

Corporate Finance: Instructor's Manual
Applied Corporate Finance - Second Edition

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This is my attempt at an instructor's manual. It is built around the slides I use for my corporate finance class at Stern (which last 14 weeks and 26 sessions). The notes for the slides are included. Please use what you want, abandon what does not work and add or modify as you go along. You can download the powerpoint slides on my website!

The Objective in Corporate Finance

"If you don't know where you are going, it does not matter how you get there"

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to the owners of the firm (if public, these would be stockholders).
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Objective: Maximize the Value of the Firm

- This is the big picture of corporate finance.
- Tie in the course outline to the big picture. (I put session numbers on this page to show when we will be doing what)
- Emphasize the common sense basis of corporate finance. Note that people have been running businesses, and some of them very well, for hundreds of years prior to the creation of corporate finance as a discipline.
- Talk about the three major components of corporate finance - the investment, financing and dividend decisions, and how corporate finance views these decisions through the prism of firm value maximization.

The Classical Viewpoint

- **Van Horne:** "In this book, we assume that the objective of the firm is to maximize its value to its stockholders"
- **Brealey & Myers:** "Success is usually judged by value: Shareholders are made better off by any decision which increases the value of their stake in the firm... The secret of success in financial management is to increase value."
- **Copeland & Weston:** The most important theme is that the objective of the firm is to maximize the wealth of its stockholders."
- **Brigham and Gapenski:** Throughout this book we operate on the assumption that the management's primary goal is stockholder wealth maximization which translates into maximizing the price of the common stock.

I picked four widely used books and quoted the “ value maximization” objective statement from each of the books to illustrate two points:

- Value maximization as an objective function is pervasive in corporate financial theory
- Not enough attention is paid to defending this objective function in most corporate finance books. The assumption is that all readers will accept this objective function, which is not necessarily true.
- It is also interesting that these four books also state the objective functions differently - Van Horne as “ stockholders value maximization”, Brealey and Myers and Copeland and Weston as stockholder wealth maximization and Brigham and Gapenski as the maximization as the stock price.
- **Question to ask :**
- Are these objective functions equivalent?
- If not, which assumption is the least restrictive and which is the most restrictive?
- What are the additional assumptions needed to get from the least to the most restrictive objective functions?

The Objective in Decision Making

- In traditional corporate finance, the objective in decision making is to maximize the value of the firm.
- A narrower objective is to maximize stockholder wealth. When the stock is traded and markets are viewed to be efficient, the objective is to maximize the stock price.
- All other goals of the firm are intermediate ones leading to firm value maximization, or operate as constraints on firm value maximization.

This is the answer to the question posed in the previous overhead.

There are alternative objective functions (Maximize market share, maximize earnings, maximize growth ...)

These are intermediate objective functions - maximizing market share by itself is valuable insofar as it increases pricing power and thus, potentially the market value.

The Criticism of Firm Value Maximization

- Maximizing stock price is not incompatible with meeting employee needs/objectives. In particular:
 - - Employees are often stockholders in many firms
 - - Firms that maximize stock price generally are firms that have treated employees well.
- Maximizing stock price does not mean that customers are not critical to success. In most businesses, keeping customers happy is the route to stock price maximization.
- Maximizing stock price does not imply that a company has to be a social outlaw.

Open up the discussion to what arguments student might have or might have heard about stock price maximization. The three that I have heard most often are listed above.

Stock price maximization implies not caring for your employees. Use a recent story of layoffs to illustrate this criticism (Eastman Kodak announced it was laying off 15,000 employees and stock price jumped \$3.50). Then note that this is the exception rather than the rule. A Conference Board study from 1994 found that companies whose stock prices have gone up are more likely to hire people than one whose stock prices have gone down. Also note that employees, especially in high tech companies, have a large stake in how well their company does because they have stock options or stock in the company.

Note that customer satisfaction is important but only in the context that satisfied customers buy more from you. What would happen to a firm that defined its objective as maximizing customer satisfaction?

A healthy company whose stock price has done well is much more likely to do social good than a company which is financially healthy. Again, note that there are social outlaws who might create social costs in the pursuit of stock price maximization (Those nasty corporate raiders..) but they are the exception rather than the rule.

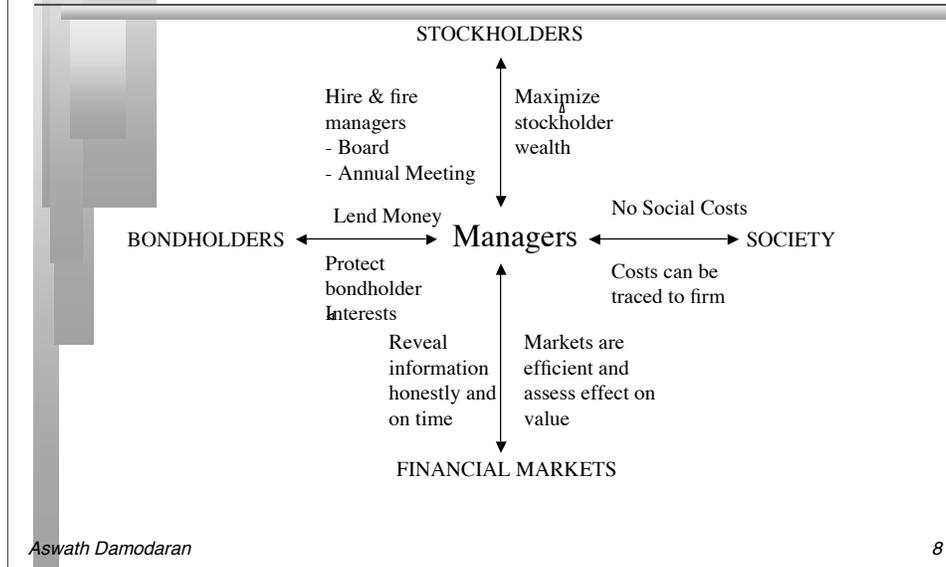
Why traditional corporate financial theory focuses on maximizing stockholder wealth.

- Stock price is easily observable and constantly updated (unlike other measures of performance, which may not be as easily observable, and certainly not updated as frequently).
- If investors are rational (are they?), stock prices reflect the wisdom of decisions, short term and long term, instantaneously.
- The objective of stock price performance provides some very elegant theory on:
 - how to pick projects
 - how to finance them
 - how much to pay in dividends

Emphasize how important it is to have an objective function that is observable and measurable. Note that stock prices provide almost instantaneous feedback (some of which is unwelcome) on every decision you make as a firm.

Consider the example of an acquisition announcement and the market reaction to it. Stock prices of the acquiring firm tend to drop in a significant proportion of acquisitions. Why might markets be more pessimistic than managers about the expected success of an acquisition? Because the track record of firms on acquisitions is not very good.

The Classical Objective Function



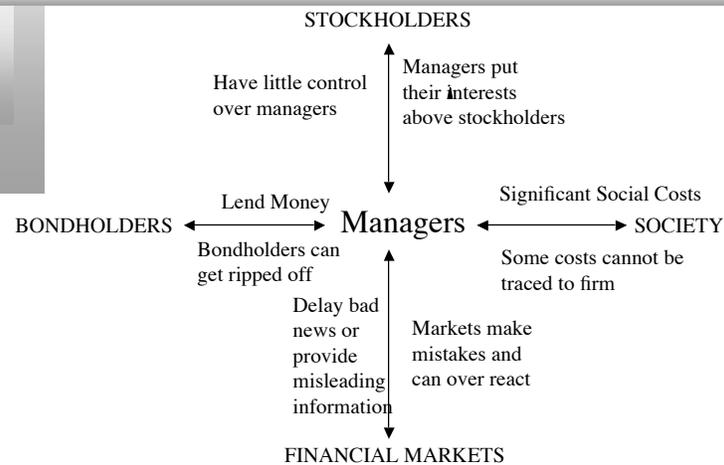
This is the utopian world. None of the assumptions are really defensible as written, and skepticism is clearly justified:

Why do we need these assumptions?

- Since, in many large firms, there is a separation of ownership from management, managers have to be fearful of losing their jobs and go out and maximize stockholder wealth. If they do not have this fear, they will focus on their own interests.
- If bondholders are not protected, stockholders can steal from them and make themselves better off, even as they make the firm less valuable.
- If markets are not efficient, maximizing stock prices may not have anything to do with maximizing stockholder wealth or firm value.
- If substantial social costs are created, maximizing stock prices may create large side costs for society (of which stockholders are members).

Note that corporate finance, done right, is not about stealing from other groups (bondholders, other stockholders or society) but about making the firm more productive and valuable.

What can go wrong?



Aswath Damodaran

9

This is my worst case scenario:

- Stockholders have little or no control over managers. Managers, consequently, put their interests above stockholder interests.
- Bondholders who do not protect themselves find stockholders expropriating their wealth.
- Information conveyed to markets is noisy, biased and sometimes misleading. Markets do not do a very good job of assimilating this information and market price changes have little to do with true value.
- Firms in the process of maximizing stockholder wealth create large social costs.

In this environment, stockholder wealth maximization is not a good objective function.

I. Stockholder Interests vs. Management Interests

- **In theory:** The stockholders have significant control over management. The mechanisms for disciplining management are the annual meeting and the board of directors.
- **In Practice:** Neither mechanism is as effective in disciplining management as theory posits.

In theory, stockholders are supposed to come to the annual meeting, and make informed judgments about whether they want to keep incumbent management in place. The board of directors is supposed to protect the stockholders.

The Annual Meeting as a disciplinary venue

- The power of stockholders to act at annual meetings is diluted by three factors
 - Most small stockholders do not go to meetings because the cost of going to the meeting exceeds the value of their holdings.
 - Incumbent management starts off with a clear advantage when it comes to the exercise of proxies. Proxies that are not voted becomes votes for incumbent management.
 - For large stockholders, the path of least resistance, when confronted by managers that they do not like, is to vote with their feet.

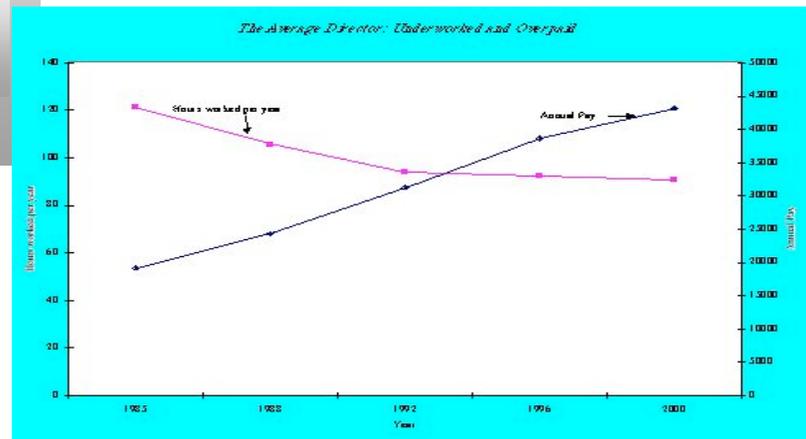
It is not irrational for small stockholders to not actively involve themselves in the management of firms, because it is not economical for them to do so.

A significant percentage of proxies do not get turned in. In many firms, the managers of the firm get the votes commanded by these proxies. That would be the equivalent of having an election and allowing the incumbent to get the votes of anyone who does not vote.

For a large stockholder like Fidelity Magellan, with its hundreds of holdings, it just might not be feasible to be an active investor. Even CALPERS, which has a history of activism, has pulled back in recent years.

The annual meeting is tightly scripted and run, making it difficult for dissident stockholders to be heard. (In Japan, in the 1980s, trouble makers were hired to heckle stockholders who tried to ask managers tough questions.)

Board of Directors as a disciplinary mechanism



Aswath Damodaran

12

This sounds judgmental and it is meant to be. Directors do not spend a great deal of time overseeing managers, and they are well paid.

The pay shown here understates the true compensation that directors make from other perks and benefits that they get (pensions, for instance).

(These numbers are from the surveys done by Korn/Ferry, an executive search firm, and come from a BusinessWeek article looking at the board.)

The CEO often hand-picks directors..

- The 1992 survey by Korn/Ferry revealed that 74% of companies relied on recommendations from the CEO to come up with new directors; Only 16% used an outside search firm. While that number has changed in recent years, CEOs still determine who sits on their boards.
- Directors often hold only token stakes in their companies. The Korn/Ferry survey found that 5% of all directors in 1992 owned less than five shares in their firms. Most directors in companies today still receive more compensation as directors than they gain from their stockholdings.
- Many directors are themselves CEOs of other firms.

This adds to why directors spend so little time on oversight. CEOs, left to themselves, will seldom pick adversarial directors. Directors also make far more money from directorships than they do from owning stock in the firm. Not surprisingly, they do not take the side of stockholders.

A Wall Street Journal article, a few years ago, looked at the phenomenon of CEOs sitting on each other's boards. It is very difficult to see how they can be objective in those cases.

Directors lack the expertise (and the willingness) to ask the necessary tough questions..

- In most boards, the CEO continues to be the chair. Not surprisingly, the CEO sets the agenda, chairs the meeting and controls the information provided to directors.
- The search for consensus overwhelms any attempts at confrontation.

Harold Geneen who ruled ITT with an iron fist during the sixties when I built itself up through acquisitions, mentions in his memoirs that almost all decisions, during his tenure, that were made by the board were unanimous.

CEOs almost always chair the board, and establish the agenda for what the board discusses.

Who's on Board? The Disney Experience - 1997

Reveta F. Bowers 1,5
Head of School
Center for Early Education

Roy E. Disney 3
Vice Chairman
The Walt Disney Company

Michael D. Eisner 3
Chairman and Chief Executive Officer
The Walt Disney Company

Stanley P. Gold 4,5
President and Chief Executive Officer
Shenrock Holdings, Inc.

Sanford M. Litvack
Senior Executive Vice President
and Chief of Corporate Operations
The Walt Disney Company

Ignacio E. Lozano, Jr. 1,2,4
Editor-in-Chief, LA OPINION

George J. Mitchell 5
Special Counsel
Verner, Lupfert, Bernart, McPherson
and Head

Thomas S. Murphy
Former Chairman
Capital Cities/ABC, Inc.

Richard A. Nunnis
Chairman
Walt Disney Attractions

Leo J. O'Donovan, S. J.
President
Georgetown University

Michael S. Ovitz 3
President
The Walt Disney Company

Sidney Potter 2,4
Chief Executive Officer
Verton-Cedric Productions

Irwin E. Russell 2,4
Attorney at Law

Robert A. M. Stern
Senior Partner
Productions

E. Gordon Walker 1
Former Chairman and Chief Executive Officer
The Walt Disney Company

Raymond L. Watson 1,2,3
Vice Chairman
The Irvine Company

Gary L. Wilson 5
Co-Chairman
Northwest Airlines Corporation

1 Member of Audit Review Committee
2 Member of Compensation Committee
3 Member of Executive Committee
4 Member of Executive Performance Plan Committee
5 Member of Nominating Committee

This may be going back in time but it may help understanding Disney's present predicament. This way Disney's board at the height of Michael Eisner's powers.

Note the number of insiders on the board. (Seven out of 16)

Also note the presence of Mr. Eisner's private attorney (Irwin Russell) and the principal of his child's elementary school (Reveta Bowers) on the board.

How independent was this board likely to be of Mr. Eisner?

The Calpers Tests for Independent Boards

- Calpers, the California Employees Pension fund, suggested three tests in 1997 of an independent board
 - Are a majority of the directors outside directors?
 - Is the chairman of the board independent of the company (and not the CEO of the company)?
 - Are the compensation and audit committees composed entirely of outsiders?
- Disney was the only S&P 500 company to fail all three tests.

Calpers was one of the first institutional investors to pay attention to corporate governance. Every year, Calpers lists the 10 companies that were the worst culprits when it came to putting managerial interests over stockholder interests.

Business Week piles on... The Worst Boards in 1997..

THE WORST BOARDS OF DIRECTORS												
RANK	FIRM	OVERALL SCORE	SURVEY SCORE	ANALYSIS SCORE	DETAILS	BOARD PERFORMANCE POLL				GOVERNANCE GUIDELINE ANALYSIS		
						SHAREHOLDER ACCOUNTABILITY	BOARD QUALITY	BOARD INDEPENDENCE	CORPORATE PERFORMANCE	SHAREHOLDER ACCOUNTABILITY	BOARD QUALITY	BOARD INDEPENDENCE
1.	DISNEY	10.3	1.8	8.5	Investors decry board for conflicts; many directors own little if any stock	3.3	4.3	2.0	5.8	-0.4	2.8	2.2
2.	AT&T	10.9	-16.6	27.5	Investors scorn board for failing to control succession, not ousting CEO	3.0	4.2	3.5	2.8	2.0	5.2	7.4
3.	H.J. HEINZ	15.4	-1.1	16.5	Longtime CEO dominates insider-filled board; resists investor calls for change	2.8	3.7	2.0	4.7	4.4	6.0	1.4
4.	ARCHER DANIELS MIDLAND	16.8	-12.2	29.0	Board changes fail to satisfy investors, who say directors still lack independence	2.3	2.1	1.3	3.5	5.6	7.6	5.0
5.	DOW JONES	21.1	1.6	19.5	Investors disenchanted with performance; weakest attendance record of any board	2.6	4.6	2.8	2.6	6.0	0.0	5.8
6.	BILLARD'S	22.0	5.0	17.0	Board loaded with insiders; lacks an outsider with retail expertise or CEO	2.0	3.0	2.0	3.5	6.4	3.2	2.0
7.	ROLLINS INTERNATIONAL	22.7	1.7	21.0	Board dominated by family members and insiders; lacks nominating panel	1.0	1.0	0.0	2.0	4.0	7.6	4.4
8.	OCCIDENTAL PETROLEUM	24.0	-1.5	25.5	Investors outraged over \$95 million payout to CEO by cozy, aging board	1.3	2.0	1.1	2.0	2.8	6.0	5.8
9.	ODGEN	27.2	4.2	23.0	Board has three consultants and a lawyer who do business with company	2.0	1.5	2.0	2.5	2.0	8.4	4.0
10.	MAXXAM	28.3	4.3	24.5	Tiny board with little business experience dominated by CEO	1.5	2.0	1.0	3.5	3.6	2.0	6.0

A poor board does not necessarily translate into a poorly managed firm. For instance, Disney and Coca Cola do not have highly rated boards but delivered superior returns to stockholders over the period.

As a stockholder, however, the fact that returns are good might not compensate for the fact that you do not believe that managers are responsive to your interests. (At the Disney stockholder meetings in both 1996 and 1997, there was substantial stockholder dissension in spite of the fact that the stock had performed very well in both periods.)

⌚ Application Test: Who's on board?

- Look at the board of directors for your firm. Analyze
 - How many of the directors are inside directors (Employees of the firm, ex-managers)?
 - Is there any information on how independent the directors in the firm are from the managers?

You can usually find this information for your firm in the 14-DEF filing that all firms in the US have to make with the SEC. If you have a non-US firm, this becomes more difficult to do. While you can usually find the names of the directors from the annual report, you may have a difficult time finding out the linkages (and potential conflicts) these directors may have with the managers of the firm.

So, what next? When the cat is idle, the mice will play

- When managers do not fear stockholders, they will often put their interests over stockholder interests
- **Greenmail:** The (managers of) target of a hostile takeover buy out the potential acquirer's existing stake, at a price much greater than the price paid by the raider, in return for the signing of a 'standstill' agreement.
 - **Golden Parachutes:** Provisions in employment contracts, that allows for the payment of a lump-sum or cash flows over a period, if managers covered by these contracts lose their jobs in a takeover.
 - **Poison Pills:** A security, the rights or cashflows on which are triggered by an outside event, generally a hostile takeover, is called a poison pill.
 - **Shark Repellents:** Anti-takeover amendments are also aimed at dissuading hostile takeovers, but differ on one very important count. They require the assent of stockholders to be instituted.
 - **Overpaying on takeovers**

These actions could all suggest that managerial interests are being put over stockholder interests. (Some of these actions, though, may also increase stockholder wealth. Managers will, of course, always claim that these actions are in stockholders' best interests)

Overpaying on takeovers

- The quickest and perhaps the most decisive way to impoverish stockholders is to overpay on a takeover.
- The stockholders in acquiring firms do not seem to share the enthusiasm of the managers in these firms. Stock prices of bidding firms decline on the takeover announcements a significant proportion of the time.
- Many mergers do not work, as evidenced by a number of measures.
 - The profitability of merged firms relative to their peer groups, does not increase significantly after mergers.
 - An even more damning indictment is that a large number of mergers are reversed within a few years, which is a clear admission that the acquisitions did not work.

Managers of acquiring firms almost always make every acquisition sound like a good idea. Stockholders are more skeptical (as is evidenced by the behavior of acquiring firm stock prices on the announcement of acquisitions).

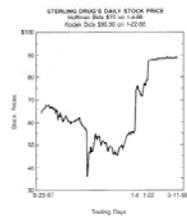
Stockholders must be right, on average, since many takeovers do not seem to work in terms on increasing stockholder wealth or making the firms more efficient.

(Good references

The Synergy Trap, Mark Sirower)

A Case Study: Kodak - Sterling Drugs

■ Eastman Kodak's Great Victory

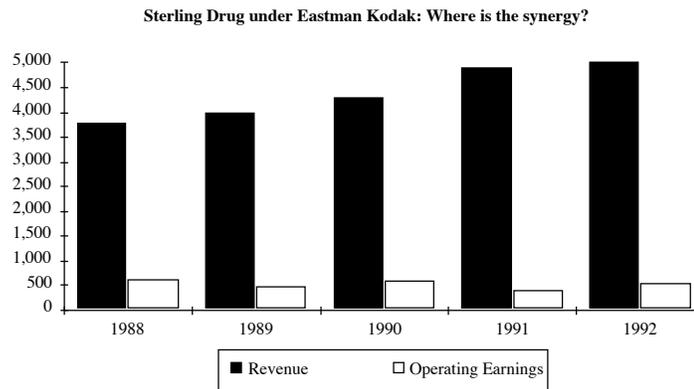


Kodak's market reaction indicates that investors expected no synergies:
Kodak's bid = \$5.1 billion
Sterling's market value 20 days prior to announcement = \$2.9 billion
Premium bid = \$2.2 billion
Decrease in Kodak's market value = \$2.2 billion
SOURCE: The Ahear Group, Inc.

Note the difference in stock price behavior of the target and bidding firms.

Note also the symmetry between premium paid over the market price at Sterling Drugs (\$ 2.1 billion) and value lost at Kodak (\$2.2 billion). Kodak argued that this merger would create synergy and that was why they were paying the premium. The market did not seem to see any synergy.

Earnings and Revenues at Sterling Drugs



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22

Where is the synergy?

Profits essentially stagnated at Sterling after the Kodak acquisition. The rest of the drug industry reported an annual growth in earnings of 15% a year during this period.

Why is synergy so hard to capture?

- Firms do not plan for it at the time of the acquisitions
- Culture shock
- Unrealistic assumptions (AT&T and NCR)

Kodak Says Drug Unit Is Not for Sale (NY Times, 8/93)

- An article in the NY Times in August of 1993 suggested that Kodak was eager to shed its drug unit.
 - In response, Eastman Kodak officials say they have no plans to sell Kodak's Sterling Winthrop drug unit.
 - Louis Mattis, Chairman of Sterling Winthrop, dismissed the rumors as "massive speculation, which flies in the face of the stated intent of Kodak that it is committed to be in the health business."
- A few months later... Taking a stride out of the drug business, Eastman Kodak said that the Sanofi Group, a French pharmaceutical company, agreed to buy the prescription drug business of Sterling Winthrop for **\$1.68 billion**.
 - Shares of Eastman Kodak rose 75 cents yesterday, closing at \$47.50 on the New York Stock Exchange.
 - Samuel D. Isaly an analyst , said the announcement was "very good for Sanofi and very good for Kodak."
 - "When the divestitures are complete, Kodak will be entirely focused on imaging," said George M. C. Fisher, the company's chief executive.
 - The rest of the Sterling Winthrop was sold to Smithkline for \$2.9 billion.

As in the old Soviet Union, nothing is true until it is officially denied.

⌚ Application Test: Who owns/runs your firm?

Look at: Bloomberg printout **HDS** for your firm

- Looking at the top 15 stockholders in your firm, are top managers in your firm also large stockholders in the firm?
- Is there any evidence that the top stockholders in the firm play an active role in managing the firm?

You can also get this information from Yahoo! Finance by going into company profiles and clicking on institutional investors...

Disney's top stockholders in 2003

<HELP> for explanation. dgp Equity HDS
 Enter #<GD> to select aggregate portfolio and see detailed information

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DIS **US** **HOLDINGS SEARCH** Page 1 / 100

Holder name	Portfolio Name	Source	Held	Outstd	Percent	Latest Filing
						Change Date
BARCLAYS GLOBAL	BARCLAYS BANK PLC	13F	83,630M	4,095	1,750M	09/02
CITIGROUP INC	CITIGROUP INCORPORAT	13F	62,857M	3,078	4,811M	09/02
FIDELITY MANAGEM	FIDELITY MANAGEMENT	13F	56,125M	2,748	5,932M	09/02
STATE STREET	STATE STREET CORPORA	13F	54,635M	2,675	2,239M	09/02
SOUTHEASTERN ASST	SOUTHEASTERN ASSET M	13F	47,333M	2,318	14,604M	09/02
STATE FARM MUTU	STATE FARM MUTUAL RU	13F	41,938M	2,054	120,599	09/02
VANGUARD GROUP	VANGUARD GROUP INC	13F	34,721M	1,700	-83,839	09/02
MELLON BANK N A	MELLON BANK CORP	13F	32,693M	1,601	957,489	09/02
PUTNAM INVEST	PUTNAM INVESTMENT MA	13F	28,153M	1,379	-11,468M	09/02
LORD ABBETT & CO	LORD ABBETT & CO	13F	24,541M	1,202	5,385M	09/02
MONTAG CALDWELL	MONTAG & CALDWELL IN	13F	24,466M	1,190	-11,373M	09/02
DEUTSCHE BANK AG	DEUTSCHE BANK AG	13F	23,239M	1,130	-5,002M	09/02
MORGAN STANLEY	MORGAN STANLEY	13F	19,655M	0,962	3,482M	09/02
HARICE T ROWE	T ROWE PRICE ASSOCIA	13F	19,133M	0,937	2,325M	09/02
ISROU EDWARD DISNE	n/a	PROXY	17,547M	0,859	-126,710	12/01
ISRAVA FINANCIAL	ALLIANCE CAPITAL MAN	13F	14,283M	0,699	69,353	09/02
JPMORGAN CHASE	JP MORGAN CHASE & CO	13F	14,209M	0,696	-462,791	09/02
Sub-totals for current page:			599,159M	29,340		

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25

Not a single individual investor in the list other than Roy Disney who was the 15th largest stockholder... Managers are not significant stockholders in Disney (and the same can be said for most large publicly traded firms).

The response is not to give them options since owning options does not create the same incentives as owning shares...

Consider the following scenarios:

1. Managers are not significant stockholders in the firm: Significant potential for conflicts of interest between managers and stockholders.
2. Individuals are significant stockholders in the firm as well as part of top management. Usually, these are founder-owners of the firm and the firms tend to be younger firms or family run businesses that have recently made the transition to publicly traded firms. Smaller potential for conflict between managers and stockholders, but potential for conflict between inside stockholders and outside stockholders.
3. Trusts or descendants of owners are significant stockholders in the firm but are not an active part of incumbent management. Power that these stockholders retain to replace managers reduces potential for conflict of interest but power is reduced as holdings get diluted among lots of family members.
4. Another company is largest stockholder in firm. In this case, trace out who owns stock in the other company....

A confounding factor: Voting versus Non-voting Shares - Aracruz

- Aracruz Cellulose, like most Brazilian companies, had multiple classes of shares at the end of 2002.
 - The common shares had all of the voting rights and were held by incumbent management, lenders to the company and the Brazilian government.
 - Outside investors held the non-voting shares, which were called preferred shares, and had no say in the election of the board of directors. At the end of 2002,
- Aracruz was managed by a board of seven directors, composed primarily of representatives of those who own the common (voting) shares, and an executive board, composed of three managers of the company.

When voting rights vary across shares, incumbent managers can consolidate their hold on a company with relatively small holdings. This reduces the power that stockholders have in these companies.

Differences in voting rights are common outside the U.S. In Asia and Latin America, incumbent managers or family members can control companies with relatively small holdings with complete impunity.

Another confounding factor... Cross Holdings

- In a cross holding structure, the largest stockholder in a company can be another company. In some cases, companies can hold stock in each other.
- Cross holding structures make it more difficult for stockholders in any of the companies involved to
 - decipher what is going on in each of the individual companies
 - decide which management to blame or reward
 - change managers even if they can figure out who to blame.

Deutsche is the largest stockholder in Daimler Chrysler, the German automobile company, and Allianz, the German insurance company, is the largest stockholder in Deutsche.

II. Stockholders' objectives vs. Bondholders' objectives

- In theory: there is no conflict of interests between stockholders and bondholders.
- In practice: Stockholder and bondholders have different objectives. Bondholders are concerned most about safety and ensuring that they get paid their claims. Stockholders are more likely to think about upside potential

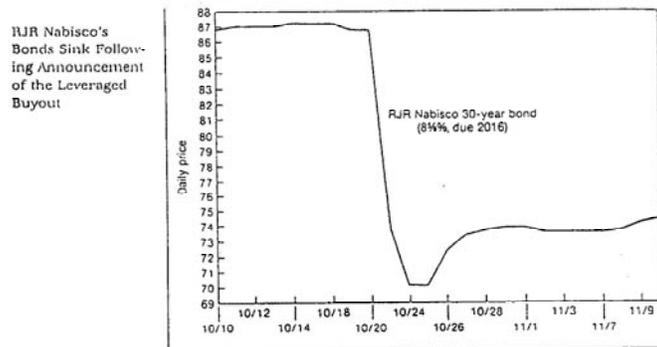
Bondholders include all lenders (including banks). The actions listed above transfer wealth from them to stockholders.

Examples of the conflict..

- Increasing dividends significantly: When firms pay cash out as dividends, lenders to the firm are hurt and stockholders may be helped. This is because the firm becomes riskier without the cash.
- Taking riskier projects than those agreed to at the outset: Lenders base interest rates on their perceptions of how risky a firm's investments are. If stockholders then take on riskier investments, lenders will be hurt.
- Borrowing more on the same assets: If lenders do not protect themselves, a firm can borrow more money and make all existing lenders worse off.

In each of these cases, you are likely to see stock prices go up on the action and bond prices go down.

An Extreme Example: Unprotected Lenders?



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30

Nabisco's bond price plummeted on the day of the LBO, while the stock price soared.

Is this just a paper loss? (You still get the same coupon. Only the price has changed)

Not really. There is now a greater chance of default in Nabisco, for which you as a lender are not compensated.

How could Nabisco's bondholders have protected themselves?

Put in a covenant that allowed them to turn the bonds into the firm in the event of something like an LBO and receive the face value of the bond. (Puttable bonds)

Make the coupon payments on the bond a function of the company's rating (Rating sensitive bonds)

III. Firms and Financial Markets

- **In theory:** Financial markets are efficient. Managers convey information honestly and in a timely manner to financial markets, and financial markets make reasoned judgments of the effects of this information on 'true value'. As a consequence-
 - A company that invests in good long term projects will be rewarded.
 - Short term accounting gimmicks will not lead to increases in market value.
 - Stock price performance is a good measure of company performance.
- **In practice:** There are some holes in the 'Efficient Markets' assumption.

An efficient market is one where the market price reflects the true value of the equity in the firm (and any changes in it). It does not imply perfection on the part of markets, but it does imply a link between what happens to the stock price and what happens to true value.

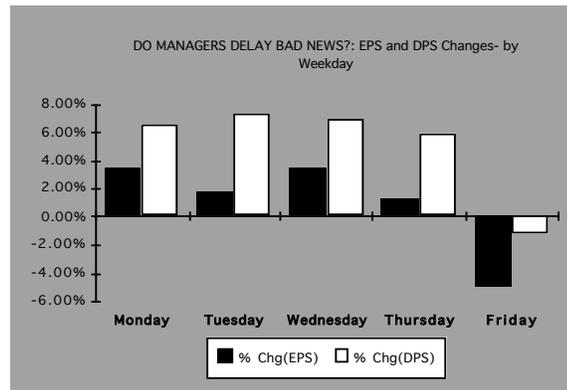
Managers control the release of information to the general public

- Information (especially negative) is sometimes suppressed or delayed by managers seeking a better time to release it.
- In some cases, firms release intentionally misleading information about their current conditions and future prospects to financial markets.

Consider an example of Bre-X, which told markets that it had found one of the largest gold reserves in the world in Indonesia in the early 1990s. In 1997, it was revealed that there was no gold, and that the firm had salted the mine with gold to fool investors. When the news eventually came out, the stock price dropped to zero.

Bre-X was followed by 9 analysts, all of whom professed to be shocked by the revelation.

Evidence that managers delay bad news..



Aswath Damodaran

33

This study looked at thousands of earnings and dividend announcements, categorized by day of the week in the 1980s. Either bad things tend to happen on Fridays, or managers are trying to hold on to bad news until Friday. In fact, most of the bad news on Friday comes out after 4 pm, and markets have closed.

Managers do not trust markets to not panic on bad news.

This may explain a portion of the weekend effect - stock prices tend to go down on Mondays.

Some critiques of market efficiency..

- Prices are much more volatile than justified by the underlying fundamentals. Earnings and dividends are much less volatile than stock prices.
- Financial markets overreact to news, both good and bad.
- Financial markets are manipulated by insiders; Prices do not have any relationship to value.
- Financial markets are short-sighted, and do not consider the long-term implications of actions taken by the firm.

The Shiller effect - stock prices are much volatile than justified by looking at the underlying dividends and other fundamentals - is debatable. While people often present anecdotal evidence on the phenomenon, they under estimate the volatility of the underlying fundamentals.

For every researcher who claims to find evidence that markets overreact, there seems to be another researcher who finds evidence that it under reacts. And no one seems to be able to systematically make real money (as opposed to hypothetical money) on these supposed over or under reactions.

Corporate strategists, like Michael Porter, argue that market prices are based upon short term forecasts of earnings and do not factor in the long term.

In markets outside the US, the argument is that prices are moved by insiders and that they have no relationship to value.

Are Markets Short term?

- Focusing on market prices will lead companies towards short term decisions at the expense of long term value.
 - a. I agree with the statement
 - b. I do not agree with this statement
- Allowing managers to make decisions without having to worry about the effect on market prices will lead to better long term decisions.
 - a. I agree with this statement
 - b. I do not agree with this statement

This again has no right answers. Most participants, given the barrage of criticism that they hear about markets on the outside, come in with the perception that prices are short term.

Are Markets short term? Some evidence that they are not..

- There are hundreds of start-up and small firms, with no earnings expected in the near future, that raise money on financial markets. Why would a myopic market that cares only about short term earnings attach high prices to these firms?
- If the evidence suggests anything, it is that markets do not value current earnings and cashflows enough and value future earnings and cashflows too much. After all, studies suggest that low PE stocks are under priced relative to high PE stocks
- The market response to research and development and investment expenditure is generally positive.

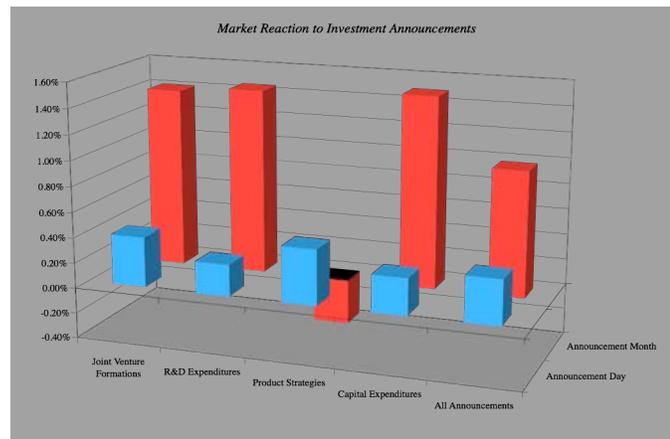
None of these pieces of evidence is conclusive proof that markets are long term, but the evidence does add up to markets being much more long term than they are given credit for. There is little evidence, outside of anecdotal evidence, that markets are short term.

The best support for markets comes from looking at how well they do relative to expert prognosticators:

1. Forward currency rates are better predictors of expected currency rates in the future than economic forecasters.
2. Orange juice futures markets seem to predict the weather in Florida better than weather forecasters.
3. The Iowa Election Market has predicted election results better than political pundits.

It is true that there are many short term investors and analysts in the market, but the real question is whether the market price is able to get past their short term considerations and focus on the long term. Sometimes, it does not but surprisingly often, it does.

Market Reaction to Investment Announcements



Aswath Damodaran

37

Note that the price increases tend to be small, since these announcements tend to affect value by only small amounts. The effect seems to correlate with the weightiness of each announcement, being lower for product strategy announcements (which might signify little or no real investment) and being higher for the other three.

Markets also tend to be discriminating and look at both the type of business where the R&D is being spent (Intel versus Kellogg) and the track record of the managers spending the money.

IV. Firms and Society

- **In theory:** There are no costs associated with the firm that cannot be traced to the firm and charged to it.
- **In practice:** Financial decisions can create social costs and benefits.
 - A social cost or benefit is a cost or benefit that accrues to society as a whole and not to the firm making the decision.
 - Environmental costs (pollution, health costs, etc..)
 - Quality of Life' costs (traffic, housing, safety, etc.)
 - Examples of social benefits include:
 - creating employment in areas with high unemployment
 - supporting development in inner cities
 - creating access to goods in areas where such access does not exist

Social costs and benefits exist in almost every financial decision.

Social Costs and Benefits are difficult to quantify because ..

- They might not be known at the time of the decision (Example: Manville and asbestos)
- They are 'person-specific' (different decision makers weight them differently)
- They can be paralyzing if carried to extremes

Economists measure social benefits in “utils”. Few, if any, businesses have figured out a way of actually putting this into practice.

A Hypothetical Example

Assume that you work for Disney and that you have an opportunity to open a store in an inner-city neighborhood. The store is expected to lose about \$100,000 a year, but it will create much-needed employment in the area, and may help revitalize it.

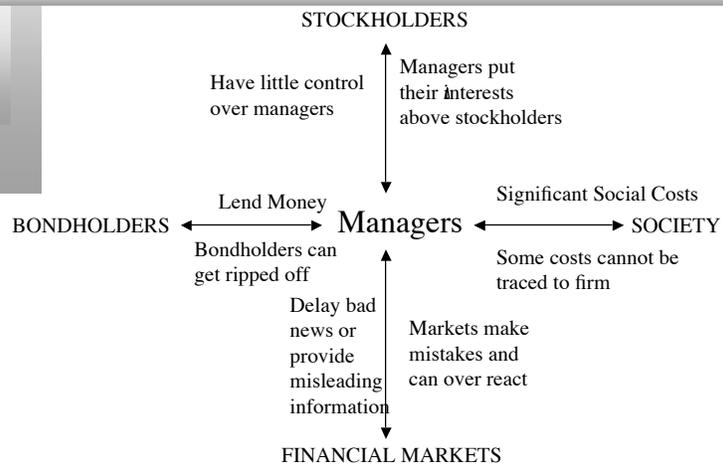
- Would you open the store?
 - a) Yes
 - b) No
- If yes, would you tell your stockholders and let them vote on the issue?
 - a) Yes
 - b) No
- If no, how would you respond to a stockholder query on why you were not living up to your social responsibilities?

I do this survey in three parts.

First, I allow people to make the choice of whether they would open the store. I then pick someone who would open the store and press them on whether they would reveal this to their stockholders. If the answer is No, I point out that it is after all the stockholders' wealth. If the answer is Yes, I then ask them whether they would let stockholders vote (if not on individual store openings, on the money that the firm will spend collectively on being socially responsible)

I also ask people why they would open the store. If the answer is that they would do it for the publicity, I counter that it is advertising and not social responsibility that is driving the decision. There is nothing wrong with being socially responsible and getting economically rewarded for it. In fact, if societies want to make firms socially responsible they have to make it in their economic best interests to do so.

So this is what can go wrong...



Aswath Damodaran

41

This is my worst case scenario:

- Stockholders have little or no control over managers. Managers, consequently, put their interests above stockholder interests.
- Bondholders who do not protect themselves find stockholders expropriating their wealth.
- Information conveyed to markets is noisy, biases and sometimes misleading. Markets do not do a very good job of assimilating this information and market price changes have little to do with true value.
- Firms in the process of maximizing stockholder wealth create large social costs.

In this environment, stockholder wealth maximization is not a good objective function.

Traditional corporate financial theory breaks down when ...

- The interests/objectives of the decision makers in the firm conflict with the interests of stockholders.
- Bondholders (Lenders) are not protected against expropriation by stockholders.
- Financial markets do not operate efficiently, and stock prices do not reflect the underlying value of the firm.
- Significant social costs can be created as a by-product of stock price maximization.

This summarizes the break down in each of the linkages noted on the previous page.

When traditional corporate financial theory breaks down, the solution is:

- To choose a different mechanism for corporate governance
- To choose a different objective for the firm.
- To maximize stock price, but reduce the potential for conflict and breakdown:
 - Making managers (decision makers) and employees into stockholders
 - By providing information honestly and promptly to financial markets

At this point, things look pretty bleak for stock price maximization. These are the three choices that we have, if we abandon pure stock price maximization as an objective function.

An Alternative Corporate Governance System

- Germany and Japan developed a different mechanism for corporate governance, based upon corporate cross holdings.
 - In Germany, the banks form the core of this system.
 - In Japan, it is the keiretsus
 - Other Asian countries have modeled their system after Japan, with family companies forming the core of the new corporate families
- At their best, the most efficient firms in the group work at bringing the less efficient firms up to par. They provide a corporate welfare system that makes for a more stable corporate structure
- At their worst, the least efficient and poorly run firms in the group pull down the most efficient and best run firms down. The nature of the cross holdings makes it very difficult for outsiders (including investors in these firms) to figure out how well or badly the group is doing.

In the 1980s, Michael Porter argued that US companies should move towards the Japanese system. The Japanese and German systems tend to do well in stable environments, where failure tends to be unsystematic (a firm here and a firm there). They can take care of their “ failures” and nurse them back to health, rather than exposing themselves to the costs associated with failure.

These systems break down when problems are wide spread and systematic. Contrast the way US banks dealt with problem loans on their balance sheets (markets forced them to deal with these problems quickly) and the way Japanese banks have dealt with them (by hiding them and hoping they go away)

Choose a Different Objective Function

- Firms can always focus on a different objective function. Examples would include
 - maximizing earnings
 - maximizing revenues
 - maximizing firm size
 - maximizing market share
 - maximizing EVA
- The key thing to remember is that these are intermediate objective functions.
 - To the degree that they are correlated with the long term health and value of the company, they work well.
 - To the degree that they do not, the firm can end up with a disaster

Consider each of these objectives. If you put them through the same tests that we did stock price maximization, you come up with far more problems with each. Note that firms might pick an intermediate objective (like market share) when it is correlated with firm value but continue to use it, even after it loses this link. Do you want a 100% market share of a losing business?

Maximize Stock Price, subject to ..

- The strength of the stock price maximization objective function is its internal self correction mechanism. Excesses on any of the linkages lead, if unregulated, to counter actions which reduce or eliminate these excesses
- In the context of our discussion,
 - managers taking advantage of stockholders has lead to a much more active market for corporate control.
 - stockholders taking advantage of bondholders has lead to bondholders protecting themselves at the time of the issue.
 - firms revealing incorrect or delayed information to markets has lead to markets becoming more “skeptical” and “punitive”
 - firms creating social costs has lead to more regulations, as well as investor and customer backlashes.

The strength of market based systems is that they are both ruthless and quick in correcting errors, once they are spotted.

These constraints flow from the earlier framework, where we introduced what can go wrong with each linkage.

The Stockholder Backlash

- Institutional investors such as Calpers and the Lens Funds have become much more active in monitoring companies that they invest in and demanding changes in the way in which business is done
- Individuals like Michael Price specialize in taking large positions in companies which they feel need to change their ways (Chase, Dow Jones, Readers' Digest) and push for change
- At annual meetings, stockholders have taken to expressing their displeasure with incumbent management by voting against their compensation contracts or their board of directors

All of these developments represent the backlash to managers putting their interests over stockholder interests.

In response, boards are becoming more independent...

- Boards have become smaller over time. The median size of a board of directors has decreased from 16 to 20 in the 1970s to between 9 and 11 in 1998. The smaller boards are less unwieldy and more effective than the larger boards.
- There are fewer insiders on the board. In contrast to the 6 or more insiders that many boards had in the 1970s, only two directors in most boards in 1998 were insiders.
- Directors are increasingly compensated with stock and options in the company, instead of cash. In 1973, only 4% of directors received compensation in the form of stock or options, whereas 78% did so in 1998.
- More directors are identified and selected by a nominating committee rather than being chosen by the CEO of the firm. In 1998, 75% of boards had nominating committees; the comparable statistic in 1973 was 2%.

While these trends are positive, note that many of these better boards (at least as seen from the vantage point of 1998) were responsible for the scandals of the bull market (Enron, Worldcom, Tyco...) In bull markets and strong economies, boards tend to get lazy.

Disney's Board in 2003

<i>Board Members</i>	<i>Occupation</i>
Reveta Bowers	Head of school for the Center for Early Education,
John Bryson	CEO and Chairman of Con Edison
Roy Disney	Head of Disney Animation
Michael Eisner	CEO of Disney
Judith Estrin	CEO of Packet Design (an internet company)
Stanley Gold	CEO of Shamrock Holdings
Robert Iger	Chief Operating Officer, Disney
Monica Lozano	Chief Operation Officer, La Opinion (Spanish newspaper)
George Mitchell	Chairman of law firm (Verner, Liipfert, et al.)
Thomas S. Murphy	Ex-CEO, Capital Cities ABC
Leo O'Donovan	Professor of Theology, Georgetown University
Sidney Poitier	Actor, Writer and Director
Robert A.M. Stern	Senior Partner of Robert A.M. Stern Architects of New York
Andrea L. Van de Kamp	Chairman of Sotheby's West Coast
Raymond L. Watson	Chairman of Irvine Company (a real estate corporation)
Gary L. Wilson	Chairman of the board, Northwest Airlines.

Some improvement over 1997 but most of the directors are still there...

The most obvious conflict (Irwin Russell) has been removed. Still, there are far too many directors on this board (16), too many of them are still insiders (4) and there are too many CEOs of other firms. Nevertheless, this board is a much better one than the 1997 board. What precipitated the changes?

1. Poor financial and stock price performance
2. Pressure from major stockholders (like Stanley Gold)
3. Stockholder distrust of management
4. Big deals (like the Cap Cities acquisition) that have gone bad...
5. Enronitis...

Changes in corporate governance at Disney

- Required at least two executive sessions of the board, without the CEO or other members of management present, each year.
- Created the position of non-management presiding director, and appointed Senator George Mitchell to lead those executive sessions and assist in setting the work agenda of the board.
- Adopted a new and more rigorous definition of director independence.
- Required that a substantial majority of the board be comprised of directors meeting the new independence standards.
- Provided for a reduction in committee size and the rotation of committee and chairmanship assignments among independent directors.
- Added new provisions for management succession planning and evaluations of both management and board performance
- Provided for enhanced continuing education and training for board members.

These changes were all welcome but they were being made in response to widespread stockholder anger. They would have been more effective and believable if they had been adopted at the height of Eisner's powers (say, in 1996)....

The Hostile Acquisition Threat

- The typical target firm in a hostile takeover has
 - a return on equity almost 5% lower than its peer group
 - had a stock that has significantly under performed the peer group over the previous 2 years
 - has managers who hold little or no stock in the firm
- In other words, the best defense against a hostile takeover is to run your firm well and earn good returns for your stockholders
- Conversely, when you do not allow hostile takeovers, this is the firm that you are most likely protecting (and not a well run or well managed firm)

This is the ultimate threat. Managers often have deathbed conversions to become advocates for stockholder wealth maximization, when faced with the threat of a hostile takeover.

For Disney, this wake-up call came in 2004, when Comcast announced a hostile acquisition bid for Disney. Though the bid failed, it shook up the company and led to Eisner's decision to step down in 2006.

Is there a payoff to better corporate governance?

- In the most comprehensive study of the effect of corporate governance on value, a governance index was created for each of 1500 firms based upon 24 distinct corporate governance provisions.
 - Buying stocks that had the strongest investor protections while simultaneously selling shares with the weakest protections generated an annual excess return of 8.5%.
 - Every one point increase in the index towards fewer investor protections decreased market value by 8.9% in 1999
 - Firms that scored high in investor protections also had higher profits, higher sales growth and made fewer acquisitions.
- The link between the composition of the board of directors and firm value is weak. Smaller boards do tend to be more effective.
- On a purely anecdotal basis, a common theme at problem companies is an ineffective board that fails to ask tough questions of an imperial CEO,

The bottom line is this. Changing the way boards of directors are chosen cannot change the way companies are governed. You need informed and active stockholders and a responsive management to make corporate governance work. When it does, stockholders are better off.

The Bondholders' Defense Against Stockholder Excesses

- More restrictive covenants on investment, financing and dividend policy have been incorporated into both private lending agreements and into bond issues, to prevent future "Nabiscos".
- New types of bonds have been created to explicitly protect bondholders against sudden increases in leverage or other actions that increase lender risk substantially. Two examples of such bonds
 - Puttable Bonds, where the bondholder can put the bond back to the firm and get face value, if the firm takes actions that hurt bondholders
 - Ratings Sensitive Notes, where the interest rate on the notes adjusts to that appropriate for the rating of the firm
- More hybrid bonds (with an equity component, usually in the form of a conversion option or warrant) have been used. This allows bondholders to become equity investors, if they feel it is in their best interests to do so.

Bondholders, responding to the Nabisco fiasco and other cases where stockholders expropriated their wealth, have become much more savvy about protecting themselves (using covenants or special features added to bonds) or getting an equity stake in the business (as is the case with convertibles)

The Financial Market Response

- While analysts are more likely still to issue buy rather than sell recommendations, the payoff to uncovering negative news about a firm is large enough that such news is eagerly sought and quickly revealed (at least to a limited group of investors).
- As investor access to information improves, it is becoming much more difficult for firms to control when and how information gets out to markets.
- As option trading has become more common, it has become much easier to trade on bad news. In the process, it is revealed to the rest of the market.
- When firms mislead markets, the punishment is not only quick but it is savage.

The distinction between the US and most foreign markets is the existence of a private market for information. In many countries, firms are the only source of information about themselves, leading to very biased information.

The more avenues there are for investors to trade on information (including option markets), the more likely it is that prices will contain that information.

The Societal Response

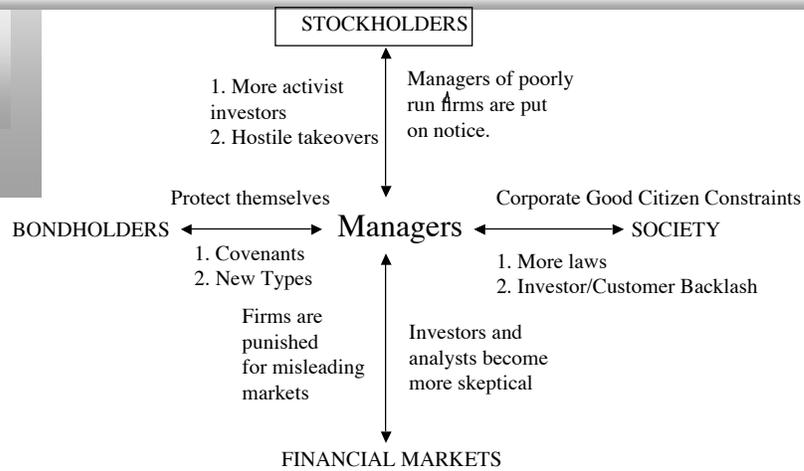
- If firms consistently flout societal norms and create large social costs, the governmental response (especially in a democracy) is for laws and regulations to be passed against such behavior.
- For firms catering to a more socially conscious clientele, the failure to meet societal norms (even if it is legal) can lead to loss of business and value
- Finally, investors may choose not to invest in stocks of firms that they view as social outcasts.

None of these measures is perfect or complete, but they reflect the tug-of-war between private and public interests.

Here are some good examples for each:

1. After the Exxon-Valdez oil spill in the alter 1980s, many states and the federal government tightened regulations on oil tankers... The same is true for tobacco firms, where laws were tightened both on smoking in general and tobacco company advertising in particular.
2. After public interest groups claimed that speciality retailers were using under-age labor to run their factories, many retailers saw sales decline.
3. Many pension funds (and university endowment funds) are restricted from investing in sin stocks.

The Counter Reaction



This summarizes the objective function of maximizing stockholder wealth, with the fixes noted on the last few pages.

So what do you think?

- At this point in time, the following statement best describes where I stand in terms of the right objective function for decision making in a business
 - a) Maximize stock price or stockholder wealth, with no constraints
 - b) Maximize stock price or stockholder wealth, with constraints on being a good social citizen.
 - c) Maximize profits or profitability
 - d) Maximize market share
 - e) Maximize Revenues
 - f) Maximize social good
 - g) None of the above

If the sales pitch has worked, most choose to maximize stock price, subject to constraint. If it has not, you have a long semester ahead of you.

In reasonably efficient markets, where bondholders and lenders are protected, stock prices are maximized where firm value is maximized. Thus, these objective functions become equivalent.

The Modified Objective Function

- For publicly traded firms in reasonably efficient markets, where bondholders (lenders) are protected:
 - Maximize Stock Price: This will also maximize firm value
- For publicly traded firms in inefficient markets, where bondholders are protected:
 - Maximize stockholder wealth: This will also maximize firm value, but might not maximize the stock price
- For publicly traded firms in inefficient markets, where bondholders are not fully protected
 - Maximize firm value, though stockholder wealth and stock prices may not be maximized at the same point.
- For private firms, maximize stockholder wealth (if lenders are protected) or firm value (if they are not)

These are the guiding objectives that we will use. For the publicly traded firms in our analysis, we will view maximizing stock prices as our objective function (but in the context of efficient markets and protected lenders). For the private firm, we will focus on maximizing stockholder wealth.

Risk and Return Models: Equity and Debt

The first and perhaps biggest part of corporate finance.

First Principles

- Invest in projects that yield a return greater than the **minimum acceptable hurdle rate**.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

The focus of the first part of this investment analysis section is on coming up with a minimum acceptable hurdle rate. In the process, we have to grapple with the question of what risk is and how to bring risk into the hurdle rate.

The notion of a benchmark

- Since financial resources are finite, there is a hurdle that projects have to cross before being deemed acceptable.
- This hurdle will be higher for riskier projects than for safer projects.
- A simple representation of the hurdle rate is as follows:
$$\text{Hurdle rate} = \text{Riskless Rate} + \text{Risk Premium}$$
- The two basic questions that every risk and return model in finance tries to answer are:
 - How do you measure risk?
 - How do you translate this risk measure into a risk premium?

Underlying the idea of a hurdle rate is the notion that projects have to earn a benchmark rate of return to be accepted, and that this benchmark should be higher for riskier projects than for safer ones.

What is Risk?

- Risk, in traditional terms, is viewed as a 'negative'. Webster's dictionary, for instance, defines risk as "exposing to danger or hazard". The Chinese symbols for risk, reproduced below, give a much better description of risk

危機

- The first symbol is the symbol for "danger", while the second is the symbol for "opportunity", making risk a mix of danger and opportunity.

Note that risk is neither good nor bad. It is a combination of danger and opportunity - you cannot have one without the other.

When businesses want opportunity (higher returns), they have to live with the higher risk.

Any sales pitch that offers returns without risk is a pipe dream.

A good risk and return model should...

1. It should come up with a measure of risk that applies to all assets and not be asset-specific.
2. It should clearly delineate what types of risk are rewarded and what are not, and provide a rationale for the delineation.
3. It should come up with standardized risk measures, i.e., an investor presented with a risk measure for an individual asset should be able to draw conclusions about whether the asset is above-average or below-average risk.
4. It should translate the measure of risk into a rate of return that the investor should demand as compensation for bearing the risk.
5. It should work well not only at explaining past returns, but also in predicting future expected returns.

Before we embark on looking at risk and return models, it pays to specify what a good model will look like...

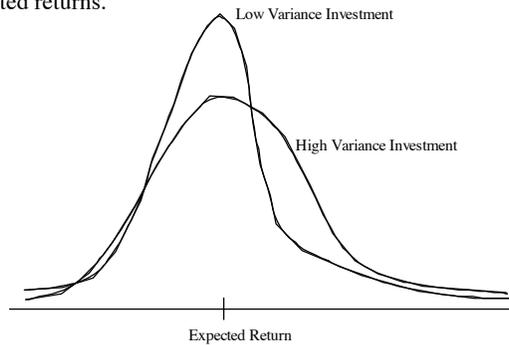
The Capital Asset Pricing Model

- Uses variance of actual returns around an expected return as a measure of risk.
- Specifies that a portion of variance can be diversified away, and that is only the non-diversifiable portion that is rewarded.
- Measures the non-diversifiable risk with beta, which is standardized around one.
- Translates beta into expected return -
Expected Return = Riskfree rate + Beta * Risk Premium
- Works as well as the next best alternative in most cases.

This is a summary of the CAPM, before we get into the details.

The Mean-Variance Framework

- The variance on any investment measures the disparity between actual and expected returns.



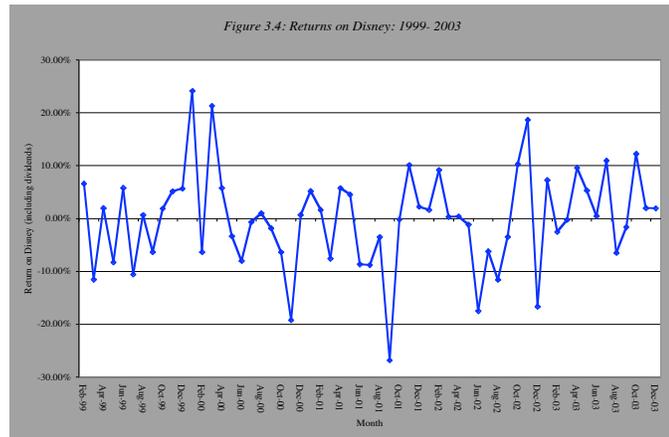
Note that the variance that the CAPM is built around is the variance of actual returns around an expected return.

If you were an investor with a 1-year time horizon, and you bought a 1-year T.Bill, your actual returns (at least in nominal terms) will be equal to your expected returns.

If you were the same investor, and you bought a stock (say Intel), your actual returns will almost certainly not be equal to your expected returns.

In practice, we often look at historical (past) returns to estimate variances. Implicitly, we are assuming that this variance is a good proxy for expected future variance.

How risky is Disney? A look at the past...



Aswath Damodaran

66

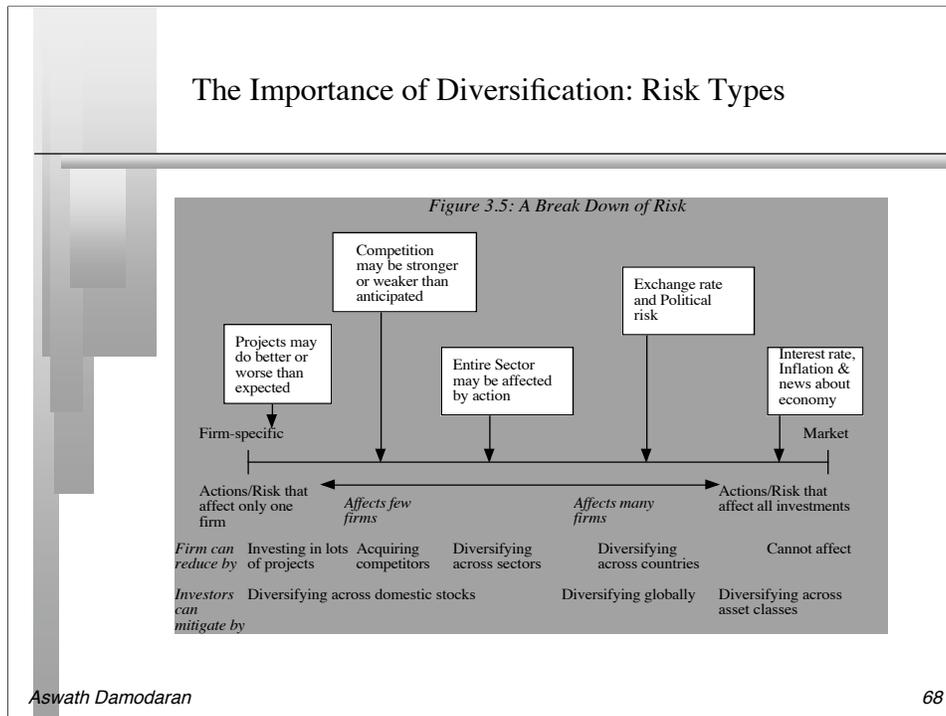
Disney's stock price has been volatile, yielding a standard deviation of 32.31% (on an annualized basis) between 1999 and 2003. If you were an investor looking at Disney in 2004, what concerns (if any) would you have in using this as your measure of the forward looking risk in Disney stock?

Do you live in a mean-variance world?

- Assume that you had to pick between two investments. They have the same expected return of 15% and the same standard deviation of 25%; however, investment A offers a very small possibility that you could quadruple your money, while investment B's highest possible payoff is a 60% return. Would you
 - a. be indifferent between the two investments, since they have the same expected return and standard deviation?
 - b. prefer investment A, because of the possibility of a high payoff?
 - c. prefer investment B, because it is safer?

While some people may be indifferent, most pick investment A. The possibility of a high payoff, even though it is captured in the expected value, seems to tilt investors. In statistical terms, this can be viewed as evidence that investors prefer positive skewness (high positive payoffs) and value it. It is a direct contradiction to the mean-variance framework that underlies so much of conventional risk theory.

The Importance of Diversification: Risk Types



This is the critical second step that all risk and return models in finance take.

As examples,

Project-specific Risk: Disney's new Animal Kingdom theme park: To the degree that actual revenues at this park may be greater or less than expected.

Competitive Risk: The competition (Universal Studios, for instance) may take actions (like opening or closing a park) that affect Disney's revenues at Animal Kingdom.

Industry-specific risk: Congress may pass laws affecting cable and network television, and affect expected revenues at Disney and ABC, as well as all other firms in the sector, perhaps to varying degrees.

International Risk: As the Asian crisis deepened in the late 1990s, there was a loss of revenues at Disneyland (as tourists from Asia choose to stay home) and at Tokyo Disney

Market risk: If interest rates in the US go up, Disney's value as a firm will be affected.

From the perspective of an investor who holds only Disney, all risk is relevant.

From the perspective of a diversified investor, the first three risks can be diversified away, the fourth might be diversifiable (with a globally diversified portfolio) but the last risk I not.

The Effects of Diversification

- Firm-specific risk can be reduced, if not eliminated, by increasing the number of investments in your portfolio (i.e., by being diversified). Market-wide risk cannot. This can be justified on either economic or statistical grounds.
- On economic grounds, diversifying and holding a larger portfolio eliminates firm-specific risk for two reasons-
 - (a) Each investment is a much smaller percentage of the portfolio, muting the effect (positive or negative) on the overall portfolio.
 - (b) Firm-specific actions can be either positive or negative. In a large portfolio, it is argued, these effects will average out to zero. (For every firm, where something bad happens, there will be some other firm, where something good happens.)

The first argument (that each investment is a small percent of your portfolio) is a pretty weak one. The second one (that things average out over investments and time) is a much stronger one.

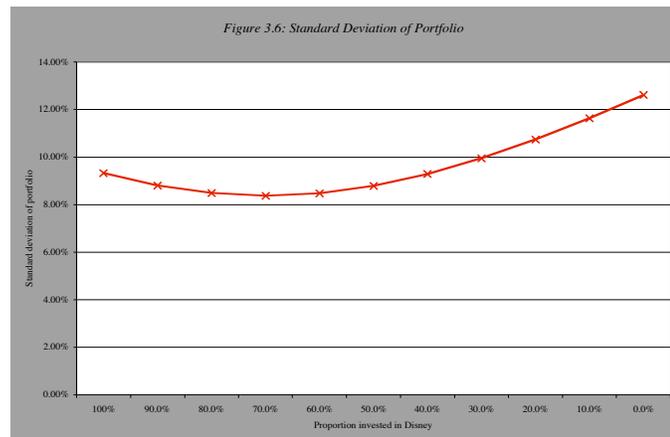
Consider the news stories in the WSJ on any given day. About 85 to 90% of the stories are on individual firms (rather than affecting the entire market or about macro economic occurrences) and they cut both ways - some stories are good news (with the stock price rising) and some are bad news (with stock prices falling)

A Statistical Proof that Diversification works... An example with two stocks..

	<i>Disney</i>	<i>Aracruz</i> <i>ADR</i>
Average Monthly Return	- 0.07%	2.57%
Standard Deviation in Monthly Returns	9.33%	12.62%
Correlation between Disney and Aracruz	0.2665	

These are the statistics for Disney and Aracruz from 1999 to 2003.... They are annualized values computed from monthly returns.

The variance of a portfolio...



Aswath Damodaran

71

As you combine Disney and Aracruz in a portfolio, the variance declines (because the correlation between the stocks is low) and is actually minimized at about 70% Disney, 30% Aracruz...

The gains would have been even stronger if the correlation had been zero... or negative.... Even when two stocks move together though (the correlation is positive but not one), there will be gains from diversification.

The Role of the Marginal Investor

- The marginal investor in a firm is the investor who is most likely to be the buyer or seller on the next trade and to influence the stock price.
- Generally speaking, the marginal investor in a stock has to own a lot of stock and also trade a lot.
- Since trading is required, the largest investor may not be the marginal investor, especially if he or she is a founder/manager of the firm (Michael Dell at Dell Computers or Bill Gates at Microsoft)
- In all risk and return models in finance, we assume that the marginal investor is well diversified.

We assume that the marginal investor, who sets prices, is well diversified. (Note that we do not need to assume that all investors are diversified)

An argument for the marginally diversified investor: Assume that a diversified investor and a non-diversified investor are both looking at Disney. The latter looks at the stock and sees all risk. The former looks at it and sees only the non-diversifiable risk. If they agree on the expected earnings and cash flows, the former will be willing to pay a higher price. Thus, the latter will get driven out of the market (perhaps into mutual funds).

Identifying the Marginal Investor in your firm...

<i>Percent of Stock held by Institutions</i>	<i>Percent of Stock held by Insiders</i>	<i>Marginal Investor</i>
High	Low	Institutional Investor ^a
High	High	Institutional Investor, with insider influence
Low	High (held by founder/manager of firm)	Insider (often undiversified)
Low	High (held by wealthy individual investor)	Wealthy individual investor, fairly diversified
Low	Low	Small individual investor with restricted diversification

This is meant to be a rough guide to identifying the marginal investor. The key is to recognize that you are not identifying a particular investor but a type of investor.

Looking at Disney's top stockholders (again)

<HELP> for explanation. dgp Equity HDS
 Enter #<GD> to select aggregate portfolio and see detailed information

001189658224-000 **HOLDINGS SEARCH** CUSIP 25468710
DIS US DISNEY (MULT) CO Page 1 / 100

Holder name	Portfolio Name	Source	Held	Outstd	Percent Change	Latest Filing Date
BARCLAYS GLOBAL	BARCLAYS BANK PLC	13F	83,630M	4,095	1,750M	09/02
CITIGROUP INC	CITIGROUP INCORPORAT	13F	62,857M	3,078	4,811M	09/02
FIDELITY MANAGEM	FIDELITY MANAGEMENT	13F	56,125M	2,748	5,992M	09/02
STATE STREET	STATE STREET CORPORA	13F	54,635M	2,675	2,239M	09/02
SOUTHEASTERN ASST	SOUTHEASTERN ASSET M	13F	47,333M	2,318	14,604M	09/02
STATE FARM MUTU	STATE FARM MUTUAL RU	13F	41,938M	2,054	120,599	09/02
VANGUARD GROUP	VANGUARD GROUP INC	13F	34,721M	1,700	-83,839	09/02
MELLON BANK N A	MELLON BANK CORP	13F	32,693M	1,601	957,489	09/02
PUTNAM INVEST	PUTNAM INVESTMENT MA	13F	28,153M	1,379	-11,468M	09/02
LORD ABBETT & CO	LORD ABBETT & CO	13F	24,541M	1,202	5,385M	09/02
MONTAG CALDWELL	MONTAG & CALDWELL IN	13F	24,466M	1,198	-11,373M	09/02
DEUTSCHE BANK AG	DEUTSCHE BANK AG	13F	23,239M	1,130	-5,002M	09/02
MORGAN STANLEY	MORGAN STANLEY	13F	19,655M	0,962	3,482M	09/02
HARICE T ROWE	T ROWE PRICE ASSOCIA	13F	19,133M	0,937	2,325M	09/02
EDWARD D DISNE	n/a	PROXY	17,547M	0,859	-126,710	12/01
ALLIANCE FINANCIAL	ALLIANCE CAPITAL MAN	13F	14,283M	0,699	69,353	09/02
JPMORGAN CHASE	JP MORGAN CHASE & CO	13F	14,209M	0,696	-462,791	09/02
Sub-totals for current page:			599,159M	29,340		

* Home market directory info available. Select portfolio, then hit [F6].
 Australia 61 2 9577 8000 Germany 49 30 7330 7000
 Hong Kong 852 2877 6000 Japan 81 3 3251 8900 Singapore 65 212 3900 17 8 1 212 338 2000 Copyright 2002 Bloomberg L.P.
 1000-0750-00-000-00 10-01-02

Aswath Damodaran

74

Of Disney's top 17 investors, only 1 is an individual....

And the top investors in Deutsche and Aracruz...

<i>Deutsche Bank</i>	<i>Aracruz - Preferred</i>
Allianz (4.81%)	Safra (10.74%)
La Caixa (3.85%)	BNDES (6.34%)
Capital Research (1.35%)	Scudder Kemper (1.03%)
Fidelity (0.50%)	BNP Paribas (0.56%)
Frankfurt Trust (0.43%)	Barclays Global (0.29%)
Aviva (0.37%)	Vanguard Group (0.18%)
Daxex (0.31%)	Banco Itau (0.12%)
Unifonds (0.29%)	Van Eck Associates (0.12%)
Fidelity (0.28%)	Pactual (0.11%)
UBS Funds (0.21%)	Banco Bradesco (0.07%)

The top investors are also institutional investors....

Analyzing the investor bases...

	<i>Disney</i>	<i>Deutsche Bank</i>	<i>Aracruz (non-voting)</i>
<i>Mutual Funds</i>	31%	16%	29%
<i>Other Institutional Investors</i>	42%	58%	26%
<i>Individuals</i>	27%	26%	45%

These companies are predominantly held by institutions who also do much of the trading on the stock. Insiders hold almost no stock in the company.... The marginal investor is an institutional investor.... Aracruz has the highest percentage of individual investors and it also has voting shares held by insiders. We would be most cautious in extending the marginal investor is diversified argument to Aracruz.

The Market Portfolio

- Assuming diversification costs nothing (in terms of transactions costs), and that all assets can be traded, the limit of diversification is to hold a portfolio of every single asset in the economy (in proportion to market value). This portfolio is called the market portfolio.
- Individual investors will adjust for risk, by adjusting their allocations to this market portfolio and a riskless asset (such as a T-Bill)

<i>Preferred risk level</i>	<i>Allocation decision</i>
No risk	100% in T-Bills
Some risk	50% in T-Bills; 50% in Market Portfolio;
A little more risk	25% in T-Bills; 75% in Market Portfolio
Even more risk	100% in Market Portfolio
A risk hog..	Borrow money; Invest in market portfolio

- Every investor holds some combination of the risk free asset and the market portfolio.

There are two reasons investors choose to stay undiversified:

They think that they can pick undervalued investments (private information)

There are transactions costs. Since the marginal benefits of diversification decrease as the number of investments increases, you will stop diversifying.

If we assume no costs to diversifying and no private information, we take away these reasons from not diversifying. Consequently, you will keep adding traded assets to your portfolio until you have every single one. This portfolio is called the market portfolio. This portfolio should include all traded assets, held in proportion to their market value.

The only differences between investors then will be in not what is in the market portfolio but how much they allocate to the riskless asset and how much to the market portfolio.

The Risk of an Individual Asset

- The risk of any asset is the risk that it adds to the market portfolio. Statistically, this risk can be measured by how much an asset moves with the market (called the covariance)
- Beta is a standardized measure of this covariance, obtained by dividing the covariance of any asset with the market by the variance of the market. It is a measure of the non-diversifiable risk for any asset can be measured by the covariance of its returns with returns on a market index, which is defined to be the asset's beta.
- The required return on an investment will be a linear function of its beta:
Expected Return = Riskfree Rate + Beta * (Expected Return on the Market Portfolio - Riskfree Rate)

If an investor holds the market portfolio, the risk of any asset is the risk that it adds to the portfolio. That is what beta measures.

The cost of equity is a linear function of the beta of the portfolio.

Limitations of the CAPM

1. The model makes unrealistic assumptions
2. The parameters of the model cannot be estimated precisely
 - Definition of a market index
 - Firm may have changed during the 'estimation' period'
3. The model does not work well
 - If the model is right, there should be a linear relationship between returns and betas
the only variable that should explain returns is betas
 - The reality is that the relationship between betas and returns is weak
Other variables (size, price/book value) seem to explain differences in returns better.

The first two critiques can be lowered against any model in finance.

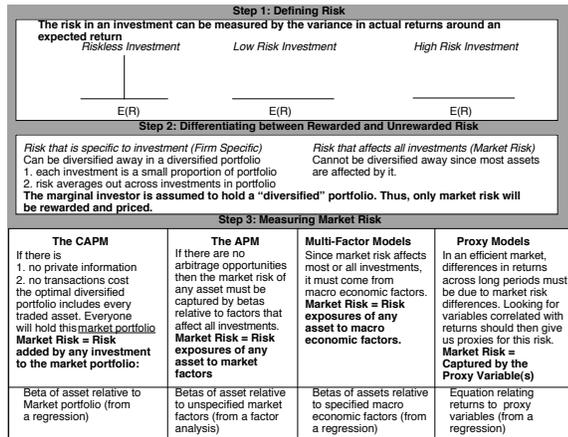
The last critique is the most damaging. Fama and French (1991) noted that

Betas explained little of the difference in returns across stocks between 1962 and 1991. (Over long time periods, it should, if the CAPM is right and betas are correctly estimated), explain almost all of the difference)

Market Capitalization and price to book value ratios explained a significant portion of the differences in returns.

This test, however, is a test of which model explains past returns best, and might not necessarily be a good indication of which one is the best model for predicting expected returns in the future.

Alternatives to the CAPM



Note that all of the models of risk and return in finance agree on the first two steps. They deviate at the last step in the way they measure market risk, with

The CAPM, capturing all of it in one beta, relative to the market portfolio

The APM, capturing the market risk in multiple betas against unspecified economic factors

The Multi-Factor model, capturing the market risk in multiple betas against specified macro economic factors

The Regression model, capturing the market risk in proxies such as market capitalization and price/book ratios

Why the CAPM persists...

- The CAPM, notwithstanding its many critics and limitations, has survived as the default model for risk in equity valuation and corporate finance. The alternative models that have been presented as better models (APM, Multifactor model..) have made inroads in performance evaluation but not in prospective analysis because:
 - The alternative models (which are richer) do a much better job than the CAPM in explaining past return, but their effectiveness drops off when it comes to estimating expected future returns (because the models tend to shift and change).
 - The alternative models are more complicated and require more information than the CAPM.
 - For most companies, the expected returns you get with the the alternative models is not different enough to be worth the extra trouble of estimating four additional betas.

It takes a model to beat a model... The CAPM may not be a very good model at predicting expected returns but the alternative models don't do much better either. In fact, the tests of the CAPM are joint tests of both the effectiveness of the model and the quality of the parameters used in the testing (betas, for instance). We will argue that better beta estimates and a more careful use of the CAPM can yield far better estimates of expected return than switching to a different model.

⌚ Application Test: Who is the marginal investor in your firm?

You can get information on insider and institutional holdings in your firm from:

<http://finance.yahoo.com/>

Enter your company's symbol and choose profile.

- Looking at the breakdown of stockholders in your firm, consider whether the marginal investor is
 - a) An institutional investor
 - b) An individual investor
 - c) An insider

For most large US firms, most, if not all, of the 15 largest investors are institutional investors. Thus, the assumption that the marginal investor is well diversified is quite justifiable.

For very small firms, the marginal investor may be an individual investor or even a day trader, who is not diversified. What implications does this have for the use of risk and return models?

Estimating Hurdle Rates: Risk Parameters

Inputs required to use the CAPM -

- The capital asset pricing model yields the following expected return:
Expected Return = Riskfree Rate + Beta * (Expected Return on the Market Portfolio - Riskfree Rate)
- § To use the model we need three inputs:
 - (a) The current risk-free rate
 - (b) The expected market risk premium (the premium expected for investing in risky assets (market portfolio) over the riskless asset)
 - (c) The beta of the asset being analyzed.

Summarizes the inputs. Note that we are replacing the last component $(E(R_m) - R_f)$ with the expected risk premium..

The Riskfree Rate and Time Horizon

- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, i.e., to have an actual return be equal to the expected return, two conditions have to be met –
 - There has to be no default risk, which generally implies that the security has to be issued by the government. Note, however, that not all governments can be viewed as default free.
 - There can be no uncertainty about reinvestment rates, which implies that it is a zero coupon security with the same maturity as the cash flow being analyzed.

Reemphasize that you need to know the expected returns with certainty for something to be riskless.

No default risk and no reinvestment risk. Most people understand the first point, but don't get the second.

If you need an investment where you will know the expected returns with certainty over a 5-year time horizon, what would that investment be?

A T.Bill would not work - there is reinvestment risk.

Even a 5-year T.Bond would not work, because the coupons will cause the actual return to deviate from the expected return.

Thus, you need a 5-year zero coupon T.Bond

Riskfree Rate in Practice

- The riskfree rate is the rate on a zero coupon government bond matching the time horizon of the cash flow being analyzed.
- Theoretically, this translates into using different riskfree rates for each cash flow - the 1 year zero coupon rate for the cash flow in year 1, the 2-year zero coupon rate for the cash flow in year 2 ...
- Practically speaking, if there is substantial uncertainty about expected cash flows, the present value effect of using time varying riskfree rates is small enough that it may not be worth it.

From a present value standpoint, using different riskfree rates for each cash flow may be overkill, except in those cases where your interest rates are very different for different time horizons (a very upward sloping or downward sloping yield curve)

The Bottom Line on Riskfree Rates

- Using a long term government rate (even on a coupon bond) as the riskfree rate on all of the cash flows in a long term analysis will yield a close approximation of the true value.
- For short term analysis, it is entirely appropriate to use a short term government security rate as the riskfree rate.
- The riskfree rate that you use in an analysis should be in the same currency that your cashflows are estimated in. In other words, if your cashflows are in U.S. dollars, your riskfree rate has to be in U.S. dollars as well.
 - Data Source: You can get riskfree rates for the US in a number of sites. Try <http://www.bloomberg.com/markets>.

Since corporate finance generally looks at long term decisions, we will for the most part use the long term government bond rate.

What if there is no default-free entity?

- You could adjust the local currency government borrowing rate by the estimated default spread on the bond to arrive at a riskless local currency rate. The default spread on the government bond can be estimated using the local currency ratings that are available for many countries.
- For instance, assume that the Brazilian government bond rate (in nominal Brazilian Reals (BR)) is 14% and that the local currency rating assigned to the Brazilian government is BB+. If the default spread for BB+ rated bonds is 5%, the riskless Brazilian real rate would be 9%.
- Alternatively, you can analyze Brazilian companies in U.S. dollars and use a treasury bond rate as your riskfree rate or in real terms and do all analysis without an inflation component.

For a real riskfree rate, an expected real growth rate for the economy should provide a reasonable approximation.

To do your analysis in real terms, you need a real riskfree rate. In the U.S., you can obtain such a rate by looking at the inflation indexed treasury bond rate. Outside the U.S., you can assume as a rough approximation that the real riskfree rate is equal to your real growth rate. If the real growth rate is much lower than the real interest rate, you will have significant deficits - trade or budget - to make up the shortfall. If the real growth rate is much higher than the real interest rate, you will have the exact opposite - surpluses. A long term equilibrium can be reached only when the two are equal.

Measurement of the risk premium

- The risk premium is the premium that investors demand for investing in an average risk investment, relative to the riskfree rate.
- As a general proposition, this premium should be
 - greater than zero
 - increase with the risk aversion of the investors in that market
 - increase with the riskiness of the “average” risk investment

Implicit here are two questions - Which investor's risk premium? What is the average risk investment?

What is your risk premium?

- Assume that stocks are the only risky assets and that you are offered two investment options:
 - a riskless investment (say a Government Security), on which you can make 5%
 - a mutual fund of all stocks, on which the returns are uncertain

How much of an expected return would you demand to shift your money from the riskless asset to the mutual fund?

- a) Less than 5%
- b) Between 5 - 7%
- c) Between 7 - 9%
- d) Between 9 - 11%
- e) Between 11 - 13%
- f) More than 13%

Check your premium against the [survey premium](#) on my web site.

I usually find that the median number that I get in the US is 10.7-12.7%, though the distribution is pretty spread out. This translates into a risk premium of 4-6%.

Risk Aversion and Risk Premiums

- If this were the capital market line, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.
- The weights will be determined by the magnitude of wealth that each investor has. Thus, Warren Buffet's risk aversion counts more towards determining the "equilibrium" premium than yours' and mine.
- As investors become more risk averse, you would expect the "equilibrium" premium to increase.

The wealthier you are, the more your estimate of the risk premium will weight into the final market premium.

Risk Premiums do change..

Go back to the previous example. Assume now that you are making the same choice but that you are making it in the aftermath of a stock market crash (it has dropped 25% in the last month). Would you change your answer?

- a) I would demand a larger premium
- b) I would demand a smaller premium
- c) I would demand the same premium

Quite a few will demand a larger premium, suggesting that this is a dynamic estimate, changing from period to period.

You can ask the same question about how a recession or losing your job will affect your risk premium.

Estimating Risk Premiums in Practice

- Survey investors on their desired risk premiums and use the average premium from these surveys.
- Assume that the actual premium delivered over long time periods is equal to the expected premium - i.e., use historical data
- Estimate the implied premium in today's asset prices.

Lists the basic approaches

The Survey Approach

- Surveying all investors in a market place is impractical.
- However, you can survey a few investors (especially the larger investors) and use these results. In practice, this translates into surveys of money managers' expectations of expected returns on stocks over the next year.
- The limitations of this approach are:
 - there are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
 - they are extremely volatile
 - they tend to be short term; even the longest surveys do not go beyond one year

Merrill Lynch does surveys of portfolio managers (who presumably have more wealth to invest and hence should be weighted more) asking investors what they think the market will do over the next year. They report the number but do not use it internally as a risk premium.

The Historical Premium Approach

- This is the default approach used by most to arrive at the premium to use in the model
- In most cases, this approach does the following
 - it defines a time period for the estimation (1926-Present, 1962-Present....)
 - it calculates average returns on a stock index during the period
 - it calculates average returns on a riskless security over the period
 - it calculates the difference between the two
 - and uses it as a premium looking forward
- The limitations of this approach are:
 - it assumes that the risk aversion of investors has not changed in a systematic way across time. (The risk aversion may change from year to year, but it reverts back to historical averages)
 - it assumes that the riskiness of the “risky” portfolio (stock index) has not changed in a systematic way across time.

This is the basic approach used by almost every large investment bank and consulting firm.

Historical Average Premiums for the United States

Historical Period	Arithmetic average		Geometric Average	
	Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
1928-2004	7.92%	6.53%	6.02%	4.84%
1964-2004	5.82%	4.34%	4.59%	3.47%
1994-2004	8.60%	5.82%	6.85%	4.51%

What is the right premium?

- Go back as far as you can. Otherwise, the standard error in the estimate will be large. (

- Be consistent in your use of a riskfree rate.

- Use arithmetic premium. $\text{Std Error in estimate} = \frac{\text{Annualized Std deviation in Stock prices}}{\sqrt{\text{Number of years of historical data}}}$ for estimates of long term costs of equity.

Data Source: Check out the returns by year and estimate your own historical premiums by going to [updated data on my web site](#).

This is based upon historical data available on the Federal Reserve site in St. Louis. There are three reasons for why the premium estimated may differ:

1. How far back you go (My personal bias is to go back as far as possible. Stock prices are so noisy that you need very long time periods to get reasonable estimates)
2. Whether you use T.Bill or T.Bond rates (You have to be consistent. Since I will be using the T.Bond rate as my riskfree rate, I will use the premium over that rate)
3. Whether you use arithmetic or geometric means (If returns were uncorrelated over time, and you were asked to estimate a 1-year premium, the arithmetic mean would be used. Since returns are negatively correlated over time, and we are estimating premiums over longer holding periods, it makes more sense to use the compounded return, which gives us the geometric average)

Thus, I should be using the updated geometric average for stocks over bonds. The rest of these lecture notes were set in 2004, and the risk premiums used will reflect risk premiums then:

What about historical premiums for other markets?

- Historical data for markets outside the United States is available for much shorter time periods. The problem is even greater in emerging markets.
- The historical premiums that emerge from this data reflects this and there is much greater error associated with the estimates of the premiums.

Increasingly, the challenges we face are in estimating risk premiums outside the United States, not only because so many companies that we value are in younger, emerging markets but because so many US companies are looking at expanding into these markets.

One solution: Look at a country's bond rating and default spreads as a start

- Ratings agencies such as S&P and Moody's assign ratings to countries that reflect their assessment of the default risk of these countries. These ratings reflect the political and economic stability of these countries and thus provide a useful measure of country risk. In September 2004, for instance, Brazil had a country rating of B2.
- If a country issues bonds denominated in a different currency (say dollars or euros), you can also see how the bond market views the risk in that country. In September 2004, Brazil had dollar denominated C-Bonds, trading at an interest rate of 10.01%. The US treasury bond rate that day was 4%, yielding a default spread of 6.01% for Brazil.
- Many analysts add this default spread to the US risk premium to come up with a risk premium for a country. Using this approach would yield a risk premium of 10.85% for Brazil, if we use 4.84% as the premium for the US.

This approach is simple but it assumes that country default spreads are also good measures of additional country equity risk. The question thought is whether equities (which are riskier than bonds) should command a larger risk premium.

Beyond the default spread

- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads. If we can compute how much more risky the equity market is, relative to the bond market, we could use this information. For example,
 - Standard Deviation in Bovespa (Equity) = 36%
 - Standard Deviation in Brazil C-Bond = 28.2%
 - Default spread on C-Bond = 6.01%
 - Country Risk Premium for Brazil = $6.01\% (36\%/28.2\%) = 7.67\%$
- Note that this is on top of the premium you estimate for a mature market. Thus, if you assume that the risk premium in the US is 4.84%, the risk premium for Brazil would be 12.51%.

In In this approach, we scale up the default spread to reflect the additional risk in stocks... This will result in larger equity risk premiums. There is a third approach which is closely related where you look at the standard deviation of the emerging equity market, relative to the standard deviation of the U.S. equity market, and multiply by the U.S. equity risk premium. Thus, the equity risk premium for an emerging market which is twice as volatiles as the the US market should have an equity risk premium of 9.68% (twice 4.84%).

Implied Equity Premiums

- We can use the information in stock prices to back out how risk averse the market is and how much of a risk premium it is demanding.

In 2004, dividends & stock buybacks were 2.90% of the index, generating 35.15 in cashflows

Analysts expect earnings to grow 8.5% a year for the next 5 years .

After year 5, we will assume that earnings on the index will grow at 4.22%, the same rate as the entire economy

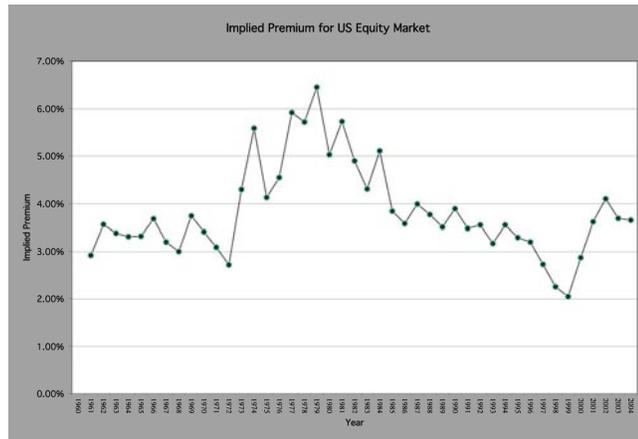
38.13 41.37 44.89 48.71 52.85

January 1, 2005
S&P 500 is at 1211.92

- Implied Equity risk premium = Expected return on stocks - Treasury bond rate = 7.87% - 4.22% = 3.65%

$$1211.92 = \frac{38.13}{(1+r)} + \frac{41.37}{(1+r)^2} + \frac{44.89}{(1+r)^3} + \frac{48.71}{(1+r)^4} + \frac{52.85}{(1+r)^5} + \frac{52.85(1.0422)}{(r-.0422)(1+r)^5}$$

Implied Premiums in the US



⌚ Application Test: A Market Risk Premium

- Based upon our discussion of historical risk premiums so far, the risk premium looking forward should be:
 - a) About 7.92%, which is what the arithmetic average premium has been since 1928, for stocks over T.Bills
 - b) About 4.84%, which is the geometric average premium since 1928, for stocks over T.Bonds
 - c) About 3.7%, which is the implied premium in the stock market today

There is no right answer, but it will lead to very different costs of equity and capital, and corporate financial decisions down the road.

Estimating Beta

- The standard procedure for estimating betas is to regress stock returns (R_j) against market returns (R_m) -

$$R_j = a + b R_m$$

- where a is the intercept and b is the slope of the regression.
- The slope of the regression corresponds to the beta of the stock, and measures the riskiness of the stock.

Betas reflect not just the volatility of the underlying investment but also how it moves with the market:

$$\text{Beta (Slope)} = \text{Correlation}_{jm} (\sigma_j / \sigma_m)$$

Note that σ_j can be high but beta can be low (because the asset is not very highly correlated with the market)

Estimating Performance

- The intercept of the regression provides a simple measure of performance during the period of the regression, relative to the capital asset pricing model.

$$R_j = R_f + b (R_m - R_f)$$

$$= R_f (1-b) + b R_m \quad \text{.....} \quad \text{Capital Asset Pricing Model}$$

$$R_j = a + b R_m \quad \text{.....} \quad \text{Regression Equation}$$

- If
 - a > $R_f (1-b)$ Stock did better than expected during regression period
 - a = $R_f (1-b)$ Stock did as well as expected during regression period
 - a < $R_f (1-b)$ Stock did worse than expected during regression period
- The difference between the intercept and $R_f (1-b)$ is Jensen's alpha. If it is positive, your stock did perform better than expected during the period of the regression.

Jensen's alpha can also be computed by estimating the expected return during the period of the regression, using the actual return on the market during the period, the riskfree rate during the period and the estimated beta, and then comparing it to the actual return over the period.

Algebraically, you should get the same answer.

Firm Specific and Market Risk

- The R squared (R^2) of the regression provides an estimate of the proportion of the risk (variance) of a firm that can be attributed to market risk;
- The balance ($1 - R^2$) can be attributed to firm specific risk.

This ties back to the second step of the derivation of the model, where we divided risk into diversifiable and non-diversifiable risk. R squared measures the proportion of the risk that is not diversifiable (also called market or systematic risk)

Setting up for the Estimation

- Decide on an estimation period
 - Services use periods ranging from 2 to 5 years for the regression
 - Longer estimation period provides more data, but firms change.
 - Shorter periods can be affected more easily by significant firm-specific event that occurred during the period (Example: ITT for 1995-1997)
- Decide on a return interval - daily, weekly, monthly
 - Shorter intervals yield more observations, but suffer from more noise.
 - Noise is created by stocks not trading and biases all betas towards one.
- Estimate returns (including dividends) on stock
 - $\text{Return} = (\text{Price}_{\text{End}} - \text{Price}_{\text{Beginning}} + \text{Dividends}_{\text{Period}}) / \text{Price}_{\text{Beginning}}$
 - Included dividends only in ex-dividend month
- Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.

Note the number of subjective judgments that have to be made. The estimated beta is going to be affected by all these judgments.

My personal biases are to

Use five years of data (because I use monthly data)

Use monthly returns (to avoid non-trading problems)

Use returns with dividends

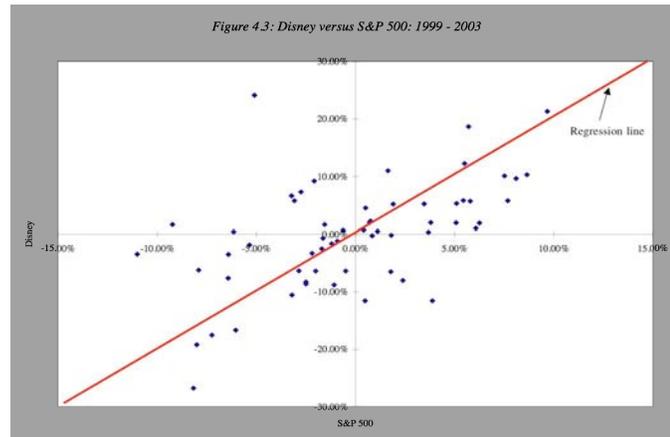
Use an index that is broad, market weighted and with a long history (I use the S&P 500. The NYSE composite is not market weighted, and the Wilshire 5000 has both non-trading and measurement issues that have not been resolved.)

Choosing the Parameters: Disney

- Period used: 5 years
- Return Interval = Monthly
- Market Index: S&P 500 Index.
- For instance, to calculate returns on Disney in December 1999,
 - Price for Disney at end of November 1999 = \$ 27.88
 - Price for Disney at end of December 1999 = \$ 29.25
 - Dividends during month = \$0.21 (It was an ex-dividend month)
 - Return = $(\$29.25 - \$27.88 + \$0.21) / \$27.88 = 5.69\%$
- To estimate returns on the index in the same month
 - Index level (including dividends) at end of November 1999 = 1388.91
 - Index level (including dividends) at end of December 1999 = 1469.25
 - Return = $(1469.25 - 1388.91) / 1388.91 = 5.78\%$

Reports parameters used.

Disney's Historical Beta



This has both the scatter plot and the regression line. Note the noise in the plots around the line.

That can be viewed either as a sign of a poor regression or as a measure of the firm-specific risk that Disney is exposed to.

The Regression Output

- Using monthly returns from 1999 to 2003, we ran a regression of returns on Disney stock against the S*P 500. The output is below:

$$\text{Returns}_{\text{Disney}} = 0.0467\% + 1.01 \text{Returns}_{\text{S \& P 500}} \quad (\text{R squared} = 29\%)$$

(0.20)

The standard error of the beta is reported in brackets under the beta.

Analyzing Disney's Performance

- Intercept = 0.0467%
 - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
 - Between 1999 and 2003,
 - Monthly Riskfree Rate = 0.313% (based upon average T.Bill rate: 99-03)
 - Riskfree Rate (1-Beta) = 0.313% (1-1.01) = -.0032%
- The Comparison is then between
 - Intercept versus Riskfree Rate (1 - Beta)
 - 0.0467% versus 0.313%(1-1.01)=-0.0032%
 - Jensen's Alpha = 0.0467% -(-0.0032%) = 0.05%
- Disney did 0.05% better than expected, per month, between 1999 and 2003.
 - Annualized, Disney's annual excess return = $(1.0005)^{12} - 1 = 0.60\%$

Disney did 0.60% better than expected on an annual basis between 1999 and 2003.

More on Jensen's Alpha

If you did this analysis on every stock listed on an exchange, what would the average Jensen's alpha be across all stocks?

- a) Depend upon whether the market went up or down during the period
- b) Should be zero
- c) Should be greater than zero, because stocks tend to go up more often than down

Should be zero, if it is weighted by market value. The market cannot beat or lag itself.

A positive Jensen's alpha... Who is responsible?

- Disney has a positive Jensen's alpha of 0.60% a year between 1999 and 2003. This can be viewed as a sign that management in the firm did a good job, managing the firm during the period.
 - a) True
 - b) False

This is not necessarily true. In fact, the average Jensen's alpha across entertainment companies during this period was 1.33% (annualized). This would suggest that Disney underperformed the sector by 0.70%. In fact, a company's positive Jensen's alpha can be entirely attributable to sector performance. Conversely, a company can have a negative Jensen's alpha and impeccable management at the same time.

Estimating Disney's Beta

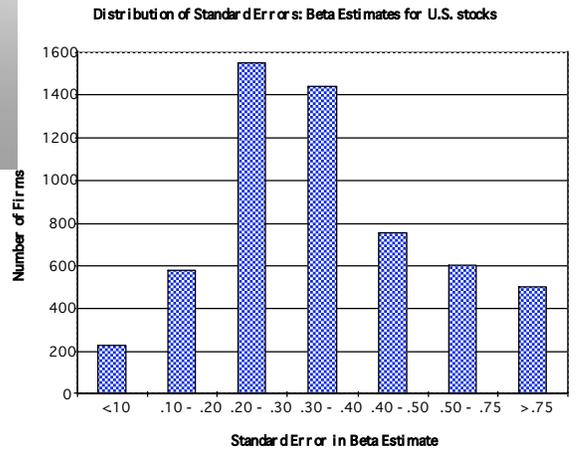
- Slope of the Regression of 1.01 is the beta
- Regression parameters are always estimated with error. The error is captured in the standard error of the beta estimate, which in the case of Disney is 0.20.
- Assume that I asked you what Disney's true beta is, after this regression.
 - What is your best point estimate?
 - What range would you give me, with 67% confidence?
 - What range would you give me, with 95% confidence?

Best point estimate: 1.01

Range with 67% confidence: 0.81-1.21

Range with 95% confidence: 0.61 - 1.41

The Dirty Secret of “Standard Error”



Aswath Damodaran

114

The standard errors of betas estimated in the US tend to be fairly high, with many beta estimates having standard errors of 0.40 or greater. These betas should come with warnings.

Breaking down Disney's Risk

- R Squared = 29%
- This implies that
 - 29% of the risk at Disney comes from market sources
 - 71%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded

This again is well in line with typical firms in the US. The typical firm has an R squared of between 20-25%. Hence, the allure of diversification.

The Relevance of R Squared

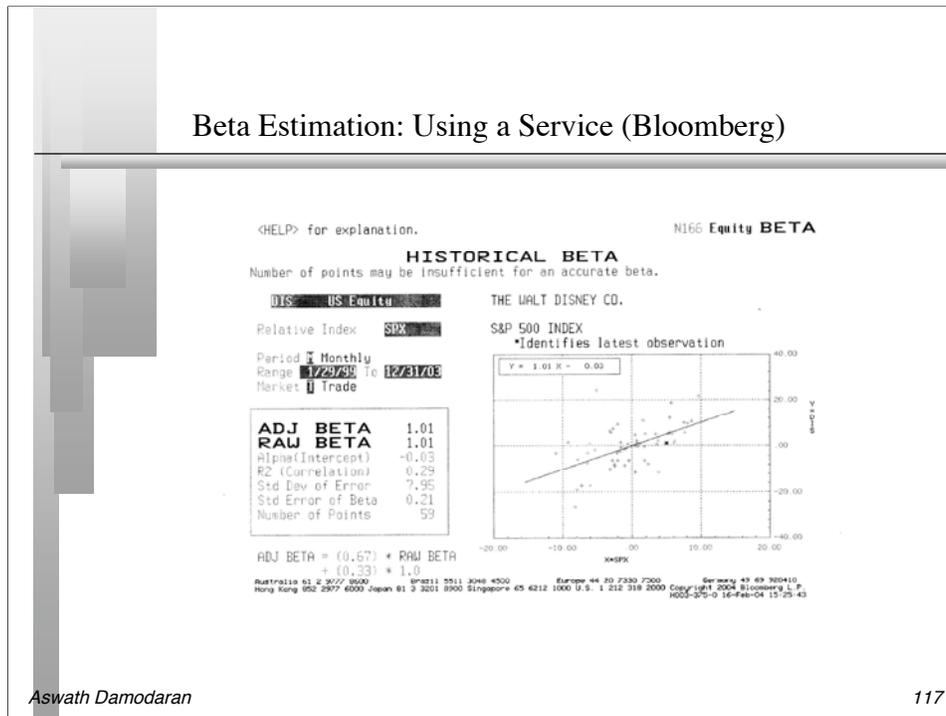
You are a diversified investor trying to decide whether you should invest in Disney or Amgen. They both have betas of 1.01, but Disney has an R Squared of 29% while Amgen's R squared of only 14.5%. Which one would you invest in?

- a) Amgen, because it has the lower R squared
- b) Disney, because it has the higher R squared
- c) You would be indifferent

Would your answer be different if you were an undiversified investor?

If you were a diversified investor, you would not care, since you would diversify away all of the “undiversifiable” risk anyway. If you were undiversified, you would prefer Disney, which has less firm-specific risk.

Beta Estimation: Using a Service (Bloomberg)



This is the page for Disney's beta, using the same period as the regression run earlier, from Bloomberg.

Bloomberg, however, uses only price returns (it ignores dividends both in the stock and the index). Hence the intercept is different.

The adjusted beta is just the regression beta moves towards one, reflecting the empirical realities that for most firms, betas tend to drift towards one as they get larger and more diversified.

Estimating Expected Returns for Disney in September 2004

■ Inputs to the expected return calculation

- Disney's Beta = 1.01
- Riskfree Rate = 4.00% (U.S. ten-year T.Bond rate)
- Risk Premium = 4.82% (Approximate historical premium: 1928-2003)

■ Expected Return = Riskfree Rate + Beta (Risk Premium)
= 4.00% + 1.01(4.82%) = 8.87%

Note that this expected return would have been different if we had decided to use a different historical premium or the implied premium.

Use to a Potential Investor in Disney

As a potential investor in Disney, what does this expected return of 8.87% tell you?

- a) This is the return that I can expect to make in the long term on Disney, if the stock is correctly priced and the CAPM is the right model for risk,
- b) This is the return that I need to make on Disney in the long term to break even on my investment in the stock
- c) Both

Assume now that you are an active investor and that your research suggests that an investment in Disney will yield 12.5% a year for the next 5 years. Based upon the expected return of 8.87%, you would

- a) Buy the stock
- b) Sell the stock

Both. If the stock is correctly priced, the beta is correctly estimated and the CAPM is the right model, this is what you would expect to make on Disney in the long term. As an investor, this is what you would need to make to break even on the investment.

Buy the stock, since you think you can make more than the hurdle rate.

How managers use this expected return

- Managers at Disney
 - need to make at least 8.87% as a return for their equity investors to break even.
 - this is the hurdle rate for projects, when the investment is analyzed from an equity standpoint
- In other words, Disney's cost of equity is 8.87%.
- What is the cost of not delivering this cost of equity?

The cost of equity is what equity investors in your company view as their required return.

The cost of not delivering this return is more unhappy stockholders, a lower stock price, and if you are a manager, maybe your job.

Going back to the corporate governance section, if stockholders have little or no control over managers, managers are less likely to view this as the cost of equity.

⌚ Application Test: Analyzing the Risk Regression

- Using your Bloomberg risk and return print out, answer the following questions:
 - How well or badly did your stock do, relative to the market, during the period of the regression? (You can assume an annualized riskfree rate of 4.8% during the regression period)

$$\text{Intercept} - (4.8\%/n) (1 - \text{Beta}) = \text{Jensen's Alpha}$$

Where n is the number of return periods in a year (12 if monthly; 52 if monthly)

- What proportion of the risk in your stock is attributable to the market? What proportion is firm-specific?
- What is the historical estimate of beta for your stock? What is the range on this estimate with 67% probability? With 95% probability?
- Based upon this beta, what is your estimate of the required return on this stock?

$$\text{Riskless Rate} + \text{Beta} * \text{Risk Premium}$$

Try this on your company.

A Quick Test

You are advising a very risky software firm on the right cost of equity to use in project analysis. You estimate a beta of 3.0 for the firm and come up with a cost of equity of 18.46%. The CFO of the firm is concerned about the high cost of equity and wants to know whether there is anything he can do to lower his beta.

How do you bring your beta down?

Should you focus your attention on bringing your beta down?

- a) Yes
- b) No

There are three ways to bring your beta down:

Pay off debt, if you have any

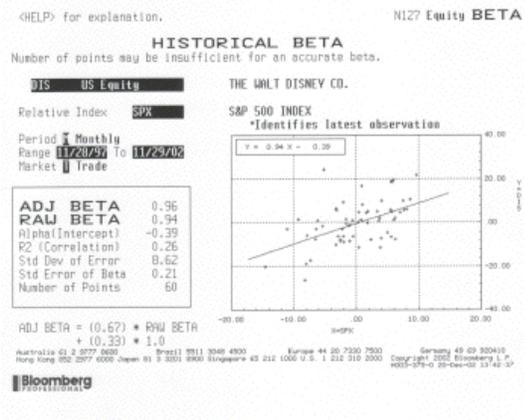
Move into safer businesses

Sell off assets, and keep cash on your balance sheet

No. What matters is the difference between what you make on your projects (return on equity) and your cost of equity. If you lower your cost of equity, but lower your return on equity even more, you are not serving your stockholders.

Disney's Beta Calculation: A look back at 1997-2002

Jensen's alpha = $-0.39\% - 0.30(1 - 0.94) = -0.41\%$
 Annualized = $(1 - .0041)^{12} - 1 = -4.79\%$



Aswath Damodaran

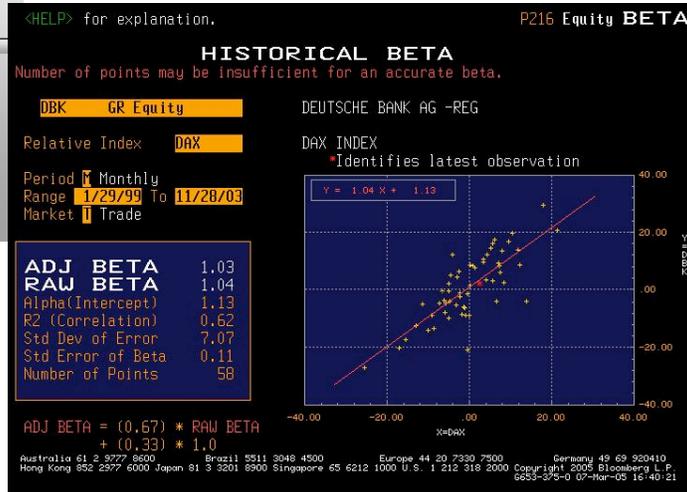
123

If you go back 12 months, the conclusions on Disney's performance would have been much more negative.

Jensen's alpha = $-0.39\% - 0.30(1 - 0.94) = -0.41\%$! Monthly riskfree rate during the period is 0.30%

Annualized Jensen's alpha = $(1 - .0041)^{12} - 1 = -4.79\%$

Beta Estimation and Index Choice: Deutsche Bank



Aswath Damodaran

124

Note that Deutsche Bank is about 8% of the DAX.

A Few Questions

- The R squared for Deutsche Bank is very high (62%), at least relative to U.S. firms. Why is that?
- The beta for Deutsche Bank is 1.04.
 - Is this an appropriate measure of risk?
 - If not, why not?
- If you were an investor in primarily U.S. stocks, would this be an appropriate measure of risk?

The R-squared is high, because Deutsche Bank is such a large percentage of the index.

This beta is a reasonable measure of risk only to those whose entire portfolio is composed of large German companies.

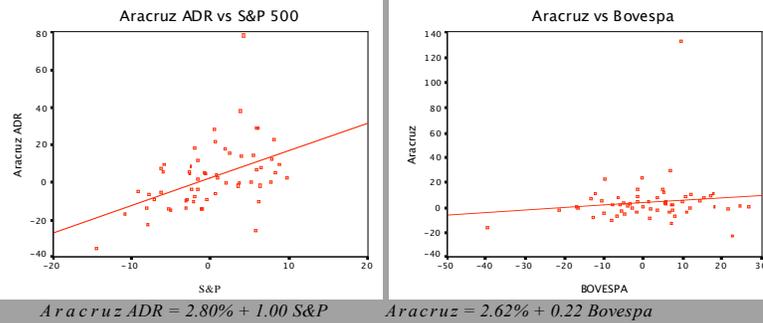
If you were primarily a US investor, you would look at the risk that DBK would add on to a US index.

Deutsche Bank: Alternate views of Risk

	<i>DAX</i>	<i>FTSE Euro 300</i>	<i>MSCI</i>
Intercept	1.24%	1.54%	1.37%
Beta	1.05	1.52	1.23
Std Error of Beta	0.11	0.19	0.25
R Squared	62%	52%	30%

As the index used expands and becomes broader, the R-squared drops off and the standard error increases. The least precise beta estimate (with the highest standard error) may be the most meaningful.

Aracruz's Beta?



Aswath Damodaran

127

Two very different views of Aracruz's risk. Which one is the right one?

The Bovespa is a narrow index and Aracruz's beta estimated against it may tell us nothing about its risk.

The regression against the S&P 500 is more informative, but the standard error is large...

Beta: Exploring Fundamentals

	Real Networks: 3.24
	Qwest Communications: 2.60
Beta > 1	
	Microsoft: 1.25
	General Electric: 1.10
Beta = 1	
	Enron: 0.95
	Philip Morris: 0.65
Beta < 1	
	Exxon Mobil: 0.40
Beta = 0	
	Harmony Gold Mining: - 0.10

Determinant 1: Product Type

- **Industry Effects:** The beta value for a firm depends upon the sensitivity of the demand for its products and services and of its costs to macroeconomic factors that affect the overall market.
 - Cyclical companies have higher betas than non-cyclical firms
 - Firms which sell more discretionary products will have higher betas than firms that sell less discretionary products

Betas measure risk relative to the market.

Firms which are cyclical or sell discretionary products tend to do much better when the economy is doing well (and the market is doing well) and much worse when the economy is doing badly than other firms in the market.

A Simple Test

Consider an investment in Tiffany's. What kind of beta do you think this investment will have?

- a) Much higher than one
- b) Close to one
- c) Much lower than one

Much Higher than one. Most of the products sold by Tiffany's are discretionary.

Determinant 2: Operating Leverage Effects

- Operating leverage refers to the proportion of the total costs of the firm that are fixed.
- Other things remaining equal, higher operating leverage results in greater earnings variability which in turn results in higher betas.

Firms with high fixed costs tend to see much bigger swings in operating income (and stock prices) for a given change in revenues than firms with more flexible cost structures.

Consider the case of the airline sector, which tends to have cost structures which are almost entirely fixed (plane lease expenses, fuel costs ...)

Measures of Operating Leverage

Fixed Costs Measure = $\text{Fixed Costs} / \text{Variable Costs}$

- This measures the relationship between fixed and variable costs. The higher the proportion, the higher the operating leverage.

EBIT Variability Measure = $\% \text{ Change in EBIT} / \% \text{ Change in Revenues}$

- This measures how quickly the earnings before interest and taxes changes as revenue changes. The higher this number, the greater the operating leverage.

The direct measures of fixed costs and variable costs are difficult to obtain.
Hence we use the second.

Disney's Operating Leverage: 1987- 2003

Year	Net Sales	% Change in Sales	EBIT	% Change in EBIT
1987	2877		756	
1988	3438	19.50%	848	12.17%
1989	4594	33.62%	1177	38.80%
1990	5844	27.21%	1368	16.23%
1991	6182	5.78%	1124	-17.84%
1992	7504	21.38%	1287	14.50%
1993	8529	13.66%	1560	21.21%
1994	10055	17.89%	1804	15.64%
1995	12112	20.46%	2262	25.39%
1996	18739	54.71%	3024	33.69%
1997	22473	19.93%	3945	30.46%
1998	22976	2.24%	3843	-2.59%
1999	23435	2.00%	3580	-6.84%
2000	25418	8.46%	2525	-29.47%
2001	25172	-0.97%	2832	12.16%
2002	25329	0.62%	2384	-15.82%
2003	27061	6.84%	2713	13.80%
1987-2003		15.83%		10.09%
1996-2003		11.73%		4.42%

This measures Disney's operating leverage historically. You need a number of years of data before you can get reasonable estimates.

Reading Disney's Operating Leverage

- Operating Leverage = % Change in EBIT / % Change in Sales
= $10.09\% / 15.83\% = 0.64$
- This is lower than the operating leverage for other entertainment firms, which we computed to be 1.12. This would suggest that Disney has lower fixed costs than its competitors.
- The acquisition of Capital Cities by Disney in 1996 may be skewing the operating leverage. Looking at the changes since then:
Operating Leverage₁₉₉₆₋₀₃ = $4.42\% / 11.73\% = 0.38$
Looks like Disney's operating leverage has decreased since 1996.

The operating leverage number makes sense only when compared to industry averages or historical averages. It is the relative operating leverage that affects betas.

A Test

Assume that you are comparing a European automobile manufacturing firm with a U.S. automobile firm. European firms are generally much more constrained in terms of laying off employees, if they get into financial trouble. What implications does this have for betas, if they are estimated relative to a common index?

- a) European firms will have much higher betas than U.S. firms
- b) European firms will have similar betas to U.S. firms
- c) European firms will have much lower betas than U.S. firms

European firms will have more fixed costs, leading to higher betas. This might put these firms at a competitive disadvantage relative to US firms.

Are there ways in which you can bring your operating leverage down as a firm?

Make more of your fixed costs into variable costs (Build in escape clauses into lease agreements, for instance). Negotiate flexibility in wage contracts or use part time employees to deal with surplus business.

Spin off assets that are capital intensive (Coca Cola spun off its bottlers in the early 1980s)

Determinant 3: Financial Leverage

- As firms borrow, they create fixed costs (interest payments) that make their earnings to equity investors more volatile.
- This increased earnings volatility which increases the equity beta

Same rationale as operating leverage.

Equity Betas and Leverage

- The beta of equity alone can be written as a function of the unlevered beta and the debt-equity ratio

$$\beta_L = \beta_u (1 + ((1-t)D/E))$$

where

- β_L = Levered or Equity Beta
- β_u = Unlevered Beta
- t = Corporate marginal tax rate
- D = Market Value of Debt
- E = Market Value of Equity

This is based upon two assumptions

- Debt bears no market risk (which is consistent with studies that have found that default risk is non-systematic)
- Debt creates a tax benefit

<i>Assets</i>			<i>Liabilities</i>	
Assets	A (β_u)		Debt	D ($\beta_D = 0$)
Tax Benefits	tD ($\beta_D = 0$)		Equity	E (β_L)

Betas are weighted averages,

$$\beta_u (E + D - tD)/(D+E) = \beta_L (E/(D+E))$$

Solve for β_L ,

$$\beta_L = \beta_u (E + D - tD)/E = \beta_u (1 + (1-t)D/E)$$

If debt has a beta (β_D)

$$\beta_u (E + D - tD)/(D+E) + \beta_D tD/(D+E) = \beta_L (E/(D+E)) + \beta_D D/(D+E)$$

$$\beta_L = \beta_u (1 + (1-t)D/E) - \beta_D (1-t) [D/(D+E)]$$

Effects of leverage on betas: Disney

- The regression beta for Disney is 1.01. This beta is a levered beta (because it is based on stock prices, which reflect leverage) and the leverage implicit in the beta estimate is the average market debt equity ratio during the period of the regression (1999 to 2003)
- The average debt equity ratio during this period was 27.5%.
- The unlevered beta for Disney can then be estimated (using a marginal tax rate of 37.3%)
 - = Current Beta / (1 + (1 - tax rate) (Average Debt/Equity))
 - = 1.01 / (1 + (1 - 0.373) (0.275)) = 0.8615

Note that betas reflect the average leverage over the period and not the current leverage of the firms. Firms whose leverage has changed over the period will have regression betas that are different from their true betas.

Disney : Beta and Leverage

Debt to Capital	Debt/Equity Ratio	Beta	Effect of Leverage
0.00%	0.00%	0.86	0.00
10.00%	11.11%	0.92	0.06
20.00%	25.00%	1.00	0.14
30.00%	42.86%	1.09	0.23
40.00%	66.67%	1.22	0.36
50.00%	100.00%	1.40	0.54
60.00%	150.00%	1.67	0.81
70.00%	233.33%	2.12	1.26
80.00%	400.00%	3.02	2.16
90.00%	900.00%	5.72	4.86

Since equity investors bear all of the non-diversifiable risk, the beta of Disney's equity will increase as the leverage increases.

Betas are weighted Averages

- The beta of a portfolio is always the market-value weighted average of the betas of the individual investments in that portfolio.
- Thus,
 - the beta of a mutual fund is the weighted average of the betas of the stocks and other investment in that portfolio
 - the beta of a firm after a merger is the market-value weighted average of the betas of the companies involved in the merger.

Betas are always weighted averages - where the weights are based upon market value. This is because betas measure risk relative to a market index.

The Disney/Cap Cities Merger: Pre-Merger

Disney:

- Beta = 1.15
- Debt = \$ 3,186 million Equity = \$ 31,100 million Firm = \$34,286
- D/E = 0.10

ABC:

- Beta = 0.95
- Debt = \$ 615 million Equity = \$ 18,500 million Firm = \$ 19,115
- D/E = 0.03

These are the betas of the firms at the time of Disney's acquisition. The tax rate used for both betas is 36%.

Disney Cap Cities Beta Estimation: Step 1

- Calculate the unlevered betas for both firms
 - Disney's unlevered beta = $1.15 / (1 + 0.64 * 0.10) = 1.08$
 - Cap Cities unlevered beta = $0.95 / (1 + 0.64 * 0.03) = 0.93$
 - Calculate the unlevered beta for the combined firm
 - Unlevered Beta for combined firm
= $1.08 (34286/53401) + 0.93 (19115/53401)$
= 1.026
- [Remember to calculate the weights using the firm values of the two firms]

The unlevered beta of the combined firm will always be the weighted average of the two firms' unlevered betas. The firm values (rather than the equity values) are used for the weights because we are looking at the unlevered betas of the firms .

Disney Cap Cities Beta Estimation: Step 2

- If Disney had used all equity to buy Cap Cities
 - Debt = \$ 615 + \$ 3,186 = \$ 3,801 million
 - Equity = \$ 18,500 + \$ 31,100 = \$ 49,600
 - D/E Ratio = $3,801/49,600 = 7.66\%$
 - New Beta = $1.026 (1 + 0.64 (.0766)) = 1.08$
- Since Disney borrowed \$ 10 billion to buy Cap Cities/ABC
 - Debt = \$ 615 + \$ 3,186 + \$ 10,000 = \$ 13,801 million
 - Equity = \$ 39,600
 - D/E Ratio = $13,801/39,600 = 34.82\%$
 - New Beta = $1.026 (1 + 0.64 (.3482)) = 1.25$

This reflects the effects of the financing of the acquisition. In the second scenario, note that \$ 10 billion of the \$ 18.5 billion is borrowed. The remaining \$ 8.5 billion has to come from new equity issues.

Exercise: What would Disney's beta be if it had borrowed the entire \$ 18.5 billion?

- Debt = \$ 615 + \$ 3,186 + \$ 18,500 = \$ 22,301 million
- Equity = \$ 31,100 million
- D/E Ratio = 71.70%
- New Beta = $1.026 (1 + 0.64 (.717)) = 1.50$

Firm Betas versus divisional Betas

- Firm Betas as weighted averages: The beta of a firm is the weighted average of the betas of its individual projects.
- At a broader level of aggregation, the beta of a firm is the weighted average of the betas of its individual division.

The same principle applies to a firm. To the degree that the firm is in multiple businesses, its beta reflects all of these businesses.

Bottom-up versus Top-down Beta

- The top-down beta for a firm comes from a regression
- The bottom up beta can be estimated by doing the following:
 - Find out the businesses that a firm operates in
 - Find the unlevered betas of other firms in these businesses
 - Take a weighted (by sales or operating income) average of these unlevered betas
 - Lever up using the firm's debt/equity ratio
- The bottom up beta will give you a better estimate of the true beta when
 - the standard error of the beta from the regression is high (and) the beta for a firm is very different from the average for the business
 - the firm has reorganized or restructured itself substantially during the period of the regression
 - when a firm is not traded

Bottom-up betas build up to the beta from the fundamentals, rather than trusting the regression.

The standard error of an average beta for a sector, is smaller by a factor of \sqrt{n} , where n is the number of firms in the sector. Thus, if there are 25 firms in a sector, the standard error of the average is 1/5 the average standard error.

Disney's business breakdown

<i>Business</i>	<i>Comparable firms</i>	<i>Number of firm</i>	<i>Average levered beta</i>	<i>Median D/E</i>	<i>Unlevered beta</i>	<i>Cash/Firm Value</i>	<i>Unlevered beta corrected for cash</i>
Media Networks	Radia and TV broadcasting companies	24	1.22	20.45%	1.0768	0.75%	1.0850
Parks and Resorts	Theme park & Entertainment firms	9	1.58	120.76%	0.8853	2.77%	0.9105
Studio Entertainment	Movie companies	11	1.16	27.96%	0.9824	14.08%	1.1435
Consumer Products	Toy and apparel retailers; Entertainment software	77	1.06	9.18%	0.9981	12.08%	1.1353

Disney has other businesses (like cruise lines) which are not broken out separately because they are too small... There is also a trade off to breaking businesses down too much into subsectors, since it becomes more difficult to find comparable firms.

Estimating details:

1. Comparable firms: get 75% or more of their revenues from the stated business
2. Average levered beta: Simple average of two-year weekly return betas for comparable firms.
3. Cash / Firm value: Cash holdings as a percent of firm value at comparable firms
4. Unlevered beta corrected for cash: $\text{Unlevered beta} / (1 - \text{Cash} / \text{Firm Value})$. We are assuming that cash has a beta of zero.

Disney's bottom up beta

<i>Business</i>	<i>Revenues in 2002</i>	<i>EV/Sales</i>	<i>Estimated Value</i>	<i>Firm Value Proportion</i>	<i>Unlevered beta</i>
Media Networks	\$10,941	3.41	\$37,278.62	49.25%	1.0850
Parks and Resorts	\$6,412	2.37	\$15,208.37	20.09%	0.9105
Studio Entertainment	\$7,364	2.63	\$19,390.14	25.62%	1.1435
Consumer Products	\$2,344	1.63	\$3,814.38	5.04%	1.1353
Disney	\$27,061		\$75,691.51	100.00%	1.0674

$EV/Sales = (\text{Market Value of Equity} + \text{Market value of debt} - \text{Cash})/Sales$. The number reported here is the average across the comparable firms.

Disney's Cost of Equity

<i>Business</i>	<i>Unlevered Beta</i>	<i>D/E Ratio</i>	<i>Levered Beta</i>	<i>Cost of Equity</i>
Media Networks	1.0850	26.62%	1.2661	10.10%
Parks and Resorts	0.9105	26.62%	1.0625	9.12%
Studio Entertainment	1.1435	26.62%	1.3344	10.43%
Consumer Products	1.1353	26.62%	1.3248	10.39%
Disney	1.0674	26.62%	1.2456	10.00%

We are using Disney's debt to equity ratio as the debt to equity ratio for each of its divisions since the divisions don't carry their own debt. Optimally, you would like to break the debt down by division, estimate a value of equity for each division and come up with a debt to equity ratio for each division.

Discussion Issue

- If you were the chief financial officer of Disney, what cost of equity would you use in capital budgeting in the different divisions?
 - a) The cost of equity for Disney as a company
 - b) The cost of equity for each of Disney's divisions?

The cost of equity for each division should be used. Otherwise, the riskier divisions will over invest and the safest divisions will under invest.

Over time, the firm will become a riskier firm. Think of Bankers Trust from 1980, when it was a commercial bank, to 1992, when it had become primarily an investment bank.

Estimating Aracruz's Bottom Up Beta

Comparables	No	Avg β	D/E	β_{Unlev}	Cash/Val	$\beta_{Correct}$
Emerging Markets	111	0.6895	38.33%	0.5469	6.58%	0.5855
US	34	0.7927	83.57%	0.5137	2.09%	0.5246
Global	288	0.6333	38.88%	0.5024	6.54%	0.5375

- Aracruz has a cash balance which was 7.07% of the market value :

$$\text{Unlevered Beta for Aracruz} = (0.9293)(0.585) + (0.0707)(0) = 0.5440$$
- Using Aracruz's gross D/E ratio of 44.59% & a tax rate of 34%:

$$\text{Levered Beta for Aracruz} = 0.5440(1 + (1 - .34)(.4459)) = 0.7040$$
- The levered beta for just the paper business can also be computed:

$$\text{Levered Beta for paper business} = 0.585(1 + (1 - .34)(.4459)) = 0.7576$$

The tax rates used were 32% for emerging market companies, 35% for U.S. companies and 33% for Global companies, based upon averaging the marginal tax rates in each group.

This is a solution to the problems associated with estimating betas for emerging markets. Use bottom-up betas and lever up.

Note that

Firms which carry disproportionate amounts of cash (greater than is typical for the sector) should have lower betas.

If they hold marketable securities (or stocks) the beta of these securities can be used in computing the weighted average.

Aracruz: Cost of Equity Calculation

- We will use a risk premium of 12.49% in computing the cost of equity, composed of the U.S. historical risk premium (4.82% from 28-03) and the Brazil country risk premium of 7.67% (estimated earlier in the package)

- U.S. \$ Cost of Equity

$$\begin{aligned}\text{Cost of Equity} &= 10\text{-yr T.Bond rate} + \text{Beta} * \text{Risk Premium} \\ &= 4\% + 0.7040 (12.49\%) = 12.79\%\end{aligned}$$

- Real Cost of Equity

$$\begin{aligned}\text{Cost of Equity} &= 10\text{-yr Inflation-indexed T.Bond rate} + \text{Beta} * \text{Risk Premium} \\ &= 2\% + 0.7040 (12.49\%) = 10.79\%\end{aligned}$$

- Nominal BR Cost of Equity

Cost of Equity =

$$(1 + \$ \text{ Cost of Equity}) \frac{(1 + \text{Inflation Rate}_{\text{Brazil}})}{(1 + \text{Inflation Rate}_{\text{US}})} - 1$$

The cost of equity can be stated in different currencies. When computing the nominal BR cost of equity, we scale up the risk premium to reflect the fact the the inflation rates (and risk free rates in BR) are much higher.

Estimating Bottom-up Beta: Deutsche Bank

- Deutsche Bank is in two different segments of business - commercial banking and investment banking.
 - To estimate its commercial banking beta, we will use the average beta of commercial banks in Germany.
 - To estimate the investment banking beta, we will use the average bet of investment banks in the U.S and U.K.
- To estimate the cost of equity in Euros, we will use the German 10-year bond rate of 4.05% as the riskfree rate and the US historical risk premium (4.82%) as our proxy for a mature market premium.

Business	Beta	Cost of Equity	Weights
Commercial Banking	0.7345	7.59%	69.03%
Investment Banking	1.5167	11.36%	30.97%
Deutsche Bank		8.76%	

Same process for Deutsche Bank. The only difference is that leverage is ignored because it is a financial service firm. It is implicitly assumed that banks tend to have similar leverage.

We use the German 10-year bond rate, not because Deutsche is a German company, but because the German 10-year Euro bond had the lowest interest rate of all European 10-year bonds (and thus most likely to be default free).

Estimating Betas for Non-Traded Assets

- The conventional approaches of estimating betas from regressions do not work for assets that are not traded.
- There are two ways in which betas can be estimated for non-traded assets
 - using comparable firms
 - using accounting earnings

Private firms are not traded. There are no historical price records to compute betas from.

Using comparable firms to estimate beta for Bookscape

Assume that you are trying to estimate the beta for an independent bookstore in New York City.

Firm	Beta	Debt	Equity	Cash
Books-A-Million	0.532	\$45	\$45	\$5
Borders Group	0.844	\$182	\$1,430	\$269
Barnes & Noble	0.885	\$300	\$1,606	\$268
Courier Corp	0.815	\$1	\$285	\$6
Info Holdings	0.883	\$2	\$371	\$54
John Wiley & Son	0.636	\$235	\$1,662	\$33
Scholastic Corp	0.744	\$549	\$1,063	\$11
Sector	0.7627	\$1,314	\$6,462	\$645

Unlevered Beta = $0.7627 / (1 + (1 - .35)(1314/6462)) = 0.6737$

Corrected for Cash = $0.6737 / (1 - 645/(1314+6462)) = 0.7346$

This is the bottom-up beta for a private book store. The beta can be estimated assuming that the business has the same or different leverage as comparable firms. (All you have for private firms is book value debt and equity)

Estimating Bookscape Levered Beta and Cost of Equity

- Since the debt/equity ratios used are market debt equity ratios, and the only debt equity ratio we can compute for Bookscape is a book value debt equity ratio, we have assumed that Bookscape is *close to the industry average* debt to equity ratio of 20.33%.

- Using a marginal tax rate of 40% (based upon personal income tax rates) for Bookscape, we get a levered beta of 0.82.

$$\text{Levered beta for Bookscape} = 0.7346 (1 + (1-.40) (.2033)) = 0.82$$

- Using a riskfree rate of 4% (US treasury bond rate) and a historical risk premium of 4.82%:

$$\text{Cost of Equity} = 4\% + 0.82 (4.82\%) = 7.95\%$$

Using Accounting Earnings to Estimate Beta

Year	S&P 500	Bookscape	Year	S&P 500	Bookscape
1980	3.01%	3.55%	1991	-12.08%	-32.00%
1981	1.31%	4.05%	1992	-5.12%	55.00%
1982	-8.95%	-14.33%	1993	9.37%	31.00%
1983	-3.84%	47.55%	1994	36.45%	21.06%
1984	26.69%	65.00%	1995	30.70%	11.55%
1985	-6.91%	5.05%	1996	1.20%	19.88%
1986	-7.93%	8.50%	1997	10.57%	16.55%
1987	11.10%	37.00%	1998	-3.35%	7.10%
1988	42.02%	45.17%	1999	18.13%	14.40%
1989	5.52%	3.50%	2000	15.13%	10.50%
1990	-9.58%	-10.50%	2001	-14.94%	-8.15%
			2002	6.81%	4.05%

Accounting betas are computed by regressing accounting earnings changes against changes in earnings at the S&P 500.

The Accounting Beta for Bookscape

- Regressing the changes in profits at Bookscape against changes in profits for the S&P 500 yields the following:
Bookscape Earnings Change Change = $0.1003 + 0.7329 (\text{S \& P 500 Earnings Change})$
Based upon this regression, the beta for Bookscape's equity is 0.73.
- Using operating earnings for both the firm and the S&P 500 should yield the equivalent of an unlevered beta.

The biggest problems with accounting betas are:

Earnings tend to be smoothed out

You will not have very many observations in your regression

Is Beta an Adequate Measure of Risk for a Private Firm?

- The owners of most private firms are not diversified. Beta measures the risk added on to a diversified portfolio. Therefore, using beta to arrive at a cost of equity for a private firm will
 - a) Under estimate the cost of equity for the private firm
 - b) Over estimate the cost of equity for the private firm
 - c) Could under or over estimate the cost of equity for the private firm

Using beta (that looks at only market risk) will tend to under estimate the cost of equity since private owners feel exposed to all risk.

Total Risk versus Market Risk

- Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.

Total Beta = Market Beta / Correlation of the sector with the market

- In the Bookscape example, where the market beta is 0.82 and the average R-squared of the comparable publicly traded firms is 16%,

$$\frac{\text{Market Beta}}{\sqrt{R \text{ squared}}} = \frac{0.82}{\sqrt{.16}} = 2.06$$

- Total Cost of Equity = 4% + 2.06 (4.82%) = 13.93%

This assumes that

The owner of the private business has all of his or her wealth invested in the business

The reality is that most individuals will fall somewhere between the two extremes.

If you were a private business looking at potential acquirers - one is a publicly traded firm and the other is an individual . Which one is likely to pay the higher price and why?

If both acquirers have the same cash flow expectations, the publicly traded firm will win out (Blockbuster Video, Browning-Ferris are good examples of publicly traded firms which bought small private businesses to grow to their current stature.)

⌚ Application Test: Estimating a Bottom-up Beta

- Based upon the business or businesses that your firm is in right now, and its current financial leverage, estimate the bottom-up unlevered beta for your firm.
- *Data Source:* You can get a listing of unlevered betas by industry on my web site by going to updated data.

The breakdown of a firm into businesses is available in the 10-K. The unlevered betas are available on my web site.

From Cost of Equity to Cost of Capital

- The cost of capital is a composite cost to the firm of raising financing to fund its projects.
- In addition to equity, firms can raise capital from debt

Capital is more than just equity. It also includes other financing sources, including debt.

What is debt?

- General Rule: Debt generally has the following characteristics:
 - Commitment to make fixed payments in the future
 - The fixed payments are tax deductible
 - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- As a consequence, debt should include
 - Any interest-bearing liability, whether short term or long term.
 - Any lease obligation, whether operating or capital.

Debt is not restricted to what gets called debt in the balance sheet. It includes any financing with these characteristics.

Estimating the Cost of Debt

- If the firm has bonds outstanding, and the bonds are traded, the yield to maturity on a long-term, straight (no special features) bond can be used as the interest rate.
- If the firm is rated, use the rating and a typical default spread on bonds with that rating to estimate the cost of debt.
- If the firm is not rated,
 - and it has recently borrowed long term from a bank, use the interest rate on the borrowing or
 - estimate a synthetic rating for the company, and use the synthetic rating to arrive at a default spread and a cost of debt
- The cost of debt has to be estimated in the same currency as the cost of equity and the cash flows in the valuation.

While the cost of debt can be estimated easily for some firms, by looking up traded bonds, it can be more difficult for non-rated firms. The default spreads can be obtained from

<http://www.bondsonline.com>

Estimating Synthetic Ratings

- The rating for a firm can be estimated using the financial characteristics of the firm. In its simplest form, the rating can be estimated from the interest coverage ratio

$$\text{Interest Coverage Ratio} = \text{EBIT} / \text{Interest Expenses}$$

- For a firm, which has earnings before interest and taxes of \$ 3,500 million and interest expenses of \$ 700 million

$$\text{Interest Coverage Ratio} = 3,500/700 = 5.00$$

- In 2003, Bookscape had operating income of \$ 2 million after interest expenses of 5000,000. The resulting interest coverage ratio is 4.00.
 - Interest coverage ratio = $2,000,000/500,000 = 4.00$

This is simplistic. A more realistic approach would use more than the interest coverage ratio. In fact, we could construct a score based upon multiple ratios (such as a Z-score) and use that score to estimate ratings.

Interest Coverage Ratios, Ratings and Default Spreads: Small Companies

Interest Coverage Ratio	Rating	Typical default spread
> 12.5	AAA	0.35%
9.50 - 12.50	AA	0.50%
7.50 - 9.50	A+	0.70%
6.00 - 7.50	A	0.85%
4.50 - 6.00	A-	1.00%
4.00 - 4.50	BBB	1.50%
3.50 - 4.00	BB+	2.00%
3.00 - 3.50	BB	2.50%
2.50 - 3.00	B+	3.25%
2.00 - 2.50	B	4.00%
1.50 - 2.00	B-	6.00%
1.25 - 1.50	CCC	8.00%
0.80 - 1.25	CC	10.00%
0.50 - 0.80	C	12.00%
< 0.65	D	20.00%

Aswath Damodaran

165

This table is constructed, using smaller non-financial service companies (<\$5 billion market cap) that are rated, and their interest coverage ratios. The firms were sorted based upon their ratings, and the interest coverage range was estimated.

These ranges will change over time, especially as the economy strengthens or weakens. You can get the updated ranges on my web site.

Synthetic Rating and Cost of Debt for Bookscape

- Rating based on interest coverage ratio = BBB
- Default Spread based upon rating = 1.50%
- Pre-tax cost of debt = Riskfree Rate + Default Spread = 4% + 1.50% = 5.50%
- After-tax cost of debt = Pre-tax cost of debt (1 - tax rate) = 5.50% (1 - .40) = 3.30%

The tax rate used is the marginal tax rate.... Interest savings you taxes on your marginal income, not first or average dollar of income....

Estimating Cost of Debt with rated companies

- For the three publicly traded firms in our sample, we will use the actual bond ratings to estimate the costs of debt:

	<i>S&P Rating</i>	<i>Riskfree Rate</i>	<i>Default Spread</i>	<i>Cost of Debt</i>	<i>Tax Rate</i>	<i>After-tax Cost of Debt</i>
Disney	BBB+	4% (\$)	1.25%	5.25%	37.3%	3.29%
Deutsche Bank	AA-	4.05% (Eu)	1.00%	5.05%	38%	3.13%
Aracruz	B+	4% (\$)	3.25%	7.25%	34%	4.79%

- We computed the synthetic ratings for Disney and Aracruz using the interest coverage ratios:

- Disney: Coverage ratio = $2,805/758 = 3.70$ Synthetic rating = A-
- Aracruz: Coverage ratio = $888/339 = 2.62$ Synthetic rating = BBB
- Disney's synthetic rating is close to its actual rating. Aracruz has two ratings – one for its local currency borrowings of BBB- and one for its dollar borrowings of B+.

Can we trust rating agencies? In general, ratings agencies do a reasonable job of assessing default risk and offer us these measures for free (at least to investors). They have two faults: (1) They adjust for changes in default risk too slowly. All too often ratings downgrades follow bond price declines and not the other way around (2) They sometimes get caught up in the mood of the moment and either overestimate default risk or underestimate default risk for an entire sector.

It is a good idea to estimate synthetic ratings even for firms that have actual ratings. If there is disagreement between ratings agencies or a firm has multiple bond ratings, the synthetic rating can operate as a tie-breaker. If there is a significant difference between actual and synthetic ratings and there is no fundamental reason that can be pinpointed for the difference, the synthetic rating may be providing an early signal of a ratings agency mistake.

⌚ Application Test: Estimating a Cost of Debt

- Based upon your firm's current earnings before interest and taxes, its interest expenses, estimate
 - An interest coverage ratio for your firm
 - A synthetic rating for your firm (use the table from previous page)
 - A pre-tax cost of debt for your firm
 - An after-tax cost of debt for your firm

To estimate the after-tax cost of debt, you need a marginal tax rate. Since the federal tax rate for corporations is 35%, I would expect the marginal tax rate to be 35% or higher. Thus, even if the effective tax rate reported in the financial statements are lower, I would use at least 35%. If the effective tax rate is higher than 35%, I would use the effective tax rate, with the assumption that it is capturing other taxes that the firm has to pay.

Costs of Hybrids

- Preferred stock shares some of the characteristics of debt - the preferred dividend is pre-specified at the time of the issue and is paid out before common dividend -- and some of the characteristics of equity - the payments of preferred dividend are not tax deductible. If preferred stock is viewed as perpetual, the cost of preferred stock can be written as follows:
 - $k_{ps} = \text{Preferred Dividend per share} / \text{Market Price per preferred share}$
- Convertible debt is part debt (the bond part) and part equity (the conversion option). It is best to break it up into its component parts and eliminate it from the mix altogether.

The easiest way to break down a convertible bond is to value it as a straight bond and to then assign the remaining market value to the conversion option. In March 2004, Disney had convertible bonds outstanding with 19 years left to maturity and a coupon rate of 2.125%, trading at \$1,064 a bond. Holders of this bond have the right to convert the bond into 33.9444 shares of stock anytime over the bond's remaining life. To break the convertible bond into straight bond and conversion option components, we will value the bond using Disney's pre-tax cost of debt of 5.25%:

At this conversion ratio, the price that investors would be paying for Disney shares would be \$29.46, much higher than the stock price of \$20.46 prevailing at the time of the analysis.

This rate was based upon a 10-year treasury bond rate. If the 5-year treasury bond rate had been substantially different, we would have recomputed a pre-tax cost of debt by adding the default spread to the 5-year rate.

Straight Bond component

= Value of a 2.125% coupon bond due in 19 years with a market interest rate of 5.25%

= PV of \$21.25 in coupons each year for 19 years + PV of \$1000 at end of year 19

The coupons are assumed to be annual. With semi-annual coupons, you would divide the coupon by 2 and apply a semi-annual rate to calculate the present value.

=

Weights for Cost of Capital Calculation

- The weights used in the cost of capital computation should be market values.
- There are three specious arguments used against market value
 - *Book value is more reliable than market value because it is not as volatile:* While it is true that book value does not change as much as market value, this is more a reflection of weakness than strength
 - *Using book value rather than market value is a more conservative approach to estimating debt ratios:* For most companies, using book values will yield a lower cost of capital than using market value weights.
 - *Since accounting returns are computed based upon book value, consistency requires the use of book value in computing cost of capital:* While it may seem consistent to use book values for both accounting return and cost of capital calculations, it does not make economic sense.

Assume that the market value debt ratio is 10%, while the book value debt ratio is 30%, for a firm with a cost of equity of 15% and an after-tax cost of debt of 5%. The cost of capital can be calculated as follows –

With market value debt ratios: $15\% (.9) + 5\% (.1) = 14\%$

With book value debt ratios: $15\% (.7) + 5\% (.3) = 12\%$

Which is the more conservative estimate?

Estimating Market Value Weights

- Market Value of Equity should include the following
 - Market Value of Shares outstanding
 - Market Value of Warrants outstanding
 - Market Value of Conversion Option in Convertible Bonds
- Market Value of Debt is more difficult to estimate because few firms have only publicly traded debt. There are two solutions:
 - Assume book value of debt is equal to market value
 - Estimate the market value of debt from the book value
 - For Disney, with book value of 13,100 million, interest expenses of \$666 million, a current cost of borrowing of 5.25% and an weighted average maturity of 11.53 years.

$$\text{Estimated MV of Disney Debt} = 666 \left[\frac{1 - \frac{1}{(1.0525)^{11.53}}}{.0525} \right] + \frac{13,100}{(1.0525)^{11.53}} = \$12,915 \text{ million}$$

The market value of debt is estimated by considering all debt as if it were one large coupon bond.

The average maturity of debt can be obtained from the 10-K. For Disney in September 2004, the face-value weighted maturity in 2004 was 11.53 years...

Converting Operating Leases to Debt

- The “debt value” of operating leases is the present value of the lease payments, at a rate that reflects their risk.
- In general, this rate will be close to or equal to the rate at which the company can borrow.

This allows us to get a more realistic view of the leverage of firms that use operating leases a lot. Examples would be the retailers like the Gap or Walmart.

Operating Leases at Disney

- The pre-tax cost of debt at Disney is 5.25%

Year	Commitment	Present Value
1	\$ 271.00	\$ 257.48
2	\$ 242.00	\$ 218.46
3	\$ 221.00	\$ 189.55
4	\$ 208.00	\$ 169.50
5	\$ 275.00	\$ 212.92
6-9	\$ 258.25	\$ 704.93
Debt Value of leases =		\$ 1,752.85

- Debt outstanding at Disney = \$12,915 + \$ 1,753 = \$14,668 million

The pre-tax cost of debt was based upon Disney's current rating.

Disney reports a lump sum of \$ 1.033 billion as the amount due in year 6....
We break it up into four annual payments of \$258.25 million a year based upon the average lease payments over the first 5 years...

⌚ Application Test: Estimating Market Value

- Estimate the
 - Market value of equity at your firm and Book Value of equity
 - Market value of debt and book value of debt (If you cannot find the average maturity of your debt, use 3 years): Remember to capitalize the value of operating leases and add them on to both the book value and the market value of debt.
- Estimate the
 - Weights for equity and debt based upon market value
 - Weights for equity and debt based upon book value

Current Cost of Capital: Disney

■ Equity

- Cost of Equity = Riskfree rate + Beta * Risk Premium
= 4% + 1.25 (4.82%) = 10.00%
- Market Value of Equity = \$55.101 Billion
- Equity/(Debt+Equity) = 79%

■ Debt

- After-tax Cost of debt = (Riskfree rate + Default Spread) (1-t)
= (4%+1.25%) (1-.373) = 3.29%
- Market Value of Debt = \$ 14.668 Billion
- Debt/(Debt +Equity) = 21%

- Cost of Capital = 10.00%(.79)+3.29%(.21) = 8.59%

↗
$$\frac{55.101}{55.101+14.668}$$

This reproduces the current cost of capital computation for Disney, using market value weights for both debt and equity, the cost of equity (based upon the bottom-up beta) and the cost of debt (based upon the bond rating)

The market value of debt is estimated by estimating the present value of total interest payments and face value at the current cost of debt.

One way to frame the capital structure question: Is there a mix of debt and equity at which Disney's cost of capital will be lower than 12.22%?

Disney's Divisional Costs of Capital

Business	Cost of Equity	After-tax cost of debt	E/(D+E)	D/(D+E)	Cost of capital
Media Networks	10.10%	3.29%	78.98%	21.02%	8.67%
Parks and Resorts	9.12%	3.29%	78.98%	21.02%	7.90%
Studio Entertainment	10.43%	3.29%	78.98%	21.02%	8.93%
Consumer Products	10.39%	3.29%	78.98%	21.02%	8.89%
Disney	10.00%	3.29%	78.98%	21.02%	8.59%

All of the divisions are assumed to share the same debt ratio and the cost of debt. If they had borrowed on their own, we would have used division specific debt ratios and costs of debt.

These would be the hurdle rates that we would use to analyze projects at each of these divisions.

Aracruz's Cost of Capital

	<i>Levered Beta</i>	<i>Cost of Equity</i>	<i>After-tax Cost of Debt</i>	<i>D/(D+E)</i>	<i>Cost of Capital</i>
In Real Terms					
Paper & Pulp	0.7576	11.46%	3.47%	30.82%	9.00%
Cash	0	2.00%			2.00%
Aracruz	0.7040	10.79%	3.47%	30.82%	8.53%
In US Dollar Terms					
Paper & Pulp	0.7576	13.46%	4.79%	30.82%	10.79%
Cash	0	4.00%			4.00%
Aracruz	0.7040	12.79%	4.79%	30.82%	10.33%

When computing cost of capital, we compute the cost both with cash as part of the equation (in which case it is lower) and without cash.

Bookscape Cost of Capital

	Beta	Cost of Equity	Cost of debt	After-tax	D/(D+E)	Cost of Capital
Market Beta	0.82	7.97%		3.30%	16.90%	7.18%
Total Beta	2.06	13.93%		3.30%	16.90%	12.14%

If we assume that the owners of a private business are not diversified, we arrive at much higher estimates of costs of equity and capital.

Application Test: Estimating Cost of Capital

- Using the bottom-up unlevered beta that you computed for your firm, and the values of debt and equity you have estimated for your firm, estimate a bottom-up levered beta and cost of equity for your firm.
- Based upon the costs of equity and debt that you have estimated, and the weights for each, estimate the cost of capital for your firm.
- How different would your cost of capital have been, if you used book value weights?

Choosing a Hurdle Rate

- Either the cost of equity or the cost of capital can be used as a hurdle rate, depending upon whether the returns measured are to equity investors or to all claimholders on the firm (capital)
- If returns are measured to equity investors, the appropriate hurdle rate is the cost of equity.
- If returns are measured to capital (or the firm), the appropriate hurdle rate is the cost of capital.

While the cost of equity and capital can be very different numbers, they can both be used as hurdle rates, as long as the returns and cash flows are defined consistently.

Back to First Principles

- Invest in projects that yield a return greater than the **minimum acceptable hurdle rate**.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Measuring Investment Returns

“Show me the money”

Jerry Maguire

First Principles

- Invest in projects that yield a **return** greater than the minimum acceptable hurdle rate.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Measures of return: earnings versus cash flows

■ Principles Governing Accounting Earnings Measurement

- **Accrual Accounting:** Show revenues when products and services are sold or provided, not when they are paid for. Show expenses associated with these revenues rather than cash expenses.
 - **Operating versus Capital Expenditures:** Only expenses associated with creating revenues in the current period should be treated as operating expenses. Expenses that create benefits over several periods are written off over multiple periods (as depreciation or amortization)
- ### ■ To get from accounting earnings to cash flows:
- you have to add back non-cash expenses (like depreciation)
 - you have to subtract out cash outflows which are not expensed (such as capital expenditures)
 - you have to make accrual revenues and expenses into cash revenues and expenses (by considering changes in working capital).

Accrual accounting income is designed to measure the “income” made by an entity during a period, on sales made during the period. Thus, accrual accounting draws lines between operating expenses (that create income in the current period) and capital expenditures (which create income over multiple periods).

It is not always consistent. R&D, for instance, is treated as an operating expense.

Accrual accounting also tries to allocate the cost of materials to current period revenues, leading to inventory, and give the company credit for sales made during the period, even if cash has not been received, giving rise to accounts receivable.

Measuring Returns Right: The Basic Principles

- Use cash flows rather than earnings. You cannot spend earnings.
- Use “incremental” cash flows relating to the investment decision, i.e., cashflows that occur as a consequence of the decision, rather than total cash flows.
- Use “time weighted” returns, i.e., value cash flows that occur earlier more than cash flows that occur later.

The Return Mantra: “Time-weighted, Incremental Cash Flow Return”

These are the basic financial principles underlying the measurement of investment returns.

We focus on cash flows, because we cannot spend earnings.

We focus on “ incremental” effects on the overall business, since we care about the overall health and value of the business, not individual projects.

We use time-weighted returns, since returns made earlier are worth more than the same returns made later.

Earnings versus Cash Flows: A Disney Theme Park

- The theme parks to be built near Bangkok, modeled on Euro Disney in Paris, will include a “Magic Kingdom” to be constructed, beginning immediately, and becoming operational at the beginning of the second year, and a second theme park modeled on Epcot Center at Orlando to be constructed in the second and third year and becoming operational at the beginning of the fourth year.
- The earnings and cash flows are estimated in nominal U.S. Dollars.

The earnings and cash flows will really be in Thai Baht. We will consider later the effects of looking at all the cash flows in a different currency.

Note that this investment is not going to be fully operational until the fifth year.

Key Assumptions on Start Up and Construction

- The cost of constructing Magic Kingdom will be \$3 billion, with \$ 2 billion to be spent right now, and \$1 Billion to be spent one year from now.
- Disney has already spent \$0.5 Billion researching the proposal and getting the necessary licenses for the park; none of this investment can be recovered if the park is not built.
- The cost of constructing Epcot II will be \$ 1.5 billion, with \$ 1 billion to be spent at the end of the second year and \$0.5 billion at the end of the third year.

The emphasis in the first item should be on “ already spent” .

While we often classify all these investments as “ initial investments” , they occur over time.

Key Revenue Assumptions

Revenue estimates for the parks and resort properties (in millions)				
Year	Magic Kingdom	Epcot II	Resort Properties	Total
1	\$0	\$0	\$0	\$0
2	\$1,000	\$0	\$250	\$1,250
3	\$1,400	\$0	\$350	\$3,000
4	\$1,700	\$300	\$500	\$4,250
5	\$2,000	\$500	\$625	\$5,625
6	\$2,200	\$550	\$688	\$6,563
7	\$2,420	\$605	\$756	\$7,219
8	\$2,662	\$666	\$832	\$7,941
9	\$2,928	\$732	\$915	\$8,735
10	\$2,987	\$747	\$933	\$9,242
Beyond	Revenues grow 2% a year forever			

These are assumptions. Most real investments involve uncertainty about the future, but we have to make a judgment on what we “expect” to make. These expectations may be based upon past experience or market testing.

Note that these are not conservative or low-ball estimates. Using lower numbers than expected (because a project is risky or because you are risk-averse) can lead to risk being double counted.

There is an alternative approach to capital budgeting where we can estimate what are called certainty equivalent cash flows, but the discount rate in that case would be the riskfree rate.

Finally, note that the project continues after year 10.

Key Expense Assumptions

- The operating expenses are assumed to be 60% of the revenues at the parks, and 75% of revenues at the resort properties.
- Disney will also allocate corporate general and administrative costs to this project, based upon revenues; the G&A allocation will be 15% of the revenues each year. It is worth noting that a recent analysis of these expenses found that only one-third of these expenses are variable (and a function of total revenue) and that two-thirds are fixed. After year 10, these expenses are also assumed to grow at the inflation rate of 2%.

Again, these numbers are easier to estimate in an investment like this one, where Disney can look at similar investments that it has made in the past.

Most large firms have significant expenses that cannot be traced to individual projects. These expenses are sometimes lumped under General and Administrative expenses (G&A) and get allocated to projects.

Depreciation and Capital Maintenance

Year	Depreciation as % of book value	Capital Maintenance as % of Depreciation
1	0.00%	0.00%
2	12.70%	50.00%
3	11.21%	60.00%
4	9.77%	70.00%
5	8.29%	80.00%
6	8.31%	90.00%
7	8.34%	100.00%
8	8.38%	105.00%
9	8.42%	110.00%
10	8.42%	110.00%

■ The capital maintenance expenditures are low in the early years, when the parks are still new but increase as the parks age. After year 10, both depreciation and capital expenditures are assumed to grow at the inflation rate (2%).

This is accrual accounting at work. Some expenses such as regular maintenance expenses will be treated as operating, but some expenses (such as replacing a significant portion of an existing ride) will be treated as capital expenditures. The capital expenditures on this page are maintenance capital expenditures, designed to keep the parks in operational condition, generating revenues in the long term, and are on top of the initial capital expenditures.

The depreciation is the total depreciation on all cap ex. Note that capital expenditures moves towards depreciation over time, reflecting the fact that on an infinite-life project, depreciation is usually no longer a cash inflow, since it has to be reinvested back to sustain future growth.

Other Assumptions

- Disney will have to maintain non-cash working capital (primarily consisting of inventory at the theme parks and the resort properties, netted against accounts payable) of 5% of revenues, with the investments being made at the *end of each year*.
- The income from the investment will be taxed at Disney's marginal tax rate of 37.3%

This will be a drain on the cash flows, since revenues are growing. This, in turn, will create larger inventory and working capital needs each year, which will tie up more cash in the project.

The tax rate used is the marginal tax rate (as opposed to the effective tax rate reported in income statements and annual reports) because projects create income at the margin and will be taxed at the margin.

Earnings on Project

	Now (0)	1	2	3	4	5	6	7	8	9	10
Magic Kingdom	\$0	\$1,000	\$1,400	\$1,700	\$2,000	\$2,200	\$2,420	\$2,662	\$2,928	\$2,987	
Second Theme Park	\$0	\$0	\$0	\$300	\$500	\$550	\$605	\$666	\$732	\$747	
Resort & Properties	\$0	\$250	\$350	\$500	\$625	\$688	\$756	\$832	\$915	\$933	
<i>Total Revenues</i>		<i>\$1,250</i>	<i>\$1,750</i>	<i>\$2,500</i>	<i>\$3,125</i>	<i>\$3,438</i>	<i>\$3,781</i>	<i>\$4,159</i>	<i>\$4,575</i>	<i>\$4,667</i>	
Magic Kingdom: Operating Expenses	\$0	\$600	\$840	\$1,020	\$1,200	\$1,320	\$1,452	\$1,597	\$1,757	\$1,792	
Epcot II: Operating Expenses	\$0	\$0	\$0	\$180	\$300	\$330	\$363	\$399	\$439	\$448	
Resort & Property: Operating Expenses	\$0	\$188	\$263	\$375	\$469	\$516	\$567	\$624	\$686	\$700	
Depreciation & Amortization	\$0	\$537	\$508	\$430	\$359	\$357	\$358	\$361	\$366	\$369	
Allocated G&A Costs	\$0	\$188	\$263	\$375	\$469	\$516	\$567	\$624	\$686	\$700	
<i>Operating Income</i>	<i>\$0</i>	<i>-\$262</i>	<i>-\$123</i>	<i>\$120</i>	<i>\$329</i>	<i>\$399</i>	<i>\$473</i>	<i>\$554</i>	<i>\$641</i>	<i>\$657</i>	
Taxes	\$0	-\$98	-\$46	\$45	\$123	\$149	\$177	\$206	\$239	\$245	
<i>Operating Income after Taxes</i>			<i>-\$164</i>	<i>-\$77</i>	<i>\$75</i>	<i>\$206</i>	<i>\$250</i>	<i>\$297</i>	<i>\$347</i>	<i>\$402</i>	<i>\$412</i>

This shows the accounting earnings calculations for the next 10 years. Note the increasing after-tax operating income over time.

And the Accounting View of Return

Year	After-tax Operating Income	BV of Capital: Beginning	BV of Capital: Ending	Average BV of Capital	ROC
1	\$0	\$2,500	\$3,500	\$3,000	NA
2	-\$165	\$3,500	\$4,294	\$3,897	-4.22%
3	-\$77	\$4,294	\$4,616	\$4,455	-1.73%
4	\$75	\$4,616	\$4,524	\$4,570	1.65%
5	\$206	\$4,524	\$4,484	\$4,504	4.58%
6	\$251	\$4,484	\$4,464	\$4,474	5.60%
7	\$297	\$4,464	\$4,481	\$4,472	6.64%
8	\$347	\$4,481	\$4,518	\$4,499	7.72%
9	\$402	\$4,518	\$4,575	\$4,547	8.83%
10	\$412	\$4,575	\$4,617	\$4,596	8.97%
	\$175			\$4,301	4.23%

This converts the accounting income into a percentage return (to enable us to do the comparison to the hurdle rate, which is a percentage rate)

The average book value is computed each year using the beginning and ending book values. The book values themselves are computed as follows:

Ending BV = Beginning BV - Depreciation + Capital Expenditures

Estimating a hurdle rate for the theme park

- We did estimate a cost of equity of 9.12% for the Disney theme park business in the last chapter, using a bottom-up levered beta of 1.0625 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- To counter this risk, we compute the cost of equity for the theme park using a risk premium that includes a country risk premium for Thailand:
 - The rating for Thailand is Baa1 and the default spread for the country bond is 1.50%. Multiplying this by the relative volatility of 2.2 of the equity market in Thailand (standard deviation of equity/standard deviation of country bond) yields a country risk premium of 3.3%.
 - Cost of Equity in US \$ = $4\% + 1.0625(4.82\% + 3.30\%) = 12.63\%$
 - Cost of Capital in US \$ = $12.63\% (.7898) + 3.29\% (.2102) = 10.66\%$

Adds a risk premium to the cost of equity to reflect the additional risk of investing in an emerging market...

Would lead us to conclude that...

- Do not invest in this park. The **return on capital of 4.23%** is lower than the **cost of capital for theme parks of 10.66%**; This would suggest that the project should not be taken.
- Given that we have computed the average over an arbitrary period of 10 years, while the theme park itself would have a life greater than 10 years, would you feel comfortable with this conclusion?
 - a) Yes
 - b) No

I would not. I think the accounting return, which cuts off the analysis arbitrarily after 10 years, understates the true return on projects like this one, which have longer expected lives.

From Project to Firm Return on Capital: Disney in 2003

- Just as a comparison of project return on capital to the cost of capital yields a measure of whether the project is acceptable, a comparison can be made at the firm level, to judge whether the existing projects of the firm are adding or destroying value.
- Disney, in 2003, had earnings before interest and taxes of \$2,713 million, had a book value of equity of \$23,879 million and a book value of debt of 14,130 million. With a tax rate of 37.3%, we get
Return on Capital = $2713(1-.373) / (23879+14130) = 4.48\%$
Cost of Capital for Disney = 8.59%
Excess Return = $4.49\% - 8.59\% = -4.11\%$
- This can be converted into a dollar figure by multiplying by the capital invested, in which case it is called economic value added
EVA = $(.0448 - .0859) (23879 + 14130) = -\$1,562$ million

A firm can be viewed as having a portfolio of existing projects. This approach allows you to assess whether that portfolio is earning more than the hurdle rate, but it is based upon the following assumptions:

- Accounting earnings are a good measure of the earnings from current projects (They might not be, if items like R&D, which are really investments for the future, extraordinary profits or losses, or accounting changes affect the reported income.)
- The book value of capital is a good measure of what is invested in current projects.

⌚ Application Test: Assessing Investment Quality

- For the most recent period for which you have data, compute the after-tax return on capital earned by your firm, where after-tax return on capital is computed to be

$$\text{After-tax ROC} = \text{EBIT} (1 - \text{tax rate}) / (\text{BV of debt} + \text{BV of Equity})_{\text{previous year}}$$

- For the most recent period for which you have data, compute the return spread earned by your firm:

$$\text{Return Spread} = \text{After-tax ROC} - \text{Cost of Capital}$$

- For the most recent period, compute the EVA earned by your firm

$$\text{EVA} = \text{Return Spread} * ((\text{BV of debt} + \text{BV of Equity})_{\text{previous year}})$$

This measure of investment quality is only as good as the measures of operating income and book value that go into it.

We use the book value of capital from the end of the previous year, because it is more consistent with how we define returns in finance. You could also do this on the basis of the average operating income and capital.

The cash flow view of this project..

	0	1	2	3	4	5	6
Operating Income after Taxes			-\$165	-\$77	\$75	\$206	\$251
+ Depreciation & Amortization			\$537	\$508	\$430	\$359	\$357
- Capital Expenditures	\$2,500	\$1,000	\$1,269	\$805	\$301	\$287	\$321
- Change in Working Capital	\$0	\$0	\$63	\$25	\$38	\$31	\$16
Cashflow to Firm	-\$2,500	-\$1,000	-\$960	-\$399	\$166	\$247	\$271

To get from income to cash flow, we

- added back all non-cash charges such as depreciation
- subtracted out the capital expenditures
- subtracted out the change in non-cash working capital

This converts earnings to cash flows.

Depreciation and amortization are just two of the most common non-cash charges.

Any capital expenditures (whether initial or maintenance) need to be subtracted out.

It is only the change in non-cash working capital that needs to be subtracted out.

The Depreciation Tax Benefit

- While depreciation reduces taxable income and taxes, it does not reduce the cash flows.
- The benefit of depreciation is therefore the tax benefit. In general, the tax benefit from depreciation can be written as:

$$\text{Tax Benefit} = \text{Depreciation} * \text{Tax Rate}$$

- For example, in year 2, the tax benefit from depreciation to Disney from this project can be written as:

$$\text{Tax Benefit in year 2} = \$ 537 \text{ million} (.373) = \$ 200 \text{ million}$$

Proposition 1: The tax benefit from depreciation and other non-cash charges is greater, the higher your tax rate.

Proposition 2: Non-cash charges that are not tax deductible (such as amortization of goodwill) and thus provide no tax benefits have no effect on cash flows.

If a firm pays no taxes (it is a tax-exempt entity, for instance), there is no benefit to depreciation.

In the 1970s, when tax rates for wealthy individuals were much higher than tax rates for corporations, the former (who get much higher tax benefits from depreciation) would buy expensive assets (such as airplanes) and lease them back to the latter.

Non-cash charges that are not tax deductible do not create a benefit from a cash flow standpoint. They are subtracted out from after-tax income and then added back. Thus, the debate in acquisitions about whether to use purchase accounting (which leads to goodwill, the amortization of which reduces after-tax earnings in future periods) or pooling (which does not affect earnings) has no implications for cash flows.

Depreciation Methods

- Broadly categorizing, depreciation methods can be classified as straight line or accelerated methods. In straight line depreciation, the capital expense is spread evenly over time. In accelerated depreciation, the capital expense is depreciated more in earlier years and less in later years. Assume that you made a large investment this year, and that you are choosing between straight line and accelerated depreciation methods. Which will result in higher net income this year?

- a) Straight Line Depreciation
- b) Accelerated Depreciation

Which will result in higher cash flows this year?

- a) Straight Line Depreciation
- b) Accelerated Depreciation

Straight line depreciation will lead to higher income and accelerated depreciation to higher cash flows.

Most US firms use straight line depreciation for financial reporting (as in annual reports) and accelerated depreciation (for tax purposes). This is often the reason why effective tax rates in annual reports look low. (Effective Tax Rate = Taxes Paid / Reported Pre-tax Income)

The Capital Expenditures Effect

- Capital expenditures are not treated as accounting expenses but they do cause cash outflows.
- Capital expenditures can generally be categorized into two groups
 - New (or Growth) capital expenditures are capital expenditures designed to create new assets and future growth
 - Maintenance capital expenditures refer to capital expenditures designed to keep existing assets.
- Both initial and maintenance capital expenditures reduce cash flows
- The need for maintenance capital expenditures will increase with the life of the project. In other words, a 25-year project will require more maintenance capital expenditures than a 2-year asset.

While most analysts who look at projects remember to consider the initial capital investment, many of them fail to consider the need for capital maintenance expenditure.

Depreciation and capital expenditures are highly interrelated assumptions. You cannot depreciate what you do not cap ex.

To cap ex or not to cap ex

- Assume that you run your own software business, and that you have an expense this year of \$ 100 million from producing and distribution promotional CDs in software magazines. Your accountant tells you that you can expense this item or capitalize and depreciate. Which will have a more positive effect on income?

- a) Expense it
- b) Capitalize and Depreciate it

Which will have a more positive effect on cash flows?

- a) Expense it
- b) Capitalize and Depreciate it

Capitalizing and amortizing the expense will have a more positive effect on income. Assuming you have the income to expense it, expensing it will have a more positive effect on cash flows.

America Online, which incurs a huge expenditure each year on the promotional CDs and diskette that it inserts in computer magazines, capitalizes the expense (at least for reporting purposes) and amortizes it.

The Working Capital Effect

- Intuitively, money invested in inventory or in accounts receivable cannot be used elsewhere. It, thus, represents a drain on cash flows
- To the degree that some of these investments can be financed using suppliers credit (accounts payable) the cash flow drain is reduced.
- Investments in working capital are thus cash outflows
 - Any increase in working capital reduces cash flows in that year
 - Any decrease in working capital increases cash flows in that year
- To provide closure, working capital investments need to be salvaged at the end of the project life.
- **Proposition 1:** The failure to consider working capital in a capital budgeting project will overstate cash flows on that project and make it look more attractive than it really is.
- **Proposition 2:** Other things held equal, a reduction in working capital requirements will increase the cash flows on all projects for a firm.

By working capital, we consider only non-cash working capital. Defined even more tightly,

$$\text{Non-cash WC} = \text{Inventory} + \text{Accounts Receivable} - \text{Accounts Payable}$$

Why do we not include cash? Because the investment in working capital is considered to be an investment on which you cannot make a return. To the extent that most US firms that have cash today earn interest on the cash, treating the cash as part of non-cash working capital may be requiring it to earn a return twice.

Some businesses do need to maintain traditional cash balances. If that is the case, that cash can be counted into working capital.

The incremental cash flows on the project

\$ 500 million has already been spent

	Now (0)	1	2	3	4	5	6	7	8	9	10
Operating Income after Taxes			-\$165	-\$77	\$75	\$206	\$251	\$297	\$347	\$402	\$412
+ Depreciation & Amortization			\$537	\$508	\$430	\$359	\$357	\$358	\$361	\$366	\$369
- Capital Expenditures	\$2,500	\$1,000	\$1,269	\$805	\$301	\$287	\$321	\$358	\$379	\$403	\$406
- Change in Working Capital	\$0	\$0	\$63	\$25	\$38	\$31	\$16	\$17	\$19	\$21	\$5
+ Non-incremental Allocated Expense (1-t)		\$0	\$78	\$110	\$157	\$196	\$216	\$237	\$261	\$287	\$293
+ Sunk Costs	500										
Cashflow to Firm	-\$2,000	-\$1,000	-\$880	-\$289	\$324	\$443	\$486	\$517	\$571	\$631	\$663

2/3rd of allocated G&A is fixed.
Add back this amount (1-t)

To get from cash flow to incremental cash flows, we

- Taken out of the sunk costs from the initial investment
- Added back the non-incremental allocated costs (in after-tax terms)

A sunk cost is any cost that has already been incurred and will not be recovered even if the project under consideration is rejected.

Only the after-tax amount of the non-incremental allocated costs are added back because the cash flows are after-tax cash flows.

Alternatively, the cash flows can be estimated from scratch using only the incremental cash flows.

Sunk Costs

- Any expenditure that has already been incurred, and cannot be recovered (even if a project is rejected) is called a sunk cost
- When analyzing a project, sunk costs should not be considered since they are incremental
- By this definition, market testing expenses and R&D expenses are both likely to be sunk costs before the projects that are based upon them are analyzed. If sunk costs are not considered in project analysis, how can a firm ensure that these costs are covered?

Sunk costs should not be considered an investment analysis, but a healthy firm has to figure out a way to recover sunk costs from on-going projects. The only way to ensure that this happens is to have a process where costs are examined before they become sunk. For instance, pharmaceutical firms need to be able to ask whether a specified expenditure in R&D is worth it (given expectations for products that might emerge from the R&D, and the size of the market) before the expenditure is made.

This is likely to be far more difficult if the research is basic research without a specific product in mind.

Allocated Costs

- Firms allocate costs to individual projects from a centralized pool (such as general and administrative expenses) based upon some characteristic of the project (sales is a common choice)
- For large firms, these allocated costs can result in the rejection of projects
- To the degree that these costs are not incremental (and would exist anyway), this makes the firm worse off.
 - Thus, it is only the incremental component of allocated costs that should show up in project analysis.
- How, looking at these pooled expenses, do we know how much of the costs are fixed and how much are variable?

Allocation is the accountant's mechanism for fairness.

If the allocation is of an expense that would be incurred anyway, whether the project is taken or not, it is not incremental.

It is difficult to figure out what allocated expenses are fixed and what are incremental. One approach that works reasonably well for firms with a history is to look at the expense (say, G&A) over time and compare it with some base variable (revenues or number of units). If the expense is fixed, it should not vary with the base variable. If it is variable, it will, and the nature of the variation will help define how much is fixed and how much is variable.

$G \& A \text{ Expense} = a + b (\text{Revenues})$ across time

The coefficient on revenues will be the amount G&A will increase by for a dollar change in revenues. This can then be used in conjunction with the revenues on the new project, to specify the G&A that the new project should carry.

To Time-Weighted Cash Flows

- Incremental cash flows in the earlier years are worth more than incremental cash flows in later years.
- In fact, cash flows across time cannot be added up. They have to be brought to the same point in time before aggregation.
- This process of moving cash flows through time is
 - discounting, when future cash flows are brought to the present
 - compounding, when present cash flows are taken to the future
- The discounting and compounding is done at a discount rate that will reflect
 - Expected inflation: Higher Inflation -> Higher Discount Rates
 - Expected real rate: Higher real rate -> Higher Discount rate
 - Expected uncertainty: Higher uncertainty -> Higher Discount Rate

Cash flows across time cannot be compared. Discounting brings cash flows back to the same point in time.

Present Value Mechanics

Cash Flow Type	Discounting Formula	Compounding Formula
1. Simple CF	$CF_n / (1+r)^n$	$CF_0 (1+r)^n$
2. Annuity	$A \left[\frac{1 - \frac{1}{(1+r)^n}}{r} \right]$	$A \left[\frac{(1+r)^n - 1}{r} \right]$
3. Growing Annuity	$A(1+g) \left[\frac{1 - \frac{(1+g)^n}{(1+r)^n}}{r-g} \right]$	
4. Perpetuity	A/r	
5. Growing Perpetuity	Expected Cashflow next year/(r-g)	

These are the basic present value formulae. All except the growing annuity, can be done using the PV key on any financial calculator.

These formulae are based upon the assumptions that cash flows occur at the end of each period.

Discounted cash flow measures of return

- **Net Present Value (NPV):** The net present value is the sum of the present values of all cash flows from the project (including initial investment).
NPV = Sum of the present values of all cash flows on the project, including the initial investment, with the cash flows being discounted at the appropriate hurdle rate (cost of capital, if cash flow is cash flow to the firm, and cost of equity, if cash flow is to equity investors)
 - Decision Rule: Accept if $NPV > 0$
- **Internal Rate of Return (IRR):** The internal rate of return is the discount rate that sets the net present value equal to zero. It is the percentage rate of return, based upon incremental time-weighted cash flows.
 - Decision Rule: Accept if $IRR > \text{hurdle rate}$

The key difference between these approaches is that Net Present Value is a dollar measure, and it measures surplus value created. Thus, even a small net present value is over and above your hurdle rate.

Internal rate of return is a percentage measure of total return (not excess return). It is only when it is compared to the hurdle rate that it provides a measure of excess return (in percentage terms)

Closure on Cash Flows

- In a project with a finite and short life, you would need to compute a **salvage value**, which is the expected proceeds from selling all of the investment in the project at the end of the project life. It is usually set equal to book value of fixed assets and working capital
- In a project with an infinite or very long life, we compute cash flows for a reasonable period, and then compute a **terminal value** for this project, which is the present value of all cash flows that occur after the estimation period ends..
- Assuming the project lasts forever, and that cash flows after year 9 grow 2% (the inflation rate) forever, the present value at the end of year 10 of cash flows after that can be written as:
 - Terminal Value in year 10= CF in year 11/(Cost of Capital - Growth Rate)
$$=663 (1.02) /(.1066-.02) = \$ 7,810 \text{ million}$$

When you stop estimating cash flows on a project, you have to either estimate salvage value or terminal value. For projects with finite lives (such as buying a plant or equipment), estimating salvage value is appropriate. For projects with very long lives, estimating a terminal value is more reasonable.

If you assume that the project is liquidated, any investments in working capital have to be salvaged. This does not necessarily mean that you will get 100% back.

A terminal value can also be thought of as the value that you would get by selling this project (as an on-going project) to someone else at the end of the analysis. In this case, we are estimating that the theme park in Bangkok will be worth \$ 8,821 million at the end of year 9. (The perpetual growth model gives the value of the asset at the beginning of the year of the cash flow)

Which yields a NPV of..

<i>Year</i>	<i>Annual Cashflow</i>	<i>Terminal Value</i>	<i>Present Value</i>
0	-\$2,000		-\$2,000
1	-\$1,000		-\$904
2	-\$880		-\$719
3	-\$289		-\$213
4	\$324		\$216
5	\$443		\$267
6	\$486		\$265
7	\$517		\$254
8	\$571		\$254
9	\$631		\$254
10	\$663	\$7,810	\$3,076
			\$749

This is the net present value calculation using the cost of capital of 10.66%, the theme park cost of capital adjusted for emerging market risk.

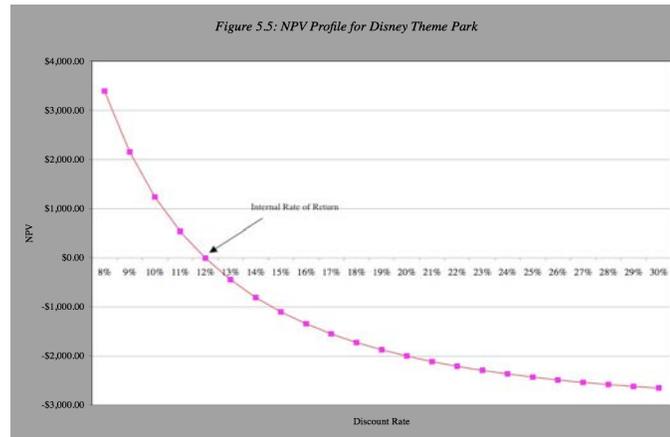
Which makes the argument that..

- **The project should be accepted.** The positive net present value suggests that the project will add value to the firm, and earn a return in excess of the cost of capital.
- By taking the project, Disney will increase its value as a firm by \$749 million.

The net present value calculation suggests that this project is a good one.

The increase in firm value will not necessarily translate into an increase in market value, since market values reflect expectations. If expectations were such that the market expected Disney to take large positive NPV projects, the \$ 818 million will have to be measured against these expectations.

The IRR of this project



Aswath Damodaran

213

This is a net present value profile, where NPV is plotted against discount rates. The IRR is that discount rate at which NPV is zero.

The IRR suggests..

- **The project is a good one.** Using time-weighted, incremental cash flows, this project provides a return of 11.97%. This is greater than the cost of capital of 10.66%.
- The IRR and the NPV will yield **similar results** most of the time, though there are differences between the two approaches that may cause project rankings to vary depending upon the approach used.

The information needed to use IRR in investment analysis is the same as the information need to use NPV.

If the hurdle rate is changing over time, IRR becomes more complicated to use. It has to be compared to the geometric average of the hurdle rates over time.

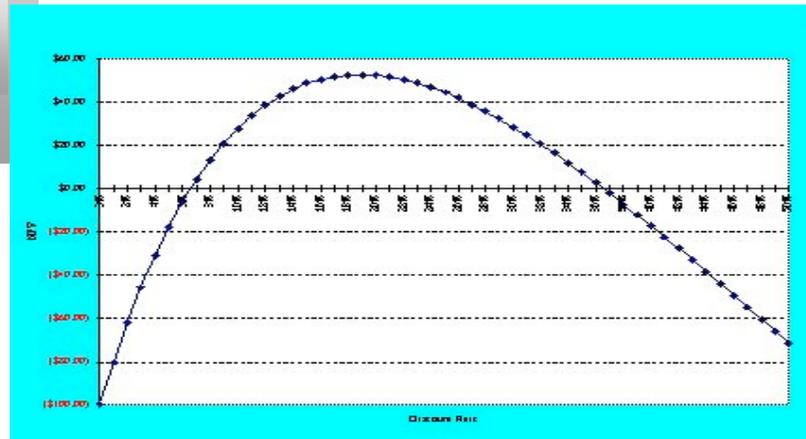
Case 1: IRR versus NPV

■ Consider a project with the following cash flows:

<i>Year</i>	<i>Cash Flow</i>
0	-1000
1	800
2	1000
3	1300
4	-2200

Two Sign Changes ...

Project's NPV Profile



Leads to Two Internal Rates of Return (IRR)

What do we do now?

- This project has two internal rates of return. The first is 6.60%, whereas the second is 36.55%.
 - Why are there two internal rates of return on this project?
 - If your cost of capital is 12%, would you accept or reject this project?
 - a) I would reject the project
 - b) I would accept this project
- Explain.

Because there are two sign changes.

I would accept the project because the NPV (see previous page) at the 12% is greater than zero.

Thus, when there is more than one IRR, use NPV.

Case 2: NPV versus IRR

Project A

Cash Flow	\$ 350,000	\$ 450,000	\$ 600,000	\$ 750,000
-----------	------------	------------	------------	------------

Investment \$ 1,000,000

NPV = \$467,937
IRR = 33.66%

Project B

Cash Flow	\$ 3,000,000	\$ 3,500,000	\$ 4,500,000	\$ 5,500,000
-----------	--------------	--------------	--------------	--------------

Investment \$ 10,000,000

NPV = \$1,358,664
IRR = 20.88%

Note the difference in scale.

Which one would you pick?

- Assume that you can pick only one of these two projects. Your choice will clearly vary depending upon whether you look at NPV or IRR. You have enough money currently on hand to take either. Which one would you pick?
 - a) Project A. It gives me the bigger bang for the buck and more margin for error.
 - b) Project B. It creates more dollar value in my business.

If you pick A, what would your biggest concern be?

If you pick B, what would your biggest concern be?

Depends upon whether you have capital rationing. If you do not have capital rationing, you should use NPV (and pick project B). The more serious the capital rationing constraint, the more likely that IRR will be used (to pick project A)

If you pick project A, the biggest risk is that no other projects come along during the course of the period, and the funds stay uninvested (earning a NPV of zero)

If you pick project B, the biggest risk is that lots of very good projects earning higher returns than B come along and you do not have the funds to accept them.

Capital Rationing, Uncertainty and Choosing a Rule

- If a business has limited access to capital, has a stream of surplus value projects and faces more uncertainty in its project cash flows, it is much more likely to use IRR as its decision rule.

Small, high-growth companies and private businesses are much more likely to use IRR.

- If a business has substantial funds on hand, access to capital, limited surplus value projects, and more certainty on its project cash flows, it is much more likely to use NPV as its decision rule.

As firms go public and grow, they are much more likely to gain from using NPV.

Small firms which are successful become large firms, but some continue to act as if they have a capital rationing constraint and maintain unrealistically high hurdle rates. These firms will often accumulate cash while turning away projects that earn more than their cost of capital.

The sources of capital rationing...

<i>Cause</i>	<i>Number of firms</i>	<i>Percent of total</i>
Debt limit imposed by outside agreement	10	10.7
Debt limit placed by management external to firm	3	3.2
Limit placed on borrowing by internal management	65	69.1
Restrictive policy imposed on retained earnings	2	2.1
Maintenance of target EPS or PE ratio	14	14.9

In a world where firms had free and complete access to capital markets and information could be conveyed credibly to financial markets, there would be no capital rationing constraints. Any firm with a good project (positive NPV) would be able to raise the funds to take the investment. In the real world, there are market frictions that can cause capital rationing. This table is the result of an old survey (1976) which tried to identify the reasons for capital rationing.

More often than not, the source of capital rationing is not external (lack of access to markets, inability to convey information, transactions costs) but by internal factors (management is conservative, restrictions on human capital...)

An Alternative to IRR with Capital Rationing

- The problem with the NPV rule, when there is capital rationing, is that it is a dollar value. It measures success in absolute terms.
- The NPV can be converted into a relative measure by dividing by the initial investment. This is called the profitability index.
 - Profitability Index (PI) = NPV/Initial Investment
- In the example described, the PI of the two projects would have been:
 - PI of Project A = $\$467,937/1,000,000 = 46.79\%$
 - PI of Project B = $\$1,358,664/10,000,000 = 13.59\%$Project A would have scored higher.

It is possible to convert NPV, which is dollar measure of value, into a percentage measure by dividing by the initial investment.

The rankings will be similar to IRR but the two approaches make different assumptions about what rate the intermediate cash flows get reinvested at. (This will be illustrated on the next two overheads)

Case 3: NPV versus IRR

Project A
Cash Flow \$ 5,000,000 \$ 4,000,000 \$ 3,200,000 \$ 3,000,000

Investment \$ 10,000,000

NPV = \$1,191,712
IRR = 21.41%

Project B
Cash Flow \$ 3,000,000 \$ 3,500,000 \$ 4,500,000 \$ 5,500,000

Investment \$ 10,000,000

NPV = \$1,358,664
IRR = 20.88%

The projects have the same scale. Why are the two approaches yielding different rankings? (They are both discounted cash flow approaches, but they must be time-weighting the cash flows slightly differently to yield different rankings)

Why the difference?

These projects are of the same scale. Both the NPV and IRR use time-weighted cash flows. Yet, the rankings are different. Why?

Which one would you pick?

- a) Project A. It gives me the bigger bang for the buck and more margin for error.
- b) Project B. It creates more dollar value in my business.

NPV assumes that intermediate cash flows get reinvested at the cost of capital, while IRR assumes that they get reinvested at the IRR.

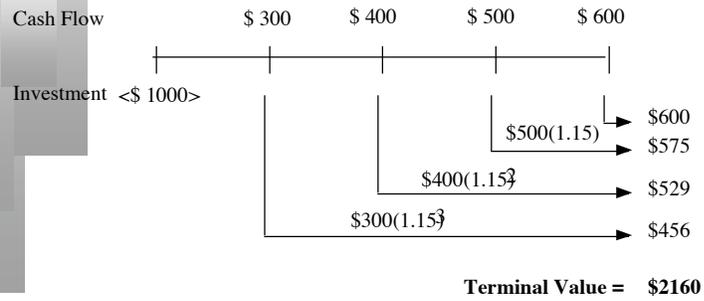
I would pick project B. It is much more reasonable to assume that you can earn the cost of capital on the intermediate cash flows (since the cost of capital is based upon what investments of similar risk are making in the market place)

NPV, IRR and the Reinvestment Rate Assumption

- The NPV rule assumes that intermediate cash flows on the project get reinvested at the hurdle rate (which is based upon what projects of comparable risk should earn).
- The IRR rule assumes that intermediate cash flows on the project get reinvested at the IRR. Implicit is the assumption that the firm has an infinite stream of projects yielding similar IRRs.
- Conclusion: When the IRR is high (the project is creating significant surplus value) and the project life is long, the IRR will overstate the true return on the project.

The higher the IRR, the more dangerous this problem. Note that this reinvestment assumption will never make a bad project into a good project. It just makes a good project look better than it really is.

Solution to Reinvestment Rate Problem



Internal Rate of Return = 24.89%
Modified Internal Rate of Return = 21.23%

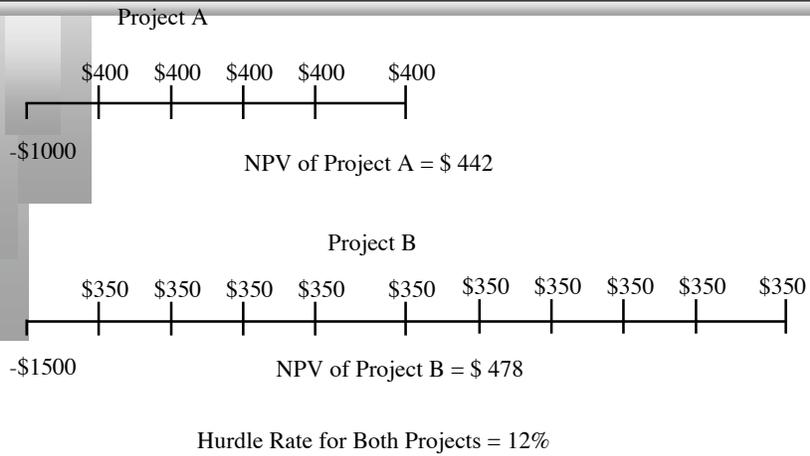
This is the modified IRR. Its rankings are going to be very similar to those yielded by the PI approach.

Why NPV and IRR may differ..

- A project can have only one NPV, whereas it can have more than one IRR.
- The NPV is a dollar surplus value, whereas the IRR is a percentage measure of return. The NPV is therefore likely to be larger for “large scale” projects, while the IRR is higher for “small-scale” projects.
- The NPV assumes that intermediate cash flows get reinvested at the “hurdle rate”, which is based upon what you can make on investments of comparable risk, while the IRR assumes that intermediate cash flows get reinvested at the “IRR”.

This summarizes the conclusions of the last 3 illustrations. Generally, the NPV approach is based upon sounder fundamental assumptions, but does assume that the firm has the capital to take positive NPV projects.

Case 4: NPV and Project Life



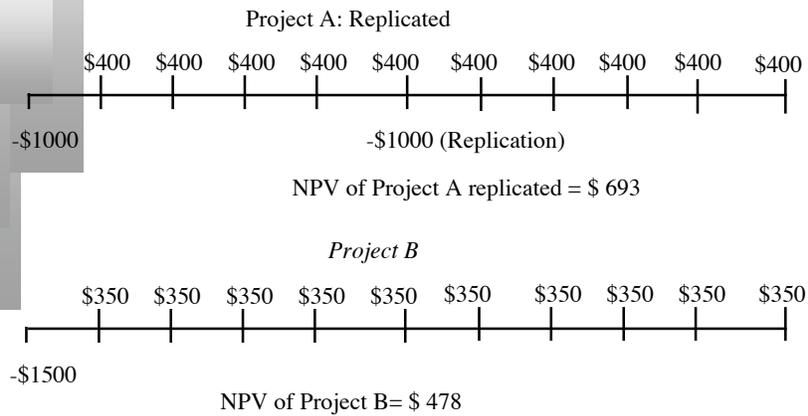
The NPV of the shorter life project will generally be lower than the NPV of the longer-life project. This is an issue only if they are mutually exclusive, i.e. you can pick only one.

Choosing Between Mutually Exclusive Projects

- The net present values of mutually exclusive projects with different lives cannot be compared, since there is a bias towards longer-life projects.
- To do the comparison, we have to
 - replicate the projects till they have the same life (or)
 - convert the net present values into annuities

To be fair in your comparison, you have to do one or the other.

Solution 1: Project Replication



Here, we have done the replication assuming that the cash flows are identical for the second replication. (This does not have to be the case)

This process will become more complicated if you are comparing projects with 7 and 9 year lives, for instance.

Solution 2: Equivalent Annuities

- Equivalent Annuity for 5-year project
= $\$442 * PV(A, 12\%, 5 \text{ years})$
= \$ 122.62
- Equivalent Annuity for 10-year project
= $\$478 * PV(A, 12\%, 10 \text{ years})$
= \$ 84.60

This is simpler than replication but it is actually based upon the principle of infinite replication. The conclusions will be the same as with replication with the same cash flows.

What would you choose as your investment tool?

- Given the advantages/disadvantages outlined for each of the different decision rules, which one would you choose to adopt?
 - a) Return on Investment (ROE, ROC)
 - b) Payback or Discounted Payback
 - c) Net Present Value
 - d) Internal Rate of Return
 - e) Profitability Index

Generally, most students pick the NPV rule and a few pick IRR.

What firms actually use ..

<i>Decision Rule</i>	<i>% of Firms using as primary decision rule in</i>	
	<i>1976</i>	<i>1986</i>
IRR	53.6%	49.0%
Accounting Return	25.0%	8.0%
NPV	9.8%	21.0%
Payback Period	8.9%	19.0%
Profitability Index	2.7%	3.0%

Why do so many firms pick IRR, if NPV is the superior approach?

Because many firms, whether it is true or not, perceive themselves to be operating with a capital rationing constraint.

Most decision-makers, for whatever reason, are more comfortable looking at percentage rates of return rather than dollar values.

The Disney Theme Park: The Risks of International Expansion

- The cash flows on the Bangkok Disney park will be in Thai Baht. This will expose Disney to exchange rate risk. In addition, there are political and economic risks to consider in an investment in Thailand. The discount rate of 10.66% that we used reflected this additional risk. Should we adjust costs of capital any time we invest in a foreign country?
 - Yes
 - No

Depends on whether this risk is viewed, from the perspective of Disney stockholders, to be diversifiable (in which case, it should be ignored) or non-diversifiable (in which case, it should lead to a higher discount rate)

For Disney, which is primarily institutionally held, I would assume that the risk is diversifiable to my stockholders, and assess no extra premium.

If I wanted to assess an extra premium, I would go back and use the risk premium for Thailand in the CAPM, and come up with a higher cost of equity and capital for this project.

If you were a large stockholder in the firm and you were not well diversified, you would probably want an even larger premium.

Should there be a risk premium for foreign projects?

- The exchange rate risk should be diversifiable risk (and hence should not command a premium) if

- the company has projects in a large number of countries (or)
- the investors in the company are globally diversified.

For Disney, this risk should not affect the cost of capital used. Consequently, we would not adjust the cost of capital for Disney's investments in other mature markets (Germany, UK, France)

- The same diversification argument can also be applied against political risk, which would mean that it too should not affect the discount rate. It may, however, affect the cash flows, by reducing the expected life or cash flows on the project.

For Disney, this is the risk that we are incorporating into the cost of capital when it invests in Thailand (or any other emerging market)

This will depend upon the company. Smaller companies, with higher insider holdings, should be more likely to assess higher discount rates for expanding overseas. Larger companies, with more diverse stockholdings, should be more inclined to use the same discount rates they use in the domestic market.

Domestic versus international expansion

- The analysis was done in dollars. Would the conclusions have been any different if we had done the analysis in Thai Baht?
 - a) Yes
 - b) No

No. It should not. A good project should be good in any currency.

The “Consistency Rule” for Cash Flows

- The cash flows on a project and the discount rate used should be defined in the same terms.
 - If cash flows are in dollars (baht), the discount rate has to be a dollar (baht) discount rate
 - If the cash flows are nominal (real), the discount rate has to be nominal (real).
- If consistency is maintained, the project conclusions should be identical, no matter what cash flows are used.

When working with higher inflation currencies, the discount rates will be higher but so will the expected growth (because of the inflation)

We are implicitly assuming that current exchange rates are correct and that expected changes in exchange rates over time will reflect differences in inflation. To the degree that this is not true, the project analysis might be affected by the currency in which the analysis is done.

Dealing with Inflation

- In our analysis, we used nominal dollars and Bt. Would the NPV have been different if we had used real cash flows instead of nominal cash flows?
 - a) It would be much lower, since real cash flows are lower than nominal cash flows
 - b) It would be much higher
 - c) It should be unaffected

Again, the answer is no. The discount rate will be lower, but so will the expected growth rate and cash flows.

Disney Theme Park: Project Analysis in Baht

- The inflation rates were assumed to be 10% in Thailand and 2% in the United States. The Baht/dollar rate at the time of the analysis was 42.09 BT/dollar.
- The expected exchange rate was derived assuming purchasing power parity.
Expected Exchange Rate_t = Exchange Rate today * (1.10/1.02)^t
- The expected growth rate after year 10 is still expected to be the inflation rate, but it is the 10% Thai inflation rate.
- The cost of capital in Baht was derived from the cost of capital in dollars and the differences in inflation rates:

Baht Cost of Capital =

$$= (1.1066) (1.1/1.02)^t - (1 + \text{US \$ Cost of Capital}) \frac{(1 + \text{Exp Inflation}_{\text{Thailand}})}{(1 + \text{Exp Inflation}_{\text{US}})} - 1$$

Note that the expected exchange rate reflects purchasing power parity.

Many companies in Asia, during the early 1990s used the current exchange rate to forecast future cash flows, because governments in these markets had pegged their currencies to the dollar (essentially promising a fixed exchange rate).

While this held up for a while, the differences in inflation eventually caused the local currency to collapse, taking many real projects down with it.

Disney Theme Park: Thai Baht NPV

Year	Cashflow (\$)	Bt/\$	Cashflow (Bt)	Present Value
0	-2000	42.09	-84180	-84180
1	-1000	45.39	-45391	-38034
2	-880	48.95	-43075	-30243
3	-289	52.79	-15262	-8979
4	324	56.93	18420	9080
5	443	61.40	27172	11223
6	486	66.21	32187	11140
7	517	71.40	36920	10707
8	571	77.01	43979	10687
9	631	83.04	52412	10671
10	8474	89.56	758886	129470
				31542

NPV = 31,542 Bt/42.09 Bt = \$ 749 Million

NPV is equal to NPV in dollar terms

The NPV is identical because what we lose by using a higher discount rate is exactly offset by what we gain in growth in the cash flows.

Equity Analysis: The Parallels

- The investment analysis can be done entirely in equity terms, as well. The returns, cashflows and hurdle rates will all be defined from the perspective of equity investors.
- If using accounting returns,
 - Return will be Return on Equity (ROE) = Net Income/BV of Equity
 - ROE has to be greater than cost of equity
- If using discounted cashflow models,
 - Cashflows will be cashflows after debt payments to equity investors
 - Hurdle rate will be cost of equity

The Disney analysis was a firm analysis, looking at cost of capital and returns on capital.

The analysis could have been done entirely in terms of cash flows and returns to equity investors in the business.

A Brief Example: A Paper Plant for Aracruz - Investment Assumptions

The plant is expected to have a capacity of 750,000 tons and will have the following characteristics:

- It will require an initial investment of 250 Million BR. At the end of the fifth year, an additional investment of 50 Million BR will be needed to update the plant.
- Aracruz plans to borrow 100 Million BR, at a real interest rate of 5.25%, using a 10-year term loan (where the loan will be paid off in equal annual increments).
- The plant will have a life of 10 years. During that period, the plant (and the additional investment in year 5) will be depreciated using double declining balance depreciation, with a life of 10 years. At the end of the tenth year, the plant is expected to be sold for its remaining book value.

This project differs from the Disney analysis on three dimensions:

The cash flows are in real terms.

The investment is a finite life investment

The analysis will be done in equity terms.

Operating Assumptions

- The plant will be partly in commission in a couple of months, but will have a capacity of only 650,000 tons in the first year, 700,000 tons in the second year before getting to its full capacity of 750,000 tons in the third year.
- The capacity utilization rate will be 90% for the first 3 years, and rise to 95% after that.
- The price per ton of linerboard is currently \$400, and is expected to keep pace with inflation for the life of the plant.
- The variable cost of production, primarily labor and material, is expected to be 55% of total revenues; there is a fixed cost of 50 Million BR, which will grow at the inflation rate.
- The working capital requirements are estimated to be 15% of total revenues, and the investments have to be made at the beginning of each year. At the end of the tenth year, it is anticipated that the entire working capital will be salvaged.

Many of these inputs were estimated by looking at similar plants run by Aracruz and other paper and pulp manufacturers.

The Hurdle Rate

- The analysis is done in real, equity terms. Thus, the hurdle rate has to be a real cost of equity
 - The real cost of equity for Aracruz, based upon
 - the levered beta estimate of 0.7576 (for just the paper business)
 - the real riskless rate of 2% (US Inflation Indexed treasury bond)
 - and the risk premium for Brazil of 12.49% (US mature market premium (4.82%) + Brazil country risk premium (7.67%))
- Real Cost of Equity = 2% + 0.7576 (12.49%) = 11.46%

Everything is done in real, equity terms.

Note that we are using the levered beta for just the paper business (and not the levered beta for Aracruz as a whole).

Breaking down debt payments by year

<i>Year</i>	<i>Beginning Debt</i>	<i>Interest expense</i>	<i>Principal Repaid</i>	<i>Total Payment</i>	<i>Ending Debt</i>
1	R\$ 100,000	R\$ 5,250	R\$ 7,858	R\$ 13,108	R\$ 92,142
2	R\$ 92,142	R\$ 4,837	R\$ 8,271	R\$ 13,108	R\$ 83,871
3	R\$ 83,871	R\$ 4,403	R\$ 8,705	R\$ 13,108	R\$ 75,166
4	R\$ 75,166	R\$ 3,946	R\$ 9,162	R\$ 13,108	R\$ 66,004
5	R\$ 66,004	R\$ 3,465	R\$ 9,643	R\$ 13,108	R\$ 56,361
6	R\$ 56,361	R\$ 2,959	R\$ 10,149	R\$ 13,108	R\$ 46,212
7	R\$ 46,212	R\$ 2,426	R\$ 10,682	R\$ 13,108	R\$ 35,530
8	R\$ 35,530	R\$ 1,865	R\$ 11,243	R\$ 13,108	R\$ 24,287
9	R\$ 24,287	R\$ 1,275	R\$ 11,833	R\$ 13,108	R\$ 12,454
10	R\$ 12,454	R\$ 654	R\$ 12,454	R\$ 13,108	R\$ 0

Start by estimating the annual payment, using the loan amount of 100 million and the interest rate of 5.25%, with a ten-year maturity. Then, break the payment down by year into interest and principal. If you do it right, there should be no principal left at the end of the 10th year.

Project Income: Paper Plant

	1	2	3	4	5	6	7	8	9	10
Capacity (in '000s)	650	700	750	750	750	750	750	750	750	750
Utilization Rate	90%	90%	90%	95%	95%	95%	95%	95%	95%	95%
Production	585	630	675	713	713	713	713	713	713	713
Price per ton	400	400	400	400	400	400	400	400	400	400
<i>Revenues</i>	<i>234,000</i>	<i>252,000</i>	<i>270,000</i>	<i>285,000</i>						
Operating Expenses	178,700	188,600	198,500	206,750	206,750	206,750	206,750	206,750	206,750	206,750
Depreciation	35,000	28,000	22,400	17,920	14,336	21,469	21,469	21,469	21,469	21,469
<i>Operating Income</i>	<i>20,300</i>	<i>35,400</i>	<i>49,100</i>	<i>60,330</i>	<i>63,914</i>	<i>56,781</i>	<i>56,781</i>	<i>56,781</i>	<i>56,781</i>	<i>56,781</i>
- Interest	5,250	4,837	4,403	3,946	3,465	2,959	2,426	1,865	1,275	654
<i>Taxable Income</i>	<i>15,050</i>	<i>30,563</i>	<i>44,697</i>	<i>56,384</i>	<i>60,449</i>	<i>53,822</i>	<i>54,355</i>	<i>54,916</i>	<i>55,506</i>	<i>56,127</i>
- Taxes	5,117	10,391	15,197	19,170	20,553	18,300	18,481	18,671	18,872	19,083
<i>Net Income</i>	<i>9,933</i>	<i>20,171</i>	<i>29,500</i>	<i>37,213</i>	<i>39,896</i>	<i>35,523</i>	<i>35,874</i>	<i>36,244</i>	<i>36,634</i>	<i>37,044</i>

Since the price of paper is held constant (in today's dollars), these net income projections are in real terms. The costs are also being held constant in real dollars.

A ROE Analysis

Beg. BV: Assets	Depreciation	Capital Exp.	Ending BV: Assets	BV of Working Capital	Debt	BV: Equity	Average BV: Equity	ROE
0	0	250,000	250,000	35,100	100,000	185,100		
250,000	35,000	0	215,000	37,800	92,142	160,658	172,879	5.75%
215,000	28,000	0	187,000	40,500	83,871	143,629	152,144	13.26%
187,000	22,400	0	164,600	42,750	75,166	132,184	137,906	21.39%
164,600	17,920	0	146,680	42,750	66,004	123,426	127,805	29.12%
146,680	14,336	50,000	182,344	42,750	56,361	168,733	146,079	27.31%
182,344	21,469	0	160,875	42,750	46,212	157,413	163,073	21.78%
160,875	21,469	0	139,406	42,750	35,530	146,626	152,020	23.60%
139,406	21,469	0	117,938	42,750	24,287	136,400	141,513	25.61%
117,938	21,469	0	96,469	42,750	12,454	126,764	131,582	27.84%
96,469	21,469	0	75,000	0	0	75,000	100,882	36.72%
								23.24%

Real ROE of 23.24% is greater than
Real Cost of Equity of 11.46%

The return on equity is computed by dividing the net income by the average book value of equity. Note the increase in return on equity as you move through to the later years (income rises as depreciation falls, and the book value of the equity investment becomes smaller because of the depreciation)

The fact that this is a finite life project allows us to get away with only a small capital maintenance expenditure in year 5.

From Project ROE to Firm ROE

- As with the earlier analysis, where we used return on capital and cost of capital to measure the overall quality of projects at Disney, we can compute return on equity and cost of equity at Aracruz to pass judgment on whether Aracruz is creating value to its equity investors
- In 2003 Aracruz had net income of 428 million BR on book value of equity of 6,385 million BR, yielding a return on equity of:
ROE = $428/6,385 = 6.70\%$ (Real because book value is inflation adjusted)
Cost of Equity = 10.79%
Excess Return = $6.70\% - 10.79\% = -4.09\%$
- This can be converted into a dollar value by multiplying by the book value of equity, to yield a equity economic value added
Equity EVA = $(6.70\% - 10.79\%) (6,385 \text{ Million}) = -261 \text{ Million BR}$

Here, we generalize to looking at the performance of the portfolio of projects that a firm has. We use

The total net income of the firm as a measure of the equity earnings generated by existing projects

The book value of equity as a measure of the equity invested in projects in place

We cannot use market value of equity since it has embedded in it a premium for expected future growth. Dividing current net income by market value of equity will yield very low returns on equity for high growth firms, not because they have necessarily taken bad projects.

We are assuming that the inflation accounting completely adjusts the book value of equity for inflation, giving us real returns on equity. To the extent that this is not true, the return can be biased. We are also using the cost of equity for the entire firm (including cash) since the net income includes the interest income from cash.

An Incremental CF Analysis

	0	1	2	3	4	5	6	7	8	9	10
Net Income		9,933	20,171	29,500	37,213	39,896	35,523	35,874	36,244	36,634	37,044
+ Depreciation & Amortization		35,000	28,000	22,400	17,920	14,336	21,469	21,469	21,469	21,469	21,469
- Capital Expenditures	250,000	0	0	0	0	50,000	0	0	0	0	0
+ Net Debt	100,000										
- Change in Working Capital	35,100	2,700	2,700	2,250	0	0	0	0	0	0	
- Principal Repayments		7,858	8,271	8,705	9,162	9,643	10,149	10,682	11,243	11,833	12,454
+ Salvage Value of Assets ^b											117,750
Cashflow to Equity	(185,100)	34,375	37,201	40,945	45,971	(5,411)	46,842	46,661	46,470	46,270	163,809

This converts the equity earnings on the previous page into cash flows to equity. Note that we reduce the initial investment by the new debt (since it reduces the equity investment needed).

The real cash flows to equity are discounted at the real cost of equity to arrive at a NPV (which should be the same in real and nominal terms)

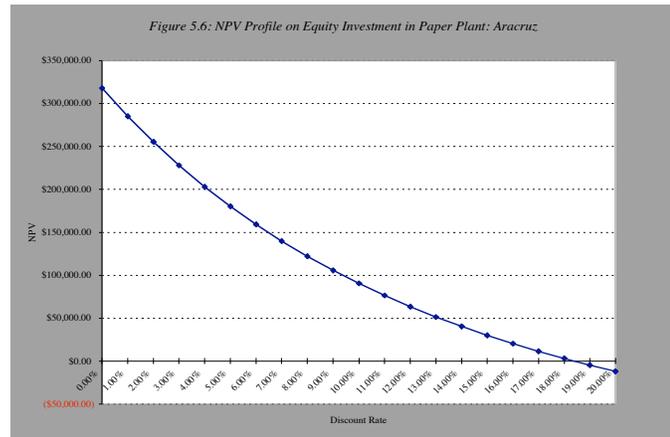
FCFE : Free Cash Flow to Equity. This measures the cash flow left over for equity investors after all needs on this project are met, including debt payments and capital expenditures.

An Equity NPV

Year	FCFE	PV of FCFE
0	(185,100 BR)	(185,100 BR)
1	34,375 BR	30,840 BR
2	37,201 BR	29,943 BR
3	40,945 BR	29,568 BR
4	45,971 BR	29,784 BR
5	(5,411 BR)	(3,145 BR)
6	46,842 BR	24,427 BR
7	46,661 BR	21,830 BR
8	46,470 BR	19,505 BR
9	46,270 BR	17,424 BR
10	163,809 BR	55,342 BR
NPV		70,418 BR

The cashflows to equity are real cashflows and are discounted back at the real cost of equity of 11.46%. This project is a good project and has a net present value of 70.418 million BR.

An Equity IRR



Aswath Damodaran

251

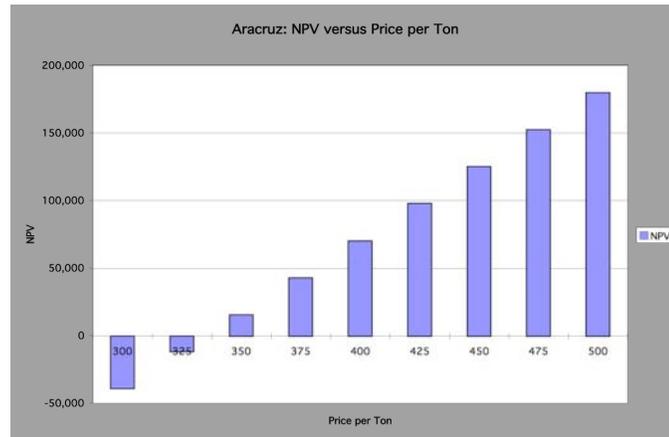
The IRR for this project, using real equity cashflows, is 18.39%, higher than the cost of equity of 11.46%....

The Role of Sensitivity Analysis

- Our conclusions on a project are clearly conditioned on a large number of assumptions about revenues, costs and other variables over very long time periods.
- To the degree that these assumptions are wrong, our conclusions can also be wrong.
- One way to gain confidence in the conclusions is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions.

It is natural to ask what-if questions about a project once an analysis is complete. Given how easy it is today to do sensitivity analysis, it is important that we focus only on the most important variables. Doing sensitivity analysis on too many minor variables may draw attention away from the key factors underlying the conclusion.

Viability of Paper Plant: Sensitivity to Price per Ton



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253

Clearly NPV goes down as the price per ton goes down. As a decision maker, then this analysis is useful on two levels:

At the point of decision making, it provides a break even point for when the project stops being viable. The question then might be: How likely is it that prices will drop below \$ 335 per ton?

It can be used as a tool in risk management. It is conceivable, for instance, that Aracruz might be able to hedge against the possibility of paper prices dropping below \$ 335 (using options or forward contracts)

What does sensitivity analysis tell us?

Assume that the manager at Aracruz who has to decide on whether to take this plant is very conservative. She looks at the sensitivity analysis and decides not to take the project because the NPV would turn negative if the price drops below \$335 per ton. (Though the expected price per ton is \$400, there is a significant probability of the price dropping below \$335.) Is this the right thing to do?

- a) Yes
- b) No

Explain.

Sensitivity analysis will reflect the risk aversion of the decision maker. There is a danger here that we are double counting some risk (by using a higher discount rate and doing the what-if) and counting in some firm-specific risk (which should be diversifiable to our investors).

Side Costs and Benefits

- Most projects considered by any business create side costs and benefits for that business.
- The side costs include the costs created by the use of resources that the business already owns (opportunity costs) and lost revenues for other projects that the firm may have.
- The benefits that may not be captured in the traditional capital budgeting analysis include project synergies (where cash flow benefits may accrue to other projects) and options embedded in projects (including the options to delay, expand or abandon a project).
- The returns on a project should incorporate these costs and benefits.

These costs and benefits should be incorporated, but that is easier said than done. Some projects deliver most of their benefits indirectly. Thus, this is not a minor issue. (How much would you pay to re-sign Michael Jordan to a one-year contract, if you were the Chicago Bulls?)

Opportunity Cost

- An opportunity cost arises when a project uses a resource that may already have been paid for by the firm.
- When a resource that is already owned by a firm is being considered for use in a project, this resource has to be priced on its next best alternative use, which may be
 - a sale of the asset, in which case the opportunity cost is the expected proceeds from the sale, net of any capital gains taxes
 - renting or leasing the asset out, in which case the opportunity cost is the expected present value of the after-tax rental or lease revenues.
 - use elsewhere in the business, in which case the opportunity cost is the cost of replacing it.

In most established businesses, this occurs frequently.

This can involve

Real assets, like land, buildings or equipment

Individuals, who work for the firm already on other project or divisions

Case 1: Opportunity Costs

- Assume that Disney owns land in Bangkok already. This land is undeveloped and was acquired several years ago for \$ 5 million for a hotel that was never built. It is anticipated, if this theme park is built, that this land will be used to build the offices for Disney Bangkok. The land currently can be sold for \$ 40 million, though that would create a capital gain (which will be taxed at 20%). In assessing the theme park, which of the following would you do:
 - a) Ignore the cost of the land, since Disney owns its already
 - b) Use the book value of the land, which is \$ 5 million
 - c) Use the market value of the land, which is \$ 40 million
 - d) Other:

Use the market value of the land, net of capital gains taxes.

$$\text{\$ 40 million} - 0.2 (40 - 5) = \text{\$ 33 million}$$

Case 2: Excess Capacity

- In the Aracruz example, assume that the firm will use its existing distribution system to service the production out of the new paper plant. The new plant manager argues that there is no cost associated with using this system, since it has been paid for already and cannot be sold or leased to a competitor (and thus has no competing current use). Do you agree?
 - a) Yes
 - b) No

No. Using that excess capacity will create a cost down the road for the firm.

Estimating the Cost of Excess Capacity

- The existing Capacity is 100,000 units; the book value of this unit is \$ 1 million. The cost of buying a unit with the same capacity is \$1.5 million. The company's cost of capital is 12%.
- Current Usage = 50,000 (50% of Capacity); 50% Excess Capacity;
 - New Product will use 30% of Capacity; Sales growth at 5% a year; CM per unit = \$5/unit
 - Current product sales growing at 10% a year. CM per unit = \$4/unit
- Basic Framework
 - If I do not take this product, when will I run out of capacity?
 - If I take this project, when will I run out of capacity
 - When I run out of capacity, what will I do?
 - cut back on production: cost is PV of after-tax cash flows from lost sales
 - buy new capacity: cost is difference in PV between earlier & later investment

The use of excess capacity in the first year does not create a cost, since there is an excess capacity of 50%, and only 30% will be used by the new product. It is the fact that the existing product revenues are growing that will create the cost.

Opportunity Cost of Excess Capacity

Year	Old	New	Old + New	Lost ATCF	PV(ATCF)
1	50.00%	30.00%	80.00%	\$0	
2	55.00%	31.50%	86.50%	\$0	
3	60.50%	33.08%	93.58%	\$0	
4	66.55%	34.73%	101.28%	\$5,115	\$ 3,251
5	73.21%	36.47%	109.67%	\$38,681	\$ 21,949
6	80.53%	38.29%	118.81%	\$75,256	\$ 38,127
7	88.58%	40.20%	128.78%	\$115,124	\$ 52,076
8	97.44%	42.21%	139.65%	\$158,595	\$ 64,054
9	100%	44.32%	144.32%	\$177,280	\$ 63,929
10	100%	46.54%	146.54%	\$186,160	\$ 59,939

PV(Lost Sales)= **\$ 303,324**

- PV (Building Capacity In Year 3 Instead Of Year 8) = $1,500,000/1.12^3 - 1,500,000/1.12^8 = \$ 461,846$
- Opportunity Cost of Excess Capacity = \$ 303,324

The costs begin in year 4.

The calculation of the cost in year 4 is as follows:

Number of Units that firm will have to cut back = $(101.28\% - 100\%)$
 $(100,000) = 1,280$ units (rounded)

We will cut back on the less profitable product (the old one), losing
 $1280 * 4 = \$ 5,120$ (rounded. The table is based upon non-rounded numbers)

Since this is already in after-tax terms, we discount it back to the present at the cost of capital to yield \$ 3,251.

We continue until year 10, which is the life of the new product. If it had a longer life, we would continue with the process.

Alternatively, we could acquire new capacity in year 3 (if we take the new product) instead of year 8 (if we do not). The difference in present values is \$ 461,846 (This fails to consider depreciation benefits)

Given the two costs, I would pick the lost sales option since it has the lower cost and show it as part of the initial investment.

Product and Project Cannibalization: A Real Cost?

Assume that in the Disney theme park example, 20% of the revenues at the Bangkok Disney park are expected to come from people who would have gone to Disneyland in Anaheim, California. In doing the analysis of the park, you would

- a) Look at only incremental revenues (i.e. 80% of the total revenue)
- b) Look at total revenues at the park
- c) Choose an intermediate number

Would your answer be different if you were analyzing whether to introduce a new show on the Disney cable channel on Saturday mornings that is expected to attract 20% of its viewers from ABC (which is also owned by Disney)?

- a) Yes
- b) No

The answer will depend upon whether the cannibalization would occur anyway (to a competitor, if Disney does not take the project). The greater the barriers to entry or the competitive advantage that Disney has over its competitors, the less likely it is that cannibalization would occur anyway. In that case, it should be treated as an incremental cost. If not, it should be treated as non-incremental and ignored.

I would argue that Disney has far greater competitive advantages at its theme parks, than it does in TV broadcasting. Therefore, I would look at only the incremental revenue for the theme park, and the total revenues for the TV show.

Project Synergies

- A project may provide benefits for other projects within the firm. If this is the case, these benefits have to be valued and shown in the initial project analysis.
- Consider, for instance, a typical Disney animated movie. Assume that it costs \$ 50 million to produce and promote. This movie, in addition to theatrical revenues, also produces revenues from
 - the sale of merchandise (stuffed toys, plastic figures, clothes ..)
 - increased attendance at the theme parks
 - stage shows (see “Beauty and the Beast” and the “Lion King”)
 - television series based upon the movie

Disney is a master at creating project synergies.

Adding a Café: Bookscape

- The initial cost of remodeling a portion of the store to make it a cafe, and of buying equipment is expected to be \$150,000. This investment is expected to have a life of 5 years, during which period it will be depreciated using straight line depreciation. None of the cost is expected to be recoverable at the end of the five years.
- The revenues in the first year are expected to be \$ 60,000, growing at 10% a year for the next four years.
- There will be one employee, and the total cost for this employee in year 1 is expected to be \$30,000 growing at 5% a year for the next 4 years.
- The cost of the material (food, drinks ..) needed to run the cafe is expected to be 40% of revenues in each of the 5 years.
- An inventory amounting to 5% of the revenues has to be maintained; investments in the inventory are made at the beginning of each year.
- The tax rate for Bookscape as a business is 40%.

This is a café being added on to an existing bookstore. The revenues shown here are the revenues at the café.

NPV of Café: Stand alone analysis

	<i>0</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>
Investment	- \$ 150,000					
Revenues		\$60,000	\$66,000	\$72,600	\$79,860	\$87,846
Labor		\$30,000	\$31,500	\$33,075	\$34,729	\$36,465
Materials		\$24,000	\$26,400	\$29,040	\$31,944	\$35,138
Depreciation		\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
Operating Income		-\$24,000	-\$21,900	-\$19,515	-\$16,813	-\$13,758
Taxes		-\$9,600	-\$8,760	-\$7,806	-\$6,725	-\$5,503
AT Operating Income		-\$14,400	-\$13,140	-\$11,709	-\$10,088	-\$8,255
+ Depreciation		\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
- Δ Working Capital	\$3,000	\$300	\$330	\$363	\$399	-\$4,392
Cash Flow to Firm	-\$153,000	\$15,300	\$16,530	\$17,928	\$19,513	\$26,138
PV at 12.14%	-\$153,000	\$13,644	\$13,146	\$12,714	\$12,341	\$14,742
Net Present Value	-\$86,413					

We used the cost of capital for Bookscape of 12.14%, estimated earlier in the package as the discount rate.

The side benefits

- Assume that the café will increase revenues at the store by \$500,000 in year 1, growing at 10% a year for the following 4 years. In addition, assume that the pre-tax operating margin on these sales is 10%.

	1	2	3	4	5
Increased Revenues	\$500,000	\$550,000	\$605,000	\$665,500	\$732,050
Operating Margin	10.00%	10.00%	10.00%	10.00%	10.00%
Operating Income	\$50,000	\$55,000	\$60,500	\$66,550	\$73,205
Operating Income after Taxes	\$29,000	\$31,900	\$35,090	\$38,599	\$42,459
PV of Cash Flows @ 12.14%	\$25,861	\$25,369	\$24,886	\$24,412	\$23,947
Net Present Value	\$124,474				

- The Net Present Value of the side benefits is \$124,474.

With the side benefits, the café looks like a good investment.

Interesting side questions;

- Should we be using different discount rates for the café revenues and the bookstore revenues? (I don't think so since the café is an extension of the bookstore)
- If we had used different discount rates, whose discount rate should be used to discount the synergies?

Project Options

- One of the limitations of traditional investment analysis is that it is static and does not do a good job of capturing the options embedded in investment.
 - The first of these options is the option to delay taking a project, when a firm has exclusive rights to it, until a later date.
 - The second of these options is taking one project may allow us to take advantage of other opportunities (projects) in the future
 - The last option that is embedded in projects is the option to abandon a project, if the cash flows do not measure up.
- These options all add value to projects and may make a “bad” project (from traditional analysis) into a good one.

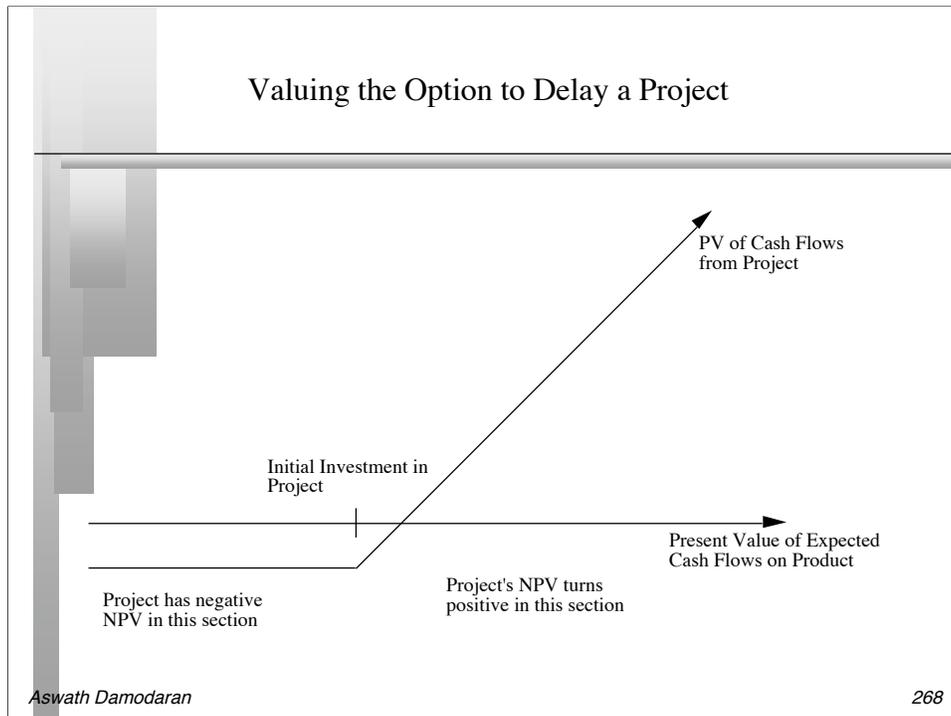
Most projects have one or more than one option embedded in them.

The Option to Delay

- When a firm has exclusive rights to a project or product for a specific period, it can delay taking this project or product until a later date.
- A traditional investment analysis just answers the question of whether the project is a “good” one if taken today.
- Thus, the fact that a project does not pass muster today (because its NPV is negative, or its IRR is less than its hurdle rate) does not mean that the rights to this project are not valuable.

Traditional investment analysis just looks at the question of whether a project is a good one, if taken today. It does not say the rights to this project are worthless.

Valuing the Option to Delay a Project



This looks at the option to delay a project, to which you have exclusive rights.

The initial investment in the project is what you would need to invest to convert this project from a right to a real project.

The present value of the cash flows will change over time.

If the perceived present value of the cash flows stays below the investment needed, the project should never be taken.

An example: A Pharmaceutical patent

- Assume that a pharmaceutical company has been approached by an entrepreneur who has patented a new drug to treat ulcers. The entrepreneur has obtained FDA approval and has the patent rights for the next 17 years.
- While the drug shows promise, it is still very expensive to manufacture and has a relatively small market. Assume that the initial investment to produce the drug is \$ 500 million and the present value of the cash flows from introducing the drug now is only \$ 350 million.
- The technology and the market is volatile, and the annualized standard deviation in the present value, estimated from a simulation is 25%.

This patent is not viable today, viewed as a conventional project. The net present value of this project is - \$150 million.

Valuing the Patent

■ Inputs to the option pricing model

- Value of the Underlying Asset (S) = PV of Cash Flows from Project if introduced now = \$ 350 million
- Strike Price (K) = Initial Investment needed to introduce the product = \$ 500 million
- Variance in Underlying Asset's Value = $(0.25)^2 = 0.0625$
- Time to expiration = Life of the patent = 17 years
- Dividend Yield = $1/\text{Life of the patent} = 1/17 = 5.88\%$
- Assume that the 17-year riskless rate is 4%. The value of the option can be estimated as follows:

■ Call Value = $350 \exp^{(-0.0588)(17)} (0.5285) - 500 (\exp^{(-0.04)(17)} (0.1219)) = \$ 37.12$ million

We are assuming that if the option goes in the money, there is a cost of not exercising (which is the dividend yield) equivalent to losing 1 of the remaining years of patent protection. (1/17 this year, 1/16 next year....)

Insights for Investment Analyses

- Having the exclusive rights to a product or project is valuable, even if the product or project is not viable today.
- The value of these rights increases with the volatility of the underlying business.
- The cost of acquiring these rights (by buying them or spending money on development - R&D, for instance) has to be weighed off against these benefits.

The value of an option will increase with the uncertainty associated with the cash flows and value of the project.

Thus, firms should be willing to pay large amounts for the rights to technology in areas where there is tremendous uncertainty about what the future will bring, and much less in sectors where there is more stability.

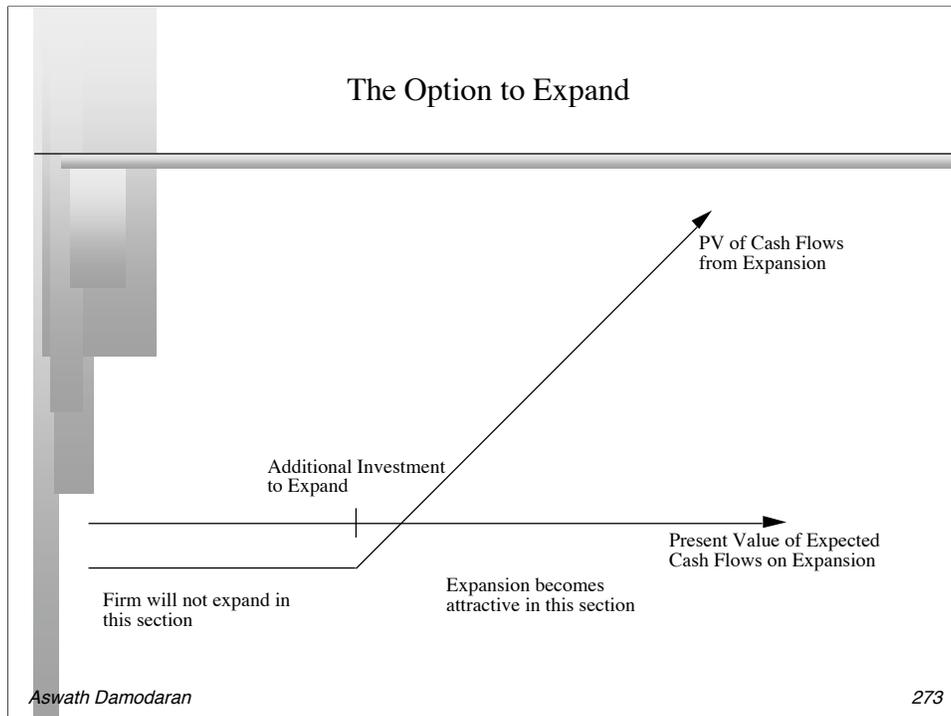
The expenses incurred on R&D can be viewed as the cost of acquiring these rights.

The Option to Expand/Take Other Projects

- Taking a project today may allow a firm to consider and take other valuable projects in the future.
- Thus, even though a project may have a negative NPV, it may be a project worth taking if the option it provides the firm (to take other projects in the future) provides a more-than-compensating value.
- These are the options that firms often call “strategic options” and use as a rationale for taking on “negative NPV” or even “negative return” projects.

A project may be the first in a sequence.

The Option to Expand



Here, the initial project gives you the option to invest an additional amount in the future which you will do only if the present value of the additional cash flows you will get by expanding are greater than the investment needed.

For this to work, you have to do the first project to be eligible for the option to expand.

An Example of an Expansion Option

- Disney is considering investing \$ 100 million to create a Spanish version of the Disney channel to serve the growing Mexican market.
- A financial analysis of the cash flows from this investment suggests that the present value of the cash flows from this investment to Disney will be only \$ 80 million. Thus, by itself, the new channel has a **negative NPV of \$ 20 million**.
- If the market in Mexico turns out to be more lucrative than currently anticipated, Disney **could expand** its reach to all of Latin America with an **additional investment of \$ 150 million** any time over the next 10 years. While the current expectation is that the cash flows from having a Disney channel in Latin America is only \$ 100 million, there is considerable uncertainty about both the potential for such a channel and the shape of the market itself, leading to significant variance in this estimate.

This is a negative net present value project, but it gives Disney the option to expand later. Implicitly, we are also saying that if Disney does not make the initial project investment (with a NPV of - \$ 20 million), it cannot expand later into the rest of Latin America.

Valuing the Expansion Option

- Value of the Underlying Asset (S) = PV of Cash Flows from Expansion to Latin America, if done now = \$ 100 Million
- Strike Price (K) = Cost of Expansion into Latin American = \$ 150 Million
- We estimate the variance in the estimate of the project value by using the annualized standard deviation in firm value of publicly traded entertainment firms in the Latin American markets, which is approximately 30%.
 - Variance in Underlying Asset's Value = $0.30^2 = 0.09$
- Time to expiration = Period of expansion option = 10 years
- Riskless Rate = 4%

Call Value= \$ 36.3 Million

This values the option, using the Black Scholes model.

The value from the model itself is affected not only by the assumptions made about volatility and value, but also by the assumptions underlying the model.

The value itself is not the key output from the model. It is the fact that strategic options, such as this one, can be valued, and that they can make a significant difference to your decision.

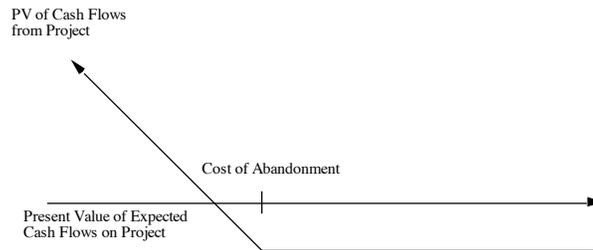
Considering the Project with Expansion Option

- NPV of Disney Channel in Mexico = \$ 80 Million - \$ 100 Million = - \$ 20 Million
- Value of Option to Expand = \$ 36.3 Million
- NPV of Project with option to expand
= - \$ 20 million + \$ 36.3 million
= \$ 16.3 million
- **Take the first investment, with the option to expand.**

A bad project, with options considered, becomes a good one.

The Option to Abandon

- A firm may sometimes have the option to abandon a project, if the cash flows do not measure up to expectations.
- If abandoning the project allows the firm to save itself from further losses, this option can make a project more valuable.



You would like to abandon a project, once you know that it will create only negative cash flows for you. This is not always possible, because of contracts you might have entered into with employees or customers.

Valuing the Option to Abandon

- Disney is considering taking a 25-year project which
 - requires an initial investment of \$ 250 million in an real estate partnership to develop time share properties with a South Florida real estate developer,
 - has a present value of expected cash flows is \$ 254 million.
- While the net present value of \$ 4 million is small, assume that Disney has the option to abandon this project anytime by selling its share back to the developer in the next 5 years for \$ 150 million.
- A simulation of the cash flows on this time share investment yields a variance in the present value of the cash flows from being in the partnership is 0.09.

We are assuming that the developer will be in a position to honor his or her commitment to buy back Disney's share for \$ 150 million.

Project with Option to Abandon

- Value of the Underlying Asset (S) = PV of Cash Flows from Project
= \$ 254 million
- Strike Price (K) = Salvage Value from Abandonment = \$ 150 million
- Variance in Underlying Asset's Value = 0.09
- Time to expiration = Life of the Project = 5 years
- Dividend Yield = 1/Life of the Project = 1/25 = 0.04 (We are assuming that the project's present value will drop by roughly 1/n each year into the project)
- Assume that the five-year riskless rate is 4%.

These are the inputs to the model. The likelihood of abandonment will increase over time, as the value of the project decreases.

Should Disney take this project?

- Call Value = $254 \exp^{(0.04)(5)} (0.9194) - 150 (\exp^{(-0.04)(5)} (0.8300))$
= \$ 89.27 million
- Put Value = $\$ 89.27 - 254 \exp^{(0.04)(5)} + 150 (\exp^{(-0.04)(5)}) = \$ 4.13$ million
- The value of this abandonment option has to be added on to the net present value of the project of \$ 4 million, yielding a total net present value with the abandonment option of \$ 8.13 million.

If you can negotiate this option into your investment projects, you increase their value. To the degree that you have to pay for this option, you would be willing to pay up to \$ 4.13 million.

Corporate Finance: Lecture Note Packet 2
Capital Structure, Dividend Policy and Valuation

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B40.2302.20

Stern School of Business

Finding the Right Financing Mix: The Capital Structure Decision

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

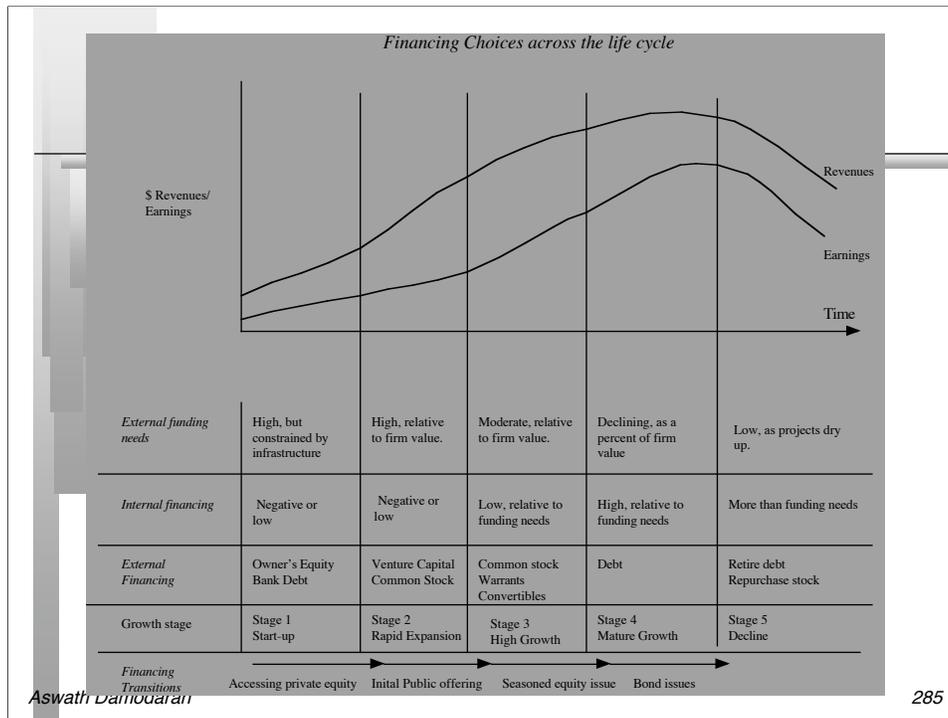
Objective: Maximize the Value of the Firm

We shift from the investment principle to the financing principle.

The Choices in Financing

- There are only two ways in which a business can make money.
 - The first is debt. The essence of debt is that you promise to make fixed payments in the future (interest payments and repaying principal). If you fail to make those payments, you lose control of your business.
 - The other is equity. With equity, you do get whatever cash flows are left over after you have made debt payments.
- The equity can take different forms:
 - For very small businesses: it can be owners investing their savings
 - For slightly larger businesses: it can be venture capital
 - For publicly traded firms: it is common stock
- The debt can also take different forms
 - For private businesses: it is usually bank loans
 - For publicly traded firms: it can take the form of bonds

While there are several different financing instruments available to a firm, they can all be categorized either as debt or equity. Furthermore, this is a choice that both private and public firms have to make.



The financing choices for a firm in terms of both debt and equity evolve as the firm goes through the life cycle.

The Financing Mix Question

- In deciding to raise financing for a business, is there an optimal mix of debt and equity?
 - If yes, what is the trade off that lets us determine this optimal mix?
 - If not, why not?

This is the basic question that we will cover in the first part of the analysis.

Measuring a firm's financing mix

- The simplest measure of how much debt and equity a firm is using currently is to look at the proportion of debt in the total financing. This ratio is called the debt to capital ratio:
$$\text{Debt to Capital Ratio} = \text{Debt} / (\text{Debt} + \text{Equity})$$
- Debt includes all interest bearing liabilities, short term as well as long term.
- Equity can be defined either in accounting terms (as book value of equity) or in market value terms (based upon the current price). The resulting debt ratios can be very different.

The difference between book value and market value debt ratios can give rise to problems. For instance, most published debt ratios are book value debt ratios and many analysts talk about book debt ratios when talking about financial leverage.

The higher the expected growth rate in a firm, the greater will be the difference between book and market value.

Costs and Benefits of Debt

- Benefits of Debt
 - Tax Benefits
 - Adds discipline to management
- Costs of Debt
 - Bankruptcy Costs
 - Agency Costs
 - Loss of Future Flexibility

This summarizes the trade off that we make when we choose between using debt and equity.

Tax Benefits of Debt

- When you borrow money, you are allowed to deduct interest expenses from your income to arrive at taxable income. This reduces your taxes. When you use equity, you are not allowed to deduct payments to equity (such as dividends) to arrive at taxable income.
- The dollar tax benefit from the interest payment in any year is a function of your tax rate and the interest payment:
 - Tax benefit each year = Tax Rate * Interest Payment
- Proposition 1: Other things being equal, the higher the marginal tax rate of a business, the more debt it will have in its capital structure.

The tax benefit of debt will be lower if the tax code allows some or all of the cash flows to equity to be tax deductible, as well. For instance, in Germany, dividends paid to stockholders are taxed at a lower rate than retained earnings. In these cases, the tax advantage of debt will be lower.

If you do not pay taxes, debt becomes a lot less attractive. Carnival Cruise Lines, which gets most of its business from US tourists pays no taxes because it is domiciled in Liberia. We would expect it to have less debt in its capital structure than a competitor in the US which pays taxes.



The Effects of Taxes

You are comparing the debt ratios of real estate corporations, which pay the corporate tax rate, and real estate investment trusts, which are not taxed, but are required to pay 95% of their earnings as dividends to their stockholders.

Which of these two groups would you expect to have the higher debt ratios?

- The real estate corporations
- The real estate investment trusts
- Cannot tell, without more information

I would expect real estate corporations to have more debt. The forced payout of 95% of earnings as dividends by REITs to their stockholders may expose their investors to substantial personal taxes, but the absence of taxes at the entity level will make debt a less attractive option.

In practice, REITs do use debt. One reason might be that they can borrow at a lower rate at the REIT level than at the property level.

Debt adds discipline to management

- If you are managers of a firm with no debt, and you generate high income and cash flows each year, you tend to become complacent. The complacency can lead to inefficiency and investing in poor projects. There is little or no cost borne by the managers
- Forcing such a firm to borrow money can be an antidote to the complacency. The managers now have to ensure that the investments they make will earn at least enough return to cover the interest expenses. The cost of not doing so is bankruptcy and the loss of such a job.

Managers of firms with substantial cash flows and little debt are much more protected from the consequences of their mistakes (especially when stockholders are powerless and boards toothless).

Left to themselves, managers (especially lazy ones) would rather run all-equity financed firms with substantial cash reserves.



Debt and Discipline

Assume that you buy into this argument that debt adds discipline to management.

Which of the following types of companies will most benefit from debt adding this discipline?

- Conservatively financed (very little debt), privately owned businesses
- Conservatively financed, publicly traded companies, with stocks held by millions of investors, none of whom hold a large percent of the stock.
- Conservatively financed, publicly traded companies, with an activist and primarily institutional holding.

Conservatively financed (Equity financed), publicly traded firms with a wide and diverse stockholding.

Private firms should have the incentive to be efficient without debt, because the owner/manager has his or her wealth at stake.

Publicly traded firms with activist stockholders (like Michael Price) might not need debt to be disciplined. Investors looking over managers' shoulders will keep them honest.

Bankruptcy Cost

- The expected bankruptcy cost is a function of two variables--
 - the cost of going bankrupt
 - direct costs: Legal and other Deadweight Costs
 - indirect costs: Costs arising because people perceive you to be in financial trouble
 - the probability of bankruptcy, which will depend upon how uncertain you are about future cash flows
- As you borrow more, you increase the probability of bankruptcy and hence the expected bankruptcy cost.

Studies (see Warner) seem to indicate that the direct costs of bankruptcy are fairly small.

The indirect cost of going bankrupt comes from the perception that you are in financial trouble, which in turn affects sales and the capacity to raise credit.

As an example, when Apple Computer was perceived to be in financial trouble in early 1997, first-time buyers and businesses stopped buying Apples and software firms stopped coming up with upgrades for products.

Similarly, Kmart found that suppliers started demanding payments in 30 days instead of 60 days, when it got into financial trouble.

The probability of bankruptcy should be a function of the predictability (or variability) of earnings.

The Bankruptcy Cost Proposition

- Proposition 2: Other things being equal, the greater the indirect bankruptcy cost and/or probability of bankruptcy in the operating cashflows of the firm, the less debt the firm can afford to use.

Both the cost of bankruptcy and the probability of bankruptcy go into the expected cost. A firm can have a high expected bankruptcy cost when either or both is high.

If governments step in and provide protection to firms that get into financial trouble, they are reducing the expected cost of bankruptcy. Under that scenario, you would expect firms to borrow more money. (See South Korea)



Debt & Bankruptcy Cost

Rank the following companies on the magnitude of bankruptcy costs from most to least, taking into account both explicit and implicit costs:

- A Grocery Store
- An Airplane Manufacturer
- High Technology company

I would expect a grocery store to have the lowest bankruptcy costs. Customers generally do not consider the rating or default risk of grocery stores when they shop, but they definitely do consider both when placing an order for an airplane. Technology companies can have high bankruptcy costs, but the costs will vary depending upon what type of product they produce. A PC manufacturer might be affected more than someone who manufactures software; a company which serves businesses might be affected more than one which creates games for children.

Agency Cost

- An agency cost arises whenever you hire someone else to do something for you. It arises because your interests (as the principal) may deviate from those of the person you hired (as the agent).
- When you lend money to a business, you are allowing the stockholders to use that money in the course of running that business. Stockholders' interests are different from your interests, because
 - You (as lender) are interested in getting your money back
 - Stockholders are interested in maximizing your wealth
- In some cases, the clash of interests can lead to stockholders
 - Investing in riskier projects than you would want them to
 - Paying themselves large dividends when you would rather have them keep the cash in the business.
- Proposition 3: Other things being equal, the greater the agency problems associated with lending to a firm, the less debt the firm can afford to use.

What is good for equity investors might not be good for bondholders and lenders....

A risky project, with substantial upside, may make equity investors happy, but they might cause bondholders, who do not share in the upside, much worse off.

Similarly, paying a large dividend may make stockholders happier but they make lenders less well off.



Debt and Agency Costs

Assume that you are a bank. Which of the following businesses would you perceive the greatest agency costs?

- A Large Pharmaceutical company
- A Large Regulated Electric Utility

Why?

I would expect a grocery store to have the lowest bankruptcy costs. Customers generally do not consider the rating or default risk of grocery stores when they shop, but they definitely do consider both when placing an order for an airplane. Technology companies can have high bankruptcy costs, but the costs will vary depending upon what type of product they produce. A PC manufacturer might be affected more than someone who manufactures software; a company which serves businesses might be affected more than one which creates games for children.

Loss of future financing flexibility

- When a firm borrows up to its capacity, it loses the flexibility of financing future projects with debt.
- Proposition 4: Other things remaining equal, the more uncertain a firm is about its future financing requirements and projects, the less debt the firm will use for financing current projects.

Firms like to preserve flexibility. The value of flexibility should be a function of how uncertain future investment requirements are, and the firm's capacity to raise fresh capital quickly.

Firms with uncertain future needs and the inability to access markets quickly will tend to value flexibility the most, and borrow the least.

What managers consider important in deciding on how much debt to carry...

- A survey of Chief Financial Officers of large U.S. companies provided the following ranking (from most important to least important) for the factors that they considered important in the financing decisions

Factor	Ranking (0-5)
1. Maintain financial flexibility	4.55
2. Ensure long-term survival	4.55
3. Maintain Predictable Source of Funds	4.05
4. Maximize Stock Price	3.99
5. Maintain financial independence	3.88
6. Maintain high debt rating	3.56
7. Maintain comparability with peer group	2.47

This survey suggests that financial flexibility (which is not explicitly allowed for in the trade off) is valued very highly. What implications does this have for whether firms will borrow as much as the trade off suggests they should?

What is financial flexibility? Flexibility to do what? What do we need to assume about access to capital markets for financial flexibility to have high value? What kinds of firms will value flexibility the most?

Debt: Summarizing the Trade Off

Advantages of Borrowing

1. Tax Benefit:

Higher tax rates --> Higher tax benefit

2. Added Discipline:

Greater the separation between managers and stockholders --> Greater the benefit

Disadvantages of Borrowing

1. Bankruptcy Cost:

Higher business risk --> Higher Cost

2. Agency Cost:

Greater the separation between stockholders & lenders --> Higher Cost

3. Loss of Future Financing Flexibility:

Greater the uncertainty about future financing needs --> Higher Cost

This summarizes our previous discussion in a balance sheet format. In this format, if the advantages of the marginal borrowing exceed the disadvantages, you would borrow. Otherwise, you would use equity.

⌚ Application Test: Would you expect your firm to gain or lose from using a lot of debt?

- Considering, for your firm,
 - The potential tax benefits of borrowing
 - The benefits of using debt as a disciplinary mechanism
 - The potential for expected bankruptcy costs
 - The potential for agency costs
 - The need for financial flexibility
- Would you expect your firm to have a high debt ratio or a low debt ratio?
- Does the firm's current debt ratio meet your expectations?

This is just a qualitative analysis. It will not give you a specific optimal debt ratio but provides insight into why the firm may be using the financing mix that it is today.

A Hypothetical Scenario

- Assume you operate in an environment, where
 - (a) there are no taxes
 - (b) there is no separation between stockholders and managers.
 - (c) there is no default risk
 - (d) there is no separation between stockholders and bondholders
 - (e) firms know their future financing needs

Assume that you super impose these assumptions on the balance sheet on the previous page. The advantages of debt go to zero, as do the disadvantages. Under such a scenario, firms should be indifferent to issuing debt.

The Miller-Modigliani Theorem

- In an environment, where there are no taxes, default risk or agency costs, capital structure is irrelevant.
- The value of a firm is independent of its debt ratio.

With the assumptions on the previous page:

The cost of capital will remain unchanged as the debt ratio changes

The value of the firm will not be a function of leverage

Investment decisions can be made independently of financing decisions

Note that if we allow for tax benefits, and keep the other assumptions, the optimal debt ratio will go to 100%.

Implications of MM Theorem

- Leverage is irrelevant. A firm's value will be determined by its project cash flows.
- The cost of capital of the firm will not change with leverage. As a firm increases its leverage, the cost of equity will increase just enough to offset any gains to the leverage

The cost of capital remains unchanged, because what you gain by substituting expensive equity with cheaper debt will be offset by the increase in the cost of equity.

What do firms look at in financing?

- Is there a financing hierarchy?
- Argument:
 - There are some who argue that firms follow a financing hierarchy, with retained earnings being the most preferred choice for financing, followed by debt and that new equity is the least preferred choice.

Firms have fairly strong preferences in terms of where they would like to raise capital. They seem to prefer internal over external sources of capital and new debt over new equity.

Rationale for Financing Hierarchy

- Managers value flexibility. External financing reduces flexibility more than internal financing.
- Managers value control. Issuing new equity weakens control and new debt creates bond covenants.

Managers make financing decisions, not stockholders.

Preference rankings long-term finance: Results of a survey

Ranking	Source	Score
1	Retained Earnings	5.61
2	Straight Debt	4.88
3	Convertible Debt	3.02
4	External Common Equity	2.42
5	Straight Preferred Stock	2.22
6	Convertible Preferred	1.72

Notice that

internal equity is vastly preferred to external equity. (Is it the fear of dilution?),

straight debt over convertible debt, and

debt over preferred stock (Is that due to debt having a tax advantage?)



Financing Choices

You are reading the Wall Street Journal and notice a tombstone ad for a company, offering to sell convertible preferred stock. What would you hypothesize about the health of the company issuing these securities?

- Nothing
- Healthier than the average firm
- In much more financial trouble than the average firm

I would expect the firm to be in much more financial trouble than the average firm. Why else would it use convertible preferred stock when it could have used an alternate source of financing?

The stock price response to the issue of securities seems to mirror this financing hierarchy, with new bond issues eliciting more positive stock price responses than new stock issues.

Determining Optimal Financing Mix: Approaches and Alternatives

Pathways to the Optimal

- The Cost of Capital Approach: The optimal debt ratio is the one that minimizes the cost of capital for a firm.
- The Adjusted Present Value Approach: The optimal debt ratio is the one that maximizes the overall value of the firm.
- The Sector Approach: The optimal debt ratio is the one that brings the firm closes to its peer group in terms of financing mix.
- The Life Cycle Approach: The optimal debt ratio is the one that best suits where the firm is in its life cycle.

I. The Cost of Capital Approach

- Value of a Firm = Present Value of Cash Flows to the Firm, discounted back at the cost of capital.
- If the cash flows to the firm are held constant, and the cost of capital is minimized, the value of the firm will be maximized.

This is the conventional valuation model for a firm.

If the cash flows are the same, and the discount rate is lowered, the present value has to go up. (The key is that cash flows have to remain the same. If this is not true, then minimizing cost of capital may not maximize firm value)

Measuring Cost of Capital

- It will depend upon:
 - (a) the components of financing: Debt, Equity or Preferred stock
 - (b) the cost of each component
- In summary, the cost of capital is the cost of each component weighted by its relative market value.

$$WACC = k_e (E/(D+E)) + k_d (D/(D+E))$$

The cost of capital is the weighted average of the cost of all the different sources of financing.

Preferred stock, which is not debt (because preferred dividends are not tax deductible) and not equity (because preferred dividends are fixed) is best treated as a third item on the cost of capital computation, with its own cost. The simplest measure of this cost is the preferred dividend yield. (Preferred dividend/Preferred stock price)

Recapping the Measurement of cost of capital

- The cost of debt is the market interest rate that the firm has to pay on its borrowing. It will depend upon three components
 - (a) The general level of interest rates
 - (b) The default premium
 - (c) The firm's tax rate
- The cost of equity is
 1. the required rate of return given the risk
 2. inclusive of both dividend yield and price appreciation
- The weights attached to debt and equity have to be market value weights, not book value weights.

The cost of debt is the rate at which a business can borrow today.



Costs of Debt & Equity

A recent article in an Asian business magazine argued that equity was cheaper than debt, because dividend yields are much lower than interest rates on debt.

Do you agree with this statement

- Yes
- No

Can equity ever be cheaper than debt?

- Yes
- No

No. Dividend yields are only a portion of what you have to deliver to equity investors to keep them satisfied (To which, the Asian manager might well respond: What if they are not satisfied? What can the do to me? The more power stockholders have over managers, the more likely it is that they will subscribe to viewing cost of equity as including dividend yield and price appreciation)

Equity can never be cheaper than debt for any firm at any stage in its life cycle, since equity investors always stand behind debt holders in line when it comes to claims on cash flows (each year) and on assets (on liquidation). I know.. I know.. There is one exception. If you have a company with a negative or very low beta, its cost of equity may be so low that it is lower than the default-risk adjusted cost of debt. Such a company should never borrow money in the first place, making the exception moot.

Fallacies about Book Value

1. People will not lend on the basis of market value.
2. Book Value is more reliable than Market Value because it does not change as much.

1. To those who would make this argument, I would ask: When you take a second mortgage on your house, do you justify it to the bank using market or book value? The proportion of market value that you are willing to lend might be higher for some assets (with less volatile market value and higher current cash flows) than for others.
2. The very fact that book value does not move very much, when we know the true value does, is an indicator of the unreliability of book value.
3. From a cost of capital perspective, this is definitely not true (see next overhead)



Issue: Use of Book Value

Many CFOs argue that using book value is more conservative than using market value, because the market value of equity is usually much higher than book value. Is this statement true, from a cost of capital perspective? (Will you get a more conservative estimate of cost of capital using book value rather than market value?)

- Yes
- No

No. In most countries, including the US, the market value of equity is far higher than the book value of equity, while the market value of debt tends to be closer to the book value of debt.

Using book value weights results in a lower weight for equity and a higher weight for debt. Since the cost of equity is much higher than the cost of debt, the cost of capital, based on book value weights, will be much lower than that computed using market value weights. Since this is the hurdle rate used to decide whether to take projects or not, it is less conservative to use book value weights.

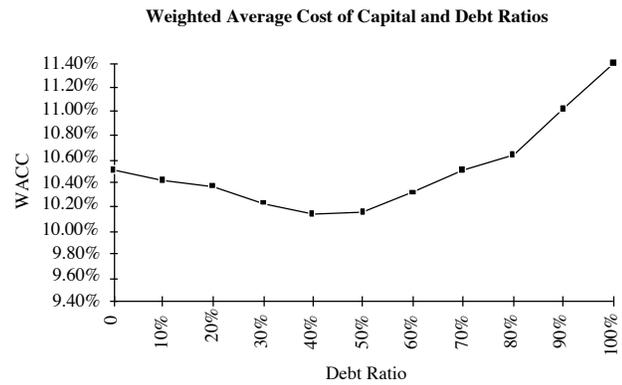
Applying Cost of Capital Approach: The Textbook Example

D/(D+E)	ke	kd	After-tax Cost of Debt	WACC
0	10.50%	8%	4.80%	10.50%
10%	11%	8.50%	5.10%	10.41%
20%	11.60%	9.00%	5.40%	10.36%
30%	12.30%	9.00%	5.40%	10.23%
40%	13.10%	9.50%	5.70%	10.14%
50%	14%	10.50%	6.30%	10.15%
60%	15%	12%	7.20%	10.32%
70%	16.10%	13.50%	8.10%	10.50%
80%	17.20%	15%	9.00%	10.64%
90%	18.40%	17%	10.20%	11.02%
100%	19.70%	19%	11.40%	11.40%

This is a simple example, where both the costs of debt and equity are given. Note that both increase as the debt ratio goes up, but the cost of capital becomes lower at least initially as you take on more debt (because you are substituting in cheaper debt for more expensive equity)

At 40%, the cost of capital is minimized. It is the optimal debt ratio.

WACC and Debt Ratios



Aswath Damodaran

318

The same results are presented here in a graphical format.
In the Miller-Modigliani world, this would be a flat line.

Current Cost of Capital: Disney

■ Equity

- Cost of Equity = Riskfree rate + Beta * Risk Premium
= 4% + 1.25 (4.82%) = 10.00%
- Market Value of Equity = \$55.101 Billion
- Equity/(Debt+Equity) = 79%

■ Debt

- After-tax Cost of debt = (Riskfree rate + Default Spread) (1-t)
= (4%+1.25%) (1-.373) = 3.29%
- Market Value of Debt = \$ 14.668 Billion
- Debt/(Debt +Equity) = 21%

- Cost of Capital = 10.00%(.79)+3.29%(.21) = 8.59%

↗
$$\frac{55.101}{55.101+14.668}$$

This reproduces the current cost of capital computation for Disney, using market value weights for both debt and equity, the cost of equity (based upon the bottom-up beta) and the cost of debt (based upon the bond rating)

The market value of debt is estimated by estimating the present value of total interest payments and face value at the current cost of debt.

One way to frame the capital structure question: Is there a mix of debt and equity at which Disney's cost of capital will be lower than 8.59%?

Mechanics of Cost of Capital Estimation

1. Estimate the Cost of Equity at different levels of debt:
Equity will become riskier -> Beta will increase -> Cost of Equity will increase.
Estimation will use levered beta calculation
2. Estimate the Cost of Debt at different levels of debt:
Default risk will go up and bond ratings will go down as debt goes up -> Cost of Debt will increase.
To estimating bond ratings, we will use the interest coverage ratio (EBIT/Interest expense)
3. Estimate the Cost of Capital at different levels of debt
4. Calculate the effect on Firm Value and Stock Price.

The basic inputs for computing cost of capital are cost of equity and cost of debt. This summarizes the basic approach we will use to estimate each.

Process of Ratings and Rate Estimation

- We use the median interest coverage ratios for large manufacturing firms to develop “interest coverage ratio” ranges for each rating class.
- We then estimate a spread over the long term bond rate for each ratings class, based upon yields at which these bonds trade in the market place.

The interest coverage ratios in the previous table are medians. We use the ratios for large manufacturing firms to develop the table on the next page.

We also estimate a spread over the long term government bond rate at each rating, using the average yield to maturity on long-term straight bonds within each ratings class and comparing to the treasury bond rate. (Try bondsonline.com for the latest default spreads)

Medians of Key Ratios : 1998-2000

	<i>AAA</i>	<i>AA</i>	<i>A</i>	<i>BBB</i>	<i>BB</i>	<i>B</i>	<i>CCC</i>
EBIT interest cov. (x)	17.5	10.8	6.8	3.9	2.3	1.0	0.2
EBITDA interest cov.	21.8	14.6	9.6	6.1	3.8	2.0	1.4
Funds flow/total debt	105.8	55.8	46.1	30.5	19.2	9.4	5.8
Free oper. cash flow/total debt (%)	55.4	24.6	15.6	6.6	1.9	-4.5	-14.0
Return on capital (%)	28.2	22.9	19.9	14.0	11.7	7.2	0.5
Oper.income/sales (%)	29.2	21.3	18.3	15.3	15.4	11.2	13.6
Long-term debt/capital (%)	15.2	26.4	32.5	41.0	55.8	70.7	80.3
Total Debt/ Capital (%)	26.9	35.6	40.1	47.4	61.3	74.6	89.4
Number of firms	10	34	150	234	276	240	23

To estimate the cost of debt, we will estimate a bond rating for the firm, using financial ratios. This page provides the averages for key ratios used by S&P to rate manufacturing firms between 1993 and 1995.

We will actually build the entire analysis around the first ratio (pre-tax interest coverage ratio = $\text{EBIT}/\text{Interest expenses}$) to

- Keep the analysis simple (It is relatively straightforward to expand it to include multiple ratios)

- Focus on a ratio that will change as the leverage changes

- Focus on a ratio that has been shown to be highly correlated with ratings.

Interest Coverage Ratios and Bond Ratings: Large market cap, manufacturing firms

Interest Coverage Ratio	Rating
> 8.5	AAA
6.50 - 6.50	AA
5.50 - 6.50	A+
4.25 - 5.50	A
3.00 - 4.25	A-
2.50 - 3.00	BBB
2.05 - 2.50	BB+
1.90 - 2.00	BB
1.75 - 1.90	B+
1.50 - 1.75	B
1.25 - 1.50	B-
0.80 - 1.25	CCC
0.65 - 0.80	CC
0.20 - 0.65	C
< 0.20	D

For more detailed interest coverage ratios and bond ratings, try the [ratings.xls](#) spreadsheet on my web site.

These are interest coverage ratio/ratings classes for large manufacturing firms (Market cap > \$ 5 billion)

The ratios need to be much higher for smaller firms to get similar ratings. (See ratings.xls spreadsheet)

Special cases:

1. If you have no interest expenses, your interest coverage ratio will be infinite: AAA rating (does not matter anyway, since you probably have no debt)
2. If you have negative operating income, interest coverage ratio is negative: D rating. You may want to modify by using average operating income over last few years.

Spreads over long bond rate for ratings classes: 2003

<i>Rating</i>	<i>Typical default spread</i>	<i>Market interest rate on debt</i>
AAA 0.35%	4.35%	
AA	0.50%	4.50%
A+	0.70%	4.70%
A	0.85%	4.85%
A-	1.00%	5.00%
BBB 1.50%	5.50%	
BB+ 2.00%	6.00%	
BB	2.50%	6.50%
B+	3.25%	7.25%
B	4.00%	8.00%
B-	6.00%	10.00%
CCC 8.00%	12.00%	
CC	10.00%	14.00%
C	12.00%	16.00%
D	20.00%	24.00%

Riskless Rate = 4%

This is the default spread over and above the long term (10 year) treasury bond rate at the time of this analysis. See <http://www.bondsonline.com> for latest spreads. T

Current Income Statement for Disney: 1996

	2003	2002
Revenues	27061	25329
- Operating expenses (other than depreciation)	23289	21924
EBITDA	3772	3405
- Depreciation and Amortization	1059	1021
EBIT	2713	2384
- Interest Expenses	666	708
+ Interest Income	127	255
Taxable Income	2174	1931
- Taxes	907	695
Net Income	1267	1236

Disney recovered somewhat from a disastrous 2001 (when operating income was only \$1.25 billion) to better years in 2003 and 2004.

Estimating Cost of Equity

Unlevered Beta = 1.0674 (Bottom up beta based upon Disney's businesses)

Market premium = 4.82%

T.Bond Rate = 4.00%

Tax rate=37.3%

Debt Ratio	D/E Ratio	Levered Beta	Cost of Equity
0.00%	0.00%	1.0674	9.15%
10.00%	11.11%	1.1418	9.50%
20.00%	25.00%	1.2348	9.95%
30.00%	42.86%	1.3543	10.53%
40.00%	66.67%	1.5136	11.30%
50.00%	100.00%	1.7367	12.37%
60.00%	150.00%	2.0714	13.98%
70.00%	233.33%	2.6291	16.67%
80.00%	400.00%	3.7446	22.05%
90.00%	900.00%	7.0911	38.18%

This reproduces the levered beta, using the formula developed during the risk and return section. The unlevered beta of 1.0674 is the bottom-up unlevered beta.

$\text{Beta}_{\text{Levered}} = \text{Unlevered Beta} (1 + (1-t) (\text{Debt/Equity Ratio}))$ In calculating the levered beta in this table, we assumed that all market risk is borne by the equity investors; this may be unrealistic especially at higher levels of debt. We will also consider an alternative estimate of levered betas that apportions some of the market risk to the debt:

$$\beta_{\text{levered}} = \beta_u [1 + (1-t)D/E] - \beta_{\text{debt}} (1-t) D/E$$

The beta of debt is based upon the rating of the bond and is estimated by regressing past returns on bonds in each rating class against returns on a market index. The levered betas estimated using this approach will generally be lower than those estimated with the conventional model

Estimating Cost of Debt

Start with the current market value of the firm = $55,101 + 14,668 = \$69,769$ mil

D/(D+E)	0.00%	10.00%	Debt to capital
D/E 0.00%	11.11%	D/E = 10/90 = .1111	
\$ Debt	\$0	\$6,977	10% of \$69,769
EBITDA	\$3,882	\$3,882	Same as 0% debt
Depreciation	\$1,077	\$1,077	Same as 0% debt
EBIT \$2,805	\$2,805		Same as 0% debt
Interest	\$0	\$303	Pre-tax cost of debt * \$ Debt
Pre-tax Int. cov	∞	9.24	EBIT/ Interest Expenses
Likely Rating	AAA	AAA	From Ratings table
Pre-tax cost of debt	4.35%	4.35%	Riskless Rate + Spread

This is a manual computation of the cost of debt. Note the circularity in the argument, since the interest expense is needed to compute the rating, and the rating is needed to compute the cost of debt.

To get around the circularity, I start the 10% debt ratio calculation assuming that my cost of debt is the same as it was at 0% (which is 4.35%). I could have even started with the long term treasury bond rate, but I would have had to do one additional iteration to get the costs of debt consistent.

We assume that whatever is borrowed is used to buy back equity, and that the operating assets of the firm remain unchanged (EBITDA and EBIT don't change...). This allows us to isolate the effect of the recapitalization.

The Ratings Table

<i>Interest Coverage Ratio</i>	<i>Rating</i>	<i>Typical default spread</i>	<i>Market interest rate on debt</i>
> 8.5	AAA	0.35%	4.35%
6.50 - 6.50	AA	0.50%	4.50%
5.50 - 6.50	A+	0.70%	4.70%
4.25 - 5.50	A	0.85%	4.85%
3.00 - 4.25	A-	1.00%	5.00%
2.50 - 3.00	BBB	1.50%	5.50%
2.05 - 2.50	BB+	2.00%	6.00%
1.90 - 2.00	BB	2.50%	6.50%
1.75 - 1.90	B+	3.25%	7.25%
1.50 - 1.75	B	4.00%	8.00%
1.25 - 1.50	B-	6.00%	10.00%
0.80 - 1.25	CCC	8.00%	12.00%
0.65 - 0.80	CC	10.00%	14.00%
0.20 - 0.65	C	12.00%	16.00%
< 0.20	D	20.00%	24.00%

This is the look-up table that I used to determine what my rating and cost of debt would be at a 12.44 interest coverage ratio.

A Test: Can you do the 20% level?

	0.00%	10.00%	20.00%	2nd Iteration	3rd?
D/(D+E)	0.00%	10.00%	20.00%		
D/E	0.00%	11.11%			
\$ Debt	\$0	\$6,977			
EBITDA	\$3,882	\$3,882			
Depreciation	\$1,077	\$1,077			
EBIT	\$2,805	\$2,805			
Interest	\$0	\$303			
Pre-tax Int. cov	∞	9.24			
Likely Rating	AAA	AAA			
Cost of debt	4.35%	4.35%			

	0.00%	10.00%	20.00%	Second Iteration	
D/(D+E)	0.00%	10.00%	20.00%		
D/E	0.00%	11.11%	25.00%		
\$ Debt	\$0	6,977	\$13,954		
EBITDA.	\$3,882	\$3,882	\$3,882		
Depreciation	\$1,077	\$1,077	\$1,077		
EBIT	\$5,559	2,805\$	2,805	\$2,805	
Interest		\$0	\$303	\$ 606	\$
677	\$698				
Int. cov	∞	9.24		4.62	
	4.14			4.02	
Likely Rating	AAA	AAA	A	A-	A-
Interest Rate	4.35%	4.35%	4.85%	5.00%	

Bond Ratings, Cost of Debt and Debt Ratios

Debt Ratio	Debt	Interest expense	Interest Coverage Ratio	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)
0%	\$0	\$0	∞	AAA	4.35%	37.30%	2.73%
10%	\$6,977	\$303	9.24	AAA	4.35%	37.30%	2.73%
20%	\$13,954	\$698	4.02	A-	5.00%	37.30%	3.14%
30%	\$20,931	\$1,256	2.23	BB+	6.00%	37.30%	3.76%
40%	\$27,908	\$3,349	0.84	CCC	12.00%	31.24%	8.25%
50%	\$34,885	\$5,582	0.50	C	16.00%	18.75%	13.00%
60%	\$41,861	\$6,698	0.42	C	16.00%	15.62%	13.50%
70%	\$48,838	\$7,814	0.36	C	16.00%	13.39%	13.86%
80%	\$55,815	\$8,930	0.31	C	16.00%	11.72%	14.13%
90%	\$62,792	\$10,047	0.28	C	16.00%	10.41%	14.33%

This is the completed schedule of interest coverage ratios, ratings and costs of debt at different debt ratios ranging up to 90%.

It is significant that EBITDA not change as the debt ratio goes up. The reason is that the new debt is not used to make the firm larger by taking new projects, but to buy back equity. (This isolates the effect of the financing decision on the value of the firm)

We are being simplistic in assuming that the interest coverage ratio solely determines the ratings. We could use more than one ratio, create a consolidated score (like the Altman Z score) and make the rating a function of this score.

Note that the effective tax rate increases after the 40% debt ratio. That is because we have insufficient income to cover the entire interest expense beyond that point. (EBIT < Interest Expenses) We therefore lose some of the tax advantage of borrowing.

Stated versus Effective Tax Rates

- You need taxable income for interest to provide a tax savings
- In the Disney case, consider the interest expense at 30% and 40%

	<i>30% Debt Ratio</i>	<i>40% Debt Ratio</i>
EBIT	\$ 2,805 m	\$ 2,805 m
Interest Expense	\$ 1,256 m	\$ 3,349 m
Tax Savings	$\$ 1,256 \times .373 = 468$	$2,805 \times .373 = \$ 1,046$
Tax Rate	37.30%	$1,046 / 3,349 = 31.2\%$
Pre-tax interest rate	6.00%	12.00%
After-tax Interest Rate	3.76%	8.25%

- You can deduct only \$2,805 million of the \$3,349 million of the interest expense at 40%. Therefore, only 37.3% of \$ 2,805 million is considered as the tax savings.

We are being conservative. The interest that is not tax deductible can be carried forward and will probably earn some tax benefit in future periods.

Given that this is a permanent change in capital structure, however, it seems to be more conservative to just look at the interest expenses that provide a tax benefit in the current period.

Disney's Cost of Capital Schedule

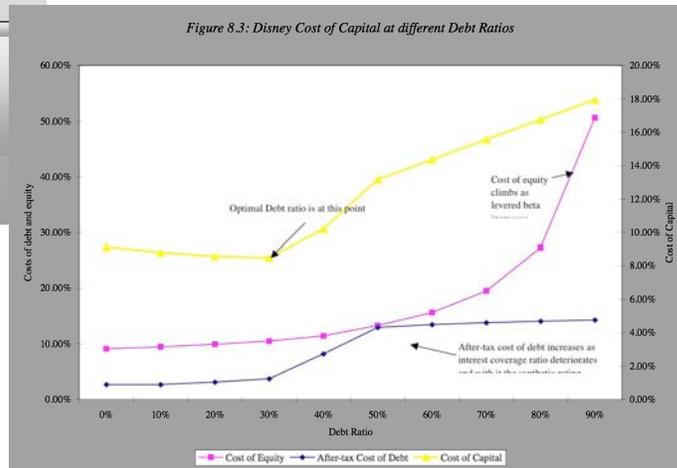
Debt Ratio	Cost of Equity	Cost of Debt (after-tax)	Cost of Capital
0%	9.15%	2.73%	9.15%
10%	9.50%	2.73%	8.83%
20%	9.95%	3.14%	8.59%
30%	10.53%	3.76%	8.50%
40%	11.50%	8.25%	10.20%
50%	13.33%	13.00%	13.16%
60%	15.66%	13.50%	14.36%
70%	19.54%	13.86%	15.56%
80%	27.31%	14.13%	16.76%
90%	50.63%	14.33%	17.96%

Summarizes the cost of equity and debt from prior pages, as well as the cost of capital at different debt ratios.

If the objective is to minimize cost of capital, it occurs at 30% debt.

This will maximize firm value, if operating earnings (EBITDA) is unaffected by changes in leverage and the consequent changes in ratings.

Disney: Cost of Capital Chart



Aswath Damodaran

333

The cost of capital is minimized at 30% but notes that the cost of capital does not rise smoothly. In fact, there are times when you will see a kink in the cost of capital graph, largely because the cost of debt changes discontinuously, changing only when the rating changes.

We can make the cost of debt a continuous function of default risk or interest coverage ratios.

Effect on Firm Value

- Firm Value before the change = $55,101 + 14,668 = \$ 69,769$

WACC _b = 8.59%	Annual Cost = $\$69,769 * 8.59\% = \$5,993$ million
WACC _a = 8.50%	Annual Cost = $\$69,769 * 8.50\% = \$5,930$ million
Δ WACC = 0.09%	Change in Annual Cost = $\$ 63$ million
- If there is no growth in the firm value, (Conservative Estimate)
 - Increase in firm value = $\$63 / .0850 = \$ 741$ million
 - Change in Stock Price = $\$741 / 2047.6 = \0.36 per share
- If we assume a perpetual growth of 4% in firm value over time,
 - Increase in firm value = $\$63 / (.0850 - .04) = \$ 1,400$ million
 - Change in Stock Price = $\$1,400 / 2,047.6 = \$ 0.68$ per share

Implied Growth Rate obtained by

Firm value Today = $FCFF(1+g)/(WACC-g)$: Perpetual growth formula

$\$69,769 = \$1,722(1+g)/(.0859-g)$: Solve for $g \rightarrow$ Implied growth = 5.98%

The reduction in the cost of capital translates into annual savings. Most of these savings are implicit, being savings in the cost of equity. Thus, the firm's accounting earnings will not reflect these savings directly.

These savings can be converted into a present value by discounting back at the new cost of capital.

It is more realistic to assume growth in firm value. A simple way to estimate what the current growth attributed to the firm by the market is to estimate it using the firm value today, the free cash flow to the firm and the current cost of capital.

Note that the simple valuation formula used above assumes stable growth forever. For high growth firms, this formula will yield an implied growth rate that is too high (It will be very close to the cost of capital). In those cases, it is better to put a cap on the growth rate of around 4% (the nominal growth rate of the US economy).

In this case, maximizing firm value also maximizes stock price, because we assume that

Debt is refinanced at current market rates, thus protecting bondholders

Markets are rational and efficient.

A Test: The Repurchase Price

- Let us suppose that the CFO of Disney approached you about buying back stock. He wants to know the maximum price that he should be willing to pay on the stock buyback. (The current price is \$ 26.91) Assuming that firm value will grow by 4% a year, estimate the maximum price.
- What would happen to the stock price after the buyback if you were able to buy stock back at \$ 26.91?

When we divide the increase in firm value by the total number of shares, we are implicitly assuming that all stockholders (including those who sell back their shares) will get an equal share of the firm value increase (since the announcement is public). Thus, we are assuming that the stock will be bought back at $26.91 + \$0.68 = \$ 27.59$

If the firm can buy the stock back at the current price of \$ 26.91, the remaining stockholders will get a much greater increase in the stock price. To compute this change in value per share, we first compute how many shares we would buy back with the additional debt taken on of \$ 6,263 billion (Debt at 30% optimal – Current Debt) and the stock price of \$ 26.91. We then divide the increase in firm value of \$ 1,400 million by the remaining shares outstanding:

Change in stock price = $\$ 1400 \text{ million} / (2047.6 - (6263/26.91)) = \$ 0.77 \text{ per share}$

Buybacks and Stock Prices

- Assume that Disney does make a tender offer for its shares but pays \$28 per share. What will happen to the value per share for the shareholders who do not sell back?
 - a. The share price will drop below the pre-announcement price of \$26.91
 - b. The share price will be between \$26.91 and the estimated value (above) or \$27.59
 - c. The share price will be higher than \$27.59

If Disney buys shares back at \$28, there will be a transfer of wealth from the stockholders who don't sell back to those that do. To compute the stock price after the buyback:

Number of shares bought back = Additional dollar debt / \$ 28 = $6263/28 = 223.68$ million shares

Dollar Premium paid to stockholders = $223.68 * (28 - 26.91) = \243 million

Premium for remaining stockholders = $1400 - 243 = 1167$ million

Increase in stock price for remaining stockholders = $1167 / (2047.6 - 223.68) = \0.64

Stock price after buyback = $\$26.91 + 0.64 = \27.55

The Downside Risk

- Doing What-if analysis on Operating Income
 - A. Standard Deviation Approach
 - Standard Deviation In Past Operating Income
 - Standard Deviation In Earnings (If Operating Income Is Unavailable)
 - Reduce Base Case By One Standard Deviation (Or More)
 - B. Past Recession Approach
 - Look At What Happened To Operating Income During The Last Recession. (How Much Did It Drop In % Terms?)
 - Reduce Current Operating Income By Same Magnitude
- Constraint on Bond Ratings

This analysis is based upon the firm continuing as a going concern. To the extent that more debt can put this survival at risk, it is important to do “ what-if” analyses or build in survival constraints into the analysis.

Disney's Operating Income: History

Year	EBIT	% Change in EBIT
1987	756	
1988	848	12.17%
1989	1177	38.80%
1990	1368	16.23%
1991	1124	-17.84%
1992	1287	14.50%
1993	1560	21.21%
1994	1804	15.64%
1995	2262	25.39%
1996	3024	33.69%
1997	3945	30.46%
1998	3843	-2.59%
1999	3580	-6.84%
2000	2525	-29.47%
2001	2832	12.16%
2002	2384	-15.82%
2003	2713	13.80%

These are percentage changes in operating income at Disney.

Disney: Effects of Past Downturns

<i>Recession</i>	<i>Decline in Operating Income</i>
2002	Drop of 15.82%
1991	Drop of 22.00%
1981-82	Increased
Worst Year	Drop of 29.47%

- The standard deviation in past operating income is about 20%.

Both are designed to measure how much Disney's operating income will drop in a "downside" scenario. The first approach gives a more intuitive estimate than the latter.

Note that the downside does not have to be framed in terms of a recession. It could be in terms of something that the firm fears (the loss of a large contract, for instance)

Alternatively, this entire analysis could have been based upon "normalized operating income", which would be the operating income that the firm will earn in a "normal year", rather than on current operating income.

Disney: The Downside Scenario

<i>% Drop in EBITDA</i>	<i>EBIT</i>	<i>Optimal Debt Ratio</i>
0%	\$ 2,805	30%
5%	\$ 2,665	20%
10%	\$ 2,524	20%
15%	\$ 2,385	20%
20%	\$ 2,245	20%

The optimal debt ratio is lower, as you would expect it to be, but it drops to 20% and stays at 20% for large drops in operating income. You can try what if analyses on the other variables, but this approach to setting leverage is based primarily upon cash flows (which are measured by the EBITDA). The effect of changing the other variables will be fairly small.

Constraints on Ratings

- Management often specifies a 'desired Rating' below which they do not want to fall.
- The rating constraint is driven by three factors
 - it is one way of protecting against downside risk in operating income (so do not do both)
 - a drop in ratings might affect operating income
 - there is an ego factor associated with high ratings
- Caveat: Every Rating Constraint Has A Cost.
 - Provide Management With A Clear Estimate Of How Much The Rating Constraint Costs By Calculating The Value Of The Firm Without The Rating Constraint And Comparing To The Value Of The Firm With The Rating Constraint.

Rating constraints are one way of buffering your analysis against the assumption that operating income will not change as leverage changes. If the operating income will suffer when ratings fall below a certain point (say BBB or investment grade), it makes sense to build in that constraint into the analysis.

When managers brag about their high ratings, the questions that should come up are whether the high rating is paying off in terms of higher operating income, and if not, how much stockholders are paying for managers' bragging rights.

Ratings Constraints for Disney

- At its optimal debt ratio of 30%, Disney has an estimated rating of BB+.
- Assume that Disney imposes a rating constraint of A or greater.
- The optimal debt ratio for Disney is then 20% (see next page)
- The cost of imposing this rating constraint can then be calculated as follows:

Value at 30% Debt	= \$ 71,239 million
- Value at 20% Debt	= \$ 69,837 million
Cost of Rating Constraint	= \$ 1,376 million

This is a little unfair, since it is based upon the assumption that operating income is unaffected by the change in ratings. To the degree that Disney's operating income will drop if its rating drops below BBB, this will overstate the cost of the constraint.

Effect of Ratings Constraints: Disney

Debt Ratio	Rating	Firm Value
0%	AAA	\$62,279
10%	AAA	\$66,397
20%	A-	\$69,837
30%	BB+	\$71,239
40%	CCC	\$51,661
50%	C	\$34,969
60%	C	\$30,920
70%	C	\$27,711
80%	C	\$25,105
90%	C	\$22,948

This shows how the constrained optimal is computed. With a BBB constraint, the constrained optimal is about 25%. With a more rigid constraint, it would be even lower.

This process can be modified to allow for other constraints. For instance, some firms do not want their book value debt ratios to rise above a certain level (say, industry averages). In other cases, existing bond covenants may restrict a financial ratio from exceeding a specified number.

What if you do not buy back stock..

- The optimal debt ratio is ultimately a function of the underlying riskiness of the business in which you operate and your tax rate.
- Will the optimal be different if you invested in projects instead of buying back stock?
 - No. As long as the projects financed are in the same business mix that the company has always been in and your tax rate does not change significantly.
 - Yes, if the projects are in entirely different types of businesses or if the tax rate is significantly different.

The analysis is built on the assumption that debt is used to buy back stock. Many firms would rather use the debt to take projects, or might be barred from buying back stock (as is the case in markets like Germany)

If we assume that projects in the same line of business have the same cash flow generating capacity as the current firm (EBITDA/Firm Value), the optimal debt ratio will remain unchanged, but the optimal dollar debt will be a much higher number. (This analysis is impervious to changes in scale. If you double all the numbers, the optimal debt ratio will remain unchanged)

If the business you are expanding into has more risk and more negative cashflows, your optimal will decrease.

Analyzing Financial Service Firms

- The interest coverage ratios/ratings relationship is likely to be different for financial service firms.
- The definition of debt is messy for financial service firms. In general, using all debt for a financial service firm will lead to high debt ratios. Use only interest-bearing long term debt in calculating debt ratios.
- The effect of ratings drops will be much more negative for financial service firms.
- There are likely to regulatory constraints on capital

Financial service firms often do not consider debt to be a source of capital, as much as they consider it to be raw material that they use to produce their products.

Thus, most banks borrow, using the regulatory capital ratios as constraints, rather than to minimize cost of capital.

Interest Coverage ratios, ratings and Operating income

<i>Long Term Interest Coverage Ratio</i>	<i>Rating is</i>	<i>Spread is</i>	<i>Operating Income Decline</i>
< 0.05	D	16.00%	-50.00%
0.05 – 0.10	C	14.00%	-40.00%
0.10 – 0.20	CC	12.50%	-40.00%
0.20 – 0.30	CCC	10.50%	-40.00%
0.30 – 0.40	B-	6.25%	-25.00%
0.40 – 0.50	B	6.00%	-20.00%
0.50 – 0.60	B+	5.75%	-20.00%
0.60 – 0.75	BB	4.75%	-20.00%
0.75 – 0.90	BB+	4.25%	-20.00%
0.90 – 1.20	BBB	2.00%	-20.00%
1.20 – 1.50	A-	1.50%	-17.50%
1.50 – 2.00	A	1.40%	-15.00%
2.00 – 2.50	A+	1.25%	-10.00%
2.50 – 3.00	AA	0.90%	-5.00%
> 3.00	AAA	0.70%	0.00%

These numbers were obtained by looking at banks in the United States. The percentage drop in operating income as the rating changes is obtained by looking at the operating income of banks whose ratings have dropped in the year after the change. Below BBB, this data was not available (since banks tend to be taken over by the FDIC when they get that risky). We set the operating income drop to be large enough to prevent any bank from having an optimal below BBB.

Deutsche Bank: Optimal Capital Structure

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on deb	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.44	6.15%	AAA	4.75%	38.00%	2.95%	6.15%	\$111,034
10%	0.47	6.29%	AAA	4.75%	38.00%	2.95%	5.96%	\$115,498
20%	0.50	6.48%	AAA	4.75%	38.00%	2.95%	5.77%	\$120,336
30%	0.55	6.71%	AAA	4.75%	38.00%	2.95%	5.58%	\$125,597
40%	0.62	7.02%	AAA	4.75%	38.00%	2.95%	5.39%	\$131,339
50%	0.71	7.45%	A+	5.30%	38.00%	3.29%	5.37%	\$118,770
60%	0.84	8.10%	A	5.45%	38.00%	3.38%	5.27%	\$114,958
70%	1.07	9.19%	A	5.45%	38.00%	3.38%	5.12%	\$119,293
80%	1.61	11.83%	BB+	8.30%	32.43%	5.61%	6.85%	\$77,750
90%	3.29	19.91%	BB	8.80%	27.19%	6.41%	7.76%	\$66,966

The optimal debt ratio is 40%, even though the cost of capital is minimized at 70%. The drop in cost of capital is overwhelmed by the drop in operating income below 40%.

Analyzing Companies after Abnormal Years

- The operating income that should be used to arrive at an optimal debt ratio is a “normalized” operating income
- A normalized operating income is the income that this firm would make in a normal year.
 - For a cyclical firm, this may mean using the average operating income over an economic cycle rather than the latest year’s income
 - For a firm which has had an exceptionally bad or good year (due to some firm-specific event), this may mean using industry average returns on capital to arrive at an optimal or looking at past years
 - For any firm, this will mean not counting one time charges or profits

Since the optimal debt ratio for a firm is a ratio that you expect the firm to sustain in the long term, you need to have a measure of what the sustainable operating income in the long term is.

Analyzing Aracruz Cellulose's Optimal Debt Ratio

- Aracruz Cellulose, the Brazilian pulp and paper manufacturing firm, reported operating income of 887 million BR on revenues of 3176 million BR in 2003. This was significantly higher than its operating income of 346 million BR in 2002 and 196 million Br in 2001.
- In 2003, Aracruz had depreciation of 553 million BR and capital expenditures amounted to 661 million BR.
- Aracruz had debt outstanding of 4,094 million BR with a dollar cost of debt of 7.25%. Aracruz had 859.59 million shares outstanding, trading 10.69 BR per share.
- The beta of the stock is estimated, using comparable firms, to be 0.7040.
- The corporate tax rate in Brazil is estimated to be 34%.

Aracruz was affected by both operating problems at its plant and the plunge in the price of paper and pulp during the year.

Aracruz's Current Cost of Capital

- Current \$ Cost of Equity = $4\% + 0.7040 (12.49\%) = 12.79\%$
 - Market Value of Equity = $10.69 \text{ BR/share} * 859.59 = 9,189 \text{ million BR}$
- Current \$ Cost of Capital
 $= 12.79\% (9,189/(9,189+4,094)) + 7.25\% (1-.34) (4,094/(9,189+4,094)) = 10.33\%$

Modifying the Cost of Capital Approach for Aracruz

- The operating income at Aracruz is a function of the price of paper and pulp in global markets. While 2003 was a very good year for the company, its income history over the last decade reflects the volatility created by pulp prices. We computed Aracruz's average pre-tax operating margin over the last 10 years to be 25.99%. Applying this lower average margin to 2003 revenues generates a normalized operating income of 796.71 million BR.
- Aracruz's synthetic rating of BBB, based upon the interest coverage ratio, is much higher than its actual rating of B- and attributed the difference to Aracruz being a Brazilian company, exposed to country risk. Since we compute the cost of debt at each level of debt using synthetic ratings, we run the risk of understating the cost of debt. The difference in interest rates between the synthetic and actual ratings is 1.75% and we add this to the cost of debt estimated at each debt ratio from 0% to 90%.
- We used the interest coverage ratio/ rating relationship for smaller companies to estimate synthetic ratings at each level of debt.

Commodity companies tend to have volatile operating income. If you use the current year's income and it happens to reflect a really good or bad year for commodity prices, you will overstate or understate the optimal debt ratio.

We are assuming that 1995 earnings were normal. There are alternative ways of estimating normalized operating income:

Look at the average operating income over time. (If you have a cyclical firm, you might want to look at the average over the entire economic cycle). This is especially true if the entire sector is earning abnormally high or low earnings.

Look at the typical margins or returns on capital earned by firms in the sector. Then estimate the normalized operating income for your firm (by multiplying the industry margin by the firm's revenues, or return on capital by the firm's capital). This is the approach to use if your firm has abnormally low or high earnings in a sector that is not affected by the same factors.

Aracruz's Optimal Debt Ratio

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value in BR
0%	0.54	10.80%	AAA	6.10%	34.00%	4.03%	10.80%	12,364
10%	0.58	11.29%	AAA	6.10%	34.00%	4.03%	10.57%	12,794
20%	0.63	11.92%	A	6.60%	34.00%	4.36%	10.40%	13,118
30%	0.70	12.72%	BBB	7.25%	34.00%	4.79%	10.34%	13,256
40%	0.78	13.78%	CCC	13.75%	34.00%	9.08%	11.90%	10,633
50%	0.93	15.57%	CCC	13.75%	29.66%	9.67%	12.62%	9,743
60%	1.20	19.04%	C	17.75%	19.15%	14.35%	16.23%	6,872
70%	1.61	24.05%	C	17.75%	16.41%	14.84%	17.60%	6,177
80%	2.41	34.07%	C	17.75%	14.36%	15.20%	18.98%	5,610
90%	4.82	64.14%	C	17.75%	12.77%	15.48%	20.35%	5,138

This is the optimal debt ratio with normalized operating income. The costs of equity and capital are computed in US dollar terms. The optimal debt ratio is 30%, which is about where they are right now.

Analyzing a Private Firm

- The approach remains the same with important caveats
 - It is far more difficult estimating firm value, since the equity and the debt of private firms do not trade
 - Most private firms are not rated.
 - If the cost of equity is based upon the market beta, it is possible that we might be overstating the optimal debt ratio, since private firm owners often consider all risk.

Private firms will tend to be more cautious about moving to a higher debt ratio than otherwise similar publicly traded firms, because the owners of a private business will not view default risk as diversifiable.

Bookscape's current cost of capital

- We assumed that Bookscape would have a debt to capital ratio of 16.90%, similar to that of publicly traded book retailers, and that the tax rate for the firm is 40%. We computed a cost of capital based on that assumption.
- We also used a “total beta” of 2.0606 to measure the additional risk that the owner of Bookscape is exposed to because of his lack of diversification.
- Cost of Capital
 - Cost of equity = Riskfree Rate + Total Beta * Risk Premium
= 4% + 2.0606 * 4.82% = 13.93%
 - Pre-tax Cost of debt = 5.5% (based upon synthetic rating of BBB)
 - Cost of capital = 13.93% (.8310) + 5.5% (1-.40) (.1690) = 12.14%

Note that we use the total beta rather than market beta to estimate the cost of equity. This will increase the cost of equity at every debt ratio.

The Inputs: Bookscape

- While Bookscape has no conventional debt outstanding, it does have one large operating lease commitment. Given that the operating lease has 25 years to run and that the lease commitment is \$500,000 for each year, the present value of the operating lease commitments is computed using Bookscape's pre-tax cost of debt of 5.5%:
 - Present value of Operating Lease commitments (in '000s) = \$500 (PV of annuity, 5.50%, 25 years) = 6,708
- Bookscape had operating income before taxes of \$ 2 million in the most recent financial year. Since we consider the present value of operating lease expenses to be debt, we add back the imputed interest expense on the present value of lease expenses to the earnings before interest and taxes.
 - Adjusted EBIT (in '000s) = EBIT + Pre-tax cost of debt * PV of operating lease expenses = \$ 2,000 + .055 * \$6,708 = \$2,369
- Estimated Market Value of Equity (in '000s) = Net Income for Bookscape * Average PE for publicly traded book retailers = 1,320 * 16.31 = \$21,525

We are treating operating leases as the equivalent of debt. Therefore, we have to be consistent and treat the imputed interest expenses (computed by multiplying the pre-tax cost of debt of 5.5% by the PV of operating leases computed to be \$3.36 million) as financing expenses. They are added back to EBIT to arrive at the adjusted EBIT.

The imputed interest expense is an approximation. The full adjustment would be to add the entire operating lease expense back to the operating income and to subtract out the estimated depreciation on the leased asset.

Interest Coverage Ratios, Spreads and Ratings: Small Firms

Interest Coverage Ratio	Rating	Spread over T Bond Rate
> 12.5	AAA	0.35%
9.50-12.50	AA	0.50%
7.5 - 9.5	A+	0.70%
6.0 - 7.5	A	0.85%
4.5 - 6.0	A-	1.00%
4.0 - 4.5	BBB	1.50%
3.5 - 4.0	BB+	2.00%
3.0 - 3.5	BB	2.50%
2.5 - 3.0	B+	3.25%
2.0 - 2.5	B	4.00%
1.5 - 2.0	B-	6.00%
1.25 - 1.5	CCC	8.00%
0.8 - 1.25	CC	10.00%
0.5 - 0.8	C	12.00%
<0.5 D		20.00%

Note that smaller firms need much higher interest coverage ratios to get the same ratings as large firms.

Optimal Debt Ratio for Bookscape

Debt Ratio	Total Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (\$)
0%	1.84	12.87%	AAA	4.35%	40.00%	2.61%	12.87%	\$25,020
10%	1.96	13.46%	AAA	4.35%	40.00%	2.61%	12.38%	\$26,495
20%	2.12	14.20%	A+	4.70%	40.00%	2.82%	11.92%	\$28,005
30%	2.31	15.15%	A-	5.00%	40.00%	3.00%	11.51%	\$29,568
40%	2.58	16.42%	BB	6.50%	40.00%	3.90%	11.41%	\$29,946
50%	2.94	18.19%	B	8.00%	40.00%	4.80%	11.50%	\$29,606
60%	3.50	20.86%	CC	14.00%	39.96%	8.41%	13.39%	\$23,641
70%	4.66	26.48%	CC	14.00%	34.25%	9.21%	14.39%	\$21,365
80%	7.27	39.05%	C	16.00%	26.22%	11.80%	17.25%	\$16,745
90%	14.54	74.09%	C	16.00%	23.31%	12.27%	18.45%	\$15,355

The optimal debt ratio for the private firm is 40% but the cost of capital is flat between 30 and 50%. The firm value is maximized at that point.

To the extent that private business owners view default risk more seriously than stockholders in a publicly traded firm, they will probably be more cautious about moving to the optimal.

We can extend the argument to closely held publicly traded firms. We would expect these firms to have lower debt ratios than publicly traded firms with diverse stockholdings.

Determinants of Optimal Debt Ratios

■ Firm Specific Factors

- 1. Tax Rate
 - Higher tax rates --> Higher Optimal Debt Ratio
 - Lower tax rates --> Lower Optimal Debt Ratio
- 2. Pre-Tax CF on Firm = EBITDA / MV of Firm
 - Higher Pre-tax CF --> Higher Optimal Debt Ratio
 - Lower Pre-tax CF --> Lower Optimal Debt Ratio
- 3. Variance in Earnings [Shows up when you do 'what if' analysis]
 - Higher Variance --> Lower Optimal Debt Ratio
 - Lower Variance --> Higher Optimal Debt Ratio

■ Macro-Economic Factors

- 1. Default Spreads
 - Higher --> Lower Optimal Debt Ratio
 - Lower --> Higher Optimal Debt Ratio

The key determinant is the pre-tax return on market value of the firm. This measures the cash flow generating capacity of the firm, relative to its market value. The greater this number, the higher the optimal debt ratio should be.

Many high growth firms have low optimal debt ratios (in market value terms) because their current operating income as a percentage of market value is a low number

As firms mature, this ratio will rise, and the optimal debt ratios will go up. Many firms, however, continue to behave as they did in earlier stages of growth and use no debt. This is the period when the gap between actual and optimal debt ratios will expand.

⌚ Application Test: Your firm's optimal financing mix

- Using the optimal capital structure spreadsheet provided:
 - Estimate the optimal debt ratio for your firm
 - Estimate the new cost of capital at the optimal
 - Estimate the effect of the change in the cost of capital on firm value
 - Estimate the effect on the stock price
- In terms of the mechanics, what would you need to do to get to the optimal immediately?

II. The APV Approach to Optimal Capital Structure

- In the adjusted present value approach, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value
- $\text{Firm Value} = \text{Unlevered Firm Value} + (\text{Tax Benefits of Debt} - \text{Expected Bankruptcy Cost from the Debt})$
- The optimal dollar debt level is the one that maximizes firm value

This is an alternative approach with the same objective of maximizing firm value. It assesses the costs and benefits of debt in dollar value terms rather than through the cost of capital.

Implementing the APV Approach

- Step 1: Estimate the unlevered firm value. This can be done in one of two ways:
 1. Estimating the unlevered beta, a cost of equity based upon the unlevered beta and valuing the firm using this cost of equity (which will also be the cost of capital, with an unlevered firm)
 2. Alternatively, $\text{Unlevered Firm Value} = \text{Current Market Value of Firm} - \text{Tax Benefits of Debt (Current)} + \text{Expected Bankruptcy cost from Debt}$
- Step 2: Estimate the tax benefits at different levels of debt. The simplest assumption to make is that the savings are perpetual, in which case
 - $\text{Tax benefits} = \text{Dollar Debt} * \text{Tax Rate}$
- Step 3: Estimate a probability of bankruptcy at each debt level, and multiply by the cost of bankruptcy (including both direct and indirect costs) to estimate the expected bankruptcy cost.

In practice, analysts often do the first two steps but skip the third because the inputs are so difficult to get. The result is that the value of the firm always goes up as you borrow money, since you count in the tax benefits but you don't consider the bankruptcy costs.

Estimating Expected Bankruptcy Cost

■ Probability of Bankruptcy

- Estimate the synthetic rating that the firm will have at each level of debt
- Estimate the probability that the firm will go bankrupt over time, at that level of debt (Use studies that have estimated the empirical probabilities of this occurring over time - Altman does an update every year)

■ Cost of Bankruptcy

- The direct bankruptcy cost is the easier component. It is generally between 5-10% of firm value, based upon empirical studies
- The indirect bankruptcy cost is much tougher. It should be higher for sectors where operating income is affected significantly by default risk (like airlines) and lower for sectors where it is not (like groceries)

The two key inputs you need to estimate the expected bankruptcy cost. The first one is easier to get than the second.

Ratings and Default Probabilities: Results from Altman study of bonds

<i>Bond Rating</i>	<i>Default Rate</i>
D	100.00%
C	80.00%
CC	65.00%
CCC	46.61%
B-	32.50%
B	26.36%
B+	19.28%
BB	12.20%
BBB	2.30%
A-	1.41%
A	0.53%
A+	0.40%
AA	0.28%
AAA	0.01%

This table is updated every year by Ed Altman at the Stern School of Business. It is the probability that a bond in each of these ratings classes will default and is based upon actual default rates over 10 years of bonds in each ratings class.

Disney: Estimating Unlevered Firm Value

Current Market Value of the Firm = $\$55,101 + \$14,668 = \$69,789$
- Tax Benefit on Current Debt = $\$14,668 * 0.373 = \$5,479$ million
+ Expected Bankruptcy Cost = $1.41\% * (0.25 * 69,789) = \984 million
Unlevered Value of Firm = $\$65,294$ million

Cost of Bankruptcy for Disney = 25% of firm value
Probability of Bankruptcy = 1.41%, based on firm's current rating of A-
Tax Rate = 37.3%

To implement APV, you have to first estimate the unlevered firm value.

Disney: APV at Debt Ratios

Debt Ratio	\$ Debt	Tax Rate	Unlevered Firm Value	Tax Benefits	Bond Rating	Probability of Default	Expected Bankruptcy Cost	Value of Levered Firm
0%	\$0	37.30%	\$64,556	\$0	AAA	0.01%	\$2	\$64,555
10%	\$6,979	37.30%	\$64,556	\$2,603	AAA	0.01%	\$2	\$67,158
20%	\$13,958	37.30%	\$64,556	\$5,206	A-	1.41%	\$246	\$69,517
30%	\$20,937	37.30%	\$64,556	\$7,809	BB+	7.00%	\$1,266	\$71,099
40%	\$27,916	31.20%	\$64,556	\$8,708	CCC	50.00%	\$9,158	\$64,107
50%	\$34,894	18.72%	\$64,556	\$6,531	C	80.00%	\$14,218	\$56,870
60%	\$41,873	15.60%	\$64,556	\$6,531	C	80.00%	\$14,218	\$56,870
70%	\$48,852	13.37%	\$64,556	\$6,531	C	80.00%	\$14,218	\$56,870
80%	\$55,831	11.70%	\$64,556	\$6,531	C	80.00%	\$14,218	\$56,870
90%	\$62,810	10.40%	\$64,556	\$6,531	C	80.00%	\$14,218	\$56,870

Disney's optimal debt ratio is 30%, which matches the optimal using the cost of capital approach.

III. Relative Analysis

I. Industry Average with Subjective Adjustments

- The “safest” place for any firm to be is close to the industry average
- Subjective adjustments can be made to these averages to arrive at the right debt ratio.
 - Higher tax rates -> Higher debt ratios (Tax benefits)
 - Lower insider ownership -> Higher debt ratios (Greater discipline)
 - More stable income -> Higher debt ratios (Lower bankruptcy costs)
 - More intangible assets -> Lower debt ratios (More agency problems)

Most firms pick their debt ratios by looking at industry averages. By staying close to the average, managers get cover in case they make mistakes - everyone else has made the same mistake.

Managers also try to stay close to the industry average, because ratings agencies and equity research analysts look at these averages.

Comparing to industry averages

	<i>Disney</i>	<i>Entertainment</i>	<i>Aracruz</i>	<i>Paper and Pulp (Emerging Market)</i>
Market Debt Ratio	21.02%	19.56%	30.82%	27.71%
Book Debt Ratio	35.10%	28.86%	43.12%	49.00%

Disney is close to the industry-average debt ratio, with market and book value debt ratios slightly higher than the industry average . It could make the argument that it is therefore correctly levered. It is, however larger and safer than the typical comparable firm.

Aracruz has a market debt ratio slightly higher than the industry average though its book value debt ratio is lower.

Getting past simple averages: Using Statistics

- Step 1: Run a regression of debt ratios on the variables that you believe determine debt ratios in the sector. For example,
$$\text{Debt Ratio} = a + b (\text{Tax rate}) + c (\text{Earnings Variability}) + d (\text{EBITDA/Firm Value})$$
- Step 2: Estimate the proxies for the firm under consideration. Plugging into the cross sectional regression, we can obtain an estimate of predicted debt ratio.
- Step 3: Compare the actual debt ratio to the predicted debt ratio.

This is one way to control for differences across firms. The variables in the regression should be proxies for the factors that drive the debt trade-off

Tax Benefit ->	Tax Rate
Bankruptcy Risk ->	Earnings Variability
Agency Costs ->	EBITDA/Firm Value

Applying the Regression Methodology: Entertainment Firms

- Using a sample of entertainment firms, we arrived at the following regression:

$$\text{Debt/Capital} = 0.2156 - 0.1826 (\text{Sales Growth}) + 0.6797 (\text{EBITDA/ Value})$$

(4.91) (1.91) (2.05)

- The R squared of the regression is 14%. This regression can be used to arrive at a predicted value for Disney of:

$$\text{Predicted Debt Ratio} = 0.2156 - 0.1826 (.0668) + 0.6797 (.0767) = 0.2555 \text{ or } 25.55\%$$

Based upon the capital structure of other firms in the entertainment industry, Disney should have a market value debt ratio of 25.55%.

This assumes a linear relationship between the independent variables and the debt ratio. The variables can be transformed if the relationship is non-linear.

The t statistics are reported in brackets. The last variable is the EBITDA as a percent of the market value of the firm.

I plugged in the values for Disney into the regression. This suggest that Disney is underlevered, relative to comparable firms, after controlling for differences across these firms. Note that the low R-squared will also result in large prediction errors.

Extending to the entire market: 2003 Data

- Using 2003 data for firms listed on the NYSE, AMEX and NASDAQ data bases. The regression provides the following results –

$$\text{DFR} = 0.0488 + 0.810 \text{ Tax Rate} - 0.304 \text{ CLSH} + 0.841 \text{ E/V} - 2.987 \text{ CPXFR}$$

(1.41^a) (8.70^a) (3.65^b) (7.92^b) (13.03^a)

where,

DFR	= Debt / (Debt + Market Value of Equity)
Tax Rate	= Effective Tax Rate
CLSH	= Closely held shares as a percent of outstanding shares
CPXFR	= Capital Expenditures / Book Value of Capital
E/V	= EBITDA/ Market Value of Firm

- The regression has an R-squared of only 53.3%.

This looks at the entire market and uses the following variables (from Value Line CD-ROM)

Variance in firm value	<i>as proxy for</i>	bankruptcy risk
Closely held shares	“	disciplinary power of debt
Free Cash flow	“	Agency costs
Capital Expenditure/BV	“	Need for flexibility

No tax rate variable was used, because it was assumed that most firms have the same marginal tax rate.

Low R-squared is typical of these large cross sectional regressions.

Applying the Regression

Lets check whether we can use this regression. Disney had the following values for these inputs in 1996. Estimate the optimal debt ratio using the debt regression.

Effective Tax Rate = 34.76%

Closely held shares as percent of shares outstanding = 2.2%

Capital Expenditures as fraction of firm value = 2.09%

EBITDA/Value = 7.67%

Optimal Debt Ratio

$$= 0.0488 + 0.810 (\quad) - 0.304 (\quad) + 0.841 (\quad) - 2.987 (\quad)$$

What does this optimal debt ratio tell you?

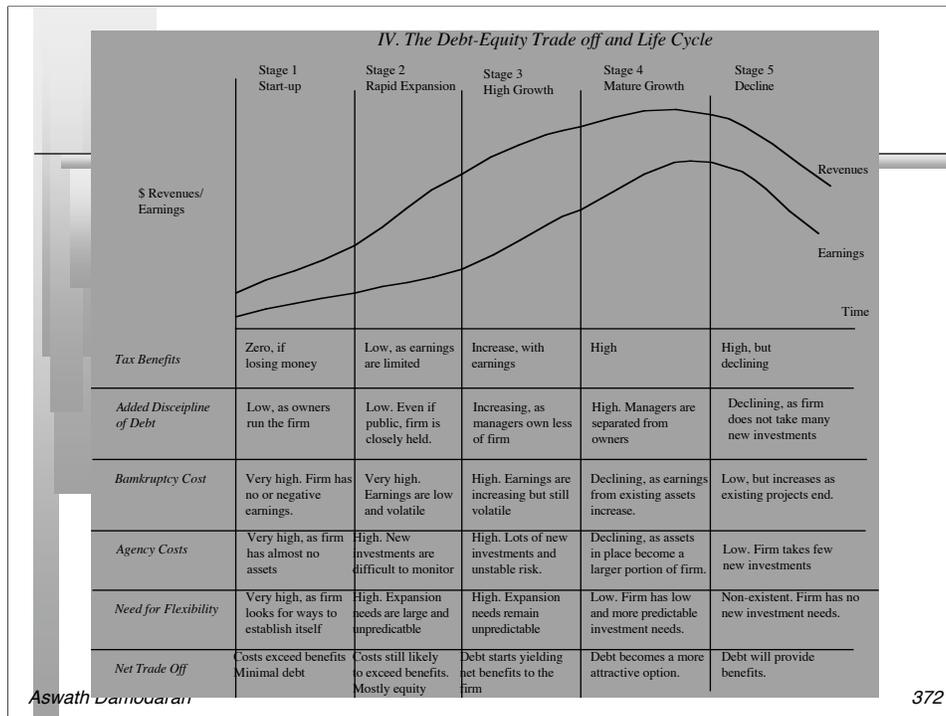
Why might it be different from the optimal calculated using the weighted average cost of capital?

Plugging in the values for Disney yields the following optimal debt ratio:

$$\begin{aligned} \text{DFR}_{\text{Disney}} &= 0.0488 + 0.810 (0.3476) - 0.304 (0.022) + 0.841 \\ & \quad (.0767) - 2.987 (.0209) \\ &= 0.3257 \text{ or } 32.57\% \end{aligned}$$

Based upon the debt ratios of other firms in the market and Disney's financial characteristics, we would expect Disney to have a debt ratio of 32.57%. Since its actual debt ratio is 21.02%, Disney is under levered.

It may be different from the optimal because it is based upon the assumption that firms, on average, get their debt ratios right. If most firms are under levered, for instance, you will get a lower predicted value from the regression than for a cost of capital approach.



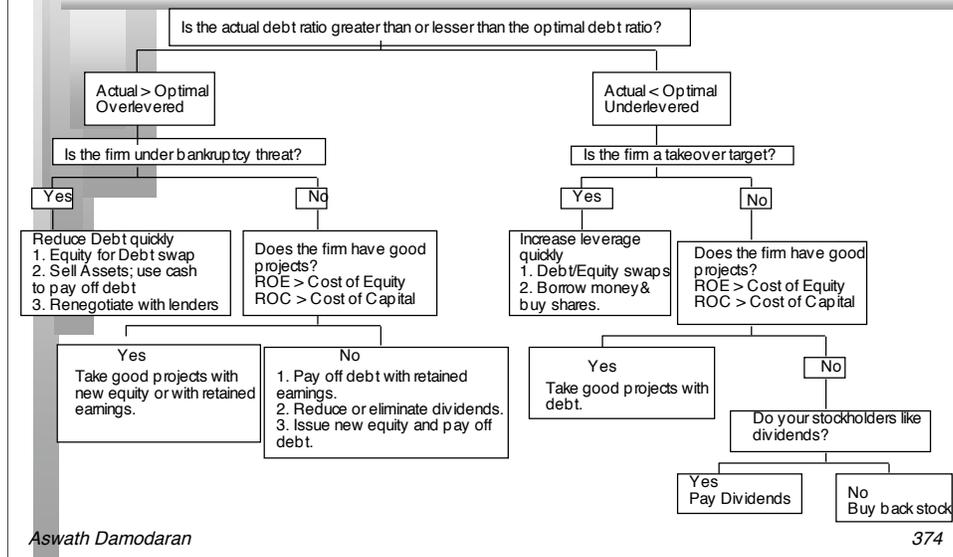
Looks at how the determinants of capital structure change (and with it the optimal) as a firm goes through the life cycle. A short cut to the optimal debt ratio is to look at where a firm is in the life cycle and assign it an appropriate debt ratio. The problem is that categorizing a firm in terms of the life cycle may not be easy to do and firms in the same stage can be very different in terms of cashflow and risk characteristics.

Summarizing for Disney

Approach Used	Optimal
1a. Cost of Capital unconstrained	30%
1b. Cost of Capital w/ lower EBIT	20%
1c. Cost of Capital w/ Rating constraint	20%
II. APV Approach	30%
IIIa. Entertainment Sector Regression	25.55%
IIIb. Market Regression	32.57%
IV. Life Cycle Approach	Mature Growth
Actual Debt Ratio	21%

Disney is slightly under levered. What would you do if you go a split verdict - under levered using cost of capital but over levered using the sector comparison?

A Framework for Getting to the Optimal



Studies that have looked at the likelihood of a firm being taken over (in a hostile takeover) have concluded that

Small firms are more likely to be taken over than larger firms

Closely held firms are less likely to be taken over than widely held firms

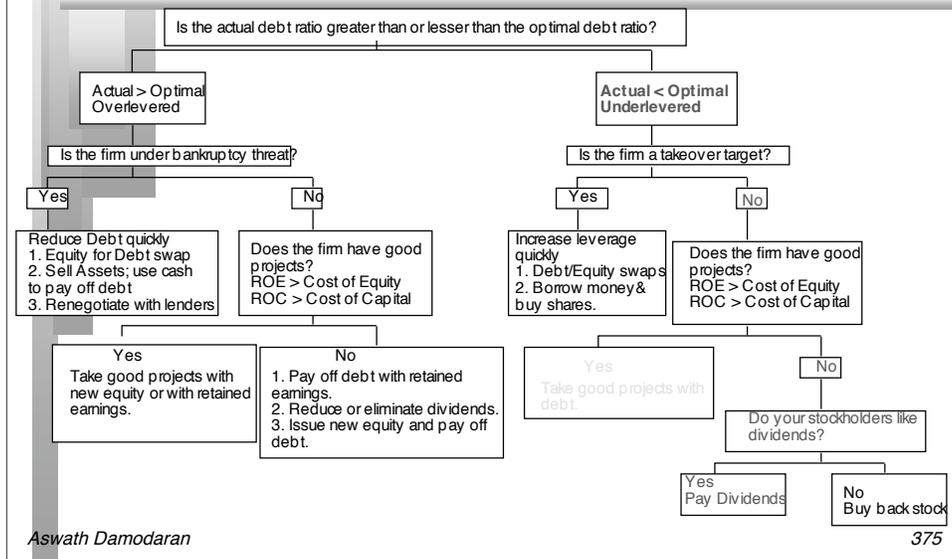
Firms with anti-takeover restrictions in the corporate charter (or from the state) are less likely to be taken over than firms without these restrictions

Firms which have done well for their stockholders (positive Jensen's alpha, Positive EVA) are less likely to be taken over than firms which have done badly.

Whether a firm is under bankruptcy threat can be assessed by looking at its rating. If its rating is B or less, you can argue that the bankruptcy threat is real.

Looking at historical ROE or ROC, relative to the cost of equity and capital, does assume that the future will look like the past.

Disney: Applying the Framework



This is the analysis for Disney.

I am assuming that future projects will be as successful as current projects. This might not always be the appropriate assumption, especially when the returns on projects are trending downwards.

⌚ Application Test: Getting to the Optimal

- Based upon your analysis of both the firm's capital structure and investment record, what path would you map out for the firm?
 - Immediate change in leverage
 - Gradual change in leverage
 - No change in leverage
- Would you recommend that the firm change its financing mix by
 - Paying off debt/Buying back equity
 - Take projects with equity/debt

Map out your firm's path to the optimal debt ratio depending upon

1. Urgency: If your is a likely target for an acquisition or bankruptcy, go for an immediate change. If not, go for a gradual change.
2. If your stock price performance has been poor (Jensen's alpha < 0) and your project choice has yielded negative excess returns (EVA < 0), go for recapitalization (paying off debt or buying back equity). If you have good projects, go for good investments.

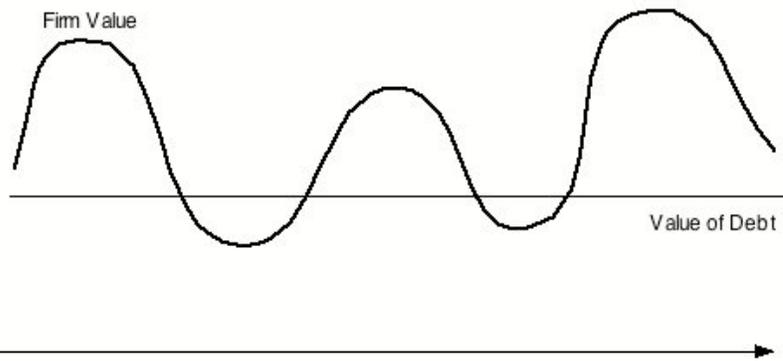
Designing the Perfect Debt

Designing Debt: The Fundamental Principle

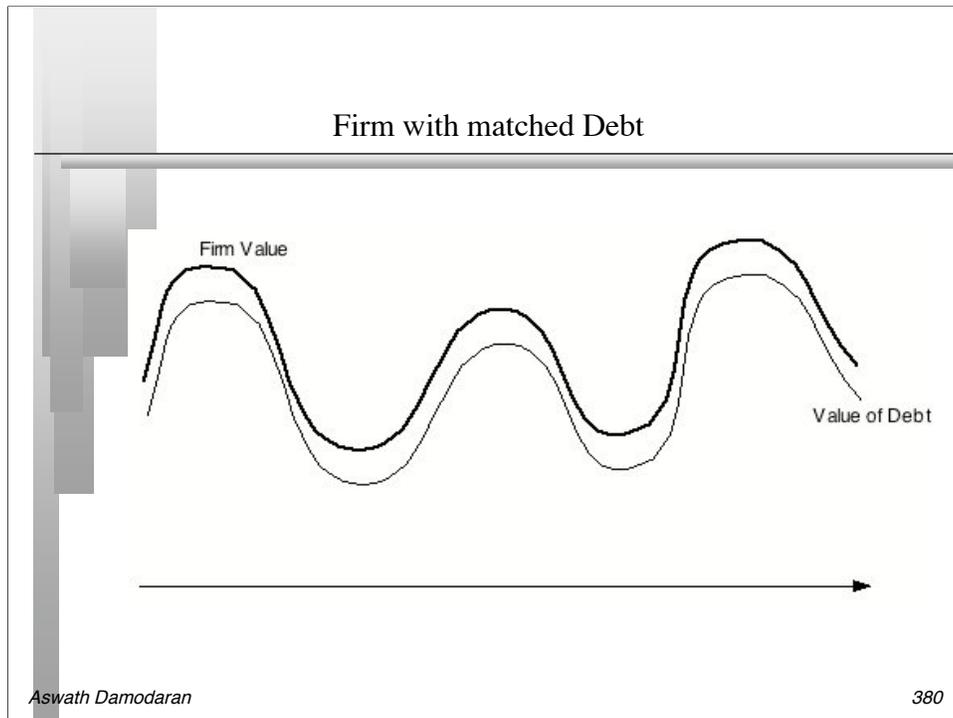
- The objective in designing debt is to make the cash flows on debt match up as closely as possible with the cash flows that the firm makes on its assets.
- By doing so, we reduce our risk of default, increase debt capacity and increase firm value.

It is not the reduction in risk but the increase in debt capacity that generates the value. A firm that does not use this debt capacity will not gain from matching debt to assets in the first place.

Firm with mismatched debt



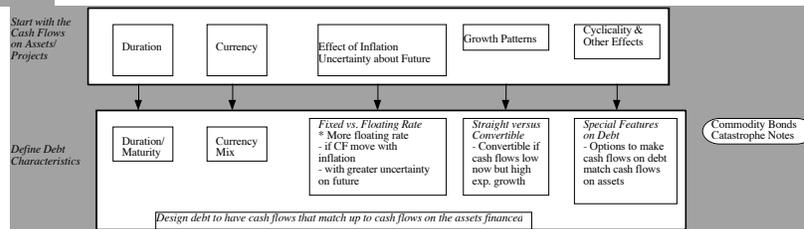
Note that the firm goes bankrupt in the two periods, when the firm value falls below the value of the debt.



The same firm never goes bankrupt, even though it has borrowed a lot more.

Design the perfect financing instrument

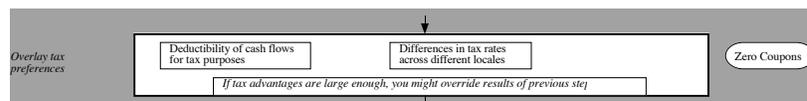
- The perfect financing instrument will
 - Have all of the tax advantages of debt
 - While preserving the flexibility offered by equity



There is ample scope for creativity in trying to design the perfect bond. The idea is to design debt that looks and acts like equity, in terms of the cash flows.

Ensuring that you have not crossed the line drawn by the tax code

- All of this design work is lost, however, if the security that you have designed does not deliver the tax benefits.
- In addition, there may be a trade off between mismatching debt and getting greater tax benefits.



Note though that all is lost if the tax authorities do not allow you to subtract interest expenses for tax purposes.

It is also possible that you could increase your tax benefits by deviating from your perfect bond.

While keeping equity research analysts, ratings agencies and regulators applauding

- Ratings agencies want companies to issue equity, since it makes them safer. Equity research analysts want them not to issue equity because it dilutes earnings per share. Regulatory authorities want to ensure that you meet their requirements in terms of capital ratios (usually book value). Financing that leaves all three groups happy is nirvana.

Consider ratings agency & analyst concerns

Analyst Concerns
- Effect on EPS
- Value relative to comparables

Ratings Agency
- Effect on Ratios
- Ratios relative to comparables

Regulatory Concerns
- Measures used

Operating Leases
MPs
Surplus Notes

Can securities be designed that can make these different entities happy?

This is a tough one. You have to issue a security that looks like equity to the ratings agency, debt to the equity research analysts and equity again to your regulatory authorities (if you are a financial service firm).

While it may seem impossible, trust preferred and several other very profitable innovations (at least to investment bankers) have succeeded in doing this.

Debt or Equity: The Strange Case of Trust Preferred

- Trust preferred stock has
 - A fixed dividend payment, specified at the time of the issue
 - That is tax deductible
 - And failing to make the payment can cause ? (Can it cause default?)
- When trust preferred was first created, ratings agencies treated it as equity. As they have become more savvy, ratings agencies have started giving firms only partial equity credit for trust preferred.

Ratings agencies have learnt over time, but slowly. As they have learnt, investment banks have come up with new securities that have the same objective.

Debt, Equity and Quasi Equity

- Assuming that trust preferred stock gets treated as equity by ratings agencies, which of the following firms is the most appropriate firm to be issuing it?
- A firm that is under levered, but has a rating constraint that would be violated if it moved to its optimal
- A firm that is over levered that is unable to issue debt because of the rating agency concerns.

I would expect under levered firms to gain, and over levered firms to lose by doing this. The latter might fool the ratings agencies but they lose because of the expected default cost that they create for themselves.

Soothe bondholder fears

- There are some firms that face skepticism from bondholders when they go out to raise debt, because
 - Of their past history of defaults or other actions
 - They are small firms without any borrowing history
- Bondholders tend to demand much higher interest rates from these firms to reflect these concerns.

Factor in agency conflicts between stock and bond holders

Observability of Cash Flows by Lenders
- Less observable cash flows lead to more conflicts

Type of Assets financed
- Tangible and liquid assets create less agency problems

Existing Debt covenants
- Restrictions on Financing

Convertibles
Puttable Bonds
Rating Sensitive
Notes
LYONs

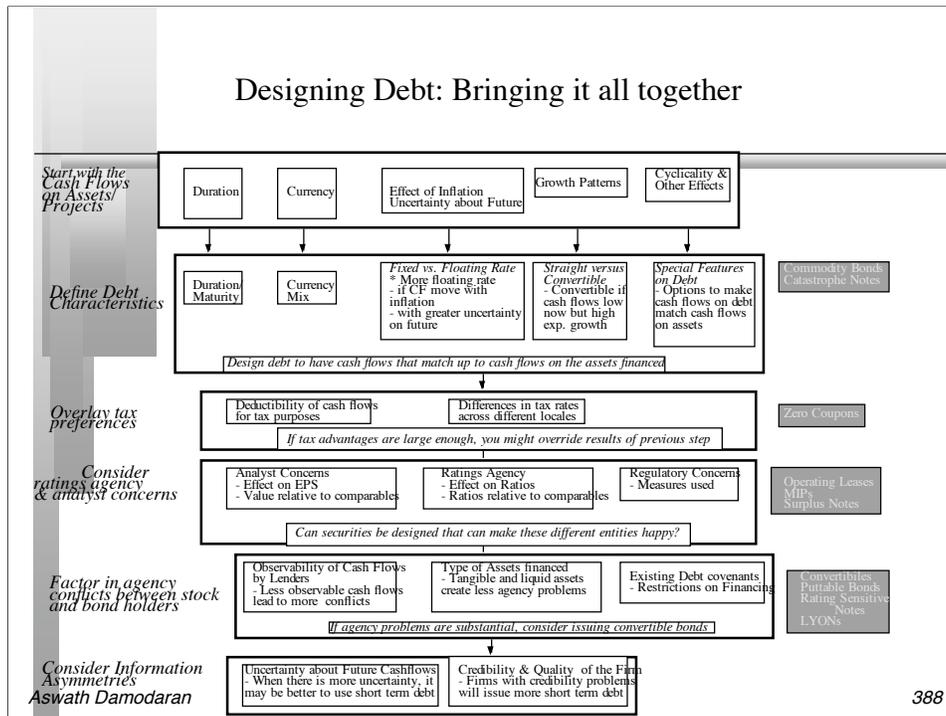
If agency problems are substantial, consider issuing convertible bond.

While adding these conditions to debt may make it less attractive to the firm, it may be only way they can borrow.

And do not lock in market mistakes that work against you

- Ratings agencies can sometimes under rate a firm, and markets can under price a firm's stock or bonds. If this occurs, firms should not lock in these mistakes by issuing securities for the long term. In particular,
 - Issuing equity or equity based products (including convertibles), when equity is under priced transfers wealth from existing stockholders to the new stockholders
 - Issuing long term debt when a firm is under rated locks in rates at levels that are far too high, given the firm's default risk.
- What is the solution
 - If you need to use equity?
 - If you need to use debt?

When you feel that your equity or debt is under valued, you do not want to lock in the under valuation. You should use short-term solutions (bridge financing) until they feel more comfortable with the valuations. Bridge financing includes short term debt and short term warrants.



This provides the basic framework for designing the right kind of debt.

You begin by trying to match up financing type to asset type (in terms of duration, currency, growth patterns and special features). By doing so, you reduce your risk of bankruptcy, increase your capacity to borrow and consequently the tax benefits of debt.

Then, you modify the “perfect debt”

For tax factors, to ensure that you get the maximum tax benefit

To meet the needs and objectives of equity research analysts and ratings agencies

To fix any agency conflicts that might prevent lenders from lending

To prevent an undeservedly low rating from pushing up the cost of debt above what it should be. (If you are under rated, you should probably use short term debt until you feel your rating is justified)

Approaches for evaluating Asset Cash Flows

■ I. Intuitive Approach

- Are the projects typically long term or short term? What is the cash flow pattern on projects?
- How much growth potential does the firm have relative to current projects?
- How cyclical are the cash flows? What specific factors determine the cash flows on projects?

■ II. Project Cash Flow Approach

- Project cash flows on a typical project for the firm
- Do scenario analyses on these cash flows, based upon different macro economic scenarios

■ III. Historical Data

- Operating Cash Flows
- Firm Value

These are the three basic approaches to assessing the cash flow characteristics of your asset base. The last two approaches provide more quantitative answers but may not work for companies which have a short history or have changed their asset mixes over time.

I. Intuitive Approach - Disney

<i>Business</i>	<i>Project Cash Flow Characteristics</i>	<i>Type of Financing</i>
Movies	Projects are likely to 1. Be short term 2. Have cash outflows primarily in dollars (since Disney makes most of its movies in the U.S.) but cash inflows could have a substantial foreign currency component (because of overseas sales) 3. Have net cash flows that are heavily driven by whether the movie is a "hit", which is often difficult to predict.	Debt should be 1. Short term 2. Primarily dollar debt. 3. If possible, tied to the success of movies. (Lion King or Nemo Bonds)
Broadcasting	Projects are likely to be 1. Short term 2. Primarily in dollars, though foreign component is growing 3. Driven by advertising revenues and show success	Debt should be 1. Short term 2. Primarily dollar debt 3. If possible, linked to network ratings.
Theme Parks	Projects are likely to be 1. Very long term 2. Primarily in dollars, but a significant proportion of revenues come from foreign tourists, who are likely to stay away if the dollar strengthens 3. Affected by success of movie and broadcasting divisions.	Debt should be 1. Long term 2. Mix of currencies, based upon tourist make up.
Consumer Products	Projects are likely to be short to medium term and linked to the success of the movie division. Most of Disney's product offerings are derived from their movie productions.	Debt should be a. Medium term b. Dollar debt.

There is plenty of room to be creative in this approach.

Look at firms which operate in each of these businesses and see what financing they use. That might be useful in designing the right kind of debt.

⌚ Application Test: Choosing your Financing Type

- Based upon the business that your firm is in, and the typical investments that it makes, what kind of financing would you expect your firm to use in terms of
 - Duration (long term or short term)
 - Currency
 - Fixed or Floating rate
 - Straight or Convertible

Based upon what a typical investment looks like, assess the right type of debt for your firm....

II. Project Specific Financing

- With project specific financing, you match the financing choices to the project being funded. The benefit is that the debt is truly customized to the project.
- Project specific financing makes the most sense when you have a few large, independent projects to be financed. It becomes both impractical and costly when firms have portfolios of projects with interdependent cashflows.

If you have large, stand alone projects, you can try to match the debt specifically to the project's characteristics. If you take lots of smaller projects, you will often find it less costly to finance a portfolio of projects rather than each project individually.

Duration of Disney Theme Park

Year	Annual Cashflow	Terminal Value	Present Value	Present value *
0	-\$2,000		-\$2,000	\$0
1	-\$1,000		-\$904	-\$904
2	-\$833		-\$680	-\$1,361
3	-\$224		-\$165	-\$496
4	\$417		\$278	\$1,112
5	\$559		\$337	\$1,684
6	\$614		\$334	\$2,006
7	\$658		\$324	\$2,265
8	\$726		\$323	\$2,582
9	\$802		\$322	\$2,899
10	\$837	\$9,857	\$3,882	\$38,821
			\$2,050	\$48,609
	Duration =	$48609/2050 = 23.71$ years		

We have used the projected cash flows on the Disney theme park to estimate the duration of the theme park.

This understates the duration,

Since cash flows are likely to drop if interest rates go up

Since we have arbitrarily estimated a terminal value at the end of year 9.

The perfect theme park debt...

- The perfect debt for this theme park would have a duration of roughly 23.71 years and be in a mix of Asian currencies, reflecting where the visitors to the park are coming from.
- If possible, you would tie the interest payments on the debt to the number of visitors at the park.

III. Firm-wide financing

Rather than look at individual projects, you could consider the firm to be a portfolio of projects. The firm's past history should then provide clues as to what type of debt makes the most sense. In particular, you can look at

1. Operating Cash Flows

- | The question of how sensitive a firm's asset cash flows are to a variety of factors, such as interest rates, inflation, currency rates and the economy, can be directly tested by regressing changes in the operating income against changes in these variables.
- | This analysis is useful in determining the coupon/interest payment structure of the debt.

2. Firm Value

- | The firm value is clearly a function of the level of operating income, but it also incorporates other factors such as expected growth & cost of capital.
- | The firm value analysis is useful in determining the overall structure of the debt, particularly maturity.

Each measures a different aspect of the firm.

The operating cash flows measure the year-to-year capacity of the firm to generate cash flows.

Firm value reflects current operating income, as well as the expected growth and the cost of capital.

Disney: Historical Data

<i>Period</i>	<i>Operating Income</i>	<i>Firm value</i>
2003	\$2,713	\$68,239
2002	\$2,384	\$53,708
2001	\$2,832	\$45,030
2000	\$2,525	\$47,717
1999	\$3,580	\$88,558
1998	\$3,843	\$65,487
1997	\$3,945	\$64,236
1996	\$3,024	\$65,489
1995	\$2,262	\$54,972
1994	\$1,804	\$33,071
1993	\$1,560	\$22,694
1992	\$1,287	\$25,048
1991	\$1,004	\$17,122
1990	\$1,287	\$14,963
1989	\$1,109	\$16,015
1988	\$789	\$9,195
1987	\$707	\$8,371
1986	\$281	\$5,631
1985	\$206	\$3,655
1984	\$143	\$2,024
1983	\$134	\$1,817
1982	\$141	\$2,108

Aswath Damodaran

396

Disney has changed considerably over time in terms of its business mix. For instance, in 1996, Disney acquired ABC.

The firm value is the market value of equity plus the book value of debt outstanding in each year. (I would have preferred to use market value of debt, but book value seems like a reasonable proxy)

In doing this table, we reverted back to reported EBIT, rather than using the adjusted EBIT that we have been working with so far.

The Macroeconomic Data

Period	T-Bond Rate	Change in rate	GDP (Deflated)	% Chg in GDP	CPI	Change in CPI	Weighted Dollar	% Change in \$
2003	4.29%	0.40%	10493	3.60%	2.04%	0.01%	88.82	-14.51%
2002	3.87%	-0.82%	10128	2.98%	2.03%	-0.10%	103.9	-3.47%
2001	4.73%	-1.20%	9835	-0.02%	2.13%	-1.27%	107.64	1.85%
2000	6.00%	0.30%	9837	3.53%	3.44%	0.86%	105.68	11.51%
1999	5.68%	-0.21%	9502	4.43%	2.56%	1.05%	94.77	-0.59%
1998	5.90%	-0.19%	9099	3.70%	1.49%	-0.65%	95.33	0.95%
1997	6.10%	-0.56%	8774	4.79%	2.15%	-0.82%	94.43	7.54%
1996	6.70%	0.49%	8373	3.97%	2.99%	0.18%	87.81	4.36%
1995	6.18%	-1.32%	8053	2.46%	2.81%	0.19%	84.14	-1.07%
1994	7.60%	2.11%	7860	4.30%	2.61%	-0.14%	85.05	-5.38%
1993	5.38%	-0.91%	7536	2.25%	2.75%	-0.44%	89.89	4.26%
1992	6.35%	-1.01%	7370	3.50%	3.20%	0.27%	86.22	-2.31%
1991	7.44%	-1.24%	7121	-0.14%	2.92%	-3.17%	88.26	4.55%
1990	8.79%	0.47%	7131	1.68%	6.29%	1.72%	84.42	-11.23%
1989	8.28%	-0.60%	7013	3.76%	4.49%	0.23%	95.10	4.17%
1988	8.93%	-0.60%	6759	4.10%	4.25%	-0.36%	91.29	-5.34%
1987	9.59%	2.02%	6493	3.19%	4.63%	3.11%	96.44	-8.59%
1986	7.42%	-2.58%	6292	3.11%	1.47%	-1.70%	105.50	-15.30%
1985	10.27%	-1.11%	6102	3.39%	3.23%	-0.64%	124.56	-10.36%
1984	11.51%	-0.26%	5902	4.18%	3.90%	-0.05%	138.96	8.01%
1983	11.80%	1.20%	5665	6.72%	3.95%	-0.05%	128.65	4.47%
1982	10.47%	-3.08%	5308	-1.61%	4%	-4.50%	123.14	6.48%

This would apply to any firm that we would analyze over this time period.

I. Sensitivity to Interest Rate Changes

- How sensitive is the firm's value and operating income to changes in the level of interest rates?
- The answer to this question is important because it
 - it provides a measure of the duration of the firm's projects
 - it provides insight into whether the firm should be using fixed or floating rate debt.

How much has firm value changed for a given change in interest rates?

Firm Value versus Interest Rate Changes

- Regressing changes in firm value against changes in interest rates over this period yields the following regression –

$$\text{Change in Firm Value} = 0.2081 \quad - 4.16 (\text{Change in Interest Rates}) \\ (2.91) \quad (0.75)$$

T statistics are in brackets.

- The coefficient on the regression (-4.16) measures how much the value of Disney as a firm changes for a unit change in interest rates.

These regressions tend to be noisy, even for firms with substantial historical data. Industry-average coefficients might provide more reliable estimates (just as sector betas are often better than firm-specific betas)

Why the coefficient on the regression is duration..

- The duration of a straight bond or loan issued by a company can be written in terms of the coupons (interest payments) on the bond (loan) and the face value of the bond to be –

$$\text{Duration of Bond} = \frac{dP/P}{dr} = \frac{\sum_{t=1}^{T-N} \frac{t * \text{Coupon}_t}{(1+r)^t} + \frac{N * \text{Face Value}}{(1+r)^N}}{\sum_{t=1}^{T-N} \frac{\text{Coupon}_t}{(1+r)^t} + \frac{\text{Face Value}}{(1+r)^N}}$$

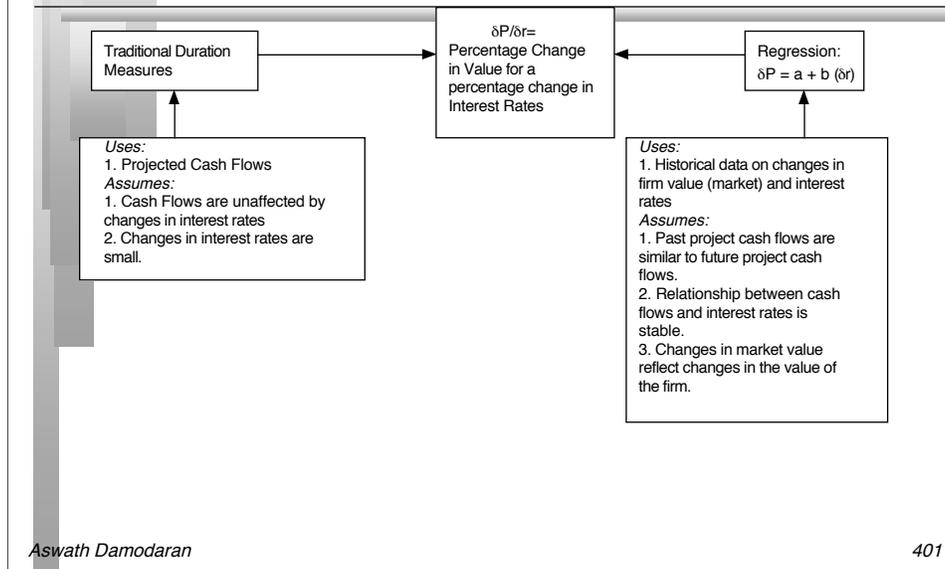
- The duration of a bond measures how much the price of the bond changes for a unit change in interest rates.
- Holding other factors constant, the duration of a bond will increase with the maturity of the bond, and decrease with the coupon rate on the bond.

This is a traditional Macaulay duration. It is a measure of the percentage change in the bond price for a 1% change in interest rates.

Equivalently, it can be viewed as the maturity of a zero-coupon bond with the same sensitivity to interest rate changes.

Note, in the regression on the previous page, the coefficient on the change in interest rates, measures the percentage change in firm value for a 1% change in interest rates. Thus, the regression coefficient also measures duration.

Duration: Comparing Approaches



It is very difficult to estimate Macaulay Duration on a project-by-project basis for all the projects that a firm has.

It is much easier to run the regression, but the results are likely to be noisy and affected by whether the firm's business mix has changed over time.

This leaves us with

The intuitive analysis that preceded this section

Industry average duration numbers, which can be used for any firm in that industry

Operating Income versus Interest Rates

- Regressing changes in operating cash flow against changes in interest rates over this period yields the following regression –
Change in Operating Income = 0.2189 + 6.59 (Change in Interest Rates)
(2.74) (1.06)
 - Conclusion: Disney's operating income,un like its firm value, has moved with interest rates.
- Generally speaking, the operating cash flows are smoothed out more than the value and hence will exhibit lower duration that the firm value.

This measures the effect of interest rates on operating income. Firm value will be affected more because discount rates tend to also go up when interest rates increase.

II. Sensitivity to Changes in GDP/ GNP

- How sensitive is the firm's value and operating income to changes in the GNP/GDP?
- The answer to this question is important because
 - it provides insight into whether the firm's cash flows are cyclical and
 - whether the cash flows on the firm's debt should be designed to protect against cyclical factors.
- If the cash flows and firm value are sensitive to movements in the economy, the firm will either have to issue less debt overall, or add special features to the debt to tie cash flows on the debt to the firm's cash flows.

Is the firm a cyclical firm?

Regression Results

- Regressing changes in firm value against changes in the GDP over this period yields the following regression –

$$\text{Change in Firm Value} = 0.2165 + 0.26 (\text{GDP Growth})$$

(1.56) (0.07)

- Conclusion: Disney is not very sensitive to economic growth

- Regressing changes in operating cash flow against changes in GDP over this period yields the following regression –

$$\text{Change in Operating Income} = 0.1725 + 0.66 (\text{GDP Growth})$$

(1.10) (0.15)

- Conclusion: Disney's operating income is not sensitive to economic growth either.

Note that neither of the t statistics on the GNP variable is statistically significant. Disney is not a cyclical firm.

III. Sensitivity to Currency Changes

- How sensitive is the firm's value and operating income to changes in exchange rates?
- The answer to this question is important, because
 - it provides a measure of how sensitive cash flows and firm value are to changes in the currency
 - it provides guidance on whether the firm should issue debt in another currency that it may be exposed to.
- If cash flows and firm value are sensitive to changes in the dollar, the firm should
 - figure out which currency its cash flows are in;
 - and issued some debt in that currency

Again, we are assuming that the historical exposure of earnings and firm value to currencies is a good measure of future exposure.

Regression Results

- Regressing changes in firm value against changes in the dollar over this period yields the following regression –

$$\begin{array}{rcl} \text{Change in Firm Value} = & 0.2060 & -2.04 \text{ (Change in Dollar)} \\ & (3.40) & (2.52) \end{array}$$

- Conclusion: Disney's value is sensitive to exchange rate changes, decreasing as the dollar strengthens.

- Regressing changes in operating cash flow against changes in the dollar over this period yields the following regression –

$$\begin{array}{rcl} \text{Change in Operating Income} = & 0.1768 & -1.76 \text{ (Change in Dollar)} \\ & (2.42) & (1.81) \end{array}$$

- Conclusion: Disney's operating income is also impacted by the dollar. A stronger dollar seems to hurt operating income.

The negative effect of the stronger dollar on operating income might reflect the revenues that Disney gets from tourists at its theme parks. These tourists are less likely to visit the theme parks when the dollar is stronger.

The effect is muted on firm value. It is possible that a stronger dollar has an offsetting effect on discount rates (A stronger dollar might translate into lower interest rates)

IV. Sensitivity to Inflation

- How sensitive is the firm's value and operating income to changes in the inflation rate?
- The answer to this question is important, because
 - it provides a measure of whether cash flows are positively or negatively impacted by inflation.
 - it then helps in the design of debt; whether the debt should be fixed or floating rate debt.
- If cash flows move with inflation, increasing (decreasing) as inflation increases (decreases), the debt should have a larger floating rate component.

On floating rate debt, interest expenses tend to increase as market interest rates increase. We are assuming that year-to-year changes in interest rates are driven primarily by changes in inflation.

Regression Results

- Regressing changes in firm value against changes in inflation over this period yields the following regression –

$$\begin{array}{rcl} \text{Change in Firm Value} = & 0.2262 & + 0.57 (\text{Change in Inflation Rate}) \\ & (3.22) & (0.13) \end{array}$$

Conclusion: Disney's firm value does not seem to be affected too much by changes in the inflation rate.

- Regressing changes in operating cash flow against changes in inflation over this period yields the following regression –

$$\begin{array}{rcl} \text{Change in Operating Income} = & 0.2192 & + 9.27 (\text{Change in Inflation Rate}) \\ & (3.01) & (1.95) \end{array}$$

Conclusion: Disney's operating income seems to increase in periods when inflation increases. However, this increase in operating income seems to be offset by the increase in discount rates leading to a much more muted effect on value.

Operating income tends to move with inflation, but firm value does not. (This is not surprising, if cashflow effects and discount rate effects cancel out)

I would weigh the operating income regression more in determining whether to use floating rate or fixed rate debt, since the cash flows each year go towards paying the coupons.

Summarizing...

- Looking at the four macroeconomic regressions, we would conclude that
 - Disney's assets have a duration of 4.17 years
 - Disney is not a cyclical firm
 - Disney is hurt by a stronger dollar
 - Disney's operating income tends to move with inflation
- All of the regression coefficients have substantial standard errors associated with them. One way to reduce the error (a la bottom up betas) is to use sector-wide averages for each of the coefficients.

Bottom-up Estimates

	Coefficients on firm value regression				Disney Weights
	Interest Rate s	GDP Growth	Inflation	Currency	
Movie s	-3.70	0.56	1.41	-1.23	25.62%
Theme Parks	-6.47	0.22	-1.45	-3.21	20.09%
Broadcasting	-4.50	0.70	-3.05	-1.58	49.25%
Consumer Products	-4.88	0.13	-5.51	-3.01	5.04%
Disney	-4.71	0.54	-1.71	-1.89	100%

Since the standard errors on the regression estimates are so high, this alternative may yield more precise estimates of the each of the coefficients.

Recommendations for Disney

- The debt issued should be long term and should have duration of between 4 and 5 years.
- A significant portion of the debt should be floating rate debt, reflecting Disney's capacity to pass inflation through to its customers and the fact that operating income tends to increase as interest rates go up.
- Given Disney's sensitivity to a stronger dollar, a portion of the debt should be in foreign currencies. The specific currency used and the magnitude of the foreign currency debt should reflect where Disney makes its revenues. Based upon 2003 numbers at least, this would indicate that about 20% of the debt should be in Euros and about 10% of the debt in Japanese Yen reflecting Disney's larger exposures in Europe and Asia. As its broadcasting businesses expand into Latin America, it may want to consider using either Mexican Peso or Brazilian Real debt as well.

Analyzing Disney's Current Debt

- Disney has \$13.1 billion in debt with an average maturity of 11.53 years. Even allowing for the fact that the maturity of debt is higher than the duration, this would indicate that Disney's debt is far too long term for its existing business mix.
- Of the debt, about 12% is Euro debt and no yen denominated debt. Based upon our analysis, a larger portion of Disney's debt should be in foreign currencies.
- Disney has about \$1.3 billion in convertible debt and some floating rate debt, though no information is provided on its magnitude. If floating rate debt is a relatively small portion of existing debt, our analysis would indicate that Disney should be using more of it.

There may be good reasons for the mismatch but for most firms, the existing debt structure is more a result of history and inertia. Disney's business mix has changed significantly over the last decade - more broadcasting, less theme park - and it is not surprising that the debt structure has not kept pace.

In some cases, market frictions and limitations may contribute to the mismatch. In fact, many emerging market companies were unable to borrow long term until recently because banks would not lend long term in those markets.

Adjusting Debt at Disney

- It can swap some of its existing long term, fixed rate, dollar debt with shorter term, floating rate, foreign currency debt. Given Disney's standing in financial markets and its large market capitalization, this should not be difficult to do.
- If Disney is planning new debt issues, either to get to a higher debt ratio or to fund new investments, it can use primarily short term, floating rate, foreign currency debt to fund these new investments. While it may be mismatching the funding on these investments, its debt matching will become better at the company level.

Disney's large size and access to capital markets give it lots of options. Smaller firms and emerging market firms will have fewer options. In the extreme scenario, it may take more time to adjust the debt.

Returning Cash to the Owners: Dividend Policy

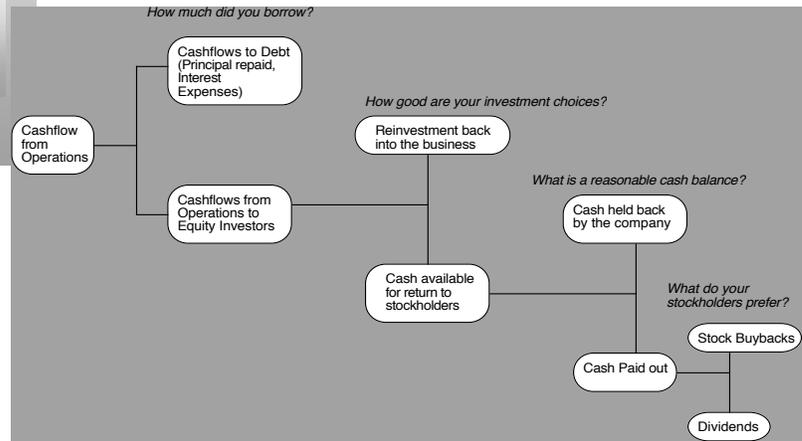
First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Objective: Maximize the Value of the Firm

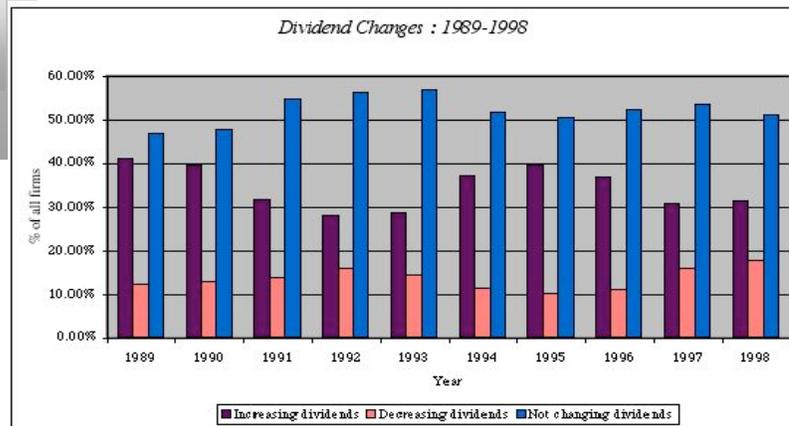
Third and final principle of corporate finance.

Steps to the Dividend Decision...



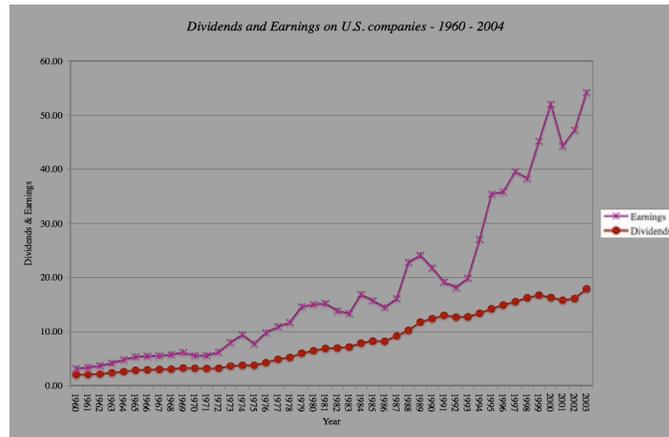
Dividend policy is affected by investment and financing decisions....

I. Dividends are sticky



Most companies in most years pay out what they did last year as dividends.
Among firms that change dividends, increases are more common than decreases.

II. Dividends tend to follow earnings

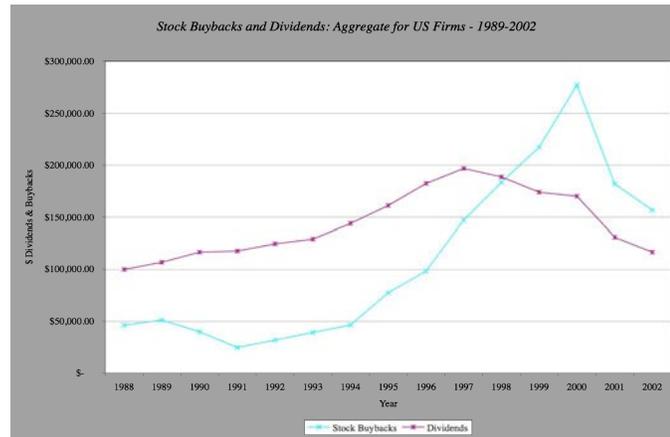


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418

Dividends tend to follow earnings. They don't lead them and they are not contemporaneous. In other words, don't expect a company to pay out more in dividends if their earnings go up... If earnings go up two years in a row, maybe.. Three years in a row and the odds increase.

III. More and more firms are buying back stock, rather than pay dividends...



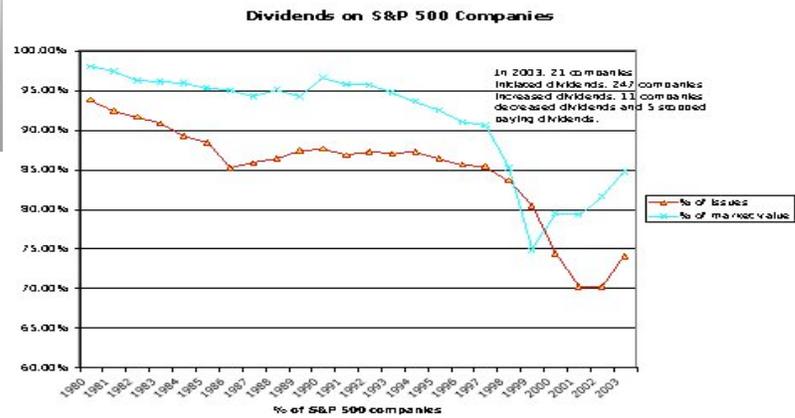
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419

This trend accelerated through the 1990s. It can be partially explained by

1. An increase in the volatility of earnings at all companies, making dividends much more difficult to maintain
2. An increasing proportion of investors who invested primarily for capital gains
3. Managers being compensated with options like stock buybacks more than dividends since the latter leads to lower stock prices.

IV. But the change in dividend tax law in 2003 may cause a shift back to dividends



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420

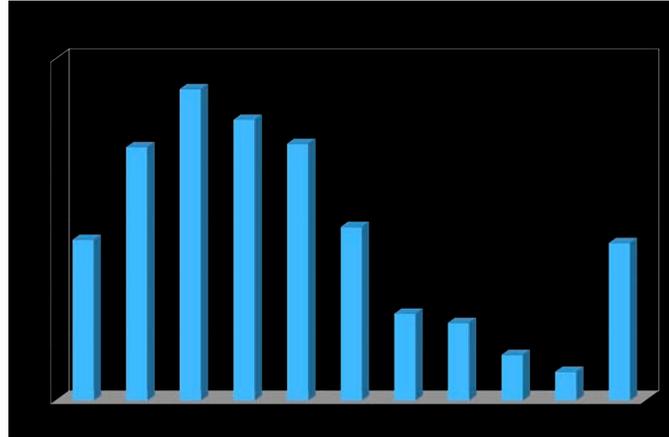
A seismic shift in the tax law in 2003. For the first time, dividends are taxed at the same rate as capital gains.... Firms are responding with higher dividends.

Measures of Dividend Policy

- Dividend Payout:
 - measures the percentage of earnings that the company pays in dividends
 - = Dividends / Earnings
- Dividend Yield :
 - measures the return that an investor can make from dividends alone
 - = Dividends / Stock Price

These are the two most common measures of dividend. They both focus on traditional dividends, and could be modified to include stock buybacks.

Dividend Payout Ratios: January 2005

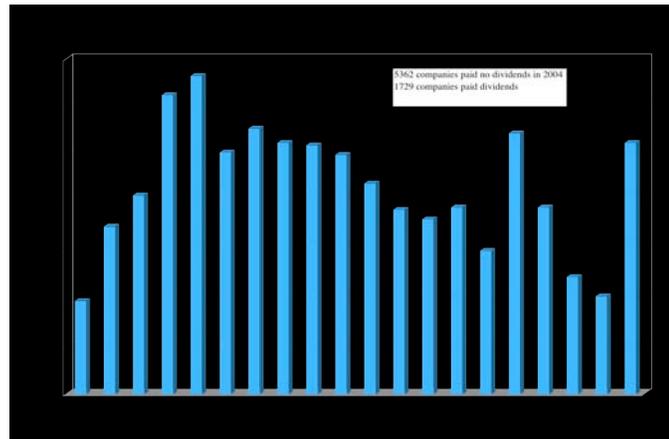


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422

The median payout ratio is between 30 and 40% for firms that pay dividends. More firms, however, do not pay dividends than do pay dividends. The trend in the number of non-dividend paying firms has been upwards.

Dividend Yields in the United States: January 2005



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423

Here again, there is a trend. Over the last two decades, the dividend yield for U.S. firms has decreased across the board.

Three Schools Of Thought On Dividends

- 1. If
 - (a) there are no tax disadvantages associated with dividends
 - (b) companies can issue stock, at no cost, to raise equity, whenever needed
 - **Dividends do not matter, and dividend policy does not affect value.**
- 2. If dividends have a tax disadvantage,
 - **Dividends are bad, and increasing dividends will reduce value**
- 3. If stockholders like dividends, or dividends operate as a signal of future prospects,
 - **Dividends are good, and increasing dividends will increase value**

Note that the schools span the spectrum. Firms which increase, decrease or do nothing on dividends can all find something in one of these schools to justify their actions.

The balanced viewpoint

- If a company has excess cash, and few good investment opportunities ($NPV > 0$), returning money to stockholders (dividends or stock repurchases) is good.
- If a company does not have excess cash, and/or has several good investment opportunities ($NPV > 0$), returning money to stockholders (dividends or stock repurchases) is bad.

These propositions are really not about dividends, but about returning cash to the owners of the business. Firms which want to return money to stockholders can buy back stock or pay dividends.

Why do firms pay dividends?

- The Miller-Modigliani Hypothesis: **Dividends do not affect value**

- Basis:

- If a firm's investment policy (and hence cash flows) don't change, the value of the firm cannot change with dividend policy. If we ignore personal taxes, investors have to be indifferent to receiving either dividends or capital gains.

- Underlying Assumptions:

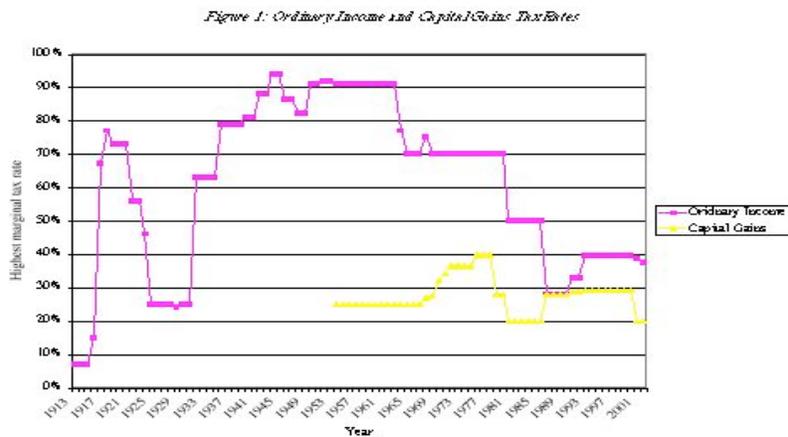
- (a) There are no tax differences between dividends and capital gains.
- (b) If companies pay too much in cash, they can issue new stock, with no flotation costs or signaling consequences, to replace this cash.
- (c) If companies pay too little in dividends, they do not use the excess cash for bad projects or acquisitions.

This summarizes the MM argument for why dividend policy is irrelevant.

Generally, firms that pay too much in dividends lose value because they cannot take value-creating projects that they should. In the MM world, this cost is eliminated by assuming that these firms can raise the capital (with no transactions costs and no frictions) to take these projects.

Investors who receive dividends often face a much larger tax bill than investors who get capital gains. This is eliminated by assuming that there are no tax disadvantages associated with dividends.

The Classic Tax Response: Until 2003, dividends were taxed much more heavily than capital gains...



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427

This has generally been true in the United States, but is not always the case in other markets. For instance, in the UK, where investors are allowed to offset the corporate tax paid on dividends against their taxes, dividends may have a tax advantage for some investors over capital gains.

There are several markets where capital gains are not taxed at all.

Gauging the tax effect by looking at Price Behavior on Ex-Dividend Date

Let P_b = Price before the stock goes ex-dividend

P_a = Price after the stock goes ex-dividend

D = Dividends declared on stock

t_o, t_{cg} = Taxes paid on ordinary income and capital gains respectively



Assume that we are looking at a market, where every investor in this stock bought this stock 3 years ago (to allow it to qualify for capital gains) at a price “ P ”.

Each investor is now assumed to face a decision of whether to sell before the ex-dividend day and get P_b (and give up the dividend) or sell after and get P_a and receive the dividend.

Cashflows from Selling around Ex-Dividend Day

- The cash flows from selling before then are-

$$P_b - (P_b - P) t_{cg}$$

- The cash flows from selling after the ex-dividend day are-

$$P_a - (P_a - P) t_{cg} + D(1-t_o)$$

Since the average investor should be indifferent between selling before the ex-dividend day and selling after the ex-dividend day -

$$P_b - (P_b - P) t_{cg} = P_a - (P_a - P) t_{cg} + D(1-t_o)$$

Moving the variables around, we arrive at the following:

For this market to be stable, the cash flow from selling before has to be equal to the cash flow from selling after for most of the investors in this firm (or for the median investor).

If, for instance, the cash flow from selling before was greater than the cash flow from selling after for the median investor, the market would collapse, with every one selling before the ex-dividend day.

If the cash flow from selling after was greater for the median investor, every one would hold through the ex-dividend day and sell after.

Differences in tax status will mean, however, that there are profit opportunities for investors whose tax status is very different from that of the median investor.

Price Change, Dividends and Tax Rates

$$\frac{P_b - P_a}{D} = \frac{(1 - t_o)}{(1 - t_{cg})}$$

If $P_b - P_a = D$ then $t_o = t_{cg}$
If $P_b - P_a < D$ then $t_o > t_{cg}$
If $P_b - P_a > D$ then $t_o < t_{cg}$

This equality has to hold, in equilibrium, for the median investor in the firm to be indifferent between selling before and selling after.

By looking at price behavior on ex-dividend days, we should be able to get a snap shot of what differential tax rate investors in this stock, on average, face on dividends as opposed to capital gains.

If the price drop is much smaller than the dividend, the median investor, it can be argued, faces a tax rate on dividends that is higher than the tax rate on capital gains.

If it is equal, the median investor faces the same tax rate on both (or does not pay taxes at all)

If the price drop is greater than the dividend, the median investor pays more taxes on capital gains than he or she does on dividends.

The Evidence on Ex-Dividend Day Behavior

	<i>Ordinary Income</i>	<i>Capital Gains</i>	$(P_b - P_d) / D$
Before 1981	70 %	28 %	0.78 (1966-69)
1981-85	50 %	20 %	0.85
1986-1990	28 %	28 %	0.90
1991-1993	33 %	28 %	0.92
1994.	39.6 %	28 %	0.90

As the difference in marginal tax rates has narrowed from what it used be prior to 1981, the trend in the ex-dividend day measure has been towards one. This may also reflect the greater role played by pension funds (which are tax exempt) in the process.

Note, though, that even in the 1986-90 time period, when dividends and capital gains were taxed at the same rate, the ratio did not converge on one. This indicates that the timing option (you choose when to take capital gains and you have none on dividends) will make dividends less attractive than capital gains even when the tax rates are the same

Source:

1966-69: Elton and Gruber

Later periods: From CRSP and COMPUSTAT, looking at only dividend paying stocks.

Dividend Arbitrage

- Assume that you are a tax exempt investor, and that you know that the price drop on the ex-dividend day is only 90% of the dividend. How would you exploit this differential?
- Invest in the stock for the long term
- Sell short the day before the ex-dividend day, buy on the ex-dividend day
- Buy just before the ex-dividend day, and sell after.
- _____

I would buy just before the ex-dividend day and sell after.

Example of dividend capture strategy with tax factors

- XYZ company is selling for \$50 at close of trading May 3. On May 4, XYZ goes ex-dividend; the dividend amount is \$1. The price drop (from past examination of the data) is only 90% of the dividend amount.
- The transactions needed by a tax-exempt U.S. pension fund for the arbitrage are as follows:
 - 1. Buy 1 million shares of XYZ stock cum-dividend at \$50/share.
 - 2. Wait till stock goes ex-dividend; Sell stock for \$49.10/share ($50 - 1 * 0.90$)
 - 3. Collect dividend on stock.
- Net profit = - 50 million + 49.10 million + 1 million = \$0.10 million

Note that this is before transactions costs and is exposed to the risk that the market might be down sharply on the day of the transaction.

To reduce these effects, successful dividend capture requires that it be done in large quantities (to reduce the transactions costs) and across a large number of stocks and ex-dividend days (to reduce the market risk)

The wrong reasons for paying dividends

1. The bird in the hand fallacy

- **Argument:** Dividends now are more certain than capital gains later. Hence dividends are more valuable than capital gains.
- **Counter:** The appropriate comparison should be between dividends today and price appreciation today. (The stock price drops on the ex-dividend day.)

When dividends are compared to the stock price drop that occurs on the ex-dividend day, this fallacy is exposed. At that point in time, the investor has a choice between receiving the dividends or cashing out on the stock (and getting the higher price).

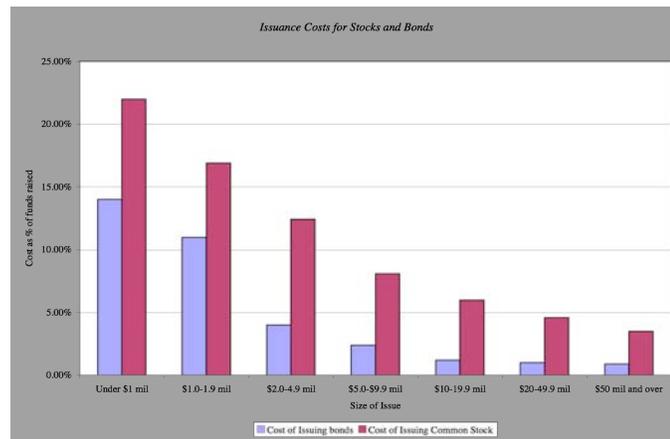
2. We have excess cash this year...

- **Argument:** The firm has excess cash on its hands this year, no investment projects this year and wants to give the money back to stockholders.
- **Counter:** So why not just repurchase stock? If this is a one-time phenomenon, the firm has to consider future financing needs. Consider the cost of issuing new stock:

Excess cash might be a temporary phenomenon. To initiate dividends with the cash will create the expectation that the firm will continue to pay those dividends, which might be unsustainable.

Stock buybacks provide more flexibility in terms of future actions.

The Cost of Raising Capital



Aswath Damodaran

436

If a small firm has excess cash and is uncertain about its future investment needs, it is prudent to hold the cash rather than return it to its stockholders.

Larger firms with more access to capital markets should be more inclined to use the cash to buy back stock.

Are firms perverse to pay dividends?

In the case of Citizen's Utility (studied by John Long), investors had a clear choice. They could buy

- Class A shares, which paid a cash dividend in each period

- Class B shares, which paid an equivalent stock dividend, but could be converted into class A shares (thus providing an equivalent capital gain)

Class A shares, given the tax argument, should sell for less than class B shares. In reality, they sold at a premium. No obvious reasons were found, including transactions cost or liquidity differences. At least for this stock, investors seemed to like the cash dividends and were willing to pay a premium for them.

Evidence from Canadian Firms

<i>Company</i>	<i>Premium for Cash dividend over Stock Dividend Shares</i>
Consolidated Bathurst	19.30%
Danfasco	13.30%
Dome Petroleum	0.30%
Imperial Oil	12.10%
Newfoundland Light & Power	1.80%
Royal Trustco	17.30%
Stelco	2.70%
TransAlta	1.10%
Average	7.54%

The same phenomenon seems to apply to these Canadian utilities, with cash dividend and capital gain shares, that were studied by Bailey a few years ago.

A clientele based explanation

- **Basis:** Investors may form clienteles based upon their tax brackets. Investors in high tax brackets may invest in stocks which do not pay dividends and those in low tax brackets may invest in dividend paying stocks.
- **Evidence:** A study of 914 investors' portfolios was carried out to see if their portfolio positions were affected by their tax brackets. The study found that
 - (a) Older investors were more likely to hold high dividend stocks and
 - (b) Poorer investors tended to hold high dividend stocks

Investors buy stock in companies which have dividend policies that they like. This self-selection process creates dividend clienteles that each firm caters to. As long as there are sufficient investors in each clientele, having a high dividend or no dividend, by itself, should not affect value.

If an imbalance occurs between supply and demand in any clientele, there can be an effect on stock prices.

Results from Regression: Clientele Effect

$$\text{Dividend Yield}_t = a + b \beta_t + c \text{Age}_t + d \text{Income}_t + e \text{Differential Tax Rate}_t + \varepsilon_t$$

Variable	Coefficient	Implies
Constant	4.22%	
Beta Coefficient	-2.145	Higher beta stocks pay lower dividends.
Age/100	3.131	Firms with older investors pay higher dividends.
Income/1000	-3.726	Firms with wealthier investors pay lower dividends.
Differential Tax Rate	-2.849	If ordinary income is taxed at a higher rate than capital gains, the firm pays less dividends.

This is evidence of investors picking stocks based upon their tax status. Low income, older investors tend to buy safer stocks with higher dividends, and this behavior is accentuated when the difference in tax rates between dividends and capital gains increases.

Dividend Policy and Clientele

- Assume that you run a phone company, and that you have historically paid large dividends. You are now planning to enter the telecommunications and media markets. Which of the following paths are you most likely to follow?
- Courageously announce to your stockholders that you plan to cut dividends and invest in the new markets.
- Continue to pay the dividends that you used to, and defer investment in the new markets.
- Continue to pay the dividends that you used to, make the investments in the new markets, and issue new stock to cover the shortfall
- Other

Given that the dividend clientele that I have attracted is unlikely to be swayed by my arguments about my investment needs, I would try to spin off my media division and allow it to set a dividend policy very different from mine. In the spin off, investors who would prefer the capital gains will hold on to the media division shares and those who want the dividends will continue to hold the phone company shares.

AT&T did something similar when it finally split itself into Lucent (that pays little in dividends), NCR (that pays a small dividend) and AT&T (which pays a high dividend).

Increases in dividends are signals... of good news..

A firm which announces an increase in dividends is sending a signal that it expects future cash flows to be strong enough to sustain this dividend. This allows it to set itself apart from other firms, which might say they have great prospects but do not have the confidence in them to raise dividends.

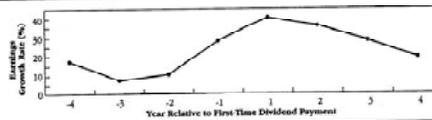
Given how reluctant firms are to cut dividends, the act of cutting dividends is viewed by the market as a signal that the firm is in far worse trouble than they thought. (Note how much larger the stock price drop on a dividend decrease is than the stock price increase on a dividend increase.)

An Alternative Story..Dividends as Negative Signals

Year Relative to Dividend Initiation	Number of Firms	Mean Earnings Growth Rate	Median Earnings Growth Rate
-4	150	14.9%	17.4%
-3	139	-7.1	7.6
-2	128	12.9	10.5
-1	151	42.7**	28.0
1	150	55.0**	40.2
2	150	22.0**	35.9
3	150	35.0**	28.2
4	128	3.5	19.5

* In our original research we compare earnings performance as earnings changes standardized by stock prices. Here we convert these values to earnings growth rates by assuming that the average price-earnings ratio for the sample firms is ten.
 ** Significantly different from zero at the 10% level or lower.

FIGURE 1
 MEDIAN EARNINGS GROWTH RATES IN YEARS SURROUNDING FIRST TIME DIVIDEND PAYMENTS*

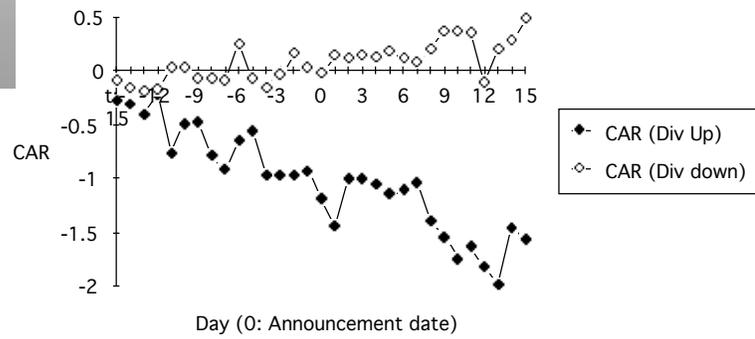


* In our original research we compare earnings performance as earnings changes standardized by stock prices. Here we convert these values to earnings growth rates by assuming that the average price-earnings ratio for the sample firms is ten.

The flip side. A firm that increases or initiates dividends might be signaling that it is running out of investment opportunities. Note that earnings growth peaks around the period when dividends are initiated.

The Wealth Transfer Hypothesis

EXCESS RETURNS ON STRAIGHT BONDS AROUND DIVIDEND CHANGES



Bondholders view dividend increases as bad news. It makes the bonds much riskier. To the extent that the dividend increase was unanticipated and was not built into interest rate, this transfers wealth from bondholders to stockholders.

Tools for Assessing Dividend Policy

Aswath Damodaran

Assessing Dividend Policy

- Approach 1: The Cash/Trust Nexus
 - Assess how much cash a firm has available to pay in dividends, relative what it returns to stockholders. Evaluate whether you can trust the managers of the company as custodians of your cash.
- Approach 2: Peer Group Analysis
 - Pick a dividend policy for your company that makes it comparable to other firms in its peer group.

Two very different approaches to assessing dividend policy. The first is more comprehensive but the second is simpler.

I. The Cash/Trust Assessment

- Step 1: How much could the company have paid out during the period under question?
- Step 2: How much did the the company actually pay out during the period in question?
- Step 3: How much do I trust the management of this company with excess cash?
 - How well did they make investments during the period in question?
 - How well has my stock performed during the period in question?

By paid out to stockholders in this phase of the analysis, we mean both dividends and stock buybacks.

A Measure of How Much a Company Could have Afforded to Pay out: FCFE

- The Free Cashflow to Equity (FCFE) is a measure of how much cash is left in the business after non-equity claimholders (debt and preferred stock) have been paid, and after any reinvestment needed to sustain the firm's assets and future growth.

Net Income

- + Depreciation & Amortization
- = Cash flows from Operations to Equity Investors
- Preferred Dividends
- Capital Expenditures
- Working Capital Needs
- Principal Repayments
- + Proceeds from New Debt Issues
- = Free Cash flow to Equity

This cashflow is

Free: because it cashflow left over after debt payments and investment needs have been met

To Equity Investors: because it is after payments to all non-equity claimholders

In coming up with the numbers, we define

Capital expenditures as including all capital investments. We do not distinguish between discretionary and non-discretionary cap ex. Once we assume growth in earnings, all cap ex is non-discretionary.

Working capital needs refers to the increase in non-cash working capital.

Estimating FCFE when Leverage is Stable

Net Income

- $(1 - \delta)$ (Capital Expenditures - Depreciation)

- $(1 - \delta)$ Working Capital Needs

= Free Cash flow to Equity

δ = Debt/Capital Ratio

For this firm,

- Proceeds from new debt issues = Principal Repayments + δ (Capital Expenditures - Depreciation + Working Capital Needs)

When leverage is stable,

All principal repayments will come from new debt issues (since repaying them with equity will lower the debt ratio)

New external financing needs [Cap Ex - Depreciation + Change in non-cash working capital] have to be financed using the desired debt ratio

Adding the two together:

New Debt Issues = Principal Repayments + δ (Cap Ex - Depreciation + Change in Non-cash Working Capital)

Substituting back into the FCFE equation on the previous page in the case where there is no preferred dividend, we arrive at this formula. If there are preferred dividends, they will be subtracted out to get to the FCFE.

An Example: FCFE Calculation

- Consider the following inputs for Microsoft in 1996. In 1996, Microsoft's FCFE was:

- Net Income = \$2,176 Million
- Capital Expenditures = \$494 Million
- Depreciation = \$ 480 Million
- Change in Non-Cash Working Capital = \$ 35 Million
- Debt Ratio = 0%

- $$\begin{aligned} \text{FCFE} &= \text{Net Income} - (\text{Cap ex} - \text{Depr}) (1 - \text{DR}) - \text{Chg WC} (1 - \text{DR}) \\ &= \$ 2,176 \quad - (494 - 480) (1 - 0) \quad - \$ 35 (1 - 0) \\ &= \$ 2,127 \text{ Million} \end{aligned}$$

Note that Microsoft has almost no net cap ex. That is because their biggest reinvestment expenditure is R&D, which is expensed to arrive at net income.

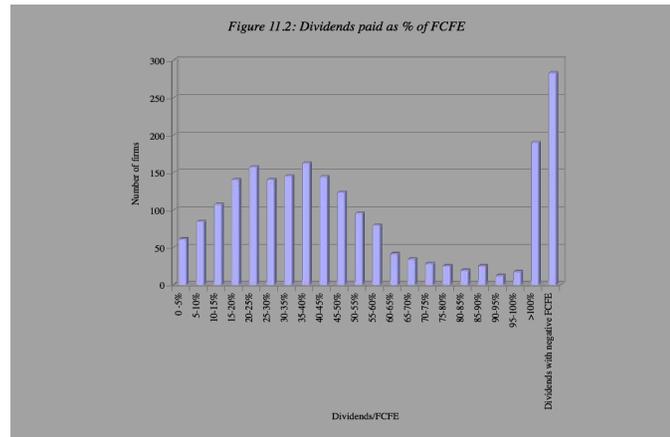
Microsoft: Dividends?

- By this estimation, Microsoft could have paid \$ 2,127 Million in dividends/stock buybacks in 1996. They paid no dividends and bought back no stock. Where will the \$2,127 million show up in Microsoft's balance sheet?

It will show up in the cash balance. (The more common answer, which is retained earnings, focuses on the wrong side of the balance sheet.) This excess cash cannot be going into projects (since it is after cap ex) or R&D (since net income is after R&D). Microsoft's cash balance at the end of 1996 was \$ 8 billion.

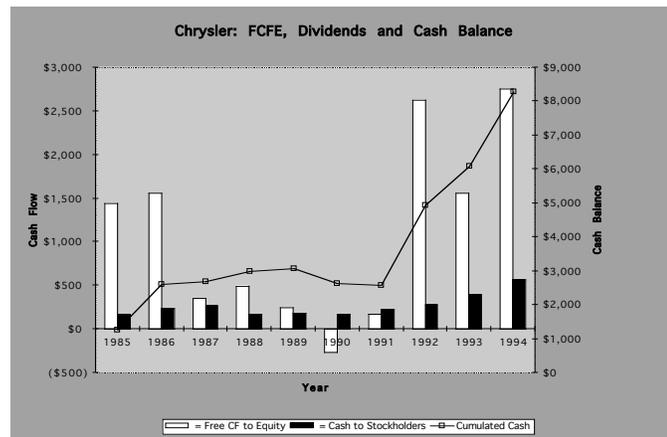
Microsoft kept doing this (paying out little or no dividends while generating billions in FCFE) through 2003, accumulating a cash balance of \$ 43 billion by the end of that year. Finally, in 2004, Microsoft paid a huge dividend (of \$ 5 billion).

Dividends versus FCFE: U.S.



Most firms pay less in dividends than they have available in FCFE. In recent years, however, many of them have supplemented dividends with stock buybacks, which return the cash, at irregular intervals, back to stockholders.

The Consequences of Failing to pay FCFE



Aswath Damodaran

453

This shows the accumulation of a large cash balance at Chrysler. Starting with a zero cash balance in 1985, I added back the difference between FCFE and dividends each year to the cash balance. In the last few years, that difference has led to an accumulation in cash.

This large cash balance, of course, was what triggered the attempt by Kirk Kirkorian to take over Chrysler. While he failed, he did put sufficient pressure on Chrysler to force them to increase dividends and buy back stock.

Note that while Chrysler has argued that it needs a large cash balance as a buffer against the next recession, it used up only \$ 0.5 billion during the 1990-91 recession.

⌚ Application Test: Estimating your firm's FCFE

In General,

Net Income
+ Depreciation & Amortization
- Capital Expenditures
- Change in Non-Cash Working Capital
- Preferred Dividend
- Principal Repaid
+ New Debt Issued

= FCFE

Compare to

Dividends (Common)
+ Stock Buybacks

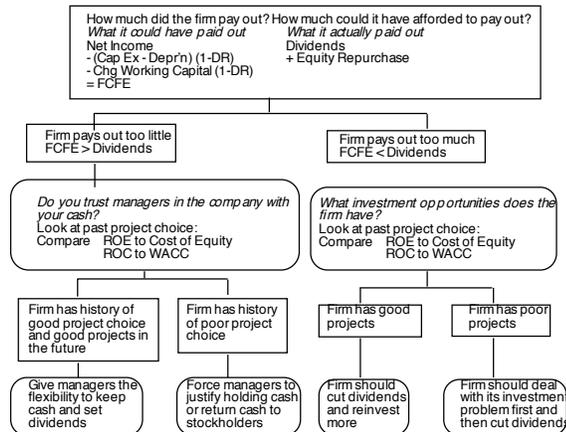
If cash flow statement used

Net Income
+ Depreciation & Amortization
+ Capital Expenditures
+ Changes in Non-cash WC
+ Preferred Dividend
+ Increase in LT Borrowing
+ Decrease in LT Borrowing
+ Change in ST Borrowing
= FCFE

-Common Dividend
- Decrease in Capital Stock
+ Increase in Capital Stock

Estimate the firm's FCFE and compare to how much it returned to stockholders.

A Practical Framework for Analyzing Dividend Policy



Aswath Damodaran

455

Most firms return less in cash than they have available to return. Whether they will find themselves under pressure (like Chrysler) or relatively untouched (like Microsoft) will depend upon how much stockholders trust the managers of the firm to use the cash wisely.

Stockholders will tend to be less aggressive about demanding that the cash be returned to them for firms

With a good investment track record

In a sector with high returns

Where managers have substantial equity stakes in the firm

They will tend to be most aggressive when these conditions do not hold.

A Dividend Matrix

		Quality of projects taken: ROE versus Cost of Equity	
		Poor projects	Good projects
Dividends paid out relative to FCFE Cash Surplus	Cash Surplus	<i>Cash Surplus + Poor Projects</i> Significant pressure to pay out more to stockholders as dividends or stock buybacks	<i>Cash Surplus + Good Projects</i> Maximum flexibility in setting dividend policy
	Cash Deficit	<i>Cash Deficit + Poor Projects</i> Cut out dividends but real problem is in investment policy.	<i>Cash Deficit + Good Projects</i> Reduce cash payout, if any, to stockholders

The freedom that a company will have with dividend policy is directly proportional to its history in delivering high returns both on projects and to its stockholders.

More on Microsoft

- As we noted earlier, Microsoft had accumulated a cash balance of \$ 43 billion by 2003 by paying out no dividends while generating huge FCFE. At the end of 2003, there was no evidence that
 - Microsoft was being penalized for holding such a large cash balance
 - Stockholders were becoming restive about the cash balance. There was no hue and cry demanding more dividends or stock buybacks.
- Why?

During that period, Microsoft also generated extraordinary returns on the projects its took ($ROE > \text{cost of equity}$ by more than 10%) and good returns for its stockholders (Jensen's alpha $> 10\%$).... Stockholders felt comfortable leaving their cash in the company. (The fact that Bill Gates and Steve Ballmer had substantial investments in the company was probably a contributing factor)

Microsoft's big dividend in 2004

- In 2004, Microsoft announced a huge special dividend of \$ 33 billion and made clear that it would try to return more cash to stockholders in the future. What do you think changed?

While the most obvious answer that comes to mind is the change in the dividend tax rate, there was a strong contributing factor. Microsoft's return on equity has been dropping in recent years and many of Microsoft's recent investments (in entertainment and software) have not paid off... The stock has not done much over the last two years. Microsoft may be anticipating stockholder pressure and being proactive.

Disney: An analysis of FCFE from 1994-2003

<i>Year</i>	<i>Net Income</i>	<i>Depreciation</i>	<i>Capital Expenditures</i>	<i>Change in non-cash WC</i>	<i>FCFE (before debt CF)</i>	<i>Net CF from Debt</i>	<i>FCFE (after Debt CF)</i>
1994	\$1,110.40	\$1,608.30	\$1,026.11	\$654.10	\$1,038.49	\$551.10	\$1,589.59
1995	\$1,380.10	\$1,853.00	\$896.50	(\$270.70)	\$2,607.30	\$14.20	\$2,621.50
1996	\$1,214.00	\$3,944.00	\$13,464.00	\$617.00	(\$8,923.00)	\$8,688.00	(\$235.00)
1997	\$1,966.00	\$4,958.00	\$1,922.00	(\$174.00)	\$5,176.00	(\$1,641.00)	\$3,535.00
1998	\$1,850.00	\$3,323.00	\$2,314.00	\$939.00	\$1,920.00	\$618.00	\$2,538.00
1999	\$1,300.00	\$3,779.00	\$2,134.00	(\$363.00)	\$3,308.00	(\$176.00)	\$3,132.00
2000	\$920.00	\$2,195.00	\$2,013.00	(\$1,184.00)	\$2,286.00	(\$2,118.00)	\$168.00
2001	(\$158.00)	\$1,754.00	\$1,795.00	\$244.00	(\$443.00)	\$77.00	(\$366.00)
2002	\$1,236.00	\$1,042.00	\$1,086.00	\$27.00	\$1,165.00	\$1,892.00	\$3,057.00
2003	\$1,267.00	\$1,077.00	\$1,049.00	(\$264.00)	\$1,559.00	(\$1,145.00)	\$414.00
Average	\$1,208.55	\$2,553.33	\$2,769.96	\$22.54	\$969.38	\$676.03	\$1,645.41

Disney could have returned \$ 969 million to its stockholders on an annual basis between 1994 and 2003.

You could also get the approximate estimate of FCFE, using the average debt ratio used by Disney during the period. The average would have been the same using the longer approach to estimating FCFE, though the year to year numbers would have been different.

Disney's Dividends and Buybacks from 1994 to 2003

Year	Disney		
	Dividends (in \$)	Equity Repurchases (in \$)	Cash to Equity
1994	\$153	\$571	\$724
1995	\$180	\$349	\$529
1996	\$271	\$462	\$733
1997	\$342	\$633	\$975
1998	\$412	\$30	\$442
1999	\$0	\$19	\$19
2000	\$434	\$166	\$600
2001	\$438	\$1,073	\$1,511
2002	\$428	\$0	\$428
2003	\$429	\$0	\$429
Average	\$ 308.70	\$ 330.30	\$ 639

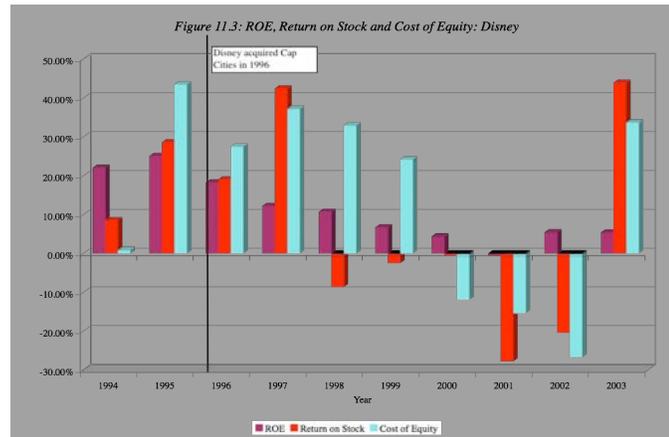
On average, Disney returned about \$ 639 million each year to investors.

Disney: Dividends versus FCFE

- Disney paid out \$ 330 million less in dividends (and stock buybacks) than it could afford to pay out (Dividends and stock buybacks were \$639 million; FCFE before net debt issues was \$969 million). How much cash do you think Disney accumulated during the period?

Roughly speaking, the cash accumulated over the 10 years amounts to 3,300 million, without interest (10 times \$ 330 million). With interest income, the accumulation would have been larger.

Disney's track record on projects and stockholder wealth



Aswath Damodaran

462

Over the entire period, Disney's stock has under performed the market (earning only 8.27% a year) and the return on equity earned by Disney of 7.50% has lagged the cost of equity of 14.62%.

Can you trust Disney's management?

- Given Disney's track record over the last 10 years, if you were a Disney stockholder, would you be comfortable with Disney's dividend policy?
 - Yes
 - No

The fact that Disney has underperformed the market both in terms of stock price performance and return on equity suggests that stockholders are unlikely to have much patience with Disney accumulating cash (afraid of what they will do with the cash).

The Bottom Line on Disney Dividends

- Disney could have afforded to pay more in dividends during the period of the analysis.
- It chose not to, and used the cash for acquisitions (Capital Cities/ABC) and ill fated expansion plans (Go.com).
- While the company may have flexibility to set its dividend policy a decade ago, its actions over that decade have frittered away this flexibility.
- Bottom line: Large cash balances will not be tolerated in this company. Expect to face relentless pressure to pay out more dividends.

Disney's acquisition of ABC is a huge gamble. By taking cash that has accumulated over time, and using this cash (in conjunction with new debt and equity issues) to finance a large acquisition, Disney has essentially puts its chips on the acquisition working out.

If it does not, stockholders will probably remember the acquisition and be much less likely to let Disney's managers accumulate cash again. (This is what happened in the aftermath of large failures like AT&T's acquisition of NCR and Kodak's acquisition of Sterling Drugs)

Aracruz: Dividends and FCFE: 1998-2003

<i>Year</i>	<i>Net Income</i>	<i>Depreciation</i>	<i>Capital Expenditures</i>	<i>Change in non-cash WC</i>	<i>FCFE (before net Debt CF)</i>	<i>Net Debt Cashflow</i>	<i>FCFE (after net Debt CF)</i>
1998	\$3.45	\$152.80	\$88.31	\$76.06	(\$8.11)	\$174.27	\$166.16
1999	\$90.77	\$158.83	\$56.47	\$2.18	\$190.95	(\$604.48)	(\$413.53)
2000	\$201.71	\$167.96	\$219.37	\$12.30	\$138.00	(\$292.07)	(\$154.07)
2001	\$18.11	\$162.57	\$421.49	(\$56.76)	(\$184.06)	\$318.24	\$134.19
2002	\$111.91	\$171.50	\$260.70	(\$5.63)	\$28.34	\$36.35	\$64.69
2003	\$148.09	\$162.57	\$421.49	(\$7.47)	(\$103.37)	\$531.20	\$427.83
Average	\$95.67	\$162.70	\$244.64	\$3.45	\$10.29	\$27.25	\$37.54

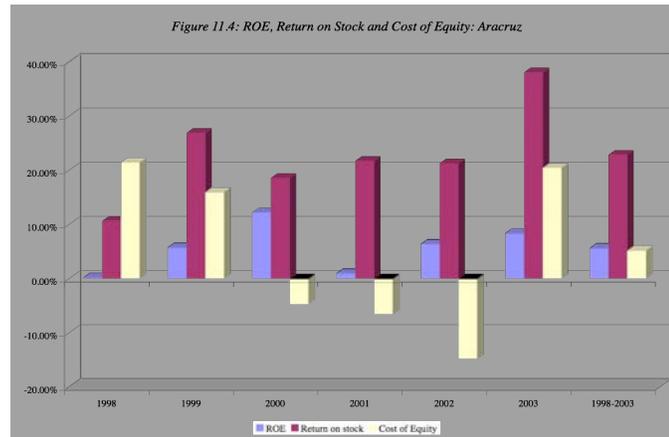
Aracruz could have paid out \$37.54 million a year in dividends between 1998 and 2003.

Aracruz: Cash Returned to Stockholders

<i>Year</i>	<i>Net Income</i>	<i>Dividends</i>	<i>Payout Ratio</i>	<i>FCFE</i>	<i>Cash returned to Stockholders</i>	<i>Cash Returned/FCFE</i>
1998	\$3.45	\$24.39	707.51%	\$166.16	\$50.79	30.57%
1999	\$90.77	\$18.20	20.05%	(\$413.53)	\$18.20	N A
2000	\$201.71	\$57.96	28.74%	(\$154.07)	\$80.68	N A
2001	\$18.11	\$63.17	348.87%	\$134.19	\$63.17	47.08%
2002	\$111.91	\$73.80	65.94%	\$64.69	\$75.98	117.45%
2003	\$148.09	\$109.31	73.81%	\$427.83	\$112.31	26.25%
1998-2003	\$574.04	\$346.83	60.42%	\$225.27	\$401.12	178.07%

Aracruz returned more cash to stockholders than it had available in FCFE.... It used its existing cash balance to make up the deficit.

Aracruz: Stock and Project Returns



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467

During this period, Aracruz earned an average return on equity of 5.68%, barely in excess of its average cost of equity of 5.27% but an investor in its stock would have seen an average annual return of 22.84% over the same period.

Aracruz: Its your call..

- Assume that you are a large stockholder in Aracruz. They have been paying more in dividends than they have available in FCFE. Their project choice has been acceptable and your stock has performed well over the period. Would you accept a cut in dividends?
 - Yes
 - No

Aracruz can make a reasonable case that they should be cutting dividends and reinvesting more back into the business... Whether their investors will accept this reasoning is a different issue.

Mandated Dividend Payouts

- There are many countries where companies are mandated to pay out a certain portion of their earnings as dividends. Given our discussion of FCFE, what types of companies will be hurt the most by these laws?
 - Large companies making huge profits
 - Small companies losing money
 - High growth companies that are losing money
 - High growth companies that are making money

It will most hurt high growth companies that are making money, and thus will be mandated to pay out dividends, even though their FCFE is negative. Note that while earnings are positive, the net cap ex needed to sustain growth might make the FCFE a negative number.

BP: Dividends- 1983-92

	1	2	3	4	5	6	7	8	9	10
Net Income	\$1,256.00	\$1,626.00	\$2,309.00	\$1,098.00	\$2,076.00	\$2,140.00	\$2,542.00	\$2,946.00	\$712.00	\$947.00
- (Cap. Exp - Depn)*(1-DR)	\$1,499.00	\$1,281.00	\$1,737.50	\$1,600.00	\$580.00	\$1,184.00	\$1,090.50	\$1,975.50	\$1,545.50	\$1,100.00
+ Working Capital*(1-DR)	\$369.50	(\$286.50)	\$678.50	\$82.00	(\$2,268.00)	(\$984.50)	\$429.50	\$1,047.50	(\$305.00)	(\$415.00)
= Free CF to Equity	(\$612.50)	\$631.50	(\$107.00)	(\$584.00)	\$3,764.00	\$1,940.50	\$1,022.00	(\$77.00)	(\$528.50)	\$262.00
Dividends	\$831.00	\$949.00	\$1,079.00	\$1,314.00	\$1,391.00	\$1,961.00	\$1,746.00	\$1,895.00	\$2,112.00	\$1,685.00
+ Equity Repurchases										
= Cash to Stockholders	\$831.00	\$949.00	\$1,079.00	\$1,314.00	\$1,391.00	\$1,961.00	\$1,746.00	\$1,895.00	\$2,112.00	\$1,685.00
<i>Dividend Ratios</i>										
Payout Ratio	66.16%	58.36%	46.73%	119.67%	67.00%	91.64%	68.69%	64.32%	296.63%	177.93%
Cash Paid as % of FCFE	-135.67%	150.28%	-1008.41%	-225.00%	36.96%	101.06%	170.84%	-2461.04%	-399.62%	643.13%
<i>Performance Ratios</i>										
<i>I. Accounting Measure</i>										
ROE	9.58%	12.14%	19.82%	9.25%	12.43%	15.60%	21.47%	19.93%	4.27%	7.66%
Required rate of return	19.77%	6.99%	27.27%	16.01%	5.28%	14.72%	26.87%	-0.97%	25.86%	7.12%
Difference	-10.18%	5.16%	-7.45%	-6.76%	7.15%	0.88%	-5.39%	20.90%	-21.59%	0.54%

Note the year to year swings in FCFE.

Note also that the required returns are computed each year using the actual returns on the market each year.

BP: Summary of Dividend Policy

	<i>Summary of calculations</i>			
	<i>Average</i>	<i>Standard Deviation</i>	<i>Maximum</i>	<i>Minimum</i>
<i>Free CF to Equity</i>	\$571.10	\$1,382.29	\$3,764.00	(\$612.50)
<i>Dividends</i>	\$1,496.30	\$448.77	\$2,112.00	\$831.00
<i>Dividends+Repurchases</i>	\$1,496.30	\$448.77	\$2,112.00	\$831.00
<i>Dividend Payout Ratio</i>	84.77%			
<i>Cash Paid as % of FCFE</i>	262.00%			
<i>ROE - Required return</i>	-1.67%	11.49%	20.90%	-21.59%

BP clearly paid out more than it could have afforded to during this period. It financed the shortfall (in each year except 1987, when it issued stock) by borrowing money.

BP: Just Desserts!

B.P.'s Shares Plummet After Dividend Is Slashed

By MATTHEW L. WALD

British Petroleum said yesterday that it would cut its dividend by 15 percent, plus a price restructuring charge of \$1 billion for the second quarter and by \$1.5 billion thereafter. The move came five weeks after Robert S. Horton, B.P.'s chairman, resigned under pressure from the company's outside directors.

The move was a dividend cut of the largest, but the real shock was at the low end of their expectations. In response, shares of the company's American depositary rights, each of which represents 10 shares of the London-based company, dropped 8 1/2 percent to \$67.15.

It was the most active issue on the New York stock exchange, with \$18 million in shares traded.

The Royal Dutch/Shell group also reported a disappointing quarter yesterday, with earnings on a replacement cost basis — excluding gains or losses on inventory holdings — of \$88 million, down 12 percent.

Quick Recovery Seems Unlikely

Adding to the gloom at B.P., the new chief executive, David A.G. St. John, said the prospects for a quick recovery were poor. "Extensive trading conditions are expected to remain difficult, particularly for the downstream and chemical businesses," he said in a statement. "Uncertainty in the economy remains uncertain," he said in a statement. "Uncertainty in the economy remains uncertain," he said in a statement.

Downstream margins in the United States would be hurt this year, he predicted, when clean air rules

take effect. The gasoline must be reformulated to reduce pollution. "In Europe, recovery will depend upon seasonal heating oil use," Mr. St. John said.

The crude oil market, he predicted, would remain balanced unless there was a shock to the market. The company said it was well positioned to take advantage of any

increase in oil prices, but the company's oil production in the United States is declining. B.P. is the largest producer in Alaska.

The market for petrochemicals in Europe remains weak.

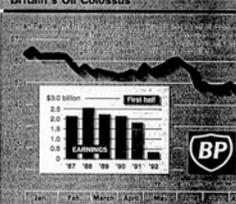
B.P.'s second quarter profits, before one-time transaction, declined to \$110 million from \$115 million, according to Sanford C. Bernstein, an analyst of Standard & Poor's.

He estimated that after exceptional items, earnings per share fell to 20 cents in the second quarter, compared with 24 cents a year earlier.

Analysts attributed B.P.'s problems to the company's acquisition in the last few years of heavy capital expenditures. Raising up the company's report, industry analyst Frank J. Knauer of Prudential Securities Research said, "This year's issues are quite dire, and profits have gone to zero."

Mr. Horton, who worked for Standard Oil of Ohio and then B.P.

Britain's Oil Colossus



after B.P. acquired Sabco, said, "What you've got is a company that bought oil prices were going to go to \$20 and spent \$10 to try to get it to \$10."

Another analyst at a large stock brokerage firm, who spoke on the condition of anonymity, said, "They look at the old British shares and turned them into modern B.P. shares. They took all the B.P. shares and turned them into B.P. shares."

The analyst said that the same of the cuts were obvious. Some came as a result of restructuring.

Continued on Page D5

While it is pretty clear the BP should cut dividends, the stock price response was not positive when it did. This reflects the fact that investor clienteles cannot be changed overnight. In BP's case, its history of high dividends had attracted investors who liked the high dividends. When they cut the dividends, these investors sold and a new clientele moved in, but not immediately. (It took a few months)

In hindsight, BP became a much healthier firm, with higher returns and lower leverage, after the dividend cut.

The Limited: Summary of Dividend Policy: 1983-1992

	<i>Summary of calculations</i>			
	<i>Average</i>	<i>Standard Deviation</i>	<i>Maximum</i>	<i>Minimum</i>
<i>Free CF to Equity</i>	(\$34.20)	\$109.74	\$96.89	(\$242.17)
<i>Dividends</i>	\$40.87	\$32.79	\$101.36	\$5.97
<i>Dividends+Repurchases</i>	\$40.87	\$32.79	\$101.36	\$5.97
<i>Dividend Payout Ratio</i>	18.59%			
<i>Cash Paid as % of FCFE</i>	-119.52%			
<i>ROE - Required return</i>	1.69%	19.07%	29.26%	-19.84%

A firm with negative FCFE should not pay dividends, especially when its projects earn excess returns.

Growth Firms and Dividends

- High growth firms are sometimes advised to initiate dividends because it increases the potential stockholder base for the company (since there are some investors - like pension funds - that cannot buy stocks that do not pay dividends) and, by extension, the stock price. Do you agree with this argument?

Yes

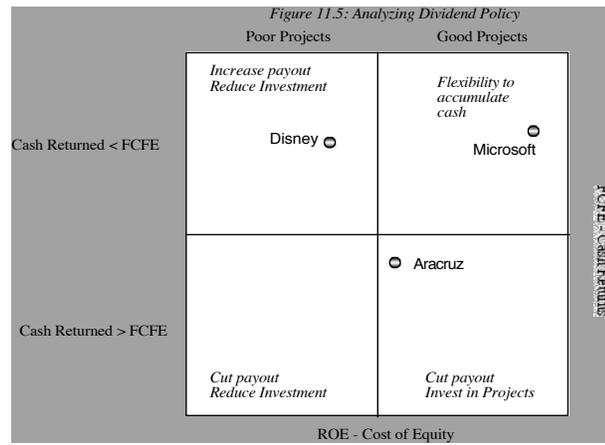
No

Why?

No. For every investor that these firms gain because they pay dividends, they lose more than one investor who will not buy the stock any more because the firm pays dividends.

Besides, firms which cannot afford to pay dividends should not be attracting a clientele that wants and likes dividends.

Summing up...



Summarizes the discussion from the last few pages...

Application Test: Assessing your firm's dividend policy

- Compare your firm's dividends to its FCFE, looking at the last 5 years of information.
- Based upon your earlier analysis of your firm's project choices, would you encourage the firm to return more cash or less cash to its owners?
- If you would encourage it to return more cash, what form should it take (dividends versus stock buybacks)?

II. The Peer Group Approach - Disney

Company Name	Dividend Yield	Dividend Payout
Astral Media Inc. 'A'	0.00%	0.00%
Belo Corp. 'A'	1.34%	34.13%
CanWest Global Comm. Corp.	0.00%	0.00%
Cinram Intl Inc	0.00%	0.00%
Clear Channel	0.85%	35.29%
Cox Radio 'A' Inc	0.00%	0.00%
Cumulus Media Inc	0.00%	0.00%
Disney (Walt)	0.90%	32.31%
Emmis Communications	0.00%	0.00%
Entercom Comm. Corp	0.00%	0.00%
Fox Entmt Group Inc	0.00%	0.00%
Hearst-Argyle Television Inc	0.00%	0.00%
InterActiveCorp	0.00%	0.00%
Liberty Media 'A'	0.00%	0.00%
Lin TV Corp.	0.00%	0.00%
Metro Goldwyn Mayer	0.00%	0.00%
Pixar	0.00%	0.00%
Radio One INC.	0.00%	0.00%
Regal Entertainment Group	2.70%	66.57%
Sinclair Broadcast	0.00%	0.00%
Sirius Satellite	0.00%	0.00%
Time Warner	0.00%	0.00%
Univision Communic.	0.00%	0.00%
Viacom Inc. 'B'	0.56%	19.00%
Westwood One	0.00%	0.00%
XM Satellite 'A'	0.00%	0.00%
Average	0.24%	7.20%

We defined comparable firms as entertainment companies with market cap > \$ 1 billion. The average dividend yield of these companies is 0.24% and the average payout ratio is 7.20%. A simple comparison with Disney's dividend yield of 0.90% and payout ratio of 32.315 would indicate that Disney is paying too much in dividends. (But is this fair? Disney is larger, more mature and more stable than most of the companies in this group...)

Peer Group Approach: Deutsche Bank

<i>Name</i>	<i>Dividend Yield</i>	<i>Dividend Payout</i>
Banca Intesa Spa	1.57%	167.50%
Banco Bilbao Vizcaya Argenta	0.00%	0.00%
Banco Santander Central Hisp	0.00%	0.00%
Barclays Plc	3.38%	35.61%
Bnp Paribas	0.00%	0.00%
Deutsche Bank Ag -Reg	1.98%	481.48%
Erste Bank Der Oester Spark	0.99%	24.31%
Hbos Plc	2.85%	27.28%
Hsbc Holdings Plc	2.51%	39.94%
Lloyds Tsb Group Plc	7.18%	72.69%
Royal Bank Of Scotland Group	3.74%	38.73%
Sanpaolo Imi Spa	0.00%	0.00%
Societe Generale	0.00%	0.00%
Standard Chartered Plc	3.61%	46.35%
Unicredito Italiano Spa	0.00%	0.00%
Average	1.85%	62.26%

Deutsche has a dividend yield very similar to the average but its dividend payout ratio is off the charts...

Peer Group Approach: Aracruz

<i>Group</i>	<i>Dividend Yield</i>	<i>Dividend Payout</i>
Latin America	2.86%	41.34%
Emerging Market	2.03%	22.16%
US	1.14%	28.82%
All paper and pulp	1.75%	34.55%
Aracruz	3.00%	37.41%

Aracruz pays dividends that are similar to other Latin American paper and pulp companies but much higher dividends than paper companies elsewhere in the world. This may be the price paid by voting shareholders in the company to maintain their voting privileges. (At most Brazilian companies, the failure to pay a mandated ratio (35% generally) can lead to non-voting shares being granted voting rights).

A High Growth Bank?

- Assume that you are advising a small high-growth bank, which is concerned about the fact that its dividend payout and yield are much lower than other banks. The CEO of the bank is concerned that investors will punish the bank for its dividend policy. What do you think?
 - a. I think that the bank will be punished for its errant dividend policy
 - b. I think that investors are sophisticated enough for the bank to be treated fairly
 - c. I think that the bank will not be punished for its low dividends as long as it tries to convey information to its investors about the quality of its projects and growth prospects.

While I would love to believe that markets are efficient and that the bank will not be punished, this will happen only if the bank works at explaining why it has low dividends.

Going beyond averages... Looking at the market

■ Regressing dividend yield and payout against expected growth yields:

$$\text{PYT} = 0.3889 - 0.738 \text{ CPXFR} - 0.214 \text{ INS} + 0.193 \text{ DFR} - 0.747 \text{ EGR} \\ (20.41) \quad (3.42) \quad (3.41) \quad (4.80) \quad (8.12) \quad R^2 = 18.30\%$$

$$\text{YLD} = 0.0205 - 0.058 \text{ CPXFR} - 0.012 \text{ INS} + 0.0200 \text{ DFR} - 0.047 \text{ EGR} \\ (22.78) \quad (5.87) \quad (3.66) \quad (9.45) \quad (11.53) \quad R^2 = 28.5\%$$

- $\text{PYT} = \text{Dividend Payout Ratio} = \text{Dividends/Net Income}$
- $\text{YLD} = \text{Dividend Yield} = \text{Dividends/Current Price}$
- $\text{CPXFR} = \text{Capital Expenditures} / \text{Book Value of Total Assets}$
- $\text{EGR} = \text{Expected growth rate in earnings over next 5 years (analyst estimates)}$
- $\text{DFR} = \text{Debt} / (\text{Debt} + \text{Market Value of Equity})$
- $\text{INS} = \text{Insider holdings as a percent of outstanding stock}$

Higher growth companies tend to pay lower dividends. These simple regressions allow us to adjust payout ratios and yields for differences across entertainment companies. Based upon this analysis, it looks like Disney is paying out too much in dividends.

Disney and Aracruz ADR vs US Market

■ For Disney

- Payout Ratio = $0.3889 - 0.738(0.021) - 0.214(0.026) + 0.193(0.2102) - 0.747(0.08) = 34.87\%$
- Dividend Yield = $0.0205 - 0.058(0.021) - 0.012(0.026) + 0.0200(0.2102) - 0.047(0.08) = 1.94\%$

Disney is paying out too little in dividends, with its payout ratio of 32.31% and its dividend yield of 0.91%

■ For Aracruz ADR

- Payout Ratio = $0.3889 - 0.738(0.02) - 0.214(0.20) + 0.193(0.31) - 0.747(0.23) = 21.71\%$
- Dividend Yield = $0.0205 - 0.058(0.02) - 0.012(0.20) + 0.0200(0.31) - 0.047(0.23) = 1.22\%$

Aracruz is paying out too much in dividends, with its payout ratio of 37.41% and its dividend yield of 3%

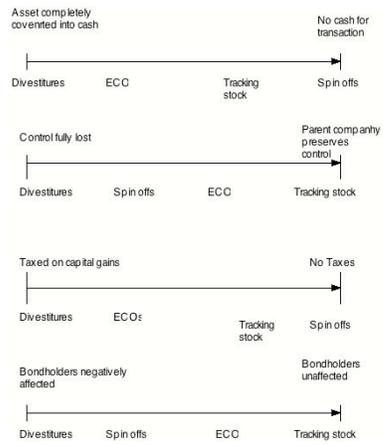
Two things to note:

1. The low R-squared on the regressions will create large prediction ranges. Disney may very well be paying out the right amount in dividends (at least for the payout ratio) when we consider this.
2. This is a comparison of the Aracruz ADR against the US market. It would be interesting to see how Aracruz measures up against the Brazilian market.

Other Actions that affect Stock Prices

- In the case of dividends and stock buybacks, firms change the value of the assets (by paying out cash) and the number of shares (in the case of buybacks).
- There are other actions that firms can take to change the value of their stockholder's equity.
 - *Divestitures*: They can sell assets to another firm that can utilize them more efficiently, and claim a portion of the value.
 - *Spin offs*: In a spin off, a division of a firm is made an independent entity. The parent company has to give up control of the firm.
 - *Equity carve outs*: In an ECO, the division is made a semi-independent entity. The parent company retains a controlling interest in the firm.
 - *Tracking Stock*: When tracking stock are issued against a division, the parent company retains complete control of the division. It does not have its own board of directors.

Differences in these actions



Valuation

Aswath Damodaran

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Objective: Maximize the Value of the Firm

Discounted Cashflow Valuation: Basis for Approach

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

- where,
- n = Life of the asset
- CF_t = Cashflow in period t
- r = Discount rate reflecting the riskiness of the estimated cashflows

The value of any asset is the present value of the expected cash flows on the assets.

Equity Valuation

- The value of equity is obtained by discounting expected cashflows to equity, i.e., the residual cashflows after meeting all expenses, tax obligations and interest and principal payments, at the cost of equity, i.e., the rate of return required by equity investors in the firm.

$$\text{Value of Equity} = \sum_{t=1}^{t=n} \frac{\text{CF to Equity}_t}{(1 + k_e)^t}$$

where,

CF to Equity_t = Expected Cashflow to Equity in period t

k_e = Cost of Equity

- The dividend discount model is a specialized case of equity valuation, and the value of a stock is the present value of expected future dividends.

The value of equity is the present value of cash flows to the equity investors discounted back at the rate of return that those equity investors need to make to break even (the cost of equity).

In the strictest sense of the word, the only cash flow stockholders in a publicly traded firm get from their investment is dividends, and the dividend discount model is the simplest and most direct version of an equity valuation model.

Firm Valuation

- The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1 + \text{WACC})^t}$$

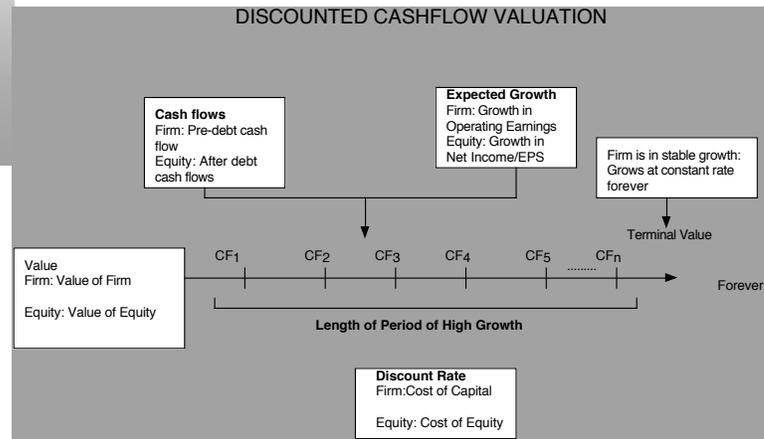
where,

CF to Firm_t = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

A firm includes not just the equity, but all claim holders. The cash flow to the firm is the collective cash flow that all claim holders make from the firm, and it is discounted at the weighted average of their different costs.

Generic DCF Valuation Model



Aswath Damodaran

490

Sets up the basic inputs:

1. Discount rates
2. Cash flows
3. Expected Growth
4. Length of the period that they can sustain a growth rate higher than the growth rate of the economy.

Estimating Inputs: I. Discount Rates

- **Critical ingredient** in discounted cashflow valuation. Errors in estimating the discount rate or mismatching cashflows and discount rates can lead to serious errors in valuation.
- At an intuitive level, the discount rate used should be consistent with both the **riskiness** and the **type of cashflow** being discounted.
- The cost of equity is the rate at which we discount cash flows to equity (dividends or free cash flows to equity). The cost of capital is the rate at which we discount free cash flows to the firm.

Recaps what we stated when we talked about investment analysis.

Estimating Aracruz's Cost of Equity

- We will do the Aracruz valuation in U.S. dollars. We will therefore use a U.S. dollar cost of equity.
- We estimated a beta for equity of 0.7576 for the paper business that Aracruz. With a nominal U.S. dollar riskfree rate of 4% and an equity risk premium of 12.49% for Brazil, we arrive at a dollar cost of equity of 13.46%

$$\text{Cost of equity} = 4\% + 0.7576 (12.49\%) = 13.46\%$$

We used the equity beta of just the operating assets in this valuation. If we had chosen to include the cash from financial holdings as part of net income, we would have used Aracruz's consolidated equity beta of 0.7040.

Estimating Cost of Equity: Deutsche Bank

- Deutsche Bank is in two different segments of business - commercial banking and investment banking.
 - To estimate its commercial banking beta, we will use the average beta of commercial banks in Germany.
 - To estimate the investment banking beta, we will use the average bet of investment banks in the U.S and U.K.
- To estimate the cost of equity in Euros, we will use the German 10-year bond rate of 4.05% as the riskfree rate and the US historical risk premium (4.82%) as our proxy for a mature market premium.

Business	Beta	Cost of Equity	Weights
Commercial Banking	0.7345	7.59%	69.03%
Investment Banking	1.5167	11.36%	30.97%
Deutsche Bank		8.76%	

This reproduces the bottom-up beta for Deutsche Bank, looking at other commercial banks in Germany, and investment banks in the US and UK. The cost of equity is estimated in nominal DM.

Reviewing Disney's Costs of Equity & Debt

<i>Business</i>	<i>Unlevered Beta</i>	<i>D/E Ratio</i>	<i>Levered Beta</i>	<i>Cost of Equity</i>
Media Networks	1.0850	26.62%	1.2661	10.10%
Parks and Resorts	0.9105	26.62%	1.0625	9.12%
Studio Entertainment	1.1435	26.62%	1.3344	10.43%
Consumer Products	1.1353	26.62%	1.3248	10.39%
Disney	1.0674	26.62%	1.2456	10.00%

- Disney's Cost of Debt (based upon rating) = 5.25%
- Disney's tax rate = 37.3%

This is a reproduction of a page that we used to estimate costs of capital for Disney divisions as part of the investment analysis section.

Current Cost of Capital: Disney

■ Equity

- Cost of Equity = Riskfree rate + Beta * Risk Premium
= 4% + 1.25 (4.82%) = 10.00%
- Market Value of Equity = \$55.101 Billion
- Equity/(Debt+Equity) = 79%

■ Debt

- After-tax Cost of debt = (Riskfree rate + Default Spread) (1-t)
= (4%+1.25%) (1-.373) = 3.29%
- Market Value of Debt = \$ 14.668 Billion
- Debt/(Debt +Equity) = 21%

- Cost of Capital = 10.00%(.79)+3.29%(.21) = 8.59%

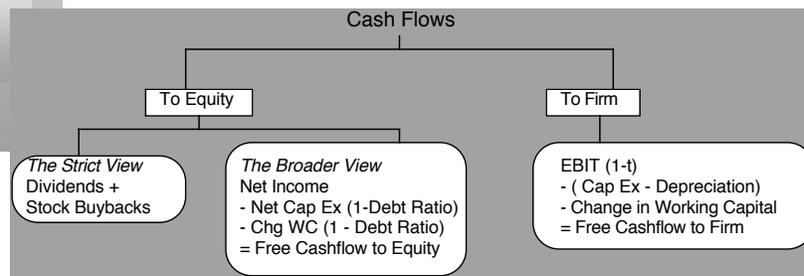
↗
$$\frac{55.101}{55.101+14.668}$$

This reproduces the current cost of capital computation for Disney, using market value weights for both debt and equity, the cost of equity (based upon the bottom-up beta) and the cost of debt (based upon the bond rating)

The market value of debt is estimated by estimating the present value of total interest payments and face value at the current cost of debt.

One way to frame the capital structure question: Is there a mix of debt and equity at which Disney's cost of capital will be lower than 12.22%?

II. Estimating Cash Flows



Shows the three different cash flows that can be used in valuation.

Cap Ex includes acquisitions and the effect of R&D. (R&D is capitalized)

Estimating FCFE last year: Aracruz

	2003 numbers	Normalized
Net Income from operating assets	\$119.68 million	\$ 119.68 million
- Net Capital Expenditures (1-DR)	\$ 37.31 million	\$ 71.45 million
-Chg. Working Capital*(1-DR)	\$ 3.05 million	\$ 7.50 million
Free Cashflow to Equity	\$ 79.32 million	\$ 40.73 million

DR = Debt Ratio = Industry average book debt to capital ratio = 55.98%

Equity Reinvestment = 71.45 million + 7.50 million = \$ 78.95 million

Equity Reinvestment Rate = 78.95/ 119.68 = 65.97%

Aracruz has had a volatile history of reinvesting a great deal in some years and not at all in others. The normalized net cap ex and non-cash working capital numbers were estimated as follows:

- We looked at aggregate net cap and changes in non-cash working capital as a percent of aggregate net income between 1998 and 2003. We used these percentages to compute the net cap ex and change in non-cash working capital in 2003, but multiplying this percent by the net income for 2003.

Net Cap Ex Normalized = Net Cap Ex as percent of Net Income₉₈₋₀₃ * Net Income₂₀₀₃ = 135.61% * 119.68 = 162.30 million

Non-cash WC change normalized = Non-cash WC as percent of Net Income₉₈₋₀₃ * Net Income₂₀₀₃ = 6.27% * 119.68 = 7.50 million

- We used an industry average book debt ratio of 55.98% to compute the equity investment each year in net cap ex and change in working capital.

Net Cap Ex Normalized (1 - Debt Ratio) = 162.30 (1-.5598) = 71.45 million

Non-cash WC Normalized (1 - Debt Ratio) = 7.50 (1-.5598) = 2.57 million

Estimating FCFF in 2003: Disney

- EBIT = \$ 2,805 Million Tax rate = 37.30%
- Capital spending = \$ 1,735 Million
- Depreciation = \$ 1,254 Million
- Increase in Non-cash Working capital = \$ 454 Million
- Estimating FCFF

EBIT * (1 - tax rate)	\$1,759	: 2805 (1-.373)
- Net Capital Expenditures	\$481	: (1735 - 1254)
-Change in Working Capital	\$454	
Free Cashflow to Firm	\$824	
- Total Reinvestment = Net Cap Ex + Change in WC = 481 + 454 = 935
- Reinvestment Rate = $935/1759 = 53.18\%$

The working capital change is rather large. We might need to normalize before we start forecasting the cash flows.

⌘ Application Test: Estimating your firm's FCFF

- Estimate the FCFF for your firm in its most recent financial year:

In general,

EBIT (1-t)

+ Depreciation

- Capital Expenditures

- Change in Non-cash WC

= FCFF

Estimate the dollar reinvestment at your firm:

Reinvestment = EBIT (1-t) - FCFF

If using statement of cash flows

EBIT (1-t)

+ Depreciation

+ Capital Expenditures

+ Change in Non-cash WC

= FCFF

Again, include acquisitions as part of cap ex.

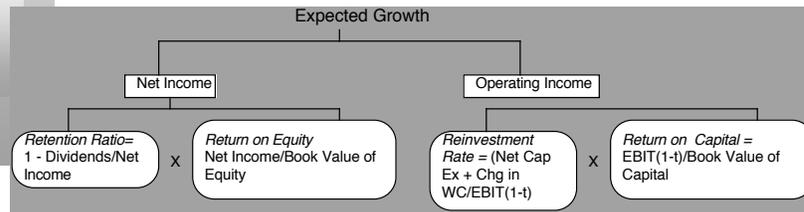
Choosing a Cash Flow to Discount

- When you cannot estimate the free cash flows to equity or the firm, the only cash flow that you can discount is dividends. For financial service firms, it is difficult to estimate free cash flows. For Deutsche Bank, we will be discounting dividends.
- If a firm's debt ratio is not expected to change over time, the free cash flows to equity can be discounted to yield the value of equity. For Aracruz, we will discount free cash flows to equity.
- If a firm's debt ratio might change over time, free cash flows to equity become cumbersome to estimate. Here, we would discount free cash flows to the firm. For Disney, we will discount the free cash flow to the firm.

As a general rule, we should use a free cash flow (rather than a dividend) to discount, if we can estimate the free cash flow. It is difficult to estimate cap ex and working capital for a financial service firm.

When leverage is changing, we need to forecast debt repayments and new debt issues to estimate the free cash flow to equity. The free cash flow to the firm can be estimated much more directly.

III. Expected Growth



Note that the approaches are similar, with the only difference being in how we define how much the firm reinvests and how well it reinvests.

Expected Growth in EPS

$$\begin{aligned}g_{\text{EPS}} &= \text{Retained Earnings}_{t-1} / \text{NI}_{t-1} * \text{ROE} \\ &= \text{Retention Ratio} * \text{ROE} \\ &= b * \text{ROE}\end{aligned}$$

- Proposition 1: The expected growth rate in earnings for a company cannot exceed its return on equity in the long term.

In the short term, improvements in return on equity will translate into more than proportional increases in expected growth in earnings. In fact, the expected growth in earnings per share in any year can be written as:

$$g_{\text{EPS}} = b * \text{ROE}_{t+1} + \{(\text{ROE}_{t+1} - \text{ROE}_t) \text{BV of Equity}_t / \text{ROE}_t (\text{BV of Equity}_t)\}$$

Note that the larger the firm, the greater the effect (in either direction) of changes in ROE.

Estimating Expected Growth in EPS: Deutsche Bank

- In 2003, Deutsche Bank reported net income of \$1,365 million on a book value of equity of \$29,991 million at the end of 2002.
 - $\text{Return on Equity} = \text{Net Income}_{2003} / \text{Book Value of Equity}_{2002} = 1365/29991 = 4.55\%$
- This is lower than the cost of equity for the firm, which is 8.76%, and the average return on equity for European banks, which is 11.26%. In the four quarters ended in March 2004, Deutsche Bank paid out dividends per share of 1.50 Euros on earnings per share of 4.33 Euros.
 - $\text{Retention Ratio} = 1 - \text{Dividends per share} / \text{Earnings per share} = 1 - 1.50/4.33 = 65.36\%$
- If Deutsche maintains its existing return on equity and retention ratio for the long term, its expected growth rate will be anemic.
 - $\text{Expected Growth Rate} = \text{Retention Ratio} * \text{ROE} = .6536 * .0455 = 2.97\%$
- For the next five years, we will assume that the return on equity will improve to the industry average of 11.26% while the retention ratio will stay unchanged at 65.36%. The expected growth in earnings per share is 7.36%.
 - $\text{Expected Growth Rate}_{\text{Modified Fundamentals}} = .6536 * .1126 = .0736$

Note that what we need are estimates for the future. While we might start with the base year estimates, nothing in valuation requires us to stay with these inputs.

Estimating Expected Growth in Net Income: Aracruz

- Rather than base the equity reinvestment rate on the most recent year's numbers, we will use the average values for each of the variables over the last 6 years to compute a "normalized" equity reinvestment rate:
 - Normalized Equity Reinvestment Rate = Average Equity Reinvestment₉₉₋₀₃ / Average Net Income₉₉₋₀₃ = 213.17/323.12 = 65.97%
- To estimate the return on equity, we look at only the portion of the net income that comes from operations (ignoring the income from cash and marketable securities) and divide by the book value of equity net of cash and marketable securities.
 - Non-cash ROE = (Net Income – After-tax Interest income on cash)₂₀₀₃ / (BV of Equity – Cash)₂₀₀₂
 - Non-cash ROE_{Aracruz} = (148.09 – 43.04(1-.34)) / (1760.58-273.93) = .0805 or 8.05%
- Expected Growth in Net Income = Equity Reinvestment Rate * Non-cash ROE
= 65.97% * 8.05% = 5.31%

Aracruz had net income of \$148.09 million in 2003, interest income before taxes of \$43.04 million and faced a tax rate of 34%. The book value of equity at the end of 2002 was \$1760.58 million, of which cash represented \$273.93 million.

ROE and Leverage

- $ROE = ROC + D/E (ROC - i (1-t))$

where,

$$ROC = (EBIT (1 - \text{tax rate})) / \text{Book Value of Capital}$$

$$= EBIT (1 - t) / \text{Book Value of Capital}$$

$$D/E = \text{BV of Debt} / \text{BV of Equity}$$

$$i = \text{Interest Expense on Debt} / \text{Book Value of Debt}$$

$$t = \text{Tax rate on ordinary income}$$

- Note that $\text{BV of Capital} = \text{BV of Debt} + \text{BV of Equity}$.

Leverage will have a positive effect on expected growth as long as the projects taken with the leverage earn more than the after-tax cost of debt.

Again, while we need to use book values if our objective is to explain past growth, looking forward, we need to make the best estimates we can for each of these inputs.

Decomposing ROE

- Assume that you are analyzing a company with a 15% return on capital, an after-tax cost of debt of 5% and a book debt to capital ratio of 100%. Estimate the ROE for this company.
- Now assume that another company in the same sector has the same ROE as the company that you have just analyzed but no debt. Will these two firms have the same growth rates in earnings per share if they have the same dividend payout ratio?
- Will they have the same equity value?

The return on equity for the first firm = $15\% + 1(15\% - 5\%) = 25\%$

The two firms, if they have the same ROE and retention ratio, will have the same earnings per share growth rate.

However, the first firm will have a higher cost of equity, since it has the higher debt ratio, and thus a lower equity value.

Expected Growth in EBIT And Fundamentals

- Reinvestment Rate and Return on Capital

$$g_{\text{EBIT}} = (\text{Net Capital Expenditures} + \text{Change in WC}) / \text{EBIT}(1-t) * \text{ROC} \\ = \text{Reinvestment Rate} * \text{ROC}$$

- Proposition 2: No firm can expect its operating income to grow over time without reinvesting some of the operating income in net capital expenditures and/or working capital.
- Proposition 3: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.

The reinvestment rate and the return on capital should be forward-looking numbers, rather than what they were last year.

Estimating Growth in EBIT: Disney

- We begin by estimating the reinvestment rate and return on capital for Disney in 2003, using the numbers from the latest financial statements. We did convert operating leases into debt and adjusted the operating income and capital expenditure accordingly.
 - $\text{Reinvestment Rate}_{2003} = (\text{Cap Ex} - \text{Depreciation} + \text{Chg in non-cash WC}) / \text{EBIT} (1-t) = (1735 - 1253 + 454) / (2805(1-.373)) = 53.18\%$
 - $\text{Return on capital}_{2003} = \text{EBIT} (1-t)_{2003} / (\text{BV of Debt}_{2002} + \text{BV of Equity}_{2002}) = 2805 (1-.373) / (15,883 + 23,879) = 4.42\%$
 - $\text{Expected Growth Rate from existing fundamentals} = 53.18\% * 4.42\% = 2.35\%$
- We will assume that Disney will be able to earn a return on capital of 12% on its new investments and that the reinvestment rate will be 53.18% for the immediate future.
 - $\text{Expected Growth Rate in operating income} = \text{Return on capital} * \text{Reinvestment Rate} = 12\% * .5318 = 6.38\%$

The book value of debt is augmented by the \$1,753 million in present value of operating lease commitments. The unadjusted operating income for Disney was \$2,713 million. The operating lease adjustment adds the inputted interest expense on the PV of operating leases to the operating income (5.25% of \$1753 million= \$92 million), the current years operating lease expense to capital expenditures (\$556 million) and the depreciation on the leased asset to depreciation (\$195 million).

Disney earned a return on capital of 19% prior to its acquisition of Cap Cities. Since then, the return on capital has been in a downward spiral and 9/11 made the spiral worse. The reinvestment rate has also jumped around, with acquisitions driving reinvestment up in some years above 100%.

⌚ Application Test: Estimating Expected Growth

- Estimate the following:
 - The reinvestment rate for your firm
 - The after-tax return on capital
 - The expected growth in operating income, based upon these inputs

IV. Getting Closure in Valuation

- A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever.

$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{\text{CF}_t}{(1+r)^t}$$

- Since we cannot estimate cash flows forever, we estimate cash flows for a “growth period” and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{\text{CF}_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

Firms have infinite lives. Since we cannot estimate cash flows forever, we assume a constant growth rate forever as a way of closing off the valuation.

A very commonly used variant is to use a multiple of the terminal year's earnings. This brings an element of relative valuation into the analysis. In a pure DCF model, the terminal value has to be estimated with a stable growth rate.

Stable Growth and Terminal Value

- When a firm's cash flows grow at a "constant" rate forever, the present value of those cash flows can be written as:
Value = Expected Cash Flow Next Period / (r - g)
where,
r = Discount rate (Cost of Equity or Cost of Capital)
g = Expected growth rate
- This "constant" growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.
- While companies can maintain high growth rates for extended periods, they will all approach "stable growth" at some point in time.
- When they do approach stable growth, the valuation formula above can be used to estimate the "terminal value" of all cash flows beyond.

If the stable growth rate is set below the growth rate of the economy (as it should be), you should never find g to be greater than r, which leads to absurd values.

Growth Patterns

- A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:
 - there is no high growth, in which case the firm is already in stable growth
 - there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
 - there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate (3-stage)
- The assumption of how long high growth will continue will depend upon several factors including:
 - the size of the firm (larger firm -> shorter high growth periods)
 - current growth rate (if high -> longer high growth period)
 - barriers to entry and differential advantages (if high -> longer growth period)

This is the shakiest area of valuation. The high growth period should be a function of a firm's capacity to earn excess returns and erect and maintain barriers to entry. This is where corporate strategy meets corporate valuation.

Length of High Growth Period

- Assume that you are analyzing two firms, both of which are enjoying high growth. The first firm is Earthlink Network, an internet service provider, which operates in an environment with few barriers to entry and extraordinary competition. The second firm is Biogen, a bio-technology firm which is enjoying growth from two drugs to which it owns patents for the next decade. Assuming that both firms are well managed, which of the two firms would you expect to have a longer high growth period?
 - Earthlink Network
 - Biogen
 - Both are well managed and should have the same high growth period

I would expect Biogen to grow longer, because its barrier to entry (patent) is much stronger and easier to maintain.

Choosing a Growth Period: Examples

	<i>Disney</i>	<i>Aracruz</i>	<i>Deutsche Bank</i>
Firm Size/Market Size	Firm is one of the largest players in the entertainment and theme park businesses but the businesses are redefining themselves and expanding.	Firm has a small market share of the paper/pulp business, but the business is mature.	Firm has a significant market share of a mature business.
Current Excess Returns	Firm is earning less than its cost of capital, and has done so for last few years	Returns on capital are largely a function of paper/pulp prices but, on average, have been less than the cost of capital.	Firm has a return on equity that has lagged its cost of equity in recent years.
Competitive Advantages	Has some of the most recognized brand names in the world. Knows more about operating theme parks than any other firm in the world. Has skilled animation studio staff.	Cost advantages because of access to Brazilian rainforests. Has invested in newer, updated plants and has skilled workforce.	Has an edge in the commercial banking business in Germany but this advantage is dissipating in the EU.
Length of High Growth period	10 years, entirely because of its strong competitive advantages (which have been wasted over the last few years) but the excess returns are likely to be small.	5 years, largely due to access to cheap raw material.	5 years, mostly to allow firms to recover to pre-downturn levels.

I would not be inclined to use growth periods longer than 10 years. While there are firms like IBM, Microsoft and Coca Cola which have been able to sustain growth for much longer periods, they are more the exception than the rule. Most firms are able to maintain high growth for shorter periods.

I am going to use firm valuation for Disney, because I expect leverage to change, and firm valuation is simpler when that occurs

For Aracruz, I will use FCFE, since I do not expect leverage to change, and do the analysis in real terms, to avoid having to deal with expected inflation in BR

For Deutsche Bank, where it is difficult to estimate free cash flows, I will use dividends and make the assumptions that dividends over time will be equal to FCFE.

Firm Characteristics as Growth Changes

Variable	High Growth Firms tend to	Stable Growth Firms tend to
Risk	be above-average risk	be average risk
Dividend Payout	pay little or no dividends	pay high dividends
Net Cap Ex	have high net cap ex	have low net cap ex
Return on Capital	earn high ROC (excess return)	earn ROC closer to WACC
Leverage	have little or no debt	higher leverage

When you adjust the growth rate to make it stable, make the other inputs about the firm consistent with the stable growth assumption.

Estimating Stable Growth Inputs

- Start with the fundamentals:
 - Profitability measures such as return on equity and capital, in stable growth, can be estimated by looking at
 - industry averages for these measure, in which case we assume that this firm in stable growth will look like the average firm in the industry
 - cost of equity and capital, in which case we assume that the firm will stop earning excess returns on its projects as a result of competition.
 - Leverage is a tougher call. While industry averages can be used here as well, it depends upon how entrenched current management is and whether they are stubborn about their policy on leverage (If they are, use current leverage; if they are not; use industry averages)
- Use the relationship between growth and fundamentals to estimate payout and net capital expenditures.

There is a significant subjective judgment involved with each of these estimates. That is unavoidable.

Estimating Stable Period Inputs: Disney

- The beta for the stock will drop to one, reflecting Disney's status as a mature company. This will lower the cost of equity for the firm to 8.82%.

$$\text{Cost of Equity} = \text{Riskfree Rate} + \text{Beta} * \text{Risk Premium} = 4\% + 4.82\% = 8.82\%$$

- The debt ratio for Disney will rise to 30%. This is the optimal we computed for Disney in chapter 8 and we are assuming that investor pressure will be the impetus for this change. Since we assume that the cost of debt remains unchanged at 5.25%, this will result in a cost of capital of 7.16%

$$\text{Cost of capital} = 8.82\% (.70) + 5.25\% (1-.373) (.30) = 7.16\%$$

- The return on capital for Disney will drop from its high growth period level of 12% to a stable growth return of 10%. This is still higher than the cost of capital of 7.16% but the competitive advantages that Disney has are unlikely to dissipate completely by the end of the 10th year. The expected growth rate in stable growth will be 4%. In conjunction with the return on capital of 10%, this yields a stable period reinvestment rate of 40%:

$$\text{Reinvestment Rate} = \text{Growth Rate} / \text{Return on Capital} = 4\% / 10\% = 40\%$$

As Disney moves into stable growth, it should exhibit the characteristics of stable growth firms. If you want to be conservative in your estimates, you could set the return on capital = cost of capital in stable growth.

A Dividend Discount Model Valuation: Deutsche Bank

- We estimated the annual growth rate for the next 5 years at Deutsche Bank to be 7.36%, based upon an estimated ROE of 11.26% and a retention ratio of 65.36%.
- In 2003, the earnings per share at Deutsche Bank were 4.33 Euros, and the dividend per share was 1.50 Euros.
- Our earlier analysis of the risk at Deutsche Bank provided us with an estimate of beta of 0.98, which used in conjunction with the Euro riskfree rate of 4.05% and a risk premium of 4.82%, yielded a cost of equity of 8.76%

We are using the dividend discount model because it is difficult to estimate the FCFE for a bank. (What are the capital expenditure and working capital requirements of a bank?)

We assume that Deutsche Bank, given its size and the competitive sector it operates in, is in stable growth.

We have used a normalized return on equity of 14% (which is the industry average ROE) to estimate expected growth rate forever.

Expected Dividends and Terminal Value

Year	EPS	Payout Ratio	DPS	PV at 8.76%
1	€4.65	34.64%	€1.61	€1.48
2	€4.99	34.64%	€1.73	€1.46
3	€5.36	34.64%	€1.86	€1.44
4	€5.75	34.64%	€1.99	€1.42
5	€6.18	34.64%	€2.14	€1.41
Present value of expected dividends =				€7.22

Terminal Value and Present Value...

- At the end of year 5, we will assume that Deutsche Bank's earnings growth will drop to 4% and stay at that level in perpetuity. In keeping with the assumption of stable growth, we will also assume that
 - The beta will rise marginally to 1, resulting in a slightly higher cost of equity of 8.87%.
Cost of Equity = Riskfree Rate + Beta * Risk Premium = 4.05% + 4.82% = 8.87%
 - The return on equity will drop to the cost of equity of 8.87%, thus preventing excess returns from being earned in perpetuity.
Stable Period Payout Ratio = $1 - g / ROE = 1 - .04 / .0887 = .5490$ or 54.9%
Expected Dividends in year 6 = Expected EPS_6 * Stable period payout ratio
 $= €6.18 (1.04) * .549 = €3.5263$
 - Terminal Value per share = Expected Dividends in year 6 / (Cost of equity - g)
 $= €3.5263 / (.0887 - .04) = €72.41$
 - Present value of terminal value = $72.41 / 1.0876^5 = 47.59$
- Value per share = PV of expected dividends in high growth + PV of terminal value =
 $€7.22 + €47.59 = €54.80$
- Deutsche Bank was trading at €66 at the time of this analysis.

To get to the terminal value, you cannot take the fifth year's dividends and grow them at 4% for a year. The dividend payout ratio has to be recomputed based upon the expected growth rate and the expected return on equity. This new payout ratio has to be used to compute the dividends in year 6, which are then used to get the terminal value at the end of year 5.

The terminal value is discounted back to the present at the high growth period cost of equity.

What does the valuation tell us?

- Stock is overvalued: This valuation would suggest that Deutsche Bank is significantly overvalued, given our estimates of expected growth and risk.
- Dividends may not reflect the cash flows generated by Deutsche Bank. The FCFE could have been significantly higher than the dividends paid.
- Estimates of growth and risk are wrong: It is also possible that we have underestimated growth or overestimated risk in the model, thus reducing our estimate of value.

Any or all three of these explanations could hold.

While it is natural to assume that you have estimated something wrong, the entire point of valuation is to take a stand when you feel that you have made reasonable assumptions. In other words, you could back out what would need to be true (in terms of growth and return on equity) for the market to be right, and then ask the question of whether this is feasible.

A FCFE Valuation: Aracruz Celulose

- The net income for the firm in 2003 was \$148.09 million but \$28.41 million of this income represented income from financial assets. The net income from non-operating assets is \$119.68 million.
- Inputs estimated for high growth period
 - Expected Growth in Net Income = Equity Reinvestment Rate * Non-cash ROE
 $= 65.97\% * 8.05\% = 5.31\%$
 - Cost of equity = $4\% + 0.7576 (12.49\%) = 13.46\%$
- After year 5, we will assume that the beta will remain at 0.7576 and that the equity risk premium will decline to 8.66%.
 - Cost of equity in stable growth = $4\% + 0.7576 (8.66\%) = 10.56\%$
 - We will also assume that the growth in net income will drop to the inflation rate (in U.S. dollar terms) of 2% and that the return on equity will rise to 10.56% (which is also the cost of equity).
 - Equity Reinvestment Rate_{Stable Growth} = Expected Growth Rate/ Return on Equity
 $= 2\%/10.56\% = 18.94\%$

We use the FCFE model because dividends are less than FCFE and we assume that leverage is stable. (If you can estimate FCFE, it is better to do the valuation using FCFE rather than dividends)

Aracruz: Estimating FCFE for next 5 years

	1	2	3	4	5
Net Income (non-cash)	\$126.04	\$132.74	\$139.79	\$147.21	\$155.03
Equity Reinvestment Rate	65.97%	65.97%	65.97%	65.97%	65.97%
FCFE \$42.89	\$45.17	\$47.57	\$50.09	\$52.75	\$55.09
Present Value at 10.33%	\$37.80	\$35.09	\$32.56	\$30.23	\$28.05
<ul style="list-style-type: none"> • FCFE in year 6 = Net Income in year 6 (1- Equity Reinvestment Rate_{Stable Growth}) = 155.03 (1.02) (1- .1894) = \$128.18 million • Terminal value of equity = $128.18 / (.1056 - .02) = \\1497.98 million 					
Present Value of FCFEs in high growth phase =				\$163.73	
+ Present Value of Terminal Equity Value = $1497.98 / 1.1346^5 =$				\$796.55	
Value of equity in operating assets =				\$960.28	
+ Value of Cash and Marketable Securities =				\$352.28	
Value of equity in firm =				\$1,312.56	
Value of equity/share =	\$1,312.56 / 859.59			= \$1.53/share	
Value of equity/share in BR = $\$1.53 * 3.15$ BR/\$	=			4.81 BR/share	
Stock price				7.50 BR/share	

These are the projected FCFE the next 5 years. These FCFE are discounted back to the present at the current cost of equity. Note that we add back cash and marketable securities because we estimated FCFE using net income only from operating assets. If we had used the total net income, we would have discounted back at a cost of equity computing using a lower beta (reflecting the cash balance) and not added back cash at the end....

Disney Valuation

■ Model Used:

- Cash Flow: FCFE (since I think leverage will change over time)
- Growth Pattern: 3-stage Model (even though growth in operating income is only 10%, there are substantial barriers to entry)

While Disney is a large firm, its brand name (especially in children's entertainment and theme parks) will allow it to earn excess returns and maintain high growth for a longer period.

Disney: Inputs to Valuation

	<i>High Growth Phase</i>	<i>Transition Phase</i>	<i>Stable Growth Phase</i>
Length of Period	5 years	5 years	Forever after 10 years
Tax Rate	37.3%	37.3%	37.3%
Return on Capital	12% (last year's return on capital was 4.42%)	Declines linearly to 10%	Stable ROC of 10%
Reinvestment Rate (Net Cap Ex + Working Capital Investments/EBIT)	53.18% (Last year's reinvestment rate)	Declines to 40% as ROC and growth rates drop: Reinvestment Rate = g/ROC	40% of after-tax operating income, estimated from stable growth rate of 4% and return on capital of 10%. Reinvestment rate = $4/10 = 40%$
Expected Growth Rate in EBIT	$ROC * Reinvestment Rate = 12\% * 0.5318 = 6.38\%$	Linear decline to Stable Growth Rate of 4%	4%: Set to riskfree rate
Debt/Capital Ratio	21% (Existing debt ratio)	Increases linearly to 30%	Stable debt ratio of 30%
Risk Parameters	Beta = 1.25, $k_e = 10\%$ Cost of Debt = 5.25% Cost of capital = 8.59%	Beta decreases linearly to 1.00; Cost of debt stays at 5.25% Cost of capital drops to 7.16%	Beta = 1.00; $k_e = 8.82\%$ Cost of debt stays at 5.25% Cost of capital = 7.16%

The transition period is used as a phase where the inputs from the high growth period can be adjusted towards stable growth levels (which reflect industry or market averages).

Note that we estimate reinvestment needs using the expected growth rate and the return on capital.

We are making the assumption that Disney will continue to earn excess returns even in stable growth. (The return on capital is moved towards the cost of capital, but it is still higher than the cost of capital). If that assumption seems over optimistic, the return on capital in stable growth can be set equal to the cost of capital.

The leverage is pushed up to 30%, which was the constrained optimal we arrived at in the capital structure section.

Disney: FCFE Estimates

Year	Expected Growth	EBIT	EBIT (1-t)	Reinvestment Rate	Reinvestment	FCFE
Current		\$2,805				
1	6.38%	\$2,984	\$1,871	53.18%	\$994.92	\$876.06
2	6.38%	\$3,174	\$1,990	53.18%	\$1,058.41	\$931.96
3	6.38%	\$3,377	\$2,117	53.18%	\$1,125.94	\$991.43
4	6.38%	\$3,592	\$2,252	53.18%	\$1,197.79	\$1,054.70
5	6.38%	\$3,822	\$2,396	53.18%	\$1,274.23	\$1,122.00
6	5.90%	\$4,047	\$2,538	50.54%	\$1,282.59	\$1,255.13
7	5.43%	\$4,267	\$2,675	47.91%	\$1,281.71	\$1,393.77
8	4.95%	\$4,478	\$2,808	45.27%	\$1,271.19	\$1,536.80
9	4.48%	\$4,679	\$2,934	42.64%	\$1,250.78	\$1,682.90
10	4.00%	\$4,866	\$3,051	40.00%	\$1,220.41	\$1,830.62

These projected cash flows reflect the assumptions made on the previous page. The reinvestment rate changes linearly over the transition period to reach the stable growth input of 40%.

Disney: Costs of Capital and Present Value

Year	Cost of capital	FCFF	PV of FCFF
1	8.59%	\$876.06	\$806.74
2	8.59%	\$931.96	\$790.31
3	8.59%	\$991.43	\$774.21
4	8.59%	\$1,054.70	\$758.45
5	8.59%	\$1,122.00	\$743.00
6	8.31%	\$1,255.13	\$767.42
7	8.02%	\$1,393.77	\$788.91
8	7.73%	\$1,536.80	\$807.42
9	7.45%	\$1,682.90	\$822.90
10	7.16%	\$1,830.62	\$835.31
PV of cashflows during high growth =			\$7,894.66

The cost of capital changes over time, since both beta and leverage change over time. As a result, the present value computation each year has to use the compounded cost of capital. To compute the present value of the cashflows in years 6 through 10, we have to use the compounded cost of capital over the previous years. To illustrate, the present value of \$1536.80 million in cashflows in year 8 is:

$$\text{Present value of cashflow in year 8} = 1536.80 / (1.0859^5 * 1.0831 * 1.0802 * 1.0773)$$

Disney: Terminal Value and Firm Value

■ Terminal Value

- $FCFF_{11} = EBIT_{11} (1-t) (1 - \text{Reinvestment Rate}_{\text{Stable Growth}}) /$
 $= 4866 (1.04) (1-.40) = \$1,903.84 \text{ million}$
- $\text{Terminal Value} = FCFF_{11} / (\text{Cost of capital}_{\text{Stable Growth}} - g)$
 $= 1903.84 / (.0716 - .04) = \$60,219.11 \text{ million}$

■ Value of firm

PV of cashflows during the high growth phase	= \$ 7,894.66
PV of terminal value	= \$ 27,477.81
+ Cash and Marketable Securities	= \$ 1,583.00
+ Non-operating Assets (Holdings in other companies)	= \$ 1,849.00
Value of the firm	= \$ 38,804.48

To estimate the terminal value, we first estimate how much needs to be reinvested. With a growth rate of 4%, and a return on capital of 10%, the total reinvestment (net cap ex + change in working capital) is 40%.

The free cash flow to the firm is used to arrive at the terminal value, with the cost of capital in year 11 being used as the discount rate.

Disney reported a book value of \$1.849 million for minority investments in other companies (Disney owns 39% of Euro Disney and 43% of the proposed Hong Kong Disney park. It also owns 37.5% of the A&E network and 39.6% of E! Television). primarily in non-US Disney theme parks. In the absence of detailed financial statements for these investments, we will assume that the book value is roughly equal to the market value. Note that we consider the rest of the assets on Disney's balance sheet including the \$6.2 billion it shows in capitalized television and film costs and \$19.7 billion it shows in goodwill and intangibles to be operating assets that we have already captured in the cashflows.

From Firm to Equity Value: What do you subtract out?

- The first thing you have to subtract out is the debt that you computed (and used in estimating the cost of capital). If you have capitalized operating leases, you should continue to treat operating leases as debt in this stage in the process.
- This is also your last chance to consider other potential liabilities that may be faced by the firm including
 - *Expected liabilities on lawsuits*: You could be analyzing a firm that is the defendant in a lawsuit, where it potentially could have to pay tens of millions of dollars in damages. You should estimate the probability that this will occur and use this probability to estimate the expected liability.
 - *Unfunded Pension and Health Care Obligations*: If a firm has significantly underfunded a pension or a health plan, it will need to set aside cash in future years to meet these obligations. While it would not be considered debt for cost of capital purposes, it should be subtracted from firm value to arrive at equity value.
 - *Deferred Tax Liability*: The deferred tax liability that shows up on the financial statements of many firms reflects the fact that firms often use strategies that reduce their taxes in the current year while increasing their taxes in the future years.

With tobacco companies, for instance, the expected liabilities from lawsuits can be a very large number and cannot be ignored. It is not easy to estimate and you may have to consult with lawyers (rather than financial analysts).

What about overfunded pension plans? There are some analysts who add the excess funding back to firm value, arguing that it belongs to stockholders. The legal and tax costs of trying to withdraw these funds are usually so high that it is prudent not to do this.

From Equity Value to Equity Value per share: The Effect of Options

- When there are warrants and employee options outstanding, the estimated value of these options has to be subtracted from the value of the equity, before we divide by the number of shares outstanding.
- There are two alternative approaches that are used in practice:
 - One is to divide the value of equity by the *fully diluted number of shares* outstanding rather than by the actual number. This approach will underestimate the value of the equity, because it fails to consider the cash proceeds from option exercise.
 - The other shortcut, which is called the *treasury stock approach*, adds the expected proceeds from the exercise of the options (exercise price multiplied by the number of options outstanding) to the numerator before dividing by the number of shares outstanding. While this approach will yield a more reasonable estimate than the first one, it does not include the time value of the options outstanding.

Valuing Disney's options...

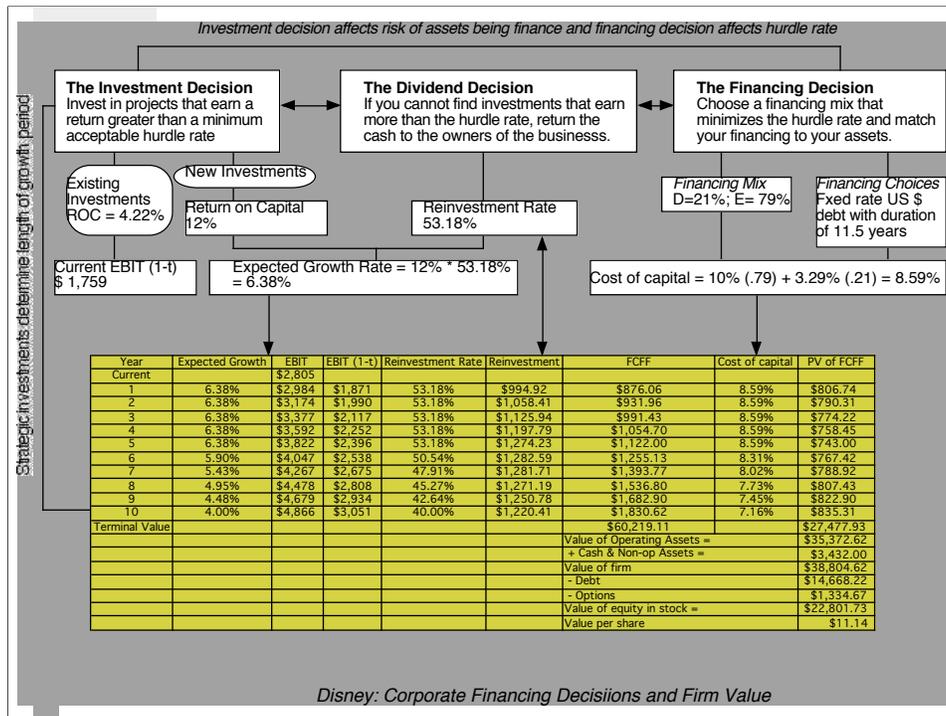
- At the end of 2003, Disney had 219 million options outstanding, with a weighted average exercise price of \$26.44 and weighted average life of 6 years.
- Using the current stock price of \$26.91, an estimated standard deviation of 40, a dividend yield of 1.21%, a riskfree rate of 4% and the Black-Scholes option pricing model we arrived at a value of \$2,129 million.
- Since options expenses are tax-deductible, we used the tax rate of 37.30% to estimate the value of the employee options:
- Value of employee options = $2129 (1 - .373) = \$1334.67$ million

In valuing the options, we modified the Black-Scholes model to allow for the fact that exercising these options will affect the stock price (reducing it by increasing the number of shares outstanding). We also used a historical standard deviation in Disney's stock price.

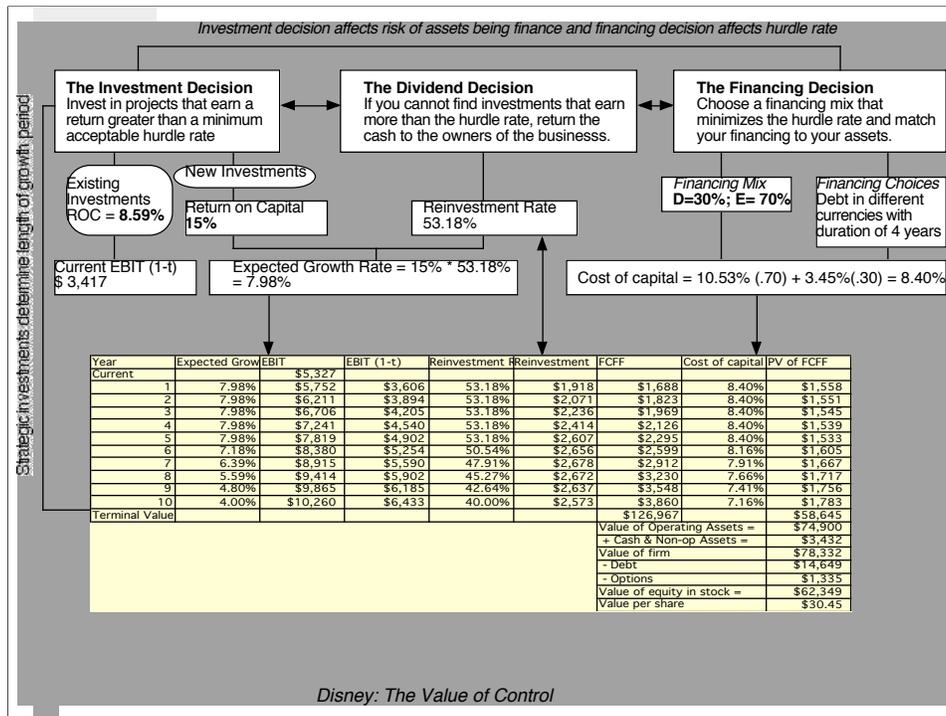
Disney: Value of Equity per Share

- Subtracting out the market value of debt (including operating leases) of \$14,668.22 million and the value of the equity options (estimated to be worth \$1,334.67 million in illustration 12.10) yields the value of the common stock:
- Value of equity in common stock = Value of firm – Debt – Equity Options =
 $\$38,804.48 - \$14,668.22 - \$1,334.67 = \$22,801.59$
- Dividing by the number of shares outstanding (2047.60 million), we arrive at a value per share of \$11.14, well below the market price of \$ 26.91 at the time of this valuation.

Note that we use the actual number of shares outstanding since we have considered the value of equity options explicitly.



Shows the link between our valuation and the earlier corporate financial analysis.



We changed three inputs:

1. We assumed that the return on capital on existing assets to the cost of capital of 8.59%, which increases the after-tax operating income to \$3,417 million
2. We assumed that new investments would earn a higher return on capital (15% instead of 12%)
3. The firm would move to its optimal debt ratio of 30% immediately and keep its existing debt on its books (at favorable interest rates). This reduces the cost of capital to 8.40%.

The net effect is that the value per share increases to \$30.45. The difference between this value and the value per share with the status quo (on last page) is the value of control; value of control = 30.45 - 11.14 = 19.31 per share.

Relative Valuation

- In relative valuation, the value of an asset is derived from the pricing of 'comparable' assets, standardized using a common variable such as earnings, cashflows, book value or revenues. Examples include --
 - Price/Earnings (P/E) ratios
 - and variants (EBIT multiples, EBITDA multiples, Cash Flow multiples)
 - Price/Book (P/BV) ratios
 - and variants (Tobin's Q)
 - Price/Sales ratios

This is the preferred mode of valuation on Wall Street. Philosophically, it is a different way of thinking about valuation.

In relative valuation, we assume that markets make mistakes on individual investments, but that they are right, on average, in how they price a sector or the market. (In discounted cash flow valuation, we assume that markets make mistakes over time.)

Multiples and Fundamentals

$$P_0 = \frac{DPS_1}{r - g_n}$$

- Gordon Growth Model:

- Dividing both sides by the earnings
- $$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- Dividing both sides by the book value of equity,

$$\frac{P_0}{BV_0} = PBV = \frac{ROE * \text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- If the return on equity is written in terms of the retention ratio and the expected growth rate

$$\frac{P_0}{BV_0} = PBV = \frac{ROE - g_n}{r - g_n}$$

- Dividing by the Sales per share,

$$\frac{P_0}{Sales_0} = PS = \frac{\text{Profit Margin} * \text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

All multiples have their roots in fundamentals. A little algebra can take a discounted cash flow model and state it in terms of a multiple. This, in turn, allows us to find the fundamentals that drive each multiple:

PE : Growth, Risk, Payout

PBV: Growth, Risk, Payout, ROE

PS: Growth, Risk, Payout, Net Margin.

Every multiple has a companion variable, which more than any other variable drives that multiple. The companion variable for the multiples listed above are underlined. When comparing firms, this is the variable that you have to take the most care to control for.

When people use multiples because they do not want to make the assumptions that DCF valuation entails, they are making the same assumptions implicitly.

Disney: Relative Valuation

Company Name	Ticker Symbol	PE	Expected Growth Rate	PEG
Point 360	PTSX	10.62	5.00%	2.12
Fox Entmt. Group Inc	FOX	22.03	14.46%	1.52
Belo Corp. 'A'	BLC	25.65	16.00%	1.60
Hearst-Argyle Television Inc	HTV	26.72	12.90%	2.07
Journal Communications Inc.	JRN	27.94	10.00%	2.79
Saga Communic. 'A'	SGA	28.42	19.00%	1.50
Viacom Inc. 'B'	VIA/B	29.38	13.50%	2.18
Pixar	PIXR	29.80	16.50%	1.81
Disney (Walt)	DIS	29.87	12.00%	2.49
Westwood One	WON	32.59	19.50%	1.67
World Wrestling Ent.	WWE	33.52	20.00%	1.68
Cox Radio 'A' Inc	CXR	33.76	18.70%	1.81
Beasley Broadcast Group Inc	BBGI	34.06	15.23%	2.24
Entercom Comm. Corp	ETM	36.11	15.43%	2.34
Liberty Corp.	LC	37.54	19.50%	1.92
Ballantyne of Omaha Inc	BTNE	55.17	17.10%	3.23
Regent Communications Inc	RGCI	57.84	22.67%	2.55
Emmis Communications	EMMS	74.89	16.50%	4.54
Cumulus Media Inc	CMLS	94.35	23.30%	4.05
Univision Communic.	UVN	122.76	24.50%	5.01
Salem Communications Corp	SALM	145.67	28.75%	5.07
Average for sector		47.08	17.17%	2.74

Note that when people compare firms across sectors, they implicitly assume that firms in a sector have similar risk and cash flow characteristics. This is clearly a dangerous assumption to make.

The PEG ratio is a simplistic way of controlling for expected growth differences across firms. A low PEG ratio is viewed as a sign of an undervalued firm.

The PEG ratio is based upon the implicit assumption that PE and expected growth are linearly related.

Is Disney fairly valued?

- Based upon the PE ratio, is Disney under, over or correctly valued?
 - Under Valued
 - Over Valued
 - Correctly Valued
- Based upon the PEG ratio, is Disney under valued?
 - Under Valued
 - Over Valued
 - Correctly Valued
- Will this valuation give you a higher or lower valuation than the discounted cashflow valuation?
 - Higher
 - Lower

If we assume that all of the firms in this sector have similar growth, risk and payout characteristics, Disney is under valued, because its PE is lower than the industry average.

On a PEG ratio basis, if we assume that all firms in this sector have similar risk and payout characteristics, Disney is also under valued.

It is tough to say. It depends upon whether the DCF valuation is making reasonable assumptions and whether the market, on average, is pricing these firms correctly.

Relative Valuation Assumptions

- Assume that you are reading an equity research report where a buy recommendation for a company is being based upon the fact that its PE ratio is lower than the average for the industry. Implicitly, what is the underlying assumption or assumptions being made by this analyst?
- The sector itself is, on average, fairly priced
- The earnings of the firms in the group are being measured consistently
- The firms in the group are all of equivalent risk
- The firms in the group are all at the same stage in the growth cycle
- The firms in the group are of equivalent risk and have similar cash flow patterns
- All of the above

All of the above.

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
 - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
 - Returns on projects should be measured based on cash flows generated and the timing of these cash flows; they should also consider both positive and negative side effects of these projects.
- Choose a financing mix that minimizes the hurdle rate and matches the assets being financed.
- If there are not enough investments that earn the hurdle rate, return the cash to stockholders.
 - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Objective: Maximize the Value of the Firm