the first time is termed as an initial public offering (IPO). This chapter will focus mainly on IPOs. Given below is a small list of some recent IPOs.

<i>Company</i>	<i>Issue date</i>	<i>Offer price(Rs)</i>	<i>Current price¹ percent</i>	<i>Change</i>
Balaji telefilms	Sep 99	130	535	311.5
Polaris software	Sep 00	105	271	158.3
IDBI bank	Feb 99	18	34	88.9
Punjab National Bank	Jan 02	31	49	57.1

Source: Equitymaster.

Financial markets around the world can be broadly classified as pre emerging, emerging, established and mature. Countries like Vietnam and Russia would be considered pre emerging whereas India, Korea and

¹ At the time of writing.

Thailand would be considered emerging markets. Similarly, Singapore and Hong Kong are established markets and the US and UK are mature markets. The definition of emerging market itself is not very clear. If age is the basis of differentiation, India would be considered mature whereas if sophistication is the basis Japan would not be considered developed because of its open outcry system. The most widely accepted definition of an emerging market is a market which has begun a process of change, and is growing in size and sophistication. Exhibit 21.3 presents the characteristics of some of the emerging and developed markets.

Exhibit 21.3 Characteristics of emerging and developed markets

<i>Country</i>	<i>Mkt cap \$ m Sep 1995</i>	<i>Standard deviation (percent)</i>	<i>Characteristics</i>	<i>No. of listed companies</i>
Emerging markets				
Argentina	18,783	91.7	Volatile and risky	175
Brazil	106,821	63.1	Lack of investor protection	565
Colombia	9,079	31.3	Weak disclosure norms	80
India	66,772	29.2	More regulated	9,871
Indonesia	26,995	30.7		155
Mexico	65,585	46.2		195
Philippines	32,829	36.8		170
Developed markets				
Australia	137,352	26.3	More stable	1,030
Canada	193,156	19.3	Stringent disclosure norms	1,119
Germany	344,087	12.6	Issue costs are high	933
Japan	2,050,510	25.0		2,470
Switzerland	285,171	19.0		180
UK	842,965	21.2		7,651
US	3,540,304	14.8		1,945

Source: Erb et al. (1996) and NSE.

IPO ACTIVITY IN THE US

The US stock market remains the largest in the world. During 1975–2000, some 6,974 issues with an offer price of \$5 or more were made raising about \$423,890 million. The number of issues increased from 112 per annum in the 1970s to 4,000+ per annum in the 1990s. An average issue in the 1970s produced a first day return of 5.7 percent whereas an issue in the 1990s produced an average initial listing return of 20.9 percent. The return in 2000 was 55 percent. In sum, both the volume and the initial returns increased substantially in recent years (see Exhibit 21.4). Exhibit 21.5 presents a small list of some prominent Internet IPOs in the US.

THE BANKING SYSTEM²

The banking system is an integral part of the financial system in an economy. Banks accept (savings) deposits from households and lend them to companies and the public. The Reserve Bank of India regulates

² This is based on an *India Infoline* report.

Exhibit 21.4 IPO activity in the US

<i>Year</i>	<i>No. of offerings</i>	<i>Av. first day returns percent</i>	<i>Gross proceeds \$ m</i>
1990	111	10.5	4,453
1991	287	11.7	15,765
1992	396	10	22,198
1993	503	12.6	29,232
1994	412	9.7	18,103
1995	464	21.1	28,866
1996	664	16.5	41,916
1997	483	13.7	33,216
1998	318	20.1	34,850
1999	491	68.6	65,471
2000	385	55.5	66,100
1975-79	112	5.7	1,124
1980-89	2,348	6.9	62,596
1980-90	4,129	20.9	2,94,070
2000	385	55.5	66,100
Total	6,974	17.8	4,23,890

Source: Prof. Jay Ritter.

Exhibit 21.5 Internet IPOs

<i>Name</i>	<i>Offer date</i>	<i>Offer price</i>
Cisco Systems	16.02.90	18.000
Valassis Communications	11.03.92	17.000
America Online	19.03.92	11.500
Micro Warehouse	10.12.92	18.000
FutureMedia	19.08.93	5.000
Macromedia	13.12.93	12.000
Netcom On-Line Communications	14.12.94	13.000
Sims Communications	10.02.95	3.500
Transaction Systems	23.02.95	15.000
UUNet Technologies	25.05.95	14.000
Spyglass	27.06.95	17.000
Netscape Communications	08.08.95	28.000

the banking system in India. Banks are classified as scheduled and non-scheduled. Non-scheduled banks are so called because they do not satisfy the conditions laid down by the second schedule of the Banking Act 1965. Scheduled banks are further classified as state co-operative banks and commercial banks. Commercial banks are further classified as public sector and private sector (Indian and foreign) banks.

In recent years development financial institutions like ICICI and IDBI have entered commercial banking because of which existing banks are facing stiff competition. There are about 96 commercial banks as on date. The new private sector banks are small when compared to the old public and private sector banks (for example, SBI). Consequently, their reach is limited. As a result they are merging to create scale economies. ICICI bank has acquired Bank of Madura, ITC Classic and Anagram Finance. Likewise Standard Chartered has acquired ANZ Grindlays bank's Asian operations.

Why Do Companies Go Public?

It seems obvious that companies eventually grow big over a period of time and, consequently, the need for capital increases because of which they go public. The fact that many large companies in the world are unlisted suggests that going public is a choice, which a company may or may not exercise. So why do some companies go public? In other words, what are the benefits and costs of going public? What sort of companies goes public?

Moral Hazard

Due to information asymmetry between a company's managers and investors it is likely that the managers possess more information about the earnings prospects of the company. This asymmetry is an obstacle for young companies without a track record in going public. Indeed regulators in some (may be many) countries prevent companies without a certain number of years of operating history from going public. Due to the adverse selection problem we would expect bigger companies to go public.

Investment Opportunity Set

One of the commonly cited reasons for going public is to get access to an alternate source of capital (compared to bank debt or venture capital). So we would expect companies with high investment requirements to go public. Getting a listing on a stock exchange opens up a large source of capital. Subsequent to a public issue, a company may return to the market for additional capital through secondary offerings of shares or bonds or convertibles. Listed companies can often bargain better terms and amount of finance from banks. This is another advantage of going public.

Increase Employee Commitment and Recruiting Power

By instituting a stock purchase plan for employees, companies may concentrate ownership in the hands of employees, which gives them an additional reason to deliver the goods. Such plans tend to elicit a stronger employee commitment to productivity and quality.

Facilitate M&A Activity

Because public companies may be able to raise additional cash through a secondary offering, they are generally better positioned to finance cash acquisitions. Alternatively, public companies may also be able to finance acquisitions with their own stock. For acquisitions financed by an exchange of stock, public companies can offer a valuation determined by the market, avoiding the complications of calculating the value of a private company.

Issue Costs

Public issue of securities involves underwriting and other issue expenses. The issue expenses can be broken down into fixed and variable components. The fixed costs are as high as \$ 250,000 and variable costs are about 7 percent of issue expenses in the US. Apart from underwriting fees and registrar's fees a company will have to pay upfront listing fees and ongoing annual fees to renew listing every year. The principals must

consider the ongoing expenses of producing information for shareholders and regulatory entities, and continuing fees to lawyers and accountants as the company grows. Companies may have to appoint chartered accountants and company secretaries for various audits and certifications. Although not always required, a company may also need a public relations firm to help promote the offering. All these entail cash outlay. The following table provides sample costs associated with a \$25 million and \$50 million offering on the NASDAQ stock market. An academic estimate of going public in America is presented in Exhibit 21.6.

<i>Offering value</i>	<i>\$25 million</i>	<i>\$50 million</i>
Total shares outstanding	5,880,000	5,880,000
Item	Estimated fee	Estimated fee
Underwriting discounts and commissions	1,750,000	3,500,000
Item 13 from registration statement		
SEC fees	9,914	19,828
NASD	3,375	6,250
Printing & engraving	100,000	100,000
Accounting fees	160,000	160,000
Legal expenses	200,000	200,000
Miscellaneous	34,200	34,200
Nasdaq annual fees	11,960	11,960
Transfer agent & registrar's fees	5,000	5,000
Total	2,353,174	4,115,963

Source: Nasdaq.

A study conducted in India finds that the costs for both debt and equity issues decline as the gross proceeds of the offering increases, suggesting substantial economies of scale. The direct expenses are higher for equity issues as compared to debt issues.

Given below is a rough estimate of the total issue expenses.

(As percentage of net offer to public)

Lead managers fees including underwriting and selling commission	3.0–4.0 percent
Other expenses like advertising, printing, etc.	1.0–2.0 percent

Exhibit 21.6 Costs of going public (in percentage, of equity IPOs 1990–94)³

<i>Proceeds (\$m)</i>	<i>Average direct and indirect costs (percent)</i>	<i>No. of IPOs</i>
2-9.99	25.16	337
10-19.99	18.15	389
20-39.99	18.18	533
40-59.99	17.95	215
60-79.99	16.35	79
80-99.99	14.14	51
100-199	12.78	106
200-499	11.10	47
>500	10.36	10
Total	18.69	1,767

³ Direct and indirect costs include underwriter compensation, selling concession, other issuing expenses plus the initial under pricing.

The actual cost to a company will however work out lesser than the above percentages because of the tax benefits. Issue expenses are treated as deferred revenue expenditure under the Indian tax laws and are deductible over a period of 5 years. Therefore tax savings are available for the immediately following 5 years from date of issue. If suppose the total net offer to the public is about Rs 100 crore, then the total fees will work out to about say Rs 3 crore (Assuming 3 percent fees and cost). Out of this Rs 6 million can be written off over a period of 5 years from date of issue. Hence tax savings to the tune of corporate tax rate (35 percent currently without surcharge) will be available for the issuing company in each of the 5 years – about Rs 21 lac. The benefits in real terms can be obtained by discounting the saving at a rate that reflects the riskiness of the project in which the capital is expected to be used. Thus, the actual commission expenses and cost turn out to be 3 percent in real terms if discounted at 15 percent.

The presence of (high) issue expenses suggests that only those companies that can afford to bear them would go public.

Information Disclosure

A public issue of securities brings fiduciary responsibilities to a company. The company's managers, as agents of shareholders, have on-going responsibility to provide timely information to investors. This results in a loss of confidentiality. So we would expect companies that are R&D intensive and hence, information sensitive, not to go public (in general).

Sharing Corporate Control

By selling stock to shareholders, the original owners of a public company are, in essence, relinquishing exclusive control of the company's future. Once public, most companies need shareholder approval to take certain corporate actions such as increasing the number of shares outstanding or creating a new class of common stock. Shareholder approval is also required to institute stock option plans, mergers, etc. Even when an explicit approval is not required, companies must keep shareholders' interests in mind.

FIXED PRICE OFFERS vs BOOK BUILDING

Conventional wisdom suggests that issuers and investment bankers would do well to assess market demand conditions before setting the terms of an initial public offering. Yet very few such efforts are made. In the UK, for instance, fixed price offerings advertise the number of shares and offer price 14 days before the acceptance date. Such practices exist in many countries. The public issue process in many countries suffers from numerous shortcomings like inordinate delay between pricing of the issue and date of opening of the issue. The issue price may become attractive or unattractive depending on stock price movement in the interim period. If the market declines after the price is set, the issue becomes overpriced. So issuers tend to underprice the issue.

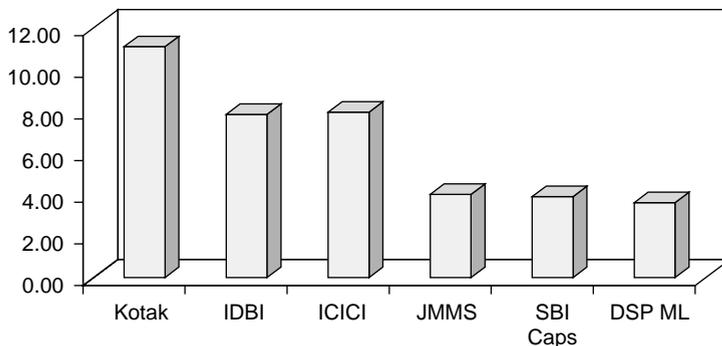
To overcome these shortcomings, many countries have allowed book building in line with practices in the US. In essence, book building involves little more than polling institutional investors before pricing the offering in an attempt to gauge market demand. This demand information is then used to determine the size, price and allocation of the offering.

In book building, a syndicate of investment banks brings an issuer's equity to the market. One of the investment banks acts as arranger with the rest of the members acting as underwriters. The arranger gives

notice of a possible price range. The underwriters sell equity on a best efforts basis. Orders for equity over the stated price range are collected by underwriters and returned to the arranger. Thus, book building assesses not only price but also volume at each price level. The arranger has the final responsibility of setting the actual price at which equity will be issued and its allocation to investors. The price, thus, reflects market demand. The issue has two components: placement portion and public portion. The placement portion is targeted at institutional investors like mutual funds. The book runner drafts the preliminary prospectus and files the prospectus with the concerned authority (SEBI) for approval. The preliminary prospectus does not contain the issue price. On obtaining the authority's approval, the book runner circulates the preliminary prospectus with intermediaries like merchant banks and brokers inviting them to join the syndicate. The revised version of the prospectus indicates the price range. The intermediaries in turn circulate the prospectus among their clients and place one order for the total quantity on behalf of all clients. The book runner 'builds the book', records information like name of the intermediary, number and price at which the buyer is willing to buy, etc. The book is kept open till the issue gets enough orders. The book runner then, in consultation with the issuer, prices the issue, decides on the amount of underwriting and allocation of securities. The final prospectus is filed with the concerned authority (SEBI). The issuer advertises the prospectus announcement in the newspaper the next day. The issue opens 10 days after the announcement and is kept open for three days. Syndicate members send their completed application. Allotment is made partly on a firm basis and partly on the basis of public subscription. If the public portion is undersubscribed, the syndicate members will receive allotment in the public portion also. Likewise, if the issue is oversubscribed, the syndicate members get a refund. Securities are allotted and listed on stock exchanges for trading purposes.

Because of better price discovery, book building results in lower underpricing.⁴ Often critics of book building point out that investment banks make disproportionately large allocations in hot issues to their favored clients and the market is rigged against the average investor.⁵ A recent study examined the books of investment banks for 39 international equity issues (Cornelli and Goldreich, 2001). The study finds that the investment banker awards more shares to bidders who provide information in their bids and that regular investors receive favorable allocations especially when the issue is heavily oversubscribed. The amount raised by the top investment banks, through book building, is shown here:

Amount raised by book building for the 9 months ended
Dec 31, 2000



⁴ Loughran, Ritter, and Rydqvist (1994).

⁵ Benveniste and Wilhelm (1997) prove that it is not so.

SEBI permits 100 percent, one-stage book building with bidding centers at all cities with stock exchanges. The allocation of 100 percent book building will be as follows:

- Not more than 60 percent of the book built portion to be allocated to institutional investors, i.e., banks, FIIs, mutual funds and other financial institutions on a discretionary basis. The maximum bid by these categories is restricted to the investment limit prescribed in the respective regulations/guidelines as applicable to these institutions.
- At least 15 percent of the book built portion to be allocated on proportionate basis to non-institutional investors applying for more than 1,000 shares
- The remaining 25 percent of the shares would be available to the small investors to be allocated on pro-rata basis.

SEBI has also approved the following:

- Companies not having a track record shall be eligible to make IPOs only through the book building route. In such a case, 60 percent of the issue size shall be allocated to qualified institutional buyers.
- IPOs of issue size more than five times the pre-issue net worth and public issues by listed companies of more than five times the pre-issue net worth shall be allowed only through the book building route. In such a case 60 percent of the issue size shall be allocated to QIBs.

There are two book-building methods: 90–10, where 90 percent of the total issue size is for book building, 10 percent is fixed price. The other is 75–25, where 75 percent of the total issue size is for book building and 25 percent is for fixed price. In either case 60 percent of the book built portion should be allocated to QIBs, 15 percent to non-institutional investors and 15 percent to retail investors. This means that QIBs hold a majority stake in the company. The following are the SEBI guidelines relating to book building:

1. The issue of securities through the book-building process is separately identified/indicated as 'placement portion category', in the prospectus.
2. The securities available to the public are separately identified as 'net offer' to the public. The requirement of minimum 25 percent of the securities to be offered to the public is applicable.
3. In case the book-building option is availed of, underwriting shall be mandatory to the extent of the net offer to the public.
4. The draft prospectus containing all the information except the information regarding the price at which the securities are offered shall be filed with the Board.
5. One of the lead merchant bankers to the issue is nominated as a book runner and his name is mentioned in the prospectus.
6. The copy of the draft prospectus filed with the Board is circulated by the book runner to the institutional buyers who are eligible for firm allotment and to the intermediaries eligible to act as underwriters inviting offers for subscribing to the securities. The draft prospectus to be circulated indicates the price band within which the securities are being offered for subscription.
7. The book runner on receipt of the offers shall maintain a record of the names and number of securities ordered and the price at which the institutional buyer or underwriter is willing to subscribe to securities under the placement portion.
8. The underwriter(s) maintain a record of the orders received by him for subscribing to the issue out of the placement portion.
9. The underwriter(s) aggregate the offers so received for subscribing to the issue and intimate to the book runner the aggregate amount of the orders received by him.

10. On receipt of the information, the book runner and the issuer determine the price at which the securities shall be offered to the public.

The issue price for the placement portion and offer to the public will be the same. On determination of the price of the underwriter enters into an underwriting agreement with the issuer indicating the number of securities as well as the price at which the underwriter shall subscribe to the securities.

Within two days after determination of the issue price the prospectus is filed with the Registrar of Companies.

The issuer opens two different accounts for collection of application moneys, one for the placement portion and the other for the public subscription.

11. One day prior to the opening of the issue to the public, the book runner collects from the institutional buyers and the underwriters the application forms along with the application moneys to the extent of the securities proposed to be allotted to them/subscribed by them.
12. Allotments for the private placement portion shall be made on the second day from the closure of the issue.
13. Allotment of securities under the public category is made as per the guidelines. Allotment of securities under the public category shall be eligible to be listed. In case of undersubscription in the net offer to the public, spillover to the extent of undersubscription is permitted from the placement portion to the net offer to the public portion subject to the condition that preference shall be given to the individual investors. In case of undersubscription in the placement portion, spillover is permitted from the net offer to the public to the placement portion.

Procedure for Bidding

The method and process of bidding is subject to the following:

- (i) Bid shall be open for at least 5 days.
- (ii) The advertisement for inviting bids contain the following:
 - (a) The date of opening and closing of the bidding (not less than 5 days).
 - (b) The names and addresses of the syndicate members as well as the bidding terminals for accepting the bids.
 - (c) The method and process of bidding.
- (iii) Bidding is permitted only if an electronically linked transparent facility is used.
- (iv) The 'syndicate members' shall be present at the bidding centers so that at least one electronically linked computer terminal at all the bidding centers is available for the purpose of bidding.
- (v)
 - (a) The number of bidding centers should not be less than the number of mandatory collection centers specified in the guidelines.
 - (b) The same norms as applicable for collection centers shall be applicable for the bidding centers also.
- (vi) Individual as well as institutional investors place their bids only through the 'syndicate members' who shall have the right to vet the bids.
- (vii) The investors shall have the right to revise their bids.
- (viii) Bidding form
 - There is a standard bidding form to ensure uniformity in bidding and accuracy.
 - The bidding form contains information about the investor, the price and the number of securities that the investor wishes to bid.
 - The bidding form before being issued to the bidder is serially numbered at the bidding centers and date and time stamped.

- The bidding form shall be issued in duplicate signed by the investor and countersigned by the syndicate member, with one form for the investor and the other for the syndicate member(s)/book runner(s).

Allocation/Allotment Procedure

1. At least 15 percent of the issue size shall be reserved for allocation to individual investors applying up to 10 tradable lots through the syndicate member.
2. 10 percent of the issue size offered to the public through the prospectus should be reserved for allocation to individual investors who had not participated in the bidding process.
3. Allotment to investors under sub-clauses (i) and (ii) of this clause shall be made on the basis of the proportionate allotment system.
4. In case of under-subscription in the category referred to in clause (ii), the issuer has the option to allocate it to whichever category it deems fit or let the undersubscribed portion lapse.
5. Allotment is made not later than 15 days from the closure of the issue failing which interest at the rate of 15 percent is paid to the investors.
6. The offer remains open for subscription from the public for a period of at least 3 working days after completing all the requirements of advertisement and dispatch of issue material to all the stock exchanges.

Maintenance of Books and Records

- (i) A final book of demand showing the result of the allocation process is maintained by the book runner/s.
- (ii) The book runner/s and other intermediaries associated in the book building process maintain records of the book building prices.
- (iii) The Board has the right to inspect the records, books and documents relating to the book building process.

CURRENT TRENDS IN BOOK BUILDING

A recent guideline states that book building is compulsory for the entire issue. Therefore, the concept of 75 percent book building and 100 percent book building is no longer applicable. This amendment has not taken shape fully. Most of the recent book-building issues have been fully book built anyway. Companies prefer to use this route instead of having a fixed price portion separate from the book building portion.

Book Building at NSE

NSE has set up a nation-wide network for trading whereby members can trade remotely from their offices located all over the country. The NSE trading network spans more than 400 cities and towns across India.

NSE decided to offer this infrastructure for conducting online IPOs through the book building process. NSE operates a fully automated screen based bidding system called National Exchange for Automated Trading, NEAT IPO, which enables trading members to enter bids directly from their offices through a sophisticated telecommunication network.

Book building through the NSE system offers several advantages:

1. The NSE system offers a nation-wide bidding facility in securities.
2. It provides a fair, efficient and transparent method for collecting bids using the latest electronic trading systems.
3. Costs involved in the issue are far less than those in a normal IPO.

There are two IPO sessions on weekdays, one session from 11:00 a.m. to 2:00 p.m. and a second session from 2:00 p.m. to 4:00 p.m. On Saturdays the timings are from 11:00 a.m. to 3:00 p.m. On the last day of the IPO, the book running lead manager can extend the session timings up to 9:30 p.m. on specific request.

To use NSE's online IPO system a company has to comply with the following procedure:

1. Submit a written request as per prescribed format for usage of electronic facilities and software of NSE.
2. Give details regarding book running lead manager, co book running lead managers and syndicate members.
3. Pay the requisite charges to NSE.

Neat IPO System

It is a fully automated screen-based bidding system that allows bidding in several issues concurrently. The system has the facility of defining a hierarchy amongst the users of the system. The book running lead manager can define who will be the syndicate members and who will be the other participating members in the issue. The syndicate member and other members also have a facility of defining a hierarchy among the users of the system as corporate manager, branch manager, and dealer. Investors interested in trading through Neat-iXS must approach the brokerage and register. Once registered, the broker will provide a login name, password and a personal identification number (PIN).

Placing an Order

An order can be placed by using the place order window and can be done in two ways:

- By entering the symbol, series of the stock and other parameters like quantity and price of the scrip on the place order window.
- By filling in the symbol, series and the default quantity. The investor then has to review the order placed by clicking the review option. He can also reset to clear values.

After reviewing, the order has to be sent by clicking on the send option. The investor will next receive an order confirmation message along with the order number and the value of the order. If the order is rejected by the stock exchange or the broker for reasons like invalid price limit, an appropriate message will appear at the bottom of the screen. Currently, there is a time lag of around 10 seconds in executing the trade.

Making Payments

Different brokerages will have different modes. Some will take some advance payment from investors and set trading limits. And after executing the trade, they will ask for transfer of funds from the investor's account to their own. One method, which most large brokerages are likely to follow, is to ask the investor to open an account in a pre-designated bank through which electronic transfer of funds can be done.

Order Book

As and when valid bids are received by the system, they are first numbered, time stamped, and stored in the book. Each bid has a distinctive bid number and a unique time stamp on it. All the bids placed in the system will remain outstanding till the last day of the book building process. Trading members can modify/cancel all the bids placed in the system from the start till the last day of the book building process. Some of the large banking companies that are venturing into net trading are providing the complete facility to the investors. For example, when an investor executes a trade on the net, money is automatically credited or debited to his account that he has opened in a specific bank. Since this facility is available only in stocks in the dematerialized category, the stock is also transferred from one account to another by the brokerage that either has its own depository or through the depository with which it has a tie-up. The cost of transaction also varies between brokerages and between clients.

Security of Trades

A lot of apprehension has been expressed over security of trades on the Net and the possible misuses. Industry experts feel that problems will definitely come up in the future but for investor safety, they should have long passwords (minimum six characters) and change their PIN number frequently by using the password navigation option. If an investor forgets his password, it can be reset and sent to the investor through an e-mail address provided during registration. Even though the NEAT system looks very efficient and user friendly, the system is not yet fully operational in practice. The terminal coverage is not as widespread as it is claimed. Practical difficulties have forced investors and brokers to use the system with caution and a certain amount of apprehension.

UNDERWRITING

In case of private placement, the company will have to negotiate with a small group of potential investors. But in the case of public issue, the company will have to employ intermediaries to ensure subscription. The underwriters have several roles to play. They bring credibility to the issue by attaching their names to the issue. Because they have to be in business, they would be concerned about the quality of the issue they handle. They also buy securities from the issuer at a discount and re-sell to other investors at a later stage thereby assuming risk. Underwriters have access to a network of retail investors to whom they can sell the issue. They also assist the issuer in pricing as they have valid market knowledge.

The registrar collects applications from the collecting banks, scrutinizes application forms, classifies them, assists in finalization of basis for allotment, dispatches allotment letters and certificates and refunds unsuccessful applicants. There are two types of underwriting contracts: Firm commitment and best efforts. In a firm commitment contract the underwriter guarantees the sale of securities at an agreed upon price. If the issue fails the underwriter has the obligation to purchase the securities and keep them in inventory (and sell them later at an available price). Obviously this is in the interest of the issuer. In a best efforts contract, as the name suggests, the underwriter does not have an obligation to take up the issue if it devolves. Since the risk faced by the underwriter is less in a best efforts contract, the underwriting commission is also less. Often issues are underwritten by a group of underwriters when the issue size is large to limit the risk of failure. The lead underwriter identifies a group of underwriters (investment banks) to sell the issue. The underwriting compensation is shared on the basis of underwriting commitment and responsibility. Exhibit 21.7 gives the

list of top underwriters in India and America. Before taking the company public, top company executives must spend substantial time in preparing to go public and ultimately, in being public. Selection of an IPO team deserves careful consideration: the company must be confident of sharing information with all team members. Before going public a company must establish an investor relations program and set aside resources for the same. Because the public issue process involves substantial investment in time and efforts, a company may appoint one or more executives to co-ordinate. The government has prescribed that for issue of securities only public financial institutions, banks and members of a stock exchange can underwrite the issue. Merchant bankers authorized by SEBI can also underwrite. The SEBI guidelines on underwriters suggest that:

- Underwriters should have a minimum net worth of Rs 2 million and the total underwriting commitment at any point of time should not exceed 20 times of their net worth.
- Underwriters should not divulge any confidential information about the issuing company.

Exhibit 21.7 Top underwriters in India and the US

When a firm goes public, the underwriting section lists all of the investment banking firms that are part of the underwriting syndicate, along with the number of shares that each underwrites. More prestigious underwriters are listed higher in the underwriting section, in brackets, with the underwriters in brackets underwriting more shares. If an underwriter always appears in the highest bracket, it is assigned the top ranking of 9.1 on a scale of 0.1–9.1.

<i>Firm</i>	<i>1992–2000</i>
ABN Amro	8.1
Bank of America Securities	8.1
Banc Boston Robertson Stephens	8.1
Bear Sterns & Co	8.1
CIBC Markets	8.1
Credit Suisse First Boston	9.1
Chase H&Q	8.1
DLJ	9.1
Deutsche Banc Alex Brown	9.1

Source: Jay Ritter, University of Florida.

The top six merchant bankers in India in terms of number of issues and capital mobilized last year (2000) are:

<i>Name</i>	<i>No. of issues (Both debt and equity)</i>	<i>Percent share</i>	<i>Rank</i>
SBI Capital Markets	21	32.30	1
Kotak Mahindra Capital	21	32.30	1
DSP Merrill Lynch	18	27.70	3
JM Morgan Stanley	15	23.10	4
ENAM Securities	15	23.10	4
I – Sec	10	15.40	6
RR Financials	10	15.40	6

For rendering their services underwriters charge a commission. The Act prescribes the following maximum rates of commission:

For shares (equity and preference)	5 percent
For debentures (convertible or otherwise)	2.5 percent

When an issue is undersubscribed the underwriters have to accept devolvement. Typically a certain number of shares in the general pool (shares that were not routed through any underwriter) are credited to each underwriter (proportional to underwriting commitment) and then the net shortfall is established.

The SEBI guidelines require any company going public to appoint a lead manager (merchant banker) to the issue. There are four categories of merchant bankers.

Category 1

A merchant banker in category 1 must have a minimum net worth of Rs 5 crore, and he is authorized to act in the capacity of lead manager/co-manager/advisor or consultant to an issue, portfolio manager and underwriter to an issue as mandatory requirement.

Category 2

A merchant banker in category 2 must have a minimum net worth of Rs 50 lac and he is authorized to act in the capacity of co-manager/advisor or consultant to an issue, portfolio manager and underwriter to an issue.

Category 3

A merchant banker in category 3 must have a minimum net worth of Rs 20 lac and he is authorized to act in the capacity of advisor or consultant to an issue, portfolio manager and underwriter to an issue.

Category 4

The merchant banker is authorized to act only as an advisor or consultant of an issue. He need not have any minimum net worth.

The lead manager is required to accept a minimum underwriting commitment of 5 percent of the total underwriting commitment or Rs 25 lac—whichever is less—or make suitable subscription arrangements and inform the Board.

SEBI guidelines restrict the number of merchant bankers that can be appointed as follows:

<i>Size of issue</i>	<i>No. of merchant bankers</i>
1. < Rs 50 crore	2
2. More than Rs 50 crore but less than Rs 100 crore	3
3. More than Rs 100 crore but less than Rs 200 crore	4
4. More than Rs 200 crore but less than Rs 500 crore	5
5. > Rs 500 crore	5 or more as agreed by the Board

Further, merchant bankers are required to accept a minimum underwriting obligation of 5 percent of the total underwriting commitment of Rs 25 lac—whichever is less and outstanding commitments at any one time not to exceed five times the net worth. While choosing a lead manager (investment banker) consideration may be given to the firm's IPO experience, industry knowledge, and distribution and research capabilities. Investment banks differ in their size, expertise and capabilities: some are global (e.g., Goldman Sachs), full-service firms; some are boutiques with industry-sector or product specialty (e.g., Hambrecht and Quist), etc. The investment banker must have sufficient knowledge of the company's industry, its market, business

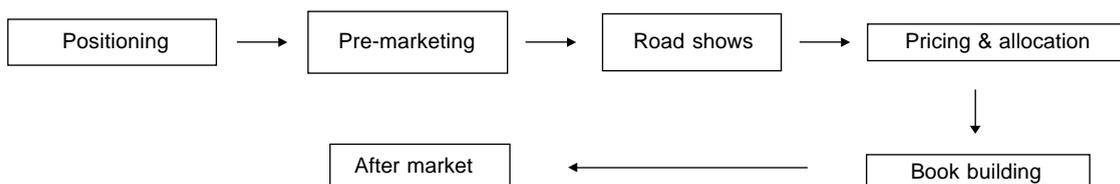
cycles, products and competitors and be creative enough to propose effective financial solutions. The investment bank must be capable of placing the stock with a desired mix of individual and institutional investors, target a particular region or country if necessary, etc. Once listed the lead manager should have the research capabilities to produce timely reports and keep the attention of institutional and individual investors.

PROSPECTUS AND THE IPO TIMELINE

In the US, SEC (Securities and Exchange Commission) clearance is required to sell securities. The Securities Act of 1933 requires all companies to prepare a prospectus for distribution of securities to investors. The contents of the prospectus and supplemental financial information are governed by the SEC regulations. The prospectus is an important document. The company and its management team are liable for information provided in the prospectus and for omission of any material information. The company's investment banker drafts the prospectus after conducting due diligence investigation of the firm in consultation with the accountant and the legal counsel. The prospectus gives the details of the company's business and management, names of principal shareholders and their level of ownership, audited financial statements, underwriting agreement, information on the use of proceeds, dividend policy and capitalization. A discussion of management's perception of all risk factors and competitive position is also included. The company has to file the draft prospectus with SEBI through a merchant banker. After the preparation of prospectus, the merchant banker along with the due diligence certificates and other compliances sends the same to SEBI for vetting. On receiving the same, the Board scrutinizes it and may suggest changes within 21 days of receipt of prospectus. A company can come out with a public issue any time within 365 days from the date of the letter from SEBI or if no letter is received from SEBI, within 365 days from the date of expiry of 21 days of submission of prospectus with SEBI. If the issue size is up to Rs 20 crore, then the merchant bankers are required to file the prospectus with the regional office of SEBI falling under the jurisdiction in which the registered office of the company is situated. If the issue size is more than Rs 20 crore, merchant bankers are required to file the prospectus at SEBI, Mumbai office. A prospectus is also filed with the concerned stock exchanges along with the application for listing its securities. After making changes, if any, made by SEBI/stock exchanges, the final prospectus duly signed by all the directors (or by authorized representatives through its power of attorney) must be filed with the Registrar of Companies (ROC) along with the copy of all material documents. The ROC may suggest changes, which should also be reported to SEBI/stock exchanges. The date on which ROC Card is obtained is the date of the prospectus. The draft offer document filed with the SEBI shall be made public for a period of 21 days from the date of filing the offer document with the SEBI. Once the registration statement is approved by the SEBI, the marketing of the offering begins.

A typical 'road show' lasts 3–4 weeks. A detailed timeline diagram of the IPO process is given in Appendix 2. Once the stock is listed, the underwriter has the obligation to stabilize the price, provide analyst recommendations and make a market in the stock. Exhibit 21.8 gives the listing statistics of Bombay Stock Exchange.

The IPO Process

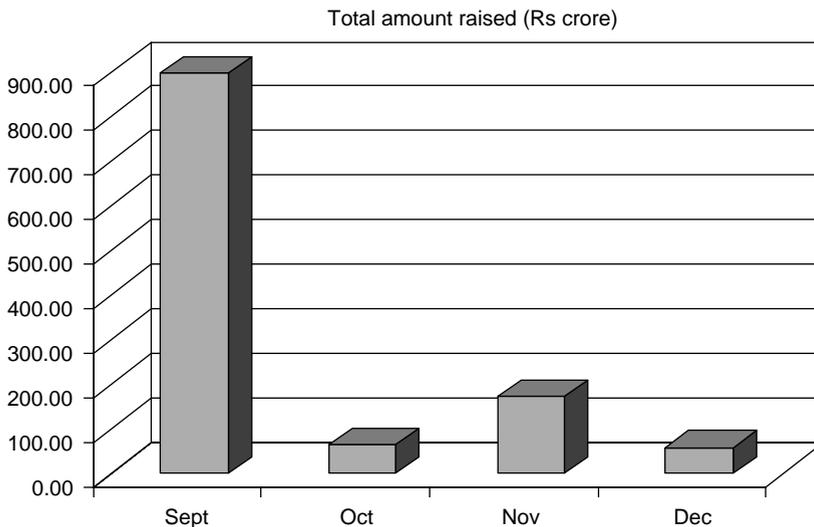


PRICING OF IPOs

In determining the initial public offering price the factors that will be considered are the prevailing market and general economic conditions, the history of and prospects for the company and industry, an assessment of the company's management and its operating results and the market prices of securities and certain financial and operating information as they relate to market valuations of companies engaged in activities similar to those of the company. There are two approaches for valuing the equity of a company undertaking the IPO—DCF approach and Peer comparison approach. The DCF approach involves forecasting of cash flows to equity and estimation of appropriate discount rate to discount cash flows. The value of equity thus arrived, is divided by the number of shares outstanding to arrive at the intrinsic value. Valuation is both an art and a science.

Exhibit 21.8 Listing statistics of the Bombay Stock Exchange

<i>Listing statistics at BSE-2000</i>				
<i>Details</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>
No. of companies listed	13.00	7.00	12.00	8.00
New securities of existing companies	28.00	26.00	28.00	37.00
Capital listed: New companies (Rs crore)	270.24	1,481.53	122.63	175.64
Amount offered through equity (prospectus)				
No. of issues	10.00	3.00	6.00	2.00
Par amount (Rs crore)	885.92	7.38	121.25	5.80
No. of premium issues	1.00	3.00	1.00	1.00
Premium amount (Rs crore)	10.80	55.69	50.05	50.65
Total amount (Rs crore)	896.72	63.07	171.30	56.45



The issuer can come up with a price range and assess the likely market reaction to each of the prices. The final price is set in consultation with the lead manager.

Peer comparison approach requires identification of a set of comparable companies; obtaining for the latter their average P/E and P/BV ratios and application of these multiples to the earnings of the issuer to estimate the price. The obvious difficulty in this methodology is that it is hard to find peer companies due to differences in product life cycle, size, capital structure, etc. Further, estimation of future revenues and earnings based on short history of the firm's existence is difficult. Some examine the pricing of recent comparable issues in pricing the next issue. The difficulty in this approach is that P/E multiples fluctuate rapidly between quarters or days rendering this approach useless. The final pricing typically takes place the day the company is likely to get the SEBI clearance.

In order to come up with a price for the Union Bank Issue one must identify a set of comparable recent Bank IPOs. Andhra Bank, Vijaya Bank, and Syndicate Bank have gone public in the recent past. The salient features of the PNB IPO are as follows:

In the News: Vanishing Acts

A total of 377 firms raised Rs 5,634.24 crore through premium issues in 1994-95. Of these 226 are quoting at less than 50 percent of issue price. The overall loss to investors is Rs 2,800 crore. Of the 822 companies whose par issues raised to Rs 4,081.23 crore, only 776 are regularly traded with 488 scrips quoted at under Rs 5—erosion of Rs 2,000 crore. A study reports that 118 of 3,872 companies which raised Rs 25,210 crore, during April 1992–March 1996 are not in the trading lists of BSE, DSE, CSE, and MSE. There are 6,987 companies listed on BSE. Three out of 4 scrips listed on the exchange are simply not traded. A BSE study carried out between Jan 1997–Feb 1998 reveals that while the number of scrips that were traded at least once a month declined from 4,600 in Jan 1997 to 3,180 in Feb 1998, those that were not traded at all rose from 2,199 to 3,760 in the same period.

Source: India Today, April 1998.

Issue price : Rs 31
 Issue size : Rs 165 crore
 Issue date : March 21–28, 2002

Valuation at the IPO Price

- 1x PER on annualized EPS for FY01 (1.4x FY02EPS actual)
- 0.25x on 1 Sept book value (0.3x FY02BV actual)
- Approximately 1x on 1 Sept adjusted book value
- The issue was well received by investors. The bank received approximately 156,000 applications with an oversubscription of 4.3 times. The issue was oversubscribed 1.47 times in the retail category (<1000) and 7.09 times in the wholesale category (>1000). The performance of bank IPOs is presented in Exhibit 21.9.

As can be seen from the exhibit all of them have been oversubscribed, which suggests that bank IPOs are usually greeted positively. Whether or not an issue will be successful depends on various factors like issue price, earnings prospects and quality, quality of management, investor recognition, and so on. The valuation of Union Bank on the basis of comparable transactions is presented in Exhibit 21.10.

Exhibit 21.9 Performance of recent bank IPOs

	<i>Andhra Bank</i>	<i>Vijaya Bank</i>	<i>IOB</i>	<i>Syndicate</i>	<i>PNB</i>
Date of issue opening	2/14/2001	11/27/2000	9/25/2000	10/25/1999	3/21/2002
Date of issue closing	2/23/2001	12/4/2000	9/29/2000	11/4/1999	3/28/2002
Issue size (Rs in crores)	150	100	111.2	125	165
Issue price	10	10	10	10	31
% of share capital divested	33.33	27.84	25.00	26.48	20.00
Return of capital to GOI (Rs. in crores)	47.95	0	0	0	0
Post issue equity capital (Rs. In crores)	450	359.28	444.8	471.97	265.3
Post issue GOI holding	66.66%	72.16%	75%	73.52%	80.00%
No. of times oversubscribed	2.72	1.87	1.89	3.76	4.3
No. of applications received	181,312	100,482	126,944	374,588	15,600
Performances of top 100 brokers (no. of applications procured)	34,588	19,837	15,351	135,514	awaited

Exhibit 21.10 Union Bank valuation

<i>Criteria</i>	<i>Historical</i>	<i>Fully diluted</i>
Capital	338.0	460.0
PAT	301.0	301.0
EPS	8.9	6.5
Avg. P/E for peer group	2.6	2.6
Fair market value	23.3	17.2
Discount of 30%	7.0	5.1
EPS		
IPO price	16.3	12.0
IPO <i>P/E</i> (trailing)	1.8	1.8
Book value	47.4	39.4
Avg <i>P/BV</i> for peer group	0.5	0.5
Fair market value	21.6	18.0
Discount of 30%	6.5	5.4
BV		
IPO price	15.2	12.6
No. of times the book	0.3	0.3
Adj. book value	7.8	10.3
Avg <i>P/Adj. BV</i> for peer group	2.0	2.0
Fair market value	15.7	20.9
Discount of 30%	4.7	6.3
Adj. BV		
IPO price	11.0	14.6
No. of times the Adj. book	1.4	1.4

Commentary on Union Bank Pricing

The following factors were considered while arriving at the issue price of Rs 16. The weighted average EPS for the years 1999–2000, 2000–01 and 2001–02 is Rs 6.86 (the weights being 1, 2, and 3 for the three years respectively). The average P/E ratio for public sector banks is 3.6. The P/E implied by the issue price works out to 2.33.

Likewise, the average P/BV for public sector banks is 0.56 and the P/BV implied by the issue price is 0.34 (assuming the book value as on March 31, 2002). In justifying the issue price the company cited the following reasons:

- The bank has a continuous track record of profitability since inception.
- Capital adequacy ratio is 11.07 percent against the prescribed minimum of 9 percent.

- The net asset value per share is Rs 46.
- The bank is a professionally managed organization with a well-established track record.

THE EMPIRICAL EVIDENCE

The cost of issuing securities includes the cost of underwriting and administrative expenses involved in the public issue process. In addition to these, there is a hidden cost of selling securities below their intrinsic values. A number of studies have recorded widespread underpricing of initial public offerings. The issue is said to be underpriced if an investor can make quick money upon listing of the issue.

The return on a stock from the day of offer to the day of listing is:

$$R = [(P_1/P_0) - 1] \times 100$$

where

P_1 = price of stock on listing day, and

P_0 = Offer price.

To remove the effect of the market, market adjusted return could be calculated by subtracting the market return.

Market adjusted return = raw return – market return

Market return = [(market index on listing/market index on offer) – 1] × 100

Given below is the summary of estimates of the underpricing of new securities at issuance in the US.

IPO	15		18		20		PNB IPO@31	
	H	FD	H	FD	H	FD	H	FD
Criteria (offer price)								
P/E	1.7	2.3	2.0	2.8	2.2	3.1	1.2	1.4
P/BV	0.3	0.4	0.4	0.5	0.4	0.5	0.2	0.4

H Historical

FD Fully diluted

Type of offering	Study	Sample period	Sample size	Estimated underpricing
IPO	Ibbotson (1974)	1960–69	120	11.4 percent
IPO	Ritter (1984)	1960–82	5,162	18.8
		1977–82	1,028	26.5
		1980–81	325	48.4
IPO	Ritter (1985)	1977–1982		
			664	14.80
			364	47.80

Source: Clifford Smith (1986).

Given here is a list of big IPO run-ups between 1975 and 2002:

<i>Company</i>	<i>Offer date</i>	<i>First day, percentage increase</i>
Va Linux	12/09/99	525
Globe.com	11/13/98	606
Foundry Networks	9/28/99	525
Webmethods	2/11/00	507.50
Free Markets	12/10/99	483.33
Cobalt Networks	11/05/99	482
MarketWatch.com	1/15/99	474
Akamai Technologies	10/29/99	458
Cacheflow	11/19/99	426.56
Sycamore Networks	10/22/99	386

Source: Prof. Jay Ritter, University of Florida.

Exhibit 21.11 lists the average initial returns in countries around the world. The performance of book building in India is presented in Exhibit 21.12.

Exhibit 21.11 Average initial returns around the world

<i>Country</i>	<i>Sample size</i>	<i>Time period</i>	<i>Average initial return (percent)</i>
Australia	381	1976–95	12.1
Brazil	62	1979–90	78.5
China	432	1990–2000	256.9
Denmark	117	1984–98	5.4
France	448	1983–98	9.5
Germany	407	1978–99	27.7
Hong Kong	334	1980–96	15.9
India	98	1992–93	35.3
Korea	477	1980–96	74.3
New Zealand	143	1979–99	23.0
Philippines	104	1987–97	22.7
Switzerland	42	1983–89	35.8

Source: Loughran, Ritter and Rydqvist (1994).

Performance of IPOs in India (in percent)

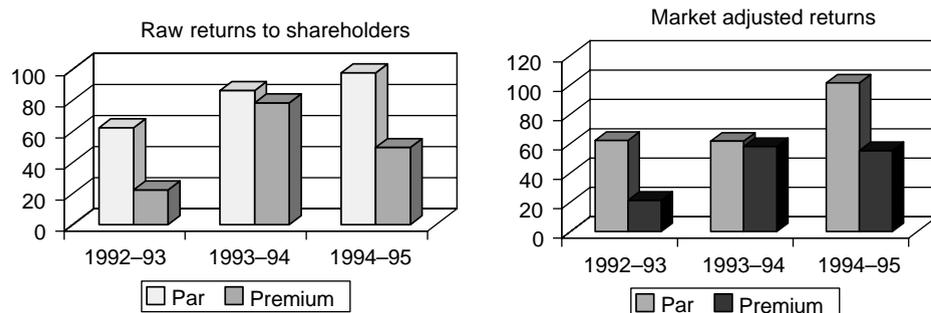


Exhibit 21.12 Performance of book building in India

<i>Company</i>	<i>Issue date</i>	<i>Offer price (Rs)</i>	<i>No of times oversubscription</i>	<i>Listing price (Rs)</i>	<i>Percentage change from offer price</i>
Hughes Software	7.10.99	630.00	25.00	1,589.00	152.22
HCL Technologies	10.12.99	580.00	NA	1,150.00	98.28
Shree Rama Multitech	4.2.00	120.00	46.00	110.25	-8.13
Cinevista Comm.	24.2.00	300.00	NA	202.00	-32.67
Cadila Healthcare	28.2.00	250.00	7.00	196.90	-21.24
Mascot Systems	2.5.00	460.00	8.00	575.00	25.00
Aksh Optifibre	18.7.00	60.00	8.00	65.00	8.33
Mukta Arts	28.7.00	165.00	4.65	220.00	33.33
Hughes Tele Com.	20.9.00	12.00	0.67	11.50	-4.17
Microtek	25.9.00	95.00	1.40	96.00	1.05
British Nandy Comm.	26.9.00	155.00	1.56	150.00	-3.23

Studies in the US have shown that although there is short run underpricing, there is considerable *overpricing* in the long run. Over the 5-year period following the IPO, new issues produce significantly lower returns than similar public companies. Between 1970 and 1990 an average new issue in the US produced annual returns of just 5 percent while investing an equal amount at the same time in a non-issuing firm would have produced an annual return of 12 percent.⁶ Other studies have found that firms going public exhibit a substantial decline in post-issue operating performance. Over a six-year period extending from the year prior to the IPO until five years after the offering, the performance of IPO firms declines significantly relative to their pre IPO levels.⁷ Exhibit 21.13 presents returns on IPOs in the long run in the US.

Exhibit 21.13 Returns on IPOs in the US during the five years after issuing, 1990–98 (percent)

	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>4th</i>	<i>5th</i>	<i>Geo. Mean</i>
IPO firms	14.9	12.0	11.5	24.2	9.9	14.4
Size-matched	14.8	16.6	13.8	23.1	13.9	16.4
Difference	0.1	-4.6	-2.3	1.1	-4.0	-2.0

Source: Prof. Jay Ritter, University of Florida.

Some studies have documented the operating performance of firms after the IPO. These studies have noted the change in operating return on assets, operating cash flows/total assets, sales and asset turnover from one year prior to the IPO to three years after the IPO. The results are shown here:

<i>Measure of performance</i>	<i>Year relative to completion of IPO</i>	
	<i>From -1 to +2</i>	<i>From -1 to +3</i>
Operating return on assets		
Median change (percent)	-10.53	-9.09
Median industry-adjusted change (percent)	-8.12	-6.81
Sales		
Median change (percent)	108.09	143.15
Median industry-adjusted change (percent)	60.97	80.67

Source: Jain and Kini (1994).

⁶ Loughran and Ritter (1995).

⁷ Jain and Kini (1994).

This pattern is not specific to America. Numerous studies replicated around the world confirm these findings.⁸ Why are so many issues underpriced? Many plausible reasons have been suggested. The underwriter, because of his superior experience in marketing IPOs and knowledge of the market can often coax an issuer to set a price low enough to sell the issue. This is obviously in the interest of the underwriter. But an underwriter's ability to set unduly low prices is limited by his desire to protect his reputation. Another explanation is based on information asymmetry between different groups of investors. If underwriters have no superior skills in accurately pricing all issues, we would expect some issues to be overpriced and some issues to be underpriced. If the informed investors are able to identify overpriced issues we would expect them to avoid such issues and invest only in underpriced issues. The uninformed group realizes the incentives faced by the informed group and demand a discount on *all* issues. Another plausible explanation for short run underpricing and long run overpricing is that analysts tracking IPOs are overly optimistic about the earnings potential of these companies and investors pay attention to analyst forecasts. A study by Rajan and Servaes (1997) suggests that analyst following is positively related to IPO underpricing and analysts are overoptimistic about the growth performance and earnings of IPOs. Usually the terms underpricing and undervaluation are used interchangeably. But are they? Undervaluation refers to the difference between the price and fair value. In other words, price and value are not the same. As discussed in the section on pricing, IPOs are priced on the basis of multiples of comparables and the DCF approach. If IPOs were priced too high compared to the valuations of comparable companies, we would expect prices of IPOs to revert to their intrinsic value in the long run. In other words, is the long run under performance of IPOs due to overvaluation at the time of offering? The answer appears to be yes.⁹ One study finds that in a sample of more than 2,000 relatively large capitalization IPOs during 1980–97, the median IPO firm is overvalued by about 50 percent relative to its industry peers. Studies have found that an IPO, on average, leaves \$ 9.1 million on the table. Yet issuers and shareholders of the issuing company rarely complain. Why? The reason is that the shareholders receive the bad news—that the issue was underpriced and the good news—that their wealth is much higher than they had anticipated simultaneously!¹⁰

Market Reaction and Subsequent Performance of Union Bank Stock

Union Bank started trading at Rs 16.35 on September 14, 2002; and, for the most part of September and October, the stock has been trading in the range of Rs 14.50–16.00. Exhibit 21.14 presents the performance of the stock up to October 23, 2002, and the stock return after adjusting for Sensex return. The adjusted return has been negative for the most part. In other words, the stock has not performed better than the index.

IN CONCLUSION

Going public is a significant decision in the history of a company. Once public, a company will have to spend considerable time and resources in maintaining investor relations. For every seller there has to

⁸ See, for instance, Levis (1993).

⁹ Purnanandam and Swaminathan (2002).

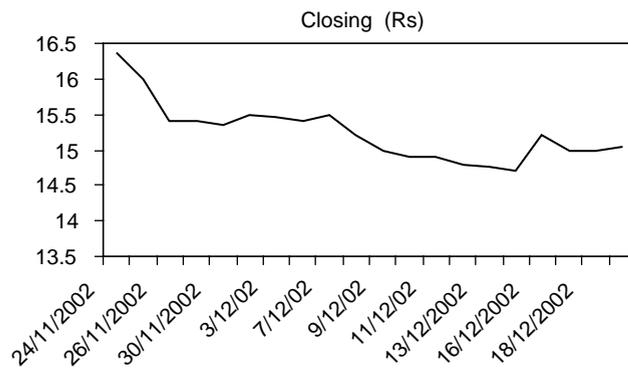
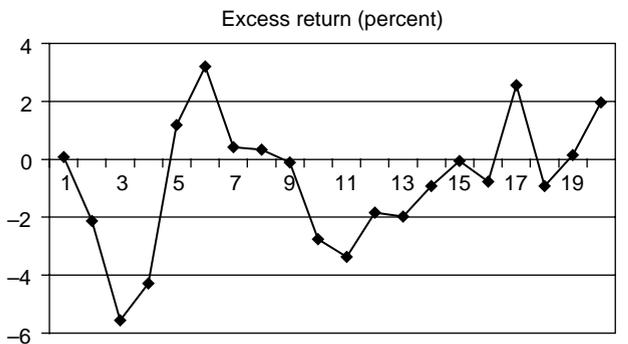
¹⁰ Loughran and Ritter present a prospect theory model to explain this phenomenon. See Loughran and Ritter (2002).

be a buyer. To decide whether or not to invest in an IPO one may rank the issue on several criteria, say, on a scale of 1 to 4 (with 4 being the best). Some of the potential criteria for ranking include:

- Business model (company's products and services, future potential)
- Financial strength
- Reputation of underwriters
- Management and its experience in the business
- Superiority of the issuing company's technology over its competition
- Shareholding base (Are the original shareholders successful venture capitalists or institutional shareholders?)
- Intended use of proceeds
- State of competition
- Trading comparables
- Major customers and their position

One may calculate an aggregate score for the company by summing up scores on each component and decide to purchase or not.

Exhibit 21.14 Stock price performance of Union Bank



APPENDIX 1: VALUATION OF RIGHTS¹¹

Consider a stock trading rights-on. Each share gives the holder one right and n rights are needed to buy one share. For the sake of convenience, assume that the stock does not pay dividends until after the right's expiration date T . Let the subscription price be X and the stock price at time t be S_t . An approximate value of a right before ex-rights date is given by $(S_t - X)/(n + 1)$.

This formula does not take into account the right's time to expiration, the stock's volatility and the risk-free rate of return. This equation ignores the option value embedded in a right and the time value of the subscription price. The arbitrage-free value of a right before the ex-rights date is given by the following equation:

$$[S_t N(d_1) - X e^{-rf(T-t)} N(d_2)]/(n + 1)$$

where

$$d_1 = [\ln(S_t/X) + (r_f + \sigma^2/2)(T - t)] / [\sigma \sqrt{(T - t)}]$$

$$d_2 = d_1 - [\sigma \sqrt{(T - t)}], \text{ and}$$

σ is the volatility of the firm's equity value, which consists of its stock and rights.

The time to maturity could range from 2–100 days, say.

The ratio of a right's subscription price and the stock price at ex-rights date could be 0.5 to 1.0, say.

The volatility could be assumed to be 20–40 percent or actually estimated; when $S_t = X$, the value of a right is zero;

To value a right on or after the ex-rights date, S_t should be replaced by $S_t +$ value of right in the above equation.

To illustrate, assume the following data:

Rights-on stock price = Rs 35

$$N(d_1) = 0.4$$

Subscription price = Rs 30

$$N(d_2) = 0.2$$

Time to expiration = 20 days

$$\sigma = 50 \text{ percent}$$

The shareholders get 1.3 rights for every share held and each right can be exercised for 1 share. Let risk-free rate be 9 percent. The traditional formula would give a value of:

$$(35 - 30)/(1 + 1.3) = \text{Rs } 2.17$$

The option pricing approach would give a value of:

$$[35 (0.4) - 30 e^{0.09(20/365)} N(0.2)]/(1+1.3)$$

The value of the right can be estimated by referring to cumulative normal tables.

¹¹ Alexander, Gordon and Alexandre Baptista (2001). 'A Note on the Valuation of Rights Formula Commonly Presented in Finance Text Books', *Journal of Applied Finance*. Also see Smith, Clifford (1977).

APPENDIX 2: SUMMARY OF SEBI GUIDELINES (DISCLOSURE AND INVESTOR PROTECTION)

1. The draft prospectus has to be filed with the Board through a merchant banker 21 days prior to the filing of prospectus with the ROC.
2. A company cannot make a public issue without seeking a listing on a recognized stock exchange.
3. Listed companies can freely price their issues.
4. Unlisted companies (i.e., first time offerings) can freely price if they satisfy the following criteria:
 - They should have a 3 year track record of profitability.
 - Not less than 20 percent of equity should be offered.
 - A justification for the premium should be given.
5. Further, the promoters should contribute 20–25 percent of total issued capital and the holding is locked for 5 years from date of allotment.
6. Underwriting is mandatory for the full issue and a minimum subscription of 90 percent is also mandatory.
7. If an issue does not receive 90 percent subscription even after accounting for accepted devolvement from underwriters, the amount received from the investors should be refunded.

APPENDIX 3: THE IPO TIMELINE IN THE US AND INDIA

<i>Time</i>	<i>Company</i>	<i>Investment bank</i>	<i>SEC</i>
1–6 months before	Select the IPO team; execute letter of intent ¹²	Assess market; Make presentation to board	Confer
1–3 months before	Select printer & transfer agent Begin due diligence	Continue due diligence	Review preliminary registration statement
1–4 weeks before	Executives present the road show	Orchestrate road show	
1–10 days before	Issue press release	Continue due diligence	
1 day before	Price the offering; Execute underwriting agreement		Declare offering effective
5 days after	Provide certificates; Collect proceeds	Assist in closing	

Source: Nasdaq.

¹² The letter of intent is among the first documents to be signed before the investment banker undertakes any work. The letter protects the underwriter against any uncovered expenses in the event the event is withdrawn due to lack of investor demand or some such thing.

IPO Calendar

S.No.	Day No.	No. of days	Event	Remarks/notes
A				
1	T-0	1	Share transfer to increase number of members to 7	Inform the existing shareholders the reason and fix the transfer price; 4 more members required.
2	T-1	1	Board meeting & resolution	Resolution for conversion and authorisation for convening AGM/EGM.
3	T-2	21	Notice for shareholders meeting	21 days notice to shareholders for the AGM/EGM
4	T-23	1	Shareholders meeting & special resolution	Resolution with three-fourths majority.
5	T-24	1	Filing of Form 23 with ROC	Within 30 days - Notice, explanatory statement, resolution.
6	T-25	1	Filing of statement in lieu of prospectus with ROC	Draft copy can be kept ready before itself.
7	T-26	1	Amendment of MOA & AOA	Delete certain clauses applicable only to a private company. File with the ROC the corrected copy
8	T-27	5	Conversion into a public limited company	ROC will issue fresh certificate with the word "Private" deleted.
9	T-32	1	Notice for statutory meeting	21 days notice to shareholders.
10	T-33	30	Statutory meeting and statutory report	Anytime after 1 month but before 6 months from date of conversion.
11	T-63	1	Copy of statutory report to ROC	Copy to be filed with ROC immediately after circulating to members.
B				
1	T-64	1	<i>Preparation and regulatory approvals</i>	Approving issue of shares and draft prospectus.
2	T-65	21	Board resolution for issue of shares Shareholders resolution	Sec 81 (A) of the Companies Act to be fulfilled. 21 days notice for the meeting to be conveyed
3	T-86	1	Filing Form 23 with ROC	Copy of special resolution, explanatory statement and notice to be filed.
4	T-87	10	Appointment of merchant banker	MoU with the merchant banker, fixing terms and conditions, appointment of share registrars, underwriters, bankers to the issue, etc.
5	T-97	30	Due diligence audit by the merchant banker	Financial statements, minutes, business profile, management study, etc.
6	T-127	10	Preparation of prospectus	Legal requirements, contents, expert comments and risk factors.
7	T-137	5	In principle approval for listing	Filing of statutory documents with regional and other stock exchanges.
8	T-142	25	Vetting of prospectus	Filing the prospectus with SEBI alongwith due diligence and compliance certificates. – 21 days available with SEBI for corrections. Practically takes more than 21 days most of the time.

IPO Calendar contd.

IPO Calendar contd.

<i>S.No.</i>	<i>Day No.</i>	<i>No.of days</i>	<i>Event</i>	<i>Remarks/notes</i>
9	T-167	7	SEBI compliance.	Terms and conditions put by SEBI. Corrections in the initial prospectus before obtaining ROC card. Corrected final copy of prospectus duly attested by the directors to be filed with the ROC – Then ROC issues the ROC card. No specified time limit for the same. Deposit to be paid to regional stock exchange and contribution to be kept in a separate escrow account.
10	T-174	5	ROC card	
11	T-179	2	1 percent security deposit and promoters contribution	
<i>C</i>			<i>Marketing & Research</i>	Identification of potential investors. Classification and segmentation of the targeted investors. Conducting detailed analysis and research into company background and past performance. – Identification of plus points and positioning the issue accordingly. Includes investor road shows, press conferences, statutory advertisements, printing prospectus and application forms and distribution of marketing materials.
1	T-181	3	Investor targeting	
2	T-184	7	Research and sales calls	
3	T-191	7	Marketing Efforts	
<i>D</i>			<i>Execution</i>	Bidding should be open for at least 5 days. In consultation with the merchant banker. Minimum 3 days and maximum 10 days. Issue monitoring.
1	T-198	10	Book open and close for book building	
2	T-208	3	Price discovery	
3	T-211	10	Public offer opens	
<i>E</i>			<i>Post issue obligations</i>	Collection of application forms and processing with the help of the merchant banker and registrars. As per statutory rules in consultation with merchant bankers and regional stock exchange. Post issue advertisement, dispatch of share certificates and refund orders. Form No. 2 to be filed with ROC within 30 days of allotment. Listing agreement with exchanges, Listing fees. Trading of securities in stock exchanges. Includes 78-day monitoring report to be submitted to SEBI. Application to SEBI after completing all legal requirements.
1	T-221	10	Registry works	
2	T-231	7	Allotment of shares	
3	T-238	5	Administrative duties	
4	T-243	3	Return of allotment	
5	T-246	5	Listing and trading of securities	
6	T-251	—	Commencement of trading	
7	—	—	Investor grievance handling	
8	—	—	Refund of security deposit	

APPENDIX 4: LISTING REQUIREMENTS OF THE BOMBAY STOCK EXCHANGE (BSE)

The Stock Exchange has a separate listing department to grant approval for listing of securities of companies in accordance with the provisions of the Securities Contracts (Regulation) Act, 1956, Securities Contracts (Regulation) Rules, 1957, Companies Act, 1956, Guidelines issued by SEBI and Rules, By-laws and Regulations of the Exchange.

The listing requirements are as follows:

Minimum Listing Requirements

Minimum Capital

For new companies the following criteria will be applicable regarding threshold limit:

- The minimum post-issue paid-up equity capital should be Rs 5 crore.
- The minimum market capitalization should be Rs 50 crore. (The capitalization will be calculated by multiplying the post issue subscribed number of equity shares with the Issue price).
- Post issue net worth (equity capital + free reserves excluding revaluation reserve) should be Rs 20 crore.

Minimum Public Offer

As per Rule 19(2) (b) of the Securities Contracts (Regulation) Rules, 1957, securities of a company can be listed on a stock exchange only when at least 25 percent of each class or kind of securities is offered to the public for subscription.

Submission of Letter of Application

As per Section 73 of the Companies Act, 1956, a company seeking listing of its securities on the exchange is required to submit a letter of application to all the stock exchanges where it proposes to have its securities listed before filing the prospectus with the Registrar of Companies.

Allotment of Securities

As per listing agreement, a company is required to complete allotment of securities offered to the public within 30 days of the date of closure of the subscription list and approach the regional stock exchange for approval of the basis of allotment.

In case of book building issue, allotment shall be made not later than 15 days from the closure of the issue failing which interest at the rate of 15 percent shall be paid to the investors.

Trading Permission

As per Securities and Exchange Board of India Guidelines a company should complete the formalities for trading at all the stock exchanges where the securities are to be listed within 7 working days of finalization of basis of allotment.

Payment of Listing Fees

A company has to pay annual listing fees by April 30 of every financial year to the exchange as per the schedule of listing fees prescribed from time to time.

The schedule of listing fees for the year 2000–2001, prescribed by the governing board of the exchange and approved by the Securities and Exchange Board of India is given hereunder:

Initial listing fees	—	Rs 20,000
Annual listing fees:		
Paid up capital upto Rs 5 crore	—	Rs 10,000
Paid up capital between Rs 5–10 crore	—	Rs 15,000
Paid up capital between Rs 10–20 crore	—	Rs 30,000

For paid up capital greater than Rs 20 crore, for every increase of Rs 1 crore, additional fees of Rs 750 will be charged.

Compliance with Listing Agreement

A company is required to enter into an agreement with the exchange called the listing agreement and is required to make certain disclosures and perform certain acts. As such, the agreement is of great importance and is executed under the common seal of a company. Under the listing agreement, the company undertakes, amongst other things, to provide facilities for prompt transfer, registration, sub-division and consolidation of securities; to give proper notice of closure of transfer books and record dates, to forward copies of unabridged annual reports and balance sheets to the shareholders, to file distribution schedule with the exchange annually; to furnish financial results on a quarterly basis; intimate promptly to the exchange the happenings which are likely to materially affect the financial performance of the company and its stock prices, to comply with the conditions of corporate governance, etc.

The listing department of the exchange monitors the compliance of the companies with the provisions of the listing agreement, especially with regard to timely payment of annual listing fees, submission of quarterly results, requirement of minimum number of shareholders, etc. and takes penal action against the defaulting companies.

LISTING REQUIREMENTS OF THE NATIONAL STOCK EXCHANGE (NSE)

Conditions Precedent to Listing

A company should have adhered to conditions precedent to listing as emerging from inter-alia, Securities Contracts (Regulations) Act 1956, Companies Act 1956, Securities and Exchange Board of India Act 1992, any rules and/or regulations framed under foregoing statutes, as also any circular, clarifications, guidelines issued by the appropriate authority under foregoing statutes.

The company should submit the audited balance sheet of three trailing financial years of the company to NSE. The project/activity plan of the applicant must have been appraised by a financial institution under Section 4A of the Companies Act, 1956 or a state finance corporation or a scheduled commercial bank with

a paid up capital exceeding Rs 50 crore or a category I merchant banker with a net worth of at least Rs 10 crore. The revenue from the core activity undertaken as stated in the prospectus shall not be less than 75 percent of the total income during the two immediately preceding years. The listing advisory committee (LAC) of the exchange shall approve and recommend the listing.

An applicant desirous of listing its securities should meet the following criteria:

- Other stock exchanges and regulatory authorities have taken no disciplinary action in the past three years.
- The company should not have been in default in payment of listing fees to any stock exchange in the last three years or has not been de-listed or suspended in the past and has not been proceeded against by SEBI or other regulatory authorities in connection with investor related issues or otherwise.
- Details of litigation record, the nature of litigation, status of litigation during the preceding three years period needs to be clarified to the exchange.

Listing Fees

The listing fees depend on the paid-up share capital of the company.

<i>Particulars</i>	<i>Amount (Rs)</i>
Initial listing fees	7,500
Annual listing fees :	
Companies with paid-up share and/or debenture capital of Rs 1 crore	4,200
Above Rs 1 crore and up to Rs 5 crore	8,400
Above Rs 5 crore and up to Rs 10 crore	14,000
Above Rs 10 crore and up to Rs 20 crore	28,000
Above Rs 20 crore and up to Rs 50 crore	42,000
Above Rs 50 crore	70,000

Listing Procedure

After fulfilling all eligibility criteria the company has to send the following to the listing manager at NSE:

- A brief note on the promoters and management.
- Company profile.
- Copies of the annual report for last three years.
- Copies of the Draft Offer Document.
- Memorandum and Articles of Association.

Approval of Draft Prospectus

The company shall file the draft prospectus and application forms with NSE. The draft prospectus and application forms have to be filed simultaneously with the NSE when the same is filed with the regional stock exchange pertaining to the issue, for the perusal of NSE. The draft prospectus should have been prepared in accordance with the statutes, notifications, circulars, guidelines, etc. governing preparation and issue of prospectus prevailing at the relevant time. NSE will peruse the draft prospectus only from the point of view of checking whether the draft prospectus is in accordance with the listing requirements, and therefore

any approval given by NSE in respect of the draft prospectus should not be construed as approval under any laws, rules, notifications, circulars, guidelines, etc.

The company should file a copy of the draft prospectus given by the respective regional stock exchange with NSE. The company should also submit the SEBI acknowledgment card or letter indicating observations on draft prospectus or letter of offer by SEBI.

Security Deposit

The relevant authority shall not grant admission to dealings of securities of the company unless it deposits with the NSE (in cases where the securities are offered for subscription, whether through the issue of a prospectus, letter of offer or otherwise, and NSE is the regional stock exchange for the issuer) an amount calculated at 1 percent of the amount of securities offered for subscription to the public and or to the holders of existing securities of the company, as the case may be for ensuring compliance by the company within the prescribed or stipulated period of all requirements and conditions hereinafter mentioned and shall be refundable or forfeitable in the manner hereinafter stated.

The issuer shall comply with all prevailing requirements of law including all requirements of and under any notifications, directives and guidelines issued by the Central Government, SEBI or any statutory body or local authority or any body or authority acting under the authority or direction of the Central Government and all prevailing listing requirements and conditions of the NSE and of each recognized stock exchange where the issuer has applied for permission for admission to dealings of the securities, within the prescribed or stipulated period;

If the company has complied with all the aforesaid requirements and conditions including, wherever applicable, its obligation under Section 73 (or any statutory modification or re-enactment thereof) of the Companies Act, 1956 and obligations arising therefrom, within the prescribed or stipulated period, and on obtaining a no objection certificate from SEBI and submitting it to NSE, NSE shall refund to the company the said deposit without interest within fifteen days from the expiry of the prescribed or stipulated period.

If on expiry of the prescribed or stipulated period or the extended period referred to hereafter, the company has not complied with all the aforesaid requirements and conditions, the said deposit shall be forfeited by the NSE, at its discretion, and thereupon the same shall vest in the NSE. Provided the forfeiture shall not release the company of its obligation to comply with the aforesaid requirements and conditions.

If the company is unable to complete compliance of the aforesaid requirements and conditions within the prescribed or stipulated period, the NSE, at its discretion and if the company has shown sufficient cause, but without prejudice to the obligations of the company under the laws in force to comply with any such requirements and conditions within the prescribed or stipulated period, may not forfeit the said deposit but may allow such further time to the issuer as the NSE may deem fit; provided that it is within the stipulated period.

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Chapter 22

Bank Loans

OBJECTIVES

- ◆ Introduction to banks as a class of financial institutions.
- ◆ Introduction to commercial bank lending products.
- ◆ Practice in calculation of maximum permissible bank finance.
- ◆ Evaluating creditworthiness from the perspective of a banker.
- ◆ introduction to syndicated loans.

Bank loans are an important source of funding for a business. Indeed, as shown in Exhibit 22.1, banks and financial institutions provided at least a quarter of new funds raised by all corporations. Banks provide short-term working capital loans and long-term loans to businesses in addition to other products like revolving credit facilities. Companies may borrow for a variety of reasons like purchase of assets like plant and machinery, repayment of other debt or meeting working capital requirements and repay such loans from cash generated by business or sale of assets or infusion of new capital. This chapter describes the various products offered by banks and the methodology adopted by banks to evaluate the creditworthiness of borrowers.

Exhibit 22.1 Sources of funds for corporate sector

Sources	1994–95	95–96	96–97	97–98	98–99
Internal sources	25.30	28.3	25.70	30.2	36.3
Retained profits	14.4	15.8	7.8	8.3	6.3
Depreciation	11.0	12.5	18.0	21.9	30.0
External sources	74.7	28.3	74.3	69.8	63.7
Capital market	34.7	15.2	15.2	20.7	11.1
Bank/institutional borrowing	21.8	31.7	40.1	32.3	18.4
Current liabilities & provisions	18.1	24.7	19.0	16.9	34.2

Source: National Stock Exchange.

COMMERCIAL BANK LENDING PRODUCTS

Although increased competition is forcing banks to design new and innovative products, the traditional products like loans—short-term and long-term— revolving credit facility, continue to be the mainstay of

banks. The credit facilities sanctioned by a bank to its corporate clients can be broadly classified into two categories:

- **Working capital loans** that are provided for meeting day-to-day expenses like purchase of raw materials, consumable stores/spares, fuel and other essential needs. They are of a continuing nature and are renewed every year.
- **Term loans** that are sanctioned for acquiring block or fixed assets like land, building, plant and machinery and also to meet long-term working capital or NWC (net working capital). They are repayable over a period of time, say 3–5 years, depending upon the profit generation capacity of the unit. Short-term loans are also granted to meet temporary cash flow mismatches.

The banks fix a margin on the value of the security and drawing power for each facility. The unit can draw money to the extent of the limit or drawing power whichever is lower. Working capital gap is defined as current assets less current liabilities (other than bank borrowings) and net working capital is defined as excess of current assets over all current liabilities. The borrower has to provide at least 25 percent of the current assets from the long-term funds. The total current liabilities (including bank finance) should not exceed 75 percent of current assets, i.e., minimum current ratio should be 1.33:1 (second method of lending prescribed by the Tandon committee). The IDBI bank, for example, accepts a lower current ratio up to 1.25 on a case to case basis.

Calculation of Maximum Permissible Bank Finance

Banks are required to make their own assessment of credit requirements of their borrowers, based on a total study of the borrower's business operations, i.e., taking into account their production/processing cycle of the industry as well as the financial and other relevant parameters. Accordingly, the bank decides the levels of holding of each item of inventory, and receivables, which in their view would represent a reasonable build-up of current assets for being supported by bank finance. The RBI has discontinued the practice of prescribing detailed norms for each item of inventory and receivable for each industry. Earlier, the level of credit to a corporate was determined on the basis of a maximum permissible bank finance (MPBF)—an elaborate but rigid procedure—to fix the eligible limits of credit. The Tandon committee prescribed the following three methods:

- Method I: $0.75 (CA - CL)$
- Method II: $0.75 (CA) - CL$
- Method III: $0.75 (CA - CCA) - CL$

where

CA = Current assets, CL = Current liabilities, and CCA = Core current assets.

This mandated system was abolished and banks now have total freedom to decide on the methodology of assessing working capital requirements. It is for the companies to convince their banks of their unique working capital needs.

The guidelines contained above apply to all borrowers enjoying aggregate fund-based working capital limits of Rs 1 crore and above from the banking system. For borrowers enjoying aggregate fund-based working capital limits of less than Rs 1 crore from the banking system, banks are required to extend finance to a minimum of 20 percent of the projected annual turnover (including village and tiny industries and other

SSI units). Further, the assessment of working capital is done both on projected turnover basis and traditional method. If the credit requirement based on the production cycle (traditional method) is higher than the one assessed on projected turnover basis, higher credit can be sanctioned as the guidelines stipulate a minimum of 20 percent of the projected turnover. On the other hand if assessed credit requirement (on traditional method) is lower than the one assessed on the projected turnover basis, a minimum of 20 percent of projected turnover should be sanctioned. The projected turnover means 'gross sales' which includes excise duty.

CREDIT FACILITIES

The total credit requirement of an organisation is usually catered to as a combination of various types of facilities listed here:

Fund-Based Credit Facilities

1. Cash Credit

It is an operating account from which the borrower can withdraw funds as and when needed up to a predetermined credit limit. The security for cash credit is the inventory.

The banker takes the following precautions under cash credit accounts:

- Valuation of stocks of raw material accepted as security is done on the basis of cost price or market price whichever is lower.
- Stocks in process are valued as in the case of raw materials.
- Finished goods are valued at cost of production or list price less trade discount and profit margin or market price whichever is the lowest.
- Drawings in the account are regulated to the extent of drawing power or limit, whichever is lower.
- The goods charged are properly stored to avoid any deterioration.
- The goods are inspected every month to verify quantity, quality, age, saleability, and value, etc.

The cash credit management permits the borrower to borrow up to a specified limit. While interest is charged only on the utilised portion, a service charge is levied on the portion that is unutilized. The customer (borrower) is also expected to maintain a minimum balance, called compensatory balance, in the cash credit account. The security offered by the customer is in the nature of hypothecation or pledge. Borrower's inventory and receivables are hypothecated to the bank in a cash credit arrangement. The amount that can be borrowed at any point in time is the lower of the sanctioned limit and the value of security less margin. This can be further illustrated:

	<i>(Rs crore)</i>	
	<i>Situation A</i>	<i>Situation B</i>
1. Sanctioned limit	2	2
2. Value of security	2	3
3. Margin requirement	20 percent (i.e., 0.40)	20 percent (i.e., 0.60)
4. Value of security less margin	1.6	2.4
5. Drawing power (minimum of 1 & 4)	1.6	2

The overdraft arrangement is similar to the cash credit arrangement. Under this arrangement, the borrower is permitted to overdraw upto a specified limit. Interest is charged on the amount drawn subject to a minimum. The drawing power is also determined as in the case of cash credit arrangement. However, there is a minor technical difference between these two arrangements. Cash credit account operates against the security of the inventory and accounts receivables in the form of hypothecation or pledge. Overdraft account operates in the form of pledge of shares and securities and sometimes even mortgage of fixed assets. The obvious shortcoming of these arrangements is that the customer can misuse the facility by keeping the limit higher than that warranted. It is tilted more towards the customer than the bank.

2. Packing Credit

Only given for exports, this credit has a lower rate of interest owing to various incentives. It is of two types:

- a) *Pre-shipment Packing Credit*: In this case, money is lent against a firm (definite) order or a LC that is opened by the foreign buyer in favor of the Indian manufacturer. The Indian manufacturer's banker gives finance against hypothecation of raw material. The borrowed funds will be used to meet the expenses incurred for production, i.e., raw material and labor.
- b) *Post-shipment Packing Credit*: In this case, the manufacturer already has finished goods which are to be exported. These goods are evaluated, based on sale value, and usually no margin is required to be paid to the banker. The banker then provides finance based on the sales invoice and shipping documents.

The packing credit can be in the form of packing credit foreign currency (PCFC) or rupee packing credit (RPC). While the former has a lower interest rate and is based on LIBOR, the latter has higher interest rate but the borrower can hedge the currency risk by booking forward contracts or by options.

In case the company uses PCFC, then it stands to gain on two fronts:

- The interest, which it pays, is substantially lower than that paid in case of RPC. In case of PCFC, interest is linked to LIBOR. At present it is approximately LIBOR + 0.5. This turns out to be quite lower than the Indian rate of interest even after converting to Indian currency.
- When it takes credit in foreign currency and converts it into INR, it has to pay the extra spread between the selling quote and buying quote. This can be avoided by letting the foreign currency remain in the same denomination.

3. Bills Purchased/Discounted

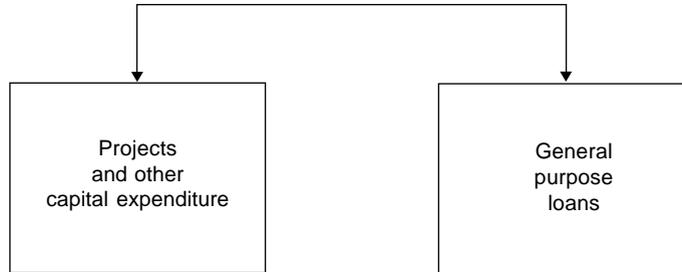
Under this facility, a banker purchases/discounts the bills and credits the amount in the customer's (seller of goods) account after deducting the discount. The term 'bills purchased' is used for allowing advance against demand bills which are payable on presentation before the drawee. The bills purchased can be clean or documentary. Under discounting of bills, advance is allowed against usance bills, i.e., those bills that mature after a certain period of time. A banker realises the amount of bill from the drawee on the due date but credits the customer's account by the amount of the bill less discounting charges immediately on receipt of the bill for discounting. Discounting charges also take care of the interest on the amount of the bill for the usance period.

In case a bill is dishonoured, the amount due, which includes the original amount, interest and other charges, etc., is debited to the drawer's account.

4. Term Loan

This is sanctioned to acquire block assets like land, building, plant/machinery and other equipment, to set up a new industrial undertaking or expansion, modernisation, etc. of the existing one or for net working capital. Term loans are normally granted for periods varying from 3 to 5 years, depending on the profit generation capacity of the unit. The unit's repayment capacity is examined before sanctioning term loans.

Term loan can be classified into two types based on the purpose and nature of the assistance:

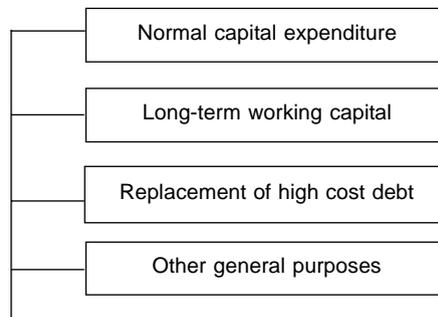


Project loans are normally provided to finance the cost of establishment, modernization or expansion of industrial concerns. Project loans typically fund purchase of land, building, plant and machinery, pre-operative and preliminary expenses including interest during construction period and margin money for working capital.

Project loans are generally provided for periods ranging from five to seven years, depending upon the anticipated cash flow of the project. In the majority of cases, the project loan is repayable in quarterly installments after a moratorium period for construction and early operational phase of the project.

Term loans are also provided to companies for their requirements of long-term funds for acquisition of equipment or investment in other capital assets such as captive power generation system, pollution control, effluent treatment, etc. The main difference over project loans is that in these cases, the investment may or may not result in increases in cash flow, or profitability. Such investments are generally made by companies to maintain their productivity, upgrade their facilities or comply with regulatory requirements.

Corporate loans are non-project general-purpose loans extended for the following purposes:



Corporate loans are normally advanced on the basis of the company's balance sheet strength and are generally extended to existing companies with good financial standing, a good credit rating and comfortable financial ratios.

The amount of a corporate loan to be provided depends on the company's credit rating, its debt-servicing capacity and its refinancing capability. The tenure of a corporate loan depends on specific requirements of

the company and its future cash flow projections. The maturity of corporate loans is generally short to medium term, ranging normally from one to five years.

Since corporate loans are essentially balance sheet funding, it is necessary to keep track of changes in the balance sheet over the life of the loan. It is therefore essential to stipulate and monitor financial covenants like maintaining a minimum debt service coverage ratio, interest cover, debt equity ratio, security cover, restrictions on undertaking new projects or raising fresh borrowings, etc., to safeguard the lending institution's interest.

Most financial lending institutions while pricing their credit products follow the following three benchmarks:

- STPR (Short-term prime rate) for one year bullet loans or loans of longer maturities with an annual repayment and annual reset values.
- MTPR (Medium-term prime rate) for loans with a final maturity between 12 and 36 months.
- LTPR (Long-term prime rate) for loans with a final maturity of greater than 36 months.

There are two options for pricing term loans:

- **Benchmark Pricing:**

Lending Rate = LTPR/MTPR/STPR + Appropriate risk charge

The appropriate rate is calculated by adding an appropriate risk charge to the benchmark rate (STPR or MTPR or LTPR). Risk charge for the term loan varies on three dimensions i.e., the credit rating of the company, loan amount, and the repayment schedule. The mark up over the benchmark rate (risk charge in this case) remains fixed during the drawdown of the loan.

- **Yield Curve Pricing:**

Lending rate = Offer rate + Appropriate risk charge

The lending rate (applicable rate) is calculated by adding the appropriate risk charge to the offer rate (that is the cost of funds for the lending institution). Each disbursement has to be re-priced based on the cost of funds prevailing at the time of disbursement. On the date of each disbursement, the client has to be informed of the composite lending rate (applicable rate) based on the yield curve pricing methodology.

In both pricing methods, the interest rate for the loan gets fixed on the date of disbursement and continues till maturity irrespective of the change in the benchmark rate or the cost of funds.

Banks also offer floating rate foreign currency loans: Pricing of foreign currency loans is similar to yield curve pricing for rupee term loans.

$$\text{Lending rate} = \text{Offer rate} + \text{Appropriate risk charge}$$

The lending rate (applicable rate) is determined by adding an appropriate risk charge to the offer rate (dependant on the credit rating).

$$\text{FC offer rate} = \text{Benchmark floating rate} + \text{Offer rate spread}$$

5. Working Capital Demand Loan

It is a short-term loan, which has a minimum repayment period of 3 months and is generally used to fund the working capital requirements of firms.

Non-Fund Based Credit Facilities

6. Letter of Credit

It is an arrangement by means of which the bank acting at the request of the customer undertakes to pay to a third party a predetermined amount by a given date, according to agreed stipulations and against presentation of stipulated documents.

There are four parties to a letter of credit. They are:

- Applicant (or opener), who is the importer and who approaches the bank for opening a letter of credit.
- Issuing bank, which opens the letter of credit.
- Beneficiary, who is the exporter and in whose favor the letter of credit is opened.
- Advising bank, which informs the exporter about the letter of credit being opened, at the behest of the issuing bank. It is generally based in the same place as the exporter.

Letter of credit (L/C) is opened by a bank in favor of its customer undertaking the responsibility to pay to the supplier in case the customer defaults on the payment for the goods purchased from the supplier within the due date. The bank does not provide finance but only assumes responsibility for its customer's behaviour. L/C plays an important role in import transactions. L/C can be of two types: Clean and documentary. When the evidence of movement of goods is present, the L/C is termed documentary L/C. Another classification of L/Cs is on the basis of whether it can be revoked or not. Accordingly, they are called revocable, irrevocable or confirmed L/C. In an irrevocable L/C the terms of the L/C cannot be revoked/cancelled/amended without the prior consent of all the parties. Unless otherwise stated, L/C is revocable. If the beneficiary is not satisfied about the issuing bank, he may ask for a confirmation by a known bank (called advising bank). The advising bank adds its own confirmation to the L/C. So the beneficiary (seller) gets two undertakings. Such an L/C is called confirmed L/C. Yet another classification of L/Cs is on the basis of method of payment. If the beneficiary gets immediate payment upon presentation of correct documents as per L/C, then the L/C is termed sight (demand) L/C. The beneficiary may draw an usance draft on the issuing bank, confirming bank or buyer. The draft is accepted by the buyer, issuer bank or conf. bank and no payment is made immediately. Such a L/C is called acceptance credit. The seller can wait till maturity or get it discounted but the buyer has to pay only on maturity.

An L/C contains:

- Particulars of import licence, if any
- The full address of the beneficiary
- Brief description of goods
- Price and value of goods in words and figures
- Origin of goods
- Mode of transport
- Port of shipment/destination
- Payment terms
- Expiry date of L/C
- Instructions regarding negotiation of documents and reimbursement.

7. Guarantee

This is a non-fund based facility, i.e., it does not involve extending any funds or money to the borrower customers. It, however, involves a commitment by the bank on behalf of the customer to pay to the parties in the event of default by the customer.

EVALUATING CREDITWORTHINESS

Before a bank agrees to commit its funds it has to assess the creditworthiness of the borrower. Evaluation of a borrower's ability and willingness to repay a loan at maturity involves financial analyses, character and capability, etc. A number of variables are considered by banks while evaluating a loan proposal.

The loan evaluation procedure followed by banks involves the following steps:

- I. Determining the purpose of the loan, cash requirements of the borrower, type of advance to be made.
- II. *Collateral/Security* given by the borrower to safeguard the loan.
- III. *Covenants*. These are the conditions imposed upon the borrower to:
 - Preserve the financial strength of the borrower
 - Maintain the borrower's ability to refinance itself
 - Control the assets
 - Ensure that the borrower does not do something that would be detrimental to the lender.

Covenants may be either positive or negative.

- IV. *Industry Analysis*. To study the prospects of the industry, an industry level credit analysis needs to be performed. It includes studying the following:
 - Industry cycles
 - Entry barriers
 - Threat from substitutes
 - Shifts in consumer demands
 - Regulatory environment
- V. *Operational Efficiency*. The company level credit evaluation is conducted to assess the operational efficiency of the client company. Critical aspects that are to be evaluated in this process fall into the following categories:
 - Operating margins
 - Stability and growth of market share
 - Access to key raw materials
 - Benefit from economies of scale.
- VI. *Financial Efficiency*. Repayment of the loan by the clients depends greatly on their financial soundness. Thus, financial analysis becomes an imperative part of analyzing the credit risk. It includes analysis of the following:
 - Capital structure
 - Cash flow statements
 - Ability to raise funds
 - Working capital management
 - Projections and sensitivity analysis
 - Comparison of actual and budgeted performance
 - Asset/liability position
 - Asset quality
 - Profitability
 - Sensitivity to interest rate structures, tax policies, etc.

Academic surveys of bank lending practices in the US have tried to find out which of the financial ratios have the highest priority in term loan decisions. The result of a survey of loan officers of 100 largest banks is shown in Exhibit 22.2.¹

Banks are concerned about the credit risk of not only individual transactions but also of the entire loan portfolio. Credit risk is the risk of loss due to the default by a borrower or counter-party in meeting his/her obligations. This default could be due to inability, incapacity or unwillingness to honor commitments in relation to lending, trading, hedging, settlement and other financial transactions. This default gives rise to low quality assets which in turn leads to credit risk. Credit risk is monitored intensively at transactional level and extensively at a portfolio level by any bank.

Exhibit 22.2 Financial ratios as perceived by loan officers

Financial ratios ranked in terms of importance (0–9)	
<i>Financial ratio</i>	<i>Average rating across respondents</i>
1. Debt/equity	8.71
2. Current ratio	8.25
3. Cash flow/current maturities of debt	8.08
4. Fixed charge coverage	7.58
5. Net profit margin after tax	7.56
6. Net interest earned	7.50
7. Degree of financial leverage	7.33
8. Inventory turnover (days)	7.25
9. Accounts receivable turnover	7.08

Credit risk can be broadly divided into two types:

1. Default Risk (This includes Probability of Default and Actual Default)

The main risk for a banker, it becomes evident, is when the counter-party misses a due-installment/interest, breaks a financial covenant, or enters into a legal procedure. Some of the important types, for a bank, under this category could be:

- a) *Direct Lending Risk*. This is the risk that actual customer obligations will not be repaid on time. It occurs in products ranging from advances/overdrafts to bill discounting, and exists for the entire life of the transaction.
- b) *Contingent Lending Risk*. This is the risk that potential customer obligations will become actual obligations and will not be repaid on time. It occurs in products like L/C and guarantees, and also exists for the entire life of the transaction.

2. Recovery Risk

Some of the types of this category of risk are:

- a) *Sovereign Risk*. Risk dependent on a country's current financial standing vis-à-vis foreign exchange controls, economy, political stability and focuses across the ability of the country to repay its obligations.

¹ Foster, George (1986). *Financial Statement Analysis* (2nd Ed.), Prentice-Hall, Englewood Cliffs.

b) *Collateral Risk*. The risk of the collateral offered as security to a transaction eroding in value, or being un-cashable.

Qualitative Assessment

While evaluating a credit proposal, the bank should assess not only the ability of the client to pay back the loan, but also its willingness to repay. This refers to an analysis of the “Five ‘C’s of Credit”:

1. **Character:** The willingness of the customer to honor his obligations. It reflects integrity and moral attributes that are very important considerations for credit managers.
2. **Capacity:** The ability of the customer to meet credit obligations from the operating cash flows.
3. **Capital structure:** The financial reserves of the customer. If the customer has difficulty in meeting his credit obligations from its operating cash flow, the focus shifts to its capital.
4. **Collateral:** The security offered by the customer in the form of pledged assets.
5. **Coverage** refers to business insurance or ‘key man’ insurance that is often required when management ability is concentrated in a few individuals. In the event of the death or disability of a key manager, such coverage ensures that the bank will be repaid if the business cannot meet its obligations.

Credit risk management is difficult due to a variety of available methods, degree of sophistication and element of subjectivity involved in some areas. Many banks adopt credit scoring/rating which is essentially a default risk analysis or assessing the creditworthiness of the borrower for the purpose of granting/rejecting his credit proposal and fixing interest rate based on rating. Under this process each type of risk is again divided under few key parameters, and each parameter is assigned scores as per their degree of presence or absence over a scale.

These parameters are illustrative and not exhaustive. However, to make the process simple and practicable at the field level, many banks have devised credit scoring/risk rating on selected parameters. Further, all the parameters are not truly objective. Some of them are subjective. Accordingly, in order to instil objectivity in the assessment, all the parameters need to be quantified against a benchmark or a scale (say 0–4 or 0–5) depending on pre-defined range of variation from the benchmark or degree of attributes. The output of the credit-appraisal process, specifically the financial ratios, is directly compared with the specified benchmarks for a particular risk category. In these cases, the risk rating is fairly standardised and credit rating model allocates a grade or a numeric value for the overall risk profile of the proposed exposure. For instance, assume a scale from ‘1’ to ‘5’, with ‘1’ representing extremely low financial risk. The credit rating model may specify that for the risk-rating exercise:

If the gross revenues are between Rs 800 to Rs 1,000 crore	Assign a score of	2
If the operating margin is 20 percent or more	Assign a score of	2
If ROCE is 25 percent or more	Assign a score of	1
If the debt/equity is between 0.60 and 0.80	Assign a score of	2
If the interest cover is 3.50 or more	Assign a score of	1

The next step would be to assign weightage to each parameter of risk. Higher weightages may be placed on size (as measured by gross revenues), profitability of operations (operating margins), financial leverage (debt equity) and debt-servicing ability (interest cover). Assume that the rating assigns 25 percent weightage to each of these two parameters—gross revenues and the operating margin; 20 percent weightage to financial leverage and debt servicing ability; and 10 percent weightage to ROCE. The weighted-average

score for the financial risk of the proposed exposure is 1.70, which would correspond with the low risk/high safety level-category of the model (category 1–2). Similarly, the business and the management risk of the proposed exposure are assessed and an overall risk rating is assigned.

In case of some parameters where no benchmark is available like profit margin, etc., time series analysis may reveal a trend and accordingly score may be assigned. Aggregate credit-rating score signifying credit-worthiness of risk rating score reveals degree of risk in the unit and helps the bank in the following aspects:

- a) To assess the borrower's credit risk.
- b) To make distinction between good and bad borrowers.
- c) To take a decision whether to lend or not on the basis of cut-off score.
- d) To fix the interest rates, margin requirement, collateral security and also to prescribe the non-monetary terms in sanction.

The credit-scoring sheet used by a major private sector bank is given in Appendix 1. Overall risk can be measured on a 10-point scale (as shown later in the book).

Credit approval is done through a multi-tier credit approving system. Credit committees, formed for different quantum of exposures, approve the loan proposals. The head of corporate risk management or his nominee is necessarily a member of this committee. The committee members base credit approval only on a unanimous decision. Each committee is delegated specific powers for sanction of credit limits, within set guidelines, under a scheme of delegation of powers. In respect of high risk and delinquent assets, lower levels have no powers to sanction credit limits. Powers exercised by each committee is subject to reporting to the next level.

STRUCTURING THE CREDIT FACILITY AND LOAN AGREEMENT

Once the creditworthiness is ascertained and the bank decides to lend, the bank and the borrower structure a suitable credit facility. The loan agreement contains the following sections:

- Amount and maturity of the loan
- Purpose of loan
- Sources of repayment
- Rate of interest
- Bank fees
- Loan covenants
- Security requirements and collateral guarantees
- Events of default
- Use of ancillary bank products.

Amount

The first section of a standard loan agreement describes how much and when the borrower may borrow, the interest provisions, repayment terms, fees and the intended use of the proceeds and any security taken by the bank.

Working capital requirements of a borrower are assessed in two stages:

<i>Grade</i>	<i>Degree of safety with regard to servicing debt obligations</i>	<i>Comments</i>
Grade I	Very high	The fundamentally strong debt servicing capacity of such companies is most unlikely to be adversely affected by changes in circumstances
Grade II	High	Adverse business conditions are unlikely to affect debt servicing capacity. Such companies differ in safety from those in Grade I only marginally
Grade III	Adequate	Changes in circumstances are more likely to affect debt servicing capacity than for higher grades
Grade IV	Average	Debt servicing capacity could weaken in view of changing circumstances
Grade V	Below average	While such companies are less susceptible to default than those in lower grades, uncertainties faced by them could adversely affect debt servicing capacities
Grade VI	Inadequate	Uncertainties faced by the issuer could lead to inadequate capacity to make timely debt repayments
Grade VII	Low	Debt servicing capacity is highly vulnerable to adverse changes in circumstances
Grade VIII	High Risk	Adverse business or economic conditions are likely to lend to lack of ability or willingness to service debt obligations
Grade IX	Substantial Risk	Timely payment of debt would continue only if favorable circumstances continue
Grade X	Default	Debt servicing capacity is in default and returns from this may be realized only on reorganization or liquidation

Stage I: Fixing of Yearly Sanctioned Limits

At this stage, assessment of the working capital is made for the entire year and MPBF is sanctioned based on the projected financials of the entity for that year. The limits sanctioned during this process are called 'Sanctioned Limits'. This limit is also called as the 'MPBF'. This assessment for a borrower is made at the beginning of the year. The borrower's requirement for working capital credit should not exceed the sanctioned limit at any point during the year.

Stage II: Fixing of Operating Limits

To ensure that borrowers are provided need-based credit, borrowers are required to submit to the bank quarterly information system reports at the end of each quarter in the prescribed formats (monthly in case of some industries). These reports highlight the actual financial figures for the last quarter (quarter to which they relate to). Based on these reports, the operating/drawing power limits are defined for the borrower for the next quarter. This means that operating limits can vary across different quarters. However, the operating limit can never exceed the sanctioned limit for the year.

The MPBF or the sanctioned limit should first be bifurcated into 'cash credit component' and 'loan component'. Where the operating limits are less than the MPBF, and hence the outstanding is less than the

MPBF, it must be ensured that outstanding in cash credit limit does not exceed 60 percent of the MPBF. Any excess outstanding above 60 percent will have to be brought under 'loan component'.

Period of Loan

This component of the working capital credit limit is based on the appraisal and the cash flow projections. Considering the need for smooth availability of bank credit for working capital purposes, the period of the short-term loan for working capital purposes is kept not less than one year. However, for seasonal industries, the minimum period is six months. The bank is free to decide the maximum period for the short-term loan for working capital purposes.

Security/Collateral

Banks are free to decide the nature, type, margin and quantum of security to be obtained from borrowers. Where commodities are covered by the directives issued by the RBI under the Selective Credit Control Policy, banks must observe the regulatory framework as prescribed. However, banks are required to limit their unsecured advances and guarantees in such a manner that 20 percent of the bank's outstanding unsecured guarantees plus the total of its outstanding unsecured advances should not exceed 15 percent of its total outstanding advances.

Mortgages are also given as security for the loans apart from hypothecation of stock and personal guarantees.

The time frame for arriving at a decision on a credit proposal does not normally exceed 3 months. All loan applications for small-scale units are dealt with and disposed of within 8 to 9 weeks of application.

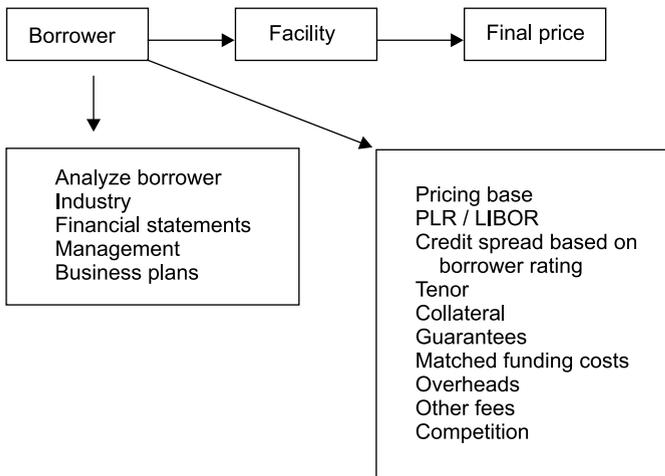
Loan Pricing

When a bank decides to extend lending support on the basis of risk/credit score, the next step should be to set risk-based loan pricing, i.e., interest rates on the basis of basic principle of risk-return trade-off. After liberalization, banks in India have been permitted to structure interest rates in this line, for advances above Rs 2 lac.

In acquiring assets, banks should use the pricing mechanism in conjunction with product/geography/industry/tenor limits. For example, if a bank believes that construction loans for suburban malls are unattractive from a portfolio perspective, it can raise the price of these loans to a level that will act as a disincentive to borrowers and an incentive to the lender, i.e., the bank. This is an instance of *marginal cost pricing*—the notion that the price of an asset should compensate the institution for its marginal cost as measured on a risk-adjusted basis. The more a product increases a lender's portfolio concentration, the higher its marginal cost to that lender. Marginal cost pricing may not always work. A bank may have idle capacity—a cost base and capital that has not been deployed. While such an institution clearly would not invest in a negative spread, it would probably view even a small positive spread as worthwhile as long as the added risk was acceptable.

Institutions tend to book unattractively priced loans when they are unable to allocate their cost base with clarity or to make fine differentiations of their risks. If a bank cannot allocate its costs, then it will make no distinction between the cost of lending to borrowers that require little analysis and the cost of lending to borrowers that require a considerable amount of review and follow-up.

Traditional pricing for credit risk has followed the cost-plus-profit approach (as illustrated here). A *cost-plus profit pricing strategy* will work in the short run, but in the long run borrowers will balk and start looking for alternatives. Cost-plus profit pricing will also work when a bank has some flexibility to compete such as on an array of other services rather than exclusively on price.



The base rate, i.e., the rate available to the prime borrowers having zero/negligible risk is prime lending rate (PLR) and as the risk becomes higher a risk premium is added to the PLR to determine the rate applicable for the unit.

$$\text{Interest rate chargeable} = \text{PLR} + \text{Risk premium}$$

The higher the aggregate credit score, the better is the creditworthiness and lesser is the risk. Accordingly, interest rate becomes higher with decline in score. The scoring is reviewed with each annual review of the account.

The interest rate charged on the loan takes into account a number of factors like operating costs, profitability targets, credit risks and the competitive environment. This rate is the PLR. At the time of writing the PLR is 14.50 percent. Banks also charge a processing fee of 0.5 percent of the sanctioned limit. The range of rates charged by a well-known private sector bank (at the time of writing) is presented here:

<i>Tenor</i>	<i>Rate of interest (percent)</i>
STPLR – up to 180 days	11.50 percent
WCPLR – for tenors > 180 days up to 1 year	13.75 percent
LTPLR – for tenors exceeding 1 year	14.50 percent

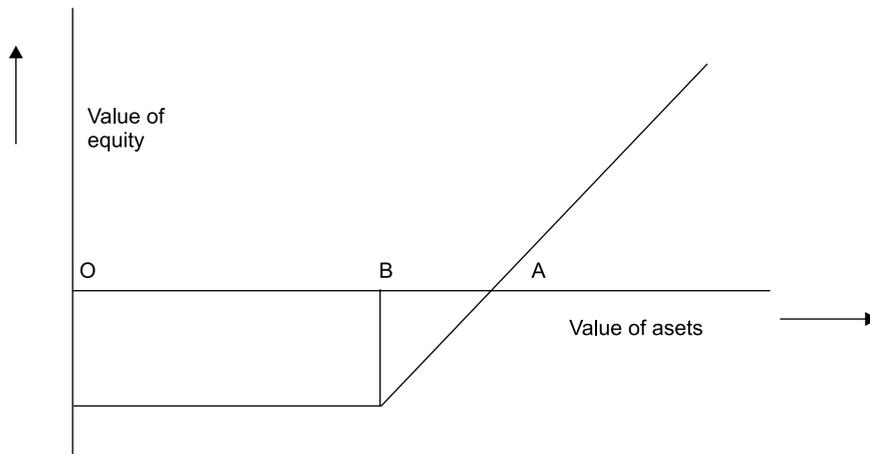
As mentioned earlier,

$$\text{Interest rate charged by the bank} = \text{PLR} + \text{Risk premium}$$

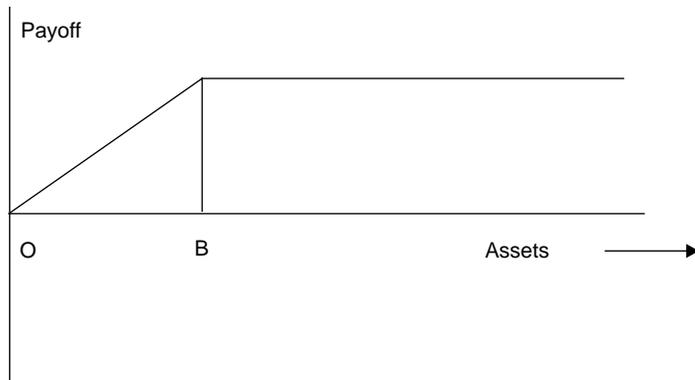
The prime lending rate (PLR) is the rate given to the best customer of the bank. It is defined as such because it is virtually risk free. It covers the cost of funds and transaction costs of the bank. The risk premium is therefore the spread of the bank and is directly proportional to the creditworthiness of the corporate client and also the uncertainty attached to the future cash flows of the company. This uncertainty relates mainly to the amount of cash inflows and the timing of the cash flows. In such uncertain situations, the bank can arrive at the probability of repayment/default and also the extent of recovery in case of a default. While the probabilities can be assessed from the past data, the recovery rate can be computed by considering the guarantees and value of collateral attached to the loan.

Thus the pricing is based on the borrower's risk rating, tenor, collateral, guarantees, etc. A capital charge is applied based on a hurdle rate and a capital ratio. The historic loan loss rate used for each of the risk-rating categories is used to calculate the expected loss allowance to be built into the price. Other inputs are the capital ratio and the required rate of return on capital. Using these assumptions, the rate to be charged for a loan to a customer with a given rating could be calculated. This relatively simple approach to credit pricing works well as long as the assumptions are correct, especially those about the borrower's credit quality.

Shareholders, as residual claimants, are entitled to profits left over after meeting interest and principal payments. Thus, from the shareholders perspective, equity can be viewed as a call option on the value of the company's assets.² If the value of the assets is more than the amount to be repaid to lenders at the end of the year, they get to keep residual profits; whereas if the value of assets falls short of the amount owed, they hand over the company to the lenders and walk away. The downside is limited because of the limited liability faced by shareholders. Their payoff is shown here:



Thus, as long as the value of assets is more than OB, they get to retain profits. Similarly, the lenders position can be thought of as writing a put option on the firm's assets.



² The option has more value when the firm is highly leveraged than when it is moderately leveraged because the probability of default is low.

If the value of assets is greater than OB, the bank gets its payment, otherwise the firm's shareholders default. The bank's return is fixed whereas it can lose its entire investment.

Prof Merton in a seminal paper³ noted the equivalence between lending and writing a put option on the firm's assets. Just as option on stocks can be valued using the five variables that enter into the Black-Scholes model (S , X , r , t , and σ), the value of a risky loan can be found using five similar parameters, A , B , r , t and σ_A (where A = market value of firm's assets, σ_A = volatility of the market value of a firm's assets, and B = market value of debt).

Given these five parameters, it is possible to solve for the value of default option and the observed interest spread between a firm's risky bonds and a matched risk-free treasury rate.⁴

The relationship between the yield on risky debt and risk-free rate (on debt) of equivalent maturity is given by:

$$k(\tau) - i = (-1/\tau) \ln[N(h_2) + (1/d) N(h_1)]$$

where

$k(\tau)$ = the required yield on risky debt,

i = risk free rate on debt of equivalent maturity,

τ = length of time remaining to maturity,

d = firm's leverage ratio as Be^{-rt}/A ,

$N(h)$ = a value computed from standard normal tables (it reflects the probability that a deviation exceeding the calculated value of h will occur),

$h_1 = - [1/2 \sigma^2 \tau - \ln(d)]/\sigma\sqrt{\tau}$, and

$h_2 = - [1/2 \sigma^2 \tau + \ln(d)]/\sigma\sqrt{\tau}$.

Bankers often calculate risk-adjusted return on capital (RAROC) and compare it with a hurdle rate, such as return on equity or WACC, while pricing individual loans.⁵ It incorporates risk and funding sources and translates it into required returns pricing of assets. The ratio is based either on the size of the asset or the size of the capital allocated to it. When an institution observes asset prices directly (infers risk from observable asset prices), then it can determine how much capital to hold based on the volatility of the asset. This is the essence of the mark-to-market concept. If the return from the asset is less, relative to the capital held, the bank will not acquire it. If the asset is already in the bank's portfolio, it may be sold off. Bankers Trust introduced risk-adjusted return on capital (RAROC) in the late 1970s. It is based on a mark-to-market concept. As defined by Bankers Trust, RAROC allocates a capital charge to a transaction or a line of business at an amount equal to the maximum expected loss (at 99 percent confidence level) over one year on an after-tax basis. RAROC is a powerful risk measurement tool that assists banks and financial institutions both in measuring solvency and evaluating performance of different business activities. The RAROC process estimates the asset value that may prevail in the worst-case scenario and then equates the capital cushion to be provided for potential loss.

³ Merton, R C (1974). 'On the Pricing of Corporate Debt: The Risk Structure of Interest Rates', *Journal of Finance*, June.

⁴ Interested readers may refer to Saunders, Anthony and Linda Allen (1990). *Credit Risk Measurement: New Approaches to Value at Risk and Other Paradigms*, John Wiley & Sons, Inc., New York.

⁵ A useful article on the topic is Zaik, Edward, John Walter, Gabriela Kelling, and Christopher James (1996). 'RAROC at Bank of America: From Theory to Practice', *Journal of Applied Corporate Finance*, Vol. 9, No. 2.

$$\text{RAROC} = \frac{\text{Adjusted income}}{\text{Capital at risk}}$$

where

adjusted income = Spread + Fees – Expected loss – Operating costs,

Spread = Loan rate – bank's cost of funds,

Capital at risk = $-D_L \times L \times (\Delta R/1 + R_L)$,

D = Duration of the loan,

L = Loan amount, and

$(\Delta R/1 + R_L)$ = Expected discounted change in the credit premium.

A loan is value adding if $\text{RAROC} > \text{ROE}$.

Establishing the maximum expected loss in each product line and linking the capital to this loss makes it possible to compare products of different risk levels, by stating the risk side of the risk-reward equation in a consistent manner. Performance measures like ROA and ROE do not consider the different sources of risk or capital requirements of different activities of a bank.

RAROC is an improvement over the traditional approach in that it allows one to compare two businesses with different risk (volatility of returns) profiles. Using a hurdle rate, a lender can also use the RAROC principle to set the target pricing on a relationship or a transaction. Although not all assets have market price distribution, RAROC is a first step toward examining an institution's entire balance sheet on a mark-to-market basis—if only to understand the risk-return trade-offs that have been made.

Covenants of the Borrower

Since the borrower can expropriate wealth from the lending bank, the borrower's behavior is contained by loan covenants that are heavily negotiated between the borrower and the bank. Covenants set minimum standards for a borrower's future conduct. There are two types of covenants: Positive and negative.

Positive covenants are requirements made on the borrower to do certain acts. Negative covenants are those that do not force the borrower to perform certain acts but require him to ensure certain things and restricts him from doing certain acts. They are designed to protect the lender from the dissipation of assets, to protect his security and to an extent preserve the financial strength of the borrower. If credit risk is high covenants may be directly tied to detailed financial projections provided by the borrower. If credit risk is low, a few general financial benchmarks may be sufficient. Exhibit 22.3 presents a sample list of covenants.

The bank has a right to recall working capital credit facility including short-term loan(s) for working capital purposes, if the performance of a borrowing unit is not satisfactory, or where a borrowing unit is found to have used the amount for purposes other than for which the short-term loan is sanctioned, or for any other reasons considered necessary.

LOAN SYNDICATION

In case of consortium, member-banks will have to share the 'cash credit component' and the 'loan component' on a pro-rata basis (individual share of MPBF in a consortium).

Exhibit 22.3 Loan covenants

<i>Affirmative covenants that include promises that the borrower will:</i>	<i>Negative covenants stipulate promises that the borrower will not:</i>
Submit annual, audited financial statements	Permit debt-equity ratio to exceed specified maximum
Submit periodic un-audited, interim financial statements	Permit the interest coverage ratio to be less than the minimum
Submit periodic certificates signed by an officer of the company stating whether the company is in compliance with the loan agreement	Permit additional borrowings
	Permit the current ratio to fall below a specified minimum
	Permit net working capital to fall below a specified minimum
	Pledge its assets to another creditor, merge with or acquire another company or sell its assets

In case of multiple banking and/or syndication, each bank must restrict sanction of 'cash credit component' to a maximum of 40 percent of its share of the MPBF. For this purpose, the banks should evolve an arrangement for sharing of information about the borrowing unit periodically.

Where the facility is sanctioned by more than one consortium, either voluntary or obligatory, or through syndication, the reporting is done by the lead bank/lead manager, as the case may be. The lead bank will be responsible for the preparation of appraisal note, its circulation, and arrangement for convening meetings, documentation, etc. The lead bank is vested with the responsibility of arranging for sanction and disbursal of credit, monitoring of the borrower's account and advising shares of member-banks in monthly/quarterly operative limits. The lead bank in a consortium will also be responsible for submitting prescribed data/information to the RBI on behalf of the consortium (syndicate). For various services rendered, the lead bank can charge a suitable fee per annum, to be borne by the borrower.

There is no ceiling on the number of banks that can participate in a consortium (whether in obligatory or voluntary consortium). With a purpose to ensure meaningful participation, the share of a member bank should be a minimum of 5 percent of the fund-based credit limits or Rs 1 crore, whichever is more. However, ceiling on bank's exposure should not exceed 25 percent of the bank's capital funds in the case of individual borrowers and 50 percent in the case of group of borrowers.

It is open to a borrower to choose his bank for obtaining credit facilities as also for the bank to take a credit decision on the borrower. However, once a consortium (obligatory or voluntary) is formed, the entry of a new member into a consortium should be in consultation with other member banks.

An existing member bank can withdraw from the consortium only after two years of its joining. This is subject to the condition that other existing member banks or a new bank is willing to take its share by joining the consortium. In cases where the other existing member banks or a new bank are unwilling to take over the entire outstanding of a withdrawing member, such bank may be permitted to leave the consortium by selling its debt at a discount and/or furnishing an unconditional undertaking that the repayment of its dues would be deferred till the dues of other members are repaid in full.

ARE BANK LOANS UNIQUE?

As pointed out in the chapter on financing choices, academic studies in America have recorded neutral to negative responses to almost all kinds of security offerings: private placement of debt, straight public debt, preferred stock, convertible debt, convertible preferred and common stock. Announcements by public firms of new bank lending agreements, in contrast, elicit, on average, a significantly positive reaction from the

stock market.⁶ This stark difference between the market reaction to announcement of bank loans and public securities raises the question, ‘What is different about banks?’ One plausible explanation for the neutral to negative reaction to sale of debt or common stock is the information asymmetry between the company’s management and investors. Since bank loans can be considered ‘inside debt’, the information asymmetry problem is resolved. In other words, since banks have an advantage in gathering information when compared to outside investors and because they actively monitor the conduct of the borrower, they are better able to price a loan. Further, banks have an incentive to monitor the borrower because they have their money at stake and take the initiative in resolving financial distress. This is a positive signal to *other* investors in the company. The stock price reaction to announcements of corporate borrowing is presented in Exhibit 22.4.

Exhibit 22.4 Stock price response to announcements of corporate borrowing

<i>Type of borrowing arrangement</i>	<i>Two-day abnormal returns (Sample sizes placed within brackets)</i>	
Bank loan agreement	1.93 percent	(80)
Private placement of debt	–91 percent	(37)
Public straight debt	–11 percent	(90)

Source: Christopher James (1987).

IN CONCLUSION

Bank credit is among the cheapest sources of finance to an entrepreneur. But getting it is not easy. Bankers are conservative because they operate on thin margins. If a banker is readily willing to lend, it is said, you probably don’t need money! Just as bankers evaluate your business it is important for you to evaluate your banker. More specifically, it is important to assess his risk-taking appetite. Some banks are more conservative than the rest. As the relationship develops, educate him on your business, your needs, and trends in your industry and encourage periodic visits. A good relationship with a bank would prove valuable to carry out business without interruptions arising out of shortage of funds.

APPENDIX 1: CREDIT GRADING SHEET

Credit Grading Sheet

There are two groups of parameters:

Group V: Veto Score Parameters consist of **Financials & Business** and must secure minimum score of **21**. (Minimum score for Financials is 12 and minimum score for Business is 9.) Proposals without these minimum scores are not considered.

Group N: Normal Score Parameters consist of **General, Management & Account**. No minimum veto score is stipulated.

Name of the Account: _____ **Branch:** _____

CG Branch: _____ **CG (Corp. Office):** _____

Legend: B – Branch Score C – Corp. Office Score

Negative Veto Score: proposals with -ve score in credit rating, profitability, liquidity, & integrity are rejected.

⁶ James, Christopher (1987). ‘Some Evidence on the Uniqueness of Bank Loans’, *Journal of Financial Economics*, Vol. 19.

I. GENERAL		B	C			B	C
1) Ownership/Constitution:				2) Credit Rating by Rating Agencies			
a) Limited & Listed		2	2	a) "AAA" and "AA" category		3	3
b) Limit - Unlisted		1	1	b) "A" category		2	2
c) Private Ltd. - closely held Ltd. Co.		0	0	c) "BBB" category/not rated		0	0
d) Partnership/Proprietorship		-1	-1	d) Speculative Grade #		-2	-2
3) Age of Business:				4) Priority Sector:			
a) Well established - over 10 years		6	6	a) Export under Priority		5	5
b) New but well established - 5-10 years		4	4	b) Domestic under Priority		3	3
c) Recently established - 3-5 years		2	2	c) Domestic		2	2
d) New, experienced promoters, synergies with existing business		1	1	d) Export & others		0	0
e) New project, no group support		-3	-3				
II. BUSINESS							
1) Market Position				2) Buyer Profile:			
a) Diverse product range and markets, strong brands, low competition, one of the strongest players or single/double, enjoys the 1st or 2nd market share, products enjoy premium in the market, would not be affected by growing competition.		5	5	a) Large number of buyers for whom this product/service input is critical. Increasingly wide product applicability. Buyer has fewer options of suppliers. Imports not competitive, buy back arrangements. Large captive consumption.		4	4
b) Same as above but a medium to large size player, has a national brand, even if a strongest player now, could stand to lose with increasing competition.		4	4	b) There are quite a few suppliers. Players are increasingly going for backward integration. Week buyback arrangements/captive use.		2	2
c) Medium size player, has a strong regional presence, no specific brand strength, but is a strong competition in the market place. Well positioned to take advantage to growing market. Even if a strong player now, could be adversely affected by competition.		3	3	c) Sales seasonal, offtake dependent on government spending. Product substitutes available and gaining acceptance.		-2	-2
d) Medium to small size player, has an average regional presence, can show consistent growth in medium term, even if a strong player now, could be badly affected by increasing competition.		2	2				
e) Small & marginal player, can grow to become a regional player, no brand strength, etc.		1	1				
f) Weak player, would get marginalised soon.		0	0				
3) Growth Plans, Capex, Diversification:				4) Mix of Business:			
a) Company's business standing is high. Company is cash rich, can approach capital markets successfully, can well sustain a unsynergistic diversification also, and improve its overall position.		4	4	a) Net forex earner		2	2
b) Company is an average player, can fund the diversification with low overall risk, going for synergistic diversification.		2	2	b) Large exports but exports are less than imports		1	1
c) Company is an average player, going for synergistic diversification.		1	1	c) Purely domestic presence/only imports		0	0

Table contd.

Table contd.

d) Any player going for unsynergistic diversification	0	0	6) Raw Material Dynamics:		
5) Technology:			a) Raw material easily available, multiple sources, flexibility to import, good credit periods available.	2	2
a) State-of-the-art technology, has strong technology oriented principals, spends large amounts on own R&D.	3	3	b) Single source/poor RM quality in India, imports possible but costly. Avg. to good manufacturing facilities.	1	1
b) Stable technology, overall impact of change in technology marginal, company can adopt to changing technology.	1	1	c) No major advantage or disadvantage in RM dynamics and average manufacturing facilities.	0	0
c) Outdated technology, technological obsolescence is frequent.	-1	-1	d) High dependence on single source/ high imports.	-2	-2
7) Manufacturing Facilities:					
a) Well laid out and clean mfg. area. Ample space available for expansion at same location.	2	2			
b) Average to good mfg. facilities. Space available for expansion.	1	1			
c) Average manufacturing facilities.	0	0			
d) Congested and poorly kept manufacturing area.	-2	-2			
III. FINANCIALS			2) Liquidity:		
1) Profitability:			a) Positive GCFO during last 3 years	5	5
a) Steadily growing with stable profitability record during last 3 years.	8	8	b) Liquidity strong with minor variations during last 3 years.	3	3
b) Steady growth with some fluctuations in profitability. Company is fundamentally strong and profitable.	6	6	c) Acceptable liquidity with +ve GCFO during last year. +ve GCFO expected to continue during the next one year.	1	1
c) Recently established, with inconclusive profit/track record operations so far have been profitable.	4	4	d) Liquidity acceptable - marginally negative GCFO. Company supporting liquidity through external term borrowings.	0	0
d) Company has suffered setback in t/o profitability in the last 1-2 years, but is expected to turn up.	0	0	e) Negative GCFO. Company supporting liquidity with short-term borrowings.	-2	-2
e) Losses. No hope except in medium term #	-5	-5	f) Company illiquid - default situation/ diverts funds to group or other ventures.#	-4	-4
3) Inventory Turnover:			4) Debtors Period:		
a) More than 4	2	2	a) Below 60 days	4	4
b) 2-4	0	0	b) 60-120 days	3	3
c) Below 2	-1	-1	c) 120-180 days	1	1
5) Current Ratio:			d) 180 days and above	-1	-1
a) 1.30 and above	3	3	6) Gearing:		
b) 1.00 to 1.30	1	1	a) TOL/NW less than 2	3	3
c) 0.75 to 1.00	0	0	b) TOL/NW between 2-3	2	2
d) Below 0.75 and more than 2.00	-2	-2	c) TOL/NW between 3-4	0	0
7) Interest coverage:			d) TOL/NW more than 4	-1	-1
PBDIT/Int. & financial charges			8) NCA to Debt		
DSCR in case of Term Loans			(Net Cash Accruals to Term Debt)		
a) More than 3	3	3	a) More than 0.33	2	2

Table contd.

Table contd.

b) More than 2 and less than 3	2	2	b) 0.20 to 0.33	1	1
c) Less than 2	0	0	c) Less than 0.20	0	0
V. MANAGEMENT					
1) Competence:					
a) Highly qualified professionals working as a team. Clarity in goals and strategies and has capability of implementing the strategies, achieving the goals. Have implemented projects in time. There is a good degree of delegation.	10	10	2) Integrity:		
b) Professionals in key areas under overall control of owners, who function independently. Delegation levels are low.	7	7	a) Management has maintained high standards of integrity and professionalism. Integrity and character is beyond reproach.	4	4
c) Company is now inducting professionals in key areas which were hitherto looked after directly by the promoters. Decision making highly centralised.	4	4	b) Apparently no adverse reason to doubt the integrity of the promoters. The management is reportedly reliable and of good integrity.	3	3
d) No long-term vision and low on technical capabilities.	-3	-3	c) Management is of acceptable integrity.	1	1
3) Succession:					
a) Succession is well planned, second line of management is strong and qualified.	1	1	d) Management is of dubious integrity. Proven reports which point to malpractices in business. #	-10	-10
b) Succession is not an issue currently.	0	0			
c) Group of promoters, succession could become an issue in medium term.	-2	-2			
V. ACCOUNT					
1) Limit:					
a) More than Rs 2.00 crore	1	1	2) Trade Reports:		
b) Less than Rs 2.00 crore	0	0	a) Good market/trade reports	3	3
3) Collateral:					
a) Available for 100 percent/more than 100 percent	4	4	b) No adverse trade reports	1	1
b) Available for 50-75 percent	2	2	c) Report of cautionary nature.	-3	-3
c) Available for pari-passu with other banks	1	1	4) Documentation:		
d) No collateral.	-2	-2	a) Completed to satisfaction before release	2	2
5) Business Prospects:					
a) Good MT/LT prospects of association in form of cross selling of products, group business/new project.	2	2	b) Completed within 6 months of release/New account	0	0
b) Influential promoters new and liability business possible.	1	1	c) Irregularities	-2	-2
c) Association to grow with usual growth.	0	0	6) Finance Information:		
7) Conduct of account:					
a) No irregularities for more than 6 months	3	3	a) Information is up to date. QIS, etc. submitted timely	2	2
b) New account	0	0	b) Information asked for is given.	0	0
c) Devolvments/Dishonor of TODs/ Excess drawings, etc.	-3	-3	c) Difficulty in obtaining information	-2	-2

Score

Parameters	Group-V		Group-N			Total
	Business	Financials	General	Management	Account	
Minimum score	9	12	—	—	—	21
Maximum score	22	30	16	15	17	100
Score : Branch						
: Corporate Office						

Credit Grade Guide

Score	Credit grade
Above 80	A2
71–80	A3
61–70	A4
51–60	A5
41–50	A6
Below 41	A7

APPENDIX 2: OTHER SOURCES OF WORKING CAPITAL FINANCE

Commercial Paper

Commercial papers are short-term usance promissory notes with a fixed maturity period issued by financial or non-financial companies with a high credit rating. The instrument was introduced in the Indian money market in 1989. RBI guidelines relating to issuance of CP are discussed as follows:

- The tangible net worth of the company as per the latest audited balance sheet should not be less than Rs 4 crore.
- Working capital (fund based) limit of the company should not be less than Rs 4 crore.
- The company should obtain the specified minimum credit rating for issuance of CP, from either CRISIL or CARE or ICRA or Duff & Phelps Credit Rating India (DCR). The minimum rating should be P-2 in the case of CRISIL, A-2 in the case of ICRA, PR-2 in the case of CAR and D-2 in the case of DCR India. The rating should not be more than 2 months old at the time of issuance of CP.
- The company should have a minimum current ratio of 1.33 based on the classification of CA & CL as per the prevailing RBI guidelines.
- The CP can be issued for maturities of 30 days up to 1 year.
- There is no grace period for the payment of CP. If the maturity date is a holiday, the company should make payment on the immediate preceding working day.
- The commercial paper may be issued in multiples of Rs 5 lac, but the amount to be invested by any single investor shall not be less than Rs 25 lac (face value), provided that the secondary market transactions may be for amounts of Rs 5 lac or multiples thereof.
- The aggregate amount to be raised by issuance of CP should not exceed the working capital limit sanctioned by bank/banks.

- The commercial paper should be issued at a discount to face value. The discount is the yield and is determined by the issuing company.
- Commercial paper can be issued to any person including individuals, banking companies and other corporate bodies registered or incorporated in India and un-incorporated bodies. CP cannot be issued to NRIs except on a non-repatriation basis.
- The issuing company should submit the proposal (to issue CPs) to the bank along with the certificate issued by the credit rating agency and thereafter make arrangements for privately placing the issue and ensure that the issue is complete within 2 weeks.
- The working capital (fund based) limit of the issuing company shall be correspondingly reduced by the bank once the CP is issued. In other words, the CP will be carved out of the working capital limit of the company with the concerned bank/s.
- The CP issue shall not be underwritten or co-accepted in any manner.
- On maturity of CP, the holder of CP shall present the instrument for payment to the issuing company.

The format of CP specified by RBI is shown in Exhibit 22.A1 and some of the recent issues by larger companies and their rating is shown in Exhibit 22.A2

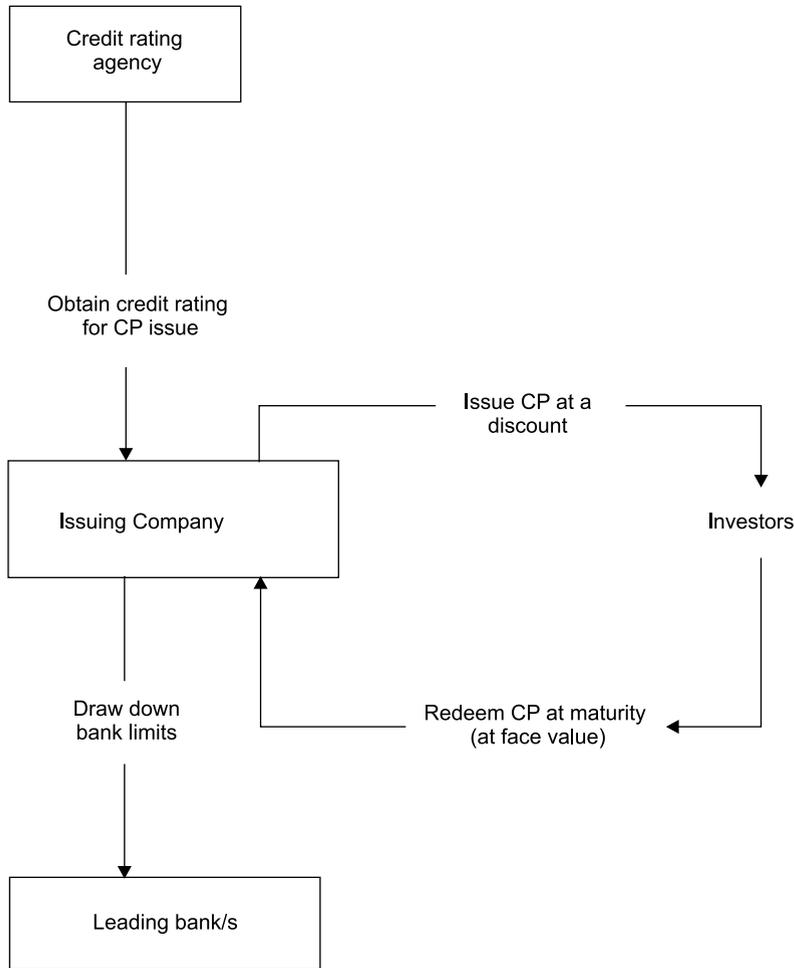
Exhibit 22.A1 Format of a commercial paper

NAME OF THE ISSUING COMPANY	
SERIAL No.	
Issued at: (PLACE) _____	Date of issue: _____ Date of maturity _____
without days of grace. (If such date happens to fall on a holiday, payment shall be made on the immediate preceding working day)	
For value received _____	hereby
(NAME OF THE ISSUING COMPANY)	
promises to pay _____	or order on
(NAME OF THE INVESTOR)	
the maturity date as specified above the sum of Rs. _____ (in words) upon presentation and surrender of this Commercial Paper at _____	
(NAME OF THE ISSUING AND PAYING AGENT)	
For and on behalf of _____	
(NAME OF THE ISSUING COMPANY)	
	Authorised Signatory

Exhibit 22.A2 Recent CP issues

<i>Company</i>	<i>Amount (Rs million)</i>	<i>Rating</i>
Hindalco Industries	500	P1+
ICI India	1,000	P1+
IPCL	9,000	P1+
Lafarge India	1,000	P1+
Mirza Tanners	1,000	P1

Steps in issuing Commercial Paper



The cost of issuing commercial paper can be calculated as :

$$\text{Cost of CP} = \frac{\text{Face value} - \text{Net amount realised}}{\text{Net amount realised}} \times \frac{360}{\text{Maturity period}}$$

The advantages of issuing commercial paper are its lower cost, and flexible maturity. Further, the borrower does not provide a charge on the asset.

Euro Commercial Paper

Euro Commercial Paper (ECP) is a short-term, unsecured promissory note issued by corporations and banks. It is issued and placed outside the jurisdiction of the currency of denomination. Thus, a dollar denominated

CP issued by a US company outside the US is a ECP. The ECP market is generally accessed by highly rated borrowers like multinationals, sovereign governments, FIs, etc. The traditional investors in ECP are: fund managers, insurance companies, banks, central banks and corporates. The ECP issue is handled by an intermediary called dealer who oversees the delivery of notes and payment of proceeds of the issue. The issuing and paying agency functions are performed also by the intermediary, often a commercial bank. The ECP is priced with reference to a benchmark index, often the LIBOR. Like a CP, the ECP is issued at a discount. ECPs are traded on a discount basis:

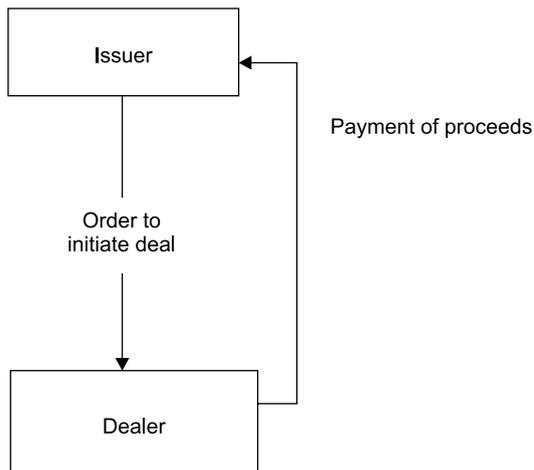
$$\text{i.e., ECP price} = 100 - \text{Discount rate} \times \frac{\text{Actual days}}{360}$$

To illustrate, if the discount rate is 8 percent and number of days to maturity is 60,

$$\begin{aligned} \text{ERP price} &= 100 - 8 \left[\frac{60}{360} \right] \\ &= 100 - 1.33 \\ &= 98.66 \end{aligned}$$

Currently, the ECB guidelines allow corporates to raise up to \$3 million for working capital purposes, subject to a ceiling and minimum maturity specification of 3 years. Once the rupee becomes fully convertible, companies can tap overseas money markets to raise working capital finance for shorter durations based on the cost differential between domestic and overseas markets.

The CP transaction is as shown:



- The issuer appoints a dealer to oversee the issue process.
- The dealer oversees the delivery of notes and payment of proceeds to the issuer.
- Issuing and paying agency functions are often performed by a commercial bank which is actually responsible for receipt and payment of funds. The I & P agent's responsibilities also extend to the handling of notes.

Factoring

Factoring involves a continuing arrangement between the company and a financial institution, called factor, to assume the credit and collection functions of the company. The factor purchases the client's receivables as and when they arise, maintains the sales ledger, attends to other bookkeeping duties relating to accounts receivable and performs other auxiliary functions.

Types of Factoring

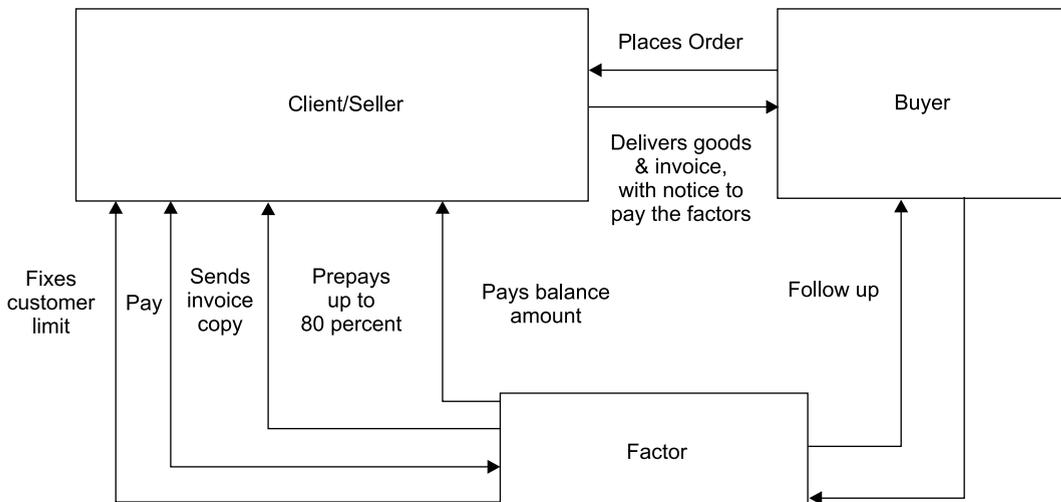
There are six types of factoring:

1. Full factoring
2. Recourse factoring
3. Maturity factoring
4. Advance factoring
5. Undisclosed factoring
6. Invoice discounting

In non-recourse factoring, the factor has no recourse to the client in the event of default by the customer. The factor assumes credit risk, but normally the factor retains recourse to client except in certain cases like the customer going bankrupt. Non-recourse factoring is also called full factoring. In under-advance factoring arrangement the factor provides an advance against the uncollected and non-due receivables to the firm.

A factoring arrangement that only provides assistance with regard to collections or insurance against bad debts is called maturity factoring. In under-confidential factoring, the customer is not informed of the factoring arrangement. The firm may collect dues from the customer on its own or instruct to remit once at some other address.

Mechanism



- c) The company should provide for repayments in its balance sheet 11 months before the maturity date.
 d) The company's financial health should be disclosed in the notice inviting public deposits.

The advantages and disadvantages of public deposits are:

<i>Advantages</i>	<i>Disadvantages</i>
* Simple procedure	Limitation in volume
* No restrictive covenants	Shorter maturities
* Unsecured borrowings	
* Fair post-tax cost	

The rates on fixed deposit programmes of manufacturing companies in the recent years is as shown:

<i>Company interest rate (percent)</i>					<i>Frequency of payment</i>	<i>Minimum amount (Rs)</i>
<i>Tenor</i>	→	<i>1</i>	<i>2</i>	<i>3</i>		
Ashok Leyland		12.5	13	14	q	5,000
Asian Paints		9.5	10.5	12.5	q	5,000
Carborandum Univ.		—	12.5	13	q	10,000
EID Parry		11	12	13	q	5,000
Escorts		13	14	15	q	5,000
India Cements		13	14	15	q	5,000
L & T		9.5	10.5	11.5	q	3,000
Nagarjuna Fertilisers		—	13	13.5	m, q	5,000

Chapter 23

A Case Study: Bermuda Airways¹

OBJECTIVES

- ◆ Introduction to the air transport industry in India.
- ◆ Application of credit grading of a borrower in a real-life setting.

Bermuda Air Ltd., India's largest, most professional general sales agency organization established since 1974, represents more than 19 international airlines for their passenger and freight business along with its associate companies. Headquartered in Mumbai, it has more than 45 offices spread across the country.

Bermuda is a general sales agent (GSA) for 17 different international airlines and Jet Airways for domestic services. A few of the airlines have the restriction of giving GSA status to the companies if they are general sales agents of other airlines too. To overcome this, companies in the trade, float a new entity to get general sales agency of such airlines. The group companies, which are in the same lines of business, are:

<i>Name of the company</i>	<i>Activity</i>
Deutsch Air Limited	GSA for Air France
India Travel Service	GSA for American Airlines, Kuwait Airways
Multinational Cargo Carriers	GSA for Kuwait Airways Cargo, Mumbai

For the reasons as explained, Bermuda Ltd. has these group companies. Bermuda Investments Pvt. Ltd. is the other group company, which makes investments for the group.

Broad performance indicators for the other companies of the group are:

Deutsch Air Limited is one of the four group companies in the same lines of business. Incorporated in 1985, Deutsch had a turnover of Rs 204.29 lac in 1998–99 with a profit of Rs 11.36 lac.

India Travel Service is also in the same line of business. It is a partnership company constituted in 1991 and is a GSA for Kuwait Airways and American Airlines. On a turnover of Rs 606.48 lac for the year 1998–99, the company reported a loss of Rs 62.67 lac and had a negative net worth of Rs 39.67 lac. Presented here is a summary of financials of India Travel Service:

¹ The name has been changed/disguised for the sake of confidentiality, but the numbers are real.

Brief financials*(Rs lac)*

	<i>Audited 1999–2000</i>	<i>Audited 1998–99</i>	<i>Audited 1997–98</i>
Partner's capital a/c	0.05	0.05	0.05
Partner's current a/c	(69.05)	(39.72)	40.80
Unsecured loans	2.21	2.21	17.21
Current liabilities	3,883.5	2,865.71	2,910.57
Fixed assets	141.91	159.89	171.24
Investments	9.87	9.87	9.87
Sundry debtors	2,128.99	1,712.86	1,662.22
Cash & bank b/s	869.74	600.22	654.77
Loans & advances	649.50	338.7	469.8
Total income	635.27	715.83	614.90
Staff cost	475.77	512.89	363.59
Finance charges	18.92	13.67	10.90
Admin & other exp.	146.48	226.63	181.18
Profit/loss before tax	(27.68)	(62.67)	34.96

Current liabilities constitute the payment to be made to the airlines. Sundry debtors are the receivables from the travel agents, which is secured by way of IATA rules by way of bank guarantee.

Multinational Cargo Carriers Ltd.

Incorporated in 1974, the company is a GSA for Kuwait Airways Cargo and has made a loss of Rs 77.94 lac on a net GSA commission of Rs 58.92 lac for the year 1998–99. The company made a profit after tax of Rs 19.42 lac on a net GSA commission of Rs 55.40 lac during the year 1999–2000. Presented here is a summary of financial details of the company:

Brief financials*(Rs lac)*

	<i>Audited 1999–2000</i>	<i>Audited 1998–99</i>
Capital	1.00	1.00
Unsecured loans	362.81	367.37
Current liabilities	406.42	382.8
Fixed assets	19.74	25.71
Investments	2.51	2.51
Sundry debtors	174.45	135.63
Cash & bank B/s	511.19	500.50
Loans & advances	42.02	48.10
Total income	111.72	102.97
Staff cost	57.81	56.92
Finance charges	14.41	17.43
Admin & other exp.	12.51	98.72
Profit /loss before tax	21.02	(77.94)

Apart from the three group companies mentioned earlier, Bermuda's business diversification includes inbound and outbound tours through Bermuda Tours Ltd. Inbound Tours, headquartered in New Delhi have been winning annual awards and acclaim for performance and service in the tourism field, both locally and at international levels in the premier tourism events like World Travel Mart (WTM), London, International Tourisms Bourse (ITB), Berlin and other tourism meets worldwide.

As part of their expansion program, Bermuda Tours set up their Outbound Tours division on October 1, 1996 and, since then, this division has emerged as highly professional and consumer-oriented, building on

the synergy of Bermuda which operates 170 daily services to 34 destinations in India. Bermuda Airways provides significant support to Bermuda's passenger and freight volumes for the international airlines they represent. Bermuda's annual turnover currently exceeds Rs 2,100 crore—it is generally expected that this figure would double in the next five years.

From the group companies, the three that are in the same line of business but are the GSAs of different airlines, are loss making mostly due to higher allocation of manpower cost, administration and selling expenses that are not in correct proportion.

The shareholding pattern of Bermuda Airways is as shown:

<i>Name</i>	<i>No. of shares</i>	<i>Holding (percent)</i>
Mrs Deepali Singh	1	0.007
Mr Amit Banerji	900	50.59
Mr Sumeet Banerji	460	6.69
Multinational Cargo Carriers Ltd.	2,510	16.80
Mr Samipendra Banerji	50	0.33
Mrs Mamta Banerji	10	0.07
Deutsch Air Ltd.	2,500	16.73
Bermuda Investments Pvt. Ltd.	1,310	8.77
Total	14,940	

Activities of the Company

The company is a general sales agent (GSA) of 12 international airlines since 1974. As a general sales agent, the company performs the following functions:

- Sales, marketing and reservations
- Revenue accounting functions including:
- Physical distribution of ticket stocks on specified territories
- Entire revenue accounting (Sales reports, pax and cargo)
- Receipts and follow-up of cash/checks on fortnightly basis and reporting defaults to the airlines
- Accounting functions
- Remittance of collections to the airlines at periodical intervals.

The company also represents the domestic airline Jet Airways. Commission from passenger and freight business from the airlines is the main line of business. The company earns 3 percent commission from ticket sales. The company has been in the business of GSA for the past 25 years. It is operating in a professional manner with periodic appraisal of the performance within a mutually agreed financial framework between the company and airlines.

Airline Requirements

To effectively carry out the business the company as a GSA is expected to provide the following:

1. Necessary office space for distribution of tickets and attend to customer/travel agents.
2. Necessary trained employees at different territories, including managers, so as to bring in more business for the airlines.

3. Necessary infrastructure facilities such as banking operations and trained accounts personnel to collect and remit money to a centralized place.
4. Accounting of all the sales and remit the proceeds to the airlines as per the agreement.
5. To make the payments on behalf of the airlines for fuel expenses, payment to Airports Authority for using the facility, maintenance expenses, etc., by collecting the billings from IATA agents.

Marketing and Sales Arrangement for the Company

Bermuda has offices across the country linked through e-mail. Their offices are located at Ahmedabad, Agra, Amritsar, Vadodara, Bangalore, Bhub, Kolkata, Kozhikode, Chandigarh, Kochi, Coimbatore, New Delhi, Mumbai, Faridabad, Goa, Gurgaon, Hosur, Hyderabad, Indore, Jaipur, Jalandhar, Jammu, Jodhpur, Kanpur, Lucknow, Ludhiana, Chennai, Madurai, Mangalore, Moradabad, Nagpur, Noida, Pune, Rajkot, Salem, Secunderabad, Surat, Tellicherry, Trichy, Trissur, Thiruvananthapuram, Tuticorin, Udaipur, Varansai, and Vellore.

There are marketing heads for the main airline as stated earlier. The company has over 1,800 employees across India, to carry out the sales, accounting and other functions so as to do the job of GSA.

The company has operations all over India through 52 offices in disbursed locations.

INDUSTRY REVIEW AND COMPETITION

The industry is controlled by large players with considerable experience in the field. Some international airlines require a separate company to be formed to handle their business. The industry is controlled by large players with considerable experience in the field. In this case, Bermuda Limited has formed India Travel Service to handle American Airlines, Kuwait Airways and Multinational Cargo Carriers to handle the business of Kuwait Airways Cargo, Deutsch Air, and Air France.

List of Competitors

<i>Airline</i>	<i>South India</i>	<i>North India</i>	<i>Gujarat</i>	<i>Pune</i>
British Airways	Nijhavan Travels	Nijhavan	Nijhavan	DKI Travel Services
Lufthansa	Hansa Aviation Pvt. Ltd.	Bird Travels	Nexus Travels	
Delta Airlines	Aviation Travels	Samveg Travels	Samveg Travels	Samveg Travels
Singapore	Aviation Travels		Samveg Travels	Global Excellence
KLM	Spencer & Co.	World Airways		World Airways

Billing and Settlement Plan (BSP)

This is a revolutionary billing system introduced recently in India by IATA. BSP was first launched in 1971 in Japan; currently there are over 30 plans operating all over the world. Under this plan a Neutral Standard Traffic Document (passenger ticket and MDP) are issued to cover a 4-month period for the agents use on behalf of all participating airlines. A single payment made to BSP clearing bank for further credit to member airlines is made using the electronic data processing centers. Hence duplication of effort is saved and a strict control on agents can also be exercised. This system is being used by 30 airlines and about 1,500 agents

across the country. TAFI, TAIA (Travel Agents Association) gives a pool bank guarantee to cover eventuality of default by its members. In this scenario, as the travel agents payment goes to the airline through BSP, the routing through a GSA is not required. Hence there is no BG requirement by the airlines from the GSA. As more airlines join BSP the BG requirements of GSAs to airlines would diminish. However as the airlines are dependent on the GSA for marketing and sales their business is not likely to be affected by BSP. Presented here is the financial performance of Bermuda Airways:

	(Rs lac)			
	<i>Audited</i> 1996–97	<i>Audited</i> 1997–98	<i>Audited</i> 1998–99	<i>Audited</i> 1999–2000
Profitability				
GSA commission (Net)	4,312.04	5,615.60	7,106.45	8,163.83
Total income	4,717.59	6,045.37	7,562.05	8,880.69
Manpower cost	1,678.05	1,906.27	2,688.07	3,205.95
Admin and selling expenses	2,206.08	2,978.02	4,168.80	4,583.17
Financial expenses	113.74	140.22	69.90	56.13
Depreciation	249.48	284.60	319.52	331.02
Profit before tax	470.24	736.26	315.76	704.42
Provision for tax	170	260.00	150.00	270
Profit after tax	300.24	476.26	165.76	434.42
Cash profit retention	549.72	760.86	485.28	765.44
Liquidity				
Inventories	Nil	Nil	Nil	Nil
Debtors	8,413.14	7,199.61	8,616.91	10,063.13
Cash & bank balances	806.28	1,414.95	3,260.33	3,668.06
Loans & advances	1,109.88	1,378.73	1,888.83	2,251.54
Total current assets	10,340.36	9,999.32	13,773.91	16,028.35
Sundry creditors	10,590.94	11,024.4	15,145.22	12,441.83
Bank borrowing	0.0	0.0	0.0	1,655.98
Others	1,336.87	1,066.03	1,585.5	2,513.02
Total current liabilities	11,927.81	12,090.43	16,730.72	16,905.54
Net working capital	-1,587.45	-2,091.11	-2,956.81	-1,703.52
Current ratio	0.87	0.83	0.82	0.90
Quick ratio	0.87	0.83	0.82	0.90
Gearing				
Capital	14.94	14.94	14.94	298.80
Reserves & surplus excluding revaluation	653.48	1,121.52	1,219.99	1,356.03
Net worth	668.42	1,136.46	1,234.93	1,654.83
Total outside liabilities	14,343.02	12,123.47	16,730.72	17,551.14
TOL/NW	21.46	10.67	13.55	10.61
Term liabilities	0.0	0.0	0.0	0.0
Gross block	3,913.92	4,264.96	4,731.60	4,844.59
Net block	3,079.35	3,169.04	3,333.21	3,151.49
Investments in-group co.	1,458.90	50.37	731.65	370.68
Efficiency Ratios				
Business growth (percent)	21.39	29.95	27.54	18.17
Financial expenses/Income (percent)	2.62	2.48	0.97	0.66
Financial expenses cover times	7.33	8.28	10.09	19.45
Cash/profit margin (percent)	12.65	13.47	6.74	8.99
PAT/commission (percent)	6.91	8.43	2.30	5.10

The company does not have term liability in its books. Neither does it have any term borrowings by way of NCDs, preference shares, etc.

Details of Working Capital Borrowing

GSA business allows the company to enjoy large floats and hence does not have any funds based needs. Bermuda Air Ltd. has a cash credit facility of Rs 500 lac with Export Bank. The account is in credit balance as on 13-09-2000. The company at times takes OD facility against the deposits with the banks.

Suppose the company has deposits in your bank, the details of which are as shown:

<i>Amount of deposit</i>	<i>Maturity date</i>	<i>Period of deposit</i>
300,000	12-05-01	13 months, 1 day
750,000	05-08-01	14 months
13,000,000	07-10-00	15 days
30,053,299	24-12-00	6 months, 1 day
15,000,000	15-01-01	6 months, 1 day
4,950,000	12-04-01	8 months, 25 days
33,000	07-11-01	15 months
270,000	26-08-01	12 months, 1 day
2,700,000	25-10-01	14 months
600,000	25-10-01	14 months
75,000	30-08-01	11 months, 30 days
330,000	30-08-01	11 months, 30 days
61,600,000	04-10-00	15 days

A part of the total deposits kept is towards the margin for the bank guarantee: deducting this, the core deposit contribution from the company is Rs 447.53 lac.

Details of Value of Receivables

The group has been submitting statement of book debts every month, the details of which are as follows:

<i>Name of company</i>	<i>(Rs lac)</i>		
	<i>Amount</i>		
	<i>April</i>	<i>May</i>	<i>June</i>
Bermuda Air Ltd.	6,423.64	8,187.03	7,207.68
India Travel Service	1,829.95	3,471.38	1,442.29
MCC	170.45	158.80	149.00
TOTAL	8,424.05	11,817.23	8,798.99

The receivables are less than 45 days old. Assuming a 40 percent margin on receivables, the drawing power of the group will be comfortably placed at a minimum of almost Rs 40 crore. Projections for the year 2000–2001 are presented here:

<i>Particulars</i>	<i>(Rs lac)</i>		
	<i>Bermuda</i>	<i>ITS</i>	<i>MCC</i>
GSA comm.			
PAX	5,951.43	470.68	—
CGO	805.14	51.66	71.30
Counter commission	1,470.00	4.51	
Other income	142.58	89.34	
Total income	8,369.15	628.30	86.97
Expenses			
Staff cost	1,695.72	264.37	64.07
Administrative expenses	4,845.82	385.42	15.76
Depreciation	267.79	13.24	3.20
Cash profit/loss	1,029.52	(110.83)	1.42
Net profit/loss	904.32	(34.73)	3.94
Performance during Apr–June 2000		(Unaudited)	
PAX (Including counter commission)		Rs 19.63 crore	
Cargo		Rs 2.07 crore	
Total		Rs 21.70 crore	

The payment mechanism in GSA business being skewed in the company's favor, wherein the company enjoys good float funds for most of the time when, in fact, the company does not require the fund-based facility on a regular basis. Bermuda Air will be requiring the cash credit facility to meet contingencies like making payments for airlines on due dates, payments to employees and advances for capital expenditure, etc., when funds get locked in various branches due to holidays or if there is some delay on the part of the agent to make payment. Presently the company has a cash credit facility of Rs 500 lac from another bank, which will be cleared and shifted to your bank if you sanction the facility.

The company has approached you for a cash credit facility of Rs 10 crore for the entire group. The company places deposits with you on a regular basis and depending on cash flows sometimes overdraws against this deposit. This OD is normally charged at PLR. The company gets OD from other banks at a rate of 1 percent over and above the rate they get on the respective deposits. So they have requested for a blanket rate of 1 percent over and above the deposit rate for OD against fixed deposits. Would you as a banker approve the loan request? More specifically:

1. Is the company profitable? Liquid?
2. How risky is the proposed facility?
3. What is your assessment of the company and industry? What do you think of the financial forecast?
4. Prepare a credit-grading sheet.
5. How would you price the facility? Would you accept the company's request?

Chapter 24

Debt Markets

OBJECTIVES

- ◆ Introduction to the domestic debt market.
- ◆ Introduction to types of fixed income instruments.
- ◆ Fixed income valuation.
- ◆ Introduction to steps involved in issuing debt.
- ◆ Recent theoretical developments in estimating credit risk of debt instruments.

Capital markets comprise of equity markets and debt markets. Debt markets are for issuance and trading of fixed income securities like bonds. Fixed income securities can be issued by the central and state governments, companies, and financial institutions. The Indian debt market is one of the largest in Asia with approximately Rs 700,000 crore worth of debt instruments outstanding. Exhibit 24.1 presents a table of issuers, investors and instruments.

Exhibit 24.1 Participants in the debt market

<i>Issuer</i>	<i>Instrument</i>	<i>Maturity</i>	<i>Investors</i>
Central government	Dated securities	2–20 years	RBI, banks, mutual funds insurance companies.
Central government	T-Bills	14/91/182/364 days	RBI, banks, mutual funds, insurance companies
PSUs	Bonds/structured obligations	5–10 years	RBI, banks, mutual funds insurance companies
Corporates	Debentures	1–12 years	RBI, banks, mutual funds insurance companies
Corporates	Commercial paper	3 months–1 year	Individuals
Banks	Certificates of deposits	3 months–1 year	Individuals

Source: National Stock Exchange.

Worldwide, the debt market is several times bigger than its equity equivalent. In the US, for example, the size of the debt market is valued at more than \$13 trillion¹ which, when compared to the \$6 trillion² size of

¹ www.bondmarket.com; also note that \$1 billion is Rs 4,600 crore and \$1 trillion is Rs 4,500,000 crore.

² www.nyse.com

its equity markets, can be deemed to be an extremely huge source of capital (Exhibit 24.2). This is the story worldwide, including the emerging economies of Asia, Latin America and Eastern Europe. Exhibit 24.3 shows that, in Asia itself (excluding Japan), corporate debt amounting to \$23.06 billion was raised in 2001. As can be seen, countries like Hong Kong and Singapore whose GDP's are far smaller than India's have capitalized on their debt markets in a better manner. The sheer size of this market can be understood from a recent statistic which evaluates the world's debt markets at more than \$35 trillion which even exceeds the sum of the GDP's of all the countries of the world! This has been made possible by efforts of the central banks in these countries to enhance retail participation in this branch of the financial market.

Exhibit 24.2 Growth of the US debt market

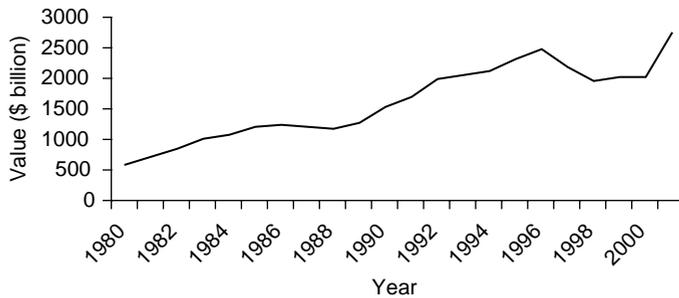
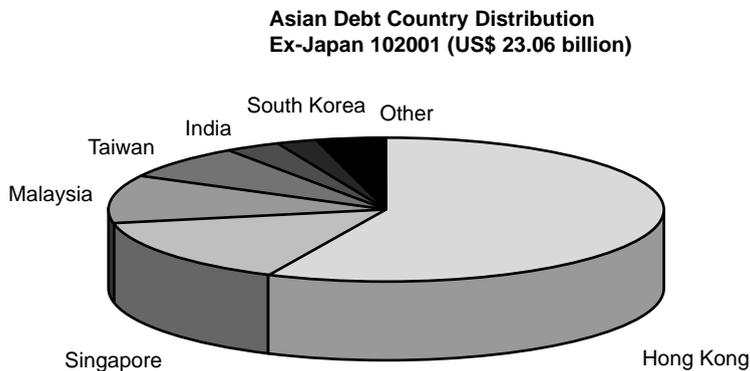


Exhibit 24.3 The Asian debt market



Other Countries in the list are Sri Lanka, Thailand, China, Indonesia, and the Philippines

DEBT MARKET IN INDIA

The debt market in India began to take shape in the mid-1990s, when RBI entered into the Ways and Means Agreement with the Government—thus ensuring that the government now would be able to borrow money for various stopgap measures to plug budgetary deficits only at market rates. This was one of the first steps taken by the central bank to dismantle the administered interest rate regime and hence laying the stepping-stones towards making this market attractive. Slowly and steadily, the market has grown with the addition of

innovative schemes and new players. As of now the size of the Indian debt market hovers around Rs 3 trillion³ and penetration also has increased from a network of six primary dealers to 18. Now banks have entered the fray and are using their immense reach across the length and breadth of the country to reach the investors in the hinterland.

There have been several reasons for RBI taking interest in developing the debt markets:

- The need to have a diversified financial market after the recent financial meltdown in South East Asia and more recently in Japan where overdependence on the banking sector for financing the economy has caused the collapse of the system.
- The immense size of this potential market as a huge source of funds for the infrastructure industry, which is of immense importance especially to a developing market like ours where various sectors like roads, housing, energy and telecom would require significantly large amounts of finances to the tune of over Rs 2 trillion⁴ and hence fuel the industrial and economic growth of India in the new millennium.
- To create options for the industry to choose their sources of funds and hence create competition amongst the markets. With the job of financial intermediation not monopolized by a single entity, it would ensure price transparency and efficient transactions.

While the equity markets have matured over the last couple of years with the setting up of the NSE and the ushering of online screen base stock trading, followed closely by the BSE with their launch of BOLT (BSE Online Trading), ensuring accessibility to investors in the remotest parts of the country, the debt market on the other hand is still in the throes of change. For a long time, the largest issuer of debt instruments has been the government. These instruments were limited in variety, offered low returns and were not tradable. However, since they were extremely secure, they found acceptance by risk-averse investors.

However now there was an increased participation of private players, who offered flexible instruments catering to various levels of risk aversion. Many types of securities were being dematerialized which made them tradable, and with the shift towards a free interest regime, market prices of these kinds of fixed interest instruments were bound to rise. Many of the bonds issued also had several tax saving options, which added to their attractiveness. During 1999–2000, the governments and companies raised a total of Rs 172,735 crore from the primary market. About 66 percent of these were raised by the government sector through public and private issues (Exhibit 24.4).

Exhibit 24.4 Resource mobilized from debt markets

(Rs crore)

<i>Issuer</i>	<i>1998–99</i>	<i>1999–2000</i>
Companies	46,155	59,399
Public issues	7,407	4,698
Private placement	38,748	54,701
Government	106,067	113,336
Total	152,222	172,735

Source: National Stock Exchange.

³ www.nse.org

⁴ www.nic.in

Regulation

RBI is the main regulator of the debt market in India. It does this while also facilitating the government's borrowing program. Till recently, the RBI also controlled the setting of interest rates. This has changed of late with the central bank taking steps towards establishing a free interest rate regime.

Another regulator in the debt markets is The Securities and Exchange Board of India (SEBI). It enforces rules and regulations to ensure that retail investors are well-informed about the various risks entailed in investing in various instruments and also oversees the operation of mutual funds in the country, which is fast emerging as a favored investment route for primary retail investors.

Over the last two years, India's G-Sec market had grown to become the largest financial market in the country. Trading volumes had nearly tripled from Rs 4.5 trillion during 2000–01 to nearly Rs 7 trillion⁵ in the first 7–8 months of 2002.

Among other changes, the retail debt markets saw some developments like increased competition among the issuing bodies, innovative products catering to various levels of risk-averse consumers, and improved and more professional risk management practices.

Some of the important changes sweeping the Indian retail scene are detailed here:

- Advances in trading technology.
- Development of market infrastructure.
- Liberalization of the financial system permitting increased participation (both local and foreign).
- Development of bond trading and portfolio management theories.
- Increased awareness among the investing populace about investing in the fixed income markets.
- Initiation of secondary market trading of privately placed issues.
- Innovations in products like STRIPS and securitized debt.

A debt instrument is a contract between the issuer and investor or holder that provides for periodic payments to the holder in exchange for money lent to the issuer. In other words, there is a creditor/debtor relationship between the investor and issuer. The issuer makes a promise to pay the holder interest periodically and repay principal at the end of a certain period of time. The issuer could be a body corporate or government. Corporate debt instruments are called debentures or bonds. There is no legal distinction between a debenture and a bond—except that the former can be either secured or unsecured whereas the latter is secured. We shall be using these terms interchangeably. The term bond is usually applied to public sector debt offerings.

A bond is a marketable debt instrument. The length of time before it matures is called term to maturity, usually greater than a year. Those with term to maturity of less than a year are called money market instruments and those with term greater than one year are called capital market instruments. The issuer generally pays a fixed rate of interest on the principal (face value). The rate of interest is called coupon rate and the amount itself is called coupon. The coupon can be annual or semi annual. To illustrate, IDBI (Industrial Development Bank of India) issued Regular Income Bond '98 in January 1998. The bond had the following features:

Term to maturity	=	5 years
Minimum investment	=	Rs 5,000

Interest could be paid either monthly @ 12.25 per annum or annually @ 13 percent per annum. In this case interest payable would be Rs 650 per annum ($13/100 \times 5000$) if the investment were to be Rs 5,000 and if the investor had chosen the second option. The interest rate payable (i.e., 13 percent per annum) is the coupon rate.

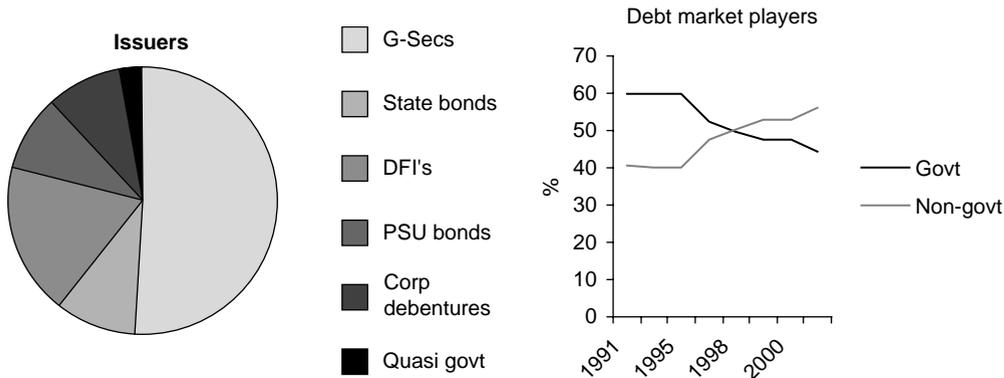
⁵ www.rbi.org

Exhibit 24.5 presents the composition on of total debt available for trading on the wholesale debt market segment of the National Stock Exchange.

Exhibit 24.5 Market composition (as on September 30, 2002)

Type of security	No. of securities	Issue size
Govt. bonds	113	508,361
State govt. bonds	522	625,539
Treasury bills	39	279,198
Financial institutions/ Bank bonds	392	291,931
Certificates of Deposits	8	1,500
Commercial paper	64	19,800
Corporate debt	253	155,230
Other debt	11	9,043
State enterprise bonds	434	387,332
Total	1836	6,853,334

Source: National Stock Exchange.



Fixed Income Innovation

Apart from plain vanilla bonds, few innovative instruments have emerged in recent years. Some of the innovative instruments are: Deep Discount bonds, capital indexed bonds, secured premium notes and dual currency bonds. A Deep Discount bond (zero coupon) is issued at 'deep discount' to the face-value of the instrument. The bond appreciates to its face-value till maturity. The investor does not receive any interest during the life of the instrument. The difference between the purchase price and the redemption price is the gain. The cash flows associated with a DDB is as shown:



IDBI issued a series of DDBs. The IDBI DDB '98 had the following features:

$$\begin{aligned}
 \text{Investment} &= \text{Rs } 12,750 \\
 \text{Maturity value} &= \text{Rs } 5 \text{ lac} \\
 \text{Term to maturity} &= 30 \text{ years} \\
 \text{YTM} &= (M/I)^{1/n} - 1 \\
 \text{YTM} &= [500000/12750]^{1/30} \\
 &= 0.13 = 13 \text{ percent}
 \end{aligned} \tag{1}$$

Investors had the option of redeeming the bond at the following amounts after the specified period:

<i>Amount</i>	<i>After</i>
23,500	5 years
43,000	10 years
79,000	15 years
145,000	20 years
2.7 lac	25 years
5 lac	30 years

Capital Indexed Bonds

The Government of India launched CIBs in December 1997. These are inflation-protected securities, designed to eliminate purchasing power risk. The bond is issued with an initial principal of Rs 100 and a real yield determined through the auction process. Over time, the principal adjusts according to changes in the price index (wholesale price index) from the time the bond is issued. As time passes, the redemption value increases in such a way as to keep its inflation adjusted value intact. Since both coupon and principal are inflation adjusted, the bond hedges the risk of rising inflation. To illustrate, suppose the government issues a 3 percent index linked bond of 1 year maturity linked to the WPI. If the face value is Rs 100 and if the WPI increases by 10 percent during the year, the government will pay Rs 110 towards the repayment of principal and Rs 3.30—as interest @ 3 percent on Rs 110. The investor receives a total of Rs 113.30. That is, the investor receives a real interest of 3 percent. The movement in yields of index-linked bonds is expected to provide valuable measures of expected inflation rate and the expected real interest rate, which improves the information efficiency of the market.

Secured Premium Note

A SPN is a debt security with a warrant attached to it. SPNs were first issued by Tata Iron and Steel Co. Ltd. (TISCO). Each SPN had a face value of Rs 300; no interest is paid during the first 3 years. Subsequently, the SPN will be redeemed in four equal annual instalments of Rs 75, each beginning from the fourth year. In addition, the company pays Rs 75 to the investor every year. The warrant gives the investor an option to buy 1 share at Rs 100. The right has to be exercised within 12–18 months of allotment.

Dual Currency Bonds

Dual currency bonds are bonds offered in one currency while the interest payments and redemption are made in another currency. The issuer offers to make interest and principal payments in some specified list of

currencies. The investor has the option to choose the currency. Dual currency bonds can be issued in India after the rupee becomes fully convertible on the capital account.

High Yield Bonds

Junk bonds are below investment grade debt (rated below BBB, by Standard & Poor's). Unrated debts are also classified as junk bonds. These include private placements and public issues, low rated municipal bonds and preferred stock. Companies issue high yield debt for various reasons like:

- They are growing rapidly and their ability to service the debt depends on increased cash flow.
- They have purposefully chosen a highly leveraged balance sheet.
- They do not have a track record because of which the rating agencies do not rate them.

Investors buy high yield bonds because of their high coupon and the up-side potential provided by warrants which typically come as attachments to high-yield bonds.

VALUATION OF BONDS

The price of an asset is the present value of the expected cash inflows from the asset. The cash inflows in case of a bond comprise of two components:

1. Fixed periodic interest payments payable on the face value of the bond (not market price) till maturity; and
2. Redemption value payable at maturity.

Interest is paid annually or semi-annually as mentioned earlier. Thus, a 15 percent coupon, 10-year bond with a face value of Rs 1,000 pays Rs 150 (15 percent of Rs 1,000) annually as interest. At the end of 10 years the bond is redeemed at the stated price (generally par). The cash flows from this bond are shown in Exhibit 24.6.

Exhibit 24.6 Cash flows associated with a bond

Year	(Cash outflow) (Rs)	Inflow in Rs
0	(1000)	→ PURCHASE PRICE
1	150] ANNUAL INTEREST PAYMENTS
2	150	
3	150	
4	150	
5	150	
6	150	
7	150	
8	150	
9	150	
10	150	
10	1000	→ REDEMPTION PRICE

Note that in year 0 (i.e., now) you pay Rs 1,000 to purchase the bond. Interest payments of Rs 150 are made every year for 10 years, and Rs 1,000 (face-value) is returned at the end of 10 years. The price of a

bond is the sum of present values of fixed interest payments and redemption value.
Thus,

$$P = \left[\frac{C}{(1+r)} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^n} \right] + \frac{M}{(1+r)^n}$$

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n} \quad (1)$$

where

P = market price (in Rs),

C = annual coupon payments (in Rs),

r = investor's required yield appropriate for the risk class of the investment,

t = time period in which payment is received, and

M = redemption price.

Note that interest payments are an annuity series whereas the redemption value is a single payment. Therefore,

$$P = C \times \text{PVIFA}(r \text{ percent}, n) + M \times \text{PVIF}(r \text{ percent}, n)$$

The cash flows in the above example are:

1. Rs 150 (coupon payments) for 10 years
2. Redemption value of Rs 1,000 at the end of 10 years

$$\text{Price of this bond, } P = \frac{150}{(1+r)^1} + \frac{150}{(1+r)^2} + \dots + \frac{150}{(1+r)^{10}} + \frac{1000}{(1+r)^{10}}$$

Let us suppose, the required yield is 15 percent,

$$\begin{aligned} P &= \frac{150}{(1+0.15)^1} + \frac{150}{(1+0.15)^2} + \dots + \frac{150}{(1+0.15)^{10}} + \frac{1000}{(1+0.15)^{10}} \\ &= \text{Rs } 150 \times \text{PVIFA}(15 \text{ percent}, 10) + 1000 \times \text{PVIF}(15 \text{ percent}, 10) \\ &= \text{Rs } 1000 \end{aligned}$$

The bond valuation model is based on three assumptions:

1. Coupon payments are fixed throughout the life of the bond.
2. The next coupon payment is due exactly one year from now.
3. Coupon payments are made annually.

The bond valuation model is to be modified if interest payments are made semi-annually. In the example of the 10-year bond, the investor would receive:

- a) Coupon payments of Rs.75 (150/2) every six months for 20 semi-annual periods (10 years).
- b) Redemption value of Rs.1,000 at the end of 20 semi-annual periods.

$$\text{Again, } P = \frac{C}{(1+r)^1} + \frac{C}{(1+r)^2} + \dots + \frac{C}{(1+r)^n} + \frac{M}{(1+r)^n}$$

$$P = \sum_{t=1}^n \frac{C}{(1+r)^t} + \frac{M}{(1+r)^n}$$

where

P = price (in Rs)

C = semi-annual coupon payments (annual coupon/2)

r = semi-annual required yield (annual yield/2)

n = number of semi-annual periods (no. of years \times 2)

M = Redemption value

An example is in order. Calculate the price of Rs 1,000 per value bond that is paying 14 percent interest over 10 years until it matures if the interest is payable (a) annually and (b) semi-annually. The required yield is 15 percent.

a) $C = (14/100) \times 1000 = \text{Rs } 140$

where

$n = 10$ years,

$M = \text{Rs } 1000$, and

$r = 15$ percent = 0.15.

$$P = \sum_{t=1}^{10} \frac{140}{(1+0.15)^t} + \frac{1000}{(1+0.15)^n}$$

$$= \text{Rs } [140 \times \text{PVIFA } (15 \text{ percent}, 10)] + [1000 \times \text{PVIF } (15 \text{ percent}, 10)]$$

$$= \text{Rs } 949.81$$

b) If the interest is paid semi-annually,

where

$C = (140/2) = \text{Rs } 70$,

$n = 20$ times periods,

$M = \text{Rs } 1000$, and

$r = 15/2 = 7.5$ percent = 0.075

$$P = \frac{70}{(1+0.075)} + \frac{70}{(1+0.075)^2} + \dots + \frac{70}{(1+0.075)^{20}} + \frac{1000}{(1+0.075)^{20}}$$

$$= \text{Rs } [70 \times \text{PVIFA } (7.5 \text{ percent}, 20)] + [1000 \times \text{PVIF } (7.5 \text{ percent}, 20)]$$

$$= \text{Rs } 948.80$$

If the required yield were to be 14 percent in the given example:

$$P = \frac{70}{(1+0.07)} + \dots + \frac{70}{(1+0.07)^{20}} + \frac{1000}{(1+0.07)^{20}}$$

$P = \text{Rs } 1000$

If the required yield were to be 13 percent:

$$P = [70 \times \text{PVIFA} (6.5 \text{ percent}, 20)] + [1000 \times \text{PVIF} (6.5 \text{ percent}, 20)] \\ = \text{Rs } 1054$$

Price, Coupon, and Yield Relationships

It is evident from the bond pricing model that when required yield (which is in the denominator) rises, bond price falls since they are inversely related. Conversely, a decrease in required yield will lead to increase in price holding coupon constant. Three important observations can be made from Exhibit 24.7, which shows the price of the 14 percent, 10-year bond for various required yields:

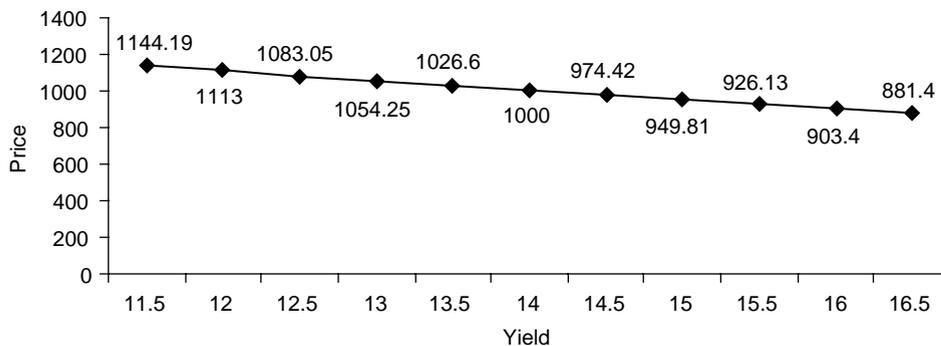
1. If the required yield is greater than the coupon rate, price of the bond is less than par value, i.e., if $r > c$, $P < F$. This bond is said to be selling at a discount to the face value. It is easy to see why this is so. If the investor's expected rate of return (or required yield), which is nothing but the prevailing market rates on comparable investments, is greater than the coupon rate promised by this bond, investors would sell this bond driving the price down until the bond offers the required yield.
2. If coupon rate = required yield, price = par value
3. If required yield < coupon rate, price > par value since this bond becomes comparatively attractive vis-à-vis other bonds in the market. So investors bid up the price.

Exhibit 24.7 The relationship between price and yield

Yield (percent)	vs	Price (Rs)
11.5		1,144.19
12		1,113.00
12.5		1,083.05
13		1,054.25
13.5		1,026.6
14		1,000.00
14.5		974.42
15		949.81
15.5		926.13
16		903.40
16.5		881.40

If we plot a graph of price versus yield, we see that it has a convex shape (Exhibit 24.8).

Exhibit 24.8 Graphical representation of the price–yield relationship



Yield to Maturity

The yield on an investment (in bonds) is the discount rate that equates the present value of cash flows and current market price: this is termed as yield to maturity. Recollecting from the bond pricing model:

$$P = \frac{C}{(1+Y)^1} + \frac{C}{(1+Y)^2} + \dots + \frac{C}{(1+Y)^n} + \frac{M}{(1+Y)^n}$$

Given market price (P), coupon (C), and redemption value, the interest rate Y could be found out.

Consider a bond with the following characteristics:

Face value	= Rs 1000
Current price	= Rs 950
Coupon rate	= 14 percent
Term to maturity	= 3 years

Coupon payments are made annually.

$$P = \sum_{t=1}^n \frac{C}{(1+Y)^t} + \frac{M}{(1+Y)^n}$$

$$950 = \frac{140}{(1+Y)} + \frac{140}{(1+Y)^2} + \dots + \frac{140}{(1+Y)^3} + \frac{1000}{(1+Y)^3}$$

The value of Y needs to be calculated by trial and error. Recollect one of the properties of the bond: If yield $>$ coupon rate, price is less than face value. Start with an interest rate greater than coupon rate since the market-price is less than face-value.

Try 15 percent

$$P = [140 \times \text{PVIFA} (15 \text{ percent}, 3)] + [1000 \times \text{PVIF} (15 \text{ percent}, 3)]$$

$$= (140 \times 2.283) + (1000 \times 0.658) = \text{Rs } 977.62.$$

This is higher than the current market price. So try a higher interest rate, say 16 percent

$$P = (140 \times 2.246) + (1000 \times 0.641) = \text{Rs } 955.4$$

Try a discount rate slightly higher than 16 percent so that present value of cash flows equal market price. The yield that equates current market price and present value of cash flows is called yield to maturity (YTM). The approximate YTM can be found using the formula:

$$YTM = \frac{C + [(F - P)/n]}{[(F + P)/2]}$$

where

C = coupon (in Rs),
 F = Face value,

P = Price of the bond, and
 n = remaining years to maturity.

For the above example, YTM works out to be:

$$\text{YTM} = \frac{140 + [(1000 - 950)/3]}{[(1000 + 900)/2]} = 16.4 \text{ percent}$$

YTM is the return expressed as a fraction of average investment. We have the coupon and average capital gain in the numerator and average price in the denominator.

To calculate YTM for a semi-annual coupon bond, first calculate the semi-annual interest rate that satisfies the following equation and multiply the semi-annual rate by 2 to arrive at annual YTM:

$$P = \frac{C}{(1+Y)^1} + \frac{C}{(1+Y)^2} + \dots + \frac{C}{(1+Y)^n} + \frac{M}{(1+Y)^n}$$

where

C = semi-annual coupon (Rs), and
 Y = semi-annual interest rate.

The current market-price of a 17.5 percent, Rs 2,500 (face-value) semi-annual coupon bond is Rs 2,833. The bond has 4 years to mature. The YTM is:

A. Calculate the semi-annual interest rate (Y) that satisfies

$$P = \frac{C}{(1+Y)^1} + \frac{C}{(1+Y)^2} + \dots + \frac{C}{(1+Y)^n} + \frac{M}{(1+Y)^n}$$

$$2833 = \frac{218.75}{(1+Y)^1} + \frac{218.75}{(1+Y)^2} + \dots + \frac{218.75}{(1+Y)^8} + \frac{2500}{(1+Y)^8}$$

Note that we have used semi-annual coupon payment of Rs 218.75 (i.e., 437.5/2).

Present values of cash flows, at various semi-annual rates, are:

<i>Semi-annual rate (percent)</i>	<i>Present value of cash flows</i>
6	$\sum_{t=1}^8 \frac{218.75}{(1.06)^t} + \frac{2500}{(1.06)^8} = \text{Rs.}2925.80$
6.5	$\sum_{t=1}^8 \frac{218.75}{(1.065)^t} + \frac{2500}{(1.065)^8} = \text{Rs.}2841.90$
7.0	$\sum_{t=1}^8 \frac{218.75}{(1.07)^t} + \frac{2500}{(1.07)^8} = \text{Rs.}2761.20$

The interest rate lies between 6.5 and 7 percent. The actual interest rate could be calculated by interpolation:

$$\begin{aligned}\text{Interest rate} &= 6.5 + (7 - 6.5) \left[\frac{2841.9 - 2833}{2841.9 - 2761.2} \right] \\ &= 6.56 \text{ percent.}\end{aligned}$$

Therefore,

$$\text{YTM} = 6.56 \times 2 = 13.12 \text{ percent on an annualized basis.}$$

Note that the correct way of arriving at an annual rate would be:

$$\text{Effective annual rate} = [(1 + \text{periodic rate})^m - 1]$$

Nominal vs Effective Yield

Some bonds pay annual coupon whereas some pay semi annual coupon. So it is necessary to consider the compounding effect in case of bonds that pay semi annual coupon. That is, the coupon received after the first six months can be reinvested for the next months. Consequently, the effective rate will be more than the nominal rate. Industrial Development Bank of India (IDBI) issued IDBI Regular Income Bond '98 in January 1998. The bond had the following features:

Maturity	= 5 years
Minimum investment	= Rs 5000; and in multiples of Rs 5000 thereafter.

The investor had the option of receiving interest payments either monthly @ 12.25 percent per annum or annually at 13 percent per annum.

Option 1

Effective yield = $[1 + (k/m)]^m$ when compounding is done 12 times a year

$$\begin{aligned}\text{Effective rate} &= [1 + (0.1225/12)]^{12} - 1 \\ &= 12.965 \text{ percent}\end{aligned}$$

An investment of Rs 5000 would grow to:

$$\begin{aligned}5000 \times [1 + (k/m)]^{m \times n} - 1 \\ = \text{Rs } 9195 \text{ in 5 years.}\end{aligned}$$

Option 2

Maturity value = Rs 5000 $(1 + 0.13)^5 = \text{Rs } 9212.00$

So, the second option is better.

STEPS INVOLVED IN ISSUING DEBT

The issuer's first step is to make an internal assessment of its financing needs and borrowing requirements. Companies may borrow for various reasons like rolling over existing debt, financing an expansion project or

a takeover, to repurchase stock, and to increase cash levels to deal with contingencies. The next step is to decide whether there are any assets and liabilities that need to be matched. In case of a currency mismatch one has to arrange for currency hedging (for example, through a currency swap).⁶ Once the preliminary analysis is ready the issuer seeks professional guidance from an investment banker. The lead manager guides the issuer through the in-depth negotiations with the rating agencies and the regulator's documentation requirements. The lead manager has the following responsibilities:

- Managing negotiations with the rating agencies
- Managing the due diligence process
- Overseeing documentation
- Putting together a syndicate, if required
- Organizing a road show
- Underwriting the transaction
- Pricing the issue
- Secondary market support.

The Role of Credit Rating Agencies

A credit rating measures the default risk of the company issuing the bond. Ratings are not buying or selling recommendations, but an indication of the issuer's ability to repay debt. They are meant to reflect the risks associated with future debt servicing capacity through business cycles. Ratings provide an objective benchmark to judge companies and their bond issues. Ratings are not mandatory in some countries like Singapore (in fact there is no agency in Singapore) and Hong Kong. Exhibit 24.9 presents a list of rating agencies in Asian countries (All rating agencies focus on several key issues like capital, asset quality, management quality, earnings and liquidity).

Exhibit 24.9 Rating agencies in Asia

Korea	Korea Investor Services National Information and Credit Evaluation Korea Management and Consulting Corp
Thailand	Thai Rating and Information Service
Taiwan	The Taiwanese Rating Agency
Indonesia	Pefindo Rating Agency
Malaysia	Rating Agency Malaysia Malaysian Rating Corp
India	CRISIL CARE ICRA

Source: Euromoney.

ESTIMATING RISK PREMIUM

The required yield (return) on a bond is the sum of a risk-free rate plus a default risk premium to account for the possibility of default on corporate bonds.

⁶ In a currency swap, two counterparties agree to exchange principal denominated in two currencies and service each other's interest payment obligation.

$$R = \text{Risk free rate} + \text{Premium}$$

$$\text{Premium} = \text{default risk premium} + \text{maturity premium} + \text{liquidity premium}$$

Corporate bonds are priced off treasuries. In other words, the yield on a 7-year corporate bond is set at a premium to a 7-year T-Bond. The difference between the two rates is the credit spread. The credit spread is a function of credit rating. For instance at any given point in time AAA rated might be trading at 70 bp (basis points) over treasuries whereas AA rated bonds may be trading at 100 bp.⁷

A bond is essentially a package of cash flows with six-month intervals. Note that we used the same discount rate to discount all cash flows to value a bond (the YTM). Intuitively we would expect different discount rates to be applied to different cash flows because of timing differences. That is, a six month discount rate for the first cash flow, a one year discount rate for the second cash flow, a one-and-a-half year discount rate for the third cash flow and so on. The modified bond valuation model looks like this:

$$P = \frac{C}{(1+Y)^1} + \frac{C}{(1+Y_2)^2} + \dots + \frac{C}{(1+Y_3)^n} + \frac{M}{(1+Y_4)^n}$$

In short, a bond is treated as a package of zero coupon bonds. To derive one-period discount rates we need to construct what is known as a spot yield curve. Recall that bonds are priced off treasuries. These spot rates are derived from treasury rates. Assume that there are five treasury instruments with the following characteristics:⁸

Maturity (years)	Coupon rate	YTM	Price
0.50	0.00	0.08	96.15
1.00	0.00	0.0830	92.19
1.50	0.0850	0.0890	99.45
2.00	0.0900	0.0920	99.64
2.50	0.11	0.0940	103.49
3.00	0.0950	0.0970	99.49

Note that the first two securities are zero coupon instruments. So the yield on these instruments itself is the spot rate. That is:

$$\text{6 month spot rate} = 8 \text{ percent (annualized)}$$

$$\text{1 year spot rate} = 8.3 \text{ percent}$$

With these spot rates, the 1.5 year spot rate can be calculated as follows:

$$99.45 = \frac{4.25}{(1+Y_1)^1} + \frac{4.25}{(1+Y_2)^2} + \frac{104.25}{(1+Y_3)^3}$$

where

$$Y_1 = 8 \text{ percent}/2 = 4 \text{ percent, and}$$

$$Y_2 = 8.3 \text{ percent}/2 = 4.15 \text{ percent.}$$

⁷ 100 basis points = 1 percent. Therefore 70 bp = 0.7 percent.

⁸ This is based on Fabozzi et al. (2002).

Note that both, coupon and yields are semi-annual. Y_3 can be solved given P , C , Y_1 and Y_2 (= 0.04465 or 4.465 percent). On an annualized basis this works out to 8.93 percent.

Similarly, the two-year spot rate may be calculated (9.247 percent). Any treasury bond can be valued using this set of spot rates.⁹ In order to price a corporate bond it is necessary to come up with credit risk premium. The premium is added to the each spot rate to estimate the present value of cash flows (Price).

$$P = \frac{C}{(1+Y_1+p)^1} + \frac{C}{(1+Y_2+p)^2} + \dots + \frac{C}{(1+Y_3+p)^n} + \frac{M}{(1+Y_4+p)^4}$$

where p is the credit risk premium.

Recollect that in the chapter on risk and return, in a recent study in the US, four factors largely explain the cross section of expected bond returns. Let us again summarize their findings here.

William Gebhardt et al (2001) find that both bond market factors like default risk beta and term risk beta and bond characteristics like bond rating and duration largely explain the variation in the cross section of bond returns. One source of risk for corporate bonds arises from unexpected changes in the term structure of interest rates. The other source of risk arises from changes in default risk in response to changing economic conditions. They take the difference between the monthly return on a portfolio of long-term government bonds and 1 month T-bill return as proxy for term risk and the difference between the monthly return on a value weighted market portfolio of all investment grade bonds with at least ten years to maturity and the monthly return on long-term government bonds as proxy for the default risk. To estimate default and term betas they run the following two-factor regression:

$$r_{it} - r_{ft} = \alpha + \beta_d \text{DEF}_t + \beta_t \text{TERM}_t + u_t$$

where

$$\begin{aligned} r_{it} - r_{ft} &= \text{excess return on corporate bonds,} \\ \text{DEF}_t \text{ and TERM}_t & \text{ are default risk and term risk factors, and} \\ \beta_d \text{ and } \beta_t & \text{ are factor loadings (beta) for the two risk factors.} \end{aligned}$$

Their model also captures firm specific default risk. They use bond ratings, Altman's Z score and duration¹⁰ to measure default risk and maturity risk. Credit risk refers to the chance that the expectation will not be met. One approach to estimating default risk is to compute a composite risk measure based on a firm's financial ratios advocated by Altman (1968). His Z-score model combines select financial ratios to come up with a score as follows:

$$\begin{aligned} Z &= 0.012 \times \text{Net working capital/Total assets} \\ &+ 0.014 \times \text{Retained Earnings/Total assets} \\ &+ 0.033 \times \text{EBIT/Total assets} \\ &+ 0.006 \times \text{Market value of equity/Book value of liabilities} \\ &+ 0.999 \times \text{Sales/Total assets} \end{aligned}$$

⁹ The term structure of interest rates in India can be found on the website of the National Stock Exchange: www.nseindia.com

¹⁰ Duration refers to the weighted average time to maturity of a bond in years. When (A modified version of) duration is multiplied by a change in yield we get approximate change in the bond price. In short, duration is a measure of bond price volatility.

A high Z score represents a low probability of default and a low Z score represents a high probability of default. The model's classification accuracy was 95 percent one year before bankruptcy and 72 percent two years before. Accuracy of the model decreases as the time period is extended (it may also be unreliable in its predictive ability). Based on the study, it was concluded that firms with a Z score less than 1.81 are all bankrupt, while those with Z scores greater than 2.99 fall into the non-bankrupt group. Those falling into the area between 1.81 and 2.99 require more analysis to determine their solvency status. The non liquid asset ratios like total debt to total assets and cash flow to total debt are, in general, better predictors of bankruptcy than the liquid assets ratios like quick ratio or net working capital to total assets.

In sum, a model containing default beta, term beta, ratings and duration could be used to calculate cost of debt.

In the chapter on bank loans I mentioned that loans and bonds can be viewed as options and that the Black–Scholes model can be applied. Professor Merton, in a seminal paper,¹¹ noted the equivalence between lending and writing a put option on the firm's assets. Just as option on stocks can be valued using the five variables that enter into the Black–Scholes model (S , X , r , t , and σ), the value of a risky loan can be found using five similar parameters A , B , r , t , and σ_A .

where

A = market value of firm's assets,

σ_A = volatility of the market value of a firm's assets, and

B = Market value of debt.

Given these five parameters, it is possible to solve for the value of default option and the observed interest spread between a firm's risky bonds and a matched risk-free treasury rate.¹²

The relationship between the yield on risky debt and risk-free rate on debt of equivalent maturity is given by:

$$k(\tau) - i = (-1/\tau) \ln [N(h_2) + (1/d) N(h_1)]$$

where

$k(\tau)$ = the required yield on risky debt,

i = risk free rate on debt of equivalent maturity,

τ = length of time remaining to maturity,

d = firm's leverage ratio as Be^{-rt}/A , and

$N(h)$ = a value computed from standard normal tables. It reflects the probability that a deviation exceeding the calculated value of h will occur.

$$h_1 = - [1/2 \sigma^2 \tau - \ln(d)] / \sigma \sqrt{\tau}$$

$$h_2 = - [1/2 \sigma^2 \tau + \ln(d)] / \sigma \sqrt{\tau}$$

To illustrate,

B = Rs 1 lac, τ = 1 year, i = 5 percent, d = 90 percent or 0., and σ = 12 percent.

$h_1 = -0.938$ and $N(h_1) = 0.174120$

¹¹ Merton, R C (1974). 'On the Pricing of Corporate Debt: The Risk Structure of Interest Rates', *Journal of Finance*, June.

¹² Interested readers may refer to Saunders, Anthony (1999). *Credit Risk Measurement: New Approaches to Value at Risk and other Paradigms*, John Wiley & Sons, New York.

$$h_2 = 0.818 \text{ and } N(h_2) = 0.793323$$

$$k(\tau) = (-1) \ln(0.986788) = 1.33 \text{ percent}$$

THE EMPIRICAL EVIDENCE ON DEBT IPOs

In the chapter on equity IPOs we saw that firms with growth opportunities and the financial strength to meet transaction costs are more likely to go public. We ask the same question again: Why do some firms issue public debt and others issue private debt? The decision to change the mix of private versus public debt depends on several factors like:¹³

- The value of bank monitoring to the firm
- The agency costs of public debt
- The investment opportunity set
- Scale economies of issuing public debt.

Those firms that value a bank relationship would be expected to issue bank debt (short and long). These are typically young firms that find outside capital expensive due to information asymmetry.

Firms with growth options are more likely to issue short-term debt because of the underinvestment problem. So we would expect companies to issue (public) long-term debt when growth options decline.

Finally, due to economies of scale in issuing public debt we would expect firms of reasonable size to go public. The empirical evidence is consistent with these expectations.

Academic studies of debt IPOs in the US have also documented the initial-day and after market performance of corporate straight debt IPOs. These studies find that IPOs of speculative grade debt are underpriced like equity IPOs while those rated investment grade are overpriced. More specifically, these studies have found that straight-bond IPOs are not statistically underpriced in contrast to equity IPOs.¹⁴ Another study has documented a significantly negative stock market reaction to debt IPOs.¹⁵

IN CONCLUSION

Issuers of public debt have to decide on the amount, maturity of the instrument, coupon, currency of offering, and the market in which it is to be offered (domestic vs foreign). The choice depends on a number of factors like funding need, asset composition, credit rating and so on (discussed in chapters 25 and 26).

¹³ Patel, Ajay (2000). 'The Causes and Consequences of Initial Public Straight Debt Offers', Working Paper, Babcock Graduate School of Management, Wake Forest University, Feb.

¹⁴ Datta, Sudip, Mai Iskandar-Datta, and Ajay Patel (1997). 'The Pricing of Initial Public Offers of Corporate Straight Debt', *Journal of Finance*, Vol. 52, No. 1.

¹⁵ Datta, Sudip, Mai Iskandar-Datta, and Ajay Patel (2000). 'Some Evidence on the Uniqueness of Initial Public Debt Offerings', *Journal of Finance*, Vol. 55, No. 2.

APPENDIX 1: LISTING REQUIREMENTS OF THE NATIONAL STOCK EXCHANGE

1. All the listings are subject to compliance with bye laws, rules and other requirements framed by the Exchange from time to time in addition to the SEBI and other statutory requirements.
2. Every issuer, depending on the category and type of security has to submit along with the application such supporting documents as stated in the listing book and as prescribed by the Exchange.
3. On getting in-principle consent of the exchange the issuer has to enter into a listing agreement in the prescribed format.
4. Upon listing, the issuer has to comply with all requirements of law, any guidelines/directions of central government, other statutory or local authority.
5. The issuer shall also comply with the post listing compliance as laid out in the listing agreement.

Details of the listing agreement are provided on the official website of the National Stock Exchange, www.nseindia.com

APPENDIX 2: ELIGIBILITY CRITERIA FOR LISTING

<i>Issuer</i>	<i>Eligibility criteria for listing</i>	
	<i>Public issue</i>	<i>Private placement</i>
Public sector undertaking		
• Minimum 51 percent holding by government or a government company	Eligible	Eligible
• Less than 51 percent shareholding	As applicable to corporates	As applicable to corporates
Banks		
• Scheduled banks	Eligible	Credit rating Investment grade
• Net worth of Rs 50 crore or above		
Corporate bodies		
• Paid-up capital of Rs 10 crore or more	Eligible	Credit rating Investment grade
• Market cap of Rs 25 crore		
Infrastructure companies		
• Tax exemption and recognition as infrastructure company	Eligible	Eligible

Given here is the schedule of listing fees:

	<i>Amount (Rs)</i>
<i>Initial Listing fees</i>	7,500
Annual listing fees:	
Issue size	
of Rs 1 crore	2,100
> Rs 1 crore–Rs 5 crore	4,200

Table contd.

Table contd.

> Rs 5 crore–Rs 10 crore	7,000
> Rs 10 crore–Rs 20 crore	14,000
>Rs 20 crore–Rs 50 crore	21,000
> Rs 50 crore	35,000

An additional listing fee of Rs 700—for every increase of Rs 5 crore above Rs 50 crore—subject to a maximum of Rs 50,000.

APPENDIX 3: SEBI GUIDELINES

Fully Convertible Debentures (FCDs)/Partially Convertible Debentures (PCDs)/Non-Convertible Debentures (NCDs):

- a) Issue of FCDs having a conversion period of more than 36 months will not be permissible, unless conversion is made optional, with 'put' and 'call' option.
- b) Compulsory credit rating will be required if conversion is made for FCDs after 18 months.
- c) Premium amount on conversion, time of conversion, in stages, if any, shall be pre-determined and stated in the prospectus. The interest rate for the above debentures will be freely determinable by the issuer.
- d) Issues of debenture with maturity of 18 months or less are exempt from the requirement of appointment of debenture trustee or creating a debenture redemption reserve (DRR). In other cases, the names of the debenture trustees must be stated in the prospectus and DRR will be created in accordance with Section (N.1). The trust deed shall be executed within six month of the closure of the issue.
- e) Any conversion in part or whole of the debenture will be optional at the hands of the debenture holder, if the conversion takes place at or after 18 months from the date of allotment, but before 36 months.
- f) In case of NCDs/PCDs credit rating is compulsory where maturity exceeds 18 months.
- g) Premium amount at the time of conversion for the PCD shall be pre-determined and stated in the prospectus. Redemption amount, period of maturity, yield on redemption for the PCDs/NCDs shall be indicated in the prospectus.
- h) The discount on the non-convertible portion of the PCD in case they are traded and procedure for their purchase on spot trading basis must be disclosed in the prospectus.
- i) In case the non-convertible portion of PCD/NCD are to be rolled over with or without change in the interest rate, a compulsory option should be given to those debenture holders who want to withdraw and encash from the debenture programme. Roll over shall be done only in cases where debenture holders have sent their positive consent and not on the basis of the non-receipt of their negative reply.
- j) Before roll over of any NCDs or non-convertible portion of the PCDs, fresh credit rating shall be obtained within a period of six months prior to the due date of redemption and communicated to debenture holders before roll over and fresh trust deed shall be made.
- k) Letter of information regarding roll over shall be vetted by SEBI with regard to the credit rating, debenture holder resolution, option for conversion and such other items which SEBI may prescribe from time to time.
- l) The disclosures relating to raising of debentures will contain, amongst other things, the existing and future equity and long-term debt ratio, servicing behavior on existing debentures, payment of due interest on due dates on term loans and debentures, certificate from a financial institution or bankers about their no objection for a second or pari passu charge being created in favor of the trustees to the proposed debenture issues.
- m) SEBI may prescribe additional disclosure requirement from time to time, after due course.

New Financial Instruments

Issuer of capital shall make adequate disclosures regarding the terms and conditions, redemption, security, conversion and any other relevant features of the instruments—such as deep discount bonds, debentures with warrants, secured premium notes, etc.—so that an investor can make reasonable determination of the risks, returns, safety and liquidity of the instruments. The disclosures shall be vetted by SEBI in this regard.

Guidelines for the Protection of the Interest of Debenture Holders

Servicing of Debentures

Subject to the provisions of Section 'F', a debenture redemption reserve (DRR) shall be created by all the companies raising debentures on the following basis:

- a) A moratorium up to the date of commercial production can be provided for creation of the debenture redemption reserve in respect of debentures raised for project finance.
- b) The debentures redemption reserve may be created either in equal installments for the remaining period or higher amounts if profits permit.
- c) In the case of partly convertible debentures, DRR should be created in respect of non-convertible portion of debenture issue on the same lines as applicable for fully non-convertible debenture issue. In respect of convertible issues by new companies, the creation of DRR should commence from the year the company earns profits for the remaining life of debentures.
- d) Companies may distribute dividends out of general reserves in certain years if residual profits after transfer to DRR are inadequate to distribute reasonable dividends.
- e) DRR will be treated as a part of general reserve for consideration of bonus issue proposals and for price fixation related to post tax return.
- f) In case of new companies, distribution of dividend shall require approval of the trustees to the issue and the lead institution, if any.
- g) Company should create DRR equivalent to 50 percent of the amount of debenture issue before debenture redemption commences. Drawal from DRR is permissible only after 10 percent of the debenture liability has been actually redeemed by the company.
- h) In the case of existing companies prior permission of the lead institution for declaring dividend exceeding 20 percent or as per the loan covenants is necessary if the company does not comply with the institutional condition regarding interest and debt service coverage ratio.

The company may redeem debentures in greater number of installments.

APPENDIX 4: ASIAN AND EUROBOND MARKETS¹⁶

Hong Kong's debt market is predominantly composed of private sector issuance accounting for 75 percent of the total outstanding debt. Given here is its profile:

¹⁶ This is partly based on a report on Asian Currency Bond Markets, by *Euromoney*.

<i>Issuer</i>	<i>Instrument</i>	<i>Term</i>	<i>HK (\$ in billion)</i>
Bank/corporate	Fixed rate bond/CD	1–3 years	53.94
		3–5	51.02
		>5	26.14
	Floating rate bond CD	1–3 years	21.72
		3–5	129.83
		>5	10.65

In Taiwan, only companies with a rating from a recognized agency can issue unsecured bonds. Foreign companies issuing bonds in Taiwan should get a minimum rating of A–/A3 for public offering and BBB–/Baa3 for private placement.

The Singapore dollar debt market is dominated by government debt accounting for 57 percent of the total outstanding debt. Corporate bonds with term to maturity of 1–7 years amounting to about \$18 billion are also outstanding.

Eurobonds are bonds issued in one of the Euro currencies (dollar, yen, FFr, DM, etc.) and underwritten by an international syndicate of investment banks and sold to investors from many countries outside the jurisdiction of the country in whose currency the bond is denominated. Thus dollar denominated bonds sold to investors outside the US is a Eurodollar offering. Foreign bonds, in contrast, are issued by foreign borrowers in the domestic bond market of another country and are underwritten by a group of domestic investment banks. Thus, a dollar offering by an Indian company in the US is a foreign bond. Eurobonds are usually traded on over-the-counter exchanges. But they are also listed on exchanges (e.g., the Luxembourg stock exchange). Average maturity of these instruments range from 5–20 years and average size of the offering (in dollars) is about \$250 million. Coupon payments are made annually. One of the key features of the Eurobonds is that they are free from regulation because they are alien to most participants in the sense that a dollar bond offering in the US should adhere to the SEC guidelines. Although there is no governmental regulation covering the Eurobond market, every Eurobond issue must conform to the laws and regulations of the country in which it is offered for sale.

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Chapter 25

A Follow-up Note on Financing

OBJECTIVES

- ◆ Demonstrate the application of capital structure theory in real-life settings.
- ◆ Outline the sequence of decisions in a financing program.
- ◆ Introduction to recent advances in capital structure theory.
- ◆ Introduce the concept of Adjusted Present Value.

APL is a major bulk drug producer in India. It is the country's largest producer of semi-synthetic Penicillin and Cephalosporins, and the sixth-largest producer in the world. The company, owing to increase in competition and over-capacity, is in the process of reducing costs. Since the borrowing costs account for 10 percent of expenses, reducing the borrowing costs is a top priority for the company. As of now, APL borrows in domestic currency to meet its working capital expenditure and expansion requirements. It is in the process of setting up a world-class facility for the production of Cephalosporins. Once this plant is fully operational it would be one of its kind in India, which would have the FDA approval for the production of this drug. Procuring equipment involves an outlay of \$ 10 million (approx. Rs 46 crore). APL expects the funding requirement to increase in the future. The chief financial officer (CFO) should decide whether to fund the expansion with foreign currency or a rupee loan, the maturity of the loan, and so on.

One of the primary responsibilities of the CFO is to estimate external fund requirement for the planning period, and maintain contact with financial institutions and capital markets so as to ensure a steady supply of funds to support the company's strategy. Doing so involves the following steps:

- Estimate the external fund requirement.
- Decide whether debt or equity or some combination of securities have to be issued.
- If the company already has adequate equity, issue the right type of debt. Corporate treasures have the following options:
 - Public vs Private debt
 - Fixed rate or Floating rate
 - Short-term vs medium term vs Long-term debt
 - Domestic vs Foreign currency
- Issue the securities in the right *sequence* and at the right time.

ESTIMATING EXTERNAL FUNDING REQUIREMENT

The first step in the sequence of decisions is to establish a planning horizon. How long should the planning horizon be? 1 year? 5 years? The planning horizon is the period over which the characteristics of the business are expected to change, and within which strategic decisions can be made.¹ For mature companies the planning horizon may be a few years whereas for a company operating in a rapidly evolving industry (e.g., computers) the horizon may be 1 year. The objective of this analysis is to arrive at an ordered sequence of investment and financing activities to support the company's strategy. As pointed out in the chapter on real options, a business is essentially a portfolio of projects that can be viewed as options: some projects are in-the-money whereas some are out-of-the money. The manager is required to cultivate promising projects and harvest those that are ripe. Any company would have competing strategies to achieve its objectives. Once a strategy is chosen from the available alternatives, a manager is required to estimate minimum financial requirements. Having determined the sequence of investments a financing strategy that satisfies a given set of corporate objectives like reasonable debt and dividend payout ratio and good liquidity is to be evolved. Companies commonly prepare pro forma statements consisting of income statement for the period under study and a balance sheet as of the end of the period. As pointed out in the chapter on financial statements, the preparation of pro forma statements requires commonsense and judgment. The end-product of the analysis is the cumulative funding requirement and the sequence of instruments to be issued (debt, converts or equity, or preferred stock). Here is a forecast of the sources and uses of funds for a hypothetical company:

(Rs crore)

	Years			
	1	2	3	4
Sources				
Net Income	300	340	450	600
Depreciation	150	210	300	360
Uses				
Increase in working capital	25	0	0	0
Total capital expenditure	500	1,300	1,200	1,500
External fund requirement	75	750	450	540
Cumulative fund requirement	75	825	1,275	1,815

The company needs Rs 1,815 crore in the next 4 years. It may sell debt or equity or convertibles or some combination of securities.

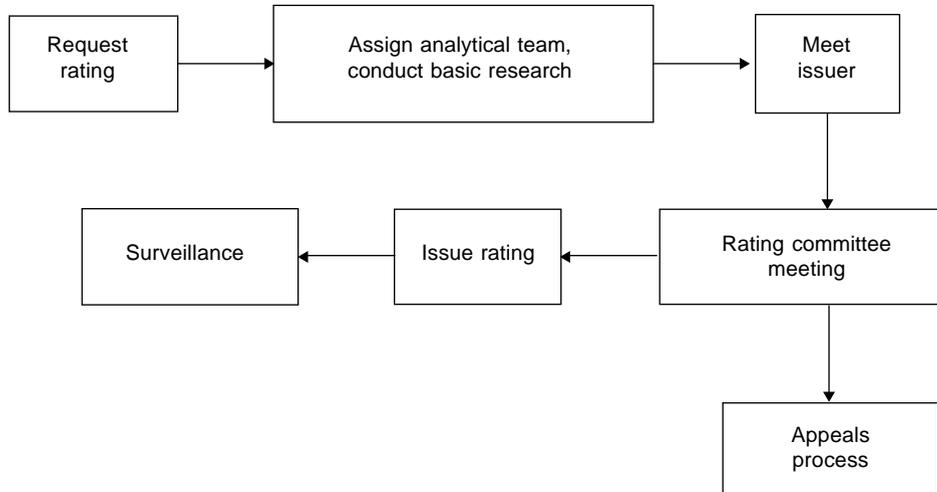
DEBT vs EQUITY vs CONVERTIBLES

The choice of the instrument, as pointed out in the chapter on financing choices, depends on the financing problem the company is facing. Undervalued companies may want to issue debt; overvalued companies may want to issue equity. In other words, companies choose a security not only on the basis of perceived need but also market conditions. If the company already has 'adequate' equity, it may issue debt. Assume that the company issues debt. Whenever a company sells debt it should get its issue rated by a credit rating agency

¹ Luehrman, Timothy (1994). 'Using APV: A Better Tool for Valuing Operations', *Harvard Business Review*.

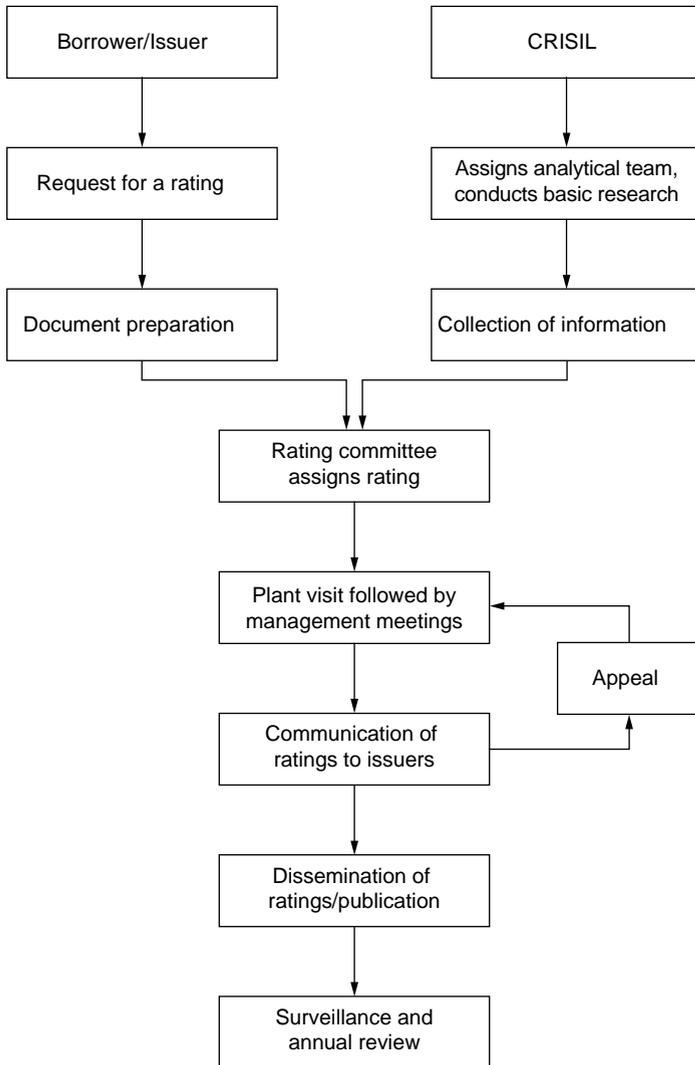
such as CRISIL (The Credit Rating Information Services of India Limited), CARE (Credit Analysis and Research) or ICRA. The issuer approaches the agency to rate its issue and update the rating throughout the life of the issue. The agency is paid a fee for this service. The foundation of credit ratings was laid when Moody's introduced the first bond ratings as a part of Moody's Analyses of Rail Road Investments in 1909. Since then, credit ratings have blossomed into a full-blown business, providing investors with an impartial measure of an issuer's creditworthiness. Most financial institutions today have guidelines on investment based on the ratings issued by the major credit rating agencies. Standard & Poor's (S&P) started operations in 1916. These two agencies have today come to be acknowledged as the two most influential agencies in the business. S&P was the first analytical organization to publish their ratings criteria and procedures and have been the pioneers in rating a large variety of financial instruments. They continue to be the most open about their ratings methodology, which is extensively documented. Exhibit 25.1 depicts the rating process adopted by S&P.

Exhibit 25.1 Standard & Poor's rating process



In India, credit ratings first began with CRISIL in 1987, which is ranked among the top rating agencies in the world today. ICRA and CARE joined in later. The rating process followed by CRISIL (illustrated in Exhibit 25.2) is more or less similar to that of S&P. In both the given illustrations, the rating process starts with a rating request from the issuer, followed by assigning teams and basic research, management meetings, assignment of ratings and appeal, and surveillance and annual review.

CRISIL employs a multi-layered decision making process in assigning a rating. It assigns a team of at least two analysts who interact with the company's management. CRISIL strongly believes that the interest of investors is best served if open dialogue is maintained with the issuer. Engaging the issuer in a direct dialogue not only enables it to incorporate non-public information in a rating report, but also makes it forward looking. After a rating has been assigned, CRISIL monitors the ongoing performance of the issuer and the economic environment in which it operates. Surveillance also enables analysts to stay abreast of current developments, discuss potential problem areas, and be apprised of any changes in the issuer's plan. Exhibit 25.3 presents a brief description of credit rating symbols used by CRISIL. The credit rating is an attempt to judge the probability of default. The highest rating of AAA is given to those companies that have negligible

Exhibit 25.2 The credit rating process

default risk. A debt rating is not an evaluation of the issuing company but is security specific. It is supposed to assess the credit risk of a particular debt security. The rating agencies consider a variety of financial and non-financial factors to arrive at a rating. The agencies consider industry growth, global competitive position of the industry, availability of raw material supply, degree of regulation and the direction of change in regulation, economic cyclicality among other factors while assigning a rating.

They also look at a number of financial ratios like interest coverage, cash flow as a percentage of total debt and long-term debt as a percentage of capitalization to rate a issue. The amount of debt a project can support depends on the amount of cash flow the project can generate to service debt—interest, and principal, credit support available to the project and the lender’s coverage requirements. Two ratios are widely used to measure a project’s ability to service debt; interest coverage ratio and debt service coverage ratio.

Exhibit 25.3 Credit rating symbols**High Investment Grades**

AAA

Highest safety

Bonds rated 'AAA' are judged to offer highest safety of timely payment of interest and principal. Though the circumstances providing this degree of safety are likely to change, such changes as can be envisaged are most likely to affect adversely the fundamentally strong position of such issues.

AA

High safety

Bonds rated 'AA' are judged to offer high safety of timely payment of interest and principal. They differ in safety from AAA issues only marginally.

Investment Grades

A

Adequate safety

Bonds rated 'A' are judged to offer adequate safety of timely payment of interest and principal; however, changes in circumstances can adversely affect such issues more than those in the higher rate categories. CRISIL may apply '+' or '-' signs, to ratings from AA to B, to reflect comparative standing within the category.

BBB

Low safety

Bonds rated BBB are judged to offer sufficient safety of timely payment of interest and principal. However, changing circumstances are more likely to lead to a weakened capacity to pay interest and repay principal than for bonds in higher rated categories.

Speculative Grades

BB

Inadequate safety

Bonds rated BB are judged to carry inadequate safety of timely payment of interest and principal; while they are less susceptible to default than other speculative grade bonds in the immediate future, the uncertainties that the issuer faces could lead to inadequate capacity to make timely interest and principal payments.

B

High risk

Bonds rated B are judged to have susceptibility to default; while currently interest and principal payments are met, adverse business conditions would lead to lack of ability or willingness to pay interest or principal.

C

Substantial risk

Bonds rated C are judged to have factors at present that make them vulnerable to default; timely payments of I&P are possible only if favorable circumstances continue.

D

In default

Bonds rated D are in default and in arrears of I&P payments or are expected to default on maturity. Such bonds are extremely speculative and returns from these bonds may be realized only on reorganization or liquidation.

$$\text{Interest coverage ratio} = \text{EBIT/Interest}$$

It measures the adequacy of operating profits to cover interest charges. A ratio less than 1.0 indicates that earnings are not adequate to meet interest charges and hence cannot support that level of borrowing. Lenders may typically insist that interest coverage ratio never falls below 1.25.

$$\text{Debt service coverage ratio (DSCR)} = \frac{\text{EBIT}}{\text{Interest expense} + \frac{\text{Principle repayment}}{1 - \text{Tax rate}}}$$

While interest coverage ratio tells us how comfortable a company is in making interest payments, the firm's ability to make principal repayment is ignored. DSCR considers both. The principal repayment is not tax deductible and is to be paid out of after-tax earnings. Principal payment is adjusted to make numerator and denominator consistent (i.e., before tax). The higher the DSCR the better is the financial position, all else equal. A DSCR of less than 1.0 indicates that earnings are not adequate to meet interest and principal payments. DSCR can be further extended to include other fixed charges like lease rentals and preference dividend. Given here is the median interest coverage ratio for all the rating categories on the S&P and CRISIL scale (for the period 1994–96):

	CRISIL	S&P
AAA	6.76	21.39
AA	3.23	10.02
A	2.27	5.67
BBB	2.10	2.9
BB	1.44	2.25

The second important ratio is the leverage as measured by debt to total capitalization. The higher the leverage the higher is the proportion of operating income that should be used to meet contractual obligations like interest payments. These agencies measure leverage in a variety of ways. For instance, another measure of leverage is (long-term debt + net worth) divided by total debt. The third important ratio is cash flow from operations to long-term debt. Debt is after all serviced from cash flows, not accounting earnings. All extraordinary sources and uses of cash are excluded to determine the overall trend in cash flow coverage. Exhibits 25.4 and 25.5 present the median ratios for all categories on the CRISIL and S&P scale. Managers often target coverage ratios. The problem with setting target ratios is that they do not tell us how much the risk of default has increased when, say, debt-to-value ratio increases from 20 percent to 30 percent. Moreover, it is hard to relate the amount of debt to historical asset values (used in the denominator). There may be substantial changes in asset values due to inventory valuation and depreciation policies and consequently changes in capitalization ratio that have no bearing on the capacity to meet fixed claims. So their usage is

Exhibit 25.4 CRISIL median ratios for 1994–96

Rating	Pre-tax interest coverage EBITINT	Funds from operations to LT debt FOLTD	Pre-tax return on permanent EBITPC	Operating income to sales capital OISALES	Long-term debt + net worth to LTD LTLEVER	(Total debt + NW)/TD TDLEVER
AAA	6.76	0.97	0.20	0.18	3.49	5.47
AA	3.23	0.44	0.16	0.12	2.34	2.83
A	2.27	0.31	0.16	0.12	1.99	2.43
BBB	2.10	0.15	0.12	0.16	1.70	2.08
BB	1.44	0.23	0.13	0.07	1.73	2.29

Key: EBITINT = Earnings before interest and taxes divided by Interest; FOLTD = Profit after tax plus depreciation divided by total debt; EBITPC = EBIT divided by (total debt + net worth); OISALES = Operating income before depreciation and interest divided by sales.

Exhibit 25.5 Standard & Poor's rating of LT debt (1994–96)

Rating	EBITINT	FOLTD	EBITPC	OISALES	LTLEVER	TDLEVER
AAA	21.39	1.10	0.25	0.21	10.31	4.42
AA	10.02	0.75	0.19	0.17	5.29	3.53
A	5.67	0.49	0.16	0.15	3.47	2.72
BBB	2.90	0.30	0.12	0.12	3.46	2.21
BB	2.25	0.20	0.10	0.12	1.99	1.80
B	0.74	0.10	0.06	0.09	1.61	1.40

Source: Raghunathan, V and Varma, J R (1997). 'Rerating the Ratings', 229 Manufacturing Companies, Period 1994–96', *Business Today* (Dec 7–21).

Key: LTLEVER = Long-term debt plus net worth divided by total debt; TDLEVER = (Total debt + Net worth) divided by total debt; TLLEVER = Net worth divided by total liability.

limited. Assume that a company currently has very little debt, say 1 percent. The managers of the company are evaluating the option of introducing debt into the capital structure. Debt is added to the capital structure by issuing debt and using the proceeds to repurchase common stock.

The company's stock is currently trading at Rs 30. The company has a cash balance of Rs 29.66 crore. The company's executives intend to bring down the cash level to that of its nearest competitor's, Rs 18.015 crore. The excess cash of Rs 11.65 crore would be used to repurchase stock. The new debt (used to repurchase stock) is expected to carry an interest rate of 14 percent. The company intends to maintain a payout ratio of 60 percent. The current and the pro forma financial details are presented in Exhibit 25.6. The impact of the repurchase on the stock price and bond rating is given here:

Reduction in shares	9.9	4.2
Additional debt	181.1	125.35
EPS—3.98	4.16	4.26
P/E—7.53	same	same
Stock price if P/E is 7.53	31.32	32.07
EBIT/Interest	17.5	10.50
Rating based on CRISIL interest coverage medians ²	AAA	AAA

Exhibit 25.6 Proforma financial forecasts and bond rating for alternate capital structures
(Rs crore)

	<i>Actual</i>	<i>30 percent debt/total capital</i>	<i>50 percent debt/capital</i>
Sales	2065.6	2065.6	2065.6
EBIT	477.4	461.1 ³	461.1
Interest	1.15	26.35	43.9
PBT	476.25	434.75	417.2
Tax @ 35 percent	166.68	152.16	146.02
PAT	309.56	282.58	271.18
Dividends @ 60 percent	185.7	169.5	162.7
No. of shares			
Outstanding (million)	77.75	67.85	63.65
Cash	296.65	180.15	180.15
Total debt	6.95	188.05	313.4
Net worth	736.4	438.8	313.45

This analysis suggests that the company is relatively safe even at high debt ratios and would probably get an 'AAA' rating. One may also benchmark debt ratio or cash flow coverage ratio. Alternately, competitors in the same industry group may be benchmarked. The increase in stock price is surprisingly negligible even when the debt ratio is 50 percent. This is in stark contrast to the notion of optimal capital structure, which suggests that increasing leverage creates shareholder value. Why is the increase in stock price so small? The reason is that the company is already trading at a high M/B (market value of equity/book value of equity)

² See the table given earlier.

³ When excess cash is returned to shareholders, the company forgoes interest income. Assume that the interest on excess cash is 14 percent. So the reduction in EBIT = $0.14 \times$ excess cash of Rs 11.65 crore.

ratio. The stock price will go up only if the market assigns a higher P/E multiple for a given level of earnings. The managers can also assess the impact of leverage on sustainable growth, risk (sensitivity of net income to a reduction in EBIT) and so on. The value of tax shields can be estimated as follows:

$$\begin{aligned} &= \text{Tax rate} \times (\text{additional debt} + \text{reduction in cash}) \\ &= 0.35 \times (\text{additional debt} + \text{reduction in cash}) \end{aligned}$$

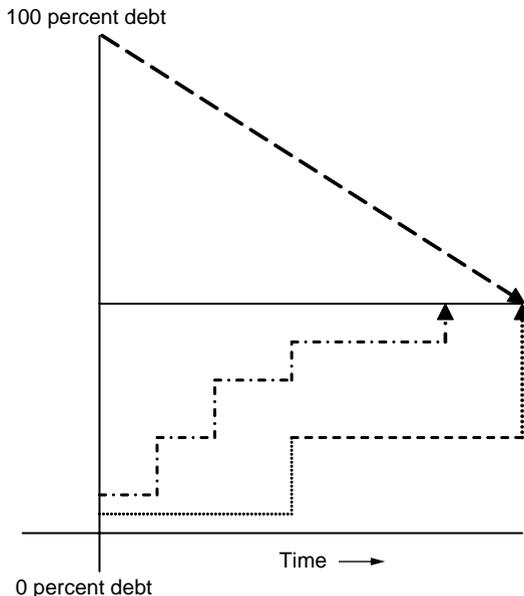
If this analysis is right, i.e., if the expected increase in stock price is negligible, we would expect the company not to increase leverage because the benefits are relatively small.

SEQUENCE OF RAISING DEBT AND EQUITY⁴

Modern finance theory hypothesizes that companies have a target debt to value ratio in mind and they move towards the optimum capital structure by trading off tax shields and bankruptcy costs. Suppose you have just set up a project and have a 40 percent debt ratio in mind. There are at least three ways (Exhibit 25.7) in which you can attain the target:

Option 1: Start with 100 percent debt and add equity slowly to bring down the debt ratio to 40 percent over a period of time. But is this path feasible? Bondholders/lenders will not lend 100 percent of the project

Exhibit 25.7 Sequence of raising capital



Option 1: - - - - - Option 2: Option 3: - . - . - .

⁴ This line of analysis was motivated by Esty, Qureshi, and Olson (2001).

cost because it provides wrong incentives to shareholders of the borrowing company in the sense that they can take on business gambles. It's not their money anyway. This is the agency cost of debt. In addition, the probability of going bankrupt would be very high. For all these reasons shareholders would not resort to this path.

Option 2: Start with equity, add debt frequently and then again equity probably. This path gives rise to the underinvestment problem suggested by Myers (1977). His theory is that firms prefer internal capital to external capital because it is costly due to information asymmetry. So companies would want to sell debt, convertibles and equity in that order. Adding debt frequently is probably in the interest of shareholders but bondholders would not allow it.

Option 3: Start with equity; add some more equity and debt later. This path reduces probability of distress, because debt is added only when the company has stable earnings. It also reduces the agency costs of debt.

Let us go back to Example 1 at the beginning of the chapter. The company needs Rs 1,815 crore in 4 years. The schedule of external fund requirement is given here:

External fund requirement	75	750	450	540
Cumulative fund requirement	75	825	1,275	1,815

The company has virtually countless options as far as sequence of securities is concerned. Consider some of them:

- All debt finance amounting to Rs 700 crore in year 1, Rs 700 crore in year 2, and the rest in year 3.
- Debt initially followed by equity issue in year 2 and debt again in year 3.
- Equity initially followed by two debt issues.
- Equity issues in year 1 and 2 followed by a debt issue in year 3.
- All equity issues.

In case you wish to make it more complicated, add some more instruments like convertibles, bond-warrant package, preferred stock and so on! To decide on the instrument, amount and sequence, one should ascertain the impact of a particular financing strategy on debt ratio, bond rating, cost of capital, control and risk. Assume that a company has the following capital structure:

Debt	900
Equity	750
<hr/>	
Total	1650
Debt ratio	54 percent

Suppose the company is thinking of issuing equity amounting to Rs 400 crore, and the next year's retained earnings are expected to be Rs 200 crore. The next year's debt ratio would be:

Debt	900	
Equity	1350	(750 existing 200 retained earnings 400 new issue)
<hr/>		
Total	2250	
Debt ratio	40 percent	

Similar calculation can be made for other combinations of instruments and sequence of issue. The central message of the discussion so far is that it is important to get the instrument and the sequence right. Otherwise a company may get into financial distress. Assume, for example, that the company has convertibles outstanding and the company issues debt assuming that the outstanding convertibles would be converted providing some equity cushion. If the stock price falls, both convertibles and bonds will remain outstanding leading to a debt overhang.

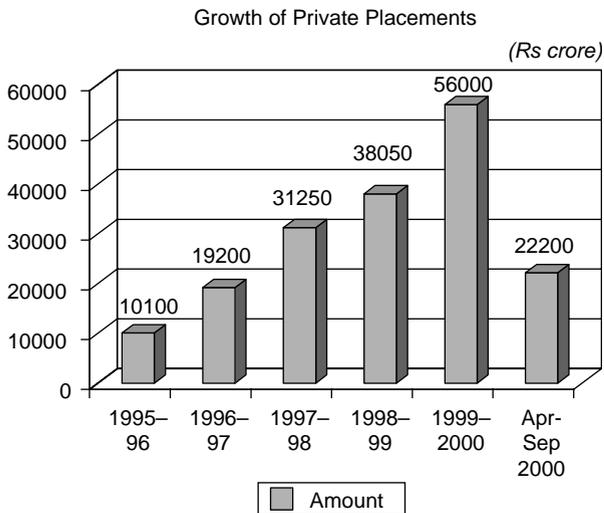
PUBLIC vs PRIVATE DEBT

For many companies private debt from banks and financial institutions remains the main source of funding (Exhibit 25.8).

Exhibit 25.8 Resource mobilization by the corporate sector

	(Rs crore)		
	1997–98	1998–99	1999–2000
Corporate Securities			
Domestic Issues	37738	59044	68963
Public Issues	4657	9365	7704
Private placement	30099	49679	61259

Source: The National Stock Exchange.



Private debt comes from two sources: bank loans and private placement of securities with institutional investors. Private placement of securities continues to be the main source of funding for many companies even in the US. Life insurance companies dominate the private placement market in the US. These companies provide long term (up to 20 years), fixed rate debt. Since the privately placed debt is usually illiquid we would expect institutional investors to charge a liquidity premium.⁵ In other words, is a privately placed debt

⁵ Rule 144-A in the US permits trading of privately placed instruments among qualified institutional investors.

costlier than public debt? A recent study in the US finds that private placement yields compare favorably with public market benchmarks. The reason is that institutional investors have greater information and due diligence opportunities than individual investors. In addition they enjoy greater covenant protection. Further, firms with high distress costs may find private debt more attractive since it is easier to resolve distress in case of private debt (it is easier to negotiate with few lenders).

MATURITY STRUCTURE OF DEBT

So far we behaved as though there is only one, homogeneous, class of debt. In real life companies have access to an array of instruments which differ in many important characteristics like cash flow rights, maturity of the instrument and so on. According to modern finance theory companies with lots of investment opportunities can be expected to issue short-term debt to preserve financial flexibility and to protect lenders against greater uncertainty in the company's future.⁶ Further, growth firms ought to use relatively less debt to prevent the underinvestment problem. Conversely, for mature companies whose value comes mostly from assets-in-place the costs of bankruptcy are likely to be low. Such firms can afford to have high leverage ratios to prevent wastage of free cash flow by managers.

Operating and Financial Leverage

The concept of fixed and variable costs was introduced under break even analysis. Fixed operating costs do not change with volume changes in the short run. Fixed costs include depreciation on plant and equipment, buildings, etc., insurance, and managerial remuneration. Variable costs, on the other hand, vary directly with the level of output. These include raw materials, direct labor costs and certain administrative expenses. Consider two firms that have the following cost structure:

	(Rs crore)	
	Firm A	Firm B
Sales	2,047	7,736
Variable costs	1,642	6,186
Fixed costs	144	1,089
Depreciation	54.60	164.44
EBIT	205	296

If the sales were to increase by 30 percent,

Sales	2,660	10,056
Variable cost	2,134	8,041
Fixed cost	144	1,089
Depreciation	54.60	164.44
EBIT	327	761
Percentage change in EBIT	58.90	157

For the same percentage change in sales, percentage change in EBIT for firm A is much lower than that for firm B. This is due to different cost structures. Firm B has substantial fixed costs. The percentage change in

⁶ The cost of long-term debt will be unacceptably high for growth firms because of uncertainty in their future.

EBIT for a given percentage change in sales is called operating leverage. The impact of operating leverage is that there is more than proportional change in profits when sales change, in either direction. The degree of sensitivity of a firm's operating profit to changes in sales is called the degree of operating leverage (DOL).

$$\text{DOL} = \text{percentage change in EBIT} / \text{percentage change in sales}$$

The operating leverage employed by some of the prominent companies is as follows:

<i>Company</i>	<i>Percentage change in sales</i>	<i>Percentage change in profits</i>	<i>Operating leverage</i>
ITC	15.70	15.90	1.01
CMC Ltd.	18.40	24.80	1.34
Wipro	31.20	133.0	1.26
Tube Investment	9.50	30.30	3.19
Grasim	-12.80	-13.50	1.05
L&T	18.0	6.0	0.33
Videocon	15.6	70.90	4.54

The operating leverage should be measured over a period of time rather than on the basis of one year data. DOL changes from year to year. An average of DOL may be taken for the recent past. Many tend to believe that operating leverage is the same as business risk. They are not the same. The volatility in sales and expenses gives rise to business risk. Other things remaining constant, the higher the degree of operating leverage, the higher the business risk. Just as the presence of fixed operating costs can boost earnings above the break-even point, the presence of fixed cost financing can boost earnings per share and return on equity. Consider two firms A & B. A is all equity financed whereas firm B has 40 percent debt. Both employ Rs 5 lac. Both generate earnings before interest and tax of Rs 1.5 lac. The interest rate on debt is 14 percent.

	<i>Firm A</i>	<i>Firm B</i>
Equity	500,000	300,000
Debt		200,000
EBIT	150000	150000
Interest		28000
Tax @35 percent	52500	42700
Profit after tax	97500	79300
No. of shares	50000	30000
Outstanding E.P.S.	1.95	2.64

The given example illustrates the effect of leverage on EPS. As expected, EPS increases when debt is injected into the capital structure. This is because firm B has issued lesser number of shares. Extending the example further, it can be verified that the volatility of EPS increases when firms resort to debt financing due to the presence of fixed interest cost. When earnings are high, debt financing boosts EPS and when earnings are low, debt financing depresses EPS. The level of EBIT at which EPS is zero is called breakeven EBIT. The earnings per share under different financing plans can be estimated and the financing plan that gives the highest EPS may be chosen. It is to be understood that the increase in EPS may not be cost-free.⁷

⁷ In well-functioning markets, investors may see through the increase in EPS (i.e., focus on cash flows) while making investment decisions. In other words, the increase in EPS may not have value relevance.

The investors may expect higher returns as risk has gone up. A manager should consider the expected earnings and its volatility before choosing an option. As long as earnings are higher than the breakeven point, EPS increases with leverage. But so does volatility of EPS. The degree of sensitivity of a firm's EPS to changes in operating profit is called the degree of financial leverage (DFL).

$$\text{DFL} = \text{percentage change in EPS} / \text{percentage change in EBIT}$$

Other things remaining constant, the higher the degree of financial leverage, the higher the financial risk. Given here is the financial leverage for Finolex Cables Ltd. for the period 1993–2000.

Year	EBIT (Rs crore)	PBT (Rs crore)	Financial leverage (EBIT/PBT)
1999–2000	90.08	71.97	1.25
1998–99	90.72	67.01	1.35
1997–98	84.36	48.53	1.74
1996–97	78.74	53.82	1.46
1995–96	81.06	56.18	1.44
1994–95	41.76	29.49	1.42
1993–94	40.47	27.78	1.46

Total Leverage

The product of degree of operating leverage and degree of financial leverage is called degree of total leverage (DTL). It is the ratio of percentage change in EPS and percentage change in sales that causes the change.

$$\text{DTL} = \text{percentage change in EPS} / \text{percentage change in sales}$$

The central message of the foregoing analysis is that a firm can combine operating and financial leverage in such a way that the total leverage is within manageable limits. Those firms which have high operating leverage should have relatively low financial leverage and vice versa. The combined leverage for Finolex Cables is as follows:

Year	Operating leverage	Financial leverage	Total leverage
1999–2000	1.17	1.25	1.46
1998–99	1.10	1.35	1.48
1997–98	1.16	1.74	2.0
1996–97	1.19	1.46	1.73
1995–96	1.15	1.44	1.65
1994–95	1.10	1.42	1.56
1993–94	1.13	1.46	1.64

Operating leverage is the ratio of contribution to EBIT. The operating profit is the closest approximation of contribution and hence, has been used in calculation. Similarly, financial leverage has been calculated as the ratio of EBIT to PBT.

Conventional wisdom suggests that companies should avoid combining high operating leverage (which leads to high business risk) and high financial leverage (which leads to high financial risk). In good times, earnings are boosted because of the presence of fixed costs and debt; but (earnings) get depressed in bad

times for the same reason, i.e., presence of interest payments on debt and other fixed costs. Massey Ferguson, a multinational producer of farm machinery, industrial machinery and diesel engines sought to increase its market share by turning to the Third World for growth. Massey manufactured its products in the UK and Canada and sold the output to LDCs (less developed countries) in the late 1970s. This strategy worked quite well in the initial years. Compared to its competitors Massey had an aggressive debt policy *and* an aggressive product market strategy. It was unwise to couple a risky strategy in a cyclical industry with high (short-term) debt.⁸ When short-term interest rates shot up and the demand (and, hence, the revenue) dried up for its products for various reasons, Massey was thrown into distress. John Deere, its major competitor, however, had moderate debt ratio because of which it had the financial flexibility to make capital investments. When Massey and another competitor International Harvester were busy resolving distress, Deere pursued aggressive tactics to lock up market-share.

Whether a particular issue of debt should be short-term or long-term depends on various factors, like:

- Current capital structure. If the company already has significant short term debt it may issue medium or long term.
- Availability and access to markets.
- Cost of alternate maturity debt issues. Finance theory hypothesizes that investors expect a maturity premium. In other words, longer tenor instruments carry a higher rate of interest compared to shorter tenor instruments because investors have to lock in their instrument for a longer period. Even if they have the option of selling the instrument, the fact that longer-term instruments are more sensitive to changes in interest rates suggests that they ought to demand a premium.
- The extent to which the firm is willing to expose itself to interest rate risk and refinancing risk. When a short-term debt comes due, the firm will have to replace it with another issue or liquidate assets to pay off debt. The second option is usually not possible. Consequently, firms should issue short-term debt only when it is used for short-term purposes or when they are confident of replacing it with another debt issue at an acceptable price.

Executives commonly prepare a business plan that spells out the company's growth target, product market strategy, market evaluation, design and development plans, etc.; accept all investment proposals that the top management consider worthwhile to exhaust earnings. If some more projects are in the queue, choose securities on the basis of some pecking order. This works fairly well in case of small companies. In large companies, which have cash flows in different currencies and service half a dozen debt and equity markets, the need for proactive steps is essential. Sub-optimal financing decision for one project could jeopardize the profitability of *other* projects by increasing the riskiness of cash flows. The first step in assessing debt capacity and default risk is to prepare a repayment schedule of existing debt. Consider a hypothetical company that has the following obligations. Exhibit 25.9 presents the maturity profile of existing debt. Since interest payments, lease rentals and other short-term debt are also contractual obligations, a maturity profile of all fixed obligations could be prepared. In case of debentures with put options, there will be uncertainty regarding the number of investors who will choose to exercise their option. Suitable assumptions about the outgo due to put option can be made on the basis of prevailing interest rates (investors may sell the bonds back to the company if interest rates have risen considerably or if the default risk of the company has increased).

⁸ Customers in less developed countries are more risky compared to customers in the developed countries.

Exhibit 25.9 Maturity profile

(Rs crore)

	1998				1999				2000
	1	2	3	4	1	2	3	4	
Deutsche Bank	15	15							
		10							
Debenture holders	—	—	5.56	—	—	—	5.56		
Citibank NA	—	—	—	—	—	2.5	—	—	
UTI	—	—	—	—	—	3.15	—	—	
IDBI	—	—	—	—	1.44	1.44	1.44	1.44	
PNB	—	—	—	—	1.43	1.43	1.43	1.43	
SBI	—	—	—	—	1.64	1.64	1.64	1.64	

(Rs crore)

Name of the institution/holders	Nature	Amount	Major terms	Repayment status
Deutsche Bank AG	Debentures	40	Secured NCDs, having a YTM of 17.05 percent	Rs 15 crore on Mar 27, '98 Rs 15 crore on May 15, '98 Rs 10 crore on June 15, '89
Debenture holders	-do-	11.12	15 percent secured NCDs of Rs 70 each offered to shareholders on rights basis with redemption in 6th, 7th, & 8th year from the date of allotment in 3 annual installments of Rs 25, 25, & 20 resp.	Installments of Rs 5.56 crore each repayable on Dec 22, '98 and Dec 22, '99
Citibank NA	-do-	25.00	Floating rate 18 month NCDs	Repayable at par on April 23, '99
UTI	-do-	3.00	19 percent, 7-year secured NCDs redeemable @ 5 percent premium	Repayable on May 10, '99
IDBI	-do-		PLR linked term loan of Rs 40.3 crore repayable in 28 quarterly installments commencing from 1 Jan '99	4 installments of Rs 1.44 crore each payable on Jan 1, April 1, July 1, & Oct 1, '99 (immediate)
PNB	Rupee term		PLR linked TL of Rs 40 crore, 28 quarterly installments	4 installments of Rs 1.43 crore each payable on Jan 1, April 1, July 1, and Oct 1, '99 (immediate)
SBI	Rupee term		PLR linked TL of Rs 46 crore loan 28 quarterly installments	4 installments of Rs 1.64 crore each payable on Jan 1, April 1, July 1, & Oct 1, '99 (immediate)

Assessing Staying Power

Consider a hypothetical company making a capital expenditure of Rs 12 crore financed with debt. The current and projected cash flow statements are given in Exhibit 25.10. The company expects to make losses in the years 1992 and 1993. The executives of this company should decide on financing the project.

The cash flows are prepared with the assumption that the project will be financed with debt. The objective of preparing the cash flow forecast is twofold: First, assess the likelihood of cash deficit in the foreseeable future. Second, plan for contingency. From the cash flow forecast, it is evident that the company will have a deficit in 1992 and 1993. To tide over the deficit, the company intends to resort to short-term debt. Ideally the cash flow from operating activities should be high enough to service debt payments. When companies raise additional debt to finance a new project, a cash flow forecast of existing and new projects should be prepared. The cash flow to the firm should be adequate to meet fixed obligations, after meeting capital expenditure and working capital requirements.

Exhibit 25.10 Cash flow projection

	(Rs crore)				
Cash flow	1992	1993	1994	1995	1996
Net Income	3.22	-2.1	6.16	1.54	3.08
Add: Depreciation	4.76	4.76	4.76	4.76	4.76
Less: Capital Exp.	16.8	1.4	0.7	0.7	0.7
Less: Non cash working capital	10.22	-2.1	-2.38	0.7	0.56
	-9.14	3.36	12.36	4.9	6.58
Less: Principal repayment	1.4	4.76	4.76	4.76	4.76
Add: New borrowing	16.8	—	—	—	—
Add: Increase in addl. S.T. debt	3.5	1.4	4.48		
Less: Decrease in S.T. debt			0.14	1.82	
Net cash					

The forecast is usually prepared with a standard set of assumptions—like the average credit period will remain constant, cost of goods sold will be a constant fraction of sales and so on. Many do not probe deep enough to unearth the exact relationships between financial variables with the fond hope that they are equipped to handle any problem arising out of omission and commission. A worst-case analysis is usually done to assess the impact of various business scenarios on financial statements. Worst-case analysis involves preparing a pessimistic cash flow forecast to determine if operations can generate enough cash to repay debt according to its contractual terms. The problem with worst-case analysis is that executives tend not to acknowledge worst case. A sensitivity analysis as described under financial statement analysis and capital budgeting provides useful insight into the magnitude of adversity when trouble comes. Executives assume that when a financial emergency arises, they can cut down inventory and book debts, divest fixed assets, lay off the workers, etc. While some of these measures are practical, some are not. When sales fall, companies do not cut down inventory; they try to maintain it so that service to the existing customers is not hurt. A careful assessment of exact relationship between financial variables would help avoid any financial embarrassment. The analysis culminates in a set of practical strategies like:

- Consideration of alternative package of securities,
- Preparation for renegotiations with the lender,
- Preparation for divesting a division/brand, etc., to tide over cash deficit; and
- Selling equity to institutional investors like private equity funds.

PRIORITY STRUCTURE

Lenders are entitled to contractual interest and principal payments. Default on promises made in lease or debt contracts generally give the claim holders the right to force the firm into bankruptcy. Default on lease payments gives the lessor the right to repossess the leased asset. In short, all financial claims do not have the same priority in bankruptcy. The characteristics of different corporate liabilities are given in Exhibit 25.11.

Exhibit 25.11 Priority structure of corporate liabilities

<i>Type of liability</i>	<i>Capitalized leases</i>	<i>Secured debt</i>	<i>Ordinary debt</i>	<i>Subordinated debt</i>	<i>Preferred stock</i>	<i>Common stock</i>
Priority of claim	Highest					Lowest
Can trigger bankruptcy?	Yes	Yes	Yes	Yes	No	No
Control rights	Right to restrict use of asset	RIGHT TO LIMIT ACTIVITIES SPECIFIED IN COVENANTS			Conditional voting	Voting

Source: Barclay and Smith (1995).

Growth firms, by definition, will have growth opportunities. Such firms may prefer to issue unsecured or subordinated debentures to maintain as much operating flexibility as possible.⁹ Lenders to such firms demand security as well as lend short because of the uncertainty in pay off from growth opportunities. Further, such firms should avoid complicated capital structures because the competition between different claim holders when in distress will destroy whatever value is left out. In sum, growth firms will not be usually successful in selling low priority claims because of which they will have to sell high priority claims. The choice of priority is not independent of other variables like tax advantage or disadvantage, floatation costs and so on.

FIXED RATE vs FLOATING RATE

Companies often have the choice of borrowing on a floating rate basis or fixed rate basis. Usually, short-term debt is floating rate whereas long-term debt is on a fixed rate basis. A finance manager is required to decide the mix of floating rate and fixed rate debt. Most companies will have rules of thumb regarding the

⁹ Subordinated debt is repaid only after all the creditors have been repaid.

mix. For instance, a company may maintain the fixed-floating rate mix at 60/40. There are countless other alternatives, like:

- Only fixed
- Only floating
- 10 percent floating and 90 percent fixed and so on.

What sort of companies should issue floating rate debt? Those companies that have floating rate assets may want to issue floating rate liabilities to match fluctuations. For instance, financial firms like banks that lend on a floating rate basis would want to issue floating rate debt. In general, companies with stable operating margins can use floating rate debt to take advantage of lower cost and companies in volatile businesses may issue to fixed rate debt to protect against the confluence of high business risk and high financial risk. Companies also have the option of dynamically shifting between fixed and floating rate debt. In general it pays to shift to fixed rate debt when long-term treasury yields are low or when the spread over treasuries is low.

CHOICE OF CURRENCY

Often companies (especially multinationals) have the option of choosing a currency in which it is cheaper to borrow. While the interest expense on the foreign currency borrowing might be lower, it exposes the company to foreign exchange risk—the risk that the foreign currency may appreciate against the domestic currency making debt service expensive. Companies may manage the currency exposure through several instruments such as a swap, a forward contract or a foreign currency option. Assume that a company has the option of borrowing in dollars or in rupees. Should this firm (say, APL Pharma) ‘time’ the market? Meaning, should this firm borrow selectively in dollars and rupees when it is cheaper to borrow in a particular currency and minimize borrowing costs? The all-in-cost of borrowing in a particular currency is simply the IRR of the series of cash outflows and the initial cash inflow, similar to a bond. The company may incur transaction costs to arrange the loan. This should be deducted from the initial amount borrowed or amortized over the life of the loan. In other words, the presence of transaction costs increases the all-in-cost of borrowing.

<i>Year</i>	<i>Cash flow</i>
0	Amount borrowed
1	Interest
2	Interest
3	Interest
N	Interest + Principal

Assume that a company borrows in dollars for 5 years, and swaps the proceeds to rupees. This transaction involves the following steps:¹⁰

1. Borrow in dollars and swap the proceeds to rupees now.
2. Convert the interest payment every six months or 1 year (as the case may be) into dollars to service debt.
3. Repay the principal at the end of 5 years by swapping rupees into dollars.

¹⁰ Alternatively the company may get into a forward contract to procure dollars to service debt. But forward markets are not liquid beyond a few years.

The foreign exchange market is divided into two segments: spot and forward market. The spot market allows for buying and selling of foreign exchange with settlement in two business days, known as the value date. The forward market allows companies to establish the exchange rate between the two currencies for settlement at a fixed future date. The forward rate is fixed at the time the contract is made but payment and delivery are not made until the delivery date.

Many factors influence the exchange rate between two currencies. But they are most affected by relative interest rates and inflation rates. The covered interest parity suggests that the forward rate and the spot rate are linked by the difference in nominal interest rates on the two currencies.

$$F = S \frac{(1 + R_h)}{(1 + R_f)}$$

where

F = forward exchange rate expressed as units of foreign currency per rupee,
 S = spot exchange rate expressed as units of foreign currency per rupee, and
 R_h and R_f are interest rates at home and abroad.

The purchasing power parity theory suggests that the percentage change in spot rate equals the difference in inflation rates in the two countries.

That is,

$$\frac{S_{t+1} - S_t}{S_t} = I_h - I_f$$

where

I_h and I_f are inflation rates in the home country and the foreign country respectively.

*Back to APL Pharma*¹¹

During the last two years, the interest rates in India have shown a continuously declining trend and they have fallen by 50 basis points. This is mainly on account of low credit offtake and investment by the companies and the infusion of more money into the economy by the RBI to induce more investments. Another reason is the constant reduction in interest rates by the Federal Reserve, which in turn prompted India to reduce the interest rates. Inflation (based on CPI) in the US during the last quarter of 2001 was 1.8 percent and in Japan, it was -1.2 percent. These figures were significantly lower than the annual inflation rates during 2000, i.e., 3.4 percent for the US, and almost nil for Japan. As on December, the Eurodollar rates on an annualised basis were 6.5 percent and Euroyen rates were 5 percent.

APL's CFO has the option of borrowing in different currencies depending on the existing economic conditions and the expectations of the future. The CFO felt that they should take advantage of capital markets around the world to select the market offering the lowest interest rate at a given time. However the treasurer

¹¹ This is a fictitious case written just for fun (and to drive home the point) but the numbers are real. I thank Nisha and Manish for their useful inputs.

thought that the dollar might appreciate sufficiently over the life of the borrowings to more than offset the lower dollar interest rates. His critics argued that if market interest rates reflected expected changes in currency values, then there was no point in trying to ‘time’ the market. The treasurer’s switching from one currency to another was sheer speculation that could not be expected to pay off in the long run. This group of critics argued that internal targets for different currencies rather than market timing considerations should guide currency choice.

COMPARING CAPITAL COSTS

So, the CFO wanted to address the question of whether real capital costs had been lower in some currencies than in others during the previous decade. Of particular interest was the question of whether there appeared to have been timing opportunities. Though a study would be conducted with hindsight, it was felt that the company would benefit from the analysis, which may act as a guide to the future. Before examining all the major currencies in which the bank transacted, the CFO decided to undertake a pilot study of the dollar. Accordingly he collected monthly observations of 90-day interest rates and inflation rates in the US and India. He also collected relevant data for end-of-the-month spot exchange rates and 90-day forward rates for the dollar. The data covered the period from Jan 2000 to Dec 2001 (Exhibit 25.12).¹² The interest rates and the inflation rates were converted to 90-day rates on a continuously compounded basis.

The continuously compounded rate is calculated as follows:

If a deposit earns compound interest, its value when it matures at some time T is:

$$= D (1 + R/N)^{NT}$$

where

N is the compounding frequency—the number of times per year that interest is credited, the constant R is the interest rate, and the limiting case of this is called ‘continuous compounding’ where interest is credited on a continuous basis.

A deposit which earns continuous interest will mature at a time T with a value $= De^{RcT}$, where e is Euler’s constant (2.71828...) and Rc is the continuous rate of interest. The compound interest rate can be converted into continuous interest rates using:

$$Rc = N \log(1 + (R/N))$$

where

\log is a natural logarithm.

The CFO wanted to know under what circumstances he should prefer to borrow in one currency rather than another. Moreover, if a particular currency did appear to be cheaper at a given time, could the opportunity have been exploited without hindsight? If yes how? Finally how long might such an opportunity persist? The results of the analysis would affect not only the choice of currency for the company’s borrowings, but also the larger debate about the company’s financing policies and strategy.

¹² In reality, one must look at longer periods to make inferences.

Exhibit 25.12 Exchange rates, inflation rates, and interest rates

Month	90-day Eurodollar rate	90-day rupee lending rate	India-CPI inflation rate	US-CPI inflation rate	Fwd ex 90- day Rs/\$	Spot ex- rate Rs/\$
Jan-00	0.06032	0.05628	0.0262	0.0268	43.42386	43.08386
Feb-00	0.06064	0.05628	0.0360	0.0314	43.50386	43.16386
Mar-00	0.06241	0.05628	0.0486	0.0368	43.59743	43.24243
Apr-00	0.06450	0.05628	0.0550	0.0292	43.57922	43.32172
May-00	0.06804	0.05445	0.0494	0.0301	43.72636	43.47386
Jun-00	0.06713	0.05445	0.0522	0.0365	43.99421	43.60921
Jul-00	0.06666	0.05445	0.0495	0.0364	44.21743	43.76493
Aug-00	0.06625	0.05568	0.0393	0.0390	44.50907	43.93657
Sep-00	0.06754	0.05628	0.0348	0.0361	44.67621	44.13121
Oct-00	0.06704	0.05628	0.0272	0.0343	44.83157	44.37157
Nov-00	0.06659	0.05628	0.0272	0.0352	45.06479	44.60479
Dec-00	0.06348	0.05628	0.0347	0.0343	45.2705	44.8405
Jan-01	0.04849	0.05628	0.0326	0.0378	45.60336	45.05336
Feb-01	0.04849	0.05628	0.0298	0.0357	45.7305	45.2705
Mar-01	0.04849	0.05507	0.0253	0.0293	46.03393	45.48393
Apr-01	0.04313	0.05507	0.0223	0.0337	46.26133	45.71393
May-01	0.03970	0.05507	0.0250	0.0372	46.51164	45.95714
Jun-01	0.03818	0.05507	0.0338	0.0326	46.73019	46.19929
Jul-01	0.03653	0.05507	0.0397	0.0272	46.92621	46.38321
Aug-01	0.03653	0.05507	0.0515	0.0219	47.06422	46.55822
Sep-01	0.02582	0.05507	0.0473	0.0244	47.45776	46.76036
Oct-01	0.02194	0.05507	0.0421	0.0210	47.66442	46.91872
Nov-01	0.02027	0.05507	0.0487	0.0183	47.77404	47.05564
Dec-01	0.01877	0.05507	0.0512	0.0157	47.92454	47.15564
Average	0.05029	0.0555				

Some might compare the average 90-day dollar-rate (0.05029 percent) and the average 90-day rupee rate (0.0555 percent). But this amounts to comparing apples and oranges. To compare nominal yields correctly, one must adjust for changes in the rupee-dollar exchange rates over the 90-day holding period. Dollar rates can be converted into realized rupee rates by taking the natural log of the ratio of the spot exchange rate for any one month to the spot rate of three months earlier and then subtracting this continuous rate of exchange from the dollar interest rate available three months ago.

If the difference is taken between this rupee-equivalent cost of borrowing in dollars, and the cost of borrowing directly in rupees, then one has the data necessary to conduct a test of ‘uncovered interest arbitrage’. This condition stipulates that the expected rate of change in the spot exchange rate equals the difference in the nominal rupee and dollar interest rates.

This may be expressed as:

$$(R_{\text{dollar}} - S) - R_{\text{rupee}} = 0 \quad (1)$$

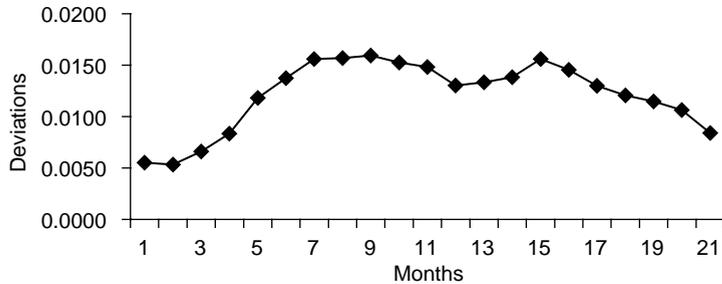
where

S is the expected rate of change in the spot rupee-dollar exchange rate, and R_{dollar} and R_{rupee} are nominal dollar and rupee interest rates respectively.

The difference between S and $R_{\text{rupee}} - R_{\text{dollar}}$ is found. Under no arbitrage conditions it should be zero. In our case, we find that the mean of the difference is 0.012, which is quite close to zero.

The standard deviation for the entire period is 0.3422 percent. On this basis, one would tend to believe that borrowing in rupees is as desirable as borrowing in dollars. But drawing this kind of conclusion would be too hasty. If monthly deviations from uncovered interest arbitrage is graphed it becomes immediately apparent that there were many substantial and sustained deviations from parity. They may have averaged essentially to zero, but *intra-period*, there appear to have been numerous opportunities to source capital more cheaply in one or the other currency (Exhibit 25.13).

Exhibit 25.13 Deviations in interest rates



What gave rise to these differences in borrowing costs? Consider equation 2, which has substituted domestic Fisher relationships for the nominal interest rates in equation 1, and re-grouped terms:

$$(r_{\$} - r_{\text{Rupee}}) + (P_{\$} - P_{\text{Rupee}} - S) = 0 \quad (2)$$

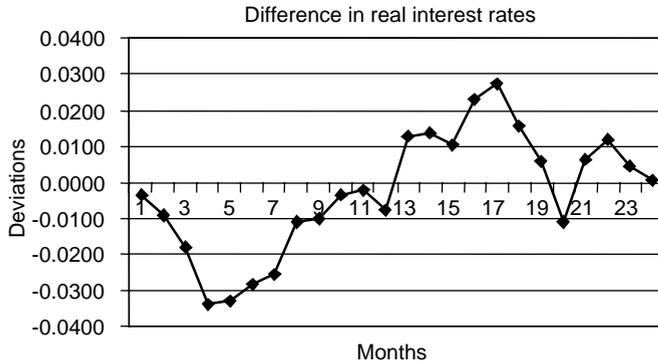
This re-expression of equation 1 divides the uncovered interest arbitrage conditions into two components: a difference in real interest rates and the expected rate of change in real (inflation – adjusted) exchange rates. Examining each component of the equation permits us to gain insight to the causes underlying deviations from uncovered interest arbitrage.

Differences in Real Interest Rates

A comparison of real interest rates can be made quite easily. Ex-post real interest rates can be computed by simply subtracting monthly observations of 90-day inflation rates in dollars and rupees from the corresponding monthly observations of 90-day dollar and rupee interest rates. Assuming investors have rational expectations, these ex-post real riskless rates should differ from ex-ante rates (which are the true focus of borrowers and lenders) by a random forecast error. Subtracting monthly dollar real rates from dollar real rates provides a time series of differences with a mean -0.00259 and the standard deviation is 1.7330 percent. However, throughout the period, there were also many sustained periods during which rupee and dollar real interest rates were not identical (Exhibit 25.14). The correct inference is that real interest rates in rupees and dollars were not identical throughout the period. This difference contributed to the failure of uncovered interest arbitrage.

Purchasing Power Parity

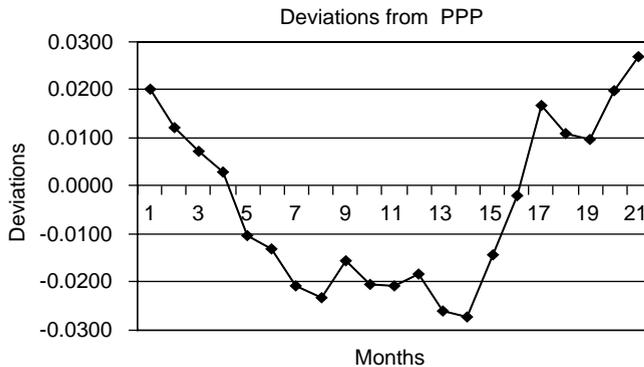
The other factor potentially giving rise to borrowing cost advantages in one currency or another is changes in real exchange rates are deviations from PPP; that is, changes in the spot exchange rate that do not reflect differences in inflation rates between the two currencies in question. To calculate deviations from PPP,

Exhibit 25.14 Differences in real interest rates

the 90-day rate of change on the spot exchange rate (calculated as before) and rupee inflation should be subtracted from dollar inflation. The results are plotted in Exhibit 25.15. Plotting ex-post real rates and deviations from PPP on a graph suggests that movement in the real exchange rate was by far the dominant factor underlying deviations.

Interest Rate Parity

A breakdown in uncovered interest arbitrage invites the question of whether or not there might have been other parity breakdowns giving rise to financial arbitrage opportunities. The no-arbitrage condition is: forward premium or discount on a currency to equal the differences in nominal interest rates in each currency:

Exhibit 25.15 Deviations from PPP

Thus $f = R_{\$} - R_{\text{Rupee}}$

where f is the continuously compounded forward premium or discount on the yen-dollar exchange rate.

A graph of this difference shows small but numerous deviations from zero. Does this indicate frequent opportunities to undertake covered interest arbitrage operations? For the most part there was no opportunity.

The vast majority of the deviations occur within a band of few basis points (Exhibit 25.16). This is roughly in line with the transaction costs that would be associated with arbitrage.

Forward Parity

The one remaining parity condition that merits examination is forward parity. This condition stipulates that the forward exchange rate at time t for the settlement at time $t + 1$ is an unbiased predictor of the spot rate that will prevail at $t + 1$.

That is:

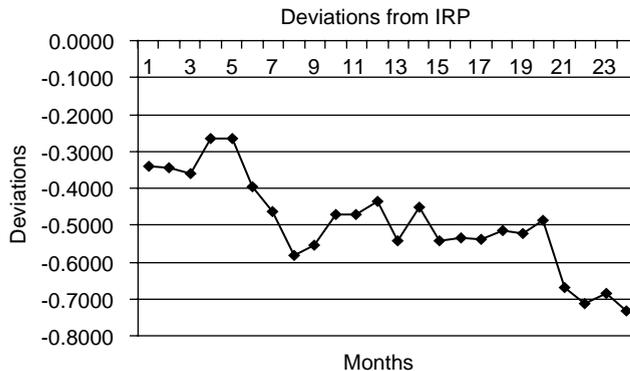
$$F_{t,t+1} = E(S_{t+1})$$

where

$F_{t,t+1}$ is the forward rate of exchange available at time t for settlement at $t + 1$.

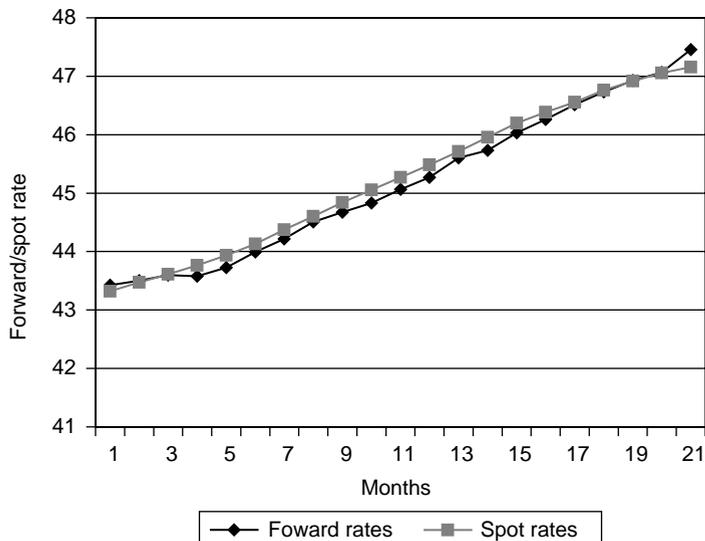
Express the difference in logs to find deviations from forward parity. From the graph we see that both spot rate and the forward rate have been moving together with very little difference. But spot rates are higher than forward rates. This shows that it is beneficial to take forward cover. But one cannot jump to this conclusion from the data available in the case since there is no information about transaction costs.

Exhibit 25.16 Deviations from IRP



In light of the foregoing analysis what recommendations should be made regarding APL's borrowing alternatives in 2002? Assume that the company wants to borrow the equivalent of \$ 10 million in a floating rate notes with a quarterly reset. The graph of IRP showed numerous small deviations from zero. This might indicate opportunities to profit by undertaking covered interest arbitrage. If the deviations occur in a certain band then there is no covered interest arbitrage as transaction cost would be associated with arbitrage. There may also be government restrictions in some cases. In case of forward parity, the forward rates are close to the spot rates excluding some deviations. Hence they can be considered as good indicators of future spot rate. Hence when debt in one currency is favored, for example, in rupee then it must be based upon the expectation that it will have a lower real all-in-cost.

The moral of the foregoing discussion is that a rational expectations approach to exchange rates implies that the forward premium or discount equals the expected change in the exchange rate adjusted by an appropriate risk premium. Holding risk constant, the difference in interest rates should equal the expected change in the exchange rate during the term of the loan. The presence of taxes distorts the interest arbitrage

Exhibit 25.17 Forward parity

relationship. In general, where there is asymmetrical tax treatment of foreign exchange gains and losses or where interest expenses are subject to one tax rate and exchange gains and losses are subject to a different rate, the expected after-tax cost of borrowing will differ across currencies even if their before-tax costs are the same.¹³

SIMULATING CAPITAL STRUCTURE

Interest on debt is a fixed obligation that should be met regardless of the firm's profitability at the time of payment. A default can lead to, in the extreme case, bankruptcy. Normally only debt is considered a fixed obligation. To stay competitive, a firm may have to maintain R&D expenditure, invest in working capital and fixed assets and are largely determined by product market conditions. In this sense, investment in fixed assets and working capital can also be considered fixed obligation. The debt level a firm can maintain is the level at which the cash flow from operations is adequate to service debt and maintain investment in fixed assets, working capital, R&D, etc.

That is:

$$\begin{aligned}
 & \text{NOPAT} + \text{Depreciation} + \text{Borrowing} \\
 & = \text{After tax interest payment} + \text{Capital expenditure} \\
 & + \text{Increase in working capital} + \text{Principal repayment}
 \end{aligned}
 \tag{A}$$

Interpretation of equation A is fairly simple. The cash flow from operations coupled with external borrowing is used to pay interest, invest in fixed assets and working capital—assuming that a firm can borrow if the cash flow from operations is not adequate to cover interest payments, capital expenditure and working capital. Extending this logic, external equity can be included as well.

¹³ Lessard, Donald and Alan Shapiro (1984). 'Guidelines for Global Financing Choices', *Midland Corporate Finance Journal*, Spring.

$$\begin{aligned} \text{NOPAT} + \text{Depreciation} + \text{Borrowing} + \text{Equity} \\ = \text{Interest payments} + \text{Capital expenditure} + \text{Working capital} \end{aligned} \quad (\text{B})$$

In real life we see that firms hate to cut dividends. They would prefer to maintain or increase dividends. So dividend payment can also be considered a fixed payment.

$$\begin{aligned} \text{NOPAT} + \text{Depreciation} + \text{Borrowings} + \text{Equity} \\ = \text{Interest} + \text{Capital expenditure} + \Delta\text{WC} + \text{Dividends} \end{aligned} \quad (\text{C})$$

Equation C holds good if the firm has access to unlimited external financing. For this firm any debt level is comfortable. Whenever cash flow falls short of $I + CE + \Delta\text{WC} + D$, the firm can sell securities to bridge the gap. But unlimited external finance is not a realistic assumption.

For instance, let $\text{CF} = 10$, $I = 11$, $\text{CE} = 10$:

$$\Delta\text{WC} = 5 \quad D = 2$$

In this case, cash flow cannot cover even interest payments. Further, if debt or equity is not available, the company will be in financial distress. So, assessing debt capacity involves assessing the risk of default given the fact that product market condition and competitive position determine cash flow (which is really a random variable) and capital market conditions determine availability of external financing. The trick is to place restrictions on discretionary variables like capital expenditure, working capital requirement and dividends and estimate the level of debt that can be serviced without causing cash inadequacy if (internal) cash flow declines.

In short, equation C is useful to:

- a) Establish the relationship between earnings and debt level.
- b) Arrive at the earnings level that the firm should maintain in order to service debt and maintain a certain level of investment.

If we know for sure what the firm will earn in the foreseeable future, the exercise is quite straightforward. In an uncertain world where earnings and cash flow fluctuate, a finance manager needs probabilistic thinking. Simulating capital structure involves the following steps:

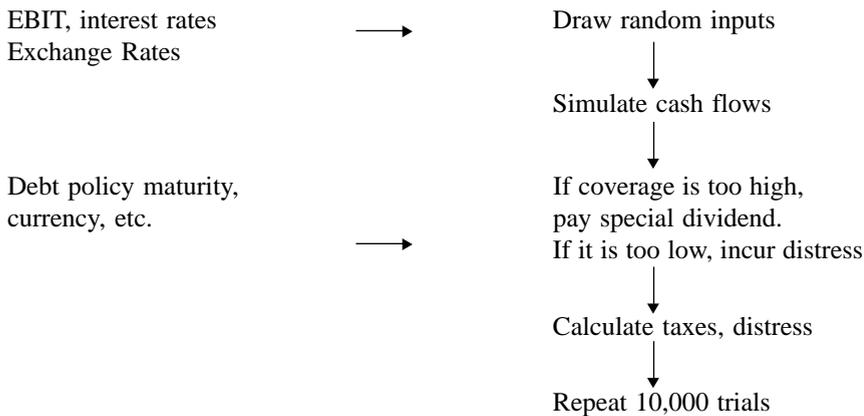
1. Analyze past changes in operating income and cash flow. Draw a frequency distribution of past changes in operating income. Find its mean and standard deviation.
2. Estimate the interest and principal repayment to be made based on the amount of debt being raised.
3. Estimate the probability of default.
4. Choose that level which has an acceptable probability of default.

Opler, Saron and Titman (1997)¹⁴ present a computer simulation model which tries to locate that capital structure which minimizes the discounted sum of future tax payments, financial distress costs and funding costs. Their model, a sophisticated extension of the model just discussed, proceeds in nine steps:

¹⁴ Opler, Tim, Michael Saron, and Sheridan Titman (1997). 'Designing Capital Structure to Create Shareholder Value', *Journal of Applied Corporate Finance*, Vol. 10, No. 1.

1. Project a company's future interest expense based on its assumed capital structure and mix of fixed and floating rate debt. The amount of interest expense is obtained under several thousand interest rate scenarios over a 20-year horizon by simulation. The model also takes into account options—like features and sinking fund requirements built into the bond, possibility of denominating in multiple currencies, etc.
2. Measure the historical volatility of earnings or EBITDA/Assets.
3. Generate many paths of future earnings for the company (both good and bad).
4. Calculate the tax payment under each scenario using the statutory tax rate after accounting for tax loss carry forwards, etc.
5. For each earnings scenario, check if the firm is financially distressed, i.e., earnings after interest is below a certain minimum.
6. Calculate the PV of future tax payments and distress costs for the distribution of future earnings with a given capital structure.
7. Holding total debt constant, account for any funding cost/pricing advantages of different ways of structuring debt.
8. Try different capital structures by altering the amount, type and currency of debt and compute earnings and repeat all the steps.
9. Find the optimal capital structure.

A simplified flow-chart is presented below:



The model suggests a target interest coverage ratio. A disadvantage of the model is that it does not factor in the value of financial flexibility. In other words, it is quite rigid. Further, one of the inputs to the model, the distress cost, is hard to estimate. One might make an intelligent guess however.

Adjusting for Bankruptcy Costs

Bankruptcy cost is the cost associated with going bankrupt. It includes direct, deadweight costs such as administrative and legal expenses and indirect costs such as lost sales, lost investment opportunities, interest paid on emergency loan (if any), higher salary for the CEO (due to increased riskiness of leverage), etc. There is no surefire formula to estimate bankruptcy cost. It is to be noted that it is the expected bankruptcy cost (i.e., present value at the time of borrowing) that we are interested in and not the actual expenses incurred in the year of going bankrupt. We also need to estimate the probability of going bankrupt.

$$\text{PV of expected bankruptcy costs} = \text{Probability of going bankrupt} \times \text{PV of bankruptcy costs}$$

The proportion of companies that have gone bankrupt in your rating class can be taken as proxy for probability. Generally, expected bankruptcy cost is taken as 20–30 percent of firm value. A practical way to adjust for risk of disruption, impact on capital rationing, impact on morale, efficiency and effectiveness of spending programs would be to:

- Take the cost of bank credit agreement as proxy for cost of disruption,
- Take the NPV of projects cancelled as proxy for capital rationing,
- Assume a subjective sum for lost efficiency—say, Rs 5 lac a year, and
- Subjectively set a value for loss in sales.

A recent study in the US examined the industry-adjusted change in sales, operating income, and market value of highly levered firms in industries experiencing downturn.¹⁵ Industry downturns were defined as drops in sales and market values of 30 percent or greater. After controlling for industry performance, the studies found that highly levered firms lost an additional 14 percent, 12 percent and 7 percent of sales, operating income and market value relative to the average firm in the industry, and 26 percent, 27 percent and 15 percent more than the least levered firm in the industry. This study provides a pointer to the magnitude of distress costs.

All said and done, a firm can, under certain circumstances, arrange for additional loans to pay off interest and sinking fund and escape bankruptcy. A default need not necessarily lead to bankruptcy. Bankers may renegotiate the loan terms and bail out the company's management.

A Re-look at WACC: Market Value vs Book Value Proportions

To calculate WACC, we use market value proportions rather than book value. Book values reflect the historical cost of tangible assets in place whereas market value reflects the economic value of assets in place and present value of future growth opportunities. Market values predict the earning power of assets better than book values. Many managers use book value proportions while arriving at WACC. It is unlikely that book values coincide with market value. So this will lead to erroneous results. Suppose your balance sheet reads like this:

<i>Liabilities</i>		<i>Assets</i>	
Equity	50	Fixed assets	70
Debt	50	CA	30
	<u>100</u>		<u>100</u>

so,

$$\text{Debt to value ratio} = 50/100 = 0.5$$

The market value of equity is 75. So the market value balance sheet is:

¹⁵ Opler, Tim and Sheridan Titman (1994). 'Financial Distress and Corporate Performance', *Journal of Finance*, July.

	<i>Liabilities</i>	<i>Assets</i>
Equity	75	
Debt	50	125
	125	125

$$\text{Debt to value ratio} = 50/125 = 0.4$$

You wish to raise Rs 50 more. If you have a target D/E of $\frac{1}{2}$ in mind, you would sell Rs 25 of debt and Rs 25 in equity, to maintain book value proportion. To balance capital structure based on market value, you have to sell Rs 12.5 of equity and 37.5 of debt. Obviously, the WACC depends on the weights you choose. You encounter a project that requires Rs 50. The project has an NPV of Rs 10. The market value of the firm's equity increases by Rs 10 (NPV) upon announcement of the firm's intention to invest in the project. To negate the resulting reduction of the firm's debt to equity ratio the company needs to issue Rs 10 additional debt (D/E is 1). There then remains only Rs 40 of the Rs 50 initial outlay to be financed in a ratio of 1:1, between debt and shares. Preserving the firm's prevailing ratio of 1:1, therefore involves the issuance of Rs 20 debt and Rs 20 equity.

Market Value Balance Sheet

<i>Liabilities</i>	<i>Assets</i>
50	
50	100
100	100

If the management mistakenly assumes that by issuing Rs 25 new debt and Rs 25 new equity, it'll preserve its debt ratio, it has to needlessly issue Rs 5 too much equity and Rs 5 too little debt, and the firm's D/E ratio will deviate from the target value.

The commonly encountered argument is that the market value weights are more volatile (as market value of debt and equity change) than book value weights. So, book value weights, which are stable, should be used. The weights are *not* the current proportions (on the B/S) but *target* proportions. There is no reason why future book values should be any less volatile than market value proportions. To sum up, a firm is supposed to have a target capital structure in mind based on market value proportions and move towards it trading off interest tax shields and bankruptcy costs. Due to extraneous reasons it may not be possible for a firm to stay on target at all times and they do get bumped off from this trajectory.

A RE-LOOK AT CAPITAL BUDGETING¹⁶

Modern capital budgeting, the way it is taught in business schools, suggests that volatility of cash flows of a project or how the cash flows are correlated with the cash flows of the firm does not matter because total risk does not affect value. Consequently, systematic risk is reflected in the discount rate. Assume that a firm has

¹⁶ Stulz, Rene (1999). 'What's Wrong with Modern Capital Budgeting?', *Financial Practice and Education*, Fall–Winter.

a project has equity of Rs 120 and a cash balance of Rs 110. The firm encounters a project with a payoff of Rs 100 in the up-state and a payoff of Rs 20 in the downstate with equal probabilities. That is, it has an expected payoff of Re 1. Would a firm take a gamble that has large volatility but a small expected gain? Unlikely. Why? Because volatility matters as financial distress is not trivial—a distressed firm may not be able to raise funds at an acceptable price or be able to retain employees or suppliers. In other words, the cost of increases in total risk associated with new projects should be taken into account. When total risk matters, companies can enhance the value of either the firm or the project by hedging.

Valuation in Parts: Adjusted Present Value (APV)

Modern capital budgeting suggests that free cash flows be discounted by WACC to estimate NPV. The WACC is a tax-adjusted discount rate. It is supposed to capture the tax advantage of debt (we have used post tax cost of debt as you know). The cost of debt and cost of equity are both opportunity costs, each consisting of time value and risk premium. WACC is a catch-all for risk and tax advantage of debt. The common practice is to increase the discount rate if the project is more risky. WACC is suitable when the capital structure is static. Quite often either the debt ratio or the absolute level of debt changes every year which makes implementation of WACC cumbersome. An alternative approach is the adjusted present value method. Under the APV approach a project is treated as though it is all equity financed and then this base case value is adjusted to account for financing effects like interest tax shield, bankruptcy costs, issue costs, etc. APV unbundles all the components of NPV and analyses each one separately whereas WACC bundles all financing side effects into the discount rate.

	Base case value		Value of financing side effects
APV =	Value of project, if all equity is financed	+	Interest tax shields, bankruptcy cost, subsidy, issue cost, other costs

An Example

A project to manufacture cooling units for electrical cabinets requires an investment of Rs 15 lac. The project is expected to generate after tax cash flows of Rs 1 lac per annum, forever. The discount rate for the project is 15 percent (compensation for business risk only). The project will have a D/E of 1.0. T = 35 percent, i = 14 percent:

$$\begin{aligned} \text{Base case NPV} &= -15 \text{ lac} + \frac{100,000}{0.15} \\ &= -\text{Rs } 833333.33 \end{aligned} \quad (\text{X})$$

The discount rate is the cost of *unlevered* equity. Since the project is debt financed to the extent of Rs 7.5 lac adjustments for tax shields and bankruptcy costs should be made.

The project's APV is calculated by adding the base case NPV (all equity) and the financing side effects:

$$\begin{aligned} \text{APV} &= \text{Base case NPV} + \text{Interest tax shield} - \text{Bankruptcy cost} \\ \text{Interest tax shield p.a.} &= i \times t_c \times D \\ \text{PV if tax shields are perpetual} &= \frac{i \times t_c \times D}{i} = t_c \times D \end{aligned}$$

$$= 0.35 \times 750000$$

$$= \text{Rs } 262500$$

Adjustments for bankruptcy costs may be made by taking suitable proxies. Therefore,

$$\begin{aligned} \text{APV} &= (1) + (2) \\ &= V_u + t_c D \\ &= -\text{Rs } 833333.33 + \text{Rs } 262500 \\ &= -\text{Rs } 570833 \end{aligned}$$

Now, suppose the debt and equity issues cost Rs.3 lac (towards underwriting, printing of prospectus, legal fees, etc.)

$$\begin{aligned} \text{APV} &= -\text{Rs } 570833 - \text{Rs } 300000 \\ &= -\text{Rs } 870833 \end{aligned}$$

Similarly adjustments for other costs and benefits can be made. The beauty of APV is that it not only tells you how much money you are making but also how (and from where).

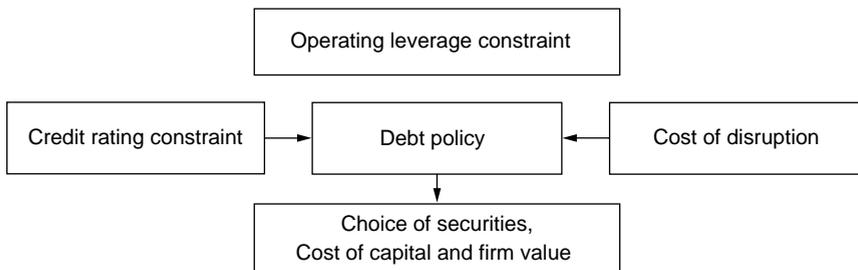
Cost of Unused Debt Capacity

Unused debt capacity is like excess cash or inventory (financial inventory). Just as a purchase manager should know the cost of holding raw material inventory, a finance manager should know the cost of holding financial reserves. The decision not to use Rs 10 lac of debt capacity is equivalent to holding Rs 10 lac more equity than needed. Using equity instead of debt has an implicit cost. If the cost of new equity is 18 percent and after tax cost of debt is 8.45 percent, the cost of not borrowing is $(18 - 8.45)$ 9.55 percent. In rupee terms, this works out to (9.55 percent of Rs 10 lac) Rs 95500.

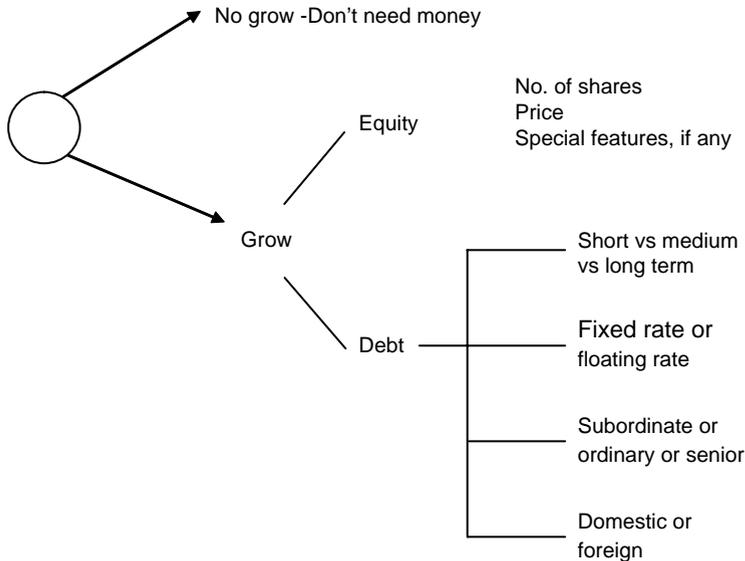
Management Incentives and Debt Capacity

It is generally difficult to convince managers that debt is something beneficial and that free cash flow need to be returned to shareholders when debt is available and/or the company is under-leveraged. The willingness of managers to borrow is a function of the compensation plan. If managerial remuneration is tied to stock market performance, they would be forced to stay close to the optimal level of debt.

BRINGING THEM ALL TOGETHER



The sequence of decisions is shown here in a decision tree:



IN CONCLUSION

The objectives of financing strategy are to minimize after-tax cost of financing, reducing riskiness of cash flows and reducing potential agency costs. The trade-off involved in borrowing is not between high risk and no risk but between high risk and *low* risk. The analysis should not be done with balance sheet and income statement numbers. The analysis should incorporate the underlying cash flow behavior. After all, fixed commitments are met from cash flows and not accrual accounting numbers. Debt policy is not the job of top management alone. It is a company-wide problem. Establish expected cash flow limits, may be with subjective probabilities attached to them. The following factors need consideration while establishing a firm's debt policy:

- Projected cash flow from the project under consideration
- Variance of operating cash flows
- Loan covenants
- Corporate tax rate
- Personal tax rate on debt and equity income
- Bankruptcy costs
- Dilution of control
- Non-debt tax shields
- Pricing of the company's securities
- Information asymmetry

Businesses with stable operating margins could use more of floating rate debt to take advantage of lower cost whereas volatile businesses should use more of fixed rate debt to protect against the combined effect of

rising interest rates and poor business conditions. Borrowing at a floating rate increases the volatility of interest expense and hence profits. But the cost would be lower. There is a trade-off between lower cost and increased volatility. It is possible to follow a dynamic policy of shifting between fixed-rate and floating rate debt when conditions change. Maintain prepayment penalty in order to take advantage of fall in interest rates. Issuers of fixed rate debt can prepay their issue and refinance it with lower cost floating rate debt if interest rates have fallen subsequently. At times there could be prepayment penalty for redeeming the issue. Prepayment makes sense if the present value of savings in coupon exceeds the penalty, which is to be paid up front. Non-investment grade issuers can include call options to allow them to raise fresh capital at lower rates if credit quality has improved in the interim. Investment grade issuers can either sell callable bonds or non-callable bonds and hedge the interest rate risk using interest rate hedging devices like interest rate swaps. In deciding the financing mix, examine the characteristics of the assets of the firm. More specifically, the duration and volatility of and the currency in which the cash flows are denominated. The cross sectional debt ratios of select industry groups are given here:

Cross Sectional Debt Ratios

<i>Industry</i>	<i>Long-term D/E</i>	<i>Total D/E</i>
Aluminum	0.22	0.22
Automobiles		
Passenger cars	0.22	0.30
Scooters	0.13	0.19
Castings – Steel	2.41	2.71
Ceramics	0.21	0.28
Computer software	0.13	0.19
Hotels	0.17	0.20
Infotech	0.07	0.15
Personal care	0.09	0.17
Pharma – MNC	0.21	0.27
Steel- alloy	2.95	3.20
Steel – tubes/pipes	2.76	3.06
Tea – processing	0.16	0.22
Textile-manmade	3.15	3.97

Source: *Capital Market*, Feb 23–March 8, 1998

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QUESTIONS

1. Calculate debt service coverage ratios for all the following years:

	1997	1998	1999
Net profit	14.59	24.95	25.40
Depreciation	5.50	10.50	10.50
Loan repayment	—	20.08	13.39
Interest	6.00	10.63	7.86

2. APV works when WACC does and when it doesn't. Explain.
3. Here's a small story. My grandmother, a conservative lady, kept saying borrowing is bad. She never borrowed, and died penniless. Now, look at the balance sheet of Tata Sons. You will see that Mr Ratan Tata has borrowed crores of rupees. But he will die a millionaire. What do you understand from this story?
4. Two rating agencies give two different ratings to a bond. Is this an indication of incompetence of one of the agencies?
5. There is this Wall Street adage, 'Use it or lose it', which means companies should make use of their debt capacity or be prepared to be taken over. How can anyone make money from such 'financial buying'?
6. If a company has issued convertibles, how would you estimate debt ratio?
7. Given the following book and market value data, calculate WACC based on book value and market value weights and compare them. Assume suitable CAPM parameters and tax rate.

	Book value	Market value
Long-term debt @ 12.5 percent	600,000	650,000
Preferred stock @ 10 percent	150,000	180,000
Equity	250,000	450,000

8. A project has the following cash flows:

<i>Year</i>	<i>Cash flow</i>
0	(1000)
1	200
2	200
3	200
4	200

The cash flows are expected to grow at 8 percent after year 4. The project will be financed with 40 percent debt. Assuming that debt is permanent, calculate APV with the following information:

Unlevered beta = 0.9

Risk free rate = 12 percent

Risk premium = 10 percent

Cost of debt = 12.5 percent

9. A company is obligated under a bank credit arrangement that includes a senior term loan and a junior term loan. On Dec 31, 1988, the unpaid balances of these two loans were Rs 140 crore and Rs 272.51 crore respectively. The credit agreement also provides a Rs 450 crore revolving credit facility, of which Rs 135 crore was outstanding as on Dec 31, 1988. The senior term loan should be fully paid on Dec 31, 1995. A payment of Rs 100 crore was made in Jan 1989; the remainder is to be paid through minimum quarterly installments ranging from Rs 37.5 crore to Rs 75 crore commencing March 31, 1990 through Sep 30, 1995. The junior term loan is payable in full on Dec 31, 1989. The amounts outstanding under the RCF will be due and payable in full on Dec 31, 1992. As of Dec 31, 1988, long-term debt scheduled maturities, which include lease obligations and sinking fund requirements, are as follows:

1989	527,174,000
1990	270,297,000
1991	171,703,000
1992	265,357,000
1993	224,376,000
Thereafter	2,855,845,000

Assume that the company makes a minimum repayment of Rs 37.5 crore per quarter starting March 31, 1990 on the senior term loan until any remaining balance is fully paid. Prepare a debt repayment schedule indicating the amount under each obligation.

A Mini Case: Debt Policy at CF Abrasives

In 1994, CF Abrasives (CFA), a manufacturer of industrial abrasives, was assessing its debt policy. Having grown at 5.4 percent during 1990–93, the company had recently acquired a competitor for Rs 15.5 crore. Its profits had fallen from Rs 25.6 crore in 1990 to Rs 9.5 crore in 1993. Profits in the first quarter of 1994 were the lowest in the last six quarters. CFA's executives feel that some of the product lines need to be modernized. The investment in fixed assets and working capital is expected to be Rs 22 crore. Further, the company needed to refinance the recent acquisition and repay the loan amounting to Rs 7 crore due in 1996. CFA's shares have been trading in the range of Rs 33–41. Investment bankers informed the company officials that the company could issue equity at Rs 36. The other option for the company is to issue 7-year debentures at 13 percent. The annual sinking fund payment would start in 1996.

Exhibit 25Q.1, 25Q.2, and 25Q.3 present CFA's historical financial statements.

Exhibit 25Q.1 Income statement

	(Rs crore)			
	1990	1991	1992	1993
Sales	332.9	358.2	370.2	351.2
Gross profit	98.5	105.4	107.6	104
SGA	68.8	73.9	80.4	89.8
Depreciation	1.6	1.7	1.8	2.6
EBIT	28.1	29.8	25.4	9.16
Less: Interest	0.875	0.875	0.875	0.875
Less: Tax @35 percent	9.52	10.123	8.58	2.89
PAT	17.69	18.8	15.94	5.38

CFA expects sales grow at 25 percent per year for the next 5 years; gross profit margin to remain at 28 percent of the sales and S, G, A will be 20 percent of the sales. The general expense also includes depreciation of Rs 2.9 crore, Rs 3.2 crore, Rs 3.8 crore, Rs 4.2 crore and Rs 4.5 crore respectively.

Exhibit 25Q.2 Balance sheet

	(Rs crore)			
	1990	1991	1992	1993
Liabilities				
Equity	101.1	111.3	119.6	121.7
L.T. debt	7	7	7	7
Current	40.1	34.9	36.5	63.8
Assets				
Assets	148.2	153.2	163.1	192.5
Fixed assets	27.8	30.7	37.3	46.7
Less: Dep.	8.8	10.3	11.8	14.1
Current assets	128.9	132.5	137.3	159.2
Other assets	0.3	0.3	0.3	0.7
	148.2	153.2	163.1	192.5

Exhibit 25Q.3 Internal content of working capital

<i>Current liability</i>	1990	1991	1992	1993
Accounts payable	23.8	20.4	22.6	30.8
Notes payable	9.6	5.2	5.5	23.0
Others	6.7	9.3	8.7	10.9
	40.1	34.9	36.5	63.8
Current assets				
Cash	2.3	2.2	1.5	3.4
Accounts	40	47	41.4	44.1
Receivable inventory	84.4	81.7	90.2	107.2
Others	2.2	1.6	4.2	4.5
	128.9	132.5	137.3	159.2

Other information

No. of shares (in crores)	3.99	3.99	3.99	3.99
EPS	4.43	4.71	3.99	1.34
Retained earnings		10.2	8.3	2.1

Average market price Rs 28.5, Rs 26.5, Rs 29.25, and Rs 32.85 in the last 4 years respectively.

P/E multiple	6.43	5.62	7.33	24.5
Beta	0.8	0.8	0.9	0.9

Risk premium	10 percent
Yield on L T Govt. bonds	10 percent
T_c	35 percent
Tax rate on ordinary income	30 percent
Tax rate on capital gains	20 percent

The estimated IRR of the acquisition is 16 percent and that of investment in product line is 15.5 percent. The company's top management feels that dividends cannot be cut back as it might send adverse signals to the market.

1. Prepare a forecast of balance sheet and income statement under the two financing plans with the available data. Make suitable assumptions if necessary.
2. Calculate relevant ratios and predict what rating the company might get. Extrapolate if necessary.
3. Is the current debt policy justified? Are there gains from leverage for this company (CFA)?
4. Calculate the current debt-to-value ratio in terms of book value and market value. And suggest a suitable financing plan to the company.

Chapter 26

A Case Study: Financing NTPC

OBJECTIVES

- ◆ Demonstrate the application of capital structure theory in a real-life setting.
- ◆ Provide an overview of the power sector in India.
- ◆ Sensitize students to the steps involved in executing a financing program.

National Thermal Power Corporation Limited (NTPC), a wholly-owned enterprise of the Government of India (GoI) was set up with the objective of supplementing the efforts of the state electricity boards in planning, promoting and organizing the integrated development of large thermal power plants in the country, thereby contributing to the development of the Indian economy. NTPC is one of the public sector undertakings identified by the GoI as having the potential to become a global player in power. In view of NTPC's rich experience and future potential in the field of power development and generation, the Department of Public Enterprises, GoI, has accorded it the 'Navaratna' status.

NTPC has set up power stations across India with an aggregate commissioned capacity of 19,435 MW [and 240 MW through joint ventures (JVs)] as on March 31, 2001. NTPC's vision is *to be one of the world's largest and best power utilities and to power India's growth*. It aims at generating 30,000 MW by the end of the 10th plan and about 40,000 MW by the end of the 11th plan.

The GoI has a vision of achieving power on demand by 2012, when the demand for power is expected to be 155,569 MW and 965,226 GWh¹ for peak demand and energy demand respectively. The installed generation capacity of the country currently stands at approximately 100,000 MW with an estimated additional 100,000 MW required by 2012. The IPP (independent power producer) program has not taken off as expected due to various reasons and it is unlikely that the private sector will add any significant capacity over the next 3–5 years.

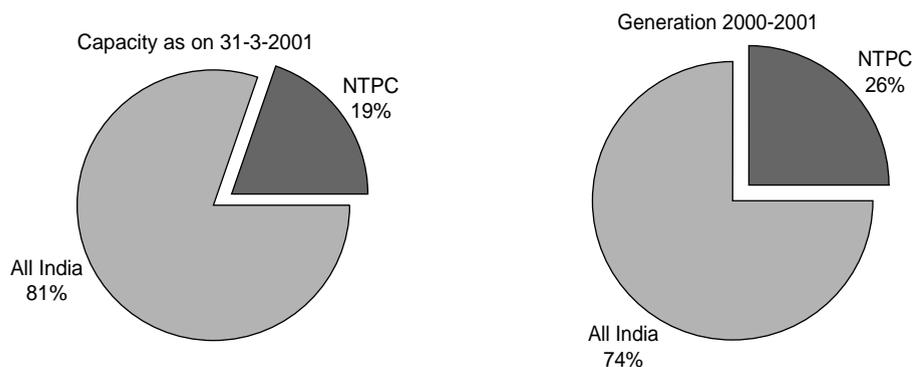
As the problems faced by the IPPs primarily emanated from the lack of confidence in the purchasers of the power (i.e., SEBs), the government has now initiated and is according thrust to the much needed reforms on the transmission and distribution side. However, it needs to be mentioned here that the fruits and results of transmission and distribution reforms would accrue only after a lead-time of 4–5 years. As such, the capacity addition in the transition period would need to be taken up by the government as a parallel activity to

¹ Watt hour is a unit of electrical work, equal to a power of one watt being absorbed for one hour. One gigawatt hour (GWh) unit of energy is equivalent to 1,000 megawatt hour (MWh) or 10 lac kilowatt hour (KWh).

the reforms program of the various states. The government would thus need to bridge the capacity gap through the Central Public Sector Utilities (CPSUs) in the power sector, and in view of NTPC's track record in project implementation, the Ministry of Power (MoP), GoI, has required NTPC to explore the possibility of adding 30,000 MW by the end of the 11th Plan, i.e., an additional 10,000 MW over and above the envisaged capacity addition as per NTPC's corporate plan.

To achieve its objectives NTPC approached its advisors to assist in estimating the financial support that NTPC would require to set up the required capacity and present the same to the Ministry of Power so that the GoI could take the appropriate decisions for further strengthening NTPC to meet the challenge ahead.

COMPANY BACKGROUND



NTPC, a public sector undertaking, is the largest power generating company in the country. The total installed capacity of the company as on March 31, 2001 was 19,435 MW with 15,480 MW (80 percent) of the capacity being coal based and the balance 3,955 MW (20 percent) being gas based. With 19 percent of the total installed capacity in the Indian power sector under its belt, NTPC was able to generate 130.145 billion units of electricity, which amounts to 26 percent of the all India generated units (499.450 billion units). NTPC has generating units in the states of Uttar Pradesh, Rajasthan, Haryana, Madhya Pradesh, Gujarat, Andhra Pradesh, West Bengal, Bihar, and Orissa.

In financial year (FY) 2001, NTPC generated 130.145 billion units of power as compared to 77.07 billion units in FY96—thus registering a CAGR of about 4.6 percent. The above growth was largely on account of addition to capacity aggregating 2,678 MW and increase in availability during the last six years.

NTPC has formulated a long-term plan by which it proposes to increase its generating capacity to over 40,000 MW by 2012. Price-Waterhouse Coopers (PWC) has conducted a financial feasibility review of the long-term capital expenditure plan of NTPC. Based on this, NTPC proposes to add 5,300 MW of capacity in the 9th plan, 11,052 MW in the 10th Plan, and 3,998 MW of capacity in the 11th Plan (Exhibit 26.1). The capacity addition plans till year 2012 comprises 21 projects of 20,350 MW. Of the 5,300 MW of target capacity in the Ninth plan about 2,640 MW including 440 MW of Tanda Project taken over from UPSEB has already been commissioned. NTPC is presently implementing projects with a total capacity of 4,500 MW in Simahadri, Talcher, Rihand, and Ramagundam.

NTPC has adopted a three-tier organization structure comprising the corporate center, the regional headquarters and the sites. The corporate center focuses on formulation of policies, guidelines, development of systems and procedures, which need to be adopted by various responsibility centers. The regional set-ups

Exhibit 26.1 Capacity addition plans of NTPC

<i>Project</i>	<i>State</i>	<i>Capacity (MW)</i>	<i>Fuel</i>
9th plan			
Simahadri	AP	500	Coal
Faridabad	Haryana	144	Gas
Anta II	Rajasthan	650	
Auriya II	UP	650	
Kawas II	Gujarat	650	
Gandhar II	Gujarat	650	
10th plan			
Simahadri	AP	500	Coal
Talcher II	Orissa	2,000	Coal
Sipat	MP	2,000	Coal
Rihand II	UP	1,000	Coal
Ramagundam III	AP	500	Coal
Cheythur	TN	1,000	Coal
Kawas III	Gujarat	650	Naphtha
Gandhar III	Gujarat	650	Gas
Kahalgaon II	Bihar	1,000	Coal
Kayamkulam II	Kerala	1,000	Coal
Barh	Bihar	500	Coal
Kol Dam & Wind	HP	252	Hydel/Wind
11th plan			
Kahalgaon II	Bihar	500	Coal
Kayamkulam II	Kerala	950	Gas
Barh	Bihar	1,500	Coal
Kol Dam & Wind	HP	1,048	Hydel

headed by an executive director (ED) each are responsible for construction and operation of power stations within their region. Project general managers are accountable for the implementation of the project and performance of their respective stations.

NTPC has a well-formulated and time-tested 'Integrated Project Management and Control System' to ensure completion of its projects in time. A master network which is the overall program of project implementation is finalized by the corporate monitoring group in consultation with all the three responsibility centers of engineering, contracts and site. It identifies the key milestone dates for each package in the areas of engineering, procurement, manufacturing, dispatch, construction, erection, testing and commissioning. The date of order of the main plant equipment is the zero date of the master network. Based on the master network schedule (Level 1 network), Level 2 networks are finalized during the award of different packages.

NTPC initially took up the management contract of the Badarpur thermal power station at New Delhi. Subsequently, it set up plants at Shaktinagar, Korba, Ramagundam, and Farakka. Of the installed capacity of NTPC 19,435 MW as on March 31, 2000, NTPC added 1,556 MW during FY 2000, which included the commissioning of Unchahar II (1 × 210 MW), Vindhyachal II (1 × 500 MW), Faridabad (2 × 143 MW) and Kayamkulam (1 × 120 MW) and acquisition of 440 MW Tanda thermal power station of erstwhile UPSEB. NTPC continues to manage the 705 MW Badarpur thermal power station as also the 270 MW captive power plant of Bharat Aluminium Company Limited. NTPC is currently implementing an additional capacity of 3,000 MW (2 × 500 MW Simhadri and 4 × 500 MW Talcher II) and work on further capacities aggregating 2,600 MW has been initiated. In addition, NTPC has identified projects aggregating 15,000 to be taken up in the 10th & 11th Plan periods, of which four projects would be coal based power stations under the mega power policy announced by the GoI, viz., Cheythur (1,500 MW), North Karanpura (1,980 MW), Kahalgaon (1,320 MW), and Barh (1,980 MW).

The NTPC has already been ranked 9th highest power generating company in the world, on the basis of 1996 data. It generated 93.15 billion units of electricity, while ESKOM of South Africa is ranked number one with 163 billion units. According to a study² by Marketline International, UK, NTPC is the third most efficient generating company among the top ten. NTPC's total installed capacity of 16,795 MW is about 20 percent of the total installed capacity and is contributing to almost 25 percent of the total electricity generation in the country. The Corporation plans to become a 30,000 MW plus company within a decade. Construction work is already in progress to add a further capacity of 3,170 MW. Over the years NTPC has maintained a high level of operating performance, with a focus on steady growth. During FY 2000, the power stations of NTPC generated 118.70 billion units of electricity thereby contributing 24.7 percent of the total power generation in the country (with a capacity share of 19.8 percent). The coal-based plants of NTPC recorded a PLF of 80.9 percent and an availability of 90.1 percent, while the overall PLF of the northern, southern and western region stations put together was 89.6 percent. NTPC is a profit-making, dividend-paying company and has hitherto displayed substantial financial strength which has been an important factor underlying its growth. Exhibit 26.2 presents the financial highlights between 1996 and 2000.

Exhibit 26.2 NTPC's past financial highlights

<i>Rs crore</i>	1996	1997	1998	1999	2000
Equity capital	7,335	7,404	7,546	7,713	7,813
Net worth	14,831	16,145	17,885	20,146	22,910
Total debt	10,448	9,672	8,923	9,643	10,077
Debt/Net worth	0.70	0.60	0.50	0.48	0.44
Mn. units generated	89,838	97,609	106,000	109,505	118,700
Sale of energy	8,289	9,778	12,354	13,991	16,039
Total income	8,494	10,330	12,686	14,288	16,715
Total expenses	7,141	8,608	10,413	11,372	13,083
PBT	1,353	1,722	2,273	2,916	3,631
PAT	1,353	1,679	2,153	2,816	3,425
Dividend & dividend tax	195	436	554	722	760
Net cash accruals	2,320	2,716	3,344	4,080	4,748
ROCE (percent)	11.79	11.91	12.36	13.37	13.86
RONW (percent)	12.15	12.15	12.78	14.13	14.97
EPS (Rs)		227	285	365	438
Debtors O/s (Days)		127	151	191	186
Debtors > 6 months (percent)		66 percent	59 percent	61 percent	67 percent

THE INDIAN POWER SECTOR

For many years, India's power sector has experienced massive and chronic problems, including very poor technical, commercial and financial performance. The sector has placed increasing demands on both state and central government budgets. Overall, the situation is not sustainable and drastic action is required to greatly improve the sector's performance. In response to these circumstances, in 1991 the Government of India opened the power sector to private investment, initially in the generation function.

Although there have been significant inflows of capital to finance new generating capacity in the form of independent power projects (IPPs), the lack of creditworthiness of the final off-takers—the state electricity

² <http://pib.nic.in/archieve/lreng/1yr98/10298/PIBR120298.html>

Boards (SEBs)—has meant that insufficient capacity has been installed to meet the growth in demand. Consequently, India's power sector continues to be plagued by supply shortages and poor quality supply.

The power sector forms a key part of the infrastructure of any economy, developed or developing. Minimizing the costs of power supply not only benefits electricity consumers directly but, by minimizing the costs of production of goods and services it also benefits the population as a whole through lower prices for final products, and increasing national income.

Governments worldwide have both been and are increasingly reforming their power sectors through the unbundling of the industry, the liberalization of markets, the establishment of new regulatory frameworks and increasing the role of the private sector. The objectives underlying these reforms vary from country to country, but primarily cover:

- Increased efficiency—both by enhancing the degree and scope of competition and by the introduction of new incentives through increased private sector participation; and
- Access to new sources of finance—through the promotion of private sector investment, through measures to increase the viability of the sector by reducing costs and developing means to credibly commit to prices set at levels adequate to cover costs.

Although many aspects of power sector reform are relatively generic, the development of an individual reform program must be based both on the existing characteristics of the specific sector and the long-term vision for that sector's development. The problems of the Indian power sector are well known. In brief, they include:

- Large and growing power shortages in many regions; and
- Over 80,000 villages remaining to be electrified.

These failures to meet demand arise largely from a lack of both investment, whether private or publicly financed, and maintenance in the sector. In turn, this lack of expenditure is largely a consequence of the sector's weak financial position, particularly the effective bankruptcy of many SEBs, due to:

- Tariffs that are inadequate to cover costs, combined with extensive cross-subsidies from industrial to agricultural and domestic consumers;
- High levels of losses, both technical and, in particular, commercial;³ and
- Low levels of operating efficiency, notably in terms of plant availability.

In 1998–99, the average tariff for all-India was estimated at only 80 percent of average unit costs. Under the 1948 Electricity Act, SEBs are obliged to set tariffs at a level sufficient to earn a 3 percent return on net fixed assets, after taking into account subsidies from state governments.⁴ The scale of such subsidies is a major drain on state finances—with gross subsidies amounting to some Rs 30,345 crore (US \$ 7 billion) in 1998–99, of which 74 percent was to agriculture.⁵ However, in many cases, state governments fail to pay these subsidies in cash, instead writing off debts. As a consequence, the cash shortage in the sector is exacerbated.

³ Technical losses are actual physical losses of power, while commercial (or non-technical) losses are those associated with physically supplying power which is not billed for, or which is billed for but for which payment is not actually received.

⁴ A 3 percent return bears little relation to the actual costs of financing new investments, even if all billed revenues were collected and state government subsidies paid in cash. As a comparison, the current Reserve Bank of India rate is 8 percent, while 1-year Government debt (the closest approximation to a risk-free investment available) yields 9.6 percent.

⁵ *The Economic Times*, February 29, 2000, Mumbai.

Extremely high levels of losses characterize the Indian power sector. Revenues collected are substantially below those billed, and in turn quantities billed are far lower than actual output. As a result, the sector faces continual cash deficits and consequently high levels of outstanding payables and receivables, severely affecting the creditworthiness of utilities. Across India, average transmission and distribution losses were estimated at 20.8 percent in 1998–99, a high figure by international standards.⁶ However, the reported figures significantly understate the true level of losses. The reasons for the widespread underestimation include:

- The presence of large numbers of un-metered consumers—particularly agricultural—for whom consumption has to be estimated; and
- Incentives for SEB management and staff to collaborate in the theft of electricity.

The high levels of technical losses are largely driven by inadequate past maintenance and investment in the transmission and distribution systems, and poor system operations. The problem of inadequate revenues undermining the power sector's creditworthiness is compounded by its inefficiency in operations and consequently high costs. For example, SEB-owned generating plants typically achieve levels of availability below those in the central sector utilities (CSUs) and private sector, and far below those seen internationally. These low levels of availability have severely reduced the sector's ability to meet demand.

Demand and Supply Estimation of the Power Requirements in India

Demand

The Indian power sector has grown manifold since independence and is Asia's third largest producer of power with installed capacity of over 93,000 MW as on date. In spite of the growth in capacity as well as generation, the gap between demand and supply has increased over the years. The energy and peak demand shortage since 1992–93 are as follows:

	1993	1994	1995	1996	1997	1998	1999
Energy shortage (million units)	25442	23758	24979	35676	47600	34200	26340
Energy shortage (percent of energy demand)	8.3	7.3	7.1	9.2	11.5	8.1	5.9
Peak demand shortage (MW)	10821	10045	9464	11145	11477	7393	9460
Peak demand shortage (percent of peak demand)	20.5	18.3	16.5	18.3	18.0	11.3	13.93

Source: The Ministry of Power.

The shortage in peak demand is considerably higher on account of low availability of power stations and a lower hydro-thermal mix. The 15th EPS report, finalized in 1995, had projected a widening of the demand supply gap both in terms of energy and peak demand. The demand estimates based on the 15th EPS are as follows:

⁶ TERI (1999). *Teri Energy Data Directory and Yearbook 1999–00*, Delhi. Figures shown are for 1997–98.

	1996	1997	1998	1999	2000	2001	2002
Total energy	294762	317977	342253	368507	395042	421953	448996
T&D losses (percent)	21.75	21.65	21.55	21.44	21.35	21.26	21.18
Consumption	376679	405823	436258	469057	502254	535903	569650
Load factor (percent)	67.73	67.76	67.80	67.83	67.88	67.90	67.91
Peak load (MW)	63490	68373	73458	78936	84466	90093	95757

Source: The Planning Commission.

However, the actual demand for the years 1996–99 has been lower than the demand as projected by the 15th EPS. This has resulted in reduced deficits in energy demand and peak demand in spite of considerable slippages in capacities in the 8th plan. The demand deficits as projected by the 15th EPS and the actual deficits are indicated here:

	1996	1997	1998	1999
Energy demand (billion units)				
Demand 15th EPS	377	406	436	469
Actual demand	390	413	425	447
Supply	354	366	390	420
Energy shortage—15th EPS (percent)	6.01	9.84	10.53	10.41
Energy shortage—Actual (percent)	9.15	11.51	8.05	5.90
Peak demand (MW)				
Demand—15th EPS	63490	68373	73458	78936
Actual demand	60981	63853	65435	67905
Peak demand met	49836	52376	58042	58445
Energy shortage—15th EPS (percent)	21.51	23.40	20.99	25.96
Energy shortage—actual (percent)	18.28	17.97	11.30	13.93

As is apparent from the table, actual energy and peak demand deficits have been significantly lower than those in the 15th EPS. The deviation in actual energy demand from the projections of the 15th EPS has occurred on account of lower load growth. The reduction in demand has occurred primarily in the industrial and commercial sectors (20 percent and 12.5 percent respectively). A regional analysis indicates that actual demand growth was lower than the demand growth projected in the 15th EPS by 20 percent in the northern region and 17 percent in the eastern region.

The reduction in peak load requirement is further higher due to the deviation from the load factor of 68 percent being used by the 15th EPS from the actual load factor of 78 percent as experienced by the SEBs in the period 1996–1999. In view of the above, the demand forecast by the 15th EPS has been modified to reflect the past experience of actual demand shortages. Further, demand side measures like accurate metering, time of the day pricing, peak tariff, etc. are expected to reduce the demand. The modified demand forecasts based on the past shortages and the December 1999 draft of ‘A base paper on demand projection’ are given in the following table:

	2000	2001	2002	2003	2004	2005
Total	35722	38188	40854	436587	466073	497136
T&D losses (percent)	32.14	22.82	22.52	22.12	21.75	21.39
Energy	46475	49479	52729	560585	595650	632390
Load factor	70.93	70.95	70.95	70.96	70.96	70.97
Peak load (MW)	74798	79614	84849	80182	95829	101715

The region-wise energy and peak load consumption for the 9th, 10th, and 11th plan periods have also been revised to lower levels as given in the following table:

	<i>Energy demand (MU)</i>			<i>Peak demand (MW)</i>		
	<i>2001–02</i>	<i>2006–07</i>	<i>2011–12</i>	<i>2001–02</i>	<i>2006–07</i>	<i>2011–12</i>
North	155,815	217,470	302,448	25,049	35,013	48,712
West	168,364	223,269	294,641	26,498	34,969	46,158
South	142,980	194,102	262,718	22,784	31,017	42,061
East	53,586	69,971	91,075	9,229	12,109	15,822
Northeast	6378	9429	13900	1253	1841	2722
Islands	176	280	444	38	60	94
All India	527,299	714,521	965,226	8,4851	115,009	155,569

Supply

The future supply of power in terms of setting up of fresh capacities has been estimated by CEA based on various scenarios of fuel availability. More than 80 percent of the power generation in the country is based on non-renewable energy sources like coal, gas, and lignite. The proven mineable coal reserves in the country are estimated at 72.7 billion tons against the present annual requirement of 276 million tons. However, the annual demand for coal is estimated to increase substantially by 2,012 on account of increase in energy generation. India has 84,000 MW of hydro potential of which only 21,600 MW has been utilized.

In view of the demand and the possible and optimal utilization of fuel supply, CEA has developed an optimal fuel mix for power generation to arrive at the following capacity addition requirement program.

	<i>9th plan</i>	<i>10th plan</i>	<i>11th plan</i>	<i>Total addition</i>	<i>Total capacity</i>
Hydro	9,815	8,947	28,611	47,373	69,033
Thermal	29,506	43,312	28,953	101,771	163,681
Nuclear	880	4,880	1,000	6,760	8,985
Total	40,201	57,139	58,564	155,904	241,699

However, the identified capacities that could be added are about 131,205 MW resulting in a total capacity of 215,275 MW at the end of 2011–12 as against the requirement of 241,699 MW leaving a gap of 26,424 MW. This combined with de-rating of existing capacity would lead to a gap of 28,357 MW. However, based on the modified estimates of demand, load factor as well as the reduction in T&D losses, the required capacity at the end of 2012 is about 195,000 MW, details of which are as follows:

<i>Demand estimates</i>	<i>15th EPS</i>	<i>Modified</i>
Energy required to be generated (billion units)	1,058	965
Load factor	68 percent	75 percent
Peak demand (MW)	176,647	155,569
Installed capacity required to meet peak demand (MW)	240,000	195,000
Additional capacity required (MW)	146,000	101,000

As per estimates, the state sector is expected to complete 4,000 MW of capacities, which are under implementation. No significant further capacity addition has been considered due to the lack of resources for capital expenditure.

The capacities identified for the central/joint sectors pertain to projects that are envisaged in the corporate plans of the respective CPSUs. The possibility of these capacities being added is contingent on state sector reforms.

Private investments in power generation, of about 10,000 MW, are based on the estimates of private projects which are likely to achieve financial closure based on escrow capacity/alternate credit enhancement mechanisms.

This leaves a gap of about 46,000 MW of capacities to be added by 2011–12 to meet the goal of power on demand.

It is likely that this balance requirement of 46,000 MW will also be set up by the private sector but the key requirement for the same would be substantial improvement in the health of the state sector via reforms. In the event that reforms do not take place leading to no further private investments, the CPSUs would have to meet the balance requirement of 46,000 MW. Hence, the capacities to meet this target of 195,000 MW are as follows:

	<i>(in MW)</i>
Capacity Installed till date	94,000
State sector	5,000
Central/Joint sector	40,000
Private	10,000
Total	55,000
Supply by 2012	149,000
Required capacity	195,000
Energy to be supplied by the private sector	46,000

Why Does NTPC Need Money? How Much?

NTPC has chalked out an elaborate capacity expansion program and is also entering into joint ventures for diversifying into power related activities. In order to assess the financial feasibility of its capacity expansion program, NTPC had engaged advisors to model and assess the resources and financial position of NTPC to support the program. The financial advisors submitted the final report in November 1999, after analyzing the financial feasibility in terms of the cash required to fund NTPC's equity contribution towards the capacity expansion vis-à-vis the cash available from operations. Considering inter-alia, the advisors' analysis, NTPC had firmed up its corporate plan up to 2012 and had planned a capacity addition of 20,350 MW during the period 1997–2012 (18,360 MW during the balance period 1999–2012). The total funds required by NTPC, including joint venture projects, was estimated at Rs 90,666 crore, of which NTPC's contribution was pegged at Rs 27,609 crore. Subsequently, considering the changes in technology and further assessment of projects, the capacity addition plan was marginally revised to 21,180 MW (comprising 5,200 MW of ongoing projects and 15,980 MW of new projects) involving an outlay of Rs. 106,352 crore (NTPC's contribution being Rs 32,308 crore). According to a report (March 2001) considering NTPC's lenders' covenants, etc., NTPC would be in a position to implement approximately 11,450 MW of capacity (comprising 5,200 MW of ongoing projects and 6,250 MW of new projects) at an estimated outlay of Rs 58,085 crore, with NTPC's required contribution being Rs 17,828 crore. As against this, NTPC's internal revenue availability has been projected at Rs 14,209 crore. The revised estimates of availability of funds, when compared to the contribution required from NTPC to meet the capacity addition program as envisaged under the corporate plan, leaves a shortfall of Rs 18,099 crore which would be required to be bridged for setting up 21,180 MW. Considering the above and the requirements of the now proposed additional capacity of 30,640 MW, NTPC has estimated that the same

would require an outlay of Rs 173,525 crore with NTPC's contribution being pegged at Rs 52,411 crore. Against the said requirement, NTPC is projected to have internal revenue availability of Rs 9,275 crore, thereby leaving a gap of Rs 43,136 crore. Given the above, NTPC has approached the advisors to jointly assist in estimating the financial support that NTPC would require. The advisors have undertaken a validation exercise covering the methodology adopted by NTPC in estimating the outlay and no independent verification of underlying assumptions has been undertaken. Further, as the advisors were not provided with the financial model (except for the limited purpose at NTPC's premises), no independent audit of the same has been undertaken. The advisors have looked at issues pertaining to the funds required at capacity addition levels of 20,750 MW, 24,710 MW and 30,640 MW (over the balance period up to 2012) in terms of investment requirement and shortfalls, supports required for comforts to lenders, availability of funds in debt markets, the overall nature of future funds infusion in NTPC by GoI and the impact of proposed measures for enhancing recovery of outstanding dues. Based on the schedule given by NTPC's corporate planning department, the possible phasing of the capacity addition program is as follows:

Capacity addition phasing

Capacity addition	9th plan*	10th plan	11th plan	Total
20,750 MW	500	9,900	10,350	40,185
24,710 MW	500	11,220	12,990	44,145
30,640 MW	500	11,880	18,260	50,075

* Balance period up to FY 2002.

Based on the detailed initial costing and assuming a 30:70 debt/equity mix, the estimates of funds required are as follows:

Highlights of funds required

	Rs crore		
	20,750 MW	24,710 MW	30,640 MW
Outlay on capacity addition	112,474	138,330	173,050
Average cost per MW	5.42	5.60	5.65
Investments in JVs	475	475	475
Total outlay envisaged	112,949	138,805	173,525
<i>Financing pattern</i>			
Foreign currency debt	44,990	55,332	69,220
Domestic debt	33,720	41,478	51,894
Internal revenue	34,239	41,995	52,411
Total	112,949	138,805	173,525

AVAILABILITY OF INTERNAL REVENUE

Based on the broad assumptions of tariff norms as per the order of the CERC, recovery of past dues aggregating Rs 2,283 crore through CPA IV, recovery of other past dues aggregating approximately Rs 10,000 in equal installments over the next 10 years, 90 percent efficiency in sales collection, and a cash (bank) balance of approximately Rs 3,184 crore for daily operations and contingencies, NTPC's estimated internal revenue availability for capacity addition and the gap to be bridged through financial support is as follows:

Financial support required

	<i>Rs crore</i>		
	<i>20,750 MW</i>	<i>24,710 MW</i>	<i>30,640 MW</i>
Internal revenue required	34,239	41,995	52,411
<i>Availability</i>			
Pre-dividend	26,761	27,457	25,620
Post-dividend	12,887	12,152	9,275
<i>Gap</i>			
Pre-dividend	7,478	14,538	26,791
Post-dividend	21,352	29,843	43,136

It can be observed from the above that while NTPC is estimated to have approximately Rs 25,620 crore available to it from its operations, in view of the requirement of dividends to be declared and paid to GoI, the net revenue availability is expected to reduce to Rs 9,275 crore. In addition, it may also be mentioned that the above table presents the overall picture up to 2012, while the actual funds flow on a year-to-year basis would require temporary additional support to adhere to financial covenants stipulated by the lenders. The estimated quantum of such support is as follows:

Support to meet covenants

	<i>Rs crore</i>		
	<i>20,750 MW</i>	<i>24,710 MW</i>	<i>30,640 MW</i>
Support for DSCR	8,105	9,512	10,011

It may be clarified here that since the nature of support would be temporary in nature, the levels indicated in the table above represent only the highest amount required (and not a cumulative sum) over the period up to 2012. However, it may also be noted that the said quantum of support is seen to be required in the years 2010-12, with much lower amounts in the previous years.

How has NTPC Financed itself? What are its Implications?

An analysis of NTPC's financial statements shows that NTPC has progressively financed its operations from internal resources and appears to have a large leveraging ability to meet its future capacity expansion plans. However, considering the physical level of outstanding debtors and their age profile, and the maturity profiles of the contracted debts, there would be a strain on the debt service coverage ratio, which would limit NTPC's borrowing capacity. Further, it can be observed that EPS is low at Rs 438 (for comparison purposes, Rs 4.38 per equity share of Rs 10) while that of some listed power sector companies is in the range of Rs 20–25. Thus, while NTPC is earning nearly 15 percent on its net worth, the same is not reflected in other profitability ratios and this might hinder any equity-raising program from the capital markets.⁷

⁷ Although academicians have argued for many years that EPS does not matter, the investing community continues to pay attention to EPS.

HOW SHOULD NTPC FINANCE NOW? DEBT OR EQUITY OR SOME COMBINATION?

From the foregoing analysis, it appears that the overall funding gap of NTPC for the proposed capacity addition of approximately 30,000 MW is nearly Rs 53,147 crore. However, in view of the nature of the funds required, it is recommended that the actual fund-based support be considered at Rs 43,136 crore—with the balance Rs 10,011 crore being in the form of non-fund based support, such as a cash shortfall guarantee, as the requirement of the same would be contingent upon the event of NTPC being unable to service the debt requirement for a particular year. Further, as discussed, the majority of this support for meeting lenders covenants is required in the last few years of the 11th plan period. In case NTPC is able to shore up its collections, the said funds may not be required.

As regards the balance amount of Rs 43,136 crore, it needs to be mentioned here that an expert group headed by Sri Montek Singh Ahluwalia (deputy chairman of the Planning Commission) has recently submitted its recommendations for settlement of outstanding dues by the SEBs. According to rough estimates, it is expected that if the expert group recommendations were implemented in letter and spirit, NTPC would be in a position to have an additional sum of approximately Rs 20,000 crore available to it.

However, it needs to be mentioned here that the recommendations of the expert group are being reviewed by a panel headed by Sri N K Singh (member of the Planning Commission) and the Chief Ministers' conference is of the view that the expert group's report on phase I (out of phases I & II) may be accepted—as of now—with detailed and specific state-wise recommendations being required as an integrated part of the phase II report. There exists an uncertainty on the final view that would be taken on the expert group's report.

Notwithstanding the above, when analyzed, it is clear that the shortfall of Rs 43,136 crore includes Rs 16,345 crore paid out as dividend by NTPC to the GoI. Assuming that the GoI would plough back the said funds into the power sector, the additional funds that would be required would be the lower pre-dividend figure of Rs 26,791 crore. Further, assuming that only 50 percent of expected funds as a result of the expert group recommendations are actually available to NTPC over a period of time, the basic minimum additional funds support from GoI would be approximately Rs 17,000 crore.

It is estimated that NTPC's debt requirement would be of the order of about Rs 121,114 crore. Considering the depth of the financial markets, the said funds would be available, albeit issues such as exposure of lenders to a particular sector/single company would need to be addressed by GoI as and when the need arises.

Depth of domestic financial markets

	<i>Rs crore</i>
Aggregate funds in the Indian financial markets	3,765,000
Projected funds available for infrastructure sector (25 percent)	941,000
Share of power sector (15 percent)	141,000
Rupee debt requirement of NTPC	51,894

The market depth above assumes a uniform growth rate of 15 percent for all sectors and it considers incremental funds that would be available in the system till 2012 based on past trends as reported in the RBI Report on Indian Financial Market Performance.

While the availability of foreign currency funds is not considered a constraint, issues regarding cost of borrowings, tenures, etc., would need to be weighed and would depend on the financial strength of NTPC at the time of such borrowings.

Considering the foregoing, NTPC should consider a cash support of approximately Rs 17,000 crore from GoI. This would be additional support that GoI would need to commit, apart from ploughing back the dividends declared by NTPC. Further, NTPC would need to seek short-term support, either by way of interim financing or guarantees to the extent of Rs 10,011 crore, to meet the covenants stipulated by NTPC's lenders.

THE DISINVESTMENT (OF GOI'S STAKE) OPTION

NTPC has been a star performer in the government's portfolio; it has regularly paid dividends with payout ratio within a range of 19–24 percent. GOI is the sole equity holder of NTPC's shares. The CAGR of income has been 17.95 percent during 1997 and 2001. The financial highlights of NTPC are presented here:

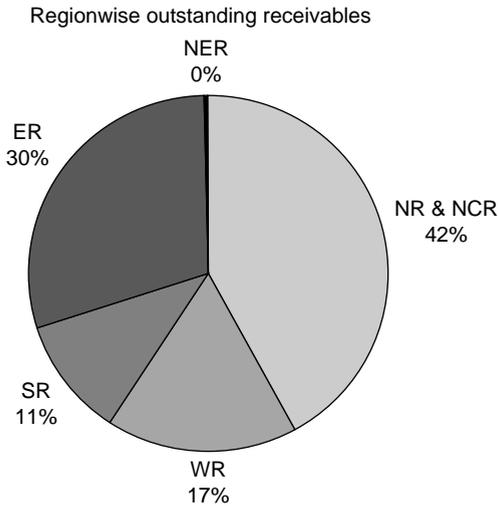
	<i>(Rs crore)</i>				
<i>Year ending March 31</i>	<i>2001</i>	<i>2000</i>	<i>1999</i>	<i>1998</i>	<i>1997</i>
Capital employed	33,045	29,760	27,158	25,253	21,957
Equity capital	7,813	7,813	7,713	7,546	7,404
Net worth	25,307	22,879	19,927	16,845	14,181
Total debt	9,805	10,077	9,642	8,923	9,673
Total income	19,045	16,102	14,057	12,412	9,840
PBT	4,074	3,630	2,916	2,273	1,723
PAT	3,733	3,425	2,816	2,154	1,679
Dividend (excluding tax)	747	650	650	504	405
ROCE (percent)	13.63	13.86	13.37	12.36	11.91
RONW (percent)	14.75	14.97	14.13	12.78	11.84

- The ROCE and RONW have shown a constantly increasing trend, except for FY2001, when they have fallen slightly.
- The EPS has recorded a steady increase from Rs 2.27 in FY 1997 to Rs 4.78 in FY2001. The profit margin has also exhibited stability.
- The debt to equity ratio has fallen from 0.68 in FY 1997 to 0.39 in FY2001.
- The dividend payout has been within a range of 19–24 percent for the same time period.

Receivables Analysis

	<i>(Rs crore)</i>		
<i>Year ended March 31</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>
Total income	14057	16102	19045
Monthly income	1171.42	1341.83	1587.08
Sundry debtors	7334	8209	9585
Receivables turnover ratio	6.26	6.12	6.04

The receivables of the company from the SEBs have declined from 1999 to 2001. The debtors balance as on March 31, 2001 was Rs 9,585 crore. This is equivalent to six months of sale.



The outstanding dues shown here exclude the outstanding surcharges (Rs 8,635 crore). The corporation has been trying to reduce outstanding dues. Some of the measures adopted are:

- Opening of letters of credit to cover current billings,
- Special incentive schemes,
- Negotiation with state governments/SEBs, and
- Central appropriation.

The implementation of the MSA recommendations will help in improving the receivables situation of NTPC. The analysis of NTPC's performance would be incomplete without comparing it with other power generating companies listed in the stock market. Two companies namely BSES and Tata Power are somewhat similar in operations—though Tata Power's business operations are more similar to that of NTPC's.

Comparing the overall performance measures

Company name	Year ending March 31	2001	2000	1999	1998	1997
NTPC	ROCE (percent)	13.63	13.86	13.37	12.36	11.91
	RONW (percent)	14.75	14.97	14.13	12.78	11.84
BSES	ROCE (percent)	12.56	15.33	14.84	14.17	12.24
	RONW (percent)	13.14	13.72	13.52	15.01	13.73
Tata Power	ROCE (percent)	14.92	12.68	12.71	14.69	14.13
	RONW (percent)	12.19	10.93	10.37	11.11	8.87

Comparing the Profitability Measures

The EPS of NTPC is low compared to that of other companies. However, NTPC has higher profit margins than those of BSES and Tata Power. The reason is that both Tata Power and BSES have higher debt/equity ratios.

For instance, in FY2001, NTPC's D/NW was 0.39; whereas it was 0.77 for BSES and 0.67 for Tata Power.

Company name	Year ending March 31	2001	2000	1999	1998	1997
NTPC	Profit margin (percent)	20	21	20	17	17
	EPS (normalized to Rs 10)	4.78	4.38	3.65	2.85	2.27
BSES	Profit margin (percent)	18	16	15	12	9
	EPS (normalized to Rs 10)	22.34	21.02	18.50	18.23	14.79
Tata Power	Profit margin (percent)	12	17	15	14	10
	EPS (normalized to Rs 10)	19.69	20.08	14.00	13.92	9.91

The disinvestment option involves the sale of equity capital currently held by the Government of India in NTPC, either to retail/institutional/strategic investors. Otherwise, NTPC could issue fresh equity—in which case, GOI would continue to hold its stake in NTPC but its proportion in the enlarged equity share capital of NTPC would come down subsequent to the issue of additional shares. The entire proceeds of the issue of the share capital would go to NTPC. This method is preferable if NTPC would like the proceeds raised to remain in and be invested in the NTPC projects. A sale of equity has the following dimensions:

Nature of Sale

This could either be a trade sale or an initial public offering (IPO), or a combination.

Initial Public Offering (IPO)

This is a form of private sector involvement wherein the divesting company or the holding company issues share capital in the capital markets. Instead of the shares being sold to one/few strategic investors, they are sold to retail investors. An IPO, by nature, does not aim to bring in new management practices. A public listing would, however, bring in additional obligations like disclosure and reporting which may lead to some improvements in efficiency and work practices.

Trade Sale

This is a form of private sector involvement in which a block of equity of a corporation is sold to an investor or a consortium with expertise in the industry to which the company belongs. This method of private sector participation would be preferable if NTPC wants to bring in a strategic investor into the new entity. The investor adds value by getting actively involved in the affairs of the new entity. A trade sale will also allow introduction of new skills and expertise. Clearly, this option will also follow the guideline of GOI of inviting private sector participation in the field of power so as to introduce private sector management practices and attracting the required investment. In addition, the experience in such transactions indicates that a trade sale is typically likely to realize higher value than other options. Outright trade sale of 100 percent equity of all the electricity companies in Australia has been done. It is also possible to sell less than 100 percent of the equity of such companies by trade sale.

Timing of Sale

The options available to NTPC would be to offer all the equity for sale simultaneously or on a staggered basis. The advantages of a *one-time offer* are that it would help in raising the entire quantum of resources

required by NTPC at one instance thereby reducing any time lag. A *staggered* sale, on the other hand, offers flexibility in matching demand for and supply of funds and reduces the regulatory risk in future transactions.

IN CONCLUSION

The case of NTPC was intended to bring out the issues involved in making a very large scale investment. Many large scale investments in emerging markets are funded by syndicated loans, Rule 144 A bonds, and Agency (World Bank) debt. Appendix 2 presents the salient features of various methods of disinvestment.

APPENDIX 1: ESTIMATION OF EXTERNAL FUND REQUIREMENT

Debt: Equity for projects = 70:30		Figures for sale of generation arrived at using CEA tariff structure		
		<i>Total</i>	<i>10th Plan</i>	<i>11th Plan</i>
Total capacity expansion (FY 2002–12)	(MW)	19,970	9,160	10,810
Funds required for thermal capacity expansion	Rs crore	95,783	55,902	39,881
Funds required for hydro projects – Kol Dam	Rs crore	4,856	4,545	311
Funds required for wind power projects	Rs crore	–	–	–
Funds for capacity expansion	Rs crore	100,639	60,447	40,192
Funds required for JVs and R&M	Rs crore	4,112	2,890	1,222
Total funds required	Rs crore	104,751	63,337	41,414
Financing				
To be financed by Equity/IR	Rs crore	34,158	20,878	13,280
To be financed by debt	Rs crore	70,594	42,460	28,134
To be raised in foreign currency	Rs crore	40,721	24,555	16,166
Equivalent US dollars	\$ million	6,557	4,234	2,323
To be raised through local borrowings	Rs crore	29,873	17,905	11,968
Gross and net IR available				
IR generation (before dividend)	Rs crore	28,882	14,419	14,463
IR generation (after dividend)	Rs crore	12,214	8,840	3,374
IR position (availability vs requirement)				
IR available (excluding opening balance)	Rs crore	12,214	8,840	3,374
IR/Equity required	Rs crore	34,158	20,878	13,280
IR shortfall	Rs crore	21,944	12,038	9,906

IR position (cumulative)	Rs crore												
	Mar 2003	Mar 2004	Mar 2005	Mar 2006	Mar 2007	Mar 2008	Mar 2009	Mar 2010	Mar 2011	Mar 2012	Mar 2013	Mar 2014	Mar 2015
Opening balance	737	(891)	(2,103)	(4,847)	(8,390)	(11,301)	(13,763)	(13,152)	(14,662)	(15,410)	(21,207)	(27,241)	(30,220)
IR available post dividend this year	697	2,003	2,294	1,920	1,926	2,467	4,592	983	382	(5,050)	(5,653)	(2,843)	(1,816)
IR - Used for Capex	2,325	3,215	5,038	5,463	4,837	4,929	3,981	2,493	1,130	747	381	136	1
Closing balance	(891)	(2,103)	(4,847)	(8,390)	(11,301)	(13,763)	(13,152)	(14,662)	(15,410)	(21,207)	(27,241)	(30,220)	(32,037)

Borrowing requirements	Rs crore												
	Mar 2003	Mar 2004	Mar 2005	Mar 2006	Mar 2007	Mar 2008	Mar 2009	Mar 2010	Mar 2011	Mar 2012	Mar 2013	Mar 2014	Mar 2015
Total debt requirements	5,083	6,167	10,205	11,257	9,748	10,525	8,526	5,298	2,219	1,566	889	317	3
Foreign currency debt	2,323	3,809	6,014	6,664	5,745	6,071	4,894	3,038	1,268	895	508	181	2
\$ million	449	702	1,055	1,114	914	920	707	418	166	112	60	20	-
Local currency debt	2,760	2,358	4,191	4,593	4,003	4,454	3,632	2,260	951	671	381	136	1

APPENDIX 2: METHODS OF DISINVESTMENT

<i>Methods of disinvestment</i>	<i>Pricing</i>	<i>Target investor</i>	<i>Transaction cost</i>	<i>Time involved</i>	<i>Regulation</i>	<i>Precedents</i>
Capital markets	Decided before the transaction; at a discount to market to ensure success and immediate capital appreciation for investors	Mix of retail and wholesale, with some reservation for small investors	High, in the range of 4–5 percent depending on issue size	3–4 months	SEBI guidelines, stock exchange requirements	Offer of 10 lac shares of VSNL @ 750 per share
Offer for sale to public through book building	Better price discovery through a bidding process for investors	Essentially wholesale, with minimum 25 percent retail (10 applicants, per lac of capital issued)	High, in the range of 5–6 percent depending on issue size	2–3 months	SEBI guidelines, stock exchange requirements	None among PSEs—Hughes Software Ltd. and HCL Technologies Ltd.—in the private sector None
Secondary market operations	At market prices	Essentially wholesale	Low, in terms of brokerage	Spot transactions	stock exchange requirements	

Table contd.

Table contd.

<i>Methods of disinvestment</i>	<i>Pricing</i>	<i>Target investor</i>	<i>Transaction cost</i>	<i>Time involved</i>	<i>Regulation</i>	<i>Precedents</i>
International offering	Valuation by international qualified institutional buyers (QIBs) (through book building) and related to domestic market prices	Essentially foreign institutional investors	High, in the range of 4–5 percent depending on the size of the issue	3–4 months	Disclosure requirements by Securities Exchange Commission (SEC) and accounting in accordance with the US Generally Accepted Accounting Practices (GAAP) for ADRs, NASDAQ/NYSE/ LSE listing requirements	VSNL, MTNL, GAIL
Private placement of equity	Valuation by merchant banker and feedback from institutional investors or price discovered through book building.	Essentially institutional including multilateral agencies, private equity funds	Low	1–2 months	Foreign investment guidelines in case of overseas investors	CONCOR, GAIL (Domestic issue with FII's participation)
Auction rounds	In case of Dutch auction, allotments made at single price. In case of French auction, allotments made at bid price. Optimization through competitive tension and control premium	Essentially institutional	Low	1–2 months	SEBI take-over code	Initial 9 of disinvestment
Strategic sale BALCO,		Investors with strategic fit—techno-commercial	Low	6–10 months	Companies Act, SEBI Take-over code, stock exchange, RBI	MFIL, CCI (Yerraguntla unit), Vikrant Tyres, OPGC, etc.

Special Topic: Project Financing

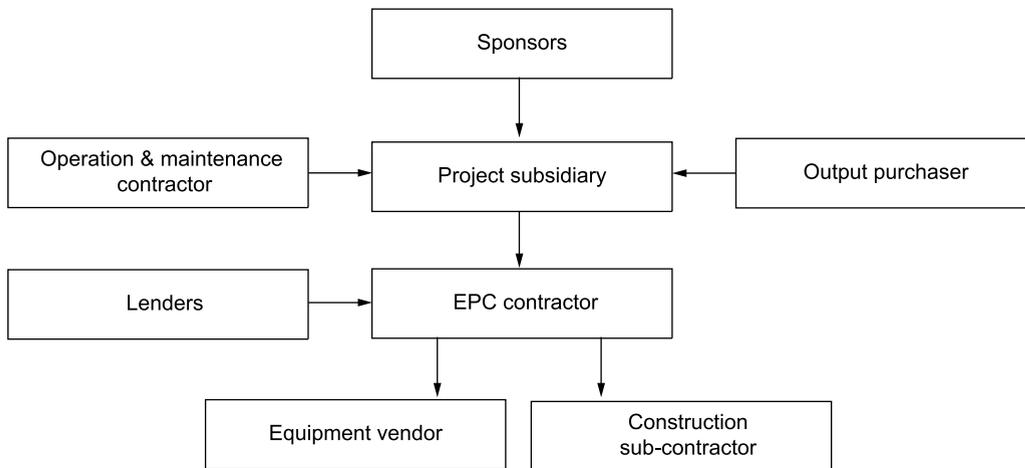
OBJECTIVES

- ◆ Provide an overview of the project finance market.
- ◆ Introduction to project financing as a means to achieve financial objectives.
- ◆ Provide a rationale for project finance.
- ◆ Provide an overview of sources of project finance and the role of multilateral agencies.
- ◆ Sensitize students to valuation issues in project finance settings.

Project finance is a method of financing an economically viable project on the basis of the cash flows it is expected to generate. The project is a separate legal entity and its cash flows are segregated from the sponsoring organization. The sponsor may be the main user of the project's output, contractor or supplier, a consortium or a government. The revenue generated from the project should be adequate to cover all operating expenses, debt-servicing burden and provide an adequate return to the equity investors. This enables the sponsors to shift the operating risk and debt-servicing burden to the project entity while retaining some benefits from the project. Project finance is usually restricted to large-scale, capital-intensive projects and often involves a high proportion of debt finance provided by a group of lenders. Toll roads, tunnels, bridges, ports and power projects are general candidates for project financing.

Project finance is not dependent on the credit support of the sponsors of the project but on the expected cash flows and/or the collateral value of project assets. Typically, lenders have no recourse to the sponsor in case of project failure. As a result, lenders should have a high degree of confidence in the performance of the project. Accordingly, extensive feasibility studies are necessary so that cash flow projections are accurate. As one project is not like the other, project finance package should be custom built and careful financial engineering is required to allocate risks and rewards among the participants. Project financing is ideal when the project's output has a strong demand and parties are willing to enter into long-term contracts. A typical project structure is shown in Exhibit 27.1.

The construction, operation and maintenance contractors are responsible for timely completion and effective maintenance respectively. The project sponsor undertakes bidding, financing, and implementing. The complexity of the documentation necessitates the retention of a law firm, at least in the case of large-scale international projects. The Hub project in Pakistan, Petrozuata in Venezuela, and the Mozal project in Mozambique are some of the prominent project finance transactions.

Exhibit 27.1 Project structure

BENEFITS OF PROJECT FINANCING

Project financing provides certain advantages vis-à-vis conventional financing. Some of these advantages are:

- Sharing of risk,
- Reduced agency cost of debt,
- Reduced agency cost of free cash flow,
- Expansion of sponsor's debt capacity, and
- Reduction in costs of information asymmetry.

Sharing of Risk

The risks associated with a project may be so great that it may not be possible for one organization to bear them alone. Project financing involves sharing of risk among project participants who are equipped to handle them efficiently. Project risks can be broadly classified as operating and financial. Technology risk, performance risk, and completion risk are some of the operating risks whereas interest rate risk and currency risk are financial risks. Exhibit 27.2 illustrates the different phases of a project and risks associated with each of the phases of a project and their sharing.

The terms shown in Exhibit 27.2 are explained in Appendix 1. The risk of death or injury on the operating facility is called liability risk. The risk that a sponsor may not meet quality standards or deadlines is called sponsors performance risk. The risk that the project revenue may not meet projections because of changes in market price is called offtake risk. The size of the project itself can be a source of risk if the outcome is strongly correlated with returns from other businesses of the group so that losses coincide. Once the risks are identified, suitable mechanism should be evolved to cover each of them. For instance, sponsors may be asked to subscribe to equity to cover technology risk during the developmental phase. A major source of risk

Exhibit 27.2 Risk sharing among project participants

<i>Project phase/risk</i>	<i>Participant</i>
Developmental phase	
• Technology risk	Sponsors
• Credit risk	Banks, developers, sponsors
• Bid risk	Sponsors, financial advisors
Construction phase	
• Completion risk	Contractors, sponsors, suppliers
• Cost over-run risk	Sponsors, sub-contractors
• Performance risk	Sponsors
• Political risk	Sponsors
Operating phase	
• Performance risk	O&M contractor
• Cost over-run risk	Sponsors
• Liability risk	Government, insurance companies
• Offtake risk	Sponsors, consumers

Source: Biedelman, Carl R et al. (1990).

in a project is the completion risk which refers to the actual costs of constructing the project exceeding the estimated costs, the completion date may be subject to unexpectedly long delays; the facility may be incapable of producing the output in the right quantity and quality as originally planned. Project level risks are usually mitigated through contractual agreements. Sponsors minimize revenue exposure to changing market conditions through sales or revenue contracts. Exhibit 27.3 presents a summary of the risks, participants and mechanisms (to cover risk). Risks can vary according to the nature of the project. For instance, market demand and interconnectivity charges are sources of risk in case of telecommunication projects whereas low asset coverage and low toll collections are the risk factors in case of road projects.

Agency Cost of Debt

An agency relationship is a contract under which one or more persons (the principal/s) engage another person (the agent) to perform some service on their behalf, which involves delegating some decision making authority to the agent. If both are utility maximizers, then there is good reason to believe that the agent will maximize *his* utility. So the principal may have to incur monitoring costs to check his behavior and limit divergence. The principal may suffer reduction in welfare due to divergence of interest. Agency cost is the sum of monitoring costs and residual loss. Agency cost arises whenever there is a cooperative effort even when there is no agency relationship. Agency cost can arise due to conflict of interests between shareholders and managers, shareholders and bondholders. Bondholders suffer opportunity wealth loss due to a firm's investment, financing and dividend decisions. If the firm sells bonds, and the bonds are priced assuming that no additional debt will be issued, the bondholders' claim gets diluted if the firm issues additional debt of the same or higher priority. Due to claim dilution, bondholders suffer capital loss. There is another form of agency cost. A company suffering losses may be tempted to take on business gambles, the gains from which largely go to shareholders, whereas if they fail shareholders have little to lose and it is the lenders who suffer. It's a heads-I-win, tails-you-lose situation. Smart bondholders recognize the incentive faced by shareholders and make estimates of the behavior of shareholders. The price bondholders' pay for the issue will be lower to reflect the possibility of subsequent wealth transfers to stockholders. Bondholders try to protect themselves with restrictive loan covenants. The loan covenants may lead to reduced efficiency and lower firm value. Since the nature and boundaries of the project in the case of project finance are clear, lenders are less exposed to agency cost. This may result in lower interest cost and higher firm value.

Exhibit 27.3 Mechanism to cover risk

<i>Project phase/risk</i>	<i>Participant</i>	<i>Mechanism</i>
Developmental phase		
• Technology risk	Sponsors	Equity or subordinated debt
• Credit risk	Banks, developers sponsors	Letter of credit Credit rating
• Bid risk	sponsors, Financial advisors	Equity Success fee
Construction phase		
• Completion risk	Contractors Sponsors Suppliers	Performance guarantee Turnkey contracts Performance guarantee
• Cost over-run risk	Sponsors Sub-contractors	Fixed-price contracts Completion bonds Fixed-price contracts Completion bonds
• Performance risk	Sponsors	Performance guarantee
• Political risk	Sponsors	JV with public partner
Operating phase		
• Performance risk	O&M contractor	Equity, performance guarantee
• Cost over-run risk	Sponsors	Fixed-price contracts
• Offtake risk	Sponsors Consumers	Take or pay, Take and pay Advance payments

Source: Biedelman, Carl R et al. (1990).

Free Cash Flow Problem

Free cash flow is the residual cash flow available to managers after meeting the normal investment and debt servicing needs. Managers have discretion over the use of free cash flow in the sense that they can return it to shareholders or reinvest in some other business. Left to their own device managers may pursue negative NPV projects for the sake of growth leaving the shareholders in the lurch. Project financing can give investors control over free cash flow. Since the project has a finite life, the free cash flow is typically redistributed to shareholders who in turn decide where to invest their money (agreements prevent the siphoning of project cash flows through dividends or other channels). Moreover, heavy debt financing in the case of project finances enforces financial discipline on managers.

Expansion of Sponsors' Debt Capacity

As pointed out earlier, project finance is not dependent on the credit support of the sponsors of the project but on the strength of the contractual arrangement between parties and expected cash flows. This means that the sponsor who does not have a high credit rating can also lever up on the basis of the project related contracts—more specifically, the one with the output purchaser. This enables the sponsor to avail the benefit of debt—the tax shield and, hence, higher firm value. The projects undertaken by project companies generally have low bankruptcy costs, as their assets are largely tangible assets that are not affected by the bankruptcy process.¹ For instance, a change in ownership in the case of a power project or toll road is not likely to affect

¹ Breal, Richard et al. (1996).

its efficiency. Further, if the bankruptcy costs of the sponsor are higher than that for the project company, it is beneficial to isolate the debt in the project company.

Inside Information

Information asymmetry occurs when the management of a company has valuable information about the earning prospects that investors do not have, may be because the managers are unwilling to disclose information due to strategic reasons or the information is too technical and complex to be communicated. Project financing reduces the cost of information asymmetry particularly in the case of large-scale, high-risk projects as project finance involves a small group of investors.

Other Advantages

Project financing can provide clearer information to investors as the project is separately identifiable. Consequently, the effect of the project's failure on the share price of the parent company may be less. The performance of the project's managers can be assessed more accurately in the case of a stand-alone project. More important, managerial incentives can be tied to the performance of the project.

TYPES OF CONTRACTS

Long-term agreements relating to purchase and sale are a characteristic of project finance. Some of the widely used types of contracts are:

- Take-or-pay contract
- Take-if-offered contract
- Hell-or-high water contract
- Throughput agreement
- Put-or-pay contracts.

In a take-or-pay contract the purchaser is obligated to pay for the output regardless of whether the purchaser takes delivery or not. But the purchaser has the option to take delivery. Also the purchaser is not obligated to pay if the project is unable to deliver the output. Payments under take-or-pay contracts may be set to cover all fixed costs or may cover only a part of the project's capacity.

A take-if-offered contract is similar to the take-or-pay contract except that the purchaser has the obligation to take delivery.

In a hell-or-high water contract, as the name suggests, the purchaser has the obligation to pay for the output regardless of whether the output is delivered or not. Obviously, such a contract is in the interest of the lenders as they get more protection.

Many oil pipeline loans involve a throughput agreement. In a throughput agreement if other companies do not make sufficient use of the pipeline, the owners themselves should ship enough oil through it to provide the pipeline company with the cash it needs to service the loan.

Put-or-pay contracts provide for a secure supply of project raw materials. If the supplier is unable to provide the inputs, it agrees to indemnify the project company for excess cost incurred in securing the inputs

from third parties, or, if third party supply is unavailable, for revenue losses due to the project's inability to comply with the offtake agreements.

Financial Agreements

Although project finance, in its pure form, involves lending with no recourse, we do not see it in reality. Lenders look for financial agreements and guarantees for comfort. A financial guarantee could take the form of a letter of credit or a guarantee from a financially sound third party such as a bank. Some of the ways in which a sponsor can provide guarantees are:

- **Cash Deficiency Agreement:** Under this agreement, the project's owners agree to provide the operating company with enough funds to maintain a certain level of working capital.
- **Capital Subscription Agreement:** Under this agreement, one or more creditworthy parties are required to purchase securities for cash when the project company experiences cash shortfall.
- **Claw-back Agreement:** Under this agreement, the sponsors are required to return cash benefits back to the project when there is a shortfall. The amount depends on the dividends and other benefits received by the sponsors (from the project).

Claw back agreements, also called cash traps, ensure that lenders continue to receive timely payments. For example, if the project were not able to maintain the DSCR (debt service coverage ratio) no dividend distributions would be allowed. If the non-compliance persists, the project may be considered in default and lenders may seize all cash flow to prepay debt.

The concession agreement between sponsors, SPV and the local authority gives the SPV the right to recover the project costs and operation and maintenance (O&M) costs through the levy of fees over the concession period (say 30 years). The base fee rate set in the concession agreement is indexed to the consumer price index to protect the revenue potential from being eroded by inflation.

The shareholders agreement specifies the inter se rights and obligations of the shareholders. It includes understanding between shareholders in relation to their shareholding, management of the company, constitution of the board, reorganization of the company, dividends, capital expenditure, material amendment to the project document, etc.

Public-Private Sector Partnerships

Until recently, much of the financing of infrastructure development in many countries came from government sources, multilateral institutions and export financing agencies. Quite often, governments in emerging markets lack the financial capacity or creditworthiness to support the volume of infrastructure projects required to develop their economies.

In case of large infrastructure projects it is becoming inevitable for the public and private sectors to come together and jointly apply their skills and strengths to develop the project more quickly and efficiently. The joint venture between Railtrack and British Rail in the UK to set up a high-speed rail project is an example of such a partnership. Such partnerships try to involve the private sector in the process of designing, building, financing and operating public utilities. The government defines the services required, makes arrangements that enable the private sector to be the service provider and ensures that public services will be delivered at a specified quality at competitive prices. A number of public-private financing structures exist. Some of the schemes that can achieve the objectives are:

- Build–Operate–Transfer (BOT) Model
- Build–Transfer–Operate (BTO) Model
- Buy–Build–Operate (BBO) Model

In a BOT model, a private entity gets the mandate to finance, build and operate the project (which is otherwise a public sector project) for a specified period of time (say 25 years) at the end of which ownership reverts to the local government. Typically, the sponsoring organisation makes an equity investment of 20 to 30 percent of the project cost and the rest is raised from international banks, multilateral agencies and domestic financial institutions. The host government generally gives a concession to carry out the construction and operation of the project and credit support for project borrowings. The license agreement clearly spells out the commercial and financial terms. The BOT concept has been used in transportation (e.g., roads), energy (e.g., power projects), sewage and water treatment plants and hospitals.²

In a BTO model, the private entity transfers the facility to the government soon after the project clears the completion test and leases it back for a specified period of time. The project company runs the facility and collects revenues during the lease term. At the end of the lease term the title passes on to the government (or the public sector entity).

In a BBO model, a private entity buys an existing facility, modernizes it, and operates it as a for–profit, public use facility. In many developing countries where existing facilities require modernization/expansion, the BBO model is ideal. Roads and bridges are candidates for this model.

A typical project goes through the following phases:

- Planning,
- Implementation,
- Construction,
- Operation, and
- Transfer.

During the planning phase, the government identifies the need for a service, identifies the quality and quantity of service required upon identification of the project, the government invites bids from qualified service providers. The most cost efficient bid is awarded the contract. Once the contract is awarded, the contractor begins detailed engineering, design and construction work, usually under a fixed price contract. Upon completion, the project is tested for its suitability. If the project clears the hurdle, the private sector participant gets to run the project for a specified period of time after which it reverts to the public sector entity (or government). Exhibit 27.4 presents the different phases in a BOT scheme.

Funding Aspects

Although the financing package for a project is tailor-made, the basic form of funding remains the same, namely, equity and debt. Project debt is either of the non-recourse or limited recourse type. Commercial banks remain the most important source of project financing. Some banks have set up subsidiaries to serve the growing need of infrastructure. Bank loans can be either secured or unsecured. They may involve a single bank or a syndicate of banks. These loans are either fixed rate or floating rate and have tenors ranging from 5–10 years.

² See Appendix 1 at the end of the chapter for a brief description of different phases in a BOT scheme.

In addition to the contractual arrangements between the parties, government may provide supplemental counter guarantee to comfort the lenders. Traditionally the multilateral agencies like Asian Development Bank (ADB) and International Finance Corporation (IFC), Washington, have been active in funding infrastructure projects. For instance, IFC has financed CESC's 250 MW coal-fired power station in Budge and GVK Industries' 235 MW gas-based, combined-cycle power station in Andhra Pradesh, India.

The ADB is a multinational development finance institution dedicated to fostering economic growth and co-operation in the Asia–Pacific region, and to contributing to the economic development of its developing member countries. It was established in 1966 with its headquarters in Manila, Philippines. The bank is an infrastructure-oriented institution. The bank has financed the Bangkok Expressway in Thailand, Hopewell power project in the Philippines, Port Qasim in Pakistan and Guangzhou power project in the Peoples Republic of China among others. The bank provides both loan and equity capital.

Infrastructure funds like Global Power Investments of GE capital and Asian Infrastructure Fund have come up to provide equity to infrastructure projects. The Asian Infrastructure Fund has been set up with equity contributions from IFC, ADB, Peregrine Investment Holdings, Frank Russel Company and Soros Fund Management. Export credit agencies finance imported equipment from reputed international suppliers like General Electric, Asea Brown Boveri, Siemens, etc.

Exhibit 27.4 Build–operate–transfer model

A. Identification and definition	Preliminary feasibility study and tendering
B. Selection	Bid evaluation and project award
C. Development of the project	Form project company, negotiate contracts and agreements
D. Financing	Equity contribution from promoters, financial closure
E. Actual construction	
F. Completion	Testing and acceptance
G. Operation	Operation and maintenance
H. Transfer of assets to the government	

The syndicated credit market is an important source of project finance. Transactions with loan amount of \$750 million–\$1 billion (Rs 3,450–4,600 crore) are not uncommon. A syndicated credit is one in which two or more banks contract with a borrower to provide credit on common terms and conditions governed by a common document. Syndicated loans are floating rate loans—the interest being reset after one, two, three, or six months. The borrower chooses the interest rate reset period. One member of the group of banks (syndicate) is appointed to act as the agent for the syndicate. The agent bank coordinates all negotiations, payments and administration between the parties. A syndicated credit is usually of medium term maturity, i.e., 3–10 years; although transactions with maturities ranging within 6 months–25 years could be arranged. Dual currency loan, term loans, and stand-by letter of credit are some of the instruments in the syndicated credit market. Bank loans have a number of disadvantages like short maturity, floating interest rate and restrictive loan covenants. Insurance companies such as AIG provide both equity and debt to infrastructure projects. They can also provide both subordinated and senior debt and can provide credit enhancement to make a non-investment grade transaction an investment grade transaction. Some of the insurance companies manage emerging market funds that contribute equity to projects in emerging markets.

Sometimes *equity kickers*, such as convertible debentures and stock warrants are also issued to allow investors to share in the upside potential of the project while limiting downside risk.

Though small, the public bond market is also an important source of finance. Project bonds, unlike bank loans, have longer maturity; carry fixed interest rate and less restrictive covenants.

Tata Power Starts Work at India's Merchant Plant

Tata Power today initiated construction of the country's first merchant power plant with an installed capacity of 120 MW at Jojobera in the State of Jharkhand. Firdose A Vandrevala, Managing Director, Tata Power Company, solemnized the commencement of the project at a groundbreaking ceremony on site. On completion the total installed capacity at the Jojobera Power Plant will increase to 427.5 MW. The Merchant Power Plant will be fully operational in a record period of 24 months, i.e., by October 2005 and the power generated will be sold to Power Trading Corporation, NDPL and other consumers directly. The boiler and turbine packages for the project will be supplied by BHEL.

Tata Power is the first utility company to take advantage and implement the provisions in Electricity Act 2003. Tata Power will lay a 34 km long dedicated transmission lines from Jojobera to Ramchandrapur in Jharkhand.

Speaking on the occasion, Firdose Vandrevala, said, 'India's first Merchant Power plant is the latest in a series of pioneering initiatives by Tata Power. Our focus will be on identifying opportunities, which enable us to leverage our strengths of infrastructure and technical expertise to provide low cost, reliable power. We anticipate that Jojobera will come to be seen as the blueprint for Merchant Power Plants in the country.'

The 307.5 MW Jojobera Plant generated 1,761 MU's with an overall plant availability factor of 92.8% in FY02-03. The plant currently provides power to Tata Steel and Damodar Valley Corporation.

Source: www.tata.com

Leasing is often a viable alternative in power project financing. Leasing can be arranged to fund equipment, real estate and industrial facilities. Power plants are good candidates for leasing because of their long useful life, predictable salvage values, and well known operating characteristics.

Export credit agencies (ECAs) like the US Exim Bank offer funding if the borrower buys equipment or technology or services from a source in the ECA's country. Loans are offered in the form of buyer credit. Since the ECAs are expected to promote export from their respective countries the interest on these loans is generally low: 1-1.25 percent above LIBOR. These loans carry a maturity of 7-12 years with a moratorium of 2 years. ECA credits can be either in the form of direct loan or as a guarantee to another lending institution. Given here is a small list of projects funded by ECAs:

<i>Export credit agency</i>	<i>Project</i>
US Exim Bank	Dabhol (Enron) Roza (A V Birla) Hazira (Essar)
KfW, Germany	Gujarat Torrent (Torrent) Neyveli Lignite Corporation Bhadravati (Ispat) Vizag (Hinduja)
COFACE, France	Bhadravati
EXIM Bank, Japan	Vizag Bakreshwar Project

CREDIT RATING CONSTRAINTS

Issuing project bonds is a viable alternative only if the issue gets an investment grade rating. Companies in emerging markets are often constrained by their sovereign rating even though the project's economics

are robust.³ A sovereign's rating on its foreign currency obligations has been regarded as the ceiling on ratings for all issuers domiciled in the country. The assumption is that a sovereign default will force all domestic issuers to default.

For the purpose of rating project finance transactions, rating agencies like Standard & Poor's and Moody's review the technical and construction risks, financial projections, political risk and currency market volatility. S&P bases its evaluation on:

- Engineering and design, Choice of technology, Operating history of similar projects and experience with other rated projects
- Independent engineer's report on the technical feasibility of the project
- Political and legal support to the project
- Controls for management of construction funds
- Achievability of construction schedule and budget
- Creditworthiness of the EPC contractor to honor contingent liabilities
- Construction contractor's experience and reputation
- Testing and commissioning procedure
- O&M expertise, planning, budgeting and staffing details
- Quality of cash flows, financial and sensitivity analyses.

THE ROLE OF BILATERAL AND MULTILATERAL ORGANIZATIONS

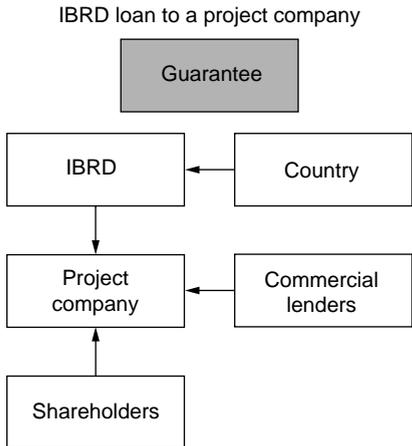
The World Bank group provides a variety of support to infrastructure projects in developed and developing countries. The group consists of the International Bank for Reconstruction and Development (IBRD), the International Development Association, the International Finance Corporation and the Multilateral Investment Guarantee Agency (MIGA). The IBRD provides loans to middle-income countries whereas IDA supports poorer developing countries. IBRD lends at rates slightly higher than those available to AAA borrowers. IBRD can either lend to the project entity directly or to the host government, which in turn can lend to the project. Within the World Bank group, the IFC and MIGA are active in supporting private sector projects. IFC supports both equity and debt financing. It assists companies through the syndicated B-loan program, security and underwriting. MIGA provides political risk insurance primarily for equity. Other multilateral agencies like Asian Development Bank, European Development Bank and European Bank for Reconstruction and Development also provide guarantees. Bilateral agencies like Export Import Bank often provide guarantee in association with the World Bank.

World Bank Guarantee Program

The guarantee program of the World Bank tries to address the need to offer political risk mitigation products to enable implementation of infrastructure projects in developing countries. The Bank offers three types of guarantees: Partial credit guarantees cover debt service defaults on a specified portion of a loan or a bond.

³ Esty, Benjamin and Mathew Mateo Millet (1998). 'Petrolera Zuata, Petrozuata C.A.', HBS Case No. 9-299-012.

Partial risk guarantees cover debt service defaults on a loan to a private sector project caused by a government's failure to meet its contractual obligations related to a private project. They are 'partial' in that they cover the minimum number of risks and the smallest amount of debt consistent with successful implementation of the project. Policy based guarantees cover a portion of debt service on a borrowing by an eligible member country from private foreign creditors. The bank has recently approved to test new product-policy based guarantees.⁴



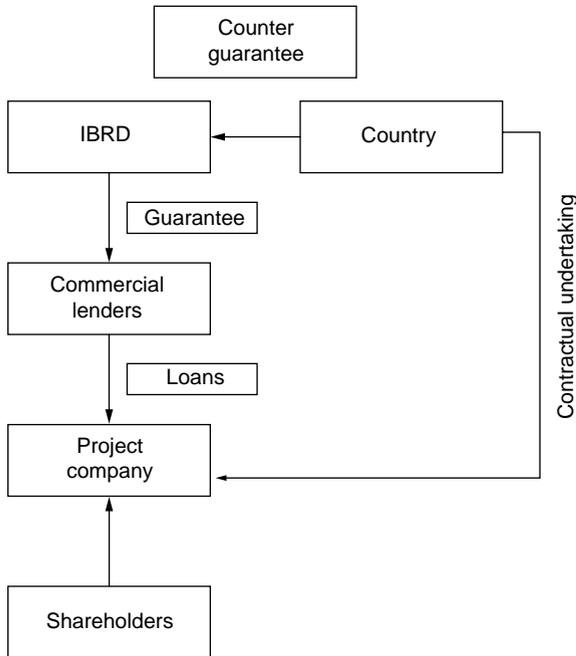
PBGs help crisis-stricken countries to re-enter international markets. PBGs are a class of partial credit guarantees that cover defaults on long-maturity interest or principal payments. Partial risk guarantees are likely to be useful to infrastructure projects located in countries that are about to attract international investors. The presence of a World Bank guarantee helps accelerate investment. Partial credit guarantee is likely to be needed where the failure to refinance as well as the pricing of loans and guarantees can be determined on the basis of the bank's knowledge of the financing market place. International Finance Corporation (IFC) is the largest multilateral source of debt and equity financing for private sector projects in developing countries. As of 1998, IFC had funded 1,138 companies in 111 countries. IFC offers a syndicated loan program (known as B-loan program) along with some 280 commercial banks and financial institutions. IFC invests through debt, equity and quasi-equity (subordinated loans and convertible loans). IFC loans have a tenor of 8 years or more and interest rates in the range of 0.5–4 percent above LIBOR. IFC also lends from its own resources (A-loan) apart from providing equity and quasi equity.

MIGA guarantees cover risks of expropriation or breach of contract by host governments, war and civil disturbance in developing member countries. MIGA guarantees are long term in nature (up to 15–20 years) and non-cancelable. MIGA's coverage for equity and equity-related investments are in addition to the World Bank guarantee products outlined here. In sum:

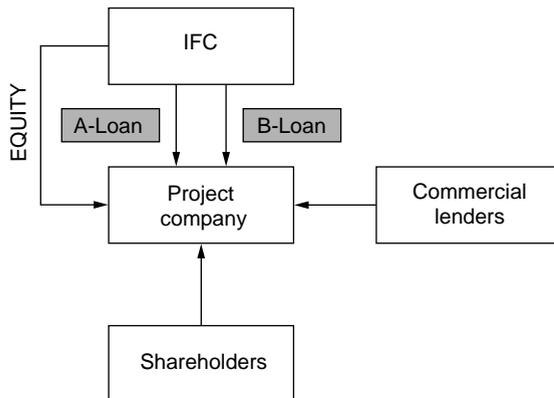
- IBRD provides loans and guarantees
- IFC provides A and B Loans, equity and quasi equity
- MIGA provides political risk insurance
- IDA lends to poorer countries.

All the four organizations may work together in a project.

⁴ 'World Bank turns to Guarantees', *Euromoney*, Sept 1999. Also see 'Bidding for Private Concessions: The use of World Bank Guarantees', RMC Discussion Paper Series 120, The World Bank.

IBRD partial risk guarantee

The IFC support is shown below:

**BENEFITS OF GUARANTEES**

World Bank guarantees benefit both borrowers and sovereign governments:

- By covering risks that the market cannot assume, guarantees facilitate access to financing that would not otherwise be available to certain projects.

- Guarantees can extend the maturity of the loan beyond loan period that would not be possible without a guarantee.
- Partial risk guarantees reduce host governments' exposure to a project.
- Credit guarantees enable borrowers to select the currency, interest rate basis (fixed or floating) and maturity to best match the project's requirements.
- The presence of bank guarantee obviates the need for a country premium usually charged by lenders.

For providing guarantee, the bank charges a standby fee, a guarantee fee, and a front-end fee. In addition, the bank may also charge an initiation fee, and a processing fee for a particular project. Charges differ from one guarantee structure to the other. The fee is usually charged in advance of each interest period and non-payment of fees results in the lapse of the guarantee. The 1292 megawatt Hub power project in Pakistan was the first private sector project to receive a World Bank guarantee.⁵ The bank's guarantee protects commercial lenders from sovereign risks associated with the project. The project achieved financial closure in 1995. A special-purpose project company, Hub Power Company, has been set up to own and operate the power station. The project cost is \$1.8 billion or Rs 8,280 crore—of which 80 percent is the debt mobilized on a project finance basis.

PROJECT FEASIBILITY STUDIES

Because of the non-recourse feature, extensive project feasibility studies are conducted. Elaborate projections are made for each of the cost and revenue items for the life of the project, profitability measures like NPV and IRR are calculated. Accounting measures like Return on investment and Return on equity are quite popular in infrastructure projects. For instance, a 16 percent return on equity is allowed in the case of power projects in India. ROE is a single period measure. The actual IRR of the project might be much lower. ROE is a function of timing of equity investment and timing of returns in case of multi-period projects. It might not be meaningful to calculate ROE as it is an accounting based measure. It suffers from the same pitfalls as ROI.

The DCF methodology requires estimation of equity cash flows or total cash flows.

$$\begin{aligned}\text{Free cash flow (FCF)} &= \text{EBIT} - \text{cash taxes} + \text{depreciation} - \text{capital expenditure} - \Delta \text{ working capital} \\ \text{Equity cash flow (ECF)} &= \text{Free cash flow} - \text{debt service} + \text{new borrowings}\end{aligned}$$

Typically, lenders expect the sponsor to maintain a debt service reserve account equal to 6 months of interest and principal payment. This amount should be deducted to arrive at equity cash flows.

If the NPV of the project is positive, the project can be accepted. This approach assumes two things:

- The capital structure remains the same throughout the life of the project and therefore a single discount rate (WACC) should be used for all the cash flows.
- The discount rate can be estimated using book value weights instead of market value weights as the latter is typically not available.

⁵ World Bank Project Finance and Guarantees, June 1995. Also see Gerrard, Michael (1995) 'Financing Pakistan's Hub Power Project', RMC Discussion Paper Series 118, World Bank.

Both the assumptions are questionable.⁶ In most project finance situations, the leverage rises from 0 percent to 60–80 percent, and then falls back to 0 percent. Therefore, using a single discount rate (WACC) is inappropriate. A project can be evaluated either from the equity investors' perspective or from the perspective of all investors. The cost of equity, which is the discount rate in the former approach, is a function of systematic risk, which depends on leverage.⁷ Calculating the project's cost of equity using the maximum leverage or average leverage gives erroneous answers. So it is necessary to calculate a different discount rate for each year based on leverage in existence in that year.

The equity beta

$$\beta_E = \beta_A (V/E)$$

where

β_A = asset beta, V and E are values of firm and equity respectively.

The asset beta can be estimated using regression analysis and a set of comparable, publicly traded companies.

To illustrate, if asset beta is 0.8, V and E are 100 and 35,

$$\text{Equity beta} = 0.8 (100/35) = 2.28$$

If risk free rate is 12 percent, market premium is 10 percent,

$$\text{Cost of equity} = 12 + 2.28 (10) = 34.8 \text{ percent.}$$

Beta and cost of equity can be estimated for each year by using actual leverage. Quite often, the capital structure is measured using book value. According to modern finance theory, investors demand returns based on market values and not book values. The two values rarely coincide. Unfortunately measuring market value of equity is difficult. The market value of equity is the present value of equity cash flows but the discount rate used to discount ECFs itself is supposed to be based on market value of equity. That is, there is a circularity problem. We can get over this problem by using the quasi market valuation.⁸ Further, DCF is unsuitable for projects characterized by varying degrees of risk resolution.⁹ For example, in case of oil exploration projects or pharmaceutical R&D projects, the exploration/research phase differs from the development and production phases in terms of risk.

IN CONCLUSION

Project financing is likely to be successful if there is no significant correlation between the cost and revenue of the project with those of the parent company. The participants should have a sound understanding of cost time required to complete the project, pattern of cash flows and risks involved. As project finance

⁶ See Esty (1999).

⁷ Cost of equity also goes into WACC under the latter approach.

⁸ For more on QMV see Esty's article that was cited earlier.

⁹ Mandron, Alix (2000).

involves complex contractual arrangements and documentation between the participants, the advantages of risk pooling and sharing of expertise should be high enough to warrant the setting up of a separate project company.

The differences between corporate finance and project finance are outlined here:

<i>Corporate finance</i>	<i>Project finance</i>
# Lend to existing entity	Lend to new entity
# Full recourse (access to corporate assets as security for loans)	Limited recourse (access to assets of the project or transaction).
# Lend against the balance sheet of the company	Lend against the income stream

In the financial structuring of projects, World Bank guarantees can complement loans from IFC and IBRD and insurance from MIGA. Guaranteed debt is often arranged at lower cost and longer maturities than would otherwise be possible.

APPENDIX 1: TAXONOMY OF RISKS

Completion Risk

It refers to the risk that the project might not be completed due to, say, an unexpected delay in construction schedule or shortage of critical inputs. A higher than expected input costs or lower than anticipated output price might reduce the profitability of the project.

Technological Risk

It is the risk that the proposed technology will become obsolete or less efficient. This is particularly important for hi-tech industries where the technology is rapidly evolving.

Raw Material Supply Risk

It is the risk wherein raw material or other factors of production may become unavailable during the life of the project. This is especially important where natural resources are critical inputs.

Economic Risk

It is the risk that the demand for the project's product will not be sufficient to meet all expenses and provide a satisfactory return to equity investors.

Financial Risk

This risk arises when floating rate debt is used to finance a project, and rising interest rates could jeopardize the viability of the project and the ability to service debt.

Currency Risk

This risk arises when the project's revenues stream or its costs are denominated in different currencies or in more than one currency. Changes in the foreign exchange rate will affect the profitability of the project.

Political Risk

In some international projects there is a possibility that political leaders in the host country may interfere in the execution of the project and in extreme cases the cost overrun will be so high that the project may no longer be viable. This is referred to as political risk. The case of Enron Corporation in India serves as a good example.¹⁰

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¹⁰ Rangan, Kasturi and Krishna Palepu (1998). 'Enron Development Corporation: The Dabhol Power Project in Maharashtra, India', Harvard Business School Case 9-596-099.

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Chapter 28

A Case Study: HPL Cogeneration Limited

OBJECTIVES

- ◆ Demonstrate the application of project finance in real life.
- ◆ Provide an overview of the captive power market in India.
- ◆ Demonstrate the valuation of a project finance transaction.
- ◆ Demonstrate how risk sharing is achieved in project finance.

In May 1997, Haldia Petrochemicals Limited (HPL) awarded Larsen & Toubro Limited (L&T) a contract to build, own, and operate, for a period of 20 years, a naphtha-fired, combined cogeneration plant with a capacity to generate 116 MW of electrical energy and 480 TPH of SHP, for the captive use of HPL. L&T was selected as the EPC contractor and the exclusive promoter and developer of the plant following an international bidding process. The plant is located within HPL's petrochemical complex at Haldia, West Bengal, India. The sponsors set up HPL Cogeneration Limited (HPLCL), to design, engineer, procure, test, commission, and operate the plant.

Project Sponsors

The project is sponsored by L&T and HPL. HPL is developing a world-scale petrochemical complex at Haldia, at a cost of \$1.4 billion (Rs 6,440 crore) to address the growing demand for polymer products in downstream processing industries. This comprises the cogeneration project, polymer processing units, and the chemicals derivatives units. HPL is a joint venture between the West Bengal Industrial Board, Chatterjee Petrochem Co. (Mauritius) Limited, an affiliate of Soros Fund Management, Chatterjee Fund Management and the Tata Group.

India's largest private sector engineering company, L&T employs more than 25,000 people and has revenues in excess of \$1.5 billion (Rs 6,900 crore). It was founded in 1938 by Holck Larsen and Soren Toubro, two Danish engineers who came to India as representatives of F L Smidth & Co A/s. L&T became a public limited company in 1950 and the revenues have grown to \$1.5 billion in 1998. Exhibit 28.1 shows the financial performance of L&T for the period 1996–98.

I would like to thank Mr Sivaraman, Vice-President, Larsen & Toubro, Mumbai, for his helpful comments and suggestions.

Exhibit 28.1 Financial performance of Larsen & Toubro

	<i>(Rs million)</i>		
	<i>1997</i>	<i>1998</i>	<i>1999</i>
Sales	53,184	57,403	73,500
Profit after tax	4,174	4,214	3,867
Gross fixed assets	37,676	42,767	53,374
Total assets	96,016	122,925	144,577
Debt	15,269	22,493	26,261
Equity	30,382	33,606	36,466
ROE	14.3	13.17	11.04
EBDIT/Total assets	10.54	8.23	7.80
L.T. Debt/equity	0.5	0.67	0.72
Total Debt/equity	0.65	0.84	0.92

Source: CMIE Prowess.

L&T's businesses include engineering and construction, electrical and electronics, and earthmoving and construction. In the last three decades, L&T has participated in EPC (engineering and procurement contractor) services to 37 power plants that generate 19,775 MW of power. In addition to in-house expertise in engineering and construction, L&T has alliances with several international companies like Sargent & Lundy, US, to execute power projects. L&T executes cogeneration and captive power projects through its power business group. Exhibit 28.2 lists some of the projects carried out by the power business group.

Exhibit 28.2 Projects handled by Cogeneration and Captive Power Projects Group

<i>Customer</i>	<i>Project</i>	<i>Year</i>
IPCL, Gujarat	90 MW naphtha fired combined cycle cogen plant	under execution
Usha Martin	25 MW coal fired captive power plant	—do—
L&T Cement (Awarpur)	46 MW coal fired	1998
L&T Cement (Kovaya)	50 MW naphtha fired	under execution
Gujarat Alkalies	90 MW naphtha	1997
MRPL	2 × 22.5 MW oil fired	1995
Tata Chemicals	2 × 20 MW naphtha fired	1994
Reliance Petrochemicals	2 × 30 MW captive cogen	1991

FINANCING IPP vs CAPTIVE POWER PROJECTS

To meet the growing shortage of power the government seeks to encourage participation by private (including foreign) enterprises in the power sector. The policy permits 100 percent foreign-owned companies to set up power projects of any type (coal, gas, etc). It also allows them to repatriate profits. An IPP (independent power producer), after getting government approvals, can generate power and sell it to a respective SEB (state electricity board) under a power purchase agreement. IPPs usually earn a 16 percent rate of return on the paid-up and subscribed equity. The company can retain savings arising from efficiency. Captive power plants are set up by companies which need uninterrupted power supply, that they are unable to get from

SEBs. Apart from this, the cost and quality of power are other considerations in setting up a captive power plant. Maruti Udyog and Ispat Industries, among other companies, have set up captive power plants. The first step for a company thinking of setting up a captive power plant is to decide on the technology used. Usually, captive plants of less than 10 MW use diesel engines and those in the range of 20–100 MW use gas turbines; while those above 100 MW use coal-based plants.

For plants of 10 MW or less, a sponsor may buy the plant outright; with financing from the banker and claim depreciation as the asset is a part of the company. For units of more than 10 MW, the sponsor may set up a separate power company and invite a project developer to invest equity along with the promoter. Project financing is gaining popularity in case of captive power projects because of the preferential tax and duty treatment. In bigger scale projects (50 MW or more) equipment suppliers like ABB are willing to take up an equity stake. In fact, in some of the situations, the equipment supplier will set up and operate the project without any investment from the promoter. The promoter has to agree to buy power over a specified period of time. Current prices are in the range of Rs 2.50–3.25 per unit.

Financial institutions in India insist on a debt equity ratio of 70:30 for captive power projects. Much of the debt comes from export credit agencies and the rest are from local financial institutions. Financing is relatively easy if the sponsor has a strong balance sheet.

WHY USE PROJECT FINANCING?

Before answering this question it is important to answer a more basic question: What is a project? Is HPLCL a project? Project financing makes sense only if HPLCL is a project. A project is defined in several ways. Two useful definitions are:

- ‘An investment carried out according to a plan in order to achieve a definite objective within a certain time and will cease when the objective is attained’.
- ‘Project is any scheme for investing resources that can reasonably be analyzed and evaluated as an independent unit’.

So a project is a scheme or an activity that fulfils the following criteria:

- It is non-routine and non-repetitive.
- Has discrete time, technical and financial performance goals.
- Has a definite beginning and an end.

Is HPLCL a project?

- It has a long yet finite life (20 years).
- It is a single purpose entity to generate electricity.
- It has a definite beginning and an end.

So HPLCL is a project.

Project finance has facilitated efficient financing of large, risky projects that might otherwise be forced to use more expensive bank syndicated loans or corporate finance raised through the sponsor’s credit rating.

The sponsors of HPLCL opted for a non-recourse financing structure since the special purpose vehicle was new and cash flows were not established. Further, a project finance structure would enable the participants

to pool both their resources and their expertise. The structure would make use of L&T's expertise in EPC, an international O&M (operation & maintenance) operator's expertise and so on.

Project financing tries to reduce numerous agency conflicts. A company suffering losses may be tempted to borrow and take on business gambles, the gains from which largely go to shareholders, whereas if they fail shareholders have little to lose and it is the lenders who suffer. It's a 'heads-I-win, tails-you-lose' situation. Smart bondholders try to restrict shareholders' wealth expropriating behavior through restrictive loan covenants, which may lead to reduced efficiency and lower firm value. Since the nature and boundaries of project in case of project finance are clear, lenders are less exposed to agency cost. This may result in lower interest rate. A recent study by Kleimeier and Megginson (2000) suggests that the interest rates on project finance loans are indeed lower than general purpose corporate loans and syndicated loans (Exhibit 28.3).¹

Exhibit 28.3 Comparative data on project finance and general purpose loans

	<i>All syndicated loans</i>	<i>Project finance loans</i>	<i>General purpose loans</i>
No of loans	90,783	4,956	10,795
Total volume (\$ in million)	13,298,457	634,422	2,292,431
Average maturity	4.8 years	8.6 years	5.1 years
Average no. of trenches	1.7	2.0	2.4
Average spreadover LIBOR	134 bp	130 bp	195 bp

Even otherwise project finance can also result in lower financing cost. One reason for using project finance is that the project developer or sponsor has low credit rating. If a project has a contractual offtaker with a higher credit rating the project will achieve cheaper financing.

Projects have lower cost of financial distress than corporations because it is easier to redeploy a project's single purpose assets than a company's multitude of assets when in distress. Further, projects—as compared to companies—have simpler capital structures.

Project finance can reduce financing cost by making the details of the project more transparent, so that investors can better identify risks. This is possible because only a small number of parties are involved as opposed to corporate finance in which the assets are commingled because of which the information disclosed to investors is imperfect.

On the flip-side, project finance can also be more expensive than corporate finance for several reasons, like:

- The time spent by the lenders, technical experts, and lawyers in evaluating the project is substantial.
- The increased insurance cover.
- Increased costs of monitoring the progress of the project.

One of the key features of project financing involves sharing of risk among project participants who are equipped to handle them efficiently. Project risks can be broadly classified as operating and financial. Technology risk, performance risk, and completion risk are some of the operating risks whereas interest rate risk and currency risk are financial risks. Most projects consist of three main phases: development, construction, and operation.

¹ Kleimeier, Stefanie and William Megginson (Spring 2000). 'Are project finance loans different from other syndicated credits?', *Journal of Applied Corporate Finance*, Vol. 13, No. 1.

A major source of risk in a project is the completion risk which refers to the actual costs of constructing the project may exceed the estimated costs, the completion date may be subject to unexpectedly long delays; the facility may be incapable of producing the output in the right quantity and quality as originally planned. If costs significantly exceed the initial financing plan, the sponsors may have to abandon the project completely. To ensure that unexpected costs do not jeopardize the viability of the project, most creditors and investors insist on standby financing as a part of the initial financing plan. Standby facilities are provided as subordinated loans or equity with a substantial amount coming from sponsors (the burden is sometimes shared). For instance, Indelpro, an IFC (International Finance Corporation) funded project, established to produce polypropylene resins for the Mexican market ran into cost overruns amounting to \$30 million (Rs 138 crore) due to changes in design, technology and currency devaluation. The additional amount was shared between sponsors, IFC and another lender. Some of the key risks in the case of a power project are discussed here:

Operating risk—also known as production or performance risk—has interrelated components: technical, management and costs. The ability to economically achieve the desired production rate depends on the experience and quality of staff deployed to the project. As a general rule if the technology is proven and known and if the plant/project's life is 30–100 percent more than the loan life then they will accept technology risk. Project finance is seldom applied to new technology. One way to evaluate the cost risk is to evaluate the position of the project on the cost curve relative to all other producers of the product. The general rule is that a project in the lower-half or lower-third of the cost curve will be able to pass the cost risk to financiers.

CONTRACTS AND AGREEMENTS

Project finance transactions are typically governed by a host of long term, formal contracts written between the project promoter, host country government, creditors, input suppliers, contractors, operators and service providers. Three classes of contracts are important: concession agreement that stipulates a property rights transfer from the government to the project-company; performance contracts between the project-company and contractors and operators; and loan contracts between creditors and the project company.

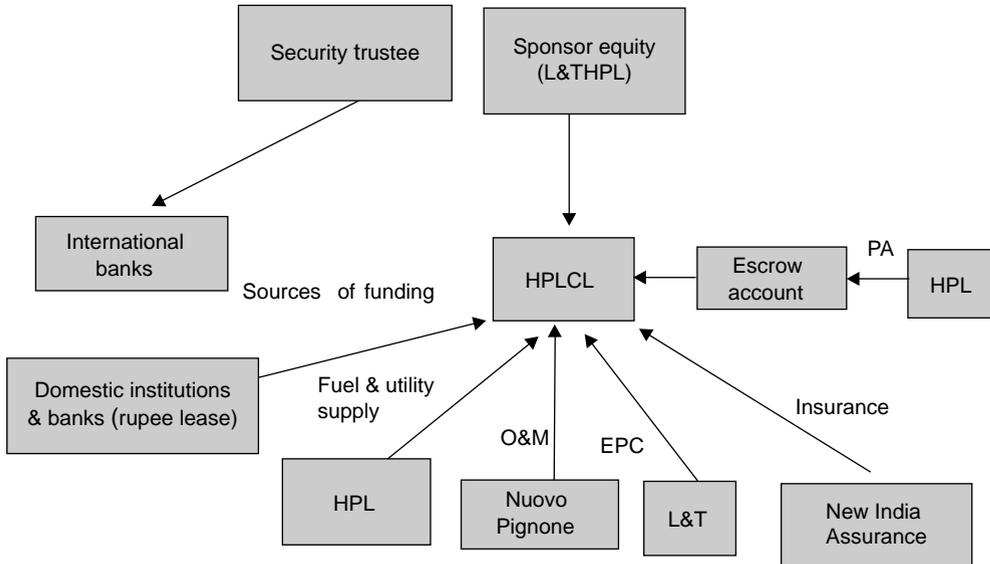
HPL entered into a series of agreements with other project participants. The major agreements are:

- Power agreement for purchase/sale of power,
- The EPC contract for construction of the power plant,
- O&M agreement for the operation and maintenance of the power plant according to laid down parameters,
- Completion agreement between sponsors and lenders for timely completion and for meeting any overruns, and
- Agreement with consulting engineers to supervise the development and implementation of the project.

Exhibit 28.4 shows the project structure.

The parties entered into a 20-year power agreement, which sets out the rights and obligations of all parties. It encompasses the construction and commissioning schedule, plant O&M, payment mechanism, risk allocation in the case of force majeure, defaults, rights of termination, insurance, and indemnity obligations. HPL is responsible for providing the site for the project; deliver fuel—free of cost—in the required quality and quantity; while L&T is responsible for successful completion and commissioning of the plant. HPL is required to pay HPLCL a facilitation charge for the supply of steam and electricity. The charge is calculated with certain assumptions regarding capital cost, inflation rates, exchange rates, and tax rates. Any change in the underlying assumptions leads to charge payable to HPLCL. Billing is done every month.

Exhibit 28.4 HPLCL project

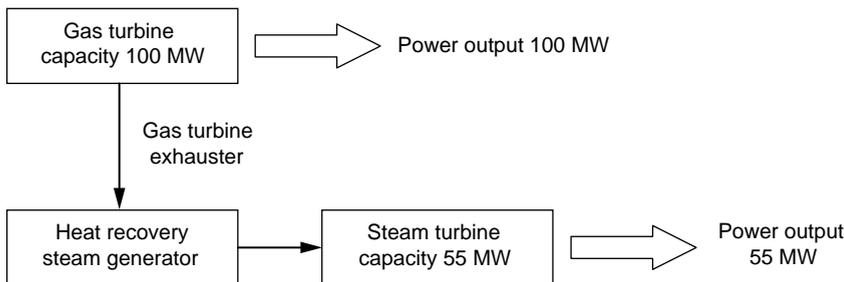


The project is based on naphtha. As per the agreement, HPL will deliver naphtha free of cost to HPLCL and HPLCL in turn will deliver power and steam to HPL.

The importance of naphtha and gas as feed-stock for power plants has been increasing rapidly. The reasons for the increased popularity are low emissions, fuel availability and high turbine efficiency. Power plants that use naphtha or gas as feed-stock can be of two types:

- Open cycle
- Combined cycle

An open cycle plant consists of a gas turbine that generates power. In a combined cycle power a gas turbine exhauster is attached to the gas turbine. The GT exhauster directs the heat generated from the gas turbine to a heat recovery steam generator. This heat is used to run the steam turbine. A combined cycle plant, therefore, optimizes the fuel burnt for the production of power.



Where in an open cycle plant the fuel can produce 100 MW of power, with the addition of a HRSG and a steam turbine of, say, 55 MW, total power produced can be increased to 165 MW. Exhibit 28.5 presents the details of some combined cycle power plants in India.

Exhibit 28.5 Combined cycle power plants in India

<i>Project promoter</i>	<i>No. of gas turbines</i>	<i>Capacity</i>	<i>No. of steam turbines</i>	<i>Capacity</i>	<i>Total power output</i>
Hazira	3	110 MW	1	185 MW	515 MW
Jegurupadu	3	45	1	77	235
Kakinada	3	47	1	67	208
Paguthan	3	137	1	243	655

The project is being executed under a fixed price, lump-sum contract with L&T as the EPC contractor. The EPC contractor undertakes the responsibility for procuring a plant that meets HPL's requirements as designed by Bechtel as part of its overall design responsibility. The EPC contract covers the design, procurement, construction, erection, testing, and commissioning of the project.

The EPC contract requires the contractor to provide a completion agreement which becomes void once the lender's independent engineer certifies the performance of the plant. The agreement provides for rejection rights if the plant is tested for less than 90 percent of the rated capacity. The EPC contractor provided for a certain percentage of asset price in liquidated damages for 1 percent shortfall in performance.

Under the completion agreement with the lenders, sponsors were required to pay for any shortfalls under the EPC contract and to guarantee equity commitments in case of cost overruns other than due to force majeure events.

The O&M agreement stipulates the role of the operation and maintenance contractor who is responsible for:

- Pre-takeover inspection, start up testing and capacity tests.
- Preparation of procedure for major overhaul.
- Training of O&M personnel.
- Maintenance of spares.
- Actual O&M in accordance with performance requirements.
- Preparation and maintenance of monthly reports, operating records, and history.

Nuovo Pignone, the O&M contractor, specializes in turbo generation. The company acts as GE's Italian engineering affiliate; designs and produces compressors, turbines and other equipment for the petrochemical and power generation industries. In 1996 Nuovo Pignone had a turnover of \$2 billion. It was merged with the O&M operations of GE to form one, streamlined company to serve the power, oil, and gas markets worldwide.

The inter-creditor arrangement stipulates the rights and remedies available to the junior lenders and subordinated lenders. HPLCL is a L&T managed company with the majority of directors nominated by L&T. Fichtner Consulting Engineers has been appointed as owner-engineer, while Nuovo Pignone is responsible for the day-to-day operations of the facility. Nuovo and Fichtner have a 6-year O&M agreement with HPLCL.

Insurance Arrangements

HPLCL and L&T selected The New India Assurance Co. Ltd. and Alexander & Alexander to provide insurance and reinsurance support respectively. The lenders in turn appointed Willis Corroon as their insurance advisor. The insurance policies cover both the construction and operating phase and are designed to protect the interest of the lenders. The policies cover all risks of loss and destruction or damage to the entire plant. Exhibits 28.6, 28.7, and 28.8 present risk-sharing arrangements for the project.

Exhibit 28.6 Pre-completion risks

<i>Pre-completion risks</i>	<i>Mitigation</i>
1. Shareholder equity contribution	L&T is willing to give a guarantee
2. Construction delay	A. Independent engineer considers the period reasonable B. Fichtner has been appointed to monitor C. L&T will pay liquidated damages in case of delay
3. Cost over-run	A. EPC is a fixed price contract B. There is a contingency provision of \$ 2.6 million to cover funding risk
4. Technological risk	A. Equipment vendors are reputed international companies like Bechtel B. L&T has experience in the field
5. Force majeure risk	A. Plant is insured against force majeure events B. HPLCL is not liable for any delay damages due to force majeure events except for additional expenditure towards interest and other standing charges.

Exhibit 28.7 Post-completion risks

<i>Post-completion risks</i>	<i>Mitigation</i>
1. Plant performance	Proven technology
1A. Plant availability	EPC contractor is experienced
1B. Plant output	O&M agreement provides for penalties
1C. Naphtha consumption	HPLCL will reimburse HPL for additional consumption
2. Steam output	A. EPC contractor guarantees steam output B. The insurance package provides for loss for protection against loss and damage to project assets C. HPLCL will pay liquidated damages if the steam output is lower than guaranteed.
3. Sufficiency of revenues	HPLCL has a take or pay contract with HPL
4. Fuel supply	HPL has the obligation to supply naphtha which it sources from Indian Oil Corporation. HPL has given an undertaking to buy out the plant at a price sufficient to cover debt in case of prolonged default
5. O&M cost overrun	If the actual expenses exceed the budget by 10 percent, then the O&M operator will pay a penalty. If the expenses exceed 20 percent, HPLCL can terminate the agreement
6. Inflation, interest rate	The facilitation charge is adjusted for inflation every month and currency risks. The power agreement permits full pass through of changes in 6 million LIBOR. Under the agreement, the facilitation charge payable to HPLCL is composed of a foreign currency charge in USD and INR, although HPLCL receives all of its revenues in INR. The project's dollar debt obligations is expected to be covered by the dollar component of the facilitation charge and any exchange losses will be passed through on an 'as realized' basis.

Exhibit 28.8 General risks

<i>General risks</i>	<i>Mitigation</i>
1. Operating risks	A. Nuovo Pignone is an experienced O&M contractor B. Insurance cover is comprehensive C. Proven technology
2. HPL Completion risk	A. Construction is in advanced stage B. All cost overruns have been guaranteed by HPL's sponsors
3. HPL credit risk	A. The power agreement permits HPLCL to sell power and steam to third party in the event of HPL default B. HPL's obligation is supported by 6 month LC and 2 month escrow account

Regulatory Approvals

In India, the responsibility for the supply of electricity is shared between the central government and the state governments. The Electricity (Supply) Act 1948 provides the overall regulatory framework for the sector. The Act created the SEBs, and entrusted them with responsibility of public power supply and related state level regulation. Although much of power generation and distribution is in the hands of the government, some private companies have been in existence for quite sometime. A private power company can be a licensee to supply power to an identified area. Licensees operate under a scheme that assures a fixed return on a cost-plus basis governed by The Electricity Supply Act. There are six companies with a total generating capacity of 3,545 MW.

In 1991, the Government of India removed power from the list of activities reserved for the public sector and the Act was amended to lift many of the regulatory disincentives to private investment in power sector. India now allows for full local or foreign private ownership of power companies and offers up to 30 year license with the possibility of renewal for another 20 years. The development, construction and operation of industrial plants in general and power plants in particular require approvals from several agencies. Exhibit 28.9 gives the partial list of regulatory consents required for private power projects.

Exhibit 28.9 Regulatory approvals and consents

1. Pollution control and environmental clearance from the West Bengal Pollution Control Board.
2. Environmental clearance from the Ministry of Environment and Forests.
3. No objection certificate from the National Airports Authority.
4. Fuel and water linkage.
5. Clearance from the state department of power for setting up the plant.
6. Approval from Government of India for the facility.

FUNDING THE HPLCL

The base case funding requirement for the project covering EPC contract, capitalized interest and fees during construction, insurance, spares, working capital margin, staff and training, pre-operative expenses and contingency provision is Rs 510.3 crore (\$117.8 million). The total fund requirement is met by equity, senior debt facility and external commercial borrowing. A short-term working capital facility would be raised from banks and financial institutions. The proposed financing plan assumes a debt-equity ratio of 76 percent: 24 percent.

According to the plan, a \$20 million standby funding arrangement was also to be made to cover cost overruns. Exhibit 28.10 shows the sources and uses of funds.

Exhibit 28.10 Sources and uses of funds

<i>Application of funds</i>	<i>(Rs in million)</i>	<i>(\$ in million)*</i>
EPC expenses	4,059	93.86
Pre-operative expenses	466	10.8
Interest during construction	597	13.8
Working capital margin	4.0	0.1
Contingency	115	2.6
Less:		
Pre-completion revenues**	(138)	(3.2)

Exhibit 28.10 contd.

Exhibit 28.10 contd.

<i>Application of funds</i>	<i>(Rs million)</i>	<i>(\$ million)*</i>
Sources of funds		
Facility	3,203	74
Rupee term loan facility and rupee lease	675	15.6
Debt	3,878	89.6
Equity	1,225	28.3
	5,103	117.9

Source: ANZ Investment Bank.

Note: * Assumes an exchange rate of \$1 = Rs 43.29. **HPL is obligated to purchase steam during Phase I; and when they are commissioned and declared ready for commercial operation. Payments made by HPL for such off-take constitutes pre-completion revenues.

Sources of Equity

Although the project finance package is tailor-made for a project, the sources of funding remain the same—i.e., debt and equity. The project sponsors take up a chunk of the equity. Sometimes, the O&M contractor, lending banks and the EPC contractor may also be offered an equity stake. HPLCL has a debt-equity ratio of 76/24. L&T committed a maximum of \$ 28.3 million (Rs 130 crore) in equity and the rest was contributed by HPL. It is a common practice to contribute equity at specified intervals. The shareholders contributed 50 percent of equity prior to initial draw down under the debt facilities. After the stated leverage was achieved, a further 35 percent of equity would be contributed. The balance 15 percent would be injected after further draw down.

Sources of Debt

The base-case finance plan assumes:

- A \$675 million (Rs 3,105 crore) lease facility with a maturity of 8 years.
- A floating rate rupee term loan facility with a maturity matching the plant construction period priced at 225 bp over the lender's prime lending rate.
- A working capital facility to cover, primarily, the two months' credit provided to the O&M contractor.
- A cost overrun provision of \$2.6 million (Rs 11.7 crore) in the total fund requirement plus provisions for construction cost overruns amounting to \$43 million (Rs 197.8 crore).
- A US \$74 million (Rs 340 crore) facility from commercial banks pegged to the 6 month LIBOR with a maturity of 10 years, a repayment period of 6.5 years and a grace period of 48 months from financial close.

PROJECT FEASIBILITY

Since the lender has no recourse, extensive feasibility studies are conducted to ascertain the profitability of the project. The financial forecast assumes a 5-year tax holiday followed by five more years of tax liability at

70 percent of normal level (which is 35 percent). The depreciable assets are assumed to have a residual value of 10 percent and a depreciation rate of 7.84 percent, straight-line basis. Further, a depreciation rate of 25 percent has been assumed for tax purposes. 25 percent of working capital requirement is capitalized as part of project cost in the form of margin money with the remainder to be financed through short-term working capital facility. Exhibits 28.11(a) and 28.11(b) present cash flow and some capital market/comparable company data.

Cash available for debt service

$$= \text{EBIT} - \text{Cash taxes} + \text{Depreciation} - \text{Capital expenditure} \\ - \text{Increases in working capital} - \text{Funding of debt service reserve account}$$

Project lenders expect sponsors to maintain a debt service reserve account containing 6 months of interest and principal payment. The return to creditors can be found by equating debt disbursements with interest and principal payments and calculating the IRR of the series by trial and error. Given here is the IRR to lenders and shareholders.

Exhibit 28.11(a) Debt service

(Rs million)

<i>Year</i>	<i>Total drawings</i>	<i>Debt service</i>
1998	0	0
1999	0	53
2000	(3877)	730
2001		699
2002		911
2003		888
2004		864
2005		889
2006		875
2007		677
2008		583
2009		0

Exhibit 28.11(b) Capital market and comparable company data

(Rs lac)

	<i>BSES</i>	<i>Tata Power</i>	<i>CESC</i>
Sales	18219	11585	16729
Net worth	21369	16646	505
LT debt	10914	12255	2931
Total debt/Equity	0.51	0.74	6.42
LT debt/Equity	0.51	0.74	5.8
E/V	0.66	0.57	0.14
Capital market data			
Levered beta	1.01	0.76	0.46
Unlevered beta	0.66	0.43	not mentioned
Risk-free rate	12.5 percent		
Market risk premium	10 percent		

Note: BSES, Tata Power, and CESC are the only publicly listed electricity generation and distribution companies in India.

Project IRR (pre-tax)	= 16.16 percent
Debt IRR	= 20.42 percent

To estimate the NPV of the project, one must come up with a discount rate. It is often difficult to come up with pure plays in order to estimate asset beta and the cost of equity. There are three power producing companies in India, with the following asset beta:

	<i>BSES</i>	<i>Tata Power</i>	<i>CESC</i>
Unlevered beta	0.66	0.43	not mentioned
Risk-free rate	12.5 percent		
Market-risk premium	10 percent		

The cogeneration plant in question is too small compared to these companies. Further, the technology is different. So it might not be correct to compare them. Since HPLCL is a captive power plant with power purchase agreement with a creditworthy company its risk might be lower than that of power companies that supply power to SEBs. Assuming that the average asset beta of these companies is a good proxy for the asset beta of the cogeneration plant,

$$\text{Cost of equity} = 12.5 + \beta_E (10)$$

This rate cannot be applied to all the equity cash flows as pointed out in the previous chapter because the leverage changes every year. It is necessary to come up with different discount rates. The D/V ratio is 69 percent in year 2000 and falls to 0.02 in 2008, and to zero thereafter. The equity beta in year 2000 can be estimated as:

$$\begin{aligned}\beta_E &= \beta_A (V/E) \\ &= 0.55 (1/0.31) = 1.77 \\ \text{Cost of equity} &= 12.55 + 1.77 (10) = 30.25 \text{ percent}\end{aligned}$$

Similarly, cost of equity in year 2008

$$\begin{aligned}\beta_E &= 0.55/0.98 = 0.56 \\ K_e &= 12.55 + 0.56(10) = 18.15 \text{ percent}\end{aligned}$$

The equity investment of Rs 122.4 crore is followed by a stream of equity cash flows. The IRR of this series is the IRR to equity. Alternatively one might estimate the IRR of dividends.

SENSITIVITY ANALYSIS

The estimation of cash flows and NPV involves assumptions regarding project cost, O&M costs, naphtha consumption, time required for completion of the project, etc. The sensitivity of NPV and IRR might be found by relaxing the underlying assumptions. The lenders base case DSCR is 1.40. If the project is delayed by 12 months, and if no compensation is received through an increase in the facilitation charge, the DSCR falls to 1.25. Likewise, the sensitivity of DSCR to various other factors is given here:

	<i>DSCR</i>
Base Case	1.40
10 percent project cost over-run	1.25
10 percent capacity shortfall in either steam or power resulting in pro rata reduction in facilitation charge	1.32/1.34
Increase in O&M costs by 20 percent	1.33
10 percent increase in naphtha consumption throughout the life of the project	1.26

Chapter 29

The Leasing Decision

OBJECTIVES

- ◆ Introduction to leasing as an alternative to borrow-and-buy.
- ◆ Provide a rationale for leasing.
- ◆ Highlight theoretical issues in the valuation of leasing.
- ◆ Highlight the creative usage of leasing in marketing new technologies.

A lease is a contract between the owner, called the lessor, and the user of the asset, called the lessee. The lease bestows the right of use on the lessee for a specific period of time for which the lessee makes periodic lease payments. The lease payments are made at regular intervals—quarterly, monthly, or semiannually. The timing of lease payments could be tailored to match the lessee's cash flows. At the end of the lease term the asset reverts back to the lessor unless there is a provision for the renewal of the contract or transfer of ownership to the lessee. In the Indian context, a lease contract cannot provide for a transfer of ownership from the lessor to lessee.

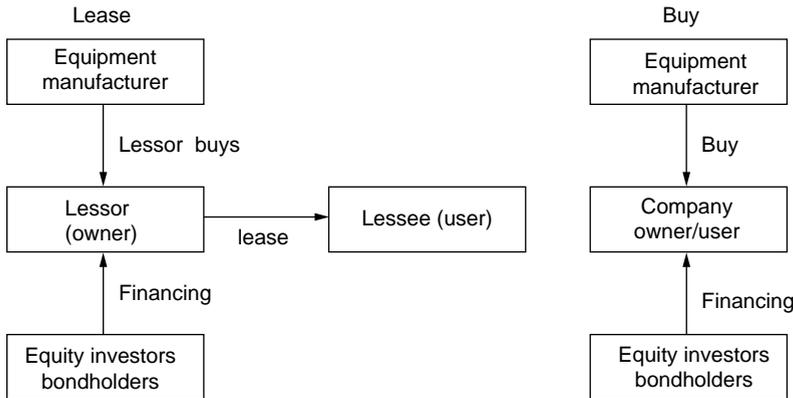
A lessee can be a company or an individual. Lessors may be leasing companies or equipment manufacturers. If the lessor is an independent company, it must buy the asset from the manufacturer and then deliver the asset to the lessee. Typically, the lessee first decides on the asset needed and then negotiates a lease contract with a lessor. The distinction between leasing and buying is depicted in Exhibit 29.1. Since the lessee is not the owner of the asset, the lessee cannot claim depreciation.

TYPES OF LEASES

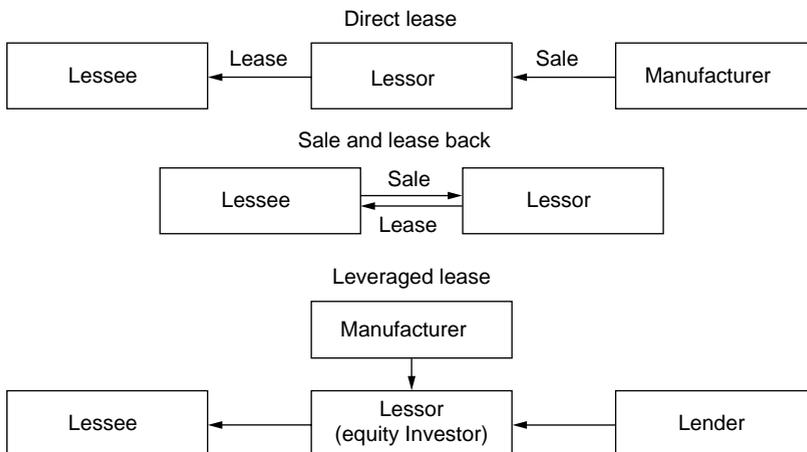
There exist two important classes of lease: finance and operating lease. The distinction is based on the extent to which the risks and rewards of ownership are transferred from the lessor to the lessee. Operating leases are short term, cancelable lease agreements running for 3–5 years. The lessor is generally responsible for maintaining and insuring the asset. Typically, the lease term will not cover the useful life of the asset or fully amortize the cost of the asset. Therefore, the lessor must recover the cost of the asset by renewing the contract or by selling the asset in the second-hand market for its residual value. The lessee will have the

option to cancel the lease agreement. This shifts the risk of product obsolescence to the lessor. Computers, cars, trucks and office equipment are some of the general candidates for operating leases. Finance lease, on the other hand, is a long-term, non-cancelable lease.

Exhibit 29.1 Lease vs buy



The technical difference between finance lease and operating lease is that if the lease term exceeds 75 percent of the useful life of the asset or the present value of the minimum lease payments exceeds 90 percent of the fair market value of the asset at the inception of lease, the lease will be classified as a finance lease. Any lease other than finance lease is an operating lease. There exist two special types of finance lease: sale and lease back arrangement and leveraged lease. In a sale and lease back arrangement a company sells an asset it owns to another company (leasing company) and immediately leases it back. The lessee receives cash from the sale of the asset but gets to use the asset for the lease term. The lessee makes regular lease payments to the lessor. A leveraged lease is similar to any other lease except that the asset is funded by 50–60 percent debt. The creditors will have the first charge on the asset and in the event of default by the lessor, the lease payments are made directly to the creditors.



RATIONALE FOR LEASING

Leasing exists primarily due to information asymmetry between lessors and lessees regarding the market for the asset in question. Lessors can specialize in particular asset categories (e.g., computers) and enjoy economies of scale in gathering information relating to technical characteristics, product obsolescence and second-hand market for the asset. A lessee might not be able to find a suitable buyer at the end of the useful life due to lack of knowledge of the second-hand market or make a realistic estimate of the asset's life or salvage value.

Leasing makes a lot of sense when the firm is not in a position to absorb the depreciation and hence avail tax shields on depreciation may be because the revenues are not adequate or the investment outlay is high for the company's size. Similar logic can be extended to a case where the company does not pay taxes. In other words, leasing makes sense when tax shields are more valuable to the lessor than the lessee. The lessor can avail tax shields and pass on some of the benefits to the lessee in the form of lower lease rentals. Thus, both are better off due to the lease transaction.

Lessors might be better equipped to provide maintenance and other services.

Lessors enjoy economies of scale in writing and monitoring lease contracts and in funding a large pool of assets. That is, the lessor can buy a hundred standard computers or trucks and structure the lease to suit the needs of the customers. The transaction cost of procuring funds for the lessor would be lower than the transaction cost for the lessee as the lessor has economies of scale in funding which can be passed on to the lessee.

CASH FLOWS OF A LEASE

Suppose a company is in need of equipment. The company can either purchase it outright or lease it. Consider the data given here:

Equipment cost	=	Rs 700,000
Asset's useful life	=	7 years

The company can lease the equipment for 7 years at an annual lease rental of Rs 1.5 lac. The maintenance and insurance of the asset is to be provided by the company. The annual operating expenses remain the same regardless of whether the asset is purchased or leased. The corporate tax rate is 35 percent. Assume 30 percent depreciation on written down value.

The cash flow consequences of a lease are:

- The company avoids the initial outlay on purchase of the equipment. The cash outflow saved is equivalent to a cash inflow—Rs 7 lac in this case.
- The company loses tax shield on depreciation because the lessee is not the owner. That is, depreciation tax shield will be claimed by the lessor.
 $\text{Depreciation tax shield in any year} = \text{Amount of depreciation} \times \text{Tax rate.}$
- The company makes lease payments (Rs 1.5 lac) every year.
- The company gets a tax shield on lease payments as lease payment is a tax-deductible expense.
- The company forgoes salvage value of the equipment at the end of the useful period as it does not own the asset.

LEASE-DEBT EQUIVALENCE

A lease is akin to debt, as the lessor is essentially making a loan to the lessee. The lease contract binds the lessee to a series of contractual lease payments. In short, lease displaces debt. Suppose a company currently has debt and equity in equal proportion. The total capital employed is Rs 1 lac. The company has equipment in mind, which requires an outlay of Rs 10,000. The firm can either purchase it or lease it. In order to purchase, the company will have to sell debt and equity in equal proportion (Rs 5,000) to maintain the debt-equity ratio of 1:0. Under the lease alternative, the company has a liability of Rs 10,000, the present value of lease rentals. To maintain the capital structure, the company should reduce existing debt by Rs 5,000. We established the fact that lease displaces debt. But how much of debt is equivalent to leasing? Define equivalent loan as the amount of loan that commits a firm to exactly the same stream of fixed obligations as does the lease liability.

Consider a single period situation. You have two options:

1. Borrow an amount Rs D @ i percent, and buy the asset.
2. Lease the asset and pay a lease rental of Rs L , and forgo depreciation tax shield.

Let us ignore salvage value for the sake of simplicity.

The cost of borrowing is the after-tax interest payment and principal payment. The cost of leasing is the after-tax lease payment and the depreciation tax shield lost. The equivalent loan is the value of D at which the costs of the two alternatives are the same.

Verify that:

$$D = [L(1-T) + DT]/[1 + i(1-T)]$$

That is, equivalent loan is the present value of after-tax lease payments and depreciation tax shield. The result holds good for a multi period situation as well.

Consider the cash flows.

	Years					
	0	1	2	3	4	5
Lease cash flows	119400	-36720	-30195	-26280	-26280	-23340
Debt cash flows	120015	-36720	-30195	-26280	-26280	-23340

The cash flows from the two alternatives are the same. The loan amount equivalent to lease is Rs 120,015. How did we arrive at this equivalent loan? It is the present value of lease cash flows discounted at the after-tax cost of debt. The difference between the initial cash flows gives the NPV of the lease—(119400 – 120015)—615 in this case. Since the NPV of the lease is negative, the company should borrow and buy. Stated in a different fashion, the lease cash flows service an equivalent loan of Rs 120,015 while the lease finance is only Rs 119,400. The company would be better off by taking a loan of Rs 119,400. If the equivalent loan is more than the lease finance, borrow and buy; else lease.

NET ADVANTAGE OF LEASE

The cash flows from buying the asset as opposed to leasing it are as shown:

Cash flows from borrow and buy

Year	Purchase price	After tax operating saving	Depreciation tax shield	Salvage value	Total
0	(P)	—	—	—	(P)
1		X_1	$D \times T$	—	$X_1 + DT$
2		X_1	$D \times T$	—	$X_1 + DT$
3		X_1	$D \times T$	—	$X_1 + DT$
N		X_1	$D \times T$	S	$X_1 + DT$

Cash flows from lease

Year	Lease rentals	After tax operating saving	Tax shield on lease rentals	Total
0		—	—	
1	L	X_1	$L \times T$	$X_1 + L(1 - T)$
2	L	X_1	$L \times T$	$X_1 + L(1 - T)$
3	L	X_1	$L \times T$	$X_1 + L(1 - T)$
N	L	X_1	$L \times T$	$X_1 + L(1 - T)$

For our analysis, it is the incremental cash flow from leasing in lieu of buying is what matters. In other words, the direct cash flows of buying the equipment are subtracted from those of leasing it. The incremental cash flows are shown in Exhibit 29.2.

Exhibit 29.2 Incremental cash flows

Year	Purchase price avoided	After tax lease rentals	Depreciation tax shield forgone (-)	Salvage value forgone (-)	Total
0	+ P	—	—	—	(P)
1	$-L(1 - T)$	$D \times T$	—	—	$L(1 - T) + DT$
2	$-L(1 - T)$	$D \times T$	—	—	$L(1 - T) + DT$
3	$-L(1 - T)$	$D \times T$	—	—	$L(1 - T) + DT$
N	$-L(1 - T)$	$D \times T$	—	S	$L(1 - T) + DT$

Let us go back to our earlier example.

Purchase price = Rs 700,000

Lease rentals = Rs 150,000

Tax rate for the company = 35 percent. Ignore salvage value. The cost of debt is 14 percent. After tax cost of debt = 9.1 percent

The depreciation tax shield for the equipment is shown in Exhibit 29.3. The incremental cash flows are shown in Exhibit 29.4.

Exhibit 29.3 Depreciation tax shield

<i>Year</i>	<i>BV of the asset</i>	<i>Depreciation</i>	<i>Dep. tax shield</i>
0	700000	—	—
1	490000	210000	73500
2	343000	147000	51450
3	240100	102900	36015
4	156065	84035	29506
5	109246	46819	16386
6	76473	32773	11470
7	0	76473	26765

Exhibit 29.4 Incremental cash flows

<i>Component</i>	<i>Years</i>							
	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>
Purchase price (+)	700000							
After tax lease payment		97500	97500	97500	97500	97500	97500	97500
Depreciation tax shield lost		73500	51450	36015	29506	16386	11470	26765
Net cash flow	700000	-171000	-148950	-133515	-127006	-113886	-108970	-124265

If the NPV of the incremental cash flows (lease minus buy), called net advantage of lease (NAL), is positive, the company should prefer leasing for buying. The lease analysis begins with the assumption that the company has convinced itself that the equipment is financially worthwhile (by applying standard capital budgeting techniques). The issue, therefore, is to find out if the company should buy it or lease it. The appropriate discount rate is the after-tax cost of borrowing.

The decision rule is

If $NAL > 0$, lease
 NAL < 0 , buy provided NPV of the equipment is > 0

The PV of the incremental cash flows is given below.

<i>Year</i>	<i>Cash flow</i>	<i>PV @ 9.1 percent</i>
0	700000	700000
1	-171000	-156737
2	-148950	-125168
3	-133515	-103100
4	-127006	-90011
5	-113886	-74048
6	-108970	-64979
7	-124265	-67978

NPV = 19979.

The lease has a positive NAL. The company would be better off leasing the equipment. Suppose the equipment in itself is not worthwhile. Can leasing make it worthwhile? Suppose the NPV of the project is -10000 . The NAL is 19979. Adjusted present value $= -10000 + 19979 = 9979$. Leasing makes the project worthwhile. The lease evaluation may be specified as:

$$\text{NAL} = P - \sum L_t/(1+X_1)^t + \sum L_t \times T/(1+X_2)^t - \sum D_t \times T/(1+X_3)^t + \sum O_t (1 - T)/(1+X_4)^t - \sum S_n/(1+X_5)^n$$

where

P = purchase price avoided,

L_t = lease payments at the end of period t ,

D_t = depreciation charge relevant for tax payment at the end of period t ,

O_t = cash operating expenses expected to occur in period t if the asset is purchased but not if it is leased,

t = tax rate,

n = no. of periods covered by the lease agreement,

S_n = expected after tax salvage value of the asset at the end of the last period covered by lease, and

X_1, X_2, X_3, X_4, X_5 are discount rates appropriate for the respective cash flow components.

Since lease is similar to debt, the discount rate applicable to lease cash flows is cost of debt. But should cost of debt be the discount rate for all the components or just lease payments? Tax shields can be availed only when the company makes money. No company can be *sure* of making money and hence avail tax shields. So tax shields might deserve a higher discount rate.

Some academics point out that the loss of interest tax shields (on borrowing) should be incorporated in the analysis. That is,

$$\text{NAL} = P - \sum L_t/(1+X_1)^t + \sum L_t \times T/(1+X_2)^t - \sum D_t \times T/(1+X_3)^t + \sum O_t (1 - T)/(1+X_4)^t - \sum S_n/(1+X_5)^n - \sum I_t \times T/(1+X_6)^t$$

where I_t is the interest payment in period t .

The after-tax borrowing rate recognizes the interest tax shield lost on displaced debt. The PV of lease for 1 year:

$$PV_L = [L(1 + \sum O_t(1 - T)T) + TD + (I \times B \times T)]/(1 + i)$$

where B is the debt displaced by lease,

i is the interest rate,

T is the tax rate, and

TD is the depreciation tax shield.

If we assume that one rupee of lease displaces one rupee of debt, then $PV_L = B$:

$$\begin{aligned} PV_L &= [L(1 - T) + TD + (I \times PV_L \times T)]/(1 + i) \\ PV_L \{1 - [i.T/(1+i)]\} &= \frac{L(1-T) + TD}{(1+i)} \\ PV_L(1+i - iT) &= (1 - T)L + TD \\ PV_L &= [L(1 - T) + TD]/[1 + i(1 - T)] \end{aligned}$$

This is precisely the lease valuation formula we used. One general observation is that, if interest tax shields are considered, then the appropriate discount rate is the before tax cost of debt; else after-tax cost of debt should be used.

Lease Evaluation: Lessor's Perspective

The cash flows to the lessor are simply the mirror image of that for lessee. When both of them are in the same tax bracket, the outflow to the lessee is the inflow to the lessor and vice versa.

The value of the lease to the lessor in the previous example would be:

$$\begin{aligned} \text{NPV} &= -700000 + 156737 + 125168 + 103100 + 90011 + 74048 + 64979 + 67978 \\ &= -\text{Rs } 19979 \end{aligned}$$

So, a lessor would not be willing to lease the equipment. Suppose the lessee has a tax rate of 25 percent, and the lessor has a tax rate of 35 percent. The cash flows for the lessee would be:

Year	Purchase price	After-tax lease payments	Depreciation tax shield lost	Total
0	700,000			700,000
1		112,500	52,500	(165,000)
2		112,500	36,750	(149,250)
3		112,500	25,725	(138,225)
4		112,500	21,008	(133,508)
5		112,500	11,704	(124,204)
6		112,500	8,193	(120,693)
7		112,500	19,118	(131,618)

Post tax cost of debt = $14(1 - 0.25) = 10.5$ percent

$$\text{NAL} = 29331$$

The lessor gets 19979.

When the lessee does not pay any tax,

$$\text{NPV of lease} = 700000 - [1.5L \times \text{PVIFA}(14, 7)] = \text{Rs } 56800.$$

The important observation is that when the parties are in different tax brackets, the lease transaction can be structured in such a way that they share the gains in some agreeable proportion.

Break-Even Lease Rentals

The lease rental at which the NAL is zero is called break-even lease rental. That is, the lessee will be indifferent between leasing and purchasing when lease rental equals break-even rental. Consider the same example.

$$\text{Purchase price avoided} = 700000$$

$$\begin{aligned} \text{PV (Depreciation tax shield)} &= 73500 \times \text{PVIF}(9.1, 1) + 51450 \times \text{PVIF}(9.1, 2) \\ &= \text{Rs } 190889 \end{aligned}$$

$$\text{PV (after tax lease rentals)} = L_t(1 - 0.35) \times \text{PVIFA}(9.1, 7)$$

$$\begin{aligned}
 &= 3.26 L_t \\
 \text{Setting } NAL &= 0 \\
 700000 - 190889 - 3.26 L_t &= 0 \\
 L_t &= \text{Rs } 156169
 \end{aligned}$$

Similarly, the break-even lease rental when tax rate is zero,

$$\begin{aligned}
 NAL &= 700000 - L_t \times PVIFA(14, 7) = 0 \\
 L_t &= \text{Rs } 163246.
 \end{aligned}$$

If the lessor is in the 35 percent tax bracket,

$$BELR = \text{Rs } 156,169$$

When the lessor is in the higher tax bracket than the lessee, the minimum lease rental required by the lessor turns out to be lesser than the maximum rental affordable by the lessee thereby making NAL positive for both.

As the break-even rental for the lessee is lower than the break-even rental for the lessor, the transaction will be successful. Suppose the rental is Rs 1.6 lac.

$$\begin{aligned}
 \text{Lessee's gain} &= 163246 - 160000 = \text{Rs } 3246 \\
 \text{Lessor's gain} &= 160000 - 156169 = \text{Rs } 3831
 \end{aligned}$$

Choice of Discount Rate

Finance theorists generally agree that the discount rate for after-tax lease payments and depreciation tax shelter is the post-tax cost of debt and that for after-tax salvage value and operating savings is the weighted average cost of capital. Probably post-tax cost of debt is too low a discount rate for tax shelters. Tax rates do change; income may not be available to be offset in every year. This makes tax shelters riskier. So it might be better to discount tax shields at the cost of capital, rather than at the cost of debt.

Obviously, NAL is a function of the discount rate. The higher the discount rate for outflows, the higher is the NPV. Applying inappropriate discount rate will lead to erroneous conclusions.

Consider the same cash flows. The weighted average cost of capital for the company is 17.05 percent. Let us change the discount rate to WACC for the depreciation tax shield.

$$\begin{aligned}
 NAL &= 700000 - [97500 \times PVIFA(9.1, 7)] - (D_t, T) PVIF(17.05, 7) \\
 &= \text{Rs } 51924
 \end{aligned}$$

Contrast this with the earlier figure of Rs 19,979. Suddenly, leasing has become more attractive. It is useful to draw a graph of NAL versus the discount rate, and see the sensitivity of NAL to changes in discount rate.

UNEQUAL ASSET AND LEASE LIVES

So far we assumed that the asset's business life specific to the lessee equals the period covered by the lease. That is, the lease-term coincides with the period for which the asset is being employed. There is no reason why

they cannot be different. For instance, the asset's life might be 10 years, the asset's useful life 8 years, and the lease term, 7 years. It implies that the lease will have to be replaced at the end of 7 years. So, the lessee will have to make a forecast of lease rentals that are likely to prevail at the end of 7 years. The difference between lease term and asset holding period should be accounted for in comparing lease and purchase alternatives. To illustrate, if X is the asset life and Y is the lease term, and if $X > Y$, the two options cannot be compared (as they have different lives) without considering what happens after the shorter option expires. One could compare the option to purchase equipment that has a life of 10 years with two 5-year, back-to-back leases. In other words, the shorter option should be replicated to cover the life of the longer option. It is important to understand that the asset and lease lives are not only unequal but also uncertain. Typically, firms make estimates of asset lives on the basis of past experience with similar assets.

An Illustration

A company is contemplating on purchasing equipment for Rs 80 lac. The company has an option to lease the equipment for 5 years. The rentals are Rs 5.5 lac per annum after tax. At the end of 5 years, the company will have to replace the lease or purchase the equipment. The company's executives have forecasted the lease rentals that are likely to prevail starting from year 6.¹

Tax rate = 34 percent
 Long-term borrowing rate = 13 percent
 After tax borrowing rate = 8.6 percent
 WACC = 15 percent
 Salvage value = 0
 Asset life = 10 years

Tax and depreciation rates are forecasts
 The lease rentals for years 6 through 10 are Rs 69 lac per annum
 The cash flows under purchase and lease alternatives are shown here:

Year	Purchase			Lease
	Purchase price	Dep. tax shield	Net C.F	After tax lease payments
0	-800		-800	
1		22	22	-55
2		38	38	-55
3		33	33	-55
4		27	27	-55
5		27	27	-55
6		27	27	-69
7		24	24	-69
8		24	24	-69
9		24	24	-69
10		24	24	-69

¹ Cason, R L (1987). 'Leasing, Asset Lives and Uncertainty: A Practitioner's Comments', *Financial Management*, Summer.

Net present value:

At borrowing rate	-619	-395
At cost of capital	-660	-337
First five years at borrowing rate		-369
Last five years at cost of capital		

The post tax cost of debt is the discount rate for the first 5 years of the lease term. For the next 5 years, either cost of debt or cost of capital could be used as discount rate. But it is better to use cost of capital because the forecast of lease payments carry normal business risk like any other economic element.

Effect of Restructuring Lease Rentals

The lessor has the discretion of structuring the lease rentals to match the cash flows of the lessee. Given here are two situations: In the first case, the lessor charges uniform rentals and in the second, a major portion of lease payments is recovered in the later part of the term.

Situation 1

Asset cost = Rs 1000
 $N = 5$ years
 $T = 0.35$
 Cost of debt = 16 percent
 $L = 250$ p.a.
 $D = 30$ percent
 Ignore salvage value.

Situation 2

Asset cost = Rs 1000
 $N = 5$ years
 $T = 0.35$
 Cost of debt = 16 percent
 75, 75, 300, 400 and 400
 $D = 30$ percent

The NAL increases as lease rentals are deferred. The reason is fairly obvious. When lease rentals are bunched towards the end, the present value of outflow falls. The NPV increases.

Monthly Lease Payments, Annual Depreciation, and Monthly Discount Rates

Usually lease payments are made monthly in advance or in arrears whereas depreciation tax shields are availed annually. So the basic model needs to be adjusted:

$$\text{NAL} = A_0 - \sum L_t(1 - T)/[1 + (r^*/12)^t] - \sum D_t \times T/(1+r^*)^t$$

where

r^* = after tax cost of debt,
 L = monthly lease payment, and
 M = number of months.

The annual rate is to be converted into a monthly rate. If the annual rate is 12 percent, the monthly rate is 1 percent if compounding is done annually.

The monthly rate is equivalent to 12 percent compounded semi-annually:

$$\text{Effective rate} = (1 + 0.12/2)^2 - 1 = 12.36 \text{ percent}$$

$$\text{Monthly rate} = 12.36/12 = 1.03 \text{ percent}$$

Similar logic applies for other compounding periods as well.

SURVEY RESULTS

Mukherjee (1991)² conducted a survey of *Fortune* 500 firms (103 firms responded) to elicit their views on leasing. His survey indicates that a large majority of the firms view leasing as a financing decision and calculate the NAL as described in the chapter. A summary of his findings is presented in Exhibits 29.5–29.7.

Exhibit 29.5 Method of lease analysis in the responding firms that consider leasing a financing decision

NAL	IRR	NAL & IRR	Other
26	18	26	3

Exhibit 29.6 Discount rate used in computing NAL

The discount rate	No. of responses
Before tax WACC	2
After tax WACC	4
Before tax cost of existing debt	1
After tax cost of existing debt	4
Before tax borrowing rate appropriate for the asset	2
After tax borrowing rate appropriate for the asset	28
Firm's after tax marginal cost of debt	4
Other	1

Exhibit 29.7 Lease analysis of projects rejected at the capital budgeting stage

If the project is rejected	Firms which use IRR of leasing	Firms which use NAL of leasing	Firms which use both
No lease analysis is performed	12	20	17
Lease analysis is seldom performed	5	1	4
Lease analysis is performed regularly	0	2	2
No/unclear response	1	3	3
Total	18	26	26

² Mukherjee, Tarun K (1991). 'A Survey of Corporate Leasing Analysis', *Financial Management*, Autumn.

A Mini Case: SPV Power Limited

SPV Power Limited (SPL) manufactures solar modules (35 MW) that form the major part of solar power system. The main application of such systems is in the areas where there is no conventional grid supply. The basic demand for the company stems from communication repeater systems in hill areas, signaling systems in agriculture.

SPL has set up a project to manufacture solar photovoltaic modules with an annual capacity of 30,000 modules. The company (when this case was written in 1998) manufactures modules of 35-watt peak power. Its plant is located near Chennai.

Renewable energy sources sell in the West because they are environment friendly. But the market is small in India because of the unfavorable economics and lack of awareness. The government has created a nodal agency, IREDA (Indian Renewable Energy Development Agency Limited), to promote the usage of renewable energy sources. Creating awareness about the availability of various solar power applications like solar lanterns, solar cookers, solar lighting and solar powered pumpsets would boost the demand for these products, especially in rural areas where the power supply is erratic or non-existing.

In the case of solar thermal systems the economics are favorable. If the customer purchases the equipment on lease, rentals can be so designed that the energy savings equal (or exceed) rentals. SPV involves high initial cost and it does not compare favorably with conventional sources of power. These systems are more suitable where conventional modes of power are either not available or if the supply and quality is erratic.

NON-CONVENTIONAL ENERGY SOURCES

The energy requirements of human needs have been largely met by fossil fuels like coal, oil, and natural gas so far. These are not only fast depleting but also have an adverse impact on the environment. Consequently, non-conventional sources³ of energy like wind power, solar power, hydel power, bio-mass power, and ocean energy have attracted attention in the recent years. Solar power has tremendous potential in a tropical country like India. The stand-alone applications of solar power include solar powered streetlights, domestic lights, and water pumps. These involve conversion of solar energy into electrical energy in solar photovoltaic cells. The cost of a photovoltaic cell is about \$3 (Rs 138) per watt.

Other solar thermal devices like solar water heaters for industrial and domestic applications, solar cookers, and solar dryers convert heat energy contained in the solar radiation into useful applications.

As mentioned earlier solar power is quite attractive in remote areas where extending the conventional electricity grid is not attractive. One successful experiment has been carried out at Sagar Islands of Sunderbans, West Bengal.

LEASING AS A MARKETING TOOL

The government provides subsidy as well as soft loans to the purchaser or to any financial intermediary for the purchase of solar power systems. IREDA, for example, provides a subsidy of Rs 1.125 lac and a soft loan of Rs 80,000 for the purchase of a solar pump priced at Rs 2.4 lac. Further, the purchaser can claim 100 percent depreciation in the first year itself. These schemes not only reduce the initial cost for the purchaser but also make the financing of these products attractive to non-banking finance companies. The manufacturers of non-conventional energy sources can design attractive schemes so that NBFCs would be willing to provide

³ This is based on a report by *India Infoline*.

finance. The main constraint for the growth in demand for S P V products is their high price relative to conventional products. It therefore becomes necessary to reduce the final price to the customer. Financial companies with the ability to absorb 100 percent depreciation benefits can finance these products through leasing.

- **The World Bank Scheme for Solar Pumpsets**

In this scheme IREDA disburses the World Bank funds as loan to financial intermediaries which finance the purchase of S P V pumpsets by customers. The cost of a SPL pumpset is about Rs 2.4 lac. The World Bank soft loan at 2.5 percent interest is given up to 90 percent of the price of the pumpset—i.e., Rs 2.16 lac. IREDA also provides a bridge loan of Rs 75,000 at 12 percent interest immediately on purchase. The soft loan is provided for a 10-year term with principal repayments starting one year from the time of disbursement. Financial intermediaries avail this soft loan as well as collect a down payment of around Rs 50,000 from the customer and lease the pumpset for 10 years. The intermediary takes the down payment and the soft loan and pays the manufacturer the full cost (Rs 2.4 lac). The profit to the financial institution is the spread between the interest it earns by investing the depreciation benefits and the interest it has to pay on the soft loan. The IRR to the intermediary works out to 44.5 percent!

- **The IREDA Scheme**

Through this scheme IREDA provides a free subsidy of Rs 1.125 lac to purchase a solar pumpset priced at Rs 2.4 lac. IREDA also provides a soft loan of Rs 80,000 at the time of sale at 2.5 percent interest per annum, with a one-year moratorium repayable over a period of 10 years in quarterly installments. Thus, a financial institution which lease finances the purchase of solar pumps by customers gets the free subsidy of Rs 1.125 lac, a soft loan of Rs 80,000 and collects a customer payment of Rs 47,500 and depreciation benefits amounting to Rs 44,825. It has to then pay the loan amount of Rs 2.4 lac, and invest the surplus at market rates. The profit to the financial institution which undertakes the lease financing arises from the spread between the investment income obtained by investing the surplus funds and payment towards the IREDA loan. The IRR of this scheme works out to 55 percent, even better!

IN CONCLUSION

The value of a lease is a function of tax rates for lessor and lessee. If the lessee cannot avail tax shield on depreciation, it makes sense to pass it on to someone who can. Indeed, many lease transactions are either credit or tax motivated deals. Sometimes a company will lease because it has a weak credit rating and wants to use the lessor's ability to borrow money at a lower rate. The value of leasing increases when the:

- Lessor's tax rate is substantially higher than the lessee's,
- Lease period is extended,
- Lease payments are bunched toward the end of the lease term, and
- Lessee uses a higher discount rate (wrongly).

The asset's holding period, the lease term and the asset's useful life need not coincide. This should be explicitly built into the analysis. Elementary capital budgeting theory tells us that two projects with unequal lives cannot be compared but their equivalent annuities can be.

There are two approaches to lease evaluation—equivalent loan approach and NPV (some compute IRR of lease). If the equivalent loan is higher than the lease finance, the company should borrow. Under the NAL method, leasing should be opted if $NAL > 0$. The implicit assumption is that the asset's $NPV > 0$. The lease evaluation attempts to assess the financing side effect.

The estimate of the equipment's residual value plays a significant role in how the company values the lease. Neither the lessor nor the lessee will know with any certainty what the market for the equipment would be after the useful life of the asset or lease term. If inflation turns out to be higher than anticipated during the term of the lease, the value of the equipment would also be high and vice versa. The uncertainty is more pronounced in the case of long lived assets like land and buildings. Finally, lease flows are slightly more risky than debt flows because lenders get priority in bankruptcy. So the discount rate for lease payments should be slightly higher than the cost of debt.

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EXERCISE

- Refer to the given data:
 Asset cost = Rs 220 lac
 Lease payments for the first 7 years = Rs 23 lac
 Lease payments for the next 8 years = Rs 28 lac
 Salvage value = 0
 Lease payments are made at the end of the year
 Cost of debt for the lessee is 9 percent after tax
 Depreciation is charged @ 25 percent.
 Tax rate is 35 percent.
 Find the NAL. Would you lease?
 Rework with a tax rates of 35 percent and 0 percent for the lessor and the lessee respectively. What is the break-even lease rental?
- The annual lease rental is Rs 1.5 lac per annum. The after-tax borrowing rate is 7 percent. The lease term is 8 years. Find the monthly lease rental.
- If the salvage value of the equipment in Question 1 is 10 percent, how would your answer change? The cost of capital is 17 percent.

4. Some argue that leasing becomes viable because of lower cost of capital for the lessor because his primary source of finance is low cost fixed deposits. The lessor uses his cost of capital as discount rate, which makes leasing viable. Do you agree? Why; or, why not?
5. Can leasing become viable because of better credit rating of the lessor? How? Why; or, why not?
6. Lease payments are usually quoted as a fraction of Rs 1,000 of asset cost on a monthly basis. Convert lease rentals in question 1 to this format.
7. An airline company needs an aircraft. It has two options.
 - Buy the aircraft for Rs 50 crore at a post-tax cost of debt of 8.5 percent. The aircraft has a life of 15 years at the end of which it can be salvaged for Rs 14 crore. Annual maintenance expenses are Rs 6 lac.
 - Lease it for 15 years by paying Rs 6 crore per year.

Assume straight-line depreciation. Tax rate is 35 percent. WACC is 18.5 percent. Calculate NAL.

Section Five

DIVIDEND POLICY

Chapter 30

The Dividend Debate

OBJECTIVES

- ◆ Highlight the theoretical debate surrounding the dividend policy of a firm.
- ◆ Contrast dividends with stock repurchases.
- ◆ Provide a rationale for stock repurchases.
- ◆ Provide a rationale for bonus shares.
- ◆ Shed light on dividend policy around the world.

Shareholders love it. Bondholders hate it. Managers consider it obvious. Financial economists find it puzzling. What is it? Dividends; what else?! Dividend policy involves the decision to pay out earnings or retain for reinvestment in the business. The fraction of earnings paid out as dividends, i.e., the dividend/PAT ratio is an important measure of dividend policy. Exhibit 30.1 shows the dividend payout ratio of some of the major industry groups.

Exhibit 30.1 Dividend payout ratio for 1991–95

<i>Industry</i>	<i>Payout ratio</i>	<i>No. of companies</i>
Tea plantations	0.39	3
Electronics, electrical equipment, cables	0.45	5
Miscellaneous	0.38	15
Chemicals, dyes, pharma Refineries & Plastics	0.41	20
General Engineering	0.24	18
Textiles	0.42	16
Cement	0.42	3
Sugar	0.31	2
Electric power	0.34	2
Food products	0.33	3
Paper pulp and hard board	0.21	3

Why should anyone care about dividends? Let me rephrase this question. Why do companies pay dividends? Why do investors pay attention to dividends? Do dividends affect firm value? Is *any* payout optimal for a company? In other words, should managers care for the amount of dividends they pay (or may be the growth rate in dividends)? By the way, dividends are cash payments made by companies to shareholders either semi

annually or annually or even quarterly. The objective of this chapter is to figure out if dividends have a bearing on equity and firm value.

Consider a company whose balance sheet reads as shown here:

Share capital	100	Assets	120
Reserves	<u>20</u>		<u>120</u>
	<u>120</u>		

The company has issued one share @ Rs 100. For the sake of simplicity, assume that the company has cash in hand as assets. The market value of the share is Rs 120. If the company were to payout all its earnings as dividends, the balance sheet would be

Share capital	100	Assets	100
Reserves	<u>—</u>		<u>100</u>
	<u>100</u>		

The market value of the share is Rs 100. Add Rs 20 of dividends. The investor is in the same final position. What the investor gets as dividends is offset by capital loss. He is neither better off nor worse off.

ARE DIVIDENDS IRRELEVANT?

An all-equity financed firm has two sources of funds: current and future earnings and/or new equity. Since changing the amount of retained earnings varies the amount of dividends that the firm pays to its stockholders, it is important to understand the relationship between market value of the firm and its dividend policy. Modigliani & Miller (MM) demonstrated that in a perfect market case dividends are irrelevant for the valuation of a firm. In other words, dividend policy does not affect stock price. Their proposition is based on certain assumptions:

- Dividends and capital gains (difference between selling price and purchase price) are taxed at the same rate.
- There are no transaction costs.
- Investment policy of the firm remains unchanged.
- Firms can issue new equity with no flotation or transaction cost.
- There are no information effects associated with dividends.

To prove their proposition let us return to our earlier example. The company generates earnings the following year. It can do two things with the earnings:

- Invest in the business and skip dividends.
- Pay dividends to current shareholders and sell new shares to meet the investment requirement.

We are interested in the second situation. When the company sells new shares, existing shareholders suffer a capital loss because more shareholders share the pie. But an equal amount in dividends compensates them. What do new shareholders get? They participate in the existing earnings as well as the future earnings. High

dividends today serve to spread the total earnings, including growth, over a larger number of shares. Cutting a pie into six or eight pieces will not *increase* the size of the pie. The same is also true of companies.

We assumed that the company has access to equity alone although the firm can sell both debt and equity to keep the discussion simple. We have also assumed that shares can be sold with no flotation costs, the company's shares are fairly priced and so on. The important message is that a company can make money by good *investment* decisions and not good dividend decisions. If abundant cash is available to finance projects, a company need not worry about dividend policy.

Dividend Irrelevance: Alternative Explanation

The price of a share is equal to the present value of the expected future dividends. If dividends are expected to grow at a constant rate in perpetuity g and the discount rate is k

$$P = D/(k - g) \quad (1)$$

If the firm retains a constant fraction, b , of its earnings per share and earns a constant average rate of return, r , on its investment, then

$$g = b \times r \quad (2)$$

Further, dividend,

$$\begin{aligned} D &= \text{Payout ratio} \times \text{EPS} \\ &= (1 - b) \times E \end{aligned} \quad (3)$$

Substituting in equation (1)

$$P = [(1 - b)E]/[k - br] \quad (4)$$

What would happen to P if retention ratio were to be changed?

Differentiating equation (4) partially with respect to b :

$$\partial P/\partial b = [(r - k)E]/[k - br]^2$$

For price to be independent of retained earnings, $\partial P/\partial b = 0$, i.e., $r = k$

In plain English, dividend policy is irrelevant if rate of return on the marginal investment is equal to the discount rate, i.e., $NPV = 0$ and if r and k are independent of payout ratio.

Are They 'Good'?

Prior to the MM paper most believed that higher dividends are good since the value of equity is the present value of dividends. Some theorists and practitioners believe that higher dividends have a favorable impact on stock price. The more generous the dividend policy, the higher will be the share price. The debate is whether investors value growth (retained earnings) or dividends. The effect is not too clear. Will an increase in dividends have the same (favorable) impact on stock price for a declining company as that for a growing company? When dividends are changed, firms may have to change their investment policies as well. So the change in stock price is probably a result of change in the investment policy and not in the dividend policy.

Are They ‘Bad’?

In many countries, dividends are taxed at a higher rate than capital gains. The tax on capital gains will be paid only when the investors sell shares. So a company that pays no dividends should be more attractive to investors than a similar company that pays dividends. This, at least in theory, should increase the price of the non-dividend paying company’s stock. To summarize, in a world with taxes, investors would prefer smaller dividends or no dividends to high dividends.

Higher marginal tax rates on dividend income versus capital gains should make taxable investors prefer a rupee of pre-tax capital gain to a rupee of dividends. Therefore, some argue that holding risk constant, the higher is a stock’s dividend yield, higher the before-tax return to compensate taxable investors for the higher tax liability. The counter argument is that the tax code has provisions that permit investors to transform dividend income into capital gains.

Bird-in-the-Hand Fallacy

Argument: Dividends are better than capital gains because dividends are certain and capital gains are uncertain. So, risk-averse investors ‘prefer’ dividends.

Response: Firm value is determined by the cash flows from the project. If a firm increases dividends, it will have to sell new shares to satisfy investment requirements. What is received as dividends will be offset by loss of price appreciation. The new investors who bear the risk that the old investors avoid need to be compensated.

Argument: The price of a stock is the present value of future dividends:

$$P = D_1/(1 + k) + D_2/(1 + k)^2 + \dots + D_n/(1 + k)^n$$

Clearly, dividends received in earlier years are more valuable.

Response: The amount and timing of dividends may change but the present value of the stream does not. In other words, dividends do not affect value of equity.

WHY MIGHT DIVIDENDS MATTER?

The MM hypothesis is based on certain assumptions like no taxes or transaction costs, no information asymmetry, etc. We can figure out why dividends may matter in real-life situations by relaxing those assumptions one by one.

Taxes

The investor who receives coupon payments or dividends must pay personal tax and therefore, cares about after-tax receipts. Hence managers should try to arrange their firms’ capital structure to minimize the total taxes paid after earnings are distributed to their owners. In real life, not every investor faces the same tax rate. Low tax investors pay no or low personal taxes on dividend or interest receipts. High tax investors pay lower taxes when they receive income as capital gains instead of as interest or dividend income. Since capital gains tax is paid only when the gain is realized and if there is no offsetting loss, the investor can defer the tax payment (and weaken the impact). The combined effect of corporate and personal taxes is that there should be ‘dividend clienteles’.

The proponents of clientele effect contend that dividends matter because of the tendency of investors to buy shares in companies that have dividend policies that match their preferences for high, low or no dividends. The investors of high payout companies are there *because* they prefer high dividends and the investors of low pay out companies are there *because* they prefer low dividends. Stockholders falling in a high tax bracket, who do not need current income, may choose low payout companies and investors in low tax brackets may choose high payout companies. So firms hate to change their dividend policies due to the clientele effect lest they incur investors' wrath.

MM were the first to recognize the clientele effect. In their words: *If for example the frequency distribution of corporate payout ratios happened to correspond exactly with distribution of investor preferences for payout ratio, then the existence of these preferences would clearly lead ultimately to a situation whose implications were different, in no fundamental respect, from the perfect market case. Each corporation would tend to attract to itself a 'clientele' consisting of those preferring its particular payout ratio, but one clientele would be as good as another in terms of the valuation it would imply for firms.*

Read the last sentence carefully. If investors are mobile, and if the search and transaction costs are not high, then the dividend policy is still irrelevant, as new investors whose preferences match the new dividend policy of the firm would replace old investors.

TAXES AND CLIENTELE EFFECT

Given the tax disadvantage of dividends, it makes sense for companies to figure out who their marginal stockholders are and how they view dividends. Suppose an investor buys a share before the ex-dividend date (i.e., the date by which the investor should buy shares in order to be eligible for dividends). He can either collect dividends, sell shares after the ex-dividend date or sell the shares just before the ex-dividend date and forgo dividends.

Let

$$\begin{aligned} \text{Purchase price} &= P_A \\ \text{Dividends} &= D \\ \text{Price just before the ex-div date} &= P_B \\ \text{Ex-dividend price} &= P_C \end{aligned}$$

Strategy A: Sell After the Ex-dividend Date

$$\begin{aligned} \text{Dividend received} &= D \\ \text{Tax on dividend} &= t_d \times D \\ \text{Capital gain} &= P_C - P_A \\ \text{Tax on capital gain} &= T_{cg}(P_C - P_A) \end{aligned}$$

Strategy B: Sell Just before the Ex-dividend Date

$$\begin{aligned} \text{Dividends} &= 0 \\ \text{Capital gain} &= P_B - P_A \\ \text{Tax on capital gain} &= T_{cg}(P_B - P_A) \end{aligned}$$

To prevent arbitrage, the gain from each course of action must be the same.

$$P_B - T_{cg}(P_B - P_A) = P_C - T_{cg}(P_C - P_A) + D(1 - t_d)$$

On simplifying, we get:

$$(P_B - P_A)/D = (1 - t_d)/(1 - t_{cg})$$

For the investor to be indifferent between selling before or after the ex-dividend date, the price drop on the ex-dividend day should reflect the investor's tax differential between dividends and capital gains. By observing the price drop and the dividends, we can get some insight into marginal tax rates of shareholders. Elton & Gruber (1970) point out that if the price drop is a larger proportion of dividends for firms in the high dividend class, it can be inferred that the investors in these firms are in the lower tax bracket. But their critics dismiss this argument on the grounds that much of the activity around ex-dividend date is restricted to speculators and thus, not indicative of 'real' shareholders.

It is interesting to note that if an investor is indifferent between dividends and capital gains (i.e., tax exempt) and the price drop is lower than dividends, the investor can make risk-less profit. An illustration clarifies the point:

$$\begin{aligned} D &= \text{Rs } 10 \\ (P_B - P_A) &= \text{Rs } 6 \\ T_d &= 0 \text{ \& } T_{cg} = 0 \end{aligned}$$

Capital loss = Rs 6, Dividend income = Rs 10, and Net position = Rs 4.

Such a strategy is called dividend capture. Of course, the transaction costs should be factored into the analysis and the investor should be sure of amount of dividends and capital loss.¹

Transaction Costs

When companies pay dividends they may have to raise external equity to fund projects. Raising equity or debt entails transaction costs like fees paid to merchant bankers, lawyers and other intermediaries. In the chapter on financing choices, I pointed out that the cost of raising equity could be about 4–6 percent of net proceeds if issued in India. The schedule of cost of raising equity in the US is given here:

<i>Proceeds (\$ in million)</i>	<i>Average direct & indirect costs (percent)²</i>	<i>No. of IPOs (percent, 1990–94)</i>
2–9.99	25.16	337
10–19.99	18.15	389
20–39.99	18.18	533
40–59.99	17.95	215
60–79.99	16.35	79
80–99.99	14.14	51
100–199	12.78	106
200–499	11.10	47
>500	10.36	10
Total	18.69	1767

¹ The solution is to sell a call option when the stock is purchased. This strategy is termed, hedged dividend capture. See Brown and Lummer (1986).

² Direct and indirect costs include underwriter compensation, selling concession, other issuing expenses plus the initial underpricing. These are for IPOs taken as proxy for seasoned offerings. In reality, subsequent equity offerings may not entail as much cash outlay as first time offerings.

The presence of transaction costs suggests that dividend policy is not trivial because paying out more forces a company to raise external capital.

Agency Conflicts

As pointed out in earlier chapters, a firm is a collection of assets that are jointly owned. The shareholders of a firm appoint managers to take decisions on their behalf. There could be potential conflict of interests between managers and shareholders, and between shareholders and bondholders.

Managers have discretion over the residual cash flow left over after meeting contractual payments. They may pay out residual cash flow as dividends or reinvest. Positive NPV projects create value for shareholders. Managers expropriate shareholders by over investing in value destroying projects or increasing their perks and benefits. So such firms should pay more dividends. In other words, dividends are good news for shareholders of such firms because they resolve agency problems.

Modern finance theory hypothesizes that investors are worried about systematic risk alone as they can diversify unsystematic risk by holding diversified portfolios. Managers, on the other hand, are concerned with total risk, which includes diversifiable risk like default risk as their careers and fortunes are tied to the fortunes of the company. Risk-averse managers may choose projects that are safe but have lower expected returns. But shareholders would want them to take on business gambles. Dividends serve the useful purpose of driving firms to competitive capital markets where the affairs of the company are scrutinized by financial intermediaries and investors.

Stockholders can transfer wealth from bondholders by choosing policies that increase the risk of the outstanding bonds. The transfer of wealth can be achieved in two ways. First, stockholders can reduce investment or sell off assets and pay dividends. Second, stockholders can sell new debt of same or higher priority and pay generous dividends. Both the acts increase the risk of existing bonds and bond price falls like a stone (in the extreme case) thereby causing wealth loss to bondholders. Bondholders realize the incentives faced by stockholders and place restrictions on the level of future dividend payments and the usage and seniority of future debt issues. Based on this analysis we would expect dividends to be constrained by the existing loan covenants.

Now let us suppose managers act in the interest of shareholders.

Consider a firm that currently has a debt/equity ratio of 1.0. The firm's balance sheet is given here:

Equity	50	Assets	100
Debt	<u>50</u>		
	<u>100</u>		<u>100</u>

The company generates earnings amounting to Rs 200 over a period of time, which it puts back into the business. The retained earnings increase equity.

Equity	250	Assets	300
Debt	<u>50</u>		
	<u>300</u>		<u>300</u>

The debt equity ratio is 0.20. The creditors have more cushion (security) than before and the shareholders are paying the creditors an interest rate more than that warranted by the default risk of the company. In other words, there is a wealth transfer from shareholders to bondholders. Shareholders can correct the

situation by paying dividends of Rs 100 and issuing debt worth Rs 100 to revert to the original situation. In plain English, managers acting in the interest of existing shareholders (or shareholders themselves) will not give away wealth to bondholders. They can achieve this by paying dividends. So dividend policy is a function of not only earning prospects but also agency considerations.

Information Asymmetry

At times the managers of a company may know more about the true prospects of the firm than outside investors. They may convey future prospects by changing financial policies. In other words, changes in dividend policy convey information to stock markets.

There is a popular belief that firms increase dividends only when they are relatively certain that the higher payout could be maintained. So it is likely that investors will interpret an increase in dividends as a signal that management anticipates higher future earnings. Given the information signaling quality of dividends we would expect the stock price to go up whenever dividends are increased. Empirical evidence supports this notion.

It is the information content that affects stock price and not dividends per se. It is not clear as to what dividends signal, why or how. Do changes in dividends signal the future or the *past*? Moreover, a firm hell bent on conveying information could resort to a cheaper means of signaling. Dividends are an expensive means of signaling. We don't know if dividends are better signals than press reports or stock repurchases or some such thing. Companies may skip dividends because internal financing is cheaper than external equity due to issue costs that could be as high as 10–15 percent of the issue size. The business press and equity research fraternity is active enough to identify performers even if they don't pay dividends. A firm will be better off by 'telling the truth' than pay dividends to prop up the stock price.

The increase in dividends may mean two things: The firm expects a permanent increase in profits and cash flows or the firm is in a declining stage and it opts to distribute dividends to liquidate the company. So an outsider cannot distinguish between 'positive dividends' and 'negative dividends'. So dividends are not the answer.

THE EMPIRICAL EVIDENCE

If dividend changes have information content in them we would expect dividend changes to be followed by earnings changes in the same direction and unanticipated dividend changes to be followed by stock price changes in the same direction. Empirical tests of dividend initiations and omissions in the US suggest that stock markets react positively to dividend initiations and negatively to omissions. Likewise, dividend cuts, in general, are greeted negatively. As pointed out earlier, shareholders can expropriate wealth from bondholders by funding dividends with new debt. Bondholders protect themselves by inserting protective covenants or me-first rules. If security holders view these covenants as insufficient, unexpected changes in dividend payments can still result in wealth transfers. For these reasons we would expect the stock price to go up and the prices of bonds and preferred stock to go down when there is a positive unexpected dividend change (and vice versa for unexpected negative dividend changes). Academic studies of security price reaction to unexpected dividend changes do not support the wealth transfer hypothesis.³

³ Woolridge, Randall (1985).

HOW DO MANAGERS SET DIVIDENDS?

The most direct way to find out what managers think of dividends is to ask them. One of the earliest surveys on dividends (a classic) is by John Lintner (1956). He conducted a survey of management views on dividend policy in the US. His study concluded that:

- Firms have long-run target dividend payout ratio.
- Firms avoid reducing dividends in a lean period and move gradually towards the target payout ratio in much the same way as they move towards optimal capital structure even if earnings rise rapidly. Dividends are increased only after managers are reasonably sure that they'll be able to maintain them permanently at the new level.
- Firms make changes in DPS slowly and these changes lag behind changes in EPS by one or more periods on the belief that shareholders prefer gradual progression in dividends vis-à-vis erratic changes.
- Investment requirements have little influence on the dividend policy.

His model suggests that DPS is a function of current earnings, existing dividend rate, target payout ratio and speed of adjustment. If his model is correct, then the next year dividend would be (target ratio \times next year earnings) and the change in dividends would be adjustment rate \times (next year dividend – current dividend). The speed of adjustment depends on the conservatism of the company's managers and the outlook for the industry. Jain and Manoj Kumar (1997)⁴ conducted a similar survey of 15 companies, 14 of which responded that they follow a stable dividend policy. Their study suggests that 62 percent of the sample companies followed stable dividend policy for the period 1991–95. Lintner's model seems to work even after 40 years. Exhibit 30.2 provides a summary of the findings of Jain and Manoj Kumar.

Exhibit 30.2 Stable dividend policy practiced by sample companies

<i>Period</i>	<i>Total observations</i>	<i>Observations confirming stable dividend policy</i>	<i>Equation (3) as a percentage of equation (2)</i>
1984-90	601	348	58
1991-95	378	236	62
1984-95	979	584	60

Exhibit 30.3 presents the results of a similar survey of managers of 114 utility companies, 147 manufacturing companies and 57 wholesale/retail firms on their views on dividend policy in the US. Anticipated level

Exhibit 30.3 Survey results—America

<i>Determinant</i>	<i>Level of importance</i>				
	<i>None 0</i>	<i>Slight 1</i>	<i>Moderate 2</i>	<i>Great 3</i>	<i>Max 4</i>
1. Anticipated level of future earnings	7		33		278
2. Pattern of past dividends	10		90		218
3. Availability of cash	62		76		180
4. Concern about maintaining or increasing stock price	41		103		174

Source: Baker et al. (1985).

⁴ Jain, P K and Manoj Kumar (1997). 'Dividend Policy and Practices in Select Corporate Firms of India and South East Asia: A Comparative Study', *Vision*, July–Dec.

of future earnings and pattern on past dividends seem to be the most important determinants of corporate dividend policy in the US.

Dividend Tax and Dividend Policy

Countries differ in their tax treatment of dividends. Some countries tax both the company and the investor at the marginal rate. Some countries prefer to keep dividends tax-free. Given below is a small list of tax treatment of dividends in select countries.

<i>Country</i>	<i>Tax</i>
Argentina	Nil
Brazil	Marginal
Mexico	Nil
Indonesia	Marginal
Philippines	Nil
Singapore	Marginal
Thailand	Nil
China	Nil
Japan	Marginal
US	Marginal
UK	Marginal

During 1997–98, the Government of India eliminated the double taxation of dividends (i.e., at the company and investor level) and introduced a new system of taxation in which dividends are taxed at a uniform rate of 10 percent at the company level. Thus, a company contemplating on paying 25 percent dividend will pay 22.73 percent as dividend and 2.27 percent as tax. It would be logical to ask who wins and who loses from this change of taxation system. Obviously, the gainers are those who are taxed at the highest rate of personal tax and the losers are the tax-exempt investors. The tax exempt investors, who would otherwise not have paid tax, will have to pay a minimum tax of 10 percent on dividend. Investors who were earlier demanding low payout will now demand higher payout. Since the short-term capital gains are taxed at ordinary income depending on the tax bracket of the individual, dividends taxed at 10 percent would become more attractive. Exhibit 30.4 shows the impact of dividend tax on various investor groups; assume a payout of 27 percent.⁵

Exhibit 30.4 The impact of dividend tax on dividend policy

	<i>Tax bracket of shareholders</i>				
	<i>Exempted</i>	<i>10 percent</i>	<i>20 percent</i>	<i>30 percent</i>	<i>35 percent</i>
Without dividend tax					
PBT	100	100	100	100	100
Tax @ 35 percent	35	35	35	35	35
PAT	65	65	65	65	65
Dividends @ 27 percent	17.55	17.55	17.55	17.55	17.55
Tax on dividend at investor level	0	1.76	3.51	5.27	6.14
After tax income to shareholders	17.55	15.80	14.04	12.29	11.41
Tax paid to Gol	35	36.76	38.51	40.27	41.14

Exhibit 30.4 contd.

⁵ The dividend tax has been recently repealed.

Exhibit 30.4 contd.

	Tax bracket of shareholders				
	Exempted	10 percent	20 percent	30 percent	35 percent
With dividend tax					
PBT	100	100	100	100	100
Tax @ 35 percent	35	35	35	35	35
PAT	65	65	65	65	65
Dividends	15.95	15.95	15.95	15.95	15.95
Tax on dividend at investor level	1.6	1.6	1.6	1.6	1.6
After tax income to shareholders	14.36	14.36	14.36	14.36	14.36
Tax paid to govt.	36.6	36.6	36.6	36.6	36.6

International Comparison

Based on the discussion so far we would expect firms operating in countries with better protections of minority shareholders to pay higher dividends because dividends are an outcome of legal protection to shareholders which enables them to extract dividends from corporate insiders. A study of dividend policies of firms from 33 countries around the world confirms this expectation.⁶ Exhibit 30.5 presents the level of dividends in select countries.

Exhibit 30.5 Dividend policy around the world

Country	Dividend/CF	Dividend/earn	Dividend/sales
Civil law countries			
Argentina	12.65	27.36	4.32
Belgium	11.77	39.38	1.09
Denmark	6.55	17.27	0.71
France	9.46	23.55	0.63
Germany	12.70	42.86	0.83
The Netherlands	11.29	30.02	0.74
Sweden	5.59	18.33	0.78
Median	9.74	25.11	0.83
Common law countries			
Australia	22.83	42.82	2.22
Canada	8.00	19.78	0.78
Hong Kong	35.43	45.93	7.51
India	25.69	49.34	1.55
Singapore	22.28	41.04	2.14
UK	16.67	36.91	1.89
US	11.38	22.11	0.95
Median	18.28	37.42	2.02

Source: La Porta et al. (1998).

La Porta et al. find that firms operating in countries with better protection of minority shareholders pay higher dividends and faster growing firms pay lower dividends than slower growing firms consistent with

⁶ La-Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and, Robert Vishny (1998). 'Agency Problems and Dividend Policies around the World', NBER Working Paper, No. 6594.

the idea that legally protected shareholders are willing to wait for dividends when investment opportunities are good. The median dividend to cash flow ratio for common law countries like the US and the UK is 18.28, whereas for civil law countries it is 9.24. Similarly other measures of dividend policy like dividend/earnings and dividend/sales are also higher for companies from common law countries.

Stock Repurchases

An alternative to paying dividends is a stock repurchase by the firm. If some of the outstanding shares of the company are repurchased (by the company), fewer shares will be outstanding. If the stock repurchase is not expected to affect earnings, the EPS on the reduced equity base will go up. Further, if the P/E multiple of the stock is unaffected by stock repurchase, the stock price increases providing capital gains to shareholders. The firm can either extinguish shares or hold the shares as treasury stock. To illustrate, suppose a company buys back 1 crore shares (face value is Rs 10) at Rs 100 each and cancels them.

The equity base of the company will be reduced by Rs 10 crore, while the reserves shrink by Rs 90 crore. The company can reissue at a later date. Many stock repurchase programmes are part of a corporate restructuring exercise where divisions or subsidiaries are sold off or leverage is increased. The inflow of capital due to debt issuance or asset sales is used for a one-time major stock repurchase. The regular stock repurchase, of course, is an alternative method of paying dividends.

Stock repurchases are a major corporate event in the US. During 1996 and 1998, companies in the US announced nearly 4,400 repurchase programs amounting to \$550 billion.⁷ This trend is spreading to other parts of the world.

Stock repurchases are carried out in three ways:

1. Fixed Price Tender Offer

In a tender offer the management offers to repurchase a certain number of shares either at the market price or at a premium to the market price. The company announces the tender price and the period for which the tender offer is open. Shareholders, at their own instance, can tender shares to the company.

2. Open Market Repurchases

In an open market repurchase, the company announces in a press release its intention of repurchasing but makes no commitments about price or amount. The company can execute trades at its will thereafter. Since the number of shares that can be repurchased in any given day is limited, the repurchase runs to several weeks or even months.⁸ While there are legal restrictions on the volume of shares that can be purchased, this method offers the greatest degree of flexibility. Because of lack of a firm commitment on the company's part may send weak or negative signals to the market. To that extent open market repurchases are not very effective.

3. The third route is to negotiate with large shareholders privately.

In a fixed price tender offer a company invites its shareholders to tender shares to the company within a stipulated time period at a preset price premium, say 15 percent, over the prevailing market price. In a Dutch auction tender offer a company announces its intention of buying shares within a specified price band. The shareholders are required to inform the company how many shares they are willing to tender and at what

⁷ Ikenberry, Lakonishok, and Vermaelen (1999).

⁸ Regulators in some countries limit daily repurchases. In the US, it is 25 percent of the average daily traded volume in the previous four weeks.

minimum price within the price band. Once all the tenders are received, the clearing price is set at the minimum price needed to purchase the desired number of shares from those shareholders who agreed to sell at or below that price. All shares transfer at the clearing price. The table given below illustrates the way a Dutch auction would work for a company wishing to repurchase 25 lac shares at an offered range of Rs 35–45 per share. In this case, the clearing price is Rs 40.

The amount of shares repurchased by the three methods in the US in the recent years (Exhibit 30.6), shows that open market repurchases are more prominent than the other two methods.

<i>Price (Rs) shares</i>	<i>Tendered (thousands)</i>	<i>Cumulative shares tendered (thousands)</i>
35	200	200
36	250	450
37	400	850
38	500	1,350
39	600	1,950
40	550	2,500
41	300	2,850
42	200	3,050
43	150	3,200
44	100	3,300
45	100	3,400

Exhibit 30.6 Stock repurchases by Dutch auction, tender offer and open market methods

	<i>Dutch auction</i>		<i>Tender offer</i>		<i>Open market</i>	
	<i>Cases</i>	<i>\$ in million</i>	<i>Cases</i>	<i>\$ in million</i>	<i>Cases</i>	<i>\$ in million</i>
1990	10	1,933	41	3,463	778	39,733
1991	4	739	51	4,715	282	16,139
1992	7	1,638	37	1,488	447	32,635
1993	5	1,291	51	1,094	461	35,000
1994	10	925	52	2,796	824	71,036
1995	8	969	40	542	851	81,591
1996	2	2,774	37	2,562	1,111	157,917
1997	30	5,442	35	2,552	967	163,688
1998	20	2,640	13	4,364	1,537	215,012
1999	19	3,817	21	1,790	1,212	137,015

Source: Grullon and Ikenberry (2000).

Exhibit 30.7 presents the advantages and disadvantages of different methods of repurchase.

Exhibit 30.7 Pros and cons of various share repurchase methods

	<i>Benefits</i>	<i>Drawbacks</i>	<i>Strength of signal to the market</i>
Open market purchase	<ol style="list-style-type: none"> 1. Most flexible 2. Timing possibility to offset dilution from stock options 3. Inexpensive 	<p>May be announced but not Completed.</p>	Weak

Exhibit 30.7 contd.

Exhibit 30.7 contd.

	<i>Benefits</i>	<i>Drawbacks</i>	<i>Strength of signal to the market</i>
Dutch auction	<ol style="list-style-type: none"> 1. Results in permanent increase in stock price 2. Lower risk of under-subscription 3. Better price discovery 	Possible wealth transfer from remaining shareholders.	Strong positive
Tender offer	<ol style="list-style-type: none"> 1. Results in permanent increase in stock price 2. Often used to increase value via leveraged recap 	Possible wealth transfer.	Strong positive

Source: C S First Boston.

RATIONALE FOR STOCK REPURCHASES

Stock repurchases are generally viewed as temporary substitutes for cash dividends. Since dividends are ‘sticky’ (i.e., managers hate to cut dividends), stock purchases can substitute cash dividends if the increase in cash flow is temporary. In other words, cash dividends are long-term commitments that managers like to maintain, whereas stock repurchase is a one-time affair.

Since managers and investors both expect a given level of dividends to be maintained, dividend payments are relatively inflexible. While higher dividends probably are the most attractive method for distributing a moderately and consistently increasing surplus of cash flow, they are not appropriate when the surplus arises in a sporadic pattern of large amounts. The important message is that stock repurchase is an alternative to making investment in the company’s operations. Shareholders would be better off by receiving cash rather than investing in less profitable outlays in investment in productive facilities. If the internal rate of return of the investment is less than cost of capital, shareholders would be better off with stock repurchases.

- Stock repurchase is the ideal tool to reduce redundant liquid assets and use unused debt capacity and move towards the firm’s optimal capital structure. The value creating potential is more if the repurchase is financed with debt. The interest expense on debt is tax deductible leading to cash savings.⁹
- Repurchase announcements may be viewed as positive signals by investors as repurchases are initiated when the company’s shares are undervalued. This may prop up share price. The flip side of the coin is that stock repurchase can convey an adverse signal to the stock market that the increase in the company’s cash flows is not permanent. This may affect the company’s stock price. In general, stock markets react positively to repurchases.

In sum, stock repurchases are used to:

- Increase reported earnings per share,
- Make changes in capital structure,
- Distribute cash to stockholders,
- Reduce outflow due to dividends,
- Buy out an irritating shareholder, and
- Send a signal to the stock market that the company’s shares are undervalued.

⁹ Of course, leverage can be increased by simply funding projects with debt. In other words, the leverage increasing property is not specific to repurchases.

Assume that a company currently has a BB capital structure. The company's management decides to buy-back 40 percent of shares at 12 percent premium to the previous market price resulting in a 54 percent reduction in shareholders equity. The impact of the repurchase is shown in Exhibit 30.8. The repurchase is to be financed with debt. Earnings may decline due to the increase in interest expense if the new facility carries a higher rate of interest compared to the existing facility. But the earnings are spread over a fewer number of shares. The net impact is that EPS and stock price rise.¹⁰ But bondholders need not be better off. The increase in debt-to-capital ratio and a decrease in earnings coverage lead to a rating downgrade. In other words, shareholders can win at the expense of bondholders.

Exhibit 30.8 Impact of a stock repurchase on securities prices

<i>Capitalization</i>	<i>Before</i>		<i>After</i>	
	<i>Rs in crore</i>	<i>Percentage</i>	<i>Rs crore</i>	<i>Percentage</i>
Bank loan	50	11.1	158	35.1
Debentures	200	44.4	200	44.4
Equity	200	44.4	92	20.4
Total	450	100	450	100
EBIT	50	50		
Interest expense:				
Bank loan	3.5 @ 7 percent		12.6 @ 8 percent	
Debentures	18 @ 9 percent		18 @ 9 percent	
EBT	28.5		19.4	
–Tax @ 34 percent	9.7		6.6	
PAT	18.8		12.8	
Market Valuations				
Shares outstanding	10 m		6 m	
E.P.S (Rs)	1.88		2.13	
P/E	12.0 x		12.0 x	
Price per share	22.5		25.5	
Credit rating	BB		B	
YTM (on bonds)	9 percent		11 percent	

Once a company has decided that it will repurchase shares, the next step is to figure out how large the buy-back should be. The size of the buy-back depends on the purpose of the buyback. If the objective is to make changes in capital structure, then the number of shares is a function of the company's market value, its share price and the percentage of debt the company wants to reach. The calculation is not trivial because the stock price rises due to (expected) tax shields and other information effects. One should factor this in order to arrive at the number of shares.

If dividends and share repurchases are equivalent and when dividends are taxed at a higher rate than capital gains, as in many countries, why do companies prefer to pay dividends? John and Williams (1985) present a theory where dividends are a costly signal because they are taxed more heavily than stock repurchases. Their starting point is the assumption that shareholders have liquidity needs that they must satisfy by selling some of their shares. The firm's managers, who act in the interest of the original shareholders, know the true value of the firm. Outside investors do not. If the firm is undervalued when the shareholders' liquidity needs arise, they would be selling shares at below the true value. However, suppose the firm pays a dividend that is taxed. If outside investors take taxed dividends to be a good signal, then the share price will rise; the shareholders will have to sell less equity to meet their liquidity needs and will maintain a higher proportionate share in the firm.

¹⁰ The actual increase depends on the P/E multiple applied by investors after the buy-back.

It is interesting to note that corporate stock repurchase plans remain a little more than symbolic acts by many companies in the US. A study in the US suggests that about two-thirds of the companies bought less than half the number of shares authorized in the repurchase program. Many European countries have authorized stock repurchases. Given below is the status of legislation in some European countries.

	<i>Legally permissible</i>	<i>Attractive to tax-paying shareholders</i>	<i>Law or tax currently under review</i>
Denmark	Yes	Yes	N.A
France	Yes	No	N.A
Germany	No	No	Yes
Italy	Yes	Yes	N.A
Netherlands	Yes	No	Yes
Spain	Yes	Yes	NA
Sweden	Yes	No	Yes
Switzerland	Yes	No	Yes
UK	Yes	Yes	N.A

Source: Marc Bertoneche (1998).

In Canada, firms must receive an approval from the exchange where the company's stock is listed before initiating a buy-back.¹¹ Once authorized, the program typically lasts 1 year and is restricted to 10 percent of public float or 5 percent of shares outstanding. A firm may commence repurchase two days after receiving approval from the stock exchange. The program is to be executed through a broker. Cumulative repurchases over the trailing 30 days must not exceed 2 percent of the outstanding shares.

Buy-back of shares has been recently introduced in India. Many companies have advertised their intention to buyback shares to create value for shareholders. In June 1999, Motor Industries Co. Ltd. (MICO), for instance, made an offer to buy-back 2 lac shares at Rs 4,200 when the market price of the company's stock was Rs 3,500. The company explained that it has accumulated free reserves and marketable securities that do not earn satisfactory return. Consequently, shareholders would be better off by receiving cash. Further, the trading volume on the stock exchanges (where it is listed) has been quite low. Those shareholders who needed liquidity would benefit.

As is shown in Exhibit 30.9, which presents the returns to tendering and non-tendering shareholders in some recent stock repurchases in India (Shivram and Agarwal 2002), tendering shareholders do substantially better than non-tendering shareholders. Another study by Mohanty (2002) suggests that stock repurchases have not been able to increase shareholders wealth perceptibly and that the primary motive behind the buy-back seems to be to increase promoters' stake. He also finds evidence of insider trading before the buy-back is announced. The gain for an insider is about 24 percent as opposed to 4 percent for an ordinary investor.

Exhibit 30.9 Who gains in a buy-back?

<i>Company</i>	<i>Premium (percent)</i>	<i>Buy-back price (1)</i>	<i>Price on opening date (2)</i>	<i>Price on closing date (3)</i>	<i>Price 3 months later (4)</i>
Finolex	7.42	275	256	261	257
Great Eastern	23.35	42	34.05	24.7	28.7
Indian Rayon	14.68	85	NA	76.2	109.25
Madura Coats	37.61	30	21.8	21.15	21
Reliance	-10.55	303	338.75	373.9	317.3

Exhibit 30.9 contd.

¹¹ Ikenberry, Lakonishok, and Vermaelen (1999).

Exhibit 30.9 contd.

Company	Tendering shareholder (percent)		Non-tendering shareholder (percent)	
	$[(1) - (2)]/(2)$	$[(1) - (3)]/(3)$	$[(3) - (2)]/(2)$	$[(4) - (2)]/(2)$
Finolex	7.42	5.36	1.95	0.39
Great Eastern	23.35	70.04	-27.46	-15.71
Indian Rayon	NA	11.55	NA	NA
Madura Coats	37.61	41.84	-2.98	-3.67
Reliance	-10.55	-18.96	10.38	-6.33

Stock repurchases are carried out with the assistance of a merchant banker. Given here is the list of top lead managers for buy-backs in 2002.

	No.	Value (Rs crore)
DSP Merrill Lynch	2	463
Kotak Mahindra	3	47
J M Morgan Stanley	3	189
Enam Financial	1	11
SBI Capital Markets	3	31
ICICI Securities	2	65
Karvy Investor Services	3	8

The SEBI guidelines, relating to share buy-backs, are given in Appendix 1.

Bonus Shares

Bonus shares, also called stock dividends, are shares issued by a company to its shareholders free of cost by capitalizing reserves. Thus stock dividend of 5 percent means 5 shares are distributed to the investor for every 100 shares held. Bonus shares, like cash dividends, are considered valuable.

Suppose a company's balance sheet reads as the one shown here. The company has issued 1 share at Rs 10.

Share capital	10	Assets	20
R&S	10		
TOTAL	20	TOTAL	20

For the sake of simplicity, suppose that market value of a share equals book-value (Rs 20). The company pays 1 bonus share. The balance sheet after payment would be:

Share capital	20	Assets	20
R&S	—		
TOTAL	20	TOTAL	20

Market value of share = Rs 20

No. of shares = 2

Price per share = Rs 10

Now 2 shares are worth what—earlier—was the worth of one share. The investor is neither better off nor worse off. The investor's share in the pie remains the same. Bonus shares may be preferred when dividends

are taxed at a higher rate than capital gains realized on selling bonus shares. It is quite possible that bonus shares may have a favorable impact on stock price in real life. Indeed, academic studies of stock market reaction to stock dividends, in the US, report positive abnormal return. Several plausible explanations have been suggested:

- **Signaling:** Due to information asymmetry a company's management may choose stock dividends to signal the company's future financial policies; say, a dividend rise or an increase in earnings.
- **Liquidity:** Stock dividends may enhance liquidity by increasing the number of shares traded and the transaction cost (i.e., bid-ask spread).
- **Making changes in trading range:** The stock dividend brings the share price down to a lower, more affordable, range. This may attract new investors.

Though academicians have been arguing that stock dividends do not have economic value, companies continue to pay stock dividends. The most direct way to find out why companies pay stock dividends is to ask them. Baker and Phillips (1993) did the same. They asked the CFOs of 312 firms (136 responded). Exhibit 30.10 summarizes the most important motives for distributing stock dividends. The SEBI guidelines relating to issue of bonus shares is given in Appendix 2.

Exhibit 30.10 Managerial motives for stock dividends

<i>Motive</i>	<i>Primary sec. (n=112)</i>	<i>Wt. score (n=110)</i>	<i>Rank</i>
Maintain the firm's historical practice of paying stock dividends	48 (42.9 percent)	1(0.9 percent) 97	1
Signal optimistic managerial expectations about the future	26 (23.2)	20 (18.2) 72	2
Increase trading volume	6 (5.4)	18 (16.4) 30	3
Increase the total market value of the firm's stock	8(7.1)	8 (7.3) 24	4.5
Gain attention from the investment community	4 (3.6)	14 (12.7) 22	6
Conserve cash	2 (1.8)	13 (11.8) 17	7.5
Moving the stock price into a better trading range	7 (6.3)	7 (6.4) 21	7.5
Attract more investors	2 (1.8)	11(10.0) 15	9
Don't know	4 (3.6)	4 (3.6) N A	N A
Other	5(4.5)	14 (12.7) 24	4.5

INTEGRATING INVESTMENT, FINANCING, AND DIVIDEND DECISIONS

It is important to understand that the investment, financing and dividend decisions are interrelated. How much is paid as dividends affects the amount retained and, thus, the growth. Cash is needed to fund growth. The cash should come from new shareholders or bondholders. But the company has a target debt-equity mix to maintain. Moreover, in real-life situations, dividends may have an impact on stock prices either due to perception of growth or lack of it. The typical sequence of decisions includes:

- Determine capital expenditure and working capital requirements for the planning horizon (say, 5 years).
- Determine the target debt-equity mix.
- Estimate cash flow available to pay out as dividends.
- Analyze the effect of various dividend policies on growth and stock price.

An Illustration

Trinity Company (identity has been disguised) is a manufacturer of paper, chemicals and textiles. The company's current income statement is given as follows:

	<i>(Rs crore)</i>
Net sales	204.69
Other income	6.39
Total income	211.08
Cost of materials	138.61
Total variable expenses	169.84
Total fixed expenses	21.85
EBIT	19.39
Depreciation	2.13
EBIT	17.25
Interest	1.11
PBT	16.14
Tax	5.649
PAT	10.49

The company spent Rs 644 lac on working capital and Rs 6.3 lac on fixed assets. Sales and expenses are expected to grow at 15 percent. Gross fixed assets (capital expenditure) are expected to grow at 5 percent a year and depreciation is 7.5 percent of gross fixed assets.

Tax rate is 35 percent. The company currently has Rs 7.92 crore in debt and Rs 38.97 in equity. Interest rate on debt is 14 percent.

$$\begin{aligned} \text{Current cash flow} &= \text{EBIT} - \text{Taxes} + \text{Depreciation} - \text{Capital expenditure} - \text{Working capital investment} \\ &= 17.25 - 6.04 + 2.13 - 0.63 - 6.44 = \text{Rs } 6.28 \text{ crore} \end{aligned}$$

$$\text{Cash flow to equity} = \text{Cash flow from operation} - \text{after tax interest} - \text{principal repayment}$$

During the year, there was no principal repayment or borrowing.

$$\begin{aligned} \text{Cash flow to equity} &= \text{Free cash flow} - \text{After tax interest} \\ &= 6.28 - 0.72 = \text{Rs } 5.55 \text{ crore} \end{aligned}$$

The company currently has a payout ratio of 31 percent.

$$\begin{aligned} \text{Dividends paid} &= \text{Rs } 3.5 \\ \text{Dividend/Cash flow to equity} &= 0.63 \\ \text{Retained earnings} &= \text{Rs } 7.60 \end{aligned}$$

The company is currently earning 37 percent on capital employed. The cost of capital for the company is 14.62 percent.

Cash flow after paying dividends = Rs 5.55 – 3.5 = Rs 205 lac, i.e., the company is retaining Rs 205 lac for further investment.

Since the company is earning more than the cost of capital, the company can retain cash assuming that the company will continue to earn more than the cost of capital on new projects and maintain the spread. Trinity is

contemplating on growing at 15 percent a year. To grow at 15 percent, the company needs to spend Rs 23.6 million on fixed assets and Rs 412 lac on working capital. The next year financials according to forecast is:

Net sales	=	235.39	Total income	=	242.27
EBIT	=	17.19	Net income	=	11.17
-Taxes on EBIT	=	6.02			
+ Depreciation	=	2.68			
Gross cash flow	=	13.85			

Since Sources of cash = Uses of cash

$$\begin{aligned} &\text{Cash balance now} + \text{cash flow after paying dividends this year} + \\ &\text{gross cash flow next year} + \text{increase in debt} = \\ &\text{Capital expenditure} + \text{Increase in working capital} + \text{After tax interest payments} \\ &+ \text{Dividends next-year} + \text{Desired cash balance next year.} \end{aligned}$$

Ignoring current cash balance and rearranging terms:

$$\begin{aligned} &\text{Cash available next year to pay dividends} = \\ &\text{Current residual cash flow} + \text{Gross cash flow} - \text{Capital expenditure next year} \\ &- \text{Increase in working capital} - \text{After tax interest payment} + \text{New debt.} \\ &= 2.05 + 13.85 - 2.36 - 0.8475 - 4.12 \\ &= \text{Rs } 8.572 \text{ crore} \end{aligned}$$

The company has excess cash flow that can be paid out as dividends. Note that the company can increase leverage substantially and improve return on equity. In short, the dividend payment next year is a function of:

- a) Current cash balance
- b) Gross cash flow, i.e., NOPAT + Depreciation
- c) Management policy on debt financing
- d) Required expenditure on upgradation of existing projects and capital expenditure on new projects
- e) Interest on new debt raised to finance expenditure on fixed assets and working capital
- f) Quality of projects in hand
- g) Cost of capital.

This analysis helps in determining the cash flow available to pay dividends next year. But, how much you *can* pay and how much you *should* pay are two different things. If management wants to increase dividends smoothly, the above equation helps in finding out ‘how smooth’ it can be.

IN CONCLUSION

Some say dividends are good. Some say dividends are bad. MM declared it irrelevant. Since the formulation of the MM dividend irrelevance proposition many academicians have been arguing that dividends do not matter. That is, whether a company pays 10 percent or 100 percent of its earnings in the form of dividends is likely to have no material effect on its long-run market value.

To say that investors collectively do not care whether they receive their returns in the form of dividends or capital gains is not the same as saying dividend policies of individual companies do not matter. In fact,

dividend policy may matter greatly in some circumstances. For mature companies with highly stable cash flows, paying out too little may cause managers to over invest (free cash flow problem). On the other hand, for companies in high growth or riskier business paying out too much may reduce financial flexibility to the point that management is forced to forgo valuable investment opportunities.

According to its own financial projections, a company might not be expecting a sharp increase in its investment requirements in the foreseeable future. But if greater competition does not increase a company's investment requirements, it might lead to significant increase in business risk and, hence, to variability of its earnings and operating cash flows. An increase in cash flow variability due to an increase in business risk implies reduction in optimal capital structure and dividend payout. In such circumstances a company may set a dividend level that would increase in tandem with earnings and that the company would be able to maintain in almost any business environment. At the same time, the payout should be designed to preserve management's ability to invest in growth opportunities in preparation for a competitive future. But what if a company's management significantly underestimates its own future earning power and, as a consequence of cutting dividend, became awash in cash? The company may simultaneously announce a stock repurchase program for the next 2–3 years. The idea is to return any excess cash to shareholders through stock repurchases. Besides potential tax benefits for investors, a policy of substituting stock repurchases for dividends increases a company's financial flexibility to respond to increased competition.

APPENDIX 1: SEBI (BUY-BACK OF SECURITIES) REGULATIONS 1998

The summary of SEBI guidelines relating to stock repurchases is given below:

1. These regulations are applicable to a company listed on a stock exchange.
2. A company may buy back its shares by any one of the following methods:
 - a. From the existing shareholders on a proportionate basis through the tender offer;
 - b. From open market through book building process or stock exchange; or
 - c. From odd lot holders.
3. A company shall not buy back its shares from any person through negotiated deals, whether on or off the stock exchange or through spot transactions or through any private placement arrangement.
4. Any person or an insider shall not deal in securities of the company on the basis of unpublished information relating to buy-back of shares of the company.
5. A company may buy back its shares from its existing shareholders on a proportionate basis.
6. The offer for buy-back shall remain open to the members for a period not less than 15 days and not exceeding 30 days.
7. The company shall as and by way of security for performance of its obligations under the regulations, on or before the opening of the offer deposit in an escrow account such sum as specified in sub-regulation.
8. The company shall within 7 days of the time specified in sub-regulation (5) of regulation 9 make payment of consideration in cash to those shareholders whose offer has been accepted or return the share certificates to the shareholders.
9. The company shall extinguish and physically destroy the share certificates so bought back.
10. The company shall buy back its shares through the stock exchange after making a public announcement at least 7 days prior to the commencement of buy-back.
11. The buy-back shall not be made from the promoters or persons in control of the company.

Given here is a comparison in share repurchase regulation between Japan and the US:

	<i>Japan</i>	<i>United States</i>
Authorization	Shareholders' Approval	Company's directors' or shareholders' approval.
Repurchase limits	Currently profits available for dividends or 3 percent of outstanding shares per annum for employee share ownership program	There is no limit.
Post -acquisition	Shares repurchased through cancellation of profits must be retired immediately, or transferred to an employee ownership program within 6 months. Repurchased shares cannot be re-issued.	Repurchased shares are held in the form of treasury stock which can be reissued at a later date.
Tax treatment for shareholders	For non-tenderers, the resultant increase in capital value of each existing stock will result in a deemed dividend, which will be taxed at an effective rate of 10 percent. capital gains tax will apply.	If shares are sold back to the company at a premium, only those shareholders that have sold their stocks have to pay a capital gains tax.

Source: Marc Bertoneche (1998).

The legal framework for share repurchases in select Asian countries is discussed below:¹²

Hong Kong

Governing Rules: The Companies Act, Securities and Future Commission code on share repurchase, Stock Exchange Listing Rules.

Treasury Stock: Not Permitted

Rules:

- Size of repurchase limited to 25 percent of the previous month's trading volume in any calendar month in the case of on-market repurchase.
- Daily disclosure of shares repurchased required for on-market repurchase.
- Maximum 60-day offer period for off-market repurchase general offer.
- For off-market repurchases above 10 percent of share capital, independent financial advisor's opinion and valuation are required.

Korea

Rules:

- Repurchase amount should be in the range of dividends that are available but there is no limit on volume. Once the company repurchases shares it must hold them for at least six months. However, if it issues

¹² Shah, Dhaval (1999). 'Valuing Excess Cash', *Credit Suisse First Boston Equity Research*, May.

DR-based treasury stock, this regulation does not apply. The company can repurchase in the open market or through a specific fund of investment trust companies.

Malaysia

Treasury Stock: Not permitted

Rules:

- Price paid for the shares repurchased ≤ 15 percent above the weighted average price of the shares for the past for the past five market days.
- There are certain limitations as to the number of shares that can be repurchased; apart from the availability of distributable reserves of the company. A company must not purchase its own shares if the repurchase results in the paid up share capital and the number of shares held by the public fall below the prescribed minimum of RM 10m and 25 percent of the issued and paid-up share capital respectively.

Philippines

A corporation may purchase its own shares, provided that it has unrestricted retained earnings on its book value to cover the shares to be purchased or acquired. In addition, a corporation purchasing its own shares must disclose the act to both the SEC and PSE.

Singapore

Treasury Stock: Not permitted

Rules:

- On-market purchases of shares should not be made at prices that exceed 5 percent above closing market prices of the stock over the last five market days on which transactions were recorded.
- A listed issuer making an off-market acquisition on an equal scheme must issue an offer document to all shareholders, which must contain the specified information.
- Repurchases are not to exceed 10 percent of the issued capital during any single fiscal year.
- Notify the exchange the next day in the case of on-market repurchase and on second market day in the case of off-market repurchase.

APPENDIX 2: SEBI GUIDELINES ON ISSUE OF BONUS SHARES

Section M of the guidelines for Disclosure and Investor Protection issued by SEBI is reproduced below:

1. These guidelines are applicable to existing listed companies who shall forward a certificate duly signed by the issuer and duly countersigned by its statutory auditor or by a company secretary in practice to the effect that the terms and conditions for issue of bonus shares as laid down in these guidelines, have been complied with.

2. Issue of bonus shares after any public/rights issue is subject to the condition that no bonus issues shall be made which will dilute the value or rights of the holders of debentures, convertible fully or partly.
In other words, no company shall, pending conversion of FCDs/PCDs, issue any shares by way of bonus unless similar benefit is extended to the holders of such FCDs/PCDs, through reservation of shares in proportion to such convertible part of FCDs or PCDs. The shares so reserved may be issued at the time of conversion of such debentures on the same terms on which the bonus issues were made.
3. The bonus issue is made out of free reserves built out of the genuine or share premium collected in cash only.
4. Reserves created by revaluation of fixed assets are not capitalized.
5. The declaration of bonus issue in lieu of dividends is not made.
6. The bonus issue is not made unless the partly paid shares, if any existing, are made fully paid up.
7. The company:
 - a. Has not defaulted on payment of interest or principal in respect of fixed deposits and interest on existing debentures or principal on redemption thereof and
 - b. Has sufficient reason to believe that it has not defaulted in respect of the statutory dues of the employees such as contribution to provident fund, gratuity, bonus, etc.
8. A company that announces its bonus issue after the approval of the Board of Directors must implement the proposals within a period of six months from the date of such approval and shall not have the option of changing the decision.
9. There should be a provision in the Articles of Association of the company for capitalization of reserves, etc., and if not, the company shall pass a resolution at its general body meeting making provisions in the Articles of Association of capitalization.
10. Consequent to the issue of bonus shares if the subscribed and paid up capital exceed the authorized share capital, a resolution is to be passed by the company at its general body meeting for increasing the authorized capital.

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QUESTIONS

- How would you choose between dividends and stock repurchases as a CFO? What considerations might affect your decision?
- What do you think would be the impact of dividend tax on cost of equity?
- There are four companies in an industry group other than your company. Their payouts are: 30 percent, 28 percent, 45 percent and 35 percent. How would you compare your dividend policy with that of competitors? The payouts of these companies are different. Why might they be different?
- Some financial economists (like Higgins) do not accept that investors and managements who pay attention to dividends are irrational. Consequently they try to build regression models to explain differences in payout ratios. Intuitively, we would expect companies requiring large amounts of capital expenditure to choose lower dividend payout. Higher payout reduces retained earnings and drives companies to capital markets every now and then. Second, we would expect highly leveraged companies to have low payout ratios. These highly leveraged companies may view dividends as fixed costs and accordingly, may keep the payout ratio low in order to maintain dividends continuously. Third, we would expect companies with riskier operation—that is, high business risk—to maintain low payout. In sum, payout is a function of growth rate, financial leverage and beta (proxy for business risk). The following data are available for an industry group:

Company	Expected growth (percent)	Beta	Payout ratio
1.	20	1.05	—
2.	13	1.1	40.0
3	21	1.0	22.0
4	33	1.45	9.0
5	11	0.80	25.0
6	12	0.95	36.88
7	16	1.0	22.0

Estimate a regression equation.

- The income statement of a company is as follows:

EBIT	2000
Interest	400
Tax	560
PAT	1040

No. of shares outstanding	=	100
Dividends paid	=	400
Current stock price	=	12

Calculate dividend payout and dividend yield.

6. A company is currently earning 12 percent return on equity. The following stock market data is available. $R_f = 12$ percent, $\beta = 1.1$ and risk premium = 10 percent. Would you force the company to pay more?
7. The following data is available for a company:

<i>(Rs crore)</i>	
Debt @ 15 percent	50
Equity	50
EBIT	28.30
Interest	75.0
Tax	8.30
PAT	12.50

- The company has a project with an outlay of Rs 9 crore. The company intends to maintain its debt-equity ratio. How much can the company pay out?
8. A company currently has a PAT of Rs 40 crore; depreciation is Rs 20 crore; capital expenditure is Rs 100 crore. If the PAT is expected to grow at 30 percent and capital expenditure at 10 percent, when will the company be able to pay dividends?

Chapter 31

A Case Study: Back to SM Electric (India) Limited

OBJECTIVES

- ◆ Illustrate the sources of cash build up.
- ◆ Illustrate how future free cash flow is estimated.
- ◆ Illustrate the impact of dividends and stock repurchases on the financial statements of a firm.
- ◆ Illustrate the mechanics of dividends and stock repurchases.
- ◆ Describe the various short-term investment opportunities for companies with excess cash.
- ◆ Introduction to mutual funds as a class of financial institutions.

SM Electric (India) Limited (SMEI) is a part of the Intelligent Business Systems Division of the Nova Group, and has a global presence in the electrical switches segment. The company has around 24 percent of the entire electrical accessories market. The demand for electric accessories, which forms the core business proposition of SMEI, is a derived demand and is directly proportional to the demand for the consumer durables. Given here is a summary of the company's financial details:

- 87 percent of the share capital of the company is held by Nova Electric Ltd., UK; the holding company.
- The shares of the company are not listed on any of the stock exchanges in India.
- The company has never paid dividends so far.
- In 2001, the company's sales stood at Rs 52 crore.
- Profits stood at Rs 5.22 crore.
- Paid-up share capital of the company stands at Rs 1 crore.
- The amount as shown in the reserves and surplus account stands at Rs 29.85 crore.
- Cash and bank balances of the company, as on 31.03.2001, stand at around Rs 14.41 crore.
- The company has no debt.

Exhibit 31.1 presents a summary of the financial analysis of the company. The company has about Rs 14 crore cash in hand.

Exhibit 31.1 Financial details of SM Electric (India) Limited

<i>Particulars</i>	<i>Amount</i>			<i>(Rs lac)</i>
	<i>2001</i>	<i>2000</i>	<i>1999</i>	<i>1998</i>
Sales and other income	5327	4396	3717	2909
Profit before depreciation and interest	1124	1077	1105	823
Depreciation	238	218	209	171
Interest	11	16	50	121
Profit before tax	875	843	847	531
Profit after tax	522	526	447	326
Paid-up share capital	100	100	100	100
Reserves and surplus	2986	2464	1938	1488
Working capital (incl. cash and bank balance)	2208	1574	1100	688
Cash and bank balances	1442	1010	559	619
Earnings per share	52.2	52.6	44.652	32.571
Book value per share	308.589	256.39	203.788	159.136
Return on equity (percent)	16.92	20.52	21.91	20.47

WHY IS THERE A CASH BUILD-UP?

The reason for the cash build-up can be attributed to the following reasons:

- The addition to fixed assets has been continuously declining because the company is planning to shift from manufacturing to trading. Hence there is considerable decrease in the requirement of funds for capital expenditure.
- Asset sales amounting to Rs 30,19,960 in 2001, Rs19,19,229 in 2000, 37,55,798 in 1999, Rs 180,523 in 1998.
- The debt service has come down because debt balance has reduced considerably. In 2001 the company had no debt.
- The company has not made any additional investment in securities.
- The company does not pay dividends.
- The profitability has increased.

IS THIS A ONE-TIME AFFAIR?

Whether or not the company should worry about its cash balance depends on the future cash requirements. If a company has growth opportunities that cannot be funded by (future) internal accruals it might want to retain cash rather than distribute it to shareholders as firms prefer internal capital to external capital because external capital is costlier (due to information asymmetries between issuers and investors). Is the cash bulge a one-time affair? We can answer this question by forecasting cash flows. If the cash flow from operations exceeds cash flow from investing activities even under a conservative scenario, the company may consider returning cash to shareholders by initiating dividends or repurchasing stock. Exhibit 31.2

presents a forecast of cash flows for the financial year 2003 up to 2007, which have been estimated on the basis of trends in the past four years starting from FY 1998. The unaudited figure for FY 2001–02 has also been considered for forecasting the trend. Estimation of cash flows involves forecasting of sales, expenses, capital expenditure and working capital investment.

Sales are to be estimated product-wise and could be bifurcated as trading and manufacturing. While estimating the sales for the various categories of products the future plans of the company for its products and past trends in sales are to be kept in mind.

The cost of goods sold includes the following expenses:

1. Material cost
2. Employee cost
3. Other administrative expenses

The percentage of COGS to sales (exclusive of excise duty) has been 75 percent in the recent years. Assuming a 3 percent increase in cost incidence the margin on manufactured goods is estimated @ 22 percent. Similar calculation may be made for trading activities.

Often companies derive income from other sources like:

- Interest income on deposits
- Lease rentals
- Sale of scrap
- Profit on sale of fixed assets
- Miscellaneous income.

One must investigate the sources of other income and make a suitable forecast.

Exhibit 31.2 Forecast of free cash flows

<i>Projected cash flows particulars</i>	<i>Amount (Rs)</i>				
	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>
FUNDS FROM OPERATIONS					
– Profit after tax	63,746,177	82,245,429	107,795,325	124,743,461	136,289,971
Add: Depreciation charges	27,808,331	27,424,335	25,047,034	20,510,770	21,733,078
Funds from operations	91,554,508	109,669,764	132,842,359	145,254,231	158,023,049
WORKING CAPITAL					
– Opening	138,723,106	140,319,526	172,929,377	214,102,365	226,397,830
– Closing	140,319,526	172,929,377	214,102,365	226,397,830	257,413,039
Increase in working capital requirements	1,596,420	32,609,852	41,172,988	12,295,465	31,015,209
CAPEX					
– Purchase of capital assets	25,000,000	15,000,000	20,000,000	20,000,000	25,000,000
FREE CASH FLOWS	64,958,088	62,059,913	71,669,372	112,958,765	102,007,840

Cumulative free cash flow = Rs 41.5 crore approximately!

The depreciation as a percentage of opening net block has been 25 percent in the recent past. It is estimated as:

- 25 percent of the closing net block of the previous financial year (opening net block of the current financial year); plus
- 27 percent (assuming this to be average rate of depreciation) on additional capital expenditure (CAPEX) incurred in the financial year

That is,

$$\text{Depreciation} = \text{Old depreciation} + \text{New depreciation}$$

The provision for taxation for all of the financial years 2003–07 has been assumed at 40 percent in line with the company's policy of setting off the provision for taxation against advance payment of tax made by the company.

The capital expenditure in each of the future financial years is estimated as follows:

<i>Year</i>	<i>Capital expenditure incurred</i>
2002–03	Rs 250 lac (of which Rs 100 lac is towards ERP implementation)
2003–04	Rs 150 lac
2004–05	Rs 200 lac
2005–06	Rs 200 lac
2006–07	Rs 250 lac

The net working capital is the difference between current assets and current liabilities. Forecasting of working capital involves forecasting components of current assets like inventory sundry debtors, etc.

Inventories are estimated using the inventory turnover ratio, where the ratio is calculated as follows:

$$\text{Inventory turnover ratio} = \text{COGS/Average inventory}$$

The average inventory is the average of the opening and the closing balances of the inventory. The inventory turnover ratios for the financial years 1999–2002 are between 2 and 3. Based on the most recent trend, the inventory ratio is assumed at two times, and this is the basis for all inventory calculations in the future financial years.

Given that the COGS figure estimated is exclusive of excise duty, and since all closing stocks are carried at cost of manufacture plus excise duty, the COGS figures are adjusted for 16 percent excise duty for the calculation of closing inventories. The unaudited figure for the value of the closing stock as on 31.03.2002 of Rs 488.87 lac is included for calculating the closing inventory, based on the inventory turnover ratio of 2 for the financial year 2002–03 and this forms the basis for all subsequent calculations.

Sundry debtors are estimated by using the debtor turnover ratio and the collection period:

$$\begin{aligned} \text{Debtor turnover ratio} &= \text{Sales/Closing debtors} \\ \text{Collection period} &= 365/\text{Debtors turnover ratio} \end{aligned}$$

The collection period is assumed to be 70 days, the current average. Given that the sales figures are exclusive of excise duty, the same have been adjusted for an excise duty rate of 16 percent for the calculation of the closing debtors balance. Similar calculations can be made for other components like sundry creditors, etc. The increase/decrease in the working capital is to be estimated as the change in the net current assets (excluding cash and bank balances) with respect to the previous year. The working capital for the year ended

31.03.2002 is taken as the basis for all further estimations, though these are based on un-audited financial statements. As can be seen from Exhibit 31.2, funds from operations exceed capital expenditure and working capital investment by at least Rs 6 crore. If the forecast is right, the cash balance will only increase to at least Rs 40 crore by 2007 (the cumulative free cash flow) even if the entire (current) cash balance is returned to shareholders by a stock repurchase. This analysis suggests that the cash accumulation is not a one-time problem. Why is the cash accumulating rapidly? The answer lies in the aggressive growth rate in sales and fat profit margin. Is this reasonable? One might conduct a sensitivity analysis to estimate the impact of changes in sales growth on cash flows.

WHAT SHOULD THE COMPANY DO WITH THE CASH?

Any company that intends to return cash to shareholders can resort to two options:

1. Declare dividends
2. Repurchase stock

We shall discuss these options here.

Start Paying Dividends

Section 205 of the Companies Act, provides for the payment of dividends as follows:

1. Only out of the profits of the company for that year arrived at after providing for depreciation.
2. Out of the profits of the company for any previous financial year or years again arrived at after providing for depreciation and remaining undistributed.
3. Dividend can also be alternatively declared from a combination of both of the above-mentioned options.
4. Declaration of dividends out of the profits of the company for any financial year requires transfer to the reserves of the company such percentage of its profits for that year, not exceeding 10 percent as may be prescribed. The Companies Act in this regard requires the transfer of the following percentage of profits based on the rate of dividend declaration. The schedule showing the percentage of transfer of profits depending on the rate of dividend payout is as shown here:

<i>Rate of dividend¹</i>	<i>Percentage of profits to be transferred to reserves</i>
– Up to 10 percent.	NIL
– Exceeding 10 percent but not exceeding 12.5 percent	Not less than 2.5 percent of current profits.
– Exceeding 12.5 percent but not exceeding 15 percent	Not less than 5 percent of current profits.
– Exceeding 15 percent but not exceeding 20 percent	Not less than 7.5 percent of current profits.
– Exceeding 20 percent	Not less than 10 percent of current profits.

Exhibits 31.3–31.5 present the impact of dividends on income statement and balance sheet.

¹ Calculated as a percentage of the par value of the share.

Exhibit 31.3 Forecasted profitability with dividends (@ 10 percent)

Profitability statement @ 10 percent dividend rate Particulars	Amount (in Rs)				
	2003	2004	2005	2006	2007
Profit after tax	63,746,177	82,245,429	107,795,325	124,743,461	136,289,971
Less: Dividend payout	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Less: Transferred to general reserve	0	0	0	0	0
Transfer to P&L a/c in the b/s.	62,746,177	81,245,429	106,795,325	123,743,461	135,289,971

Exhibit 31.4 Projected balance sheet with dividends

Projected balance sheet (10 percent dividend rate) Particulars	Amount (in Rs)				
	2003	2004	2005	2006	2007
Shareholders' funds					
– Share capital	10,000,000	10,000,000	10,000,000	10,000,000	10,000,000
– General reserve	0	0	0	0	0
– Reserves and surplus—P&L a/c	417,258,851	498,504,281	605,299,606	729,043,066	864,333,038
NETWORTH	427,258,851	508,504,281	615,299,606	739,043,066	874,333,038
Loan funds					
– Deferred payment liability	0	0	0	0	0
Total	427,258,851	508,504,281	615,299,606	739,043,066	874,333,038
APPLICATION OF FUNDS					
Fixed assets					
– Gross block	270,129,956	285,129,956	305,129,956	325,129,956	350,129,956
Less : Depreciation	192,215,507	219,639,841	244,686,876	265,197,646	286,930,723
Net block	77,914,450	65,490,115	60,443,080	59,932,310	63,199,233
– Capital advances	0	0	0	0	0
Total	77,914,450	65,490,115	60,443,080	59,932,310	63,199,233
Investments	998,355	998,355	998,355	998,355	998,355
Current assets, loans and advances					
– Inventories	81,103,350	96,091,900	121,519,620	121,638,129	141,352,774
– Sundry debtors	122,460,493	165,590,466	202,202,821	225,630,080	243,901,625
– Cash and bank balances	208,026,521	269,086,434	339,755,806	451,714,571	55,272,2411
– Other current assets	2,886,000	3,751,800	4,877,340	6,340,542	8,242,705
– Loans and advances	16,131,742	18,551,504	21,334,229	24,534,364	28,214,518
Total	430,608,107	553,072,103	689,689,816	829,857,685	974,434,033
Less: Current liabilities and provisions					
– Liabilities	81,363,331	110,022,754	134,643,077	150,378,430	162,726,701
– Provisions for leave encashment	898,728	1,033,538	1,188,568	1,366,854	1,571,882
Total	82,262,060	111,056,292	135,831,645	151,745,284	164,298,583
Net current assets	348,346,047	442,015,811	553,858,170	678,112,401	810,135,450
Total	427,258,851	508,504,281	615,299,606	739,043,066	874,333,038

Exhibit 31.5 Forecasted balance sheet after a repurchase

—Repurchased at Rs 310, at the end of 2003.

Particulars	Amount (in Rs)
SOURCES OF FUNDS	
Shareholders' funds	
– Share capital	8,700,000
– Reserves and surplus—P&L a/c	377,958,851

Exhibit 31.5 contd.

Exhibit 31.5 contd.

<i>Particulars</i>	<i>Amount (in Rs.)</i>
– Capital redemption reserve	1,300,000
NETWORTH	387,958,851
Loan funds	
– Deferred payment liability	0
Total	387,958,851
APPLICATION OF FUNDS	
Fixed assets	
– Gross block	270,129,956
Less: depreciation	192,215,507
<i>Net block</i>	77,914,450
– Capital advances	0
Total	77,914,450
Investments	998,355
Current assets, loans and advances	
– Inventories	81,103,350
– Sundry debtors	122,460,493
– Cash and bank balances	168,726,521
– Other current assets	2,886,000
– Loans and advances	16,131,742
Total	391,308,107
Less: Current liabilities and provisions	
– Liabilities	81,363,331
– Provisions for leave encashment	898,728
Total	82,262,060
Net current assets	309,046,047
Total	38,795,8851

Tax Implications

In addition to ascertaining the impact of initiating dividends on profit and growth one must also estimate its tax implications as investors care about after-tax returns.

In the Hands of the Company

With the removal of the dividend declaration tax, the company will no longer have to pay tax on the declaration of dividends. Hence this option would now considerably reduce the burden on the company if it opts for this method for effective utilization of the company's funds. The liability now will rest on the company to deduct tax at source on these dividends before the payment on these dividends at the following rates:

- At the rate of 10 percent in the case of Indian residents only if the amount received by the resident exceeds Rs 1,000.
- A non-resident would be taxable in respect of such dividend at the rate of 20 percent on a gross basis and in the absence of any specific rate for withholding tax being specified, the residual rate of 10 percent for withholding tax should apply.

In the Hands of the Recipient

Under the current tax code a company declaring dividend need not pay dividend tax. A dividend receipt would be taxable in the hands of the shareholders as follows:

- At 20 percent on a gross basis in the case of a *foreign corporate assessee* under Section 115A of the Income Tax Act. Against such dividend no deduction is available under sections 80CCC to 80U for dividends received by a foreign company from a domestic company.
- In the case of an individual resident assessee, such dividends would be included in the gross total after making permissible deductions and taxable at the marginal tax rate applicable to such assessees. Income from dividend is eligible for a tax rebate under Section 80L up to an overall limit of Rs 9,000. Assuming that, in the case of SMEI, the remaining 13 percent shares are held by resident individuals, who fall in the topmost tax bracket, the tax liability on dividend income by such individual works out to 31.5 percent.

The schedule of outflow due to dividends is given here. The outflow is only Rs 50 lac, even when the payout is 50 percent (as percent of par value of shares) which suggests that dividends are not really the right method to distribute cash since the cash balance (current + expected increases) is in excess of Rs 15 crore unless the company increases the payout in future years.

<i>Dividend rate (percent)</i>	<i>Dividend amount (Rs lac)</i>
10	10
12.5	12.5
15	15
20	20
25	25
50	50

Though dividends are an effective way to return excess cash to shareholders, once established dividend cuts are hard to make, i.e., shareholders will continue to expect the same or higher rates of dividends. Dividends are taxed in the hands of the shareholders at comparatively high tax rates.

Stock Repurchase

A repurchase has both advantages and disadvantages. Some of the advantages are:

- Reduces capital and thus improves EPS, book value and ROE of the company post buy-back.
- Low cost transaction
- Relatively quick method

The disadvantages are:

- Regulatory requirements
- Post buy-back debt equity ratio not to exceed 2:1
- Maximum number of equity shares to be bought back should not exceed 25 percent of the company's paid-up capital and free reserves.
- Reduces cash surplus with the company.

Under the option of buy-back of shares, in the case of SMEI, we are looking at buying back the 13 percent shares, which are not held by Nova Electric Ltd., UK.

A company, subject to the provisions of Section 77A(2) and Section 77B (of The Companies Act), may purchase its own shares or other specified securities (referred to as 'buy-back') out of:

- Its free reserves
- The securities premium account
- The proceeds of any shares or other specified securities.

But no buy-back of any kind of shares or other specified securities shall be made out of the proceeds of an earlier issue of the same kind of shares or the same kind of other specified securities.

For the above, 'free reserves' connotes reserves which are free for distribution as dividend as per the latest audited balance sheet including balance of securities premium account. Thus, reserves set apart for any specific purpose and revaluation reserve shall not be treated as free reserves.

Limits on Buy-Back of Shares

The company will have to undertake the purchase of its own shares or other specified securities only after ensuring that:

- The buy-back is or less than 25 percent of the total paid-up equity capital and free reserves of the company.
- The buy-back of equity shares in any financial year shall not exceed 25 percent of its total paid-up equity capital in that financial year.
- The ratio of debt owned by the company is not more than twice the capital and its free reserves after such buy-back.
- For this purpose the expression '*Debt*', includes all amounts of unsecured and secured debt.
- All the shares or other specified securities for buy-back are fully paid-up.
- The buy-back in respect of shares or other specified securities are in accordance with the regulations made by SEBI in this respect.

Filing of Letter of Offer

The company should file, with the ROC, a draft letter of offer containing the following particulars:

- Details of the offer including the total number and percentage of the total paid-up capital and free reserves proposed to be bought back and price.
- The proposed timetable from opening of the offer till the time certificates are extinguished.
- Authority for the offer of buy-back.
- A full and complete disclosure of all material facts including the contents of the explanatory statement annexed to the notice for the general meeting at which the special resolution approving the buy-back was passed.
- The necessity for the buy-back.
- The process to be adopted for the buy-back.
- The minimum and the maximum number of securities that the company proposes to buy back, sources of funds from which the buy-back would be made and the cost of financing the buy-back.
- Brief information about the company.

- Audited financial information for the last 3 years, and the lead manager shall ensure that the particulars (audited statement and un-audited statement) contained therein shall not be more than 6 months old from the date of the offer document together with financial ratios as may be specified by the Board.
- Present capital structure (including the number of fully-paid and partly-paid securities) and shareholding pattern.
- The capital structure, including details of outstanding convertible instruments, if any, after the buy-back.
- The aggregate shareholding of the promoter group and of the directors of the promoters, where the promoter is a company and of persons who are in control of the company.
- The aggregate number of equity shares purchased or sold by persons mentioned in the clause above during a period of twelve months preceding the date of the public announcement and from the date of public announcement to the date of the letter of offer; the maximum and minimum price at which purchases and sales referred to above were made along with the relevant dates.
- Management discussion and analysis on the likely impact of buy-back on the company's earnings, public holdings, holdings of NRIs/FIIs, etc., promoters' holdings and any change in management structure.
- Details of the statutory approvals obtained, and so on.

Offer Procedure

- The letter of offer shall be immediately dispatched to the shareholders after filing with the ROC, but not later than 21 days from its filing with the ROC.
- The offer shall remain open for a period of not less than 15 days and not exceeding 30 days from the date of dispatch of the letter of offer.
- In case the number of shares offered by the shareholders is more than the total number of shares to be bought back by the company, the acceptance per shareholder shall be on a proportionate basis.

On completion of the buy-back under this section, the company is required to file with the Registrar of Companies, a return containing such particulars relating to the buy-back within 30 days of such completion.

Tax Implications

The buy-back of shares amounts to 'transfer' under the provisions of The Income Tax Act. The capital gain chargeable to tax is calculated as follows:

- From the receipts receivable on buy-back of shares, a resident assessee can claim the indexed cost of acquisition as a deduction.
- The indexation benefit is available to a resident assessee only and the same is allowed only on the transfer of a long-term asset (1 year holding period in the case of SMEI shares).
- The capital gain if transferred after one year from the date of acquisition of the shares amounts to a long-term capital gain and hence will be taxable in the hands of the resident assesses @ 20 percent.

Other Implications

Though a buy-back scheme provides a company to effectively utilize its excess cash resources in rewarding its shareholders, it prevents the shareholders in taking part in the future benefits of the company, as compared to a dividend declaration. In the case of SMEI, since only 13 percent of the shares can be bought back, the

buy-back amounts to a 'targeted buy-back'. It may totally prevent these shareholders from partaking in the future benefits of the company.

Valuation of Shares for Buy-Back

In the case of SMEI, as mentioned earlier, the company is buying back the 13 percent shares which are not held by the holding company, i.e., Nova Electric, UK. To repurchase stock the company should estimate a fair price for the shares. The value as computed under the guideline issued by the Ministry of Finance is the average of the following two methods in the case of an unlisted company:

1. Net asset value (NAV) method

NAV is calculated by taking the true 'net worth' of the business—after providing for all outside present and potential liabilities—and adding thereto any proceeds from the fresh issue of capital. The amount thus arrived at is to be divided by the total number of shares (including the bonus shares), so as to then arrive at the NAV per share.

2. Price earning capacity value (PECV) method

The PECV is calculated by capitalizing the average of the after-tax profits at the following rates:

- 15 percent in the case of manufacturing concerns.
- 20 percent in the case of trading companies.
- 17.5 percent in the case of 'intermediate companies', that is, companies whose turnover from trading activity is more than 40 percent but less than 60 percent of their total turnover.

The calculation in determining the PECV can be summarized as follows:

- In the case of SMEI, since the turnover from trading activities does not exceed 40 percent, the PECV has been estimated using the 15 percent capitalization rate.
- In estimating the average after tax profits, usually the average of the past three years is taken. But in arriving at a more realistic picture, the valuation in the case of MKEI is done based on the weighted average figures for the past five years.
- First, the weighted average of the profits before tax is calculated; then provision is made for the tax to arrive at the average profits after tax attributable to equity shareholders.
- The profit so arrived at is then divided by the total number of the shares to arrive at the EPS per share.
- This EPS is then adjusted for the 15 percent capitalization rate to arrive at the PECV per share.

The final valuation (fair value), in the case of the shares not being listed, is the average of the NAV and the PECV and this should be discounted to take into account the restricted liquidity of the shares. The estimation of the fair value of the shares in the case of SMEI is shown here:

Particulars	Amount (in Rs) (per share)					
	2002	2003	2004	2005	2006	2007
Price under the different methods:						
NAV method	364.51	428.26	510.50	618.30	743.04	879.33

Table contd.

Table contd.

PECV method	321.77	336.04	371.96	491.60	623.56	748.22
Average price	343.14	382.15	441.23	554.95	683.30	813.77
Average price – 10 percent discount	308.83	343.93	397.11	499.45	614.97	732.40

The average price arrived at has been discounted by 10 percent to take into consideration the absence of liquidity as the shares are not listed. Exhibit 31.5 presents the impact of a stock repurchase on the balance sheet.

Although the guideline suggests the usage of NAV and PECV approaches, there are more refined ways to value private businesses. There are broadly two ways of valuing private companies:

- DCF methodology in which the free cash flows to equity are discounted at cost of equity. Dividing it by the number of shares yields a per share price.
- Price multiples of comparable transactions.

The valuation of private companies is a difficult and often subjective process because a private company has no stock (market) price to serve as a benchmark. Several multiples are in vogue.

The price earnings multiple is the ratio of stock price and earnings per share for the most recent four quarters (or market capitalization and net income). For example, if a competitor has sold his business at a price of five times the net income, then the same price earnings multiple may be applied.

Likewise, the price-to-sales multiple is the ratio of stock price and sales per share or market capitalization and sales.

The price-to-book value multiple is the ratio of market capitalization to book value of shareholders' equity.

The enterprise value to EBITDA multiple is the ratio of EV (i.e., market value of equity plus book value of debt) and earnings before interest tax depreciation, and amortization. Application of this multiple yields *firm* value—not equity value.

It must be understood that it is not easy to either find comparable transactions or apply the 'right' multiple because of differences in risk, growth rate, capital structure, size, and timing of cash flows between the comparable transaction and the company in question.² Often, companies apply a discount to comparable public transactions to account for lack of marketability of private company shares. A recent study in the US compared the valuation ratios paid for the private and public companies and found that private companies are acquired at an average 20–30 percent discount relative to similar public companies when using earnings multiple as the basis for valuing the transactions.³

$$\text{Private company discount} = 1 - (\text{Private company multiple} / \text{Public company multiple})$$

One may look at similar transactions and infer a private company discount.

Let us go back to SMEI. The projected balance sheet and income statement—without dividends, with dividends, and after a repurchase—are shown in Exhibits 31.4 and 31.5. What is the outgo due to a repurchase?

² Valuation of private businesses is beyond the scope of this book. Interested readers may refer to a small list of books provided at the end of the chapter.

³ Kopelin, John, Atulya Sarin, and Alan C Shapiro (2000). 'The Private Company Discount', *Journal of Applied Corporate Finance*, Vol. 12, No. 4.

About Rs 40,300,000. That doesn't solve the problem either. The company will have at least Rs 50 crore if the forecast is correct.

So what should SMEI do? Issue bonus shares and then pay dividends on the enlarged equity base and maintain the option to repurchase, probably. What are the other ways in which the company can spend its cash productively?

- New product development.
- Acquiring potential companies.
- Increasing compensation to managers/employees to motivate them to work harder/attract talented managers.
- Put a strong accounting/control system in place and take the company public at the right time.

Many high technology companies like Intel and Microsoft also keep huge cash balances and do not pay dividends (Intel has started paying dividends now) because they operate in fiercely competitive markets and new product innovation is the key to success. Since these companies spend heavily on R&D and the payoffs are uncertain, it is necessary to maintain a rather high cash balance. The high cash balance itself serves as a warning signal to competitors who would want to compete on the basis of price. Although dividend initiations are usually considered good news it isn't as far as hi-tech companies are concerned. Dividends probably send a wrong signal that the company has ran out of product ideas and is using dividends to return cash.

SHORT-TERM INVESTING OPPORTUNITIES

The company will be left with excess cash even after paying dividends and repurchasing stock. It may invest cash in short-term instruments. The factors to be considered in making an investment decision are listed here.

- Rate of return on the instrument: All efforts should be made to get the maximum possible return on the investment.
- Liquidity of the instrument: The liquidity of the invested asset should match the company's future cash requirements. It should be possible to convert the asset into cash with least procedural hassles and with least cost as well.
- Default risk: Most investments have default risk. This aspect needs no emphasis, as it is integral to the investment decision to select that investment which has an acceptable level of default risk.
- Price risk: This is the risk associated with the market value of the investment; it arises primarily because of two factors:
 - *Interest rate risk*: This risk arises because of the fluctuations in interest rates. If the interest rate offered on a particular instrument increases after the investment has been made, the market price of the investment falls. This causes the investor to incur opportunity loss. Interest rates depend on a host of macro economic factors and tend to be fickle and very difficult to predict. The interest rates need to be monitored closely on a daily basis. For investments in money market instruments the best parameter to keep track of the market is the 'Overnight call money rates' which is a fair indicator of interest rate movements in the economy.
 - *Risk perception of an investment*: If the investors feel that the default risk associated with an investment has increased, the market price of that investment will go down. Price risk would also depend upon

the business risk associated with the poor performance of the agency where the investment has been made and the market risk associated with the economy in general.

SMEI has around Rs 14 crore in excess cash and in course of its operations and the funds are invested in Bank of Baroda earning an annual interest of around 6 percent. The management of the company is very risk averse and wants to consider only money market instruments as an investment option.

The following are some of the instruments available for investment:

1. Fixed deposit
2. Treasury bills
3. Commercial paper
4. Inter corporate deposits
5. Certificate of deposit
6. Call money
7. Mutual funds

The mode of investment, implications to the company, and analysis on a number of parameters of some of the above instruments are given in the following sections.

Bank Fixed Deposits

The banks are free to fix interest rates on their deposits which were previously administered by the RBI. This has increased the flexibility of fixed deposits and brought in interest rates differentiation between the banks. The salient features of fixed deposits are as follows:

1. Banks are free to fix the interest rate on their deposits.
2. Banks are free to have their own set of rules with regard to premature withdrawal of deposits.
3. The minimum tenure of fixed deposits is 15 days, which is being offered by all the banks.
4. The maximum tenure of fixed deposits is 7 years. There are banks, which offer deposits for a maximum duration of only up to 5 years and 3 years.

The interest on the amount deposited is paid quarterly or at the end of the investment tenure whichever is earlier in most of the banks. The high and the low annualized rates of return being offered for the different time periods by the banks are as shown here:

<i>Time period</i>	<i>Annualized rate of return (percent)</i>	
	<i>Low</i>	<i>High</i>
15–30 days	5	7
30–45 days	5	8
45–90 days	6	8
90–180 days	6.5	9.5
180 days–1 year	7	9.5
1–1.5 years	8.5	10.25
1.5–2 years	8.5	10.5
2–3 years	9	10.5

The rates offered by various banks as on December 2002, on short-term deposits, are given in Exhibit 31.6.

Exhibit 31.6 Interest rates on bank fixed deposits

Name	<i>(in percent)</i>	
	15–30 days	30–45 days
Foreign banks		
HSBC	4.75	5.00
Standard Chartered Grindlays Bank	4.50	5.00
ABN–Amro Bank	4.50	7.00
INDIAN BANKS–PUBLIC SECTOR		
Canara Bank	4.25	4.25
Corporation Bank	4.50	5.00
Indian Bank	4.50	4.75
Vijaya Bank	5.00	5.00
INDIAN BANKS–PRIVATE SECTOR		
Bank of Punjab	5.00	5.25
Bharat Overseas Bank	4.50	4.75
Centurion Bank	5.25	5.25
Development Credit Bank	4.25	5.00
Global Trust Bank	5.25	5.50
HDFC Bank	4.75	5.25
ICICI Bank	3.50	3.50
IDBI Bank	4.75	5.25
IndusInd Bank	5.00	5.25
Lord Krishna Bank	5.00	5.00
Tamilnad Mercantile Bank	5.00	5.25
The Catholic Syrian Bank	5.00	5.25
Dhanalakshmi Bank	5.00	5.00
Federal Bank	4.50	4.50
The J&K Bank	4.50	4.75
The Karur Vysya Bank	5.00	5.00
The South Indian Bank	5.00	5.25
Vysya Bank	5.00	5.00
UTI Bank	5.00	5.00

The rates offered are revised by the banks depending on the macro economic factors and the asset liability position. An analysis of the rates offered by banks on fixed deposits shows that they are higher for longer time periods. It is also seen that the rates are significantly different across banks for the shorter time periods.

Liquidity

As per the RBI guidelines the minimum lock-in period of deposits is 15 days, though the amount deposited can be withdrawn before maturity in most of the banks. But the banks do not give any interest for deposits withdrawn before 15 days. The payment is however made without delay in case of premature withdrawals. Some banks like ANZ Grindlays charge 1 percent penalty for premature withdrawal. Further, the amount deposited cannot be withdrawn in parts. The entire amount has to be withdrawn in case of premature withdrawal, though the excess amount can be put into a new fixed deposit at the prevailing rates of the bank. But some banks like ANZ Grindlays Bank, ICICI Bank, etc., provide the facility of withdrawing only the required amount. The remaining amount continues to earn interest. This facility can only be availed if one deposits the amount for the normal rate, which is slightly lower than the rates offered by the bank for large deposits.

Default Risk

- Non-existent in the case of public sector banks.
- Minimal in case of reputed foreign banks.
- The risk for other banks depends upon the credit ratings given to the banks.

Commercial Paper

These are short-term unsecured promissory notes issued by public and private sector manufacturing companies. Only well known and strong companies are able to issue CP's.

Features

Some of the features of the CP are as follows:

1. The maturity period varies from 15 days to one year but 91 days CP is the most common.
2. CP is issued at a discount from its face value and is subsequently redeemed at its face value on maturity.
3. Primary placements of CP are subject to stamp duty. But the stamp duty chargeable is significantly higher for non-bank investors as compared to bank investors.
4. Generally a return of around 7.40–9.75 percent per annum can be expected.

Liquidity

The secondary market for CP is not as liquid as any other money market instrument.

Default Risk

The default risk is much higher than T-bills, bank deposits, and liquid schemes of mutual funds.

Price Risk

The price of the CP is greatly affected by the risk perception about the issuing company. CP, as any other money market instrument is subject to interest rate risk, i.e., variation in price of CP due to variation in the prevailing interest rate.

Implications for the Company

- For the amount of money the company is planning to invest, i.e., around Rs 14–15 crore, it would not be cost effective to subscribe to CP's in the primary market due to the high stamp duty charges. Hence, it would be advisable to go through a bank that could subscribe on the company's behalf.
- This instrument is suitable for investing for than 15 days, as it would be difficult to find a CP of less than 15 days.
- Since the secondary market for CP is not so liquid, it may prove to be difficult to find a buyer immediately when required. Moreover, due to this the company may have to offload the CP at a much lower price.

Treasury Bills (T-Bills)

These are short-term obligations issued by RBI on behalf of the Government of India. T-bills are issued for varying periods of maturity at a discount to their face value. Following are the different kinds of T-bills issued in November 2002, along with the present returns:

<i>Kind</i>	<i>Return</i>
365 day bill	5.57 percent
182 day bill	5.15–5.63 percent
91 day bill	5.06–5.63 percent
31 day bill	5.5 percent

Liquidity

T-bills are very liquid as there is an active secondary market for them compared to other money market instruments. The price they would command very much depends upon the lot size and the number of days to maturity.

Default Risk

This kind of risk in the context of a government security is always zero. However, these securities suffer from a small variant of default risk, i.e., maturity risk. Maturity risk is the risk associated with the likelihood of the government issuing a new security in place of redeeming the existing security.

Price Risk

The price is subject to variation in the interest rates in the economy. It would also depend upon the number of days to maturity and the lot size.

Implications for the Company

- T-bills are the safest form of short-term investment for the company.
- The liquidity for T-bills is high as there is an active secondary market for these instruments.
- T-bills are a good investment source for less than 15 days as they have a good liquid market. The company can purchase T-bills approaching maturity from the secondary market according to its investment needs.
- T-bills investment can be traded in parts depending on the requirements of the company and the market conditions.
- Since they are subject to high interest risk, they need close day-to-day monitoring of the market to ensure entry and exit at the right time.

Operational Details

The company can participate in the T-bill market either in the primary market or secondary market or both. It can participate in the primary market through the 'primary dealers' appointed by RBI. It can participate in

the secondary market either through the primary dealer or other dealers specializing in secondary markets like UTI Securities, Prebon Yamane, etc. Since the company's quantum of investment may not so high, it would not be feasible to trade in the primary market. It would be advisable to trade through the primary dealers like STCI or secondary market dealers. The primary dealers themselves offer 'buy' and 'sell' quotes on a daily basis. To trade in T-bills, the company has to open a constituent subsidiary general ledger account (Constt. SGL account) with its banker which in turn has a SGL account maintained with RBI. A constituent subsidiary general ledger account is a service provided by Reserve Bank of India through primary dealers and banks those entities that are not allowed to hold direct SGL accounts with it. This account provides for holding of government securities and treasury bills in dematerialized form. The deal can be carried over by calling up the dealer and placing either the buy or sell quote. The quotes are available earliest on one day before (T-1 day) the day of the trade.

Mutual Funds

A mutual fund is a trust that pools together the savings of a number of investors who share a common financial goal. Anybody with an investible surplus of as little as a few thousand rupees can invest in a mutual fund. These investors buy units of a particular mutual fund scheme that has a defined investment objective and strategy. The money thus collected is then invested by the fund manager in different types of securities like:

1. Shares,
2. Debentures, and
3. Money market instruments.

The quantum of investments in specific securities depends upon the scheme's stated objectives, i.e., whether it is income oriented/growth oriented/income cum growth oriented/tax-saving schemes. The income earned through these investments and the capital appreciations realized by the scheme are shared by its unit holders in proportion to the number of units owned by them. Mutual funds can be classified on two broad parameters. These can be:

1. On the basis of liquidity

Open-ended schemes which do not have a fixed maturity. Investors deal directly with the mutual fund for investments and redemptions. The key feature of this scheme is that of the liquidity that it provides. The investor can conveniently buy and sell his units at net asset value (NAV) related prices after adjusting for the load if any.

Close-ended schemes that have a stipulated maturity period (ranging from 2 to 15 years) are called close-ended schemes. The investor can directly invest in the scheme at the time of the initial issue and thereafter he can buy or sell the units of the scheme through the stock exchanges where they are listed. Some close-ended schemes give the investor an additional option of selling the units directly to the mutual fund through periodic repurchase at NAV related prices. SEBI regulations ensure that at least one of the two exit routes is provided to the investor.

Interval schemes combine the features of the open-ended and close-ended schemes. They may be traded on the stock exchange or may be open for sale or redemption during pre-determined intervals at NAV related prices.

2. On the basis of returns

Growth schemes aim to provide capital appreciation over the medium to long-term duration. They normally invest a majority of their funds in equities and are willing to bear short-term decline in value for possible

future appreciation. These schemes are not for investors seeking regular income or needing their money back in the short term. This scheme is best suited for investors seeking growth over the long term.

Income schemes intend to provide the investor a regular and steady flow of income. These funds generally invest the funds in fixed income securities such as bonds and corporate debentures. These schemes also offer income-oriented schemes with very high liquidity. This enables the investor to park the surplus funds in these schemes for very short periods, even a day and exit out of the scheme whenever he desires. These schemes invest in money-market instruments. The capital appreciation provided by such schemes is limited.

Balanced schemes are intended to provide both growth and income by periodically distributing a part of the income and capital gains that they earn. They invest in both shares and fixed income securities in the proportion indicated in the offer documents. In a rising stock market the NAV of these schemes may not normally keep pace or fall equally when the market falls. Such schemes are ideal for investors looking for a combination of continuous income and moderate growth in capital returns.

Money market schemes are intended to provide easy liquidity, preservation of capital and moderate income. These schemes generally invest in safer, short-term instruments such as treasury bills, certificate of deposits, commercial paper and inter-bank call money. These funds are considered the safest and the most liquid class of mutual funds. Returns on these schemes may fluctuate depending on the interest rates prevailing in the market. Such schemes are most suitable for corporate and individual investors as a means to park their surplus funds for short intervals or awaiting more favorable investment alternatives.

3. Other Schemes

Tax-saving schemes offer tax rebates to the investors under tax laws as prescribed from time to time. This is made possible because the government offers tax incentives for investment in specified avenues. Examples of such schemes are equity linked saving schemes (ELSS) and pension schemes.

Recent amendments to the Income Tax Act provide further opportunities to investors to save capital gains by investing in mutual funds. The details of such tax saving are provide in the relevant offer documents. It is suitable for investors seeking tax rebates.

Special schemes include index schemes that attempt to replicate the performance of a particular index such as the BSE Sensex or the NSE 50, of industry-specific schemes (which invest in specific industries) or sectoral schemes (which invest exclusively in segments such as 'A' group shares or initial public offerings).

Index funds are ideal for investors who are satisfied with returns approximately equal to that of an index. Sectoral fund schemes are ideal for investors who have already decided to invest in a particular sector or segment. In spite of the features that each scheme provides, any one scheme cannot meet all the requirements of an investor. Thus the investor needs to invest the money in a judicious manner in different schemes to be able to get the best combination of growth, income, and stability.

As far as the company is concerned, the major criteria for selecting a particular kind of scheme should be as follows:

1. The investment horizon or the objective of the scheme.
2. The amount of liquidity required.
3. The extent of safety required on the funds invested or the risk profile of the scheme.
4. The expected return from the investment.

Given the company's requirements the schemes that suit the company's investment criteria are either 'money market funds' or 'liquid funds'. The other kinds of funds do not match the risk profile and the investment horizon of the company and are not suitable for short-term investments in spite of the high returns provided by such schemes.

The operational difference between the money market scheme and the liquid scheme is very thin. The major difference is in the allocation of funds between the money market instruments as these instruments are supposed to provide more liquidity than the liquid schemes. Of late the liquid schemes have become analogous to money market schemes in terms of their liquidity and in other operational aspects like lock-in periods, entry and exit loads, etc.

Liquid Funds

These funds invest money only in money market instruments like T-bills, call money markets, commercial paper, GoI securities and in bonds of AAA rated companies. The objective of these funds is to provide fixed income and at the same time preserve the capital. The important features of such funds are as follows:

1. They are suitable for short-term investments.
2. The returns on these funds are dependent on the prevailing interest rate in the economy as the investments made are in the money markets.
3. The funds are offered both under the growth and dividend plan policies.
4. Most of the funds offer dividend re-investment plan under which the dividend issued is compulsorily reinvested back in the funds as fresh investments.
5. The returns from both the growth funds and the dividend reinvestment plan qualify for the capital gain tax and not as interest income.
6. Most of the funds charge 1 percent of the average net assets as expenses towards recurring expenses, investment management and advisory fees.
7. The annualized return for an investment of 7 days in the liquid funds is between 9 percent and 10 percent across various mutual funds.

The following shows the returns on a few liquid funds as on July 31, 2002:

Fund	Rolling returns (percent)			
	7 days	15 days	30 days	90 days
IDBI principal GSF savings	0.2115	0.4636	0.9354	2.9252
Birla gilt plus liquid plan	0.1871	0.3820	0.8187	2.6958
Tempelton India GSF treasury plan	0.2200	0.4861	0.9762	2.4700
SBI magnum gilt fund short-term-G	0.1554	0.3256	0.6776	2.2656
Alliance GSF short-term	0.1554	0.3285	0.6853	2.2475
Prudential ICICI gilt treasury	0.1572	0.3334	0.7083	2.1285
DSPML GSF shorter duration	0.1530	0.3179	0.6524	2.1109
K gilt saving plan	0.1540	0.3320	0.6607	2.0811
SBI magnum gilt fund short-term-DM	0.1393	0.2989	0.6101	2.0531
HDFC gilt short-term	0.1719	0.3617	0.7010	1.8533
Pioneer ITI gilt liquid fund	0.2050	0.4167	0.7558	1.5708
Zurich India sovereign gilt saving	0.0999	0.2144	0.4498	1.4337
IL & FS gilt fund short-term	0.2051	0.4296	0.7868	1.3061

Default Risk

The default risk involved in these funds is minimal as the investments in government backed securities carry sovereign ratings and other investments are made either securities issued by banks or by companies with very low default risk.

Liquidity Risk

The investments in liquid funds are highly liquid as they can be redeemed within 24 hours in most of the funds. Most of the funds also quote daily NAVs which make it possible to track the investments regularly.

Price Risk

The value of the investment in liquid funds depends on the general interest level in the economy and the overnight call money rate. The interest rates do not fluctuate to the extent that would erode the capital itself.

Implications to the Company

- Liquid funds offer one of the most attractive returns amongst the short-term instruments and are also relatively secured as the investments are in money market instruments.
- They also offer easy entry and exit options, which are the prerequisites for a short-term investment.
- The investments can be liquidated partially depending on the company's commitments.
- The company need not keep a close watch on the money markets to monitor its investments as the fund managers are professionally qualified to handle the investments.
- This instrument is best suited for funds, which are surplus for short periods like less than 15 days.

Operational Details

The company can directly place its funds with the mutual funds. Alternatively, to avoid operational hassles, it can transact through investment advisory companies like:

- Kotak Securities
- Prebon Yamane Securities
- ANZ Grindlays Bank (Mutual Fund Advisory services)
- HDFC Bank (Treasury Department)
- UTI Securities

These companies regularly update the company about the prevailing conditions in the money market and would advise the company regarding its investments in various funds. They would also handle the operational procedures involved both at the time of investing and redemption of the investments. These companies perform weekly analysis of various mutual fund schemes. The clients are informed about the performance of their current portfolio of investments and advise them on suitable opportunities either to invest or to exit from their investments. These advisory companies do not charge any fee to the company for handling its mutual fund investments. They only receive commission from the concerned mutual fund companies. Exhibit 31.7 gives a comparison of alternatives.

Exhibit 31.7 Comparison of alternatives

<i>Instruments</i>	<i>Returns (percent)</i>	<i>Liquidity</i>	<i>Default risk</i>	<i>Price risk</i>
Fixed deposits	7–9.5	High*	Low	Low
Treasury bills	5.5	Very high	No risk	Low
Commercial paper	7.40–9.75	Medium	Medium	Medium
Call money	5.58–5.75	High	Low	Low
ICD	8.58–9.5	Very low	High	High
Mutual funds (Liquid funds)	8–9	Very high	Low	Medium #
Certificate of deposit	10	Low	Low	Medium

Key: *For bank FD's of greater than 15 days withdrawal at any time before maturity is allowed, but the investor would be charged a penal interest, which is at present 1 percent for most of the banks. For FD's less than 15 days premature withdrawal is not allowed.

#Though the liquid mutual funds invest a major portion of their funds in the money market, their price risk is medium as they require longer time to shuffle their portfolio in case of changes in market conditions.

The above table illustrates the following factors:

- **CDs** provide the highest returns, but their secondary market is highly illiquid which makes this investment option highly unsuitable for the company.
- **Commercial paper (CP)** also offer high returns but their risk is high and the secondary market for these instruments is also not so active. Hence, they are not an attractive investment option.
- **Call money** market offers fairly low returns. This instrument is less risky and also highly liquid. The company's quantum of investment also makes this option unviable, as it may not be possible for the company to find suitable buyers in the secondary market. The call money market requires the investor to continuously monitor the money market but the company does not have the necessary expertise to do so. Hence, though attractive, this option is not viable for the company.
- The liquid schemes of the **mutual funds** are best suited for investments of less than 15 days due to their good returns, high liquidity and low default risk. Though their price risk is medium, investments for less than 15 days would not be affected by the price risk much.
- **T-bills** are the safest mode of investments for any period. But the lot size required for dealings in the T-bills market is fairly high. Any investment less than the lot size may hinder the liquidity of the investment. Hence to choose this investment option, the company should have certain minimum cash available with it.

APPENDIX 1: PROJECTED INCOME STATEMENTS

<i>Projected profitability statement particulars</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>(Amt in Rs) 2006</i>
Sales inclusive of excise duty	570,500,000	777,000,000	954,010,000	1,065,568,000
Other income	16,898,210	19,787,550	23,193,734	27,211,748
Total revenues	587,398,210	796,787,550	977,203,734	1,092,779,748

Table contd.

Table contd.

<i>Projected profitability statement particulars</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>(Amt in Rs) 2006</i>
Cost of goods sold	451,920,000	622,345,000	770,112,800	861,699,290
Gross profit (Sales – COGS)	118,580,000	154,655,000	183,897,200	203,868,710
Total revenues–COGS	135,478,210	174,442,550	207,090,934	231,080,458
Less: Additional expenditure on account of product launch	0	8,000,000	0	0
Interest and finance charges	1,426,250	1,942,500	2,385,025	2,663,920
Depreciation	27,808,331	27,424,335	25,047,034	20,510,770
Profit before tax	106,243,629	137,075,716	179,658,875	207,905,768
Less: Provision for taxation @ 40 percent	42,497,452	54,830,286	71,863,550	83,162,307
<i>Profit after tax</i>	<i>63,746,177</i>	<i>82,245,429</i>	<i>107,795,325</i>	<i>124,743,461</i>

APPENDIX 2: FORECASTED BALANCE SHEET WITHOUT DIVIDENDS

<i>Projected balance sheet Sources of funds</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>(Amount in Rs) 2006</i>
<i>Shareholders' Funds</i>				
– Share capital	10,000,000	10,000,000	10,000,000	10,000,000
– Reserves and surplus-P&L a/c	418,258,851	500,504,281	608,299,606	733,043,066
NET WORTH	428,258,851	510,504,281	618,299,606	743,043,066
<i>Loan funds</i>				
– Deferred payment liability	0	0	0	0
Total	428,258,851	510,504,281	618,299,606	743,043,066
<i>APPLICATION OF FUNDS</i>				
<i>Fixed assets</i>				
– Gross block	270,129,956	285,129,956	305,129,956	325,129,956
Less: Depreciation	192,215,507	219,639,841	244,686,876	265,197,646
Net block	77,914,450	65,490,115	60,443,080	59,932,310
– Capital advances	0	0	0	0
Total	77,914,450	65,490,115	60,443,080	59,932,310
<i>Investments</i>	998,355	998,355	998,355	998,355
<i>Current assets, loans and advances</i>				
– Inventories	81,103,350	96,091,900	121,519,620	121,638,129
– Sundry debtors	122,460,493	165,590,466	202,202,821	225,630,080
– Cash and bank balances	209,026,521	271,086,434	342,755,806	455,714,571
– Other current assets	2,886,000	3,751,800	4,877,340	6,340,542
– Loans and advances	16,131,742	18,551,504	21,334,229	24,534,364
Total	431,608,107	555,072,103	692,689,816	833,857,685
Less: Current liabilities and provisions				
– Liabilities	81,363,331	110,022,754	134,643,077	150,378,430
– Provisions for leave encashment	898,728	1,033,538	1,188,568	1,366,854
Total	82,262,060	111,056,292	135,831,645	151,745,284
<i>Net current assets</i>	349,346,047	444,015,811	556,858,170	682,112,401
Total	42,825,8851	510,504,281	618,299,606	743,043,066

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Section Six

FINANCIAL POLICY, COMPETITIVE STRATEGY, AND SHAREHOLDER VALUE

Chapter 32

Growth and Value

OBJECTIVES

- ◆ Provide a link between growth and shareholder value.
- ◆ Introduction to the concept of sustainable growth and its determinants.

Corporate finance theoreticians generally agree that the objective of the firm is to maximize wealth although there may be some disagreement as to whether the objective is to maximize the wealth of shareholders, that is, maximize the present value of dividends and appreciation in the price of the firm's stock or the wealth of the firm, which includes bondholders and preferred stockholders.

For years, growth has been only second to profits in the pantheon of corporate virtues. In recent years, however, there are increasing signs that some management must finally face the fact that unrestrained growth may be inconsistent with established financial policies. Empire building might be out of fashion but high growth is still in vogue. The question is: Is growth something that is to be maximized? Is there an ideal growth rate for a firm? What are the implications of faster growth? Finally, what relationship exists between financial policy that determines growth and corporate strategy?

SUSTAINABLE GROWTH

Define sustainable growth for those companies which have target payout ratio and capital structure as the annual percentage increase in sales that is consistent with the firm's established financial policies.

Let

- p = the profit margin on existing and new sales,
- d = the target payout ratio,
- $(1 - d)$ = retention ratio,
- L = target debt – equity ratio,
- S = sales at the beginning of the year, and
- ds = increase in sales during the year.

The increase in sales is preceded by an increase in asset base. Retained earnings, new debt or new equity can finance the increase in asset base. If we assume that the firm is unable or unwilling to sell new equity, the option reduces to retained earnings or new debt. Since the firm has a target debt—equity ratio to maintain, the increase in debt has to be proportional to the increase in retained earnings. So under stable conditions, retained earnings determine increase in sales.

$$\begin{aligned} \text{Increase in sales} &= \text{Addition to retained earnings} + \text{Increase in debt} \\ \text{Sustainable growth } g' &= \text{Change in equity during the period} / \text{Beginning equity} \\ &= (\text{Retention rate} \times \text{Earnings}) / \text{Beginning equity} \\ &= \text{Retention rate} \times (\text{Earnings} / \text{Beginning equity}) \\ &= \text{Retention rate} \times \text{ROE} \end{aligned}$$

But
$$\begin{aligned} \text{ROE} &= \text{PAT} / \text{Equity} \\ &= [\text{PAT} / \text{Sales}] \times [\text{Sales} / \text{Assets}] \times [\text{Assets} / \text{Equity}] \end{aligned}$$

i.e.,

$$g' = \text{Retention rate} \times [\text{PAT} / \text{Sales}] \times [\text{Sales} / \text{Assets}] \times [\text{Assets} / \text{Equity}]$$

Let us plug in some numbers into the equation and see how it works. Consider the following data:

$$\begin{aligned} \text{Sales} &= \text{Rs } 8730 \text{ crore} \\ \text{PAT} &= \text{Rs } 1323 \text{ crore} \\ \text{Total assets} &= \text{Rs } 19536 \text{ crore} \\ \text{Net worth} &= \text{Rs } 8471 \text{ crore} \\ \text{Debt} &= \text{Rs } 7626 \text{ crore} \\ \text{Beginning equity} &= \text{Rs } 8405 \text{ crore} \\ \text{Sustainable growth} &= 0.15 \times 0.47 \times 0.45 \times 2.32 \\ &= 7.3 \text{ percent} \end{aligned}$$

What the equation tells us is that g' is the only growth rate consistent with the stable values of the four ratios. Sustainable growth is a number. If the actual growth rate is not equal to g' , one of these ratios will change. If actual growth is greater than g' , the firm should improve operations or change financial policies. The firm has four options.

- Improve profit margin
- Improve asset turnover
- Decrease payout
- Increase leverage

A firm can improve asset turnover by cutting down finished goods inventory or being harsh on credit terms. This may either hurt service or drive bargaining customers away reducing the actual growth rate. A firm may or may not have much scope for improving the profit margin depending on the product differentiation, perceived value, and nature of competition in the industry group.

The traditional argument is that a firm can always sell new equity. This may not be true for private firms either because of shortage of personal funds or promoters fear dilution of control if the firm goes public or approaches an institutional investor. Many firms may not be able to go public at all. Public companies may postpone public issue because of procedural hassles or underpricing of new issues or high issue costs or prolonged bearish market sentiment. Some firms may have the option of tapping overseas capital markets. But the number is small. Moreover profit in real terms will be small due to high inflation in many countries. The other option is to decrease payout or increase leverage or resort to some combination.

Decrease Dividends

From the stockholders viewpoint there may be no *real* difference among dividend plans but may have different impact on stock price, may be because investors do not see the similarity. It is quite possible that an increase in cash dividends would have a favorable impact on stock prices. Unexpected cuts in dividends can have dramatic impact on stock prices.

Increase Leverage

The other alternative is to increase leverage. Probably no other topic has attracted as much scholarly attention as the search for the optimal level of debt. Most of us believe that there are gains from leverage although we may debate on the magnitude. At one extreme, some conservative managers keep the debt levels too low thereby foregoing increase in firm value. At the other extreme, some take on too much debt for the size and operating characteristics of the company probably because of lack of understanding of corporate debt capacity. Many managers do not realize the risk associated with debt while making large capital investments financed with debt. It is possible to generate probability distribution of changes in earnings and cash flows based on historical patterns and current industry data to set debt levels with acceptable risk. Analysis of debt policy in real-life situations often lacks probabilistic inputs, because of which the estimates turn out to be point estimates, probably with large variance leading to unrealistic estimates of risk.

Incorporating Business Dynamics

Many growth plans that look good on paper go bad on execution. The reason could be anything: wrong product, wrong market, wrong strategy, and competitive reaction. The list can go on. The most difficult part of growth analysis is incorporating competitive reaction, which many executives fail to take note of. It is indeed a challenge to balance growth drivers and restraining forces. Over time it is possible to track the strategic degrees of freedom that are available to competitors on various dimensions like pricing, new product introduction and so on. The growth analysis should ascertain how sensitive the payoffs are to differing degrees of competition and competitive reactions. The growth plan analysis should incorporate soft issues like motivation and productivity. Too rapid a growth may heighten pressure on executives resulting in defections, sagging morale and lower productivity. Sales personnel, in a large copier manufacturing company, ‘compete’ with each other to book sales. This has driven many trained personnel to competitors. Quite often, skill development does not keep pace with growth. Executives get bogged down with the fire-fighting; organization development takes a back seat. The time to market and develop a new product gets extended. This is not to say that a company growing at a supernormal growth rate is ugly. Nor does it mean that a company cannot sustain ‘high’ growth for long periods. We shall address this issue later.

PRODUCT MARKET vs CAPITAL MARKET

It is a well-known fact that the executives’ decision making is guided by financial ratios—either their own or that of competitors. At times financial intermediaries may also impose such norms on them. This probably explains the similarity in financial policies across industry groups. Policies are not supposed to be extraneously determined. They are supposed to reflect the firm’s strategic choice. Executives caught between financial

standards and strategic choices opt to adhere to financial standards. It is likely that projects that improve the competitiveness of the firm in the long run may be shelved because of conservative financial policy. Since managerial reward is proportional to the extent to which one beats forecasts, there is an incentive for downward biasing. This may also contribute to not taking up a project that is otherwise worthwhile. One should distinguish between not implementing the right strategy in conformance with accepted financial policy, implementing wrong strategy in conformance with accepted financial policy and not implementing right strategy not in conformance with financial policy. They are, obviously, not the same. The questions one should ask are:

- Who has valid market knowledge? Who makes investment decisions? Who decides on the package of securities that we sell? How do we ensure coordination among these ‘interest’ groups?
- What financial policies are conducive for good growth in this industry? What are the assumptions underlying our financial policy and capital expenditure decisions? How do we allocate resources to projects that differ in importance and risk levels?
- What relationship exists between financial policy, competitive strategy and stock prices?

Ironically, a firm that goes totally by ratios (that determine growth) becomes a victim of blurred vision and focus, thereby curtailing its own growth. Consider a firm in a declining market. It will probably cut down assets, prune work force size and retire debt in anticipation of lower earnings and cash flows in the future. This might be a wise move. This exercise will not *improve* the position of the firm although it may help sustain the recession. What is really required is a fundamental rethinking on strategy, industry condition and customer value. The company’s assets or capabilities, if need arises, should be recreated. So growth is not something that can be explained by a set of balance sheet and income statement numbers alone but soft issues like strategic logic.

SENSITIVITY OF SUSTAINABLE GROWTH

To better understand the relationship between sustainable growth rate and the four determinants, a sensitivity analysis can be conducted.

Suppose $P = 0.15$, $(1 - d) = 0.5$, $T = 1.0$ and $L = 1.8$:

$$\text{Sustainable growth} = 0.15 \times 0.5 \times 1.8 \times 1.0 = 13.5 \text{ percent}$$

Holding profit margin and asset turnover constant, increase retention ratio by 10 percent and financial leverage to 2.0.

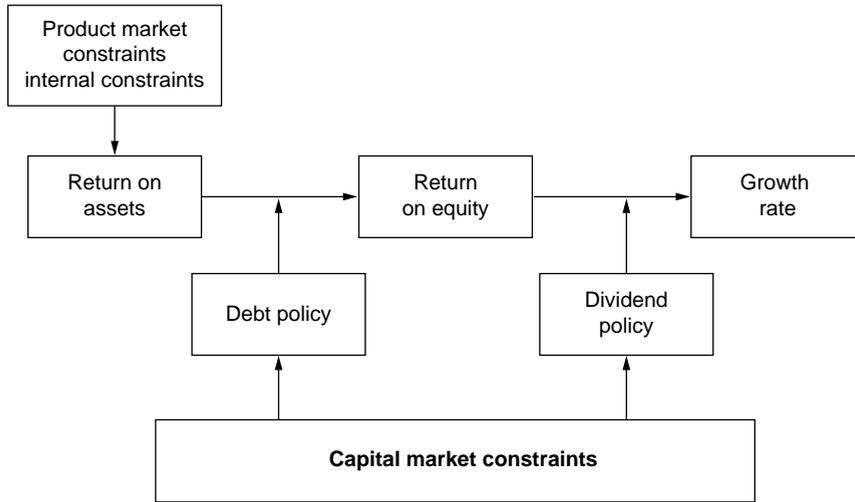
$$\begin{aligned} \text{Sustainable growth} &= 0.15 \times 0.6 \times 1.0 \times 2.0 \\ &= 18 \text{ percent} \end{aligned}$$

Sustainable growth increased from 13.5 percent to 18 percent. Suppose, profit margin improves by 1 percent and asset turnover increases to 1.2.

$$\begin{aligned} g' &= 0.16 \times 0.5 \times 1.2 \times 1.8 \\ &= 17.3 \text{ percent} \end{aligned}$$

A graph of sustainable growth can be plotted for various combinations of two of the determinants (say P and T), holding the other two constant. Exhibit 32.1 shows the sensitivity of g' for various values of retention ratio and financial leverage; when $P = .15$, $T = 1.0$, $(1 - d) = 0.4$ and $L = 1.8$, $g' = 10.8$ percent.

Bringing Them All Together



Similar calculations have been made for other combinations. Suppose the current g' is 15 percent and the company is contemplating on increasing it to 18 percent. For the growth to increase, one or more ratios should change. Work backwards to arrive at *realistic* values of the four ratios, say, $P = 15$ percent, $T = 1.0$, retention = 0.6 and leverage = 2.0.

Exhibit 32.1 Sustainable growth rates for various combinations of P , A , T , and L
— ($P = 15$ percent, and $T = 1.0$) —

Retention ratio	Leverage	Sustainable growth (percent)
0.2	1.5	4.5
	1.6	4.8
	1.7	5.1
	1.8	5.4
	2.0	6.0
	2.2	6.6
	0.3	1.5
1.6		7.2
1.7		7.65
1.8		8.1
2.0		9.0
2.2		9.9
0.4	1.5	9.0

Exhibit 32.1 contd.

Exhibit 32.1 contd.

Retention ratio	Leverage	Sustainable growth (percent)
0.5	1.6	9.6
	1.7	10.2
	1.8	10.8
	2.0	12.0
	2.2	13.2
	1.5	11.25
	1.6	12.0
	1.7	12.75
	1.8	13.5
	2.0	15.0
2.2	16.5	

GROWTH vs VALUE

Sustainable growth is a function of return on assets, retained earnings and financial leverage.

$$g' = \text{retention rate} \times \text{ROE}$$

$$g' = (1 - d) [\text{ROA} + \text{D/E} \{ \text{ROA} - i (1 - T) \}]$$

where

i = interest rate on debt,

T = tax rate, and

D/E = debt – equity ratio.

ROA = EBIT (1 – T)/Book value of total capital

Injecting debt could increase sustainable growth. Injecting debt will increase the actual return on equity as long as ROA is greater than the after-tax cost of debt by an amount that is:

$$\text{D/E} [\text{ROA} - i (1 - T)]$$

But the systematic risk of the stock and hence expected return increase with leverage.

$$\text{Expected return} = R_f + \beta_L [E(R_M) - R_f] \quad (1)$$

The relationship between levered and unlevered beta is:

$$\beta_L = \beta_U [1 + (1 - T) \text{D/E}] \quad (2)$$

(i.e., leverage increases beta.)

where β_U = unlevered beta of the stock (beta without debt).

Given the beta at the current level of debt β_L , the unlevered beta of the stock can be calculated as:

$$\beta_U = \beta_L / [1 + (1 - T) \text{D/E}] \quad (3)$$

The new beta, after increasing leverage, could be estimated using equation (2). The new beta can be plugged in the CAPM to arrive at the new expected return.

After quantifying change in required return (cost of equity) due to increase in beta and actual return due to injecting debt, the percentage change in value can be calculated as follows:

$$\text{Percentage change in value} = [(\text{PV of increased return}/\text{PV of existing return}) - 1] \times 100$$

If we assume that the stream of returns is a growing perpetuity, the present value of returns reduces to:

$$[\text{Return}/k - g]$$

where k = cost of equity and g = sustainable growth in equity.

It should be noted that the increase in actual return should be more than the increase in expected return (cost of equity) for value to increase. We shall apply our new-found knowledge to two situations and figure out what creates value, and why. Consider two companies. The first company has an investment opportunity with 25 percent ROE in amounts sufficient to produce 10 percent sustainable growth rate in sales for 10 years. The second company has an investment opportunity with 10 percent ROE in amounts sufficient to produce 10 percent sustainable growth rate in sales for 10 years. Both the companies have 20 percent cost of equity. The market value of the two hypothetical companies is shown in Exhibits 32.2 and 32.3 respectively.

Exhibit 32.2 Market price of Company A

<i>Beginning of the year of invoice</i>	<i>B.V.</i>	<i>ROE (percent)</i>	<i>PAT</i>	<i>Retention rate (percent)</i>	<i>Retained earnings</i>	<i>Dividend</i>	<i>PV @ 20 percent</i>
1	1000	25	250	40	100	150	125
2	1100		275		110	165	114.6
3	1210		302.5		121	181.5	105
4	1331.0		332.8		133.1	199.7	96.3
5	1464.1		363		146.4	219.6	88.3
6	1610.5		402.6		161.1	241.5	80.9
7	1771.6		442.9		177.2	265.7	74.2
8	1948.7		487.2		194.9	292.3	68.0
9	2143.6		535.90		214.4	321.3	62.3
10	2357.9		589.5		235.8	353.7	57.1
11	2593.7				2593.7	418.8	
							Total = 1290.5

At the end of 10 years, the stock is expected to sell at the book value of Rs 2,593.70. In other words, ROE = cost of equity.

The second company retains all the profits it generates (i.e., retention rate is 100 percent) to produce a growth of 10 percent per annum. The theoretical market price for the second company is shown in Exhibit 32.3.

Exhibit 32.3 Market price of Company B

<i>Beginning of the year of invoice</i>	<i>B.V.</i>	<i>ROE (percent)</i>	<i>PAT</i>	<i>Retention rate (percent)</i>	<i>Retained earnings</i>	<i>Dividend</i>	<i>PV @ 20 percent</i>
1	1000	10	100	100	100	0	0
2	1100		110		110	0	0
3	1210		121		121	0	0
4	1331.0		133.1		133.1	0	0
5	1464.1		146.4		146.4	0	0
6	1610.5		161.1		161.1	0	0
7	1771.6		177.2		177.2	0	0
8	1948.7		194.9		194.9	0	0
9	2143.6		214.4		214.4	0	0

Exhibit 32.3 contd.

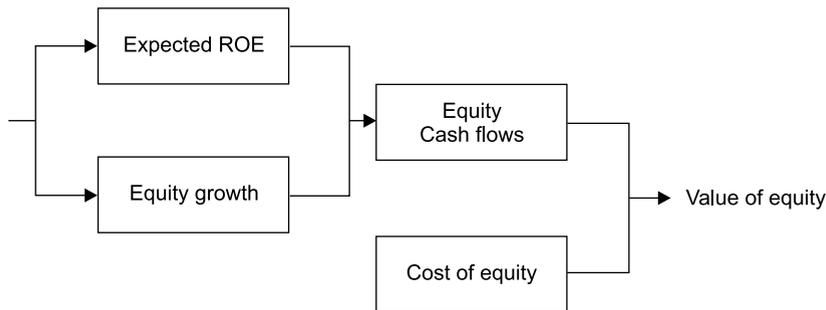
Exhibit 32.3 contd.

Beginning of the year of invoice	B.V.	ROE (percent)	PAT	Retention rate (percent)	Retained earnings	Dividend	PV @ 20 percent
10	2357.9		235.8		235.8	0	0
11	2593.7					2593.7*	418.8

Key: * = Market price at the end = Book value

- Market price/Book value = $1290.5/1000 = 1.29$ for Company A
The PV of cash returned to stock holders—Rs 1290.5—is Rs 290.5 more than the initial investment of Rs 1000 for shareholders in Company A. So the M/B ratio of Company A is greater than 1.
- Market price/Book value = $418.8/1000 = 0.42$ for Company B
The PV of cash returned to stock holders—Rs 418.9—is lower than the initial investment of Rs 1000 for shareholders in Company B. So the M/B ratio of Company B is less than 1.

The moral of the story is that how fast a company *can* grow and how fast a company *should* grow are two different things. Growth is desirable if expected ROE is greater than cost of equity and if the spread can be maintained. If not, growth will destroy value. The value creation model (Exhibit 32.4) depicts the concept.

Exhibit 32.4 Value creation model

The M/B ratios of the stocks of some well-known companies are shown in Exhibit 32.5. Why is it that some companies are trading at M/B of less than 1? Is the proposition at work?

Exhibit 32.5 M/B ratio of some well-known companies

Company	Market price	P/BV
ACC	1425	1.76
Arvind Mills	65.20	0.6
Atul Products	19.50	0.28
Blue Star	34.95	0.99
Ballarpur	32.25	0.25
BPL	138.8	1.29
Ceat	23.5	0.27
L&T	231.6	1.88
Videocon	4415	0.24
Voltas	33.40	0.73

Market price as on March 20, 1998.

Source: *Business Today*, April 7, 1998.

The purpose of value analysis is twofold. First, evaluate the performance of current strategy. Second, evaluate potential strategies for each of the business units. For instance, a company may have the following options for a business unit: modernize the plant, hold, harvest or sell out. Even if the unit is currently losing money, it might make sense to invest in the unit if the spread between ROE and COE is expected to become positive in the foreseeable future; implying that executives will have to take a long-term view of business prospects before a strategic decision is made. Yet the problem of the executives' 'favorite strategy' remains. Value-creation should be the guiding factor in executive decision-making. But how do you measure value? This is important for two reasons. First, managers need to know how their performance will be evaluated and second, how to work towards that goal.

Measuring Value

Shareholder value analysis is the process of analyzing how business decisions affect the company's economic value (i.e., NPV of cash flows discounted at WACC). One of the measures of shareholder value is the total shareholder return (TSR). It is the rate (IRR) that equates the purchase price (cash outflow) and dividends and sales proceeds (cash inflows) at the end of the holding period.¹

If the holding period is 1 year

$$\text{TSR} = [\text{Div} + (P_1 - P_0)]/P_0 \text{ ignoring time value of money}$$

The TSR of the company may be compared with that of the peer group to evaluate performance. More important, executives may be encouraged to be in the top 10 percent of the peer group, year after year. The holding period returns of some big-business group companies are shown in Exhibit 32.6. The TSR are based on average of the compounded annual rate of return of major companies in the group. The returns are adjusted for Sensex returns. As can be seen, many of them have not performed due to reasons like family squabbles, business recession, and reliance on government-controlled businesses (like the sugar industry) where profitability is low, etc. Contrast this with the TSR of MNC stocks (Exhibit 32.7). Many of the stocks have performed despite bearish market sentiment; when the market declined by 31 percent, MNC stocks appreciated by 22 percent on an average.

Another measure of value is the cash flow return on investment (CFROI). It is similar to the IRR of a project. It compares the cumulative cash invested in a business with the cash the business produces while recognizing the importance of asset ages, asset lives, and inflation.

Exhibit 32.6 Total shareholder return of some big business groups

Business group	HPR (percent)			
	1994–98	1995–98	1996–98	1997–98
Tata	(2.6)	0.4	0.8	21.8
TVS	(1.9)	(7.7)	(18.1)	(10.6)
Reliance	(8.1)	(10.5)	9.0	(7.4)
Aditya Birla	(18.5)	(21.8)	(18.4)	(13.1)
RP Goenka	(21.7)	(28.2)	(30)	(5.5)
Modi	(23.4)	(24)	(11.4)	(9.8)

Exhibit 32.6 contd.

¹ One must compare risk-adjusted returns or market adjusted returns. It is inappropriate to compare raw returns. Further, a business group cannot be compared with a stand-alone company. The comparison is inexact.

Exhibit 32.6 contd.

<i>Business group</i>	<i>HPR (percent)</i>			
	<i>1994–98</i>	<i>1995–98</i>	<i>1996–98</i>	<i>1997–98</i>
Essar	(31.7)	(30.1)	(13.5)	(3.4)
BK Birla	(30.7)	(31.7)	(33)	(23.2)
LM Thapar	(24.4)	(33.3)	(30.9)	16.80
CK Birla	(21.7)	(34.90)	(37.5)	(16.0)
UB	(11.9)	(10.6)	(2.90)	13.0

Source: Business Line, Sunday, Aug 13, 1998.

Note: Prices in August considered for all the years.

Exhibit 32.7 TSR of some MNC stocks

<i>Company</i>	<i>TSR (percent)</i>			
	<i>1994–98</i>	<i>1995–98</i>	<i>1996–98</i>	<i>1997–98</i>
HLL	34.2	43.5	45.8	42.1
Bata	(2.5)	40.8	69.2	77.0
P&G	19.9	38.3	47.7	62.8
ITC	17.8	34.7	45.6	32.8
Pfizer	16.4	33.9	34.8	112.0
Nestle	23.2	31.3	31.8	85.9
Glaxo	23.1	30.7	32.2	17.4
Cadbury	23.9	30.2	22.7	36.8
SmithKline Beecham	10.6	23.7	14.6	9.3

Source: Business Line, Sunday, Aug 23, 1998.

VALUE DRIVERS

Value is created when the NPV of a strategy is positive at the time of implementation.

$$\begin{aligned} \text{Value created by strategy} &= \text{PV of incremental cash flows due to new investment} \\ &\quad - \text{PV of investment in fixed assets and working capital} \\ &\quad + \text{PV of residual value.} \end{aligned}$$

From our knowledge of capital budgeting we know that NPV is a function of valuation parameters or *value drivers* like sales growth rate, operating profit margin, tax rate, fixed capital investment, working capital investment, cost of capital, and the duration of the project. These value drivers are affected by operating decisions such as product mix, promotion, advertising, distribution, customer service, investment in inventory, capacity expansion, etc. Value is enhanced if the same returns are achieved for lower level of investment or higher returns for the same level of investment. The value of the strategy can be enhanced by:

- Acceleration of cash flows (leads to higher NPV).
- Increase in level of cash flows.
- A reduction in risk associated with cash flows (volatility) and hence, indirectly, the firm's cost of capital.
- Increasing the residual value of the business.

Total shareholder value is the sum of NPVs of all projects undertaken by the firm. This beautiful characteristic of NPV (i.e., additivity) provides us some useful insights into value creation.

- Whenever a loss making project is terminated, the value of the firm goes up.
- Whenever a firm accepts a positive NPV project, the value of the firm goes up.
- Whenever a firm acquires another firm for a price greater than the PV of the expected cash flows, the value of the firm drops.

Market-based assets like customer and channel partner relationships also contribute to the four drivers of value. For instance, faster response to marketing efforts and earlier brand trials accelerate cash flows while brand extensions and development of new uses enhance cash flows. The important point is that shareholder value is driven by *both* tangible and intangible assets.

The value creation model presented earlier has three components: profitability, spread between cost of equity and return on equity and the advantage horizon during which the firm generates abnormal returns.

In any industry group, more profitable firms—those able to generate higher earnings per rupee of earnings—should have higher M/B ratios. Conversely, firms that are unable to generate positive abnormal returns should sell for lower M/B ratios.

$$\text{ROE} > K_e, \text{M/B} > 1$$

$$\text{ROE} < K_e, \text{M/B} < 1$$

$$\text{ROE} = K_e, \text{M/B} = 1$$

The period for which a firm can maintain a positive ($\text{ROE} - K_e$) spread is called advantage horizon. The greater the abnormal return, the longer the advantage horizon, the sooner the abnormal returns, the higher the M/B ratio.²

The market value of equity can be obtained by discounting equity cash flows at an appropriate discount rate.

$$M = [\text{ECF}/(1+k)^1 + \text{ECF}/(1+k)^2 + \dots]$$

If we assume that cash flows and discount rate are constant, the series reduces to perpetuity.

$$M = \text{ECF}/k$$

Further, if we assume that $\text{ECF} = \text{Net income}$ (i.e., retention) is zero,

$$M = \text{Net income}/k$$

but

$$\text{Net income} = \text{ROE} \times \text{Book value of equity}$$

$$M = [\text{ROE} \times B]/k$$

or

$$\boxed{M/B = \text{ROE}/k}$$

² One of earliest studies of value creation and destruction by the US firms is by Prof William Fruhan of the Harvard Business School. This is his model, based on his study.

Thus, market-to-book ratio is a function of ROE and cost of equity.
If all earnings are returned to shareholders and earnings are constant

$$M = (\text{ROE} \times B)/(1 + k) + (\text{ROE} * B)/(1 + k)^2 + \dots$$

Divide both sides by B

$$M/B = (\text{ROE})/(1 + k) + (\text{ROE})/(1 + k)^2 + \dots$$

Add and subtract k from each of the terms

$$M/B = [(\text{ROE} + k) - k]/(1 + k) + [(\text{ROE} + k) - k]/(1 + k)^2 + \dots$$

The first term $(\text{ROE} - k)$ is the abnormal earning and the second term, k , is the normal earning. It can be proved that the present value of this series is:

$$\text{PV} = 1 + (\text{ROE} - k) [(1/k) - \{1/k(1 + k)^n\}] \quad (4)$$

This model assumes that retention is zero. Allowing for different rates would yield a more realistic model.

$$M = D_1/(k - g) = (\text{Net income} \times \text{payout})/(k - g)$$

but

$$\text{Payout} = (1 - \text{retention}) = 1 - r$$

$$g = \text{sustainable growth rate} = \text{ROE} \times r$$

$$\text{Net income} = \text{ROE} \times B$$

$$M = [\text{ROE} \times B \times (1 - r)]/[k - (r \times \text{ROE})]$$

$$\boxed{M/B = [\text{ROE} \times (1 - r)]/[k - (r \times \text{ROE})]} \quad (5)$$

If a firm pays out all its earnings as dividends, r is zero. Those firms that generate positive abnormal returns can increase value by retaining a larger fraction of earnings and invest in business.

Equations (4) and (5) can be combined as:

$$M/B = [1 + (\text{ROE} \times r)]/(1 + k) + [\text{ROE} (1 - r)/(k - r \times \text{ROE})] [1 - (1 + r \times \text{ROE})/(1 + k)^n]$$

Thus, M/B is a function of ROE, retention rate and the advantage horizon, n .

Competitive advantage period (CAP) is defined as the time period for which the company earns returns in excess of cost of capital.³ Over time competitive pressures drive returns to the cost of capital. Although a company's competitive advantage period is affected by a multitude of internal and external factors only a few key factors like current return on capital, rate of industry change, and barriers to entry have a significant bearing. Companies with high P/E multiples tend to have a long competitive advantage period and those with low P/E multiples tend to have low CAP. The CAP of some companies in the food industry is given here:

³ Mauboussin, Michael and Paul Johnson (1997). 'Competitive Advantage Period (CAP): The Neglected Value Driver', *CS First Boston Research*, Jan.

Company	(Years)	
	1982	1989
Campbell Soup	4	20
CPC International	10	15
HJ Heinz	5	13
Hershey Foods	6	20
Kellogg	18	19
Average	8.6	17.4

MANAGING FOR SHAREHOLDER VALUE

In small companies, where a small group of people or the head takes a decision, it is not difficult to marshal all the resources. But in large companies, where the decision-making is delegated to operating managers, there is a need for shared framework which provides guidelines regarding how operating decisions need to be made and how they affect the overall value-creation effort because value created in one part of the company may get destroyed elsewhere in the company. The management processes and measures relating to strategic planning, capital investments, budgets and executive compensation should be designed to encourage value-creating behavior in the organization. Once the goal of value creation is set (say in terms of shareholder return) one can work backwards to arrive at strategies that can achieve it. Managers should be encouraged to strive to beat minimum acceptable value and move towards the maximum value that the best owner could deliver through improved operations, reduced cost, lower working capital, etc. The planning process should generate intense discussion and debate on the value drivers and the process of delivering value. The end product of such a discussion is a value creating strategy. Value-based management requires a new way of thinking among executives, especially the top level managers. Often top managers who have authority to take decisions on major issues like dividends, mergers and acquisitions, debt policy, corporate restructuring, etc. can create tremendous value. The implementation process typically starts at the top and percolates downwards. It is hard to link actions—at the lower levels of hierarchy—to shareholder value. But the company can benchmark the processes that characterize an ideal organisation.

Limitations of Shareholder Value Analysis

It is usually easy to manipulate shareholder value analysis (SVA) calculations and show value-creation on paper. SVA is a function of financial variables like cash flows, sales volume, price, cost, etc. Quite often, the forecasts are made by financial managers but *controlled* by other line executives. The forecast may be nowhere near product market realities or not in line with the strategic thrust. But then it is probably not fair to hold an analytical tool responsible for the users' traits. Another limitation of SVA is that it does not capture the value of future growth opportunities.

IN CONCLUSION

Growth, per se, is not bad. Individual firms may exhibit sustained high growth by creative fine-tuning of financial policies specific to the circumstances of the company. But then, no company can grow at fantastic

rates forever. If it does, it'll take over the national economy in a few decades. Too much growth can destroy value because of sheer complexity of operations, bureaucracy and lack of analytical support to important projects. Given a choice between growth and value, it is value that should win. After all, as Gordon Donaldson once wrote, it is OPM.⁴

⁴ Other people's money!

Chapter 33

Growth via Mergers and Acquisitions

OBJECTIVES

- ◆ Provide a rationale for mergers and acquisitions.
- ◆ Provide an overview of valuation approaches in an acquisition.
- ◆ Introduce valuation of brands.
- ◆ Summarize the empirical findings on mergers.
- ◆ Highlight some commonly adopted takeover defenses.

During the 1990s, there were over 11,500 acquisitions in the US for a total value¹ exceeding \$1.75 trillion; non-US firms acquired nearly \$250 billion worth of high technology assets in the US, 60 percent of which were from acquirers from the European Union. 1998, for example, was a year of mega mergers aimed at giving global reach and scale to companies.

- Exxon and Mobil Corporation merged to create the world's largest oil company with a market capitalization of about \$242 billion.
- Germany's largest bank, Deutsche Bank AG, acquired Bankers Trust of the US to create the world's largest bank.
- Chrysler and Daimler Benz merged to create a new global automobile giant.

Why do companies merge? What are some of the reasons for mergers? Is it possible to create value by acquiring companies? Why do some mergers miscarry? What are the characteristics of a successful merger program?

Mergers are defined as the combining of two or more companies into one, usually with only one company retaining its identity. Typically, the larger firm is the one whose identity is maintained. The term 'merger' is generally used to indicate friendly joining of companies, while the term 'acquisition' is used for unfriendly takeovers or combinations where one company is much larger than the other. As is evident from Exhibit 33.1, mergers and acquisitions (M&A) are increasingly becoming a popular tool in pursuing strategic goals like entering new markets, acquiring technology, etc.

Mergers can be classified as horizontal, vertical, or conglomerate. A horizontal merger is one that takes place between two firms in the same line of business. A vertical merger is one in which the buyer expands toward the source of raw material or forwards toward the end customer. A conglomerate merger is one in which companies in unrelated lines of business merge. Firms merge due to a variety of reasons:

¹ The approximate values of \$1, \$1 million, and \$1 billion are Rs 46, Rs 4.6 crore, and Rs 4,600 crore respectively.

- Lower production and distribution costs by combining facilities,
- Gaining access to new distribution channels,
- Tax benefit,
- Gaining a favorable raw material position,
- Gaining access to new markets, and
- Faster growth.

Exhibit 33.1 Recent acquisitions

<i>Date</i>	<i>Acquirer</i>	<i>Target</i>	<i>Country</i>	<i>Value (\$m)</i>
2000	Mascon Global	International Software Cons.	US	37.5
2000	BFL Software	Mphasis Corp	US	200.8
2000	DSQ Software	San Vision	US	30.0
2000	SSI	Albion Orion Co	US	63.65
2000	Silverline Tech.	Sky Capital	Hong Kong	22.0
		Sera Nova	US	99.0

Source: *Business World*, November 20, 2000.

US and US Cross-Border Transactions: Top 5 Deals YTD 10/9/2002

<i>Rank</i>	<i>Announce date</i>	<i>Seller</i>	<i>Buyer</i>	<i>Value (\$ in million)</i>
1	7/15/2002	Pharmacia	Pfizer Inc	58293.81
2	2/22/2002	TRW Inc Grumman	Northrop	7645.36
3	8/20/2002	Quest Comm.	Welsh Carson	7050
4	1/7/2002	Bertlesmann Warner	AOL Time	6750
5	5/21/2002	Golden State	Citigroup	5494.48

Source: Mergerstat.

Acquisitions in 2002 in India

<i>Category</i>	<i>No.</i>	<i>Value of acquisitions (Rs crore)</i>
Food and beverages	69	1,219
Textiles	54	348
Chemicals	147	6,410
Electronics	126	1,736
Financial services	116	4,346
Ferrous metals	33	364
Non-ferrous	11	1,629

Source: *The Economic Times*, March 7, 2003.

WHY DO COMPANIES MERGE?

The most commonly cited reasons are economies of scale and synergy. Economies of scale are enjoyed when the average unit cost of production decreases as production increases. The fixed costs are spread over a larger volume of production when companies merge. There are numerous examples where economies are

never realized. The combined entity might become so large that the complicated organisation structure that usually follows a merger may increase costs due to bureaucratization. Small companies are generally acquired with the idea that the small company lacks something—say, managerial talent—which the acquirer can provide and use the small company’s strength, say product, in return. Thus the acquisition tries to make use of complementary resources better. Put two companies together. What emerges is bigger and better.

At times the acquired company may have potential tax shields but cannot avail them as the profits are not adequate. The company with tax loss carry forwards can merge with a profitable entity so that the tax shields may be availed.

Synergy could be expected in production, marketing, finance and operations due to sharing of R&D know-how, transferring of technology, more efficient usage of machinery, selling of complementary products through a common distribution channel, lower borrowing costs due to scale economies in borrowing, etc. Some cash rich companies prefer to use cash for acquisitions under the premise that diversification reduces unsystematic corporate risk. That is, downturn in one company’s fortune will be offset by upturn in another company’s earnings. Modern finance theory hypothesizes that unsystematic risk is not priced in markets and hence irrelevant. So, a diversifying company can create value only by providing a better risk–return trade-off that is unavailable through simple portfolio diversification. There are six ways in which diversification can create value:²

1. By applying one merger partner’s knowledge of the industry and skills to the competitive problems and opportunities of the other.
2. Investing in markets closely related to current fields of operation thereby reducing the long-run average cost.
3. By achieving a critical mass in an area of competence.
4. Reducing systematic risk by diversifying into related product markets.
5. By profitable allocation of cash among units to maximize efficiency.
6. By lowering cost of debt and weighted average cost of capital due to risk pooling.

Gains from Merger

The first step in merger analysis is to identify the economic gains from the merger. There are gains if the combined entity is more than the sum of its parts. That is,

$$\text{Combined value} > (\text{value of acquirer} + \text{stand-alone value of target})$$

The difference between the combined value and the sum of the values of individual companies is usually attributed to synergy.

$$\text{Value of acquirer} + \text{stand-alone value of target} + \text{value of synergy} = \text{combined value}$$

There is also a cost attached to an acquisition. The cost of acquisition is the price premium paid over the market value plus other costs of integration. Therefore, the net gain is the value of synergy minus premium paid. Exhibit 33.2 depicts the synergy equation.

² Salter, Malcolm and Wolf Weinhold (1978). ‘Creating Value via Diversification’, *Harvard Business Review*.

If

$$V_A = \text{Rs } 100$$

$$V_B = \text{Rs } 50$$

$$V_{AB} = 175$$

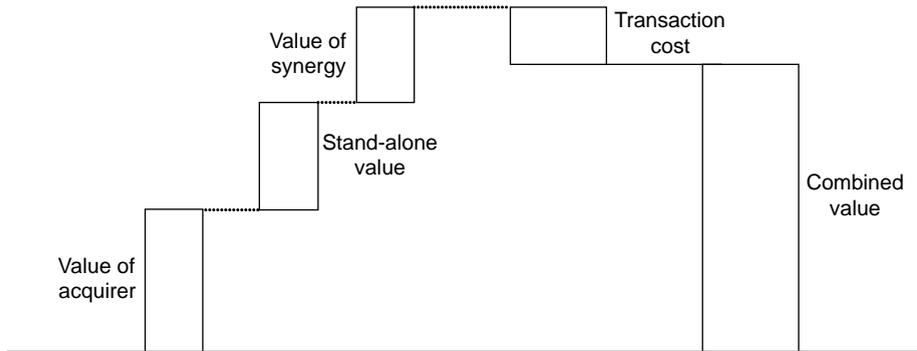
Then

$$\text{Synergy} = V_{AB} - (V_A + V_B) = 25$$

If premium is Rs 10,

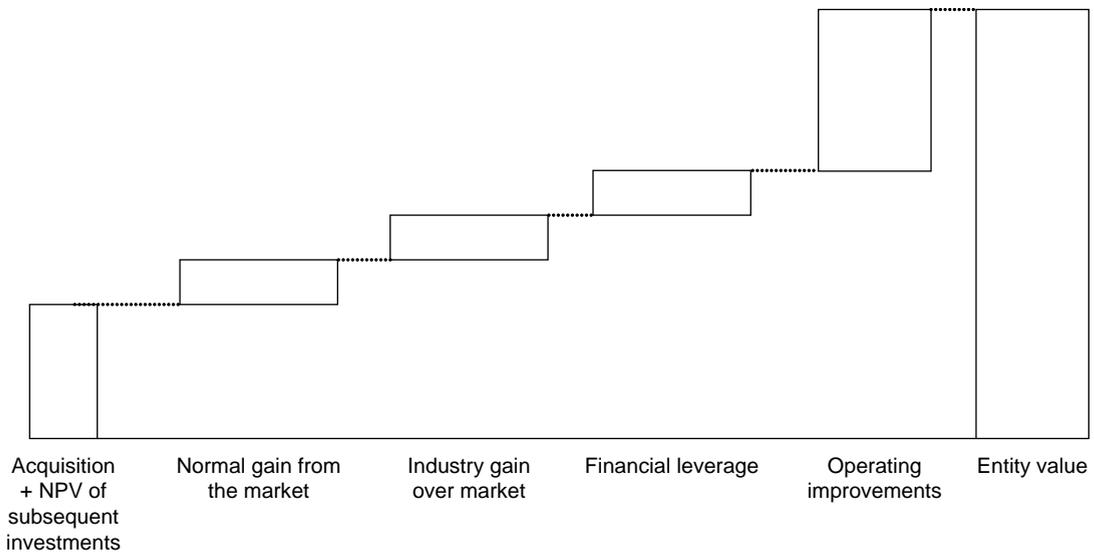
$$\text{Net gain} = 25 - 10 = 15.$$

Exhibit 33.2 Merger gains



Acquisition need not be made with synergy in mind. It is possible to make money from non-synergistic acquisitions as well. As shown in Exhibit 33.3, operating improvements are a big source of value creation

Exhibit 33.3 Value-creation in acquisitions



(see Anslinger and Copeland 1996). Better post-merger integration could lead to abnormal returns even when the acquired company is in an unrelated business. Obviously, managerial talent is the single most important instrument in creating value by cutting down costs, improving revenues and operating profit margin, cash flow position, etc. Many a time, executive compensation is tied to the performance in the post-merger period. Providing equity stake in the company induces executives to think and behave like shareholders.

There are five principal steps in a successful M&A program:

1. Manage the pre-acquisition phase.
2. Screen candidates.
3. Eliminate those who do not meet the criteria and value the rest.
4. Negotiate.
5. Post merger integration.

During the pre-acquisition phase, the acquirer should maintain secrecy about its intentions. Otherwise, the resulting price increase due to rumors may kill the deal.

Target Valuation

One of the essential steps in M&A is determining the value of the target company. There are several valuation frameworks for measuring the value of the target firm. One of the popular approaches is the DCF methodology described under capital budgeting. In the DCF approach, the value of the business is the future expected cash flow discounted at a rate that reflects the riskiness of the projected cash flows. This methodology is used to value companies since firms are essentially collection of projects. The steps involved in the valuation are:

Step 1: Determine Free Cash Flow

Free cash flow is the cash flow available to all investors in the company—both shareholders and bondholders after consideration for taxes, capital expenditure and working capital investment.

$$\text{Free cash flow} = \text{NOPAT} + \text{Depreciation} - \text{Capital expenditure} - \text{Working capital investment}$$

Estimate the most likely incremental cash flows to be generated by the target company with the *acquirer as owner* (and not on a as-is basis). Note that financing is not incorporated in the cash flows. Suitable adjustments for the specific financing of the acquisition will be made in the discount rate.

Step 2: Estimate a Suitable Discount Rate for the Acquisition

The acquiring company can use its weighted average cost of capital based on its target capital structure only if the acquisition will not affect the riskiness of the acquirer. If the acquirer intends to change the capital structure of the target company, suitable adjustments for the discount rate should be made. The pure play technique discussed in earlier chapters can be employed to estimate the discount rate. The discount rate should reflect the capital structure of the company after the acquisition.

Step 3: Calculate the Present Value of Cash Flows

Since the life of a going concern, by definition, is infinite, the value of the company

$$= \text{PV of cash flows during the forecast period} + \text{Terminal value}$$

We can set the forecast period in such a way that the company reaches a stable phase after that. In other words, we are assuming that the company will grow at a constant rate after the forecast period.

Step 4: Estimate the Terminal Value

The terminal value is the present value of cash flows occurring after the forecast period. If we assume that cash flows grow at a constant rate after the forecast period, the terminal value

$$\text{TV} = [\text{CF}_t (1 + g)] / k - g$$

where

- CF_t = cash flow in the last year,
- g = constant growth rate, and
- k = discount rate.

Step 5

Add present value of terminal value.

Step 6

Deduct the value of debt and other obligations assumed by the acquirer.

An Illustration

Clariant is a manufacturer of dyes and chemicals. Analysts expect the company to grow at 15 percent, per annum. The analyst forecast of free cash flow is shown in Exhibit 33.4. The cost of capital for the company is 14.62 percent. The present value of cash flows amounts to Rs 39.09 crore. We are assuming that the company acquiring Clariant will not make any operating improvements or change the capital structure.

Exhibit 33.4 Free cash flow forecast for Clariant

	Years							
	1997	1998	1999	2000	2001	2002	2003	2004
Sales	162.13	204.69	235.39	270.7	311.31	358.01	411.71	473.46
NOPAT	10.62	11.22	11.72	12.72	14.41	16.21	18.13	20.11
+Depreciation	3.14	2.13	2.68	2.82	2.96	3.11	3.26	3.42

(Rs crore)

Exhibit 33.4 contd.

Exhibit 33.4 contd.

(Rs crore)

	Years							
	1997	1998	1999	2000	2001	2002	2003	2004
Less:								
Capital exp.	0	0.63	2.36	1.79	1.88	1.97	2.07	2.17
Increase in working capital	0	6.44	4.12	6.10	9.45	11.67	12.97	14.32
Free cash flow	13.76	6.28	7.37	7.65	6.04	5.68	6.35	7.04

Note: Analysts expect the cash flows to grow at 10 percent forever after 2004.

Approach 1: Terminal Value is a Growing Perpetuity

$$\begin{aligned}\text{Terminal value} &= \text{FCF}_t (1 + g)/(k - g) \\ &= 7.04 (1.10)/(0.1462 - 0.10) \\ &= \text{Rs } 167.6 \text{ crore}\end{aligned}$$

Present value of terminal value

$$\begin{aligned}&= 167.6 \times \text{PVIF} (14.62, 7) \\ &= 167.6 \times 0.384 = 64.46\end{aligned}$$

$$\begin{aligned}\text{Total value} &= \text{Rs } (39.06 + 64.46) \\ &= \text{Rs } 103.52 \text{ crore}\end{aligned}$$

Since we are interested in buying only the shares of the firm, the value of outstanding debt should be deducted from the firm value to arrive at the value of equity. Clariant has debt amounting to Rs 7.92 crore.

$$\text{Value of equity} = 103.52 - 7.92 = \text{Rs } 95.60 \text{ crore}$$

As is evident, much of the target company's value comes from terminal value, which is sensitive to the assumption made about the growth rate of cash flows in perpetuity. There are three other ways in which terminal value can be estimated.

Approach 2: Terminal Value is a Stable Perpetuity

If there is no capital expenditure or capital expenditure exactly equals depreciation after the forecast period, meaning that the total capital does not grow anymore, cash flow equals profit after tax. In other words, when we assume that the company earns a rate of return on capital equal to the cost of capital irrespective of growth in sales,

$$\begin{aligned}\text{Terminal value} &= [\text{free cash flow}/\text{discount rate}] = \text{FCF}/k \\ &= [7.04/0.1462] = \text{Rs } 48.15 \text{ crore} \\ \text{Value of the firm} &= 39.09 + 48.15 \\ &= \text{Rs } 87.24 \text{ crore}\end{aligned}$$

The difference in value is almost Rs 16.28 crore

Approach 3: Terminal Value as a Multiple of Book Value

The terminal value can also be estimated by multiplying the forecasted book value of capital by an appropriate market-to-book ratio (P/BV). Normally, the current M/B ratio is taken as proxy for the future. Consider the following example:

	<i>Market value</i>	<i>Book value</i>	<i>M/B</i>
Debt	7.92	7.92	1.0
Equity	15.0	10.0	1.50
Total capital	22.92	17.92	1.28

The current M/B ratio is 1.28. If the book value of capital at the end of forecast period is Rs 30 crore, then terminal value = $30 \times 1.28 = \text{Rs } 38.40$ crore.

Approach 4: Terminal Value as a Multiple of Earnings

The terminal value under this method is established by multiplying the forecasted terminal year profits by an appropriate price–earning multiple. As usual, the current P/E multiple can be used as proxy for the future.

$$\text{Current P/E multiple} = [\text{Current market value of company} / \text{Current profit after tax}]$$

To illustrate, if the current market value is Rs 57.62 crore and profit after tax is Rs 8.23 crore,

$$\begin{aligned} \text{P/E} &= 57.62/8.23 = 7 \\ \text{Terminal value} &= \text{Last year profits} \times \text{P/E multiple} \\ &= 20.11 \times 7 = \text{Rs } 140.8 \text{ crore} \end{aligned}$$

Obviously, the method adopted by the analyst affects the final value placed on the company's equity. These four methods might give four different answers. The DCF approach can capture the value of assets in place. Some components of the acquisition are hard to quantify. Consequently, the final price paid by the acquirer might be much higher than the DCF value obtained. But the premium paid for the so-called synergy should not be out of proportion. We could think of the target company's value as:

$$\begin{aligned} \text{Value to buyer} &= \text{value to seller} + \text{value added by buyer} + \text{change in value to buyer} \\ &\text{if target firm is acquired by competitor} \end{aligned}$$

The first component is the DCF value of the target firm in its current form with the current growth rate, current financial plan, etc.

The second component, value added by acquirer comprises of synergy to acquirer, cost savings, value of new strategy after the acquisition, proceeds from sale of redundant assets adjusted for taxes, benefits from improvement in credit rating and other financing side effects.

The third component is the gain or loss to the acquirer if the competition manages to acquire the target. The sum total of these three components gives the maximum value of the target.

A sensitivity analysis may be conducted for pessimistic and optimistic values of key financial variables like sales growth rate, profit margin, working capital investment, capital expenditure, period of high growth, etc. The end product of such an analysis is a range of prices within which the acquisition price may lie. Obviously, the acquirer would want to lower the price as much as possible and the opposite is true for the target. The important message is that the acquirer should consider not only what the target may be worth to the buyer but also what the target's next best alternative is likely to be. For example, suppose that when valued as a stand-alone, a target is worth Rs 100, whereas, due to synergies, the target is worth Rs 150 as part of the buying firm. A key element in the negotiation process is the value of target to *another bidder*. If the

synergy is unique to the buyer, the buyer may purchase the company for one buck more than the stand-alone value (Rs 101). On the other hand, if the synergy is available to other bidders as well, the buyer may have to raise the bid closer to Rs 150. In other words, the valuation must take into account the uniqueness of synergy and the likely range of prices affordable by other bidders. Summing up, valuation has three elements—estimation of cash flows, estimation of discount rate, and sensitivity analysis.

Let us look at an extended example. ABC is in the process of purchasing XYZ. The pre-merger financial statements of both the companies are given in Exhibit 33.5. Forecasting cash flows for XYZ under ABC's management involves suitable assumptions regarding sales growth rate, profit margin, capital expenditure and net working capital for every rupee of sales increase. The relevant assumptions for the forecast period are given here:³

	Years		
	1–5	6–7	8–10
Sales growth rate, <i>g</i> percent	15	12	12
EBIT/Sales, percent	0.18	0.15	0.12
Tax rate percent	46	46	46
Capex per rupee of sales Increase (C) ⁴	0.20	0.20	0.20
Working capital per rupee of sales increase (W)	0.15	0.15	0.15

Exhibit 33.5 Pre-merger financial statements

<i>Income statement</i>	<i>(Rs crore)</i>	
	ABC	XYZ
Sales	600	50
Operating income	522	42.50
EBIT	78	7.5
Interest	4.50	0.40
PBT	73.50	7.10
Net income	37.50	3.55
No. of shares outstanding (million)	10.00	1.11
Balance sheet		
Debt	56.00	5.10
Equity	272.00	17.00
	328.0	22.10
Fixed assets	216.00	20.00
Less: Accumulated depreciation	(95)	(8.00)
Net working capital	180.00	7.50
Investments	25.00	1.00
Other assets	2.00	1.60
	328.0	22.10

³ This methodology was first suggested by Alfred Rappaport (1979).

⁴ Net of depreciation.

The cash flow in any year =

$$CF_t = S_{t-1} (1 + g_t) (p_t) (1 - T_c) - (S_t - S_{t-1}) (C_t + W_t)$$

where p = EBIT/Sales, S = sales, and T_c = tax rate.

Thus,

$$CF \text{ in year 1} = 50 (1+0.15) (0.18) (1 - 0.46) - (57.5 - 50) (0.20+0.15) = 2.96$$

The projections for the first 10 years are shown in Exhibit 33.6.⁵

Exhibit 33.6 Forecast of cash flows

	(Rs crore)		
	1	2	10
Sales	57.50	66.12	177.23
EBIT	10.35	11.90	21.27
NOPAT	5.59	6.43	11.48
Cash flow	2.96	3.41	4.84

If we assume that the company generates normal returns from year 10, i.e., the company's value is unaffected by growth, the terminal value can be estimated as a perpetuity.

$$\text{Terminal value} = \frac{\text{NOPAT}_{10}}{\text{Discount rate}}$$

$$\text{PV of terminal value} = \text{TV} \times \text{Discount rate}$$

Assuming that the discount rate is 13 percent, the present value of terminal value = Rs 26.02.

The total present value of all cash flows	48.61
+ Investments	1.00
– XYZ's debt assumed	5.10
Value of XYZ equity (Rs crore)	44.51
Value/Share (Rs crore)	40.10

The next step in the analysis is to find out if a cash purchase is indeed possible at the current offer price. The acquirer's equity is unchanged in a cash offer. So the post-merger debt capacity of the combined entity is ABC's equity (Rs 272 crore) multiplied by the target debt-equity ratio (say, 30 percent). ABC and XYZ currently have pre-merger debt balances of Rs 56 crore and Rs 5.1 crore respectively. The unused debt capacity is:

$$\begin{aligned} \text{Post-merger debt capacity} & \text{ minus the sum of pre-merger debt balances of the two companies}^6 \\ & = \text{Rs } 272 \times 0.4 - (56 + 5.1) \text{ crore} \\ & = \text{Rs } 47.7 \text{ crore} \end{aligned}$$

⁵ The sales growth rate and the assumptions regarding margins, CAPEX and working capital investment are extrapolated from the current year (base year) based on the assumption that current year is a normal year. One might take the average of the past two or three years if there is a reason to believe that the current year is too good or too bad so that the trend is not unrealistic.

⁶ One might add the investments to this number assuming that the acquirer can liquidate such temporary investments.

If the post-merger debt capacity is more than the total offer price (number of shares acquired × acquisition price), a cash purchase financed with debt is possible. In this case the purchase price of Rs 44.51 crore is less than the post-merger debt capacity. So a cash purchase is feasible.

VALUATION IN PARTS

The APV approach described in earlier chapters can be used for valuing acquisition targets. WACC works reasonably well when the company targets a constant debt to value ratio. The corporate WACC used in many valuations is based on the assumption that the cash flows of the target are about as risky as that of the acquiring company and the target company will maintain a similar capital structure as that of the acquiring company. Both are restrictive assumptions. A better approach for valuation is to:

- Value the company as if it were financed entirely with equity.
- Estimate the value of financing side effects like tax shields and bankruptcy costs, etc.
- Add the two to arrive at APV.

The first step in calculating APV requires the calculation of the present value of the target company's cash flows assuming all equity financing. Consider a hypothetical example. The cash flows of a company are as follows:

<i>(Rs crore)</i>					
<i>Year</i>	<i>NOPAT</i>	<i>Capital expenditure</i>	<i>Depreciation</i>	$\Delta W.C$	<i>Net cash flow</i>
1	65	30	20	20	35
2	70.20	32	22	22	38.20
3	75.40	35	24	23	41.40
4	80.60	37	26	25	44.60
5	87.10	40	28	27	48.10

Cash flows are expected to grow at 7 percent forever thereafter.

$$\text{PV of terminal value} = \frac{48.10 (1.07)}{(k - 0.07) (1 + k)^5}$$

The unlevered value is obtained by discounting all the cash flows at the unlevered cost of equity. Assume that there are four comparable firms. Their betas and D/E ratios are as follows:

<i>Firm</i>	<i>Beta</i>	<i>D/E</i>
1.	1.0	0.50
2.	0.6	0.0
3.	0.8	0.4
4.	0.9	0.45

Company 2 has no debt. The cost of equity for this company can be taken as proxy for unlevered cost of equity.

Assume the following parameters:

$R_f = 12.2$ percent, $\beta = 0.60$, market premium = 10 percent

$$\begin{aligned}\text{Cost of unlevered equity} &= 12.2 + 0.60(10) \\ &= 18.2 \text{ percent}\end{aligned}$$

The PV of cash flows

$$= [35 \times \text{PVIF}(18.2,1) + \dots + 48.1 \times \text{PVIF}(18.2,5) + \text{Present value of terminal value}]$$

$$\text{Terminal value} = [51.47/0.112] = 459.50$$

$$\text{All equity value} = \text{Rs } 325.51 \text{ crore}$$

The acquisition price of Rs 330 will be financed with Rs 99 of debt. It will be brought down to Rs 66 in 5 years. The indebtedness is expected to remain at that level forever.

<i>End of year</i>	<i>Debt</i>
0	99
1	92.40
2	85.8
3	79.20
4	72.60
5	66.0

$$\begin{aligned}\text{Present value of interest tax shields} &= \text{PV of tax shields during the first five years} \\ &\quad + \text{PV of perpetual tax shields after year five.}\end{aligned}$$

$$\text{Tax shield} = \text{interest rate} \times \text{amount of debt outstanding} \times \text{tax rate}$$

Assume a tax rate of 35 percent and interest rate of 14 percent

PV of tax shield during first 5 years

$$= [0.14 \times 99 \times 0.35 \times \text{PVIF}(14,1)] + \dots + [0.14 \times 72.60 \times 0.35 \times \text{PVIF}(14,5)] = \text{Rs } 14.70$$

$$\begin{aligned}\text{Terminal value of tax shields} &= \frac{0.14 \times 66 \times 0.35}{0.14 (1.14)^5} \\ &= \text{Rs } 12\end{aligned}$$

The cost of debt is used as discount rate on the assumption that tax shields are about as uncertain as debt payments generating them. If tax shields are considered riskier than interest payments, a higher rate may be used.

$$\text{Present value of tax shields} = 14.70 + 12 = \text{Rs } 26.7 \text{ crore}$$

$$\boxed{\text{APV} = \text{Base case value} + \text{PV of tax shield}}$$

Adjustment for incremental bankruptcy cost can be made either subjectively or taking suitable proxies. The acquisition price of Rs 330 crore compares well with the base case value. An acquirer should look for making money from incremental improvements in operations rather than good financing. If tax shields evaporate or bankruptcy cost exceeds tax shields, the value will never be realized.

VALUATION OF BRANDS

Brand equity is created by a combination of brand loyalty, consumer awareness, perceived quality, and brand associations. Brand valuation quantifies the benefits of brand equity to the owner of the brand. Though companies have long recognized the importance of brands, interest in placing a value on them is a relatively recent phenomenon—mostly a result of the recent M&A wave, in which brands play an important role. Exhibit 33.7 lists some of the recent brand acquisitions.

Exhibit 33.7 Recent brand acquisitions

<i>(Rs million)</i>					
<i>Brand</i>	<i>Seller</i>	<i>Buyer</i>	<i>Consideration</i>	<i>Brand sales</i>	<i>Sales multiple</i>
Crocin	Duphar Interfran	Smith Kline Beecham	470	210	2.23
Mediker	P&G	Marico	100	80	1.25
Coldarin	Knoll Pharma	Johnson & Johnson	210	60	3.5
Burnol	Knoll Pharma	Reckitt & Coleman	120	55	2.18

Source: KPMG.

There are four approaches for measuring the value of a brand.

- **Cost Based**

According to this approach, the value of a brand is the present value of all expenditure incurred on the brand till date (which an acquirer will have to incur in building a brand of comparable equity). It is, however, difficult to trace all brand-related costs throughout the life of the brand.

- **Market Based**

The market value of a brand is the amount for which a brand can be sold which is simply the present value of the benefits from owning the brand.

- **Income Based**

This involves determining future revenues directly attributable to the brand and then discounting them to the present at a suitable rate. In order to estimate net revenues the brand's price premium and volume are compared to those of a generic product.

- **Interbrand Approach**

The interbrand approach is the most popular methodology for estimating the value of brands.⁷

A brand's value is the product of:

- Average annual after-tax profits of the brand adjusted for earnings of an equivalent unbranded product, and
- A multiple reflecting the brand's strength.

⁷ Birkin, Michael (1994). 'Assessing Brand Value', in Paul Stobart (ed.), *Brand Power*, New York University Press.

Interbrand takes seven factors into account to arrive at a 'brand strength multiple'. They are:

1. **Leadership**

A brand which has the ability to influence the market in setting price points and commanding distribution gets a higher score (Maximum: 25).

2. **Stability**

Those brands which enjoy a strong consumer franchise are considered stable and awarded a higher score (Maximum: 15).

3. **Market**

Brands in markets such as foods and soft drinks are less vulnerable to shifts in fashion and technology (Maximum: 15).

4. **Geographic spread**

Brands that have an international appeal are stronger than regional brands (Maximum: 25).

5. **Trend**

The long-term appeal to consumers (Maximum: 10).

6. **Support**

Consistency in investment and strength of communication (Maximum: 10).

7. **Protection**

Legal protection that is available to the brand owner.

To assess the brand strength, Interbrand conducts a detailed audit of trade and retail outlets among other things. The final multiple assigned to the brand depends on the brand strength score. To illustrate, if the brand score is 56, Interbrand may apply a multiple of 8.42.

Brand valuation involves the following steps:

- Collect most recent profit data (3 years).
- Restate the prior period (year-2, year-1) profits to present-day values by inflating at a suitable rate.
- Attach a weighting factor to the restated profit figures. Usually, a simple weighting of three times the current year, twice the previous year and once before is used. These aggregate earnings are divided by the sum of the weighting factors ($3 + 2 + 1 = 6$).
- Deduct operating income of an equivalent unbranded product.
- Deduct taxes at the medium-term effective tax rate.
- Apply a suitable multiple depending on the brand strength.

Seller's Perspective

It is necessary to remember that for every buyer there must be a seller. Although the methods of analysis for selling are the same as for buying, the selling process is termed divestiture. The decision to sell a company is at least as important as buying one. But selling generally lacks the kind of planning that goes into buying. Quite often, the decision and the choice of the buyer is arbitrary resulting in a raw deal for the selling company's shareholders. It is important to understand that selling needs the same set of skills required for buying. At some point in time the executives of a company may have to take the decision to divest a division. There is nothing wrong in selling a division if it is worth more to someone else. The decision to sell may be prompted by poor growth prospects for a division or consolidation in the industry. Given the fact that the need to sell may arise any time it makes sense for executives to be prepared. More specifically, executives need to know their company's worth. Consideration may be given to the strengths and weaknesses in

production, marketing, general management, value of synergy to potential buyers, value of brand equity, skill base of the organization, etc.

THE EMPIRICAL EVIDENCE ON MERGERS

Academic studies indicate that success in creating value through acquisitions in a competitive market is extremely difficult. Jensen and Ruback (1983) highlight this point by summarizing results from mergers and acquisitions over a period of 11 years. They found that in case of a merger, the average return, around the date of announcement, to shareholders of the acquired company is 20 percent whereas the average return to the acquiring company is 0 percent. Another study by McKinsey indicates that 61 percent of the 116 acquisitions studied were failures, 23 percent were successes. Yet another study suggests that more than half the deals—amounting to \$1.5 trillion—fall short of value-creation targets. To assess the profitability of mergers and acquisitions, academic studies have adopted two approaches (excluding clinical studies of one or a small group of companies). Event studies examine the abnormal returns to shareholders in the period surrounding the announcement of the transaction. The raw return for one day is simply the change in the share price and any dividends paid, divided by the closing share price the day before. The abnormal return is obtained by deducting a benchmark of what investors required that day (as estimated by CAPM or any benchmark index return, say S&P 500). Accounting studies examine the reported financial results of acquirers before and after acquisitions to see how financial performance changed. These studies match acquirers and non-acquirers in the same industry of similar size.

In Real Life: Estimation of the Value of Dr Reddy's Brand Name

Dr Reddy's Lab reports the value of its corporate name. The same is reproduced here:

	2000	1999	1998
PBT	808.67	704.87	622.25
Less : Non-brand income	43.84	51.10	32.10
	764.83	653.77	590.15
Inflation factor	1.0	1.07	1.15
PV of profits	764.83	699.53	678.68
Weightage factor	3	2	1
Weighted profit	2,294.49	1399.06	678.68
3-year weighted profit	728.70		
Less: Remuneration of capital@10 percent	502.14 ⁸		
Brand related profits	226.57		
Less: Tax @10 percent	22.66		
= Brand earnings	203.91		
Multiple	(say) 20		
= Brand value	4,078.20		

⁸ The profitability of the brand reflects the value of other assets employed in the business such as management, distribution systems, etc. So earnings not related to the brand strength should be eliminated. This is achieved by deducting a charge for capital tied up in the production of the brand, which one might have earned by producing the generic. A real return of 5–10 percent may be used as a capital remuneration figure.

These studies attempt to find out if acquirers outperformed the non-acquirers. The results of event studies of returns to target and bidding firms are presented in Exhibits 33.8 and 33.9. Note that most studies have documented negative returns to bidding firms.⁹ Despite such statistics why do companies acquire? Why do mergers fail? The reasons for merger failures can be numerous. Some of the key reasons are:

1. Acquirers generally overpay.
2. Poor due diligence
3. The value of synergy is over-estimated.
4. Poor post-merger integration.
5. Psychological barriers

Exhibit 33.8 Returns to target firm shareholders

<i>Study</i>	<i>Cumulative abnormal return</i>	<i>Sample size</i>	<i>Period</i>
Lang et al. (1989)	+40.3 percent	87	1968–86
Healy et al. (1992)	+45.6 percent	50	1979–84
Bradley et al. (1988)	+31.77 percent	236	1963–84

Source: Bruner (2002).

Exhibit 33.9 Returns to acquiring firm shareholders

<i>Study</i>	<i>Cumulative abnormal return</i>	<i>Sample size</i>	<i>Period</i>
Asquith et al. (1987)	−0.85 percent	343	1973–83
Healy et al. (1992)	−2.2 percent	50	1979–84
Morck et al. (1990)	−0.70 percent	326	1975–87

Source: Bruner (2002).

Companies often merge in the fear that the bigger competitors have economies of scale and may destroy them by exercising a stranglehold on raw material supply, distribution, etc. What they don't realize is the drawbacks of being big.¹⁰ The acquiring company's executives would have drawn up elaborate plans for the target without consulting its executives which leads to resentment and managerial attrition. This can be avoided by honest discussions with the target company's executives. Most companies merge with the hope that the benefits of synergy will be realized. Synergy will be there only if the merged entity is managed better after the acquisition than it was managed before. It is the quality of the top management that determines the success of the merger. Quite often, the executives of the acquiring company lose interest in the target company due to its smallness.¹¹ The small company executives get bogged down preparing vision and mission statements, budgets, forecasts, and profit plans that were hitherto unheard of.

The elaborateness of the control system depends on the size and culture of the company. To make a merger successful:

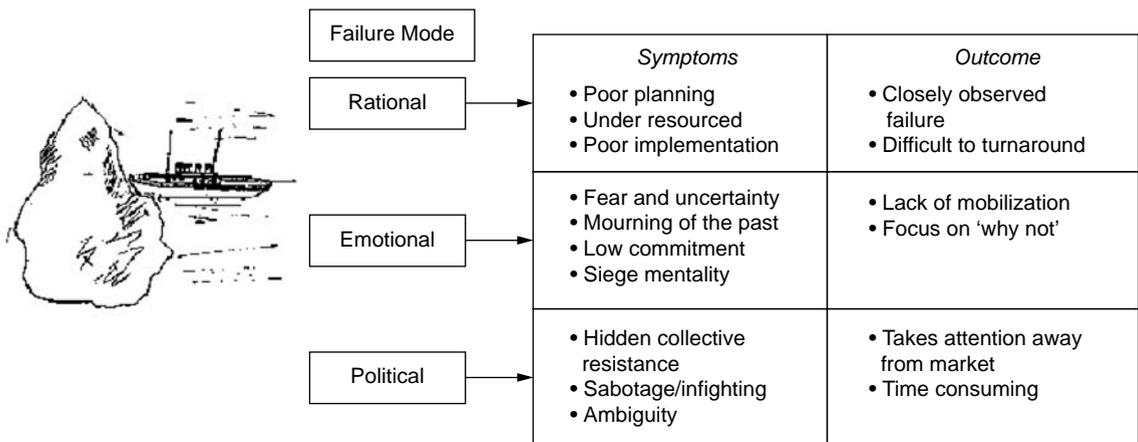
⁹ Some studies have documented zero or positive returns.

¹⁰ Levinson, Harry (1970). 'A Psychologist Diagnoses Merger Failures', *Harvard Business Review*, Mar–Apr.

¹¹ Kitching, John (1967). 'Why do Mergers Miscarry?', *Harvard Business Review*, Nov–Dec.

- Define merger objectives.
- Decide what tasks need to be accomplished in the post-merger period.
- Install an on-site integration manager to co-ordinate all activities. This person could be from a finance background because they are often considered less intimidating.
- Choose managers from both the companies (and from outside).
- Make them a part of the solution rather than the problem.
- Establish performance yardstick and evaluate the managers on that yardstick. Put them on an attractive P&L incentive compensation plan.
- Motivate them to the hilt.

Once a company is acquired, the acquirer should decide whether the target should be ‘left alone’ or adhere to the acquiring company’s culture and control system. This is not a easy question to answer. If the target is a broken company, the answer is yes. If the target is a successful company and the acquisition motive is getting a foothold in other markets or some such thing, one should exercise one’s judgement in changing existing systems because the exercise may destroy the unique culture and systems that contributed to the success of the company.



Integration has been cited as the most important process in an M&A deal. As mentioned earlier, many mergers have fallen through because of poor integration. The first 100 days is a time of anxiety and uncertainty for both the acquirer and the target. This is where care must be taken to avoid the ‘iceberg syndrome’ that will sink all efforts. Executives often feel uncomfortable communicating with key employees after a merger because so many of their questions cannot be answered.

But not meeting with key employees can be fatal. Key employees who are made to feel a part of the process, allowed to make a case for their candidacies, and reassured that their company of origin won’t be counted against them are less likely to fall through the cracks. If key employees don’t feel that they are in the loop, they will probably be busy looking for career opportunities elsewhere.

According to Michael Porter, acquisitions will most likely be profitable if:

- The floor price created by the seller’s alternative of keeping the business is low, as when the seller feels great compulsion to sell or the seller is not optimistic about its prospects if it continues in the business.

- The market for companies is imperfect and does not eliminate above-average returns through the bidding process, as when the buyer has superior information, the number of bidders is low, the condition of the economy is bad, the selling company is sick, and the seller has objectives besides maximizing the price received for the business.
- The buyer has a unique ability to operate the acquired business, as when the buyer has a distinctive ability to improve the operations of the seller, the firm buys into an industry and can use the acquisition as a base from which to pursue an internal or grassroots development, and the acquisition will uniquely help a buyer's position in its existing business.

Nevertheless, there is only one test of the success or failure of a merger or acquisition—whether or not the per-share value of the acquiring company rises after the deal is done. It is believed that astute companies can use the current M&A wave to deliver substantial value for their shareholders.

Finally, companies will have to act decisively to build the three capabilities that build a successful strategy—local networks, the capability to manage uncertainty, and the ability to distinguish prime targets.

Those that move quickly, that understand the long-term potential, that have the courage to dip a toe in what may be the unknown and turbulent waters and that have the staying power, will be in the best position to capitalize on the M&A opportunities in the coming decade.

An Illustration

Cisco is a leading provider of network communications equipment for the Internet-based economy. Cisco is one of the most successful Silicon Valley acquirers. A recent study probed the reasons for Cisco's success.¹² The authors attribute Cisco's success to six factors:

1. Cisco acquires close to home; integrates the acquisition quickly (10 days). The company's competitors are slow to integrate and generally do not acquire close to home.
2. Cisco lets the new employees know what their roles and titles will be immediately and communicates the company's vision to the acquired company. The competitors, on the contrary, have poor communication interface with the target.
3. Cisco finds new markets and acquisition opportunities through socializing and word of mouth.
4. Cisco prefers to retain a majority of an acquired company's employees by understanding what is important to them and what motivates them. Those managers who do not fit into Cisco's culture are asked to leave.
5. Cisco continues to give stock options to employees of the acquired company whereas most competing firms usually discontinue stock option plans.
6. Cisco focuses on people first and then drives the business.

Takeover Defenses

Studies indicate that only 25 percent of all targets are successful in remaining independent (Fortier, 1989). Another 25 percent are saved and acquired by a 'white knight'. The remaining 50 percent ultimately fall prey to the hostile acquirer. There are several defensive measures available to the managers of target companies to save their firm from the hands of an acquirer. Some of these defensive measures are discussed:

¹² Inkpen, Andrew, Anant K Sundaram, and Kristin Rockwood (2000). 'Cross Border Acquisitions of US Technology Assets', *California Management Review*, Vol. 42, No. 3.

Dual-class recapitalization restructure equity into two classes with different voting rights with the goal of providing management or family owners with voting rights disproportionately greater to their holdings.

Staggered or classified board of directors is broken into classes with only one class being elected each year. This makes it difficult for a substantial shareholder to:

- Change all of the board at once without approval of the existing board, and
- Lowers the effectiveness of cumulative voting.

Poison pills are triggered by a tender offer or accumulation of shares by a single shareholder beyond a certain threshold. The trigger allows target shareholders with rights to purchase additional shares making acquisition difficult.

Greenmail. In a greenmail the target repurchases at a premium the hostile bidder's target's block. Greenmails typically result in reduced shareholder value.

IN CONCLUSION

This chapter outlined some of the sensible reasons for mergers, action areas and valuation approaches. The post-merger period is the most important phase in the merger process. Some quantify the number of changes in the working of the company at 2000 and non-routine decisions at 10000! All the decision areas may be clubbed under important headings—such as Finance, Personnel and HR, Marketing, and Technology—and a checklist prepared, so that the acquirer is better prepared to handle the complexity of the process.

Acquisitions work only if:

- There are operating and financial improvements.
- The acquisition price is not too high.
- The incumbent management is competent.
- There is top management involvement in the process.

Given here are the steps involved in buying:

- Make the initial decision to buy.
- Educate yourself on the type of business you want to buy.
- Determine how much you can afford to pay.
- Search for sources which list businesses for sale.
- Engage professional advisors.
- Evaluate the businesses which are being offered for sale.
- Place a bid on the businesses in which you are interested.
- Negotiate with the seller.
- Execute a letter of intent.
- Perform due diligence on the business.
- Structure and complete documentation for the purchase.
- Obtain a contingent financing commitment.
- Sign the purchase agreement.
- Satisfy the conditions to the closing.
- Close the purchase.

APPENDIX 1: PROCEDURE FOR MERGERS

1. Prepare scheme of merger.
2. Get approval of board of directors of both companies.
3. Get approval from banks and financial institutions which have lent money and the trustees of debenture holders.
4. Intimate stock exchange about the proposed merger.
5. Apply to the high court (HC) having jurisdiction over the registered office of the company.
6. HC gives direction for calling a meeting of members.
7. HC approves the notice.
8. Dispatch notices to shareholders and creditors.
9. Advertise the meeting in newspapers 21 days before the meeting.
10. Hold the shareholder general meeting and pass resolutions.
11. File resolutions with the Registrar of Companies within 30 days.
12. Submit the report of the chairman of the meeting with high court.
13. Within 7 days of filing both companies should make a joint petition to the court for approving the scheme.
14. The court issues a notice to the Regional Director, Company Law Board.
15. Hearing of petition and confirmation of scheme.
16. File the court order with Registrar of Companies.
17. Dissolution of transferor company.
18. Transfer of assets and liabilities.
19. Allotment of shares to shareholders of transferor company.
20. Listing of shares at stock exchange.

APPENDIX 2: PROCEDURE FOR TAKEOVERS

1. Appoint a Category–1 merchant banker to advise on the acquisition.
2. Collect relevant information on the target.
3. Examine shareholder profile.
4. Investigate title and indebtedness.
5. Examine articles of association.
6. Public announcement is to be made within four days of finalization of negotiation or entering into a MOU.
7. Make all public announcements in a national English daily, a Hindi newspaper and one regional language newspaper of that place where the shares of the company are listed and traded.
8. The public announcement should contain:
 - Identity of the acquirer.
 - Purpose of the acquisition.
 - Total number of shares proposed to be acquired.
 - Offer price.
 - Method of payment.

- The highest and the average price paid by the acquirer, if any, to shares of the target company during the twelve-month period before the announcement.
 - Date of opening and closure of the offer.
 - Date by which the payment would be made.
 - Details of financial arrangements made for the purpose of acquisition.
5. Prepare a letter of offer with the help of the merchant banker within 14 days of announcement and get it approved by SEBI.
 6. Send a copy of the draft letter of offer to the target company at its registered office and to all the stock exchanges where the company is listed.
 7. Send the offer letter to all the shareholders of the company whose names appear in the register of members of the company as on the date of public announcement and the offer letter should reach them within 45 days.
 8. Open an escrow account and deposit the required amount as security for performance.
 9. Make payment and complete all other procedures within 30 days of the closure of the offer.
 10. Upward revision of price can be made any time up to 7 days before the closure of the offer.

APPENDIX 3: SALIENT FEATURES OF SEBI TAKEOVER REGULATIONS

1. Does it cover mergers and amalgamations?
Number of mergers covered under The Companies Act.
2. Meaning of takeovers and substantial acquisition of shares:
When an acquirer takes over the control or management of the target company it is termed as takeover.
3. Persons acting in concert:
Individuals or companies or other legal entities who are acting in concert for a common objective or for a purpose of substantial acquisition of shares or voting rights or gaining control over the target company either directly or indirectly.
4. Substantial quantity of shares:
 - (1) For the purpose of disclosure
 - (a) if holding 5 percent or more shares or voting rights should inform the target company within 4 working days.
 - (b) if holding 15 percent shall within 21 days from the financial year ending March 31 as well as the record date fixed for the purpose of dividend declaration, disclose its aggregate shareholding to the target company.
 - (2) For the purpose of making an open offer by the acquirer
 - (a) if acquiring 5 percent shares (including existing shareholding) can do so only after making a public announcement to acquire at least additional 20 percent of voting rights.
 - (b) An acquirer having 75 percent shares or voting rights of target company, can acquire further shares or voting rights only after making a public announcement specifying the number of shares to be acquired through open offer.
5. Control
Includes right to appoint majority of directors or control management or make policy decisions.

6. Public announcement

Announcement in newspapers by acquirer primarily disclosing its intention to acquire a minimum of 20 percent shares of the target company. Other disclosures include offer price, number of shares to be acquired from the public, identity of acquirer, purpose of acquisition, future plans for the company, etc.

7. Can the acquirer make an offer for less than 20 percent?

Yes, if the acquirer already holds 75 percent or more of voting rights.

8. When is the announcement to be made?

The announcement is made through merchant bankers within 4 working days of the entering into an agreement to acquire shares which triggered off the takeover code.

9. Documents to be filed with SEBI after making public announcement:

- Draft offer document within 14 days from the date of PA along with filing fees of Rs 50,000.
- Merchant banker has to submit a due diligence certificate.

10. Offer document:

The acquirer through his MB sends the OD and blank acceptance form within 45 days from the date of PA to all the shareholders. The offer remains open for 30 days. The shareholders send their share certificates to the registrar/merchant banker. If accepted, shareholders are to be paid within 30 days.

11. Information to be furnished to stock exchanges

Details of the proposed acquisition should be filed with the SE where the shares of the company are listed at least 4 working days before the date of actual acquisition/allotment.

In case of public offers, the copy of the same is to be given to the stock exchange 2 days in advance of its issue. Subsequently, upward revision of the offer/withdrawal has also to be intimated simultaneously.

12. Violation of provision of the regulations by acquirer/MB/target company

Suitable penalty/cancellation of registration/prosecution.

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EXERCISE

1. Refer to the following data: Beta = 1.40, market premium = 10 percent, Long-term T-bond rate = 12 percent. Pre-tax cost of debt = 13.5 percent, Tax rate = 35 percent, Target debt-to-value ratio = 0.45. The working results for the past three years are given here:

	(Rs crore)		
	1995	1996	1997
Sales	9.0	9.9	11.0
EBIT	4.5	4.95	5.5
Depreciation	0.72	0.72	0.72

The company has made capital expenditure of 0.72 crore each year in the last three years. It is expected to grow at 10 percent for the next three years and drop to 5 percent thereafter in line with growth in sales. Working capital is expected to be 15 percent of the sales. Additional depreciation for the next three years on the new equipment will be provided on straightline basis. Free cash flows are expected to grow at 5.5 percent in perpetuity after three years. Determine the value of the company.

2. The adjusted present value approach and the WACC approach should yield the same results. Can you think of a situation when they diverge?

For the illustration (Clariant) given in the chapter, conduct a sensitivity analysis for the following factors:

- Discount rate
- Sales
- Growth rate in sales
- Investment in working capital and capital expenditure
- Terminal growth rate.

Draw suitable graphs.

3. Write essays on the following topics:

- Role of top management in acquisitions
- Post merger integration
- Non synergistic acquisitions
- Post-acquisition performance appraisal.

4. The executives of Babur Chemicals are evaluating a potential acquisition candidate: Arathi Chemicals. The forecast of free cash flow under the current management is as follows:

	0	1	2	3	4	5	6
Revenues	455	551	800	1080	1195	1255	
COGS	341.3	414.9	596	811.10	893.9	941.3	
SGA exp.	110.4	130	219.2	251.6	280.3	287.4	
NOPAT							
+ Depreciation	19	21	21	46.3	48.1	50	
– Capex	100	8.1	9.5	13	16	16.3	17
– Working Capital	25	4.1	5.5	6.0	7.1	8	9.7
Free cash flow							

Cash flows are expected to grow at 6.5 percent after year 6.

The executives of Babur believe that NOPAT margin can be improved by 8 percent and working capital investment can be cut by 20 percent. Arathi Chemicals has a strong marketing network which could be used to sell Babur's existing products. The arrangement is likely to generate savings of Rs 10 lac per annum for 8 years.

	<i>(in percent)</i>	
	<i>for Babur</i>	<i>for Arathi</i>
Cost of equity	20	22
Tax rate	35	35
Cost of debt	12.5	13.5
Target D/V	30	20

- Estimate the value of Arathi under the current management.
 - Estimate the value of Arathi for Babur.
 - Can Babur's cost of capital be used to discount cash flows of Arathi? If yes, when? If not, why not?
 - Babur intends to increase debt by Rs 25 lac. What is the value of interest tax shields to Babur? Assume that debt is permanent.
 - Conduct a sensitivity analysis.
5. ABC Ltd. is considering the acquisition of XYZ Ltd. The management of ABC believes that cost of goods sold could be reduced by 1.5 percent over the next 3 years (due to purchasing economies) and administrative expenses could be brought down by 3 percent. The forecast of income statement of XYZ under ABC is as follows:

	<i>(in Rs)</i>		
<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>
Sales	60,000	63,000	66,000
COGS	30,000	31,000	33,000
Depreciation	4,000	4,200	4,300
SGA	21,000	22,000	22,500

Assume that cash flow increases at 7 percent after year 3.

ABC needs to incur expenditure on fixed assets and working capital to make operational improvements to XYZ, the details of which is as follows:

	<i>(in Rs)</i>		
<i>Year</i>	<i>1</i>	<i>2</i>	<i>3</i>
Capex	4,900	5,100	5,300
WC	(510)	(540)	(550)

At a discount rate of 13 percent what is the maximum price that ABC should pay?

Chapter 34

A Case Study: The Merger of ICICI Bank and Bank of Madura

OBJECTIVES

- ◆ Record a recent well-publicized merger.
- ◆ Provide an overview of the banking sector in India.
- ◆ Highlight the application of theory in a real-life setting.
- ◆ Highlight the issues surrounding the choice between cash and stock offers.

The boards of ICICI Bank and Bank of Madura met on December 11, 2000, at Mumbai and Chennai respectively and separately approved the merger of the two banks. The scheme of amalgamation envisaged a share exchange ratio of two shares of ICICI Bank for every one share of Bank of Madura (2:1). The swap ratio approved by the respective boards was based on recommendations made by M/s. Deloitte, Haskins & Sells, which acted as an independent valuer to the transaction.

The scheme of amalgamation was placed for approval at the meetings of shareholders of the two banks on January 19, 2001 and was subject to approval of the Reserve Bank of India. The appointed date of the merger was proposed to be February 1, 2001.

Commenting on the news, H. N. Sinor, Managing Director and CEO of ICICI Bank, said:

‘This merger is full of possibilities. The large customer base, geographical reach and infrastructure managed by trained personnel will help us accelerate our growth plans.’

Dr. K. M. Thiagarajan, Chairman of Bank of Madura, said: ‘The merger with a new private sector bank, particularly a financially and technologically strong bank like ICICI Bank, should add to shareholder value and enhance career opportunities for our employees besides providing first rate, technology-based modern banking services to customers.’

ICICI BANK LIMITED

ICICI Bank is a commercial banking outfit set up by the Industrial Credit and Investment Corporation of India. The bank was registered as a banking company on January 5, 1994 and received its banking license

from the Reserve Bank of India on May 17, 1994. It is the first Indian bank to be listed on the New York Stock Exchange (NYSE). The first ICICI Bank branch was started in Chennai in June 1994. As of March 31, 1999, 64 branches were functional across the country. The branches are fully computerized with state-of-the-art technology and systems. All of them are fully networked through VSAT (Satellite) technology. The bank is connected to the international SWIFT network since March 1995. ICICI Bank's *Infinity* was the first Internet banking service in the country, and a prelude to banking in the next millennium.

For the year ended March 2000, the bank had total assets of Rs 12,072.60 crore. While deposits and advances stood at Rs 9,866.02 crore and Rs 5,030.96 crore respectively, the bank's capital adequacy ratio (CAR) stood at 19.6 percent. The net interest income (NII) stood at Rs 185.92 crore and profit after tax (PAT) was Rs 105.30 crore. The net non-performing assets (NPA) ratio was 1.1 percent. Of the bank's current equity base of Rs 196.82 crore, 62.2 percent was held by parent ICICI Bank, 16.2 percent by its ADR holders, 6.9 percent by foreign institutional investors (FIIs), 4.7 percent by financial institutions (FIs), 1.4 percent by mutual funds and banks and the balance 8.6 percent by the public.

ICICI Bank has a network of 117 offices and 540 ATMs (automatic teller machines) in the country. The network of ATMs is the largest in the country consisting of branch, off-site and work-site ATMs. All offices and ATMs of the bank are networked, thereby exploring the branch concept and giving the customer the real benefits of anywhere banking, and work 24 hours a day, 365 days a year. The ATM is the bank's prime delivery channel. The network of 540 ATMs increased every day with a view to attaining a target of 1,000 ATMs in the country by 2001. The ATMs are mini-banks performing almost all retail banking functions automatically, round the clock. In addition to regular cash withdrawals, customers can make balance inquiries, deposit cheques and cash, obtain mini-account statements, collect product information, carry out transactions for multiple accounts, etc.

ICICI Bank, with its primary focus on retail banking believes in continuous product innovation. Products and services cater to the varying needs of an individual at different stages in his life. ICICI Bank calls this 'Lifestyle Segmentation'. The Bank has *Kid-e-Bank*, an Internet-based bank account for children aged 5 to 12 years; *Bank@Campus* caters to the banking requirements of students; and *Power Pay*, a multi-benefit salary account package for the corporate employee. ICICI Bank also has *I-Select* for its high net worth clientele and Non-Resident Indians (NRI) Services and overseas remittance facilities for NRIs; along with very attractive interest rates on deposits for senior citizens.

BANK OF MADURA

Bank of Madura (BoM) was a profitable and well-capitalized private sector bank in operation for 57 years. BoM was one of the top 10 private sector banks in India, having a network of 261 branches spread all over the country covering most of the important business centers. Within the state of Tamil Nadu, Bank of Madura had a wide network covering all important centers. The bank had access to 12 lac customer accounts. With most of its branches located in the semi-urban and rural areas of Tamil Nadu, Bank of Madura was looked upon as an old and reliable semi-urban bank.

A vibrant bank from South India, BoM started in the year 1943 at the temple city, Madurai, with strong fundamentals that withstood the turmoil of the banking industry in India for the past 56 years. Bank of Madura had maintained its No.1 position among the private sector banks in Tamil Nadu. It had fostered an environment akin to new private sector banks with progressive employee base and technology driven operations in major branches.

Bank of Madura pioneered computerized banking at the national level in India in the year 1984. One hundred and twenty-seven branches representing more than 90 percent of the total business of BoM had

been upgraded with better infrastructure, interior decor, central air conditioning and 'Total Branch Automation'. Since the year 1998, five of its branches in Chennai had received ISO 9002 certification.

Recognition by Reserve Bank of India could be gauged from the fact that it was the only Indian private sector bank to get its approval for starting the Money Market Mutual Fund (MMMF) and Satellite Dealership for retail securities dealing. The company can advise and help customers not only in deposit transactions but also in parking their short-term funds in money market securities and also for disposal of debentures and other bearer securities.

For the full year ended March 2000, the total assets of the bank stood at Rs 4,443.70 crore, while deposits and advances stood at Rs 3,631.04 crore and Rs 2,072 crore respectively. The bank's CAR was 15.8 percent while NII stood at Rs 104.12 crore and PAT at Rs 45.58 crore. The net NPA ratio was higher at 4.7 percent. However, BoM's cost of deposits was the lowest among private sector banks at 7.3 percent.

Bank of Madura has an active division for marketing cash management products and was ranked the 3rd in the market. Cash management services of the bank were availed by most of the international banks operating in India, the new private sector banks, large institutions like Unit Trust of India, Life Insurance Corporation of India and many corporate bodies. All corporate office functions like fore, treasury, credit investments, personnel, merchant banking, recovery, inspection and NRI services were computerized. It also had in place an online, screen-based fore dealing room with Reuters 2000 at Chennai and Mumbai, for instant connection to the dealers all over the world resulting in very fine rates to the customers. A very strong treasury division contributed an important component of the Bank of Madura's income, forming part of the profits generated in trading in securities.

THE BANKING SECTOR IN INDIA

The banking system constitutes the core of the financial sector and plays a critical role in transmitting monetary policy impulses to the entire economic system. Banking is probably one of the oldest industries we know of in India, having always revolved around the traditional function of credit and deposits. Its role has been defined to assist the overall economic growth with a major share of control in most Indian banks being with the government.

However, with the process of liberalization, the banking industry has also undergone tremendous change in the last five years. The industry, which was largely controlled by public sector banks, has now been facing stiff competition not only from foreign players but also from new generation private sector banks. The rules of the game have also been changing with the new norms introduced by RBI to make banks more accountable and to adopt practices followed worldwide.

In the Indian context, the banking industry has undergone one more shift—in the basic objectives of bank management. Following the nationalization of most banks in the 1960s, the focus was on developmental banking and increasing the reach of the banks. With the financial sector reforms undertaken in the 1990s, the focus have now shifted to sound, viable and professional banking.

The industry now has some clearly distinguished segments—the public sector banks—which have a large reach and are now attempting to restructure; the private sector banks, domestic and foreign, which are trying to expand their base. There are, again, different sub-segments within the private sector, some trying to focus on particular niche markets.

The RBI normally classifies the scheduled commercial banking sector into three broad areas based on ownership patterns—the public sector banks (further classified into the State Bank Group and the nationalized banks), the private sector banks (further classified into old and new private sector banks) and the foreign banks.

The industry, especially the public sector and old private sector banks, has its own set of problems. While it has just attempted to attack one problem of excess manpower on a massive scale through implementation of voluntary retirement schemes (VRS), the other important problem of non-performing assets (NPA) still largely remains unsolved. The regulatory regime for banking is still evolving, though its direction is clear. The objective of this regime is to make the banks prudent in their approach to manage risks. The implementation of asset liability management (ALM) is one of these.

Most of the banks have now been trying to function on the concept of a universal bank. Apart from the traditional functions of a commercial bank, they are taking steps to build themselves into a one-stop financial center wherein all financial products would be available. Banks have started catering to the retail segment to improve their deposit portfolios. In order to have a maximum share in this segment, most of the banks have been introducing new products at a rapid pace. The channels of service delivery have also been shifted from traditional branches to ATMs, and banking via the phone, Internet, etc.

Technology has become an important medium of not only attracting new customers, but also retaining them. The new generation private sector banks have made a strong presence in the most lucrative business areas in the country because of their technology upgradation. While their operating expenses have been falling as compared to public sector banks, their efficiency ratios, such as employees' productivity and profitability ratios have also improved significantly. The technology drive has benefited the customers in terms of faster, improved and convenient banking services and a variety of financial products to suit their requirements. ATMs, phone banking, Internet banking, anywhere banking, etc., are some of the services the banks have started to offer. In the plastic money segment, customers have also got a new option of debit cards as against the previously popular credit cards.

The Government is planning to bring down its stake in the public sector banks from 51 percent to 33 percent. This move will help these banks raise further capital to adhere to the CAR requirements and will also help in changing customers' perception of them vis-à-vis the private sector banks. Moreover, public sector banks are embarking on a major branch rationalization exercise, which will see several branches and extension counters being either shut down or merged. They are also planning to prune the number of administrative offices through rationalization measures.

The Verma Committee appointed to suggest a restructuring plan of weak banks expressed mergers as a possible solution for revamping weak banks. In the 1980s and the 1990s, mergers were used as a means to strengthen the banking sector. Small, weak and inefficient non-scheduled banks were merged with scheduled banks when the running of the former became non-viable. However, today, mergers are driven with the motive to establish a bigger market share in the industry and to improve profitability.

The merger of HDFC Bank with Times Bank was the signal for a new wave of consolidation in the Indian banking sector. The State Bank of India has planned to merge seven of its associates as a part of its long-term policies to group and consolidate its position. Some of the Indian financial sector players are already on their way for mergers to strengthen their base.

BENEFITS OF THE MERGER

From ICICI Bank's perspective, Bank of Madura was an attractive merger partner for several reasons. It had a recognized brand name and was trusted and stable. It had a strong retail business and was also the only private bank to operate an MMMF. Furthermore, it had a wise presence all over the country with over 260 branches. The merger would enable ICICI Bank to expand its reach into the semi-urban and rural areas as well as gain a foothold in the retail and SME (small and medium enterprise) businesses, which were less risky than the corporate (wholesale) business ICICI Bank had traditionally been operating in.

A merger of ICICI Bank and Bank of Madura would also create significant expense reduction opportunities. Both banks operated in a number of common businesses and maintained technologically sophisticated back-office operations. To achieve these cost savings, it would be necessary to close down overlapping branches and lay off the excess employees. Nevertheless, Sinor assured that this would not happen.

Beyond anticipated cost savings, the merger would also produce a much larger bank, and therefore allow shareholders to realize potential benefits of increased scale and scope that Sinor envisioned. The merged bank would be the largest private sector bank in the country with a balance sheet size in excess of Rs 60,000 crore.

Sinor's goal was to cross-sell the ICICI Group products, such as mutual fund units, insurance, credit cards, personal loans, etc., to BoM's customer base of 12 lac. This, along with the benefits of increased size, he believes, would eventually translate into higher revenues, especially in the bank's operating services, fee-based income and retail operations. Over the short-term, however, management recognized that the merger would place some stress on the banks' combined earnings. Revenues would decline to some extent due to overlap of the banks' businesses and client bases in some areas, such as deposits and middle and corporate lending. Revenue could also be affected by disruptions that would occur as the banks undertook to integrate their computer networks, temporarily inconveniencing customers.

Consolidation, cross-selling of products and increasing non-interest income was the current trend in the banking sector. Considerable synergies were expected to accrue from the merger of the two banks as they brought together complimentary business strengths that would enhance the product portfolio, the distribution network and brand image. It would have taken ICICI Bank more than three to four years to increase its branch network by 260 branches and also gain the customer base of 1.2 million. Achieving this would have entailed expenditure, which would have been greater than what the present merger had cost.

The merged entity would have 26 lac customer accounts and an extensive network of about 350 branches spread across India, providing a critical mass in the intensely competitive banking arena. The expanded customer base and distribution network of the merged entity would provide considerable cross-selling opportunities, enhancing the universal banking strategy of ICICI Bank. The enlarged distribution network also offers scope to enhance fee income, particularly in core areas like cash management services (a traditional strongpoint for both the banks) and payment and collection services.

The CAR was roughly above the stipulated 10 percent level at 12–13 percent. The investment income for the combined firm was estimated to be 52 percent of total revenues (as compared to 80 percent for ICICI Bank pre-merger), exposure to equity markets through direct investment just 1.8 percent while the contribution of retail deposits increased to 61 percent. ICICI Bank's total profits were expected to grow by about 90 percent. All in all, Bank of Madura was expected to contribute to about 25 percent of ICICI Bank's profits. A common consultant was to be appointed for completing the process of integration of all Bank of Madura employees and this exercise was to be completed in the next 9–12 month's time. Exhibits 34.1–34.3 present selected financial data for ICICI Bank and Bank of Madura, as well as the proforma financial statements for the combined entity. Given below are some financial and non-financial details of the two banks.

<i>Particulars</i>	<i>ICICI Bank</i>	<i>BoM</i>
No. of employees	1344	2622
No. of branches	88	263
Business per employee (Rs crore)	5.95	2.02
Business per branch (Rs crore)	183.91	19.05
Percent of computerized branches	100	43
Business per computerized branch (Rs crore)	183.91	35.31
NPA (percentage of advances)	1.14	4.7

Size	Acquirer (ICICI Bank)	Target (Bank of Madura)
Assets (Rs crore)	12,063	3,988
Deposits (Rs crore)	9,728	3,395
Equity (book)	62	206
Equity (market)	151	66
Market valuation		
Price/Earnings	23.81	1.6
Price/Book value	2.44	0.32
Profitability		
Net profit	105.5	45.58
Capital adequacy	17.6	15.8

Exhibit 34.1 Financials for the half-year ended september 2000

(Rs crore)

(Annualized on the current equity)	Pre-merger		Post-merger
	ICICI Bank	Bank of Madura	ICICI Bank
Interest income	570.90	201.51	772.41
Interest expenses	389.55	134.50	524.05
Net interest	181.35	67.01	248.36
Other income	65.35	45.31	110.66
Net total income	246.70	112.32	359.02
Operating expenses	126.29	60.50	186.79
Operating profit	120.41	51.82	172.23
Provisions (incl. tax)	50.21	25.58	75.79
Net profit	70.20	26.24	96.44
Equity	196.82	11.77	220.36
Deposits	9,728.27	3,394.84	13,123.11
Advances	6,324.27	2,210.00	8,534.20
Total assets	12,062.90	3,988.50	16,051.40
EPS	6.68	43.17	8.80
Shares outstanding (Nos. in crores)	196,818,880.00	11,769,900.00	220,358,680.00
P/E multiple	25.44	3.05	11.00

Exhibit 34.2 Profit and loss account for the year ended March 31, 2000

(Rs crore)

	ICICI Bank	Bank of Madura
Income	1,048.09	453.35
Interest received	443.15	224.07
On advances	347.91	185.06
On deposits with RBI	94.61	38.99
On others	0.63	0.02
Dividend earned	409.71	146.14
Security transactions	101.14	26.64
Leasing & hire services	4.63	18.68
Bill discounting	—	—
Exchange transactions	22.39	3.62
Commission & brokerage	67.07	34.20
Others	—	—
Other income	—	15.55
Non-recurring income	—	0.04

Exhibit 34.2 contd.

Exhibit 34.2 contd.

	ICICI Bank	Bank of Madura
<i>Less: Expenditure</i>		
Interest expended	666.94	266.09
Lease rent	—	—
Other rent	18.01	6.83
Interest tax	6.00	3.20
Personnel cost	36.37	62.78
Prov. for contingencies, NPA, etc.	75.50	32.67
Other operating expenses	3.82	1.42
Other expenses	70.45	18.57
Non-recurring expenses	12.84	—
PBDT	158.16	77.38
Depreciation	25.84	17.80
Leased depreciation	3.21	10.69
PBT	132.32	59.58
Tax provision	27.02	14.00
Corporate tax	26.60	14.00
Other direct taxes	0.42	—
PAT	105.30	45.58
<i>Appropriation of profit</i>		
Dividends	24.75	6.47
Dividend Tax	2.72	1.43
<i>Retained earnings</i>	77.83	37.68

Key Financials—ICICI

<i>Year end</i>	<i>Mar 2002</i>	<i>Mar 2001</i>	<i>Mar 2000</i>	<i>Mar 1999</i>	<i>Mar 1998</i>
Net sales	2756.95	1469.09	1047.06	633.19	344.79
Operating profit	1817.22	998.77	772.25	488.88	236.90
Net profit	258.30	161.10	105.30	63.36	50.22
Equity cap pd	220.36	196.82	196.82	165.00	165.00
NOPAT	1650.17	757.82	637.75	352.14	183.16
Operating cash flow	2241.20	-394.02	1091.57	662.90	568.37
Free cash flow	2362.74	-288.01	1169.69	728.57	689.35
EPS (Rs)	11.52	7.96	5.21	3.72	2.95
Book value (Rs)	265.74	65.50	58.40	18.69	16.17
CEPS (Rs)	14.43	9.82	6.47	4.78	3.82
ROE (percent)	7.23	13.21	14.45	22.04	22.39
P/E	10.76	20.78	49.90	7.37	15.53
P/BV	0.47	2.53	4.45	1.47	2.83
P/CEPS	8.60	16.84	40.18	5.73	11.98
EV/EBIDTA	1.50	3.26	6.63	0.92	3.19
Market cap/sales	0.99	2.22	4.89	0.71	2.19
PBIDT/Sales (percent)	65.91	67.99	73.75	77.21	68.71
Sales/Net assets	0.07	0.17	0.23	0.21	0.29
PBIDT/Net assets (percent)	0.05	0.12	0.17	0.16	0.20
PAT/PBIDT (percent)	14.21	16.13	13.64	12.96	21.20
Net assets/Net worth	6.85	6.65	4.04	9.93	4.53
ROE (percent)	7.23	13.21	14.45	22.04	22.39

Exhibit 34.2 contd.

Exhibit 34.2 contd.

Bank of Madura Ltd (Merged)*(Rs crore)*

<i>Year end</i>	<i>Mar 2000</i>	<i>Mar 1999</i>	<i>Mar 1998</i>	<i>Mar 1997</i>
Net sales	468.93	421.79	370.14	299.92
Operating profit	311.67	285.29	234.64	195.04
Net profit	45.58	30.13	34.19	25.77
Equity cap pd	11.77	11.77	11.77	11.61
NOPAT	311.67	285.29	234.64	195.04
Operating cash flow	-38.81	-33.13	719.27	158.06
Free cash flow	-10.50	-16.18	794.78	221.83
EPS (Rs)	37.51	25.10	28.55	22.20
Book value (Rs)	183.27	179.55	130.15	106.58
CEPS (Rs)	52.63	51.10	49.97	40.00
ROE (percent)	21.35	16.53	24.69	22.83
P/E	2.69	2.31	2.73	3.91
P/BV	0.55	0.32	0.60	0.81
P/CEPS	1.92	1.14	1.56	2.17
EV/EBIDTA	0.38	0.24	0.39	0.52
Market cap/sales	0.25	0.16	0.25	0.34
PBIDT/Sales (percent)	66.46	67.64	63.39	65.03
Sales/Net assets	0.25	0.32	0.32	0.40
PBIDT/Net assets (percent)	0.16	0.22	0.20	0.26
PAT/PBIDT (percent)	14.62	10.56	14.57	13.21
Net assets/Net worth	8.77	6.22	7.58	6.07
ROE (percent)	21.35	16.53	24.69	22.83

Exhibit 34.3 Balance sheet as on March 31, 2000

<i>Assets</i> <i>(Rs crore)</i>	<i>ICICI Bank</i>	<i>Bank of</i> <i>Madura</i>	<i>Liabilities</i> <i>(Rs crore)</i>	<i>ICICI Bank</i>	<i>Bank of</i> <i>Madura</i>
Cash and bank balance	3,415.16	763.32	Capital	196.82	11.77
Cash in hand	31.45	31.71	Equity capital	196.82	11.77
Bank balance	1,131.55	267.43	Bonus equity capital	—	4.71
Balance outside India	1,561.73	39.78	Reserve funds & surplus	952.69	236.06
Balance with RBI	690.43	424.40	Share premium reserves	769.03	35.51
Investments	4,416.68	1,712.89	Statutory reserves	103.86	109.98
Advances & loans	3,657.34	1,665.43	Other specific reserves	79.66	33.75
Secured advances	2,904.30	1,116.87	Revaluation reserves	—	32.13
Unsecured advances	753.04	548.56	Revenue reserves	0.14	56.82
Advances to priority sector	497.37	481.77	Deposits	9,866.01	3,631.04
Advances to public sector	104.47	21.78	Demand deposits	1,587.47	800.03
Other assets			Saving deposits	533.26	505.82
Stock in trade	0.10	0.62	Term deposits	7,745.28	2,325.19
Stock others	0.10	0.62	Demand deposits from banks	85.45	35.92
Receivables	336.44	122.73	Term deposits from banks	1,553.57	268.34
Accrued income	114.74	74.39	Borrowings	659.46	183.56
Inter office adjustments	4.86	—	RBI	218.66	—
Advance payment of tax	36.76	27.65	Banks	192.18	0.16
Other receivables	180.08	20.69			

Exhibit 34.3 contd.

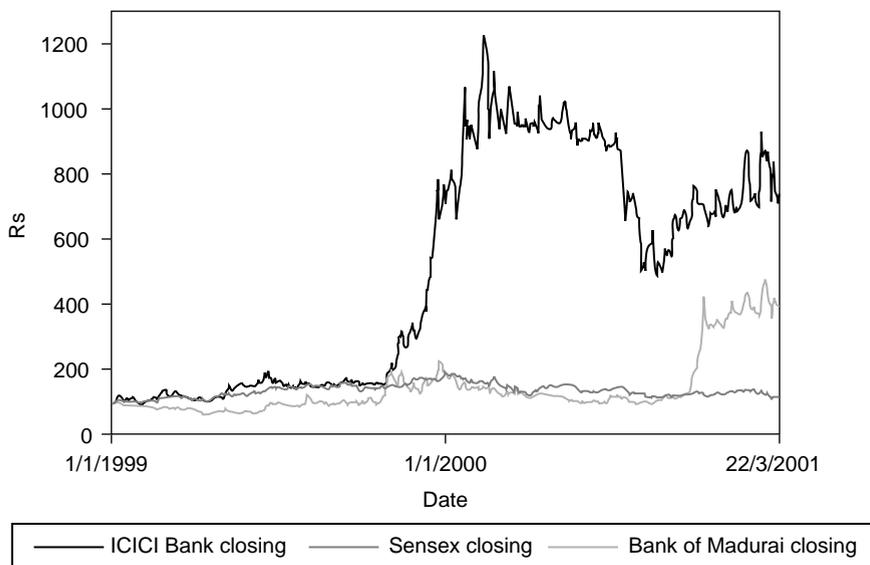
Exhibit 34.3 contd.

Assets (Rs crore)	ICICI Bank	Bank of Madura	Liabilities (Rs crore)	ICICI Bank	Bank of Madura
Gross fixed assets	320.32	259.78	Financial institutions	80.62	163.42
Less: depreciation	93.02	81.08	Foreign institutions	—	19.98
Net fixed assets	227.30	178.70	Debentures & bonds	168.00	—
Land & building	144.74	77.48	Other liabilities & provisions	397.64	381.26
Revalued assets	—	32.13	Bills payable	142.20	159.15
Leased assets	58.16	138.94	Inter office adjustment	—	115.88
Intangible assets/expenses	19.60	—	Interest accrued and due	33.52	22.69
			Earmarked funds	—	—
Total assets	12,072.62	4,443.69	Others (incl. provisions)	221.92	83.54
			Total liabilities	12,072.62	4,443.69
			<i>Contingent liabilities</i>		
			<i>Bills for collection</i>	—	281.12
			<i>Endorsement obligation</i>	848.96	118.17

MARKET REACTION TO THE MERGER

Shares of the two banks showed a mixed trend in the late morning trade on the day of announcement of the merger, i.e., December 11, 2000. Shares of ICICI Bank on the BSE (Bombay Stock Exchange) moved up from Rs 109 in end-October 2000, to Rs 183 on the day of the announcement, but subsequently, they dipped by 2.67 percent over the previous close to end the day at Rs 165.30. Since then, the scrip continued to go down gradually on apprehensions of a relatively higher NPA and the large employee base of Bank of Madura. Against this, Bank of Madura's shares, which used to be traded in the Rs 70–85 range in November 2000, had been hitting the 8 percent circuit limit everyday. (This means that if a stock's price increases over 8 percent, all trading will temporarily stop until the number of sellers matches the number of buyers). Exhibit 32.4 shows the stock price movements of both the banks over a four-month period.

Exhibit 34.4 Share price movements of ICICI Bank and Bank of Madura



ESTIMATING THE EXCHANGE RATIO

The acquirer can pay the target company in cash or exchange shares in consideration. The analysis of acquisition for shares is slightly different. The steps involved in the analysis are:

- Estimate the value of acquirer's (self) equity.
- Estimate the value of target company's equity.
- Calculate the maximum number of shares that can be exchanged with the target company's shares.
- Conduct the analysis for pessimistic and optimistic scenarios.

Exchange ratio is the number of acquiring firm's shares exchanged for each share of the selling firm's stock. Suppose company A is trying to acquire 100,000 shares of company B, at Rs 230 each. So the cost of acquisition is Rs 2.3 crore. Company A has estimated its value at Rs 200 per share. To get 1 share of company B, A has to exchange $(230/200 =) 1.15$ share, or 115,000 shares for 100,000 shares of B. The relative merits of acquisition for cash or shares should be analyzed after giving due consideration to the impact on EPS, capital structure, etc. Consider two hypothetical situations—one in which the target is trading at a P/E multiple of 20 and the other in which the target is trading at a P/E multiple of 15. The acquiring company's stock is trading at a P/E of 18. The summary statistics are as follows:

	Before acquisition		
	Acquirer	Target	
		A	B
EPS	2.50	5.0	5.0
MPS (Rs)	45	100	75
P/E	18	20	15
Earnings	25	10	10

Situation 1: The Acquirer Pays 22.5 Times the Earnings (Current P/E)

Suppose the target is acquired under the first situation at a P/E of 22.5. That is, the negotiated price is 22.5 crore, or 12.5 percent premium over current P/E.

$$\begin{aligned} \text{The acquirer issues } & 22.5 \text{ crore}/45 = 50 \text{ lac shares.} \\ \text{Company B's EPS} & = 1 \text{ crore}/50 \text{ lac} = \text{Rs } 2 \text{ per share} \\ \text{EPS of composite operations} & = \text{Composite earnings}/ \\ & \quad [\text{Acquirer's shares} + \text{New shares issued to A}] \\ & = [2.5 \text{ crore} + 1 \text{ crore}]/[10+5] = \text{Rs } 2.33 \end{aligned}$$

$$\text{Dilution of EPS for shareholders of acquirer} = 2.5 - 2.33 = \text{Re } 0.17$$

Situation 2: The Acquirer Pays 15 Times the Earnings (Current P/E)

The acquirer pays Rs 15 crore or 15 times the earnings.

$$\text{That is, the acquirer issues } (150/45) = 33.33 \text{ lac shares.}$$

EPS of target = 1 crore/33.3 = Rs 3/share
 Composite EPS = 35 million/13.333 million = Rs 2.62
 Gain to shareholders of acquirer = Re 0.12

The summary statistics are as follows:

	<i>After acquisition</i>	
	A	B
Acquirer pays	22.50 times earnings	15 times earnings
Composite EPS	2.33	2.62
Gain/loss	(0.17)	0.12

The important point emerging from the analysis is that dilution occurs if the increase in number of shares is proportionally greater than the annual increase in earnings. In the first case, the acquiring company's P/E multiple should increase to 19.3 to sustain its current market price. In the second case, the P/E multiple can come down to 17 without affecting the current price of acquirer. Here's a quick and dirty method to find out if dilution will occur: If the acquiring company's stock price is greater than or equal to the price attached to the target company, dilution will not occur.

The post merger P/E multiple for the combined firm is the weighted average of the pre-merger ratios.

$$P/E_{(A+B)} = \frac{N_A P_A + N_B P_B + \Delta V}{N_A EPS_A + N_B EPS_B}$$

where

$N_{A,B}$ = no. of shares of acquiring, selling firms resp.,
 $P_{A,B}$ = stock price of acquiring and selling firms resp.,
 EPS_A and EPS_B are their earnings per share, and
 ΔV is the increase in the value of firm's equity after the merger.

Maximum Exchange Ratio for the Acquiring Firm

The post-merger price of the acquiring company's stock should be at least as high as the pre-merger price to maintain the wealth position, i.e., $P_{A+B} \geq P_A$.

But (P_{A+B}) is the total value of merged firm's equity divided by number of shares outstanding.

$$P_{(A+B)} = \frac{N_A P_A + N_B P_B + \Delta V}{N_A + r.N_B}$$

where r is the exchange ratio (B's shares for A's shares).

$$\frac{N_A P_A + N_B P_B + \Delta V}{N_A + r.N_B} \geq P_A$$

Solving for r

$$r \leq \frac{N_B P_B + \Delta V}{N_B N_A}$$

This is the maximum exchange ratio that can preserve wealth. As is evident, r is a function of increase in the value of the firm's equity after the merger.

If $\Delta V = 0$,

$$r \leq \frac{N_B P_B}{N_B P_B}$$

That is,

$$r \leq P_B/P_A.$$

The exchange ratio can also be expressed as:

$$r_{\max} \leq \frac{P/E_{(A+B)}(N_A EPS_A + N_B EPS_B) - N_A P_A}{N_A P_A}$$

Maximum exchange ratio is a function of the price-earnings multiple expected to prevail soon after the merger.

Minimum Exchange Ratio for the Selling Firm

From the selling firms' shareholders perspective, the price of the shares sold should equal the price of the shares received for their wealth position to be maintained.

That is

$$r \cdot P_{(A+B)} \geq P_B$$

Wealth after merger = wealth before merger

$$\begin{aligned} r_{\min} &\geq \frac{N_A P_A}{N_A P_A + \Delta V} \\ &\geq \frac{N_A P_A}{P/E_{(A+B)}(N_A EPS_A + N_B EPS_B) - N_B P_B} \end{aligned}$$

Value will decline for stockholders of the selling firms, if a lower exchange ratio is accepted.

With a swap ratio of 2:1, the post-merger equity of ICICI Bank would be approximately Rs 220.36 crore. ICICI Bank issued 235.4 lac shares to the shareholders of Bank of Madura. One approach for picking an exchange ratio is to recognize that the market value of the combined entity is equal to the sum of:

- The stand-alone value of acquirer
- The stand-alone value of target
- The value of the net merger benefits

In general, the exchange ratio is the product of negotiation between the merging banks. The healthier and better capitalized bank or the bank that made the greater contribution to the merger contribution would be negotiating from a position of greater strength. The exchange ratio determines how the shareholders of the merging companies share the net merger benefits. One response is that shareholders' entitlement to these benefits depends on how much of the merger benefits they have helped create. The exchange ratio, therefore, reflects a number of considerations like size, asset quality, contribution to cost savings and revenue enhancement, etc. So it is logical to argue that the exchange ratio should be based on the relative size and profitability of the merging companies. One could calculate exchange ratio on the basis of a number of financial parameters (like the ones listed here) to calculate the exchange ratio.

<i>Acquirer</i>	<i>Target</i>
Size	
Assets	
Equity (book)	
Equity (market)	
Market valuation	
Price/Earnings	
Price/Sales	
Price/Book Value	
Profitability	
ROA (percent)	
ROE (percent)	
Capitalization	
Equity/Assets (percent)	

Often the exchange ratio is set equal to the ratio of merging firms' stock prices. When the merger is consummated, the market value of all outstanding target company shares (which are extinguished under merger) by definition must equal the market value of the new company shares given to target company shareholders in the exchange.

$$P_{\text{target}} \times N_{\text{target}} = P_{\text{acquirer}} \times \Delta N_{\text{acquirer}}$$

Rearranging,

$$\Delta N_{\text{acq}} / N_{\text{target}} = \text{exchange ratio} = P_{\text{target}} / P_{\text{acq}}$$

The average of 3-month, 6-month or 12-month stock prices might be used.

Setting the exchange ratio is not a mechanical exercise; the ratio could have a significant impact on whether the projected merger benefits are realized. Why? The ratio can have behavioral implications, in the sense that the ratio can have demoralizing effect on senior management of the two companies making post-merger integration more difficult.

One can also estimate the merger synergies independently and assume an exchange ratio and estimate the premium over pre-merger value of the company. The exercise might be conducted for a range of exchange ratios.

Insider Trading in Mergers

Insider trading is the buying or selling of securities based on the access to confidential or proprietary information which is not available to the general public. An insider is one who is restricted from some kind

of trading in a company's stock because s/he has access to privileged information. Insider trading has been a controversial issue all over the world and is closely watched by regulators.

The Bank of Madura and ICICI Bank merger was preceded by some interesting trading patterns that suggested the possibility of informed trading.

Reportedly, the Securities Exchange Board of India verified whether there was any instance of informed buying of Bank of Madura shares, just prior to the announcement of its merger with ICICI Bank on December 11, 2000.

In order to facilitate this verification, SEBI asked the BSE and the National Stock Exchange to furnish details on trading patterns in both the scripts. SEBI investigation has revealed that a big trader bought more than 5 lac BoM shares—of a total 5.9 lac shares traded on the BSE—on December 6, 2000. On this day, on the BSE, 5.9 lac shares were traded in just 67 trades at an average price of Rs 98.18 each. The average volume per trade was 8,775 shares against the normal volume of 100 per trade. The volume traded on that single day by a few traders is 6.50 times more than the entire volume of trading in the BoM's share on the BSE, over the last five months. On December 5 the volume in the scrip was a mere 150 shares. On December 8, the two banks announced their intention to consider a merger. The following is a SEBI report that appeared in a newspaper:

*SEBI Report On BoM Finds Muthiah Negotiated Deal With B Arun Kumar
Muthiah denies having authorised Ramesh Gelli to sell Bank of Madura shares*

Yagnesh Kansara

Mumbai, March 22, 2001: Securities and Exchange Board of India's (Sebi) investigation report on trading in Bank of Madura (BoM) shares prior to its merger with ICICI Bank has found a negotiated deal between Mr AC Muthiah of the SPIC group of companies, and B Arun Kumar Capital and Credit Services Private Limited (BACCL). Mr Muthiah sold the shares to BACCL and LKP Shares and Securities was the broker in the deal. Sebi had ordered the stock exchanges to annul the transaction last week. Sebi had initiated investigations into the sudden spurt in the price and the trading volumes at the BoM counter after its merger was announced with ICICI Bank on December 11, 2000. Prior to the merger announcement, BoM was a very thinly traded stock.

The Sebi report, quoting Mr Muthiah's statement under oath, said he, along with his associates, was holding around 5 percent of the equity capital of BoM. Mr Muthiah had wanted to dispose of these shares as he was in need of liquidity. Accordingly, he had approached Mr Ramesh Gelli, the then chairman of Global Trust Bank, to find a prospective buyer. When contacted by The Financial Express, Mr Muthiah declined to comment on the issue.

The report also quotes Mr Gelli as saying he had contacted Mr Mahendra Doshi of LKP Shares and had asked him to look for a prospective buyer. Mr Gelli had made a statement under oath to Sebi that Mr Muthiah asked him to help him in disposing of the shares. However, Mr Gelli could not be reached for comment.

The report first says Mr Muthiah had stated that he was in need of money and had asked Mr Gelli to help him in disposing of the shares. In this connection, he had approached Mr Gelli around December 2, 2000. The report then points out that at another place, Mr Muthiah had said on December 4, 2000, Mr Doshi had informed his employee Mr Chokhu that as per instructions of Mr Gelli, he had found a customer who had offered to buy the shares at a price of Rs 83 per share. Since the market price was going up, a fax regarding sale of shares at Rs 97.56 a share was received from LKP Shares.

But the report then says Mr Muthiah emphatically said he had never dealt with Mr Doshi and never asked/authorised Mr Gelli to sell BoM shares. Mr Muthaiah had also contended that Mr Gelli had sold these shares without authorisation.

The report also discusses what it finds as some discrepancies in some of the statements. According to the report, BACCL had purchased 5,08,270 shares through LKP Shares at Rs 96.25 a share on December 6, 2000. It was a negotiated deal put through the trading system. The negotiation of this deal started around the end of November 2000 and the negotiation ended on December 4, 2000. Finally, on December 6, 2000, the deal was put through the trading system.

The Sebi report also says it is pertinent to note that though Mr Arun Mehta invested in shares of other companies during the period April 1, 2000 till December 31, 2000, he had not invested in the shares of BoM during this period. He had not invested in the shares of BoM before this transaction. It is pertinent to mention that Mr Gelli is known to Mr Mehta, adds the report.

The report also proposes to initiate enquiry proceedings against LKP Shares for abusing the trading system and violating Sebi (brokers and sub-broker) regulations and stock exchange guidelines. The report further proposes that the merging parties, ICICI Bank and BoM may be asked to get internally investigated whether there was breach of confidentiality clause by the valuers, lead managers, advisors, etc., and send a report on this to the market regulator for further necessary action.

Source: Financial Express, Saturday, March 23, 2002.

Chapter 35

Leveraged Recaps and Buyouts

OBJECTIVES

- ◆ Why do companies undertake high leverage transactions?
- ◆ What is the impact of high leverage on organizational performance?
- ◆ What are the sources of value and distress in high leverage transactions?
- ◆ How should HLTs (high leverage transactions) be evaluated?

Hindustan Lever Limited (HLL) is a subsidiary of Unilever (UK). In October 2001, the company announced a bonus debenture issue in the ratio of one bonus debenture for every share held. The debentures would be redeemed in 3 years and carry an interest of 9 percent per annum. The company has a rather high cash (and bank) balance(s) amounting to Rs 911.74 crore. So it was exploring ways of providing extra dividend to shareholders. Instead of distributing a special cash dividend or bonus shares, the company decided to issue bonus debentures with a face value of Rs 6. The proposed debentures will be redeemed in two equal installments in the second and third year. The debentures entail an initial outflow of Rs 1,320 crore. The company also declared that small debenture holders with less than 1,000 debentures would be eligible to tender their debentures to the company at any time on first-come first served basis for repurchase at par. This facility is available to a maximum limit of Rs 100 crore per annum. What HLL did is a leverage increasing transaction—a (variant of a typical) leveraged recapitalization. There are two types of leverage increasing transactions: recapitalization and buyout.

RECAPITALIZATION VERSUS BUYOUTS

Managers run modern corporations on behalf of shareholders. Managers in many large corporations do not own significant fraction of shares because of which they do not have the incentive to act in the interest of shareholders.¹ Further, large companies are typically owned by a large number of small investors who do not have the incentive to monitor managers' performance because of which managers may get away uncontested. Managers waste resources in the absence of a control mechanism (Jensen, 1986). Changes in

¹ In addition, the link between pay and performance is apparently weak in the US companies. See Jensen and Murphy (1990).

ownership through mergers and acquisitions generally lead to an increase in shareholder value. Many academic studies in America report increases in shareholder returns of target companies. Mergers and acquisitions enable transfer of assets to owners who value them most. In well planned acquisitions the gain is primarily due to better governance and improved efficiency. In a market-oriented economy like the US, capital markets discipline companies making value-destroying investments. The takeover wave of the 1980s in the US was largely due to deconglomeration. That is, companies sold off unrelated businesses and acquired related businesses. In the absence of an effective market for corporate control companies are not subject to the discipline of the stock market. Even when the market for corporate control is active, companies may still escape any disciplinary mechanism. Organizations, by nature, resist control systems and ineffective governance is a major part of the problem with many firms. General Motors, for example, one of the world's high cost producers in a market with substantial excess capacity, avoided making major changes in its strategy for over a decade.² Yet the board acted to remove the CEO, Robert Stempel, only in 1992, after the company had reported losses of \$6.5 billion (Rs 29,900 crore) in 1990 and 1991 and an opportunity loss of over \$100 billion (Rs 460,000 crore) in its R&D and capital expenditure program from 1980 to 1990. General Motors is not the only example. IBM, Eastman Kodak, Iridium have all changed strategy or CEO or filed for bankruptcy (as the case may be) only after experiencing severe losses. Another way to discipline inefficient managers is to force them to borrow. The burden of contractual payments on debt makes them work harder. It is difficult to convince managers that debt is something good and more debt is better.

Recaps and buyouts have been found to increase corporate focus and productivity, reduce wasteful use of free cash flow, and enhance the tax shield provided by the deductibility of interest payments and result in substantial increases in value. LBO specialists like Kohlberg, Kravis and Roberts raised large amounts of debt in the 1980s and 1990s to buy out inefficient conglomerates and split them up to unlock value.

By resorting to a recap HLL signaled its confidence in generating cash flows. The recap will have a favorable impact on net income, profit margin, return on equity and return on capital employed. The increase in leverage will put pressure on HLL's managers to improve efficiency and generate adequate cash flows required to service the debentures. Consequently the stock market reacted positively to the transaction.

In a recap, the firm pays out a large debt-financed dividend to the stockholders. The immediate result of such a payment is a steep decline in stock price and the stock following a recap is commonly known as a 'stub'. In a leveraged buyout (LBO), a group of investors use debt financing to purchase a company or a division. The erstwhile public company becomes a private company. Specialists like Kohlberg, Kravis, Roberts & Co. arrange buyouts. The LBO specialist arranges debt and equity financing. Buyouts are structured in such a way that management's equity interest increases substantially. The equity investors join the company's board and run the company along with the company's managers. The difference between a recap and a buyout is that the firm becomes privately held in case of an LBO, but remains public in case of a recap.

MECHANICS OF A RECAP

A leveraged recap entails payment of a large debt financed dividend to existing shareholders. The shareholders typically receive cash and paper (e.g., shares, subordinated notes). The recap is funded by bank loans,

² Jensen, M C (1993). 'The Modern Industrial Revolution, Exit and the Failure of Internal Control Systems', *Journal of Finance*, July.

subordinated debt and cash in hand. USG Corp., for example, exchanged each outstanding share of common stock for³ \$37 in cash, \$5 in stated face amount of 16 percent junior subordinated pay-in-kind debentures and one share in the newly recapitalized company.⁴ In 1989, Sealed Air Corp., a manufacturer of protective packaging materials and systems, borrowed over \$300 million and paid a \$328 special dividend (\$40 per share) to its shareholders.⁵ The recap increased the company's leverage from 13 percent to 135.8 percent of the total assets. Sealed Air Corp. was a profitable company facing internal stagnation and future decline—because the company had profitable patented products its managers had become complacent. The company's top management decided to shake the managers up through the company's capital structure. The capital structure was expected to influence and drive change. The special dividend was funded as follows:

Amount of dividend payout	=	\$328 million
Senior secured bank credit	=	\$136.7 million
12.625 percent, 10 year senior subordinated notes	=	\$170 million
Dividends from subsidiaries + cash balance + marketable investments	=	\$21.3 million

Due to the recap the accounting net worth decreased from \$162.3 million to a negative \$160.5 million. The financial statements of Sealed Air Corp. before and after the recap are as follows:

Balance sheet immediately following the dividend

	1988	1989
Cash	55.1	32.0
Other assets	202.2	202.2
Total	257.3	234.2
Other liabilities	61.5	61.5
Debt	33.5	340.2
Equity	162.3	(167.5)
Total	257.3	234.2

Notwithstanding investors' concern about the negative accounting net worth following a recap, stock markets react positively to recap announcements. One obvious source of value in case of a recap is the present value of tax shields generated by incremental debt. Performance improvements due to the burden of leverage are the second source.

At the time of the recap, shareholders should decide whether to accept the offer or not. In other words they must evaluate their net position after the recap and compare it with what they currently have. Assume that you have accepted an offer of recap in which you will receive Rs 35, a junior debenture and a share in exchange for each share held. Your position after the recap depends on the value of the stub and the junior debenture. Given the high leverage level after the recap we would expect the value of debentures to be highly uncertain. Assume that its value is equal to its face value. The value of the stub is estimated as follows:

³ The approximate values of \$1, \$1 million, and \$1 billion are Rs 46, Rs 4.6 crore, and Rs 4,600 crore respectively.

⁴ Pay-in-kind debentures are discussed later.

⁵ Wruck, Karen (1994–95).

- Forecast capital cash flows for the company.⁶
- Discount capital cash flows at pre-tax WACC.
- Estimate the terminal value assuming an appropriate growth rate and its present value using pre-tax WACC.
- The sum of these two components gives firm value.
- Deduct post-recap debt.

The result is the value of equity after the recap.
That is,

$$\text{Value of firm} - \text{Value of post-recap debt} = \text{Value of stub equity}$$

Dividing the value of equity by the total number of outstanding shares after the recap gives you the value of one share.

The sum of these components—cash, debenture and share—gives the total wealth. If the debenture has a face value of Rs 10, the value of stub estimated as above is Rs 7, the total worth of the deal = Rs (35+10+7) = Rs 52.

Though less accurate than the DCF methodology, one may also undertake a valuation analysis on the basis of comparable transactions. That is, apply average market/book ratio and price/earnings ratio of comparable firms to arrive at the post-recap value of the company. For example, if the average P/E ratio of comparable firms is 12 and the post-recap earnings per share, of the company in question, is Rs 2.50, the post-recap value of equity is Rs 30 (i.e., 12×2.50).

EMPIRICAL EVIDENCE ON RECAPS

Empirical studies of recaps have used the ‘event study’ methodology to detect abnormal returns to shareholders of firms undertaking recaps.⁷ The market reaction to the announcement decision provides an estimate of anticipated value gains assuming that markets are semi-strong efficient.⁸ Sealed Air Corp.’s stock, for example, out-performed the market by 10 percent over the three day period extending from two days before through the day of the announcement (–2 to 1). Many firms undertake a leveraged recap to fend off a takeover attempt. Owens-Corning, for example, announced a recapitalization when Wickes Corporation made a tender offer. So the results of some of these studies also reflect the anticipated value gains from takeover in addition

⁶ Capital cash flow valuation is discussed in the last section. $CCF = FCF + \text{Interest tax shields}$.

⁷ The actual description of the methodology is beyond the scope of this book. Event studies examine the abnormal returns to shareholders in the period surrounding the announcement of the transaction. The raw return for one day is simply the change in the share price and any dividends paid, divided by the closing share price the day before. The abnormal return is obtained by deducting a benchmark of what investors required that day (as estimated by CAPM or any benchmark index return, say S&P 500).

⁸ There are three forms of market efficiency. They are weak form, semi-strong form and strong form on the basis of whether the market prices reflect either publicly available or even privately available data. A market is considered semi-strong efficient if prices reflect all publicly available data.

to the recap. To isolate the impact of takeover announcement on stock price, academic studies have isolated firms that were targets of a takeover attempt from those that were not. These studies have also measured the long-run performance after the payout. The result of one such study (Palepu and Wruck, 1992) is as follows:

<i>Company</i>	<i>0 if takeover threat is absent 1 if takeover threat is present</i>	<i>Annualized post-payout return (percent)</i>	<i>Annualized S&P return (percent)</i>
Sealed Air Corp.	0	62.83	10.77
CUC International	0	39.47	7.58
Colt Industries	0	24.07	8.46
Interco	1	-63.11	13.85
Kroger	1	25.84	13.01
USG Corp.	1	-35.26	12.84

Academic studies of recaps in the US have also documented the accounting measures of operating performance after the recap. In the case of Sealed Air Corp., for example, sales grew by 31 percent; operating profit before depreciation improved by 70 percent after the payout, in line with the expectation that high leverage has a disciplining role. Another study finds that recaps reduce managerial discretion over cash flow and reduce excess investment in negative NPV projects. Some firms that undertake leveraged recapitalization encounter financial distress. Academic studies of causes of financial distress following recaps suggest that poor deal structure is not the primary cause of financial distress but a number of post recap legal and regulatory developments increased the incidence of distress. For example, many distressed firms had difficulty selling assets in the absence of which these firms would have no difficulty in servicing debt. Likewise, the market for junk bonds dried up making it difficult for these firms to finance their operations.⁹

LEVERAGED BUYOUTS

In a leveraged buyout, a group of investors use debt financing to purchase a company or a division. The erstwhile public company becomes a private company. Buyouts are arranged by specialists like Kohlberg, Kravis, Roberts & Co (KKR). The LBO specialist arranges debt and equity financing. The buyer can be the firm's management (in which case it is called management buyout) or another management team (in which case it is called a leveraged buyout). In case of a buyout, the company's management and investors (outside) provide equity whereas banks, mutual funds, investment banks, insurance companies and private equity funds provide debt. LBO funds generally do not concern themselves with the day to day running of the company. This is left to the managers of the company. Indeed, the successful funds are known for improving operations by providing autonomy to the company's managers. They, however, provide broad strategic direction because of their intricate knowledge of the business. Given here is a small list of LBO funds in the US, the amount of funds received by them, and the top 10 LBO transactions in 1989 (Piatkowski, 2001).

⁹ Junk bonds are non-investment grade bonds.

Investment in LBO funds in 1997	<i>(\$ billion)</i>
<i>LBO fund</i>	<i>Investment</i>
Kohlberg, Kravis, Roberts & Co.	5.8
Blackstone Group	3.8
Forstmann Little	3.2
Thomas H Lee Company	3.5
Hicks, Muse, Tate and Furst	3.5
Texas Pacific Group	2.5
Total	22.3
R J R Acquisition	23,350,000
N M Acquisition Corp	10,000,000
Cilva Holdings Corp	7,708,333
Black & Decker Corp	6,575,000
NWA Inc	6,450,000
Wings Acquisition	6,450,000
Metsun Ltd	6,340,580

The LBO market which emerged in the 1970s reached astonishing proportions of the total M&A activity in the US largely due to the availability of non-investment grade capital (through junk bonds) marketed by investment banks like Drexel Burnham Lambert (employer of the legendary Michael Milken). In the late 1980s, LBOs constituted almost 25 percent of all M&A activity in the US. The difference between a typical public company and an LBO firm is shown in Exhibit 35.1 (Jensen, 1989).

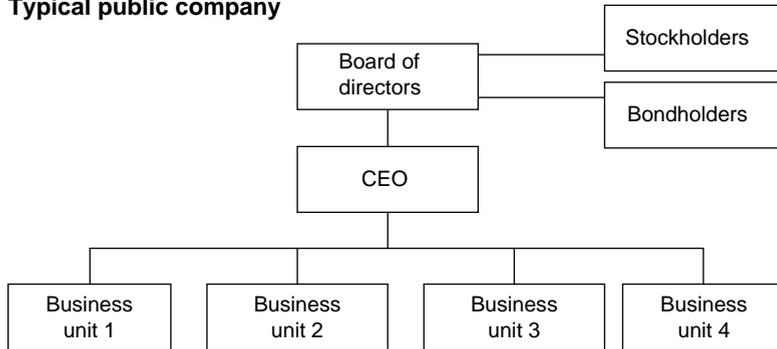
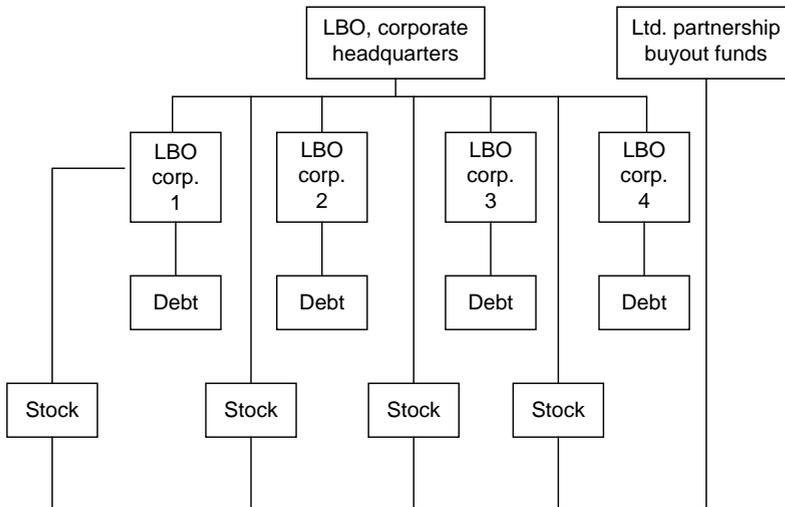
Executing an LBO involves the following steps:

- Structuring the transaction: The assets of the company and the associated cash flows provide the collateral for the debt financing. An LBO may either involve purchase of assets or shares. In case of an asset purchase lenders secure themselves with those assets. In case of a share purchase, which is usually the route, involves complete takeover of all assets of the company. Leveraged buyouts are usually tender offer for shares of the target company. In case of a share purchase, the purchaser is liable for undisclosed as well as contingent liabilities unlike asset purchase.
- Selecting the most suitable legal, tax and accounting structure for the transaction.
- Getting regulatory approvals.
- Developing a business plan for the LBO.
- Arranging finance.
- Closing the deal.
- Assuming control of the company.

Why do Companies go Private?

Companies may go private for a variety of reasons. Some of the plausible reasons include:

- **Saving stockholder servicing costs**—payment of dividend, mailing of annual general meeting letters, production of annual reports, communicating with shareholders and analysts through meetings entail cash costs. Going private eliminates these costs.
- **Repelling takeover threats and distributing free cash flow.** Some firms that go private do so to avoid being taken over because the firm's management believes that it is the best course of action for shareholders or for themselves.

Exhibit 35.1 Public company vs LBO association**Typical public company****Typical LBO association**

- **Resolving agency conflicts** that we see in modern corporations. Companies often go unmonitored by investors because they do not have the incentive to do so. Prof. Jensen points out that the public corporation is no longer a suitable form of organization in industries with low growth rates, where there are large internally generated funds, which remain idle because of limited investment opportunities, or where downsizing is the most appropriate strategy. Since LBOs are financed with heavy debt, managers are forced to pay out future cash flow in the form of interest payments.
- **Reducing agency cost of debt.** Shareholders in levered firms essentially hold a call option on the value of the firm. If the value of the firm exceeds the value of debt, bondholders get their payment else shareholders can walk away by handing over the company to bondholders. Managers in many public companies hold negligible fraction of equity because of which they have an incentive to make sub optimal investments. Managers in LBO firms, in contrast, hold larger fraction of equity. Consequently the agency cost of debt is reduced.

- **Addressing information asymmetry.** Often, managers have superior information regarding the earnings potential of the company compared to investors. Because of information asymmetry, shares of a company can be either over or undervalued. Managers, acting in the interest of shareholders, sell equity when it is over valued and repurchase when it is undervalued. Since a going private transaction involves 100 percent repurchase of shares, we would expect highly undervalued firms to go private.

Academic studies find that firms that go private are undervalued, have higher agency cost of free cash flow and have unused debt capacity. The best way to find out why managers buy their companies is to ask them. A survey of 110 buyouts from the US and the UK completed between 1980–87 finds that a large number of them go private for the following reasons:¹⁰

- Avoiding sale to another company.
- Making fortunes.
- An LBO allows managers to make their own decisions.
- The managers of such companies enjoy hard work and dangerous living.
- LBOs allow development of unexploited strategic opportunities.
- Corporation starved them of capital and LBOs correct the situation.

SOURCES OF VALUE AND DISTRESS

LBO organizations are characterized by high financial leverage, significant managerial equity ownership and intense monitoring by LBO (active) investors. As pointed out earlier, buyouts are structured in such a way that management's equity interest increases substantially. The equity investors join the company's board and run the company along with the company's managers. LBOs are often accompanied by substantial improvements in value and operating performance of the company/division. This improvement is usually attributed to concentrated ownership and better oversight by investors.¹¹ Critics of LBOs claim that the heavy debt burden makes the organization short-sighted and vulnerable to bankruptcy. Since a firm remains public in case of a recap and private in case of a buyout some argue that recaps are fairer to pre-HLT (high leverage transaction) shareholders because they get to share the upside. In other words, LBOs are structured in such a way that selling shareholders get a raw deal. In 1986, KKR made buyout offers to Kroger Inc. and Safeway Stores Inc.¹² Kroger rejected the offer and decided to do a recap whereas Safeway accepted KKR's offer. Following the buyout Safeway tied managerial compensation more closely to firm performance whereas Kroger made no such changes. Following the transaction, Safeway generated significantly higher stock returns than Kroger. This result suggests that LBOs generate superior returns due to better incentive structure and monitoring by LBO firms.

Another LBO firm, Clayton, Dubilier and Rice (CD&R), for example, is known for its expertise in adding value by improving governance and operations.¹³ In 1986, OM Scott & Sons was taken private by its management and Clayton & Dubilier, in an LBO transaction.¹⁴ Scott's performance improved dramatically

¹⁰ Kitching, John (1989).

¹¹ Palepu, Krishna (1990), Jensen, M C (1989), and Steven Kaplan (1989).

¹² Denis (1994).

¹³ Kester, Carl and Timothy Leuhrman (1995).

¹⁴ Baker, George P and Karen H Wruck (1989).

during 1986–88. Sales increased by 25 percent, EBIT by 56 percent, and capital spending by 23 percent. The improvement in performance was largely due to changes in incentives, monitoring, and governance.

One of the important sources of value in an LBO is the tax savings associated with higher leverage and increased depreciation deductions associated with step-up of assets in going private transactions. For example, if a corporation has a debt/value ratio of 30 percent before and 90 percent after the buyout, the incremental tax shield is: incremental debt in rupees \times interest on debt \times tax rate. The present value of tax shields can be estimated as perpetuity or for some specific period of time.

Some argue that the firm gains tax shield at the expense of the other taxpayers. That is, LBOs reduce revenue to the central government. This view is incorrect because it overlooks other sources of revenue to the government, i.e.:¹⁵

- LBOs give rise to increased capital gains tax.
- LBO firms generate significant increases in operating income, which is taxable.
- LBO creditors are taxable on the interest received.
- LBO firms sell off assets. The asset sale attracts taxes.

Although LBOs make impressive efficiency gains they often fail to meet forecasts made to investors and lenders. A large number of LBOs completed in the late 1980s got into distress because of poor deal structure and higher leverage ratios in riskier industries. Because of the boom in the market too much money was chasing too few deals. As a result of this, the market was over heated. Consequently the volumes fell dramatically (although mid-sized LBOs were still being done).

FINANCING ARRANGEMENTS

Financing a buyout requires substantial intermediate and long-term debt financing, which is usually provided by banks and insurance companies. Banks also finance receivables and inventory. In a typical LBO there will be more than one layer of debt—senior debt secured by assets and subordinated debt. The subordinated lenders receive equity kickers (warrants) because of their junior status. The warrant allows them to share the upside potential with shareholders. Subordinated debt is also called mezzanine capital. Due to the upside potential afforded by warrants, the yields on subordinated debt are lower than that on similar high-risk venture capital investment. Lenders in an LBO must obtain protection primarily via the cash flow of the borrowing entity. So they require a stable cash flow history and the amount lent is typically a multiple of that proven cash flow. Further, the loan is amortized over a specified period of time. They may also base the amount to be advanced on the basis of value of assets. A typical buyout in the US is funded with 50 percent of senior bank debt, 30 percent of subordinate debt (mezzanine), and 20 percent of equity (with the management holding 5–10 percent).

Cash flows in the initial period of an LBO frequently are not sufficient to meet debt service. If a company misses interest payments it can be forced into bankruptcy. Consequently deferred interest securities like step-up coupon debentures and pay-in-kind (PIK) debentures are used in recaps and buyouts. In case of deferred coupon payment debentures are sold at a deep discount, and no interest accrues for a specified time period after which interest is paid in cash. In case of step-up coupon debentures, coupon increases over a period of time. PIK debentures give borrowers the choice of paying the coupon in cash or paying with

¹⁵ Jansen, Kaplan, and Stiglin (1989).

some more of the security. If the latter is chosen no cash payment is necessary to meet interest payments until the end of the PIK period, typically 5–10 years. These securities give *issuers* the *option* to either pay in cash or in kind. Further, these securities have little or no call protection. When market interest rate goes up the issuer can put a certain amount of debt in lieu of cash to the investors each semi annual period. When interest rates fall, the bond will be called. That is, the issuer has a series of European-type put options.¹⁶

REVERSE LBOs

LBO firms don't remain private forever. They issue shares publicly after a few years and become public once again. That is, they *reverse* the LBO. Kidder, Peabody reports that, between January 1, 1983 and June 30, 1988, there were 90 initial public offerings for buyout companies of \$10 million or more. The median period between completion of the LBO and launch of the IPO was 22 months. More than 70 percent of the companies were taken public within three years of their LBO dates.¹⁷ If high leverage and concentrated ownership lead to improvements in performance we would expect the performance to decline after the LBO because of diffused ownership due to selling of shares and decrease in leverage. To the extent that these firms have higher leverage and concentrated ownership than other similar firms these firms might continue to outperform their industry. Academic studies of reverse LBOs in the US find that the operating performance of reverse LBOs is significantly better than that of the median company in their industry in the year before and in the year of the IPO.¹⁸ Further, these companies tend to outperform their industry for at least four years after the IPO.

VALUATION IN LBO SETTINGS

The DCF methodology employed for valuing projects and companies involves estimation of free cash flows and discounting them by the weighted average cost of capital for the project/company. WACC is suitable for static capital structures. The WACC formula is a tax-adjusted discount rate. It is supposed to capture the tax advantage of debt (WACC incorporates post-tax cost of debt). The cost of debt and cost of equity are both opportunity costs, each consisting of time value and risk premium. WACC is a catch all for risk and tax advantage of debt. The common practice is to increase the discount rate if the project is more risky. The methodology assumes that a company targets a debt–equity blend. In LBO settings companies commonly purchase the division/company by heavy debt which is typically repaid to a large extent within a few years until the division/company is taken public again. In other words, the amount of debt falls every year until the reversion of the LBO. Consequently, it is inappropriate to use a single discount rate (WACC) for all the cash flows. Intuitively, we would expect the discount rate to fall when leverage falls because the cash flows to equity investors become less risky. In short, one should come up with a different cost of equity for each of the years.

¹⁶ Valuation of the option component and the PIK is beyond the scope of this book. Interested readers may refer to Goodman and Cohen (1989), Black-Derman-Toy (1990).

¹⁷ Rappaport, A (1990). 'The Staying Power of the Public Corporation', *Harvard Business Review*, Jan–Feb.

¹⁸ Another study has arrived at contradictory results. See DeGeorge and Zeckhauser (1993). This study finds that reverse LBOs do well before the IPO; then disappoint.

We know that

$$\begin{aligned} \text{Assets} &= \text{Debt} + \text{Equity}^{19} \\ A &= D + E \\ \beta_A A &= \beta_D D + \beta_E E \end{aligned}$$

Ignoring the systematic risk of debt,²⁰ we get

$$\begin{aligned} \beta_A A &= \beta_E E \\ \beta_E &= \beta_A [A/E] \end{aligned}$$

or,

where A is firm value, $D + E$.

Using this relationship one can come up with values of beta and by extension, cost of equity for all the years based on the leverage in existence in that year (A/E essentially measures leverage). These discount rates may be used to discount *equity* cash flows to estimate the value of the division/company's equity. The APV (adjusted present value) approach is a good alternative when companies target an absolute amount of debt. A transaction can be treated as though it is all equity financed and then this base case value can be adjusted to account for financing effects like interest tax shield, bankruptcy costs, etc. APV unbundles all the components of NPV and analyses each one separately whereas WACC bundles all financing side effects into the discount rate.

	Base case value	+	Value of financing side effects
APV =	Value of project if all equity is financed		Interest tax shields, bankruptcy cost

The free cash flows may be discounted at the cost of unlevered equity and the value of tax shields arising out of interest payments may be added to arrive at APV.

$$\begin{aligned} \text{APV} &= \text{FCF discounted at } K_u + \text{PV of tax shields @ } K_d \text{ (cost of debt)} \\ \text{Cost of unlevered equity} &= R_f + \beta_A [E(R_m) - R_f] \\ \text{PV of tax shields} &= \text{PV (Interest rate} \times \text{Amount borrowed} \times \text{Tax rate)} \end{aligned}$$

Now consider a typical LBO transaction. The management of a division of a *Fortune* 500 company has submitted a LBO proposal to the company's management. Under the proposal, the division would be purchased at \$194 million. The transaction would be funded by way of \$140 million of senior debt and \$40 million of junior debt. The senior debt carries an interest rate of 14 percent and the junior debt carries an interest rate of 15 percent. The division's management along with outside investors would contribute \$14 million of equity to complete the purchase. The managers of the division expect the first year's sales to be \$140 million for the first year and expect it to grow at 10 percent for the next two years and stabilize at 4 percent

¹⁹ Assuming that the MM theory holds—that is, $V_L = V_U$.

²⁰ The assumption that beta of debt is zero is somewhat restrictive especially in high leverage settings. One recent study of high yield bonds by Brad Cornell and Rick Green suggests that the beta of debt is about 0.25.

thereafter. Annual costs are 50 percent of the revenue. Capital expenditures and depreciation are expected to be \$18 million in the first year and then grow in tandem with sales. Working capital levels are expected to be 10 percent of sales. Under the LBO plan, the management has committed itself to a debt service schedule as shown here:

Years	1	2	3	4	5
Amount (\$ million)	14 (Senior)	14 (Senior)	14 (Senior)		

The junior debt will be paid off in year-5. The projections of after-tax, net operating profit and incremental working capital are given here. Ongoing capital expenditures are expected to equal depreciation (i.e., they cancel out).

	(\$ million)		
Operating cash flows	Year 1	Year 2	Year 3
Sales	140	154	169.4
Cash costs	70	77	84.70
Depreciation	18	19.80	21.78
Operating Income	52	57.20	62.92
Taxes @ 35 percent	18.2	20	22
NOPAT	33.80	37.20	40.90
+Depreciation	18	19.80	21.78
Less: Capex Inc.	18	19.80	21.78
NWC	14	15.40	16.94
Free cash flow	19.80	21.80	23.96

The value of the division can be written as:

$$\begin{aligned} & \text{Present value of unlevered free cash flows for the first three years} \\ & + \text{Present value of tax shields during the first three years} \\ & + \text{Terminal value} \end{aligned}$$

Often it is useful to use a combination of APV and WACC methods. For instance, in this example, we can calculate the unlevered value for the first 3 years and add the present value of tax shields to it. This gives us the value of the company during the LBO. The terminal value may be estimated using the WACC approach (assuming that the company achieves a stable capital structure at the end of 3 years) and added to the value of the division during the LBO to arrive at the total levered value of the division.

The unlevered value is obtained by discounting all the cash flows at the unlevered cost of equity. Suppose unlevered cost of equity for the division is 15 percent.

$$\begin{aligned} \text{PV of FCF} &= 19.80 \times \text{PVIF}_{15,1} + 21.80 \times \text{PVIF}_{15,2} + 23.96 \times \text{PVIF}_{15,3} \\ &= \$49.50 \text{ million} \\ \text{Tax shield} &= \text{interest rate} \times \text{amount of debt outstanding} \times \text{tax rate} \end{aligned} \tag{1}$$

Assume a tax rate of 35 percent.

To calculate tax shields a debt service schedule is required:

Beginning debt	140	126	112
Interest	—	—	—
Principal repayment	14	14	14
Ending debt	126	112	98

PV of tax shield arising out of senior debt during the first 3 years:

$$\begin{aligned}
 &= 0.14 \times 140 \times 0.35 \times \text{PVIF}_{14,1} + 0.14 \times 126 \times 0.35 \times \text{PVIF}_{14,2} + 0.14 \times 112 \times 0.35 \times \text{PVIF}_{14,3} \\
 &= 17.20 + 13.60 + 10.60 = 6.07 + 4.71 + 3.70 \\
 &= \$14.48 \text{ million}
 \end{aligned}$$

PV of tax shield arising out of junior debt during the first 3 years:

$$\begin{aligned}
 &= 0.15 \times 40 \times 0.35 \times \text{PVIFA}_{15 \text{ percent}, 3} \\
 &= 2.1 \times 2.283 \\
 &= \$4.80 \text{ million}
 \end{aligned}$$

PV of tax shields during the LBO

$$= \$19.28 \text{ million} \quad (2)$$

The cost of debt is used as discount rate on the assumption that tax shields are about as uncertain as debt payments generating them. If tax shields are considered riskier than interest payments, a higher rate may be used. Assume that the company targets a debt-equity ratio of 0.8 at the end of 3 years. Also assume that cash flows grow at 4 percent for ever after year 3.

$$\begin{aligned}
 \text{PV of terminal value} &= \frac{FCF_4}{K - g} \times \frac{1}{(1 + K)^3} \\
 &= \frac{23.96 (1.04)}{(WACC - 0.04)} \times \frac{1}{(1 + r_A)} \quad (3)
 \end{aligned}$$

$$\text{Levered value} = \text{equation (1)} + \text{equation (2)} + \text{equation (3)}$$

To calculate terminal value one must calculate WACC with target capital structure ($D/E = 0.80$ or $D/V = 0.45$ in this case). The interest on debt during the stable phase (after the LBO) is the cost of debt. The relationship between cost of unlevered equity and WACC is:

$$r_{\text{WACC}} = r_A - t \cdot r_D L \frac{(1 + r_A)}{(1 + r_D)}$$

where r_A is cost of unlevered equity,
 r_D is the cost of debt after the LBO reversal,
 L is the target debt-to-value ratio, and
 t is the tax rate.

The levered value may be compared with the purchase price (\$194 million) to find the NPV of the transaction.

At the time of the buyout the management team and lenders would be interested in estimating their return. Shareholders provide equity and receive equity cash flows in return. Likewise lenders provide debt and receive interest and principal payments. Their respective returns can be estimated by finding the IRR of initial outflow and subsequent inflows.

$$\begin{aligned} \text{Equity cash flow if any} &= \text{Earnings after taxes} + \text{Depreciation} - \text{Capital expenditure} \\ &\quad - \text{Net working capital} - \text{Principal payments} \end{aligned}$$

Shareholders also receive the terminal *equity* value.

$$\begin{aligned} \text{Terminal equity value} &= \text{Terminal firm value obtained by discounting last year cash} \\ &\quad \text{flows as a growing perpetuity (say)} - \text{Debt outstanding in the} \\ &\quad \text{last year of the LBO} \end{aligned}$$

The level of debt in the last year of LBO itself can be obtained by preparing a debt service schedule. For example, the initial debt level may be brought down by 25 percent in the LBO period.

$$\text{Initial equity investment} = \frac{ECF_1}{(1+K_e)} + \frac{ECF_2}{(1+K_e)^2} + \frac{ECF_n + TV}{(1+K_e)^n}$$

K_e is the IRR of the series obtained by trial and error.

From the perspective of lenders,

$$\text{Amount lent} = \frac{I_1 + P_1}{(1+K_d)} + \frac{I_2 + P_2}{(1+K_d)^2} + \frac{I_3 + P_3}{(1+K_d)^3} + \dots + \frac{I_n + P_n}{(1+K_d)^n}$$

where I_1, I_2, I_3 , etc., are interest receipts,

P_1, P_2 , etc., are principal receipts, and

K_d is the IRR of the series.

Capital Cash Flow Valuation

In free cash flow valuation the weighted average cost of capital is used to discount cash flows. An algebraically equivalent, yet superior, method is the capital cash flow valuation.²¹ Free cash flow valuation excludes interest tax shields because the discount rate, WACC, incorporates the tax advantage of debt. In capital cash flow valuation, free cash flows plus interest tax shields are discounted at *pre-tax* WACC (expected asset return). Since the asset return does not change when capital structure changes, it is easier to implement capital cash flow valuation.

²¹ Ruback, R S (2000). 'Capital Cash Flows: A Simple Approach to Valuing Risky Cash Flows', Working Paper, Harvard Business School, March.

$$\begin{aligned}\text{Capital cash flow} &= \text{Net income} + \text{Depreciation} - \text{Capital expenditure} \\ &\quad - \Delta \text{ Working capital} + \text{Cash interest.}\end{aligned}$$

or,

$$\begin{aligned}&= \text{EBIT} (1 - T) + \text{Depreciation} - \text{Capital expenditure} \\ &\quad - \Delta \text{ Working capital} + \text{Interest tax shields.}\end{aligned}$$

It is easier to implement the former approach because it incorporates corporate estimates of taxes that reflect the special circumstances facing the firm rather than mechanically finding the product of tax rate and taxable income.²²

The appropriate discount rate is a before-tax rate because the tax benefits of debt are already included in the capital cash flows. The correct discount rate is the pre-tax WACC.

$$\begin{aligned}\text{Pre-tax WACC} &= \text{Weighted average costs of debt and equity} \\ &= (D/V) K_D + (E/V) K_E\end{aligned}$$

D/V and E/V are debt-to-value and equity-to-value ratio respectively; K_D and K_E are costs of debt and equity.

$$\begin{aligned}\text{Cost of debt} &= K_D = R_f + \beta_D (\text{risk premium}) \\ \text{Cost of equity} &= K_E = R_f + \beta_E (\text{risk premium}) \\ \text{Pre-tax WACC} &= \frac{D}{V} (R_f + \beta_D \times R_p) + \frac{E}{V} (R_f + \beta_E \times R_p) \\ &= R_f + (D/V \beta_D + E/V \beta_E) R_p \\ &= R_f + \beta_A (R_p)\end{aligned}$$

since
or,

$$\begin{aligned}\beta_A V &= \beta_D D + \beta_E E \\ \beta_A &= \beta_D D/V + \beta_E E/V\end{aligned}$$

Note that the discount rate depends on R_f , β_A and the risk premium, and does not incorporate D/V or E/V . That is, the pre-tax WACC is independent of capital structure and hence can be applied to all cash flows regardless of the capital structure in existence. In other words, pre-tax WACC, which is a function of asset beta, is constant. Both free cash flow valuation and capital cash flow valuation provide the same answer. CCF valuation, however, is easier to implement.

IN CONCLUSION

LBOs result in efficiency gains. But they are not without a cost. The probability of distress increases substantially because of high leverage. LBO funds and sponsors recognize it. KKR, for example, targets companies that have strong and predictable cash flows, readily separable assets or businesses available for sale, products with well-known brand names and strong market positions that are not subject to rapid technological change, status as a low-cost producer, and limited sensitivity to cyclical swings.

²² In other words, in many instances it does not reflect the actual tax paid.

Notwithstanding Prof. Jensen's argument that LBO organizations are the most suitable for many industry groups, many firms reverse LBOs within a few years, which suggest that the LBO is a transitory form of organization. Nevertheless, those LBOs that return to public ownership as independent companies do have equity ownership and debt ratios significantly higher than pre-buyout levels.

Due to a substantial increase in leverage in an LBO we would expect a decrease in bondholders' wealth. In other words, are the gains in an LBO a transfer of wealth from bondholders? Some academic studies have documented losses of 3–7 percent at the time of the LBO announcement, which supports the notion that at least a part of wealth gain in case of an LBO is due to wealth transfer from bondholders.

APPENDIX: NUMBER AND VALUE OF BUYOUTS (COUNTRY-WISE, 1995)

Country	No. of deals	Value (\$ in million)
France	101	1,246
Sweden	18	571
Germany	74	707
Italy	15	229
Netherlands	57	685
Switzerland	41	532
Spain	13	190
Belgium	5	18
US	272	20,571
UK	577	7,267
Continental Europe	582	4,738

Source: Lisa Meulbroek (1996).

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EXERCISE

1. A company is in the process of setting up a media division with projected cash flows as follows: The new operation require an initial investment in plant and equipment of Rs 100 crore, plus an infusion of Rs 7.5 crore of working capital (= 10 percent of first year sales). Media's sales are projected to be Rs 75 crore during the first year of operation. Sales are expected to increase at 12 percent per annum over the next two years with growth stabilizing at a rate of 4 percent thereafter. Management estimates that cash costs will constitute 60 percent of revenue. New investments in plant and equipment will match depreciation each year, starting at 10 percent of the initial investment (Rs 100 crore) and growing in tandem with sales thereafter. The firm plans to maintain working capital levels at 10 percent of the following year's projected sales. With the division in the 35 percent tax bracket, unlevered free cash flow would approach Rs 16 cr in 3 years and grow at 4 percent per annum thereafter. Assume that the division arranges to borrow Rs 77.5 crore initially. The firm agrees to repay Rs 8.5 crore of principal at the end of the first three years of the contract, bring debt outstanding at the end of the third year to Rs 52 crore. From that point onwards, the division will increase debt outstanding by 4 percent per annum, in line with the expected growth of operating cash flows. Because of the firm's highly levered position in the early years assume that the borrowing rate is 11 percent initially, falling to 9 percent once it re-achieves a stable capital structure after year 3. Assume that the cost of unlevered equity is 18 percent. What is the division's worth? Use APV (adjusted present value).
2. An LBO fund has received an offer to sell from the founder of a company. The company manufactures paper that is not seasonal. In 2000, the company had a market share of 26 percent of the industry. The recent financial statements of the company are as follows:

	(Rs crore)		
<i>Income statement</i>	1998	1999	2000
Sales	17.7	19.1	20.2
Cost of goods sold	12.7	14.1	14.2
Gross profit	5.0	5.0	6.0
Operating expenses	1.4	1.5	1.8
PBT	3.6	3.5	4.2
Taxes	1.3	1.2	1.5
Net profit	2.3	2.3	2.7

(Rs crore)			
<i>Balance sheet</i>		<i>March 31, 2000</i>	
Equity	14.2	Net fixed assets	6.3
Current liabilities	1.9	Current assets	9.2
		Other assets	0.6
	16.1		16.1

The company's sales are expected to increase at 10 percent per annum for the next 5 years. EBIT as a fraction of sales is expected to be 16 percent of sales. The company's tax rate is 35 percent. Capital expenditure in each year is expected to be equal to the annual depreciation expense of Rs 5 lac. Further, working capital investment is expected to be 11 percent of sales. The terminal growth rate is expected to be 4 percent. The LBO involves heavy usage of debt carrying an interest rate of 15 percent repayable in 10 equal annual installments. The company has a cash balance of Rs 6 crore—of which, Rs 1 crore is sufficient to carry out operations.

Assuming a discount rate of 12 percent, what is a fair price for the company? How much debt would be required for the LBO? What level of debt can the company be able to service?

3. An LBO firm has tentatively agreed to pay Rs 1.1 billion to acquire a certain business. The managers of the business anticipate EBIT of Rs 100 million for the first year. EBIT is expected to grow at 5 percent per annum for the next five years. The LBO sponsors are confident that they can raise Rs 900 million in debt financing provided they contribute Rs 200 million of equity and that all excess cash generated by the business is used to pay down debt. The sponsors expect to divest their holdings after 5 years. Should they invest the Rs 200 million, and acquire the business? Assume the following:

Tax rate = 36 percent

Interest rate on debt = 7 percent

Capital expenditure equals depreciation and both grow at 5 percent per annum

Additions to net working capital start at Rs 10 million in year-1 and grow at 5 percent.

Risk-free rate = 5 percent

Asset beta = 0.7

Risk premium = 8 percent

Perpetuity growth rate after year 5 = 8 percent

The company is likely to achieve a stable capital structure after year 5 at the time of which the discount rate is expected to be 12 percent.

(Hint: Value equity cash flows. The cost of equity is to be estimated for each year. To arrive at the value of equity in year 0 start with the value of equity in year 5, discount it back to year 4, 3, etc., to year 0 using different costs of equity for each year. The value of equity in year 5 is Value of firm – Value of debt outstanding at the end of year 5)

4. Compare and contrast the organizational structure of a typical corporation with that of a LBO association.
5. Corporate managers generally don't disgorge cash unless they are forced to do so. In 1988, the 1,000 largest firms generated total funds of \$1.6 trillion. Yet they distributed only \$108 billion as dividends and another \$51 billion through stock repurchases.²³
- A. What are the incentives for managers to retain excessive cash balances in lieu of payment to shareholders?
- B. In what way do high debt levels resolve the agency cost of free cash flow?
- C. 'Equity is soft, debt hard. Equity is forgiving, debt insistent. Equity is a pillow, debt a sword.' Interpret the meaning of this quotation.

²³ Drawn from Cooley, Philip L (ed) (1986). *Advances in Financial Management* (2nd Ed.), The Dryden Press, Chicago.

Chapter 36

EVA and Divisional Performance Measurement

OBJECTIVES

- ◆ Introduction to a relatively new financial metric called Economic Value Added (EVA) and contrast it with competing metrics.
- ◆ Highlight the characteristics of a sound performance measure.
- ◆ Highlight the controversy surrounding CEO pay in the US.
- ◆ Summarize the empirical findings on EVA.
- ◆ Provide an overview of Leveraged Equity Purchase Plan.

The term Divisional Performance Measurement (DPM) refers to the organizational rules that consist of performance measurement and evaluation, and reward and punishment systems. Performance measurement includes the objective and subjective measurement of both individuals and sub-units/divisions of the organisation whereas performance evaluation is the process of attaching values to various measures of performance to represent the importance of achievement (Jensen and Meckling, 1998).

The rewards and punishment system prevailing in the organisation attempts to encourage certain types of behavior and discourage certain other types by linking rewards to results measured by the performance measurement system.

Since the objective of a firm is to maximize shareholders wealth, a performance measure should have high correlation with changes in shareholders wealth. Managers are commonly appraised on measures like return on assets, earnings per share and return on equity that do not capture value. Managers focus on cash flows while evaluating capital investments; but when it comes to performance measurement, accounting measures take over. If a company changes its accounting method from FIFO to LIFO (first-in-first-out to last-in-first-out) during a period of high inflation, cash flow increases but earnings fall. Similarly, when a company acquires another company, there may be special writeoffs like amortization of goodwill that are non-cash in nature. The earnings per share falls, but the cash flow is unaltered. Moreover, these measures can be easily manipulated due to 'denominator management': One can increase the value of these ratios by simply cutting down whatever that appears in the denominator.

Profit itself is not an appropriate measure of performance because it does not capture either the amount of capital used to generate those earnings or the required rate of return on capital. A good performance measure is one that incorporates all three.

Economic Value Added (EVA)¹ is an accounting-based measure of operating performance. The period could be a month, quarter, half year or a year. The entity whose performance is being measured could be a division or the firm itself. EVA is the difference between accounting earnings—with suitable adjustments for interest and some accounting methods—and the cost of capital used to generate these earnings.

Expressed as a formula,

$$\text{EVA} = \text{NOPAT} - (\text{WACC} \times \text{Net assets})$$

where

NOPAT = Net operating profit after tax = EBIT (1 – T),

Net assets = Adjusted book value of net capital at the beginning of the period, and

WACC = weighted average cost of capital.

$$= D/V (1 - T) K_d + E/V K_e$$

where

D = Market value of firm's debt, and

E = Market value of equity

= Number of shares × current market price.

Convertible debt/preferred securities must be converted if in-the-money and options must be included if in-the-money

$$V = D + E,$$

T = marginal tax rate,

K_d = marginal cost of borrowing long term after adjusting for offering discount and issuance cost, and

K_e = cost of equity estimated by capital asset pricing model.

EVA has certain characteristics:

- It provides greater accountability for investor capital as it measures the required return on all investments.
- It is custom-made to a company's specific circumstances making only those accounting adjustments that are necessary.
- It is easy to communicate.
- It aligns managerial and shareholders' interests by tying management compensation to improvements in EVA.

COMPETITORS TO EVA

The purpose of value analysis is twofold. First, evaluate the performance of current strategy. Second, evaluate potential strategies for each of the business units. For instance, a company may have the following options

¹ EVA is the registered trade mark of Stern Stewart and Co.

for a business unit: modernize the plant, hold, harvest, or sell out. Even if the unit is currently losing money, it might make sense to invest in the unit if the spread between ROE and cost of equity is expected to become positive in the foreseeable future implying that executives will have to take a long-term view of business prospects before a strategic decision is made. Value creation should be the guiding factor in executive decision-making. But how do you measure value? This is important for two reasons. First, managers need to know how their performance will be evaluated and second, how to work toward that goal.

Shareholder value analysis is the process of analyzing how business decisions affect the company's economic value (i.e., NPV of cash flows discounted at WACC). One of the measures of shareholder value is the total shareholder return (TSR). It is the rate (IRR) that equates the purchase price (cash outflow) and dividends and sales proceeds (cash inflows) at the end of the holding period.

If the holding period is 1 year:

$$\text{TSR} = \text{Div} + (P_1 - P_0)/P_0$$

The TSR of the company may be compared with that of the peer group to evaluate performance. More important, executives may be encouraged to be in the top 10 percent of the peer group year after year. The Boston Consulting Group recently examined the performance of 5,316 large, quoted companies from around the world and ranked them on the basis of TSR. Exhibit 36.1 lists the top 10 companies on the basis of average annual TSR, for the period 1994–98.

Exhibit 36.1 Top companies on the basis of total shareholder return

<i>Company</i>	<i>Nationality</i>	<i>Sector</i>	<i>TSR (Average)</i>
Dell Computer	US	I C & T	153
America Online	US	Media & Entertainment	143
SAP	Germany	I C & T	91
Nokia	Finland	I C & T	79
Hennes & Mauritz	Sweden	Retail	69
Microsoft	US	I C & T	69
Cisco Systems	US	I C & T	67
Aegon	The Netherlands	Insurance	66
Charles Schwab	US	Bank	65
Compuware	US	I C & T	64

Source: Boston Consulting Group.

Exhibit 36.2 gives a list of the top 10 value creators in Europe during 1995–99. Another measure of value is the cash flow return on investment (CFROI). It is similar to the IRR of a project. It compares the cumulative cash invested in a business with the cash the business produces while recognizing the importance of asset ages, asset lives and inflation. HOLT Value Associates measures CFROI in two steps: First, the inflation adjusted cash flow available to all capital owners is compared with the inflation adjusted gross investment made by the capital owners. HOLT then translates the ratio of gross cash flow to gross investment into an IRR.

The Balanced Scorecard popularized by Kaplan and Norton recognizes the fact that executives do not focus on one set of measures, as no single measure can provide a clear performance target, or focus attention on the critical areas of business.² The balanced scorecard allows managers to look at their business from the perspective of customers, shareholders and employees. A typical balanced scorecard (Exhibit 36.3) considers

² Kaplan, Robert S and David Norton (1992, 1993, 1996).

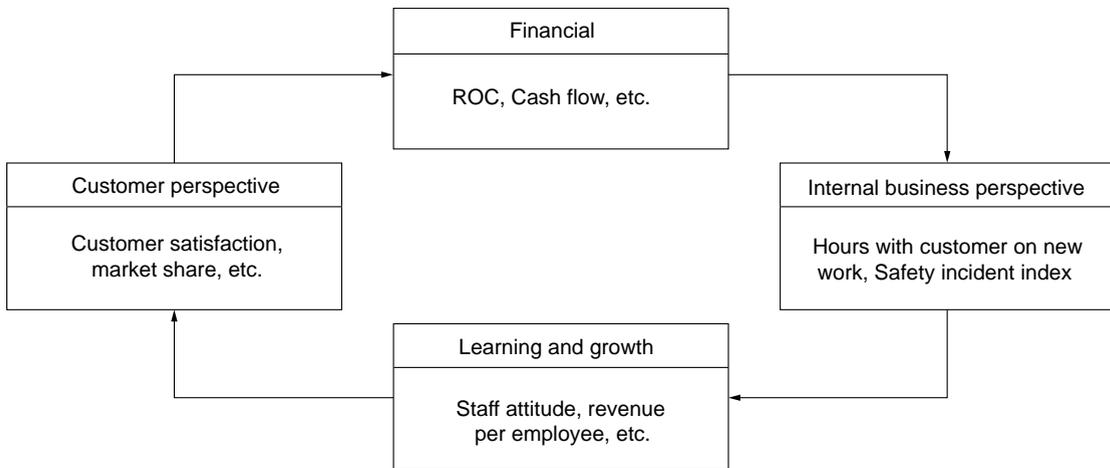
goals and measures from various perspectives and tries to bring all the elements of the business together in a single management report.

Exhibit 36.2 Top value creators in Europe

<i>Company</i>	<i>Sector</i>	<i>TSR (percent)</i>
ARM	I T & Internet	347
PMJ	Electronics & Electrical	198
AIXTRON	Engg & Management	177
Radio A	Retail	172
Korassidis		
Real Software	I T & Internet	159
Omega Pharma	Chemicals/Rubber/Plastics	154
Baltimore Tech	I T & Internet	134
Dane Elec Memory	I T & Internet	117

Source: Boston Consulting Group.

Exhibit 36.3 The balanced scorecard



The balanced scorecard could serve as the focal point for the organization's efforts communicating priorities to managers, employees, investors, and customers. It is important to understand that performance measurement is an important aspect of strategy. What gets measured gets managed. The balanced scorecard tries to measure the capital allocation efficiency of executives from various perspectives. From a purely financial perspective, ROI, cash flow, project profitability and sales booking might be the relevant measures whereas from a customer's perspective, customer satisfaction index, customer ranking survey, and market share might be the relevant measures. A company can start by assessing its current position on these perspectives and arrive at the priority areas where attention is required. Question is: Are balanced scorecard and EVA substitutes or complementary? The answer: They are complementary, and are very effective when used together. The balanced scorecard is an excellent tool that can help managers track the many factors that influence performance. But it lacks a single focus for accountability. EVA provides it. The balanced scorecard broadens the view of performance and EVA provides a link between decisions, performance measures, and rewards.

Under the *residual income* method, an explicit cost of capital is specified for the investment center and is applied on the investment base to arrive at the capital charge. To illustrate, if the invested capital is \$ 100,000 and EBIT is Rs 40,000, the residual income at a capital cost of 15 percent would be:

$$\begin{aligned}\text{Residual income} &= \text{EBIT} - (\text{Cost of capital} \times \text{Invested capital}) \\ &= 40000 - (0.15 \times 100000) \\ &= \text{Rs } 25000\end{aligned}$$

EVA differs from residual income method in several ways. First, it does not directly accept balance sheet numbers since a balance sheet is prepared on historical-cost basis. Accounting adjustments are made to produce a balance sheet that reflects economic values of assets in place and eliminate the effect of managers' focus on current earnings. Stern Stewart & Co. considers about 250 accounting adjustments in moving to EVA. In defining and refining its EVA measure, Stern Stewart & Co. has identified over 120 shortcomings in conventional accounting. In addition to GAAP's (Generally Accepted Accounting Principles) inability to handle R&D and other corporate investments, Stern Stewart & Co. addressed performance measurement problems associated with accounting treatments of inventory costing and valuation, depreciation, revenue recognition, writing-off of bad debts, mandated investments in safety and environmental compliance, pension and post-retirement medical expense, valuation of contingent liabilities and hedges, transfer pricing and overhead allocation, joint ventures and start ups, special issues of taxation, inflation and currency translation. Only 15–20 key issues are considered necessary, and as few as 5–10 key adjustments are actually made in practice.

Second, EVA can be used as a compensation tool. Thirdly, it makes use of modern finance theory to arrive at WACC. Let us discuss the steps involved in the calculation of EVA:

Calculating Net Operating Profit After Tax (NOPAT)

NOPAT is calculated by deducting cash taxes from EBIT and adding the value of non-cash items like goodwill amortization and LIFO charges. Depreciation is deducted to arrive at EBIT because depreciation is a real economic cost. To arrive at NOPAT:

	Net operating profits
Add:	increase in bad debt reserve
Add:	increase in LIFO reserve
Add:	Amortization of goodwill
Add:	Increase in capitalized R&D
Add:	other operating income
Less:	Cash operating taxes

where cash operating tax is defined as provision for income taxes less the increase in the deferred income tax reserve, plus the tax saved by unusual loss (gain), plus the tax saved by deducting interest expense.

That is,

$$\begin{aligned}\text{NOPAT} &= \text{Net sales} - \text{Cost of sales} - \text{SG\&A} + \text{Goodwill amortization} \\ &\quad - \text{Deferred taxes} + \text{Tax shield from interest expense} \\ &\quad - \text{Taxes on interest income.}\end{aligned}$$

Calculating Invested Capital

The capital charge is to be applied on the economic book value of cash invested in business activities. To arrive at invested capital:

Total assets
Less: Non interest bearing current liabilities
Less: Marketable securities and construction in progress
Add: Present value of non-capitalized leases
Add: Equity equivalent reserves ³

Exhibit 36.4 shows the calculation of invested capital for Wal-Mart.

EVA is a useful tool for divisional performance appraisal. The objective of divisional performance appraisal is to trace the overall performance to its constituent units. By separately measuring the performance of individual business units, operating managers can be held responsible for operations that are directly under their control and hence for creation or destruction of value. Rewarding divisional managers using company-wide measures will allow them to have lunch at the expense of others. EVA can be calculated for each of the divisions and used as a performance measure. Computation of EVA involves calculation of NOPAT and WACC for each of the divisions. The WACC for the division could be calculated based on the division's target debt to value ratio, if it has one, or the firm's target may be taken as proxy for each of the divisions. Since, almost by definition, divisions are unlisted, stock market data will not be available to estimate cost of equity. The 'pure play' technique can be used to estimate divisional cost of capital.⁴ The cost of debt could be estimated using prevailing yields on comparable debt instruments.

One might be tempted to reward those divisional managers who are reporting positive EVA and penalize those reporting negative EVA. A negative divisional EVA by itself does not tell us the whole story. One division might be subsidizing the other and hence reporting lower earnings and profits. The divisional EVA does not take synergies between divisions into account (Zimmerman, 1997).

EVA CENTERS

A positive EVA or an improvement in EVA does not happen by chance or luck. It is the product of concentrated effort by all functions in the organization. EVA can be used to measure the efficiency of each department and the department's contribution towards firm wide EVA. In real-life situations, however, measuring departmental EVAs could be difficult. Manufacturing, almost by definition, does not have revenues but the investment in assets will be higher than that in other departments. Consequently, EVA will be negative. Marketing, on the other hand, will have lower investment needs but has revenues and profits. EVA will obviously be positive. The solution to this problem is to set transfer prices for inter-departmental transfers of goods and services. An external party's quoted price may be taken as proxy after making some adjustments. If the organization's costs are more than the price at which it can be outsourced, then there is clear incentive to outsource rather than make it in-house. It is possible to treat each department as contracting with each other just as the firm

³ LIFO reserve is added to inventories, bad debt reserves are added to receivables, the cumulative amortization of goodwill is added back to goodwill, R&D expense is capitalized as a long-term asset and smoothly depreciated over 5 years.

⁴ See Appendix 2 at the end of the chapter for a brief description.

would have contracted with an external party (Glassman, 1997). Each party is required to make 'payments' for the services availed. The contract is enforced even if conditions change. For instance, marketing department cannot hold production department responsible for increases in cost due to volume shortfall. It should continue to 'buy' capacity.

In general, an EVA center represents a separate business unit. Selecting EVA centers could be problematic, especially for multinationals. Such companies will have to restate balance sheet and income statements of all subsidiaries in the home currency. In addition, there could be transfer-pricing issues. One solution is to organize the company along businesses, rather than along location.

Exhibit 36.4 Wal-Mart stores invested capital

	(\$ million) ⁵	
	1987	1988
Operating cash	11.3	12.6
Net accounts receivable	222.8	241.3
Net Inventory	2,651.7	3,351.4
+ LIFO reserve	202.7	291.3
Other current assets	19.2	25.90
Adjusted current assets	3,107.7	3,922.5
– Accounts payable	1,100.0	1,390.0
– Accounts expenses	400.1	514.7
– Income taxes payable	120.8	121.2
Non-interest-bearing, current liabilities	1,620.9	2,025.9
Net working capital	1,487.1	1,896.8
Property plant and equipment	2,144.9	2,662.0
+ PV of non-capitalized leases	504.5	598.6
Adjusted PP&E	2,649.4	3,260.6
Goodwill	47.0	41.0
+Accumulated goodwill amortization	3.0	9.0
Gross goodwill	50.0	50.0
Other assets	34.8	25.7
Invested capital	4,221.0	5,232.9

Source: Bennett Stewart (1991).

In short, internal departments behave like independent companies. The transfer price is the opportunity cost of the product or service or the value forgone by not using the product or service transferred in its next best alternative use. In practice, however, it is difficult to obtain or costly to estimate transfer prices for all goods. Also, in real-life situations it might be difficult to find the next best use for the resource. Often, all concerned parties negotiate a price. It should be noted that there could be internal resistance to such an exercise because of greater accountability.

EVA AND MVA

Another reliable measure of management's long run success in adding value is Market Value Added (MVA). The aim of management is to maximize the amount by which the company's market value exceeds the

⁵ The approximate values of \$1, \$1 million, and \$1 billion are Rs 46, Rs 4.6 crore, and Rs 4,600 crore respectively.

capital supplied by the firm's investors. MVA is the difference between the company's current market value, as determined by the market price of its securities and its economic book value.

$$\text{MVA} = \text{Market capitalization} - \text{Invested capital}$$

where,

Market capitalization = market value of debt and equity

Invested capital = Book value of debt and equity including equity equivalent reserves like R & D expenses.

Thus, if a company's market value of debt and equity are Rs 10 crore and the adjusted book value of capital is Rs 5 crore, then the MVA is Rs 5 crore. A negative MVA implies that the company will generate returns below its cost of capital whereas a positive MVA implies the opposite. Exhibit 36.5 gives the list of top companies on the basis of MVA. If MVA is a better indicator of performance, why calculate EVA? MVA has a limitation. MVA cannot be calculated for privately held firms and non-profit organizations as they are not listed on the stock exchange.

Exhibit 36.5 Top companies in the US, the UK, and Pan-Asia, on the basis of market value added

<i>US (\$ in million, in 2000)</i>			<i>UK (£ in million, in 1999)</i>		
<i>Company</i>	<i>MVA</i>	<i>EVA</i>	<i>Company</i>	<i>MVA</i>	<i>EVA</i>
GE	502,307	3499	Glaxo Wellcome	54465	1088
Microsoft	388922	5796	BP Amoco	88393	941
Cisco Systems	377883	182	Shell Transport	57631	686
Intel	281832	4695	Unilever	42169	1301
Pfizer	260984	1953	Smithkline Beecham	41239	982
Merck	193348	3449	British Telecom	78497	244
EMC	191904	668	Lloyds TSB Group	26713	1027
Oracle American	180885	605	Vodafone Airtouch	33417	(2142)
International Group	177982	(119)	Diageo Plc	12351	204

Source: *Fortune* (Dec 18, 2000); and Stern Stewart & Co.

Pan-Asia (in 1999)

<i>Company</i>	<i>MVA rank</i>
China Mobile, Hong Kong	1
Hutchison Whampoa	2
Korea Telecom	3
Taiwan Semiconductor	4
Cable & Wireless HKT	5
Samsung Electronics	6
S K Telecom	7
Singapore Telecom	8
United Microelectronics	9
Pacific Century Cyberworks	10

Studies in the US have shown that there is a high degree of correlation between EVA growth and MVA. Since EVA is correlated with MVA, increase in EVA results in higher MVA. At the company level, MVA is simply the present value of future EVAs.

THE RELATIONSHIP BETWEEN EVA AND NPV

EVA is defined as:

$$\text{EVA} = \text{NOPAT} - (\text{WACC} \times \text{Net assets})$$

The present value of this equation is:

$$\sum_{i=1}^{\infty} \{\text{EVA}/(1+k)^i\} = \sum_{i=1}^{\infty} \{\text{NOPAT}/(1+k)^i\} - \sum_{i=1}^{\infty} \{k \times \text{NA}\}/(1+k)^i \quad (1)$$

where

$$k = \text{WACC.}$$

If we assume that the net asset base of the company remains constant, i.e., depreciation equals capital expenditure and increase in working capital requirement:

$$\begin{aligned} \text{NOPAT}_t &= \text{Cash flow}_t \text{ and Net assets}_{t-1} \\ &= \text{Net assets}_t = \text{Net assets (a constant)} \end{aligned}$$

The present value of (1) can be written as:

$$\text{PV of EVA} = \text{PV of Cash flows} - \sum_{i=1}^{\infty} \{(K \times \text{NA})/(1 + K)^i\}$$

Since net assets, NA is a constant,

$$\begin{aligned} \text{PV of EVA} &= \text{PV of Cash flows} - \text{NA} \sum \{(K)/(1+K)^i\} \\ \text{PV of EVA} &= \text{PV of Cash flows} - \text{Net assets} = \text{NPV} \end{aligned}$$

At a project level, the present value of the future EVAs equals the NPV derived from the DCF methodology. The difference between the two is that EVA is a flow measure and NPV is a stock measure. Further, NPV is a summary measure based on projected cash flows and not realized performance. Compensation is to be tied to actual (periodic) performance as and when it is realized and not projected cash flows. Consequently NPV cannot be used as an executive compensation tool (Bacidore et al., 1997a).

CONTROVERSY SURROUNDING EVA

A financial performance measure must be highly correlated with changes in shareholder wealth where 'shareholder wealth' is defined as the abnormal return (also called 'alpha') earned by shareholders in any given period. That is,

$$\text{Abnormal return} = \text{Actual return} - \text{Expected return (as measured by CAPM)}$$

A firm derives its value from two sources: assets in place and future growth opportunities. Balance sheets prepared by accountants capture the value of assets in place. Stern Stewart & Co. considers a number of accounting adjustments to produce an ‘economic balance sheet’ which reflects the value of assets in place more accurately than the balance sheet prepared by accountants. But it still does not produce a market value balance sheet that would capture the value of future growth opportunities. Further, EVA is calculated by deducting a capital charge on the *economic book value* of assets using WACC based on *market value weights* (from NOPAT). Apparently there’s a problem. Bacidore et al. (1997b) propose that a variant of EVA, called Refined EVA (REVA), be used in which the capital charge is applied on the *market* value of the firm. They conclude that:

- Both EVA and REVA are positively correlated with abnormal returns.
- The market rewards the unexpected increases in EVA. So rewarding managers for total EVA results in rewarding managers for inferior performance.
- REVA contains information not captured in EVA that is relevant for predicting abnormal returns.
- REVA could be used to compensate senior executives and EVA could be used to compensate those at lower levels.

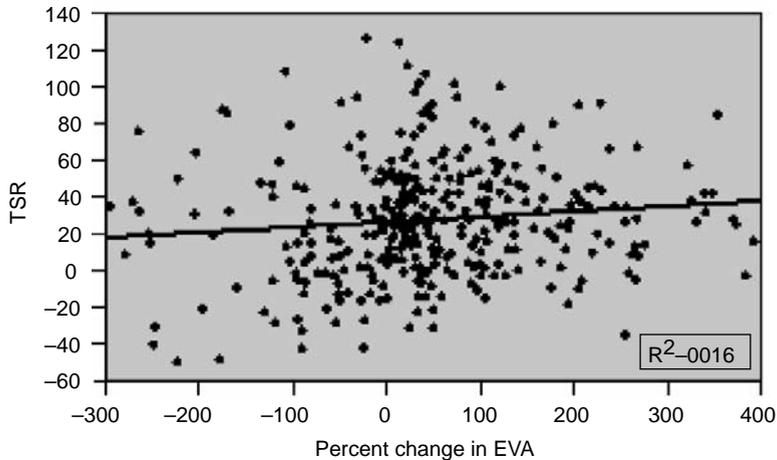
Unfortunately, according to finance theory, no single measure of operating performance is supposed to be correlated with abnormal stock returns. An operating decision can add substantial value in the period in which it is made even if it reduces that period’s operating performance and there is no reason to expect an appropriate measure of one period’s operating performance to be significantly correlated with the same period’s abnormal stock returns (Ferguson and Leistikow, 1998).

Is EVA Correlated with Stock Returns?

If EVA is indeed the magic bullet that captures something net income and cash flow from operations do not. We would expect EVA to be more closely associated with stock returns and firm values than net income and CFO. Academic research does not support this hypothesis (Biddle et al., 1997). The researchers examined a sample of 6,174 firm-years over the period 1984–93. As a test of association they use adjusted R^2 from a regression of stock returns on each performance metric. Their study indicates that current period accounting earnings is significantly more highly associated with market adjusted annual stock returns than are residual income and EVA. Another study of 274 American companies suggests that the correlation between EVA with shareholder value is only 17.66 percent; 60 companies (in the sample) had negative EVA but created positive shareholder value; 64 companies had positive EVA but destroyed shareholder value (Fernandez, 2001)! Exhibit 36.6 illustrates the correlation between EVA and shareholder value.

Does Implementing EVA Result in Better Performance?

Companies contemplating on implementing EVA or any other metric would want to make sure that they get their money’s worth. If the experience of some of the companies that have implemented EVA is any indication, then EVA seems to be the answer. Herman Miller is a \$2 billion office furniture company. During 1990–95, the company’s sales grew at an annual rate of 4.2 percent, and EVA was a negative \$127 million. Herman Miller adopted EVA as the primary performance metric and compensation tool in 1996 (Glassman, 2001). EVA has grown from –\$23 million in 1995, to \$88 million in 2000. Sales have grown by 12.3 percent and stock price by 28.4 percent. It is important to understand that refining performance measurement alone will

Exhibit 36.6 Correlation between percentage change in economic value added and shareholder value (1994–95)

Source: Boston Consulting Group.

not help a company. Often under performing companies may have to change other key business processes like manufacturing, marketing, procurement, etc. A company may have to reinvent a business model if there is a need.

Obviously one cannot generalize the benefits of implementing EVA by observing one company. To find out whether firms adopting residual income-based measures create more wealth for shareholders by changing their operating, investing and financing decisions researchers have compared the actions of companies that have adopted residual income-based incentives with those of non-adopters (Wallace, 1997 and Biddle et al., 1999). The percentage relative change, i.e., average percentage changes in selected actions of firms that adopt RI based incentives is shown here:

Percentage relative change in

<i>Asset turnover</i>	<i>Asset dispositions</i>	<i>Asset investments</i>	<i>Share repurchases</i>	<i>Dividends per share</i>
14 percent	100 percent	-20 percent	112 percent	1 percent

Operating decisions that use invested capital more efficiently will boost NOPAT. So we would expect companies resorting to RI-based incentives to increase asset turnover, reallocate capital to more profitable activities by increasing divestitures and decreasing new investments. Academic findings are consistent with these expectations.

INCENTIVE COMPENSATION

Few topics in finance generate more debate than incentive compensation. The average pay of British chief executive officers (CEOs) at the top 500 companies by market capitalization is about 660,000 pounds while the average pay of their US counterparts has been 6.3 million pounds. Michael Eisner of Disney exercised options worth 348 million pounds in December 1997—more than the remuneration of all top 500 CEOs in

Britain! Should investors worry about absolute levels of pay? What is ‘fair pay’ for the executive? Are they already overpaid for what they do? Do managers respond differently to different compensation plans? The controversy surrounding executive compensation is understandable.

Professors Michael Jensen and Kevin Murphy recently found that there is *no* correlation between pay and performance.⁶ They analyzed data on salaries and bonuses for 2,505 CEOs in 1,400 publicly held companies from 1974 through 1988 and found that:

- Annual changes in executive compensation do not reflect changes in corporate performance. A \$1,000 change in corporate value corresponds to a CEO compensation of just \$2.59.
- Compensation for CEOs is no more variable than compensation for hourly and salaried employees.
- CEO stock ownership, a powerful link between shareholder wealth and executive wealth, was 10 times greater in the 1930s than in the 1980s.

The pay-performance linkage has two viewpoints—that of the company and of the executive. The company’s cost is the employee’s reward. The cost–benefit ratio depends on the executive’s age and income level and position in the hierarchy. The reward to the executive (cost to the company) is the present value of after-tax benefits after accounting for mortality rates and tax laws. The company would try to minimize costs and the employee would try to maximize benefits. Does this sound like a win-lose situation? Not necessarily. As long as the employee’s contribution equals or exceeds the remuneration, however high it might be, the shareholders of the company will not be worse off. In other words, should someone negotiate for a few hundred thousand dollars with an applicant for the CEO’s post when the value of the decisions taken by the executive runs to hundreds of millions of dollars? In short, shareholders need not worry about absolute levels of pay. What they should compare is the size of the pie with the executive and that without him.

EVA and Executive Compensation

The objective of incentive compensation is to make managers behave like owners. They should identify themselves with the fortunes of the company. Incentive compensation plans are usually administered by consultants. There are as many types of plans as there are consultants. One of the measures of managerial performance is the appreciation in the stock price or stock returns derived from stock prices. Tying executive compensation to stock prices requires managers to take on too much risk. Moreover, stock prices are affected by extraneous factors not controllable by executives. EVA does not suffer from this drawback. It is a useful tool for executive compensation. Indeed, EVA is more a compensation tool than a financial management tool. Executives can be paid for the performance of the entire company or of their own division. For instance, at Eastman Chemical Company, compensation is determined by the performance of the entire company. But this leads to the ‘free lunch’ problem. Some companies form groups of business units and managers are

⁶ Jensen, M C and Kevin Murphy (1980). ‘CEO Incentives—It’s Not How Much You Pay, But How’, *Harvard Business Review*, May–June.

Another study that uses a broad measure of CEO holdings of stock and stock options reports that CEO compensation is highly responsive to firm performance. Hall, Brian and Jeffrey Leibman (1998). ‘Are CEOs really Paid Like Bureaucrats?’, *Quarterly Journal of Economics*, Aug. A study of the compensation policies of 1,200 US corporations from 1975 to 1984, supplemented by a 1984 University of Rochester symposium on managerial compensation shows that there is a strong, positive statistical relationship between executive salary and bonus and company performance as measured by the rate of return on common stock.

Murphy, Kevin (1986). ‘Top Executives are Worth Every Nickel They Get’, *Harvard Business Review*, Jan.

responsible not only for their own divisional EVA but also that of the entire group. Some companies link divisional pay to other divisions' performance. Some supplement objective measures with subjective criteria. Executives should understand the need to maximize the value of not only their division but also that of other divisions that complement their resources and efforts. In a group incentive scheme a plant or business unit sets financial or operational performance targets. If the unit hits the target, everybody gets a payout. If the unit exceeds the target, then the payout increases. Typically executives get several times the incentive opportunity for rank and file employees.

The EVA compensation system has two components: cash bonus plan and leveraged stock option plan (Stern et al, 1995). The cash bonus plan rewards improvements in EVA rather than absolute EVA in order to reward value addition due to managerial efforts as in the case of a business turnaround. The EVA bonus does not have a ceiling. Executives can earn unlimited amounts depending on their performance. A part of the annual bonus award is held in a bonus bank, which is distributed only if there is a continuous improvement in EVA. Usually two-thirds of the bonus is carried forward. The EVA targets are set by a predetermined formula and not by annual negotiation. EVA compensation encourages performers to stay on and pursue their business plans aggressively and forces under performers to leave.

Under the leveraged stock option plan, managers are given the option to buy shares (unlimited) at a discount to the prevailing market price. But managers are not allowed to exercise their option immediately. The option is held in a bank. The exercise price of the option increases at a rate that reflects the cost of capital for the company. To illustrate, the strike price increases at 15 percent if the cost of capital is 15 percent during the planning period. Managers win only if the stock price rises at a faster rate compared to the strike price. Managers use a part of their cash bonus awards to make leveraged purchase of stock.

A leveraged equity purchase plan has three features (Stewart 1990):

- Most of the purchase price for the shares is financed through a loan from the company secured solely by a pledge of the stock.
- The rest of the purchase price (say, 10 percent) comes from managers' personal wealth.
- The loan from the company accrues interest at a rate equal to the company's cost of capital.

The leveraged equity purchase plan is not to be confused with executive stock options which many companies grant their employees. Executive stock options are call options which give the holder the right but not the obligation to purchase a company's shares at a specified exercise price. These are mostly at-the-money options, which mean that the exercise price matches the stock price at the time of grant. The options usually come with certain restrictions: They cannot be sold to a third party and they must be exercised before a stipulated period of time (say, 10 years). Many of them also have a vesting period (say, 3–5 years) before which the executive cannot exercise the option.

Calculation of incentive compensation under the EVA system involves four steps:

1. Establish a bonus target equal to a certain percentage of base pay (say, 35 percent). The executive earns the target bonus if the bonus unit is valued at \$ 1.
2. Establish a baseline EVA level. The EVA for the following year changes by a specified percentage of the difference between the actual EVA achieved and the baseline EVA for the prior year. This makes the system self-adjusting.
3. A base unit value is established for each ensuing year. The base unit value indicates the target bonus amount an executive can earn by hitting the baseline EVA. To illustrate, if the base unit value is \$ 0.8 in a year, simply repeating the EVA baseline performance will produce only 80 percent of the target bonus.
4. Establish a bonus sensitivity factor (say, \$1,500,000) which is added to or subtracted from the base unit value to create a total unit value.

Reasons for Failure

Not all incentive plans succeed in achieving their objectives. Most of them end up causing more harm than good. There could be several reasons for such failures depending on the specific circumstances under which the plan is administered. Some of the common reasons are:

- *Inadequate incentives.* If the incentives are not sufficiently high, employees might not be adequately motivated to achieve the target.
- *De-linking pay and performance.* Some companies set the bonus as a percentage of salary regardless of performance under the belief that short-term individual performance of executives cannot be measured. This is not true. Profitability indeed depends on a number of short term decisions like make vs buy made by individuals and these are not group decisions. This is especially true of managers in any well-run company, with decentralization of powers.
- *Complexity of the performance metric.* Given here is a plan:
 - Bonus = $0.8 [\text{SQRT} \{0.982 + (1.16 \text{ PAT} \times 0.8 \text{ Sales growth})\}] + [0.2 \times \text{base salary}]$ if PAT is between \$650 million and \$750 million.
 - Bonus = 0, if PAT < \$650 million, and if sales growth is less than the average for the industry.
 - Bonus = 120 percent of the normal, if PAT > \$750 million and the rate of growth in sales beats the average growth of the industry by 10 percent.
 Does this make sense? One of the pre-requisites of a performance metric is that it should be simple and well-understood by all.
- *Too many measures.* All too often, companies insist on one set of measures like profit after tax, sales growth, cash flow, inventory turns, etc., all through the year but tie compensation to a totally different set of measures. In so far as these measures are correlated with each other and with the objective of the firm—i.e., creating shareholder value—there is no problem. Too many measures simply confuse managers and employees and lead the company astray. The EVA compensation plan does not suffer from this shortcoming. Some companies tie compensation to a matrix built around sales growth and profitability. To illustrate, if the target bonus for an executive is 40 percent, and the unit provided return on assets of 23 percent and sales growth of 10 percent, the manager might receive the target bonus of 40 percent; else he may receive bonus according to a pre-specified formula.
 - *Rewarding employees for the means rather than for the end-result, and concentrating 'high-value' activities in the hands of few.*
 Commonsense suggests that human beings tend to maximize *their* earnings. In those organizations where compensation is tied to activities (that are supposed to lead to results), the demand for 'high value' activities will obviously be high and those entrenched in the organization will simply not allow newcomers to contribute—leading to heartburn and defection amongst employees.

EVA, TQM AND SHAREHOLDERS' WEALTH

While EVA focuses on shareholders, TQM focuses on all the stakeholders. Apparently, there is a goal divergence. It is quite possible for a firm to have negative EVA even when it has delighted customers and employees. There is an optimal level of satisfaction beyond which value decreases. The two diverge only

when a company is hell-bent on winning the Malcolm Balridge Award without paying attention to economics.⁷ Indeed, higher quality should result in higher revenues and profits. The increase in quality may not lead to an increase in profits if the company is forced to charge an unacceptably high price that customers may refuse to pay. When profits are low in relation to investment, EVA will be either low or negative because of which the stock price (or stock returns) would stagnate (assuming a causal relationship).

IMPROVING EVA

There are three ways to improve EVA. The first is to grow the business by taking on new investments that promise to earn more than the cost of capital. The second way is to improve the efficiency of the existing business and increasing the return on existing capital. The third way is to get rid of those parts of the business that are not promising. EVA encourages managers to change behavior by improving profits, investing money in projects with positive ROIC–WACC spread, eliminating investment in projects where returns are inadequate, focusing on cash flows.

Stern Stewart & Co. has developed a management tool called ‘EVA Drivers’ that helps management to trace EVA through the income statement and balance sheet to key operating and strategic levers available to the company. This tool is useful in diagnosing performance, benchmarking peer’s planning, and helping employees understand their role in creating value. The manufacturing EVA drivers, for instance, are:

- Reduce inventory
- Improve yields
- Reduce waste
- Improve labor efficiency
- Improving process.

Likewise, marketing EVA drivers are:

- Increase market share/revenue
- Advertising
- Sales promotion
- Brand awareness.

Managing for Shareholder Value

In small companies with a small group of people the head of the company can take all key decisions. But in large companies where the decision-making is delegated to operating managers, there is a need for a shared framework which provides guidelines regarding how operating decisions need to be made and how they affect the overall value creation effort because value created in one part of the company may get destroyed

⁷ Apparently, General Motors spent millions of dollars on quality programs for their Saturn car project. The customers loved the car but the stock price stagnated.

elsewhere in the company. The management processes and measures relating to strategic planning, capital investments, budgets, and executive compensation should be designed to encourage value-creating behavior in the organization. Once the goal of value creation is set (in terms of, say, total shareholder return or EVA), one can work backwards to arrive at strategies that can achieve it. Managers should be encouraged to strive to beat minimum acceptable value and move towards the maximum value, which the best owner could deliver through improved operations, reduced cost, lower working capital, etc. The planning process should generate intense discussion and debate on the value drivers and the process of delivering value. The end product of such a discussion is a value-creating strategy. Value based management requires a new way of thinking among executives, especially the top-level managers. Often, top managers who have the authority to take decisions on major issues like dividends, mergers and acquisitions, debt policy, corporate restructuring, etc. can create tremendous value. The implementation process typically starts at the top and percolates downwards. It is hard to link actions at lower levels of hierarchy to shareholder value. But the company can benchmark the processes that characterize an ideal organization.

Survey Results

Of the 2,000 respondents to a 2001 survey conducted by the consultant Lawrence Maisel and the American Institute of Certified Public Accountants, 80 percent said that performance measurement systems were a way to achieve business results and create shareholder value. The highlights of the survey are as follows:

- Only 35 percent rate their system effective.
- 80 percent consider the information from their PM systems merely ‘adequate’.
- Finance most often runs the PM process, and financial measures are given more importance than non-financial measures.

IN CONCLUSION

Choosing a metric which has the highest correlation with shareholder value is a good idea. But the benefits from implementing that metric should exceed the potential costs. The obvious benefit from implementing the metric is the additional shareholder value created (assuming that managers deliver goods). Some of the metrics require training of all executives involved in the process. The training entails cash outlay. Additional records need to be maintained apart from the normal accounting records; periodic audits are necessary; managers may resort to ‘gaming’—that is, increase their payoff without adding any value to shareholders. A company should choose a metric that has the highest benefit-to-cost ratio.

Implementation of the EVA incentive system proceeds in three steps:

- Analyze businesses on EVA parameters, benchmark them against peers, understand shareholders expectations and work out historical and future EVAs.
- Train managers to optimize EVA.
- Introduce an incentive compensation plan for all employees.

The characteristics of a sound compensation plan are:

- It should be perceived as fair.

- Employees should find it exciting.
- It should be linked to the business strategy.
- It should encourage ideas from employees to boost performance.

The result of a survey of performance measures used in annual incentive plans in 177 large US corporations is given in Appendix 4.

APPENDIX 1: ESTIMATION OF COST OF EQUITY USING CAPM

The capital asset pricing model (CAPM) suggests that the cost of equity for a firm is:

$$E(R) = R_f + \beta [R_m - R_f]$$

Generally finance theorists agree that long-term T-bond rate can be used as proxy for risk-free rate. Sometimes the T-bill rate is also used. In countries where there is no liquid market for government securities, one may add 50–100 basis points to the prevailing interest rate on long-term government owned/controlled bank deposits.

In the CAPM, beta is the sole company specific factor. The estimates of risk-free rate and market premium are the same for all stocks. So the estimate of beta should be accurate. Often academics and practitioners estimate the historical beta and use it as proxy for the future. The standard practice is to regress stock returns against the returns from an index representing the market portfolio.

The estimate of beta is sensitive to:

1. The period over which the beta is estimated.
2. The starting and ending points of the estimate.
3. The market proxy that is used.
4. The choice of return interval.

The actual return earned by stocks (index) over a long period of time over and above the actual return earned on a default-free security is the market premium, $R_m - R_f$. The arithmetic average of return on government bond is deducted from the average return from stocks. This historical premium is used as proxy for future risk premium. Given here is the estimate of risk-free rate and market premium for select Asian countries.

Country	Index	MRP (percent)	R_f (percent)	Historical premium (percent)	Measurement period
Singapore	STI	6	4	8	87–95
Taiwan	TWSE	6.5	7	10	86–96
Korea	KOSPI	6.5	10	6	85–96
Malaysia	KLSE	8	7	8.5	85–96
Hong Kong	HIS	7.5	8	8.8	69–96
Thailand	SET	9	13.5	14	86–96
India	BSE 100	8	13	10.5	91.96

Source: C S First Boston.

APPENDIX 2: ESTIMATING DIVISIONAL BETA USING PURE PLAY TECHNIQUE

Since the beta for the division is unobservable in the marketplace, a proxy beta derived from a publicly traded firm whose operations are as similar as possible to the project in question is used as the measure of the division's systematic risk. The pure play approach attempts to identify firms with publicly traded securities that are engaged solely in the same line of business as the division. These comparable firms are called 'pure play' firms.

Characteristics of the pure play firm:

1. The firm should have only one business line and no miscellaneous revenues.
2. The pure play should be in the same industry or business line as the division in question.
3. The revenues of the pure play should be roughly the same as those of the division in question.
4. When more than one firm could be identified as a potential pure play, the firm with the median beta could be chosen as the pure play.

After obtaining the proxy betas, estimate the unlevered betas for each of these firms. The idea is to remove the effect of capital structure on beta. The unlevered beta reflects only operating risk.

The relationship between levered and unlevered beta is:

$$\beta_L = \beta_u [1 + (1 - T) D/E] \quad (1)$$

or

$$\beta_u = \frac{\beta_L}{(1 + (1 - T) D/E)}$$

The average of these unlevered betas serves as an estimate of unlevered beta for the division. Relever the divisional beta to reflect the division's financing mix using equation (1):

$$\beta_u = \beta_u [1 + (1 - T) D/E]$$

The betas of individual stocks tend to be fickle. They change quite rapidly. Portfolio betas, on the other hand, are more stable. Their standard errors are generally lower than that of individual beta. The weighted average of betas of stocks in the same industry group, say pharmaceutical, is called industry beta. The weights are market capitalization (number of shares outstanding multiplied by market price) of individual companies. The industry beta may also be used in the estimation of divisional cost of capital. Given here is the cost of capital for several industry groups in the US.

Industry	Industry leveraged beta	Cost of equity (percent)	Cost of debt (percent)	Debt/capital (percent)	Cost of capital (percent)
Aerospace	0.68	8.6	9.1	38.6	7.3
Airlines	0.89	10.8	9.8	70.4	7.4
Beverages	0.89	10	8.1	45.7	9.3
Cars & Trucks	1.03	12.4	8.5	46.6	8.7
Computers & Peripherals	1.36	12.9	8.6	30.7	12.7
Electronics	1.51	14.1	10.6	39.1	13.5
Oil & Gas (integrated)	0.60	7.9	8.6	46.7	6.9
Restaurants	0.80	9.5	10	46.4	8.6

Source: Stern Stewart & Co.

APPENDIX 3: NOTE ON TRANSFER PRICING

When a company's profit-centers/SBUs interact with each other as vendor and customer, a price for the service needs to be fixed. Since the transfer price is the revenue for one division and cost for another, the profitability of the unit is affected by the price. The following are the most commonly used types of transfer prices:

- **Market price:** If there is a competitive market available for the product under question, then the market-price is the most appropriate transfer price.
- **Marginal cost:** If no market exists for the product, the price that will maximize the overall profitability is the marginal cost.
- **Marginal cost plus fixed fee:** Under the marginal cost method there is no incentive for the supplying division to operate efficiently. So a fixed fee based on capacity utilization may be added to marginal cost to arrive at the transfer price.
- **Marginal cost plus opportunity cost:** When the supplier division is independent and operating at full capacity, the appropriate transfer price will be the marginal cost plus the contribution lost by transferring the productive resources to produce the product required by the other division.

APPENDIX 4: PERFORMANCE MEASURES USED IN ANNUAL INCENTIVE PLANS, IN 177 LARGE US CORPORATIONS

Performance measures used in annual incentive plans in 177 Large US corporations

	<i>Industrials</i> (n=125)		<i>Finance & Insurance</i> (n=21)		<i>Utilities</i> (n=31)	
<i>Firms with a single performance measure</i>	50		11		7	
<i>Performance measures (Number of firms)</i>	Earnings ^a	(32)	Earnings ^a	(8)	Earnings ^a	(6)
	EBFI ^c	(7)	EBIT ^b	(2)	EVA ^c	(1)
	EVA ^c	(5)	Discretionary	(1)		
	Discretionary	(2)				
	Indiv. perform	(2)				
	Other financial	(2)				
<i>Firms with two or more performance measures</i>	75		10		24	
<i>Are measures additive?</i>	Yes-83%		Yes-70%		Yes-67%	
<i>Performance measures (Number of firms)</i>	Earnings ^a	(80)	Earnings ^a	(19)	Earnings ^a	(23)
	EBIT ^b	(32)	Indiv. perform	(3)	Costs	(9)
	Indiv. perform	(25)	Sales	(1)	Op. objectives	(7)
	Sales	(21)	Op. objectives	(1)	Cust. satisf.	(6)
	Cust. satisf.	(6)			EBIT ^b	(6)
	Strategic goals	(5)			Sales	(3)
	Stock price	(5)			Safety	(3)
	Discretionary	(4)			Strategic goal?	(3)
	Op. objective	(4)			Indiv. perform	(2)
	EVA ^c	(3)			Stock price	(2)
					EVA ^{c0}	(1)

Appendix 4 contd.

Appendix 4 contd.

Firms with two or more performance measures Are measures additive?	75		10		24	
	Yes—83%		Yes—70%		Yes—67%	
	Other:		Other:		Other:	
	Financial	(11)	Financial	(1)	Financial	(3)
	Non-financial	(13)	Non-financial	(0)	Non-financial	(5)
Is accounting performance measured in absolute dollars expressed as a return (e.g., ROE), measured per-share (e.g., EPS), and/or measured as the growth or change from prior year?	Dollar value	44%	Dollar value	19%	Dollar value	22%
	Margin/return	20%	Margin/return	52%	Margin/return	32%
	Per share	19%	Per share	26%	Per share	34%
	<i>Growth rates:</i>		<i>Growth rates:</i>		<i>Growth rates:</i>	
	Dollar value	1%	Dollar value	4%	Dollar value	5%
	Margin/return	1%			Per share	5%
	Per share	6%				

Source: Kevin Murphy (1999).

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EXERCISE

1. The following data is available for a company for the period 1985–89:

	<i>(Rs '000)</i>				
	1985	1986	1987	1988	1989
NOPAT	235,029	270,140	281,950	296,642	362,744
Beginning capital	1,430,280	1,981,285	2,551,826	2,901,126	3,465,870
Long-term debt	1,013,967	2,152,208	2,577,134	1,546,824	3,255,236
Av. shares outstanding	46,970	49,840	51,905	52,670	52,272
Share price	58	66	44	49	45
Tax rate (percent)	45	46	34	34	34
T-bond rate (percent)	10.74	8.14	8.76	9.11	8.62
Yield on the company's bond (percent)	12.19	10.37	10.55	10.75	10.35
Beta	1.35	1.3	1.15	1.10	1.10

Calculate EVA, cumulative annual EVA, and percentage change in cumulative EVA during 1985–89. If the book value of equity is \$815,000 in 1985, calculate MVA.

2. A company is in the process of estimating EVA for two of its divisions: beverages and restaurants. The estimation of EVA requires an estimate of divisional cost of capital. The industry beta and average debt ratio for several industry groups is as follows:

<i>Industry</i>	<i>Industry lev. beta</i>	<i>Cost of equity (percent)</i>	<i>Cost of debt (percent)</i>	<i>Debt/ capital (percent)</i>	<i>Cost of capital (percent)</i>
Aerospace	0.68	8.6	9.1	38.6	7.3
Airlines	0.89	10.8	9.8	70.4	7.4
Beverages	0.89	10	8.1	45.7	9.3
Cars & trucks	1.03	12.4	8.5	46.6	8.7
Computers & peripherals	1.36	12.9	8.6	30.7	12.7
Electronics	1.51	14.1	10.6	39.1	13.5
Oil & gas (integrated)	0.60	7.9	8.6	46.7	6.9
Restaurants	0.80	9.5	10	46.4	8.6

Source: Stern Stewart & Co.

The beverages division has a target debt/value ratio of 40 percent and the restaurants' division has a target debt ratio of 35 percent. Calculate the cost of equity for the divisions assuming a risk-free rate of 6 percent and a risk premium of 7.5 percent.

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