Corporate Finance
B40.2302
*Lecture Note: Packet 1*

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This is an unconventional instructor's manual. I have annotated the slides I use in my corporate finance class. Feel free to add your own notes or modify mine…

The Objective in Corporate Finance

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

Since the objective in corporate finance (to maximize firm value) is central to everything we do, we need to look at both its strengths and weaknesses. In fact, many disagreements that people have with corporate finance practice stems from the fact that they have a different objective.

First Principles

| The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it. | The **return** should relfect the magnitude and the timing of the cashflows as welll as all side effects. | The **optimal mix** of debt and equity maximizes firm value | The **right kind** of debt matches the tenor of your assets | **How much cash** you can return depends upon current & potential investment opportunities | **How you choose** to return cash to the owners will depend whether they prefer dividends or buybacks |

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Maximize the value of the business (firm)

Our focus will be on the objective: Maximize firm value. What are the choices in terms of objectives and why this one?

■ **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 "stockholder value maximization", Brealey and Myers and Copeland and Weston as stockholder wealth maximization and Brigham and Gapenski as the maximization of 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 <u>maximize the value of the firm</u>.
- A narrower objective is to <u>maximize stockholder wealth</u>. When the stock is traded and markets are viewed to be efficient, the objective is to <u>maximize the stock price</u>.

Maximize equity value ← Maximize market estimate of equity value

Maximize firm value →

Maximize equity value ↓

Assets		Liabilities	
Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived(working capital) assets	Assets in Place	Debt	Fixed Claim on cash flows Little or No role in management *Fixed Maturity* *Tax Deductible*
Expected Value that will be created by future investments	Growth Assets	Equity	Residual Claim on cash flows Significant Role in management *Perpetual Lives*

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

1. Maximizing the value of the business is the most general objective function. Remember that value of the business includes assets in place and growth assets. If you are managing a growth company,, increasing earnings may not necessarily increase firm value. The other problem is that firm value itself is a difficult number to estimate. While there are models available, they all need inputs, most of which allow for subjective judgments.

2. Managers answer to stockholders. Consequently, the objective gets narrowed down to "maximizing equity value". (Implicit assumption: Bondholders/ Banks can protect themselves by writing in covenants and setting interest rates).

3. It is tough to assess equity value objectively. It would be nice to have a "third party" estimate that is objective. For publicly traded firms, the market (in spite of all its limitations) provides such an estimate. (Implicit assumption: Markets are rational and reasonably efficient).

Maximizing Stock Prices is too "narrow" an objective: A preliminary response

- 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 profitable firms that can afford to treat 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 of 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.

Maximizing firm value is incompatible with caring for your customers. 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?

Firms that maximize firm value are bad social citizens. 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

Why traditional corporate financial theory focuses on maximizing stockholder wealth.

- Stock price is <u>easily observable</u> and constantly updated (unlike other measures of performance, which may not be as easily observable, and certainly not updated as frequently).
- If investors are <u>rational</u> (are they?), stock prices reflect the wisdom of decisions, short term and long term, instantaneously.
- The objective of stock price performance provides some <u>very elegant theory</u> on:
  - Allocating resources across scarce uses (which investments to take and which ones to reject)
  - how to finance these investments
  - 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

STOCKHOLDERS

Hire & fire
managers
- Board
- Annual Meeting

Maximize
stockholder
wealth

Lend Money

No Social Costs

BONDHOLDERS ←——————→ Managers ←——————→ SOCIETY

Protect
bondholder
Interests

Costs can be
traced to firm

Reveal
information
honestly and
on time

Markets are
efficient and
assess effect on
value

FINANCIAL MARKETS

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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.
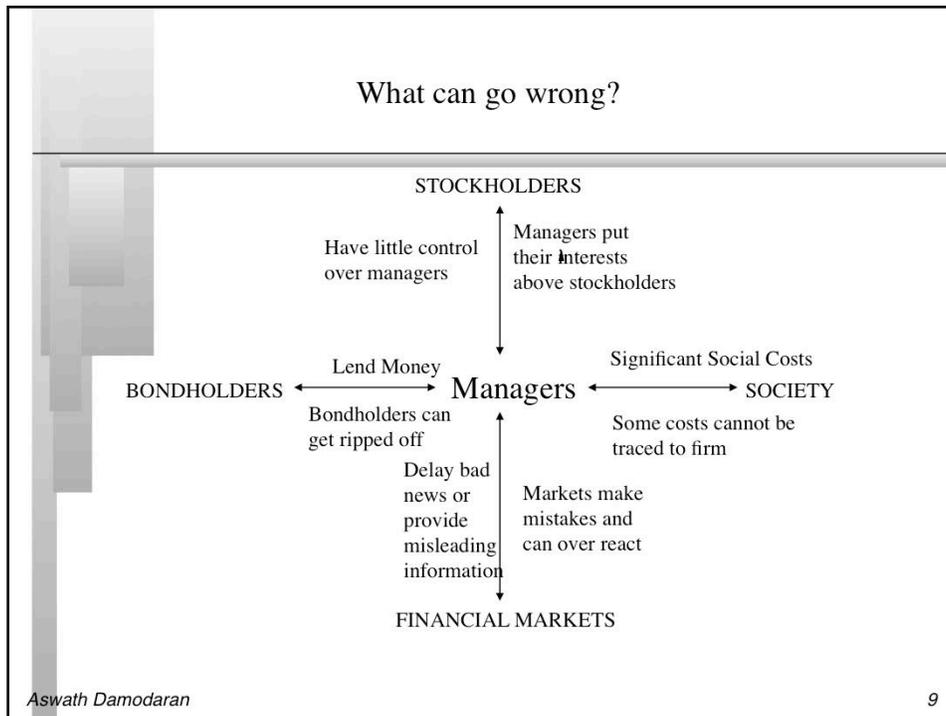
What can go wrong?

STOCKHOLDERS

Have little control over managers

Managers put their interests above stockholders

Lend Money

BONDHOLDERS ← → Managers ← → SOCIETY

Significant Social Costs

Bondholders can get ripped off

Some costs cannot be traced to firm

Delay bad news or provide misleading information

Markets make mistakes and can over react

FINANCIAL MARKETS

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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.

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. So why don't they work?

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. There are also potential conflicts of interest, since Fidelity is also in the business of managing corporate pension funds… Even activist investment funds (such as the California Pension Fund), have pulled back in recent years. (Putnam exception? See WSJ article on Putnam: Putnam is one of the few mutual fund companies to context management)

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. In Europe, until very recently, annual meetings were exquisitely well mannered affairs where elite managers told plebian stockholders what was good for them - shades of Marie Antoinette and "let them eat cake"…. (At Tattingers, the French luxury good company that owns Tattingers and Baccarat, Claudia Tattinger said that she felt ashamed for the stockholders who would ask "such

And institutional investors go along with incumbent managers…

Mainstream Mutual Fund Families
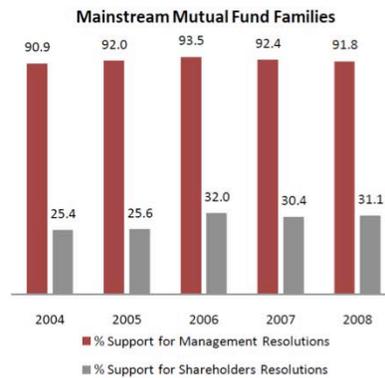
You would expect mutual funds and other institutional investors to take a more activist role and act as a check on the incumbent managers at annual meetings. For the most part, though, they seem to be supporters of the status quo, seldom challenging managers (even when they are wrong). This can be attributed to two factors:

1.Cost: It is costly to challenge incumbent managers. For institutional investors spread over multiple firms, this cost may be too high to bear.

2.Conflicts of interest: Many mutual fund families also look to companies for business. To the extent that challenging managers may cost them this business, they may hold back.

Board of Directors as a disciplinary mechanism

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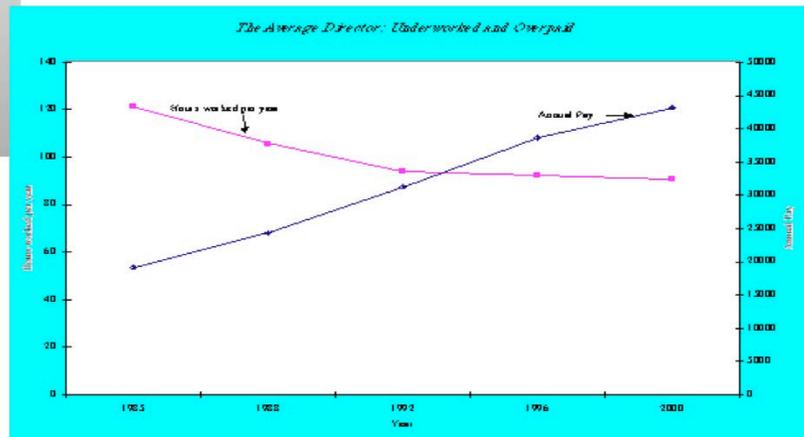
This sounds judgmental and it is meant to be. Directors do not spend a great deal of time overseeing managers, and they are well paid.

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 Business Week article looking at the board.)

As a postscript, the pay of directors has kept rising since 2000 to about $76,000 in 2004 and the number of hours spent has also increased somewhat though how much of this additional time is spent on getting legal protection (against stockholder lawsuits) is debatable.

- A 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. While more companies have outsiders involved in picking directors now, CEOs still exercise significant influence over the process.
- 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. While share ownership is up among directors today, they usually get these shares from the firm (rather than buy them).
- Many directors are themselves CEOs of other firms. Worse still, there are cases where CEOs sit on each other's boards.

When John Mack became CEO of Morgan Stanley, the fist two directors he picked to sit on the board were members of his golf club in Purchase, NY…

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 ITT 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 often 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
Shamrock 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, Liipfert, Bernard , McPherson
and Hand

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

Richard A. Nunis
Chairman
Walt Disney Attractions

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

Michael S. Ovitz [3]
President
The Walt Disney Company

Sidney Poitier [2,4]
Chief Executive Officer
Verdon-Cedric Productions

Irwin E. Russell [2,4]
Attorney at Law

Robert A.M. Stern
Senior Partner Productions

E. Cardon 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 standing. This was Disney's board at the height of Michael Eisner's powers. (Eisner became CEO of Disney in 1985 and consolidated power in the years after.)

Note the number of insiders on the board. (Seven out of 16; five current employees & two ex-employees)

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

How independent was this board likely to be of Mr. Eisner? This may explain some of the actions taken by Disney (and specifically Eisner) during the 1990s… (Read Disney War by James Stewart for the gory details)

-When Eisner was hired in 1984, he insisted on bringing in his protégé Jeffrey Katzenberg, a brilliant show-biz exec lacking in social skills, into the firm with him. Katzenberg was largely responsible for the rebirth of Disney Animation (which Eisner had considered shutting down) with The Little Mermaid, Beauty and the Beast and The Lion King all proving to be mega-winners. As a reward for this success, Esiner fired him. His lucrative contract entitled him to 2% of the revenues from the movies he made in posterity but he would have settled for $100 million. Eisner refused to pay; Disney paid $ 250 million in 1999.

-In 1995, Eisner hired Ovitz, the leading agent in Hollywood, and then told the

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

BW RANK	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. DILLARD'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. OGDEN	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. However, a poor board give CEOs carte blanche to do what they want to do… At some point in time, even good managers need restraint and good counsel. A rubber-stamp board will not provide that. (The best analogy is to a dictator… the line between a benevolent dictator and a malevolent one is a very fine one…)

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 reasonably in both periods.)

- 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?
- Are there any external measures of the quality of corporate governance of your firm?
  - Yahoo! Finance now reports on a corporate governance score for firms, where it ranks firms against the rest of the market and against their sectors.

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.

No stockholder approval needed...... Stockholder Approval needed

■ 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:** Acquisitions often are driven by management interests rather than stockholder interests.

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)

The reason that I have put overpaying on poison pills and shark repellants below greenmail and golden parachutes is not because they create less damage to stockholders but because stockholders at least get a chance to voice their view (they both require stockholder approval). Greenmail and golden parachutes just require board approval.

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 of increasing stockholder wealth or delivering higher profitability.

(Good references:

The Synergy Trap, Mark Sirower)

A Case Study: Kodak - Sterling Drugs
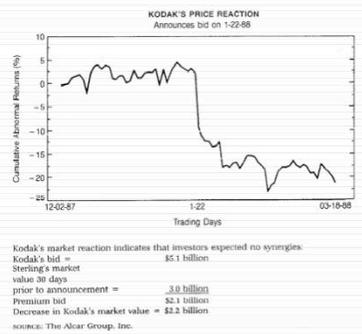
Note the difference in stock price behavior of the target and bidding firms.

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

Sterling Drug under Eastman Kodak: Where is the synergy?
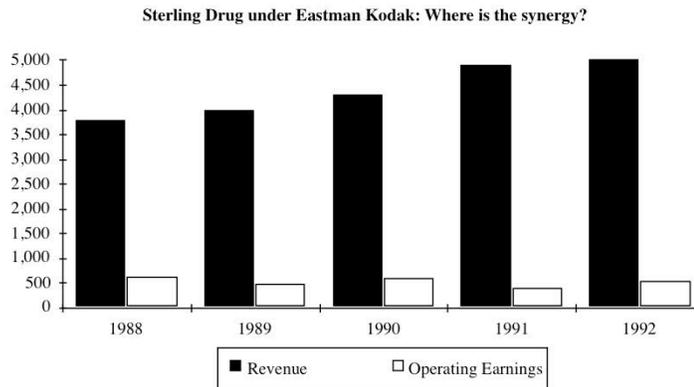
Where is the synergy?

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 deliver?

•Firms do not plan for it at the time of the acquisitions

•Culture shock

•Unrealistic assumptions

Kodak Says Drug Unit Is Not for Sale … but…

- 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.

It is also worth noting that analysts sometimes say the most inane things in response to corporate actions and strategic buzzwords will often be offered by corporate chieftains (focus, diversification, synergy, strategic considerations..)

⌛Application Test: Who owns/runs your firm?

Look at: Bloomberg printout **HDS** for your firm
- Who are the top stockholders in your firm?
- What are the potential conflicts of interests that you see emerging from this stockholding structure?

Government

Outside stockholders
- Size of holding
- Active or Passive?
- Short or Long term?

Managers
- Length of tenure
- Links to insiders

Control of the firm

Employees   Lenders

Inside stockholders
% of stock held
Voting and non-voting shares
Control structure
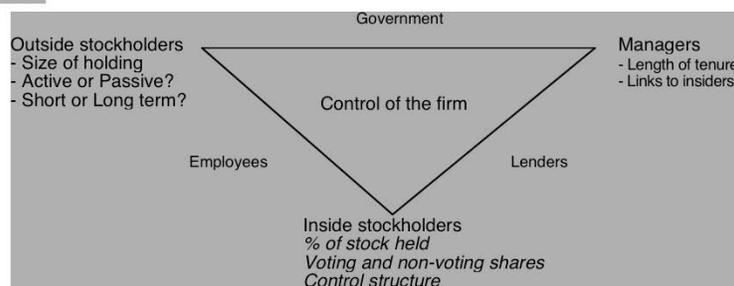
One of your first tasks when assessing a company is to see whether managers have a significant stake in the company. You can get this information in a variety of places. I use Bloomberg to get the data on the top 17 stockholders and go down the list to see if incumbent managers have a stake in the company. I also check to see if there are other investors on the list who may not be incumbent managers but are strong advocates for stockholders - Berkshire Hathaway at Coca Cola, KKR or Blackstone at many publicly traded firms…

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

As you look at the list of top stockholders, you should be also considering the potential conflicts of interest created by the stockholder structure.

-Inside stockholders (Founding family, controlling stockholder/manager) versus outside stockholders

-Government as major stockholder (or holder of golden vote)

-Employees as major stockholders

Case 1: Splintering of Stockholders
Disney's top stockholders in 2003

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). 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. The government is a large stockholder (or a stockholder with veto power). This may keep managers in some check but it will create potential conflicts of interest between the other stockholders and the government (Consider what would happen if the company tried to minimize taxes paid)

4. 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 is reduced as holdings get diluted among lots of family

Case 2: Voting versus Non-voting Shares: Aracruz

- Aracruz Cellulose, like most Brazilian companies, had multiple classes of shares.
  - 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.

Case 3: Cross and Pyramid Holdings
Tata Chemical's top stockholders in 2008

Cross holding structures are often designed with control in mind. In the case of Tata Chemicals, other Tata companies (which are part of the Tata family group) represent 5 of the top 15 stockholders in the company. (At least the Tatas are up front and open about their cross holding structures… In many Indian companies, the cross holdings are disguised with front companies holding the stock for families).

In Asia and Latin America, corporate holdings structures are designed to consolidate control.

Things change.. Disney's top stockholders in 2009

Things can change… This is Disney in 2009. Note that there is now an individual at the top of the list – Steve Jobs, whose holdings come from his majority ownership at Pixar that was acquired by Disney.

As a stockholder in Disney, what are your thoughts about Jobs at the top of the list?

I think that it will shake the company up. Jobs has many shortcomings, but he is a visionary who will push Disney to take another look at its established business practices.

II. Stockholders' objectives vs. Bondholders' objectives

- <u>In theory</u>: there is no conflict of interests between stockholders and bondholders.
- <u>In practice</u>: 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). What is good for stockholders is not necessarily good for lenders….

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. Lenders value stability and security. Equity investors share in upside and may prefer to cash out…

RJR Nabisco's Bonds Sink Following Announcement of the Leveraged Buyout

RJR Nabisco 30-year bond (8¾%, due 2016)

Daily price

88
87
86
85
84
83
82
81
80
79
78
77
76
75
74
73
72
71
70
69

10/10 10/12 10/14 10/18 10/20 10/24 10/26 10/28 11/1 11/3 11/7 11/9
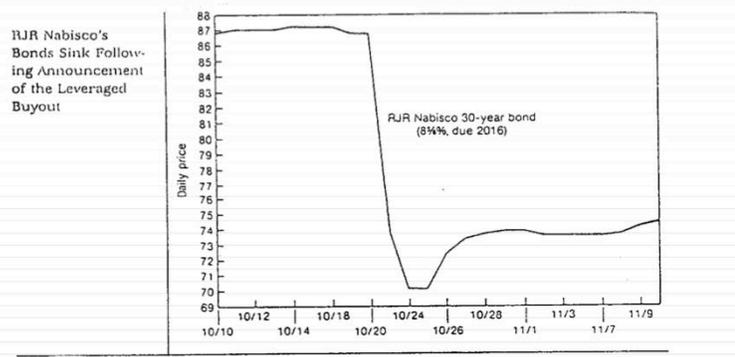
The fact that a company is well known and has a good reputation(as Nabisco did in the early 1980s, when you bought the bond) will not protect you as a lender. Nabisco's bond price plummeted on the day of the LBO, while the stock price soared.

Is this just a paper loss? (You still get the same coupons. 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 an event 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 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.

Note:

a. Efficient markets can and often should be volatile. True values change on a minute by minute basis, and so should the price.

b. Information should still affect prices in an efficient market.

- 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.

Or Satyam Computer (a CFO who could not find the cash)….Or Mercury Finance (a company that could not find its CFO..) … Or Comverse, the Israeli company that could not find its CEO (until someone spotted him in Sri Lanka… and later in Namibia)

For a non-US example, consider Parmalat, the Italian dairy company. The managers and promoters of the firm went to jail because billions in debt raised by the firm could not be traced.

And there is Enron… and WorldCom… and Tyco…

Notwithstanding these examples, outright fraud remains the exception rather than the rule… What is more common is for firms to fudge the truth or to try to control the release of bad news to the market.

Evidence that managers delay bad news?

DO MANAGERS DELAY BAD NEWS?: EPS and DPS Changes- by Weekday
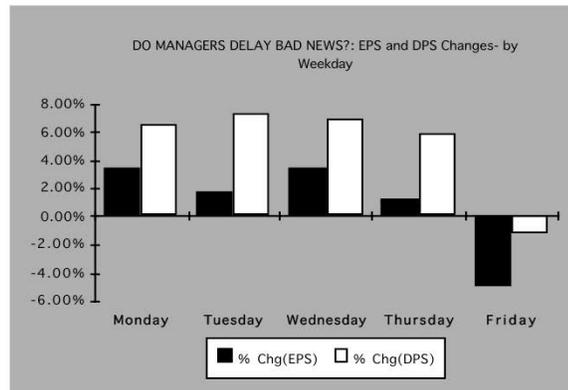
This study looked at thousands of earnings and dividend announcements, categorized by day of the week in the 1980s. Either bad things tend to happen on Fridays, or managers are trying to hold on to bad news until Friday. In fact, most of the bad news on Friday comes out after 4 pm, and markets have closed.

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..

- Investors are irrational and prices often move for not reason at all. As a consequence, prices are much <u>more volatile</u> than justified by the underlying fundamentals. Earnings and dividends are much less volatile than stock prices.
- Investors <u>overreact</u> to news, both good and bad.
- Financial markets are <u>manipulated by insiders</u>; Prices do not have any relationship to value.
- Investors are <u>short-sighted</u>, 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 they under react. 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.

- 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
- Neither managers nor markets are trustworthy. Regulations/laws should be written that force firms to make 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.

However, most people are also unwilling to trust managers to make good long-term decisions, which brings the real problem to the forefront. The question should not be whether you trust the market to be long term, but whether you trust markets more than managers…

The point is that markets are imperfect, but someone has to make the judgments. Managers argue that they do it better. Governments argued (especially in the socialist heyday) that they have a long term focus. The Ministry of Finance in Japan thought it had the monopoly on long term perspective.

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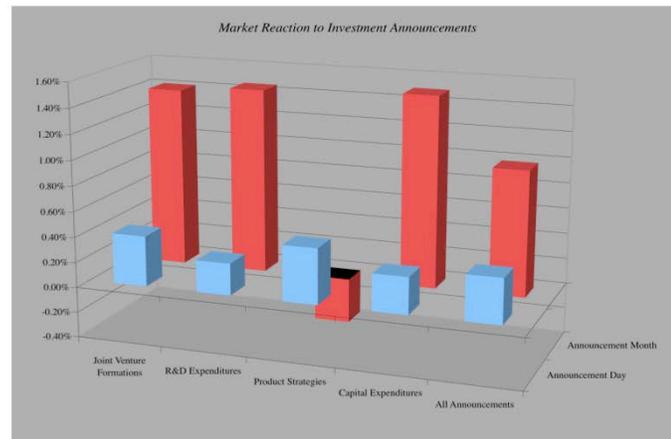
Note that the price increases tend to be small, since these announcements tend to affect value by only small amounts. The effect seems to correlate with the weightiness of each announcement, being lower for product strategy announcements (which might signify little or no real investment) and being higher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

You may argue that investors may be reacting this way because they want to make short term profits and that could be true, but so what? As long as the end-result is a price that reflects long term value, does it matter that what allowed that to happen was greedy, short term investors.

Note that only down markets are viewed as failures.. But not up markets! In other words, we are selective about our outrage. We feed off the positives of markets, attributing success to everything but the presence of markets but when markets fail, we blame their existence.

Here is a follow up. If it is market volatility that is the culprit, note that the they reflected some real uncertainty – about economic growth, bank failures and government actions.

As a thought experiment, consider a world without financial markets and ask yourself whether the gains would exceed the losses. (This does not have to be an experiment.. After all, Asia prior to the 1990s was a world without functioning financial markets for millennia… What was the real growth rate in India and China prior to 1995 and pos-1995?

Do I have less trust in markets now than I did a few months ago? Of course. But I have even less trust in the other (alternate) institutions that I would have used instead – managers, governments, central banks, experts… This may sound weird. But, on a relative basis, I trust markets more now than I did in September 2008.

IV. Firms and Society

■ **In theory**:   All costs and benefits associated with a firm's decisions can be traced back to the firm.

■ **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. In other words, a firm may think that it is delivering a product that enhances society, at the time it delivers the product but discover afterwards that there are very large costs. (Asbestos was a wonderful product, when it was devised, light and easy to work with… It is only after decades that the health consequences came to light)
- 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.

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.

The bottom line is the following. If you own a private business, you can do whatever you want with your money. If you are a managers of a publicly traded firm, you are being charitable with other people's money. You have an obligation to be open and up-front with your stockholders about how much you are spending to be socially conscious and give them a chance to decide whether you should continue on your path.
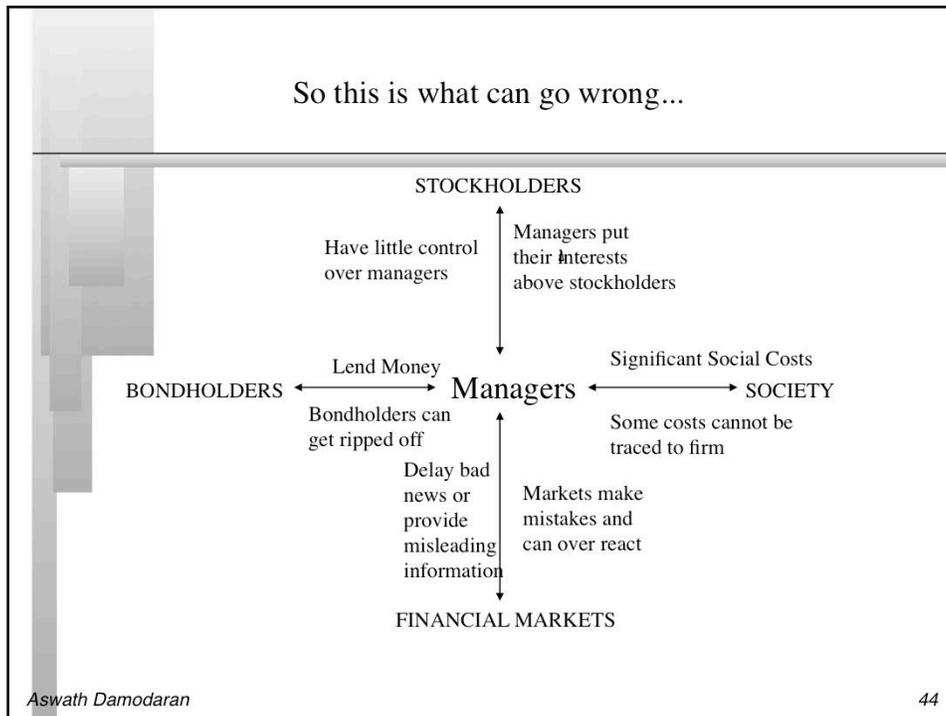
So this is what can go wrong...

STOCKHOLDERS

Have little control over managers

Managers put their interests above stockholders

Lend Money

BONDHOLDERS ← → Managers ← → SOCIETY

Significant Social Costs

Bondholders can get ripped off

Some costs cannot be traced to firm

Delay bad news or provide misleading information

Markets make mistakes and can over react

FINANCIAL MARKETS

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 <u>different mechanism for corporate governance</u>, i.e, assign the responsibility for monitoring managers to someone other than stockholders.
- To choose a <u>different objective</u> for the firm.
- To maximize stock price, but reduce the potential for conflict and breakdown:
  - Making managers (decision makers) and employees into stockholders
  - Protect lenders from expropriation
  - By providing information honestly and promptly to financial markets
  - Minimize social costs

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 its 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)

In recent years, people have pointed to the Chinese system (centrally planned, quasi market) as the success story. I don't buy it (yet). The test of a system comes not during periods of success but during periods of failure. Neither the Chinese nor the Indian systems have been tested yet. The next two years will tell us whether either system is a long term sustainable system.

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?

In the 1980s, American Airlines (under Robert Crandall) set itself the objective of becoming the number one domestic airline in the United States. It succeeded but by 1989, it was losing billions.

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 Carl Icahn specialize in taking large positions in companies which they feel need to change their ways (Blockbuster, Time Warner and Motorola) 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 recent years, private equity investors have joined the fray as activist investors pushing managers to change the way they run their firms.

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.

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.

The scandals at Enron and Tyco created the impetus for Sarbanes-Oxley, which in turn created a legal mandate for more independent boards..

The annual reports of more and more companies include corporate governance rules that they have adopted.

Eisner's concession: Disney's Board in 2003

Board Members	Occupation
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.

By 2003, stockholders were in open revolt at Disney. A hostile bid by Comcast for Disney was rebuffed by the board, with little discussion of its merits. In the 2004 meeting, 45% of the stockholders voted against Eisner's compensation contract and 23% voted against George Mitchell for Chairman. 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. The jobs of CEO and Chairman were separated. Nevertheless, this board is a 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…

Shortly after this filing, Stanley Gold and Roy Disney resigned from the board in protest over its ineffectiveness.

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 credible if they had been adopted at the height of Eisner's powers (say, in 1994)….

The changes made by Eisner were too little.. Too late,,, and he was forced to leave in 2005, His successor, Bob Iger, has made a break from the past. Note the differences between the board in 2008 and the one in 2004:

1.It is smaller, 12 members instead of 18.

2.There is little overlap between this board and the 2003 board, reflecting the fact that this is now Iger's board and not Eisner's board.

3.The directors with the most obvious conflicts of interests are gone.

The question, though, is an open one. As Iger becomes entrenched as CEO, will be find directors who are beholden to him?

What about legislation?

- Every corporate scandal creates impetus for a legislative response. The scandals at Enron and WorldCom laid the groundwork for Sarbanes-Oxley.
- You cannot legislate good corporate governance.
    - The costs of meeting legal requirements exceed the benefits
    - Laws always have unintended consequences
    - In general, laws tend to be blunderbusses that penalize good companies more than they punish the bad companies.

While the motives for passing these laws may be good, there are significant costs. Sarbanes-Oxley has created new business for consultants, corporate governance experts and lawyers but it is debatable whether it has made boards more effective. In fact, while laws can require that directors be independent, it cannot force them to be competent.

You can try suing managers and directors who do not do their job but it is difficult to win. Disney's stockholders sued in a Delaware court over the Ovitz fiasco, arguing that directors had not done their jobs. The court largely agreed with them on the failures of directors but ruled against the stockholders because the directors acted in good faith.

Ultimately, the best antidote to poor corporate governance is a stockholder base that takes its responsibilities seriously. Mutual funds need to think like stockholders and take a role in overseeing management (or at least demanding accountability).

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.

Think of companies that have been destroyed or severely damaged by fraud and scandal over the last decade - Enron, Tyco, Cendant and Worldcom come to mind. In each of these firms, the board was largely ineffective and the top management ran the company.

Perhaps the best indicator that corporate governance matters is that independent services have come into being to measure the strength of corporate governance at companies. (You can get the Corporate Governance Score for many US companies on Yahoo! Finance)

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 process never ends, though. A new set of lessons seem to be in order after the banking and loan crisis of 2008: that accounting statements are deceptive, that credit risk can change quickly and that macro problems can very quickly make even safe firms into risky ones. It will be interesting to see how bonds change to reflect these lessons.

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 development of hedge funds (which can go short) and long term put options is good from this perspective. Short term solutions that prevent trading (restrictions on short selling, increased transactions costs) will only make this response less effective.

■ 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 socially irresponsible.

None of these measures is perfect or complete, but they reflect the tug-of-war between private and public interests. Ultimately, if you want companies to be socially conscious, you have to make it in their economic interests to behave as such.

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 specialty 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

STOCKHOLDERS

1. More activist investors
2. Hostile takeovers

Managers of poorly run firms are put on notice.

Protect themselves

BONDHOLDERS ←→ **Managers** ←→ SOCIETY

Corporate Good Citizen Constraints

1. Covenants
2. New Types

1. More laws
2. Investor/Customer Backlash

Firms are punished for misleading markets

Investors and analysts become more skeptical

FINANCIAL MARKETS

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

- 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, with no constraints
  b) Maximize stock price, with constraints on being a good social citizen.
  c) Maximize stockholder wealth, with good citizen constraints, and hope/pray that the market catches up with you.
  d) Maximize profits or profitability
  e) Maximize earnings growth
  f) Maximize market share
  g) Maximize revenues
  h) Maximize social good
  i) None of the above

If the sales pitch has worked, and you believe in financial markets, you would choose to maximize stock price, subject to constraint.

If the sales pitch has worked but you remain skeptical about the short term efficiency of markets, you would maximize stockholder wealth.

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.

My bottom line. Companies should focus on **making decisions that increase long term value** but remain cognizant of what the market thinks (and the market price). They should consider market reactions to their actions and consider the possibility that the market is right (and that they are wrong). If they believe that the market reaction is wrong and that it is based upon incomplete or erroneous information, they should try to set the record straight.

As for social obligations, companies have to recognize that it is in their best long term interests to not violate social norms (even if such violations are legal). They should be open about their social consciousness (but not holier than thou) and be willing to expend real resources (not just words) and be open about their social investments.

The Investment Principle: Risk and Return Models

"You cannot swing upon a rope that is attached only to your own belt."

While the general presumption is that risk is a bad thing and some seek to avoid it at any cost, the reality is that businesses will not only always be exposed to risk but success may sometimes ride on seeking out and taking specific risks.

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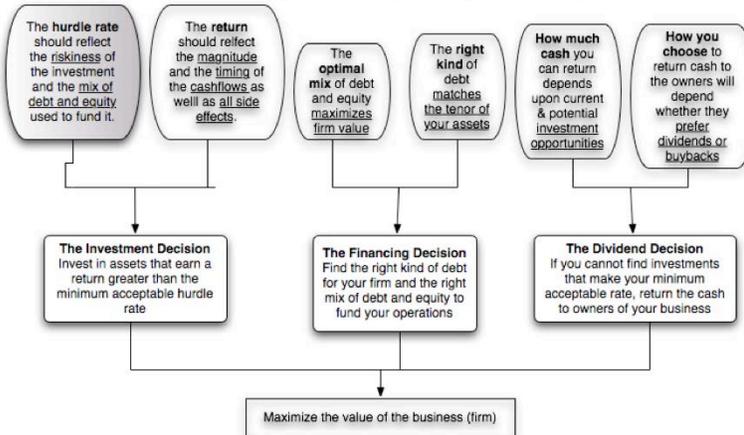
The focus of the first part of this investment analysis section is on coming up with a minimum acceptable hurdle rate. In the process, we have to grapple with the question of what risk is and how to bring risk into the hurdle rate.

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 <u>higher for riskier projects</u> than for safer projects.
- A simple representation of the hurdle rate is as follows:

  Hurdle rate = Riskless Rate + 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. You cannot have one, without the other.

Note that risk is neither good nor bad. It is a combination of danger and opportunity - you cannot have one without the other. Consequently, risk is neither something to be avoided nor sought out but carefully balanced. Good business avoid some risks, let others pass through to their investors and actively seek out still others.

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.

-Bob Citron, treasurer of Orange County (CA), after he lost a chunk of the county's pension fund money after investing in interest rate derivatives claimed that he was "not a finance person" and that Merrill's market strategist (Charlie Clough) had told him he could make "15% with no risk".

-Many prominent (and intelligent) people invested with Bernie Madoff because he promised them (through third parties) that he could deliver 8% more than the treasury bill rate, guaranteed. (He was called the Jewish T.Bill). One investor, interviewed by the NY Times said, "I really did not understand what he was doing, but he said was going to do something with calls, something with puts and earn 12% every year. It sounded plausible (and all my friends were investing with him too).

A good risk and return model should…

1. It should come up with a <u>measure of risk</u> that <u>applies to all assets</u> and not be asset-specific.
2. It should <u>clearly delineate what types of risk are rewarded</u> and what are not, and provide a rationale for the delineation.
3. It should come up with <u>standardized risk measures</u>, 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 <u>translate the measure of risk into a rate of return</u> that the investor should demand as compensation for bearing the risk.
5. It should <u>work well not only at explaining past returns</u>, 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…

A risk measure that works only for US stocks or even for only publicly traded firms is inferior to one that applies across all stocks.

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.

Low Variance Investment

High Variance Investment
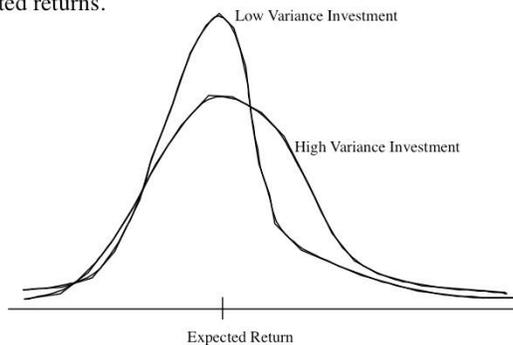
Expected Return

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 return. It is riskfree.

> 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...

Figure 3.4: Returns on Disney: 2004- 2008
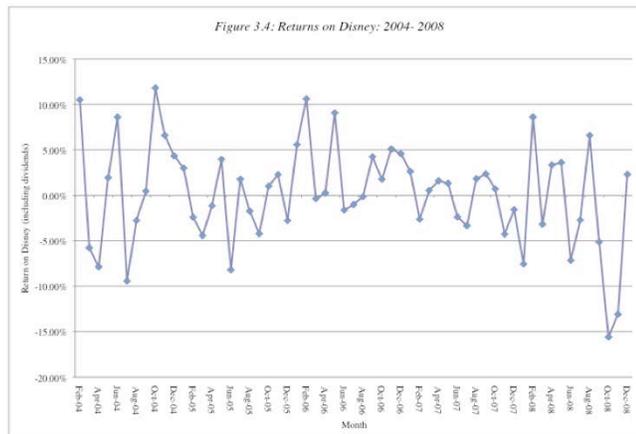
Disney's stock price has been volatile, yielding a standard deviation of 19.36% (on an annualized basis) between 12004 and 2008. If you were an investor looking at Disney in 2009, what concerns (if any) would you have in using this as your measure of the forward looking risk in Disney stock?

1.Disney as a company changed over this period. The standard deviation from the past may not be a good indicator or future risk.

2.If historical standard deviations are your only way of estimating risk, it makes it impossible to measure risk in non-traded assets.

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?

Would your answer change if you were not told that there is a small possibility that you could lose 100% of your money on investment A but that your worst case scenario with investment B is -50%?

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.

Once you add the possibility that the big positive jumps are matched by the possibility of big negative jumps, the game changes again. This propensity, called kurtosis, is not desirable to most investors.

In the real world, investments reveal far too much skewness and kurtosis than would be expected in the standard normal distribution. In fact, there are some (Mandelbrot decades ago to Taleb in the Black Swan today) who have argued that the dependence on the normal distribution is what causes risk management systems like Value at Risk (VAR) to fail.

The Importance of Diversification: Risk Types

Figure 3.5: A Break Down of Risk
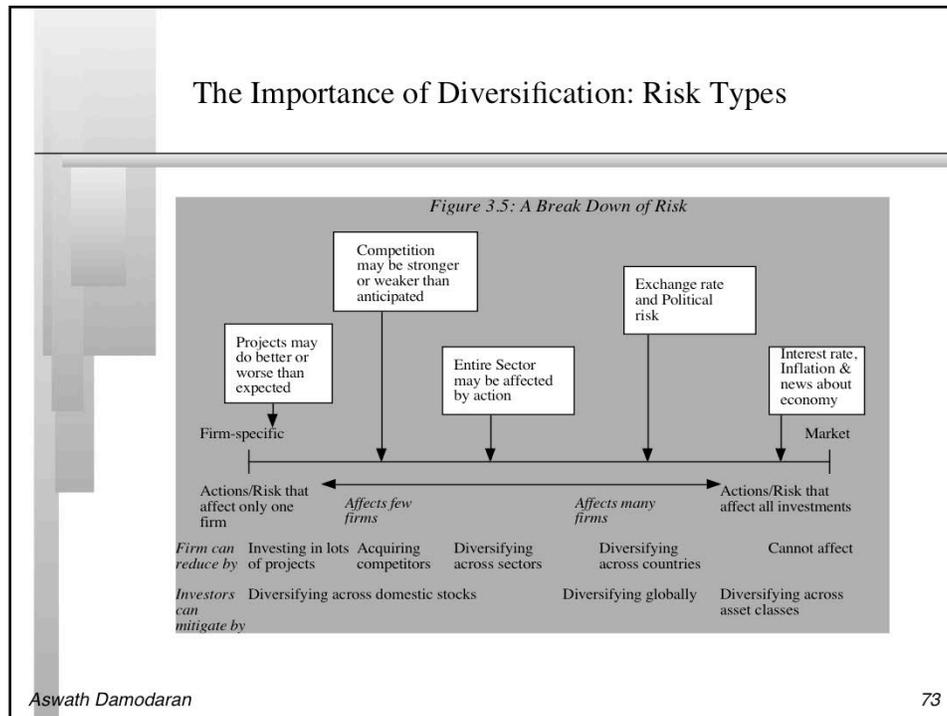
This is the critical second step that all risk and return models in finance take. As examples,

> Project-specific Risk: Disney's new Hong Kong theme park: To the degree that actual revenues at this park may be greater or less than expected. (Other examples: A big budget movie, ESPN Asia…)

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

> 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 or the economy weakens, 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 <u>can be reduced</u>, if not eliminated, by <u>increasing the number of investments in your portfolio</u> (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 <u>much smaller percentage</u> 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 <u>average out to zero</u>. (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)

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 <u>a lot of stock</u> and also <u>trade a lot</u>.
- 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…

Percent of Stock held by Institutions	Percent of Stock held by Insiders	Marginal Investor
High	Low	Institutional Investor[a]
High	High	Institutional Investor, with insider influence
Low	High (held by founder/manager of firm)	Tough to tell; Could be insiders but only if they trade. If not, it could be individual investors.
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 and considering whether that investor is likely to be diversified.

	Disney	Deutsche Bank	Aracruz (non-voting)	Tata Chemicals
Institutions	72%	76%	32%	47%
Individuals	21%	23%	60%	24%
Insiders	7%	1%	8%	29%*

Disney and Deutsche 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 and Tata Chemicals has cross holdings. We would be more cautious in extending the "marginal investor is diversified" argument to Aracruz and Tata Chemicals than we would with Disney and Deutsche Bank.

Looking at Disney's top stockholders in 2009 (again)

Of Disney's top 17 investors, only 1 is an individual…. And Steve Jobs does not trade often (as an insider, he is constrained), making the remaining institutional investors the marginal investors…

And the top investors in Deutsche and Aracruz…

Disney	Deutsche Bank	Aracruz Preferred	–Tata Chemicals
Steven Jobs (7.43%)	Deutsche Post (8.05%)	BB DTVM (0.89%)	Tata Sons (14.26%)
Fidelity (4.86%)	Allianz (6.81%)	Barclays(0.34%)	Life Insurance Co (11.71%)
State Street (3.97%)	AXA (4.64%)	Banco Itau (0.32%)	Tata Investment (6.8%)
Barclays (3.79%)	Credit Suisse (3.55%)	Banco Barclays (0.19%)	Tata Tea (6.54%)
Vanguard Group (3.07%)	Deutsche Bank (3.52%)	Vanguard Group (0.18%)	New India Assur. (2.58%)
Southeastern Asset (2.40%)	Barclays (3.02%)	UBS Strategy (0.17%)	Hindustan Lever (2.14%)
State Farm Mutual (2.27%)	Blackrock (2.35%)	Banco Itau (0.17%)	General Insurance (2.12%)
AXA (2.13%)	UBS (1.65%)	Dimensional Fund (0.10%)	United India Insur. (1.13%)
Wellington Mgmt (1.87%)	Deka (1.52%)	Banco Bradesco (0.09%)	National Insurance (1.01%)
Massachusetts Finl (1.57%)	Dekabank (1.44%)	Landesbank (0.08%)	Templeton Funds (1.01%)

The top investors at Disney, Deutsche Bank and Aracruz are all institutional investors… In Tata Chemicals, it is true that other Tata companies are key players on the list. However, since they do not trade, it is the institutional investors who continue to dominate….

Taking a closer look at Tata Chemicals…

Distribution of Shareholding as on March 31, 2007

Category	No. of Shares	Percentage	No. of Shareholders	Percentage
1 - 500	2,25,07,207	10.46	1,75,703	88.20
501 – 1000	96,48,263	4.49	12,926	6.49
1001 - 2000	87,86,211	4.09	6,155	3.09
2001 - 3000	46,01,699	2.14	1,855	0.93
3001 - 4000	27,70,825	1.29	786	0.39
4001 - 5000	24,11,227	1.12	528	0.27
5001 - 10000	57,32,258	2.66	809	0.41
Greater than 10000	15,86,44,961	73.75	442	0.22
Total	21,51,02,651	100.00	199204	100.00

Tata companies and trusts: 31.6%
Institutions & Funds: 34.68%
Foreign Funds: 5.91%

Note that other companies in the Tata family group own 32% of Tata Chemicals, but they seldom trade these holdings. The bulk of the trading in the stock at Tata comes from the institutional investors who own roughly 40% of the stock.

The Market Portfolio

- Assuming <u>diversification costs nothing</u> (in terms of transactions costs), and that <u>all assets can be traded</u>, 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)

Preferred risk level	*Allocation decision*
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 fro 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 <u>risk that it adds</u> 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 <u>measure of the non-diversifiable risk</u> 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

Step 1: Defining Risk

The risk in an investment can be measured by the variance in actual returns around an expected return

| Riskless Investment | Low Risk Investment | High Risk Investment |
| E(R) | E(R) | E(R) |

Step 2: Differentiating between Rewarded and Unrewarded Risk

Risk that is specific to investment (Firm Specific)
Can be diversified away in a diversified portfolio
1. each investment is a small proportion of portfolio
2. risk averages out across investments in portfolio
The marginal investor is assumed to hold a "diversified" portfolio. Thus, only market risk will be rewarded and priced.

Risk that affects all investments (Market Risk)
Cannot be diversified away since most assets are affected by it.

Step 3: Measuring Market Risk

The CAPM	The APM	Multi-Factor Models	Proxy Models
If there is 1. no private information 2. no transactions cost the optimal diversified portfolio includes every traded asset. Everyone will hold this market portfolio **Market Risk = Risk added by any investment to the market portfolio:**	If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. **Market Risk = Risk exposures of any asset to market factors**	Since market risk affects most or all investments, it must come from macro economic factors. **Market Risk = Risk exposures of any asset to macro economic factors.**	In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk. **Market Risk = Captured by the Proxy Variable(s)**
Beta of asset relative to Market portfolio (from a regression)	Betas of asset relative to unspecified market factors (from a factor analysis)	Betas of assets relative to specified macro economic factors (from a regression)	Equation relating returns to proxy variables (from a regression)

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. 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.

Just as a side note, there are many who either dislike or distrust the CAPM. While we share some of their skepticism about its precision, we would not throw the basic principle that the discount rate has to be adjusted for risk out, just because we do not like the CAPM. In other words, find a different risk and return model, if so inclined, but adjust for risk.

⧖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 publicly traded US firms, most, if not all, of the 15 largest investors are institutional investors. In addition, high proportions of both the stock owned and traded are by 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?

From Risk & Return Models to Hurdle Rates: Estimation Challenges

"The price of purity is purists…"

Anonymous

Aswath Damodaran

As we struggle to take the theory and models of risk and return and try to use them to estimate discount rates, we will be faced with the fact that the real world is a messy place and that data is not always clear and clean. We have to be pragmatic and make compromises along the way to get to usable discount rates.

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(Rm)-Rf) with the expected equity 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 <u>no default risk</u>, 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 <u>no uncertainty about reinvestment rates</u>, 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.
  • If your cash flows are in Euros, your riskfree rate should be a Euro riskfree rate.

■ The conventional practice of estimating riskfree rates is to use the government bond rate, with the government being the one that is in control of issuing that currency. In US dollars, this has translated into using the US treasury rate as the riskfree rate. In May 2009, for instance, the ten-year US treasury bond rate was 3.5%.

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

What is the Euro riskfree rate?
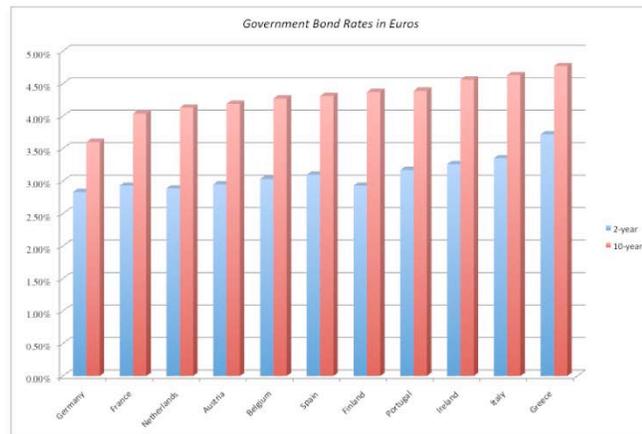
Government Bond Rates in Euros

Note that there are a dozen government that issue bonds denominated in Euros… with different rates on each of them. Since they are all in the same currency, the differences have to be attributed to perceptions of default risk. For a riskfree rate in Euros, I would go with the lowest of the rates in this table, which belongs to the German Euro bond; the ten-year rate is 3.60%.

A purist can argue that even the German Euro bond has some default risk embedded in it. The Euro riskfree rate would therefore have to be lower than 3.60%.

What if there is no default-free entity?

- If the government is perceived to have default risk, the government bond rate will have a default spread component in it and not be riskfree. There are three choices we have, when this is the case.
  - Adjust the local currency government borrowing rate for default risk to get a riskless local currency rate.
    - In May 2009, the Indian government rupee bond rate was 7%. the local currency rating from Moody's was Ba2 and the default spread for a Ba2 rated country bond was 3%.
      Riskfree rate in Rupees = 7% - 3% = 4%
    - In May 2009, the Brazilian government $R bond rate was 11% and the local currency rating was Ba1, with a default spread of 2.5%.
      Riskfree rate in $R = 11% - 2.5% = 8.5%
  - Do the analysis in an alternate currency, where getting the riskfree rate is easier. With Aracruz in 2009, we could chose to do the analysis in US dollars (rather than estimate a riskfree rate in R$). The riskfree rate is then the US treasury bond rate.
  - Do your analysis in real terms, in which case the riskfree rate has to be a real riskfree rate. The inflation-indexed treasury rate is a measure of a real riskfree rate.

- Work with the local currency but you cannot use a long-term government bond rate as a riskfree rate if the government has default risk. You need to back into a riskfree rate. If you cannot do this, you have two choices:

-Work with a currency where you can get a riskfree rate

- Do everything in real terms

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. IIf 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 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 <u>average risk investment</u>, 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?

With this assumption it is quite clear that estimating equity risk premiums will be difficult to do because different investors have different degrees of risk aversion (and will demand different premiums) and risk aversion will change over time.

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 9-11%, though the distribution is pretty spread out. This translates into a risk premium of 4-6%. (I have also run a survey on my web site for three years. With more than 30,000 responses, the median risk premium is about 4-6% as well.)

Risk Aversion and Risk Premiums

- If this were the entire market, 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 wealth that each investor brings to the market. Thus, Warren Buffett'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. Some will settle for a smaller premium, arguing that if stocks were a bargain before the drop, they should be even more so now. The broader point is that risk premiums change over time.

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. Not all of them are equally useful… So, let's look at each one separately.

The Survey Approach

■ Surveying all investors in a market place is impractical.

■ However, you can survey a few individuals and use these results. In practice, this translates into surveys of the following:

Group Surveyed	Survey done by	Estimated ERP
Individual Investors	Securities Industries Assn	8.3% (December 2004)
Institutional Investors	Merrill Lynch	3.8% (2009)
CFOs	Campbell & Harvey	4.7% (2009)
Finance Academics	Fernandez	5.7% (2009)

■ The limitations of this approach are:
  • there are no constraints on reasonability (the survey could produce negative risk premiums or risk premiums of 50%)
  • The survey results 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.

Morningstar does surveys of individual investors and reports absurdly high premiums. It is not clear whether these are wishes of expectations.

Campbell and Harvey have been doing surveys of CFOs for a decade and they report their results in detail every year. (The full surveys are well worth reading and are on ssrn.com)

Generally survey premiums seem to be more backward looking than forward looking. In other words, they seem to decrease in good times and jump after market crises (the key word is after… no predictive power here)

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
  - Defines a time period for the estimation (1928-Present, 1962-Present....)
  - Calculates average returns on a stock index during the period
  - Calculates average returns on a riskless security over the period
  - Calculates the difference between the two averages 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.

The US has the longest and richest historical data base for stocks (going back as far as the 1800s) and many historical premiums are based upon that data…

We are trusting mean reversion, i.e., that numbers revert back to historical averages over time..

The Historical Risk Premium: Evidence from the United States

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2010	7.62%	6.03%	5.67%	4.31%
	2.25%	2.38%		
1961-2010	5.83%	4.13%	4.44%	3.09%
	2.42%	2.69%		
2001-2010	1.37%	-2.26%	-0.79%	-4.11%
	6.73%	9.00%		

What is the right premium?

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

$$\text{Std Error in estimate} = \frac{\text{Annualized Std deviation in Stock prices}}{\sqrt{\text{Number of years of historical data}}}$$

■ Be consistent in your use of a riskfree rate.

■ Use arithmetic premiums for one-year estimates of costs of equity and geometric premiums for estimates of long term costs of equity.

The US has the longest and richest historical data base for stocks (going back as far as the 1800s) and many historical premiums are based upon that data…

We are trusting mean reversion, i.e., that numbers revert back to historical averages over time..

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.

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 data problem 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 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 May 2009, the local currency rating, from Moody's, for Brazil was Ba1.
- If a country issues bonds denominated in a different currency (say dollars or euros), we can assess how the bond market views the risk in that country. In May 2009, Brazil had dollar denominated 10-year Bonds, trading at an interest rate of 6%. The US treasury bond rate that day was 3.5%, yielding a default spread of 2.50% for Brazil.
- India has a rating of Ba2 from Moody's but has no dollar denominated bonds. The typical default spread for Ba2 rated sovereign bonds is 3%.
- Many analysts add this default spread to the US risk premium to come up with a risk premium for a country. This would yield a risk premium of 6.38% for Brazil and 6.88% for India, if we use 3.88% as the premium for the US (3.88% was the historical risk premium for the US from 1928-2008)

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

- While default risk spreads and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads.
- Risk Premium for Brazil in 2009
  - Standard Deviation in Bovespa (Equity) = 34%
  - Standard Deviation in Brazil $ denominated Bond = 21.5%
  - Default spread on $ denominated Bond = 2.5%
  - Country Risk Premium (CRP) for Brazil = 2.5% (34%/21.5%) = 3.95%
  - Total Risk Premium for Brazil = US risk premium (in '09) + CRP for Brazil

    = 3.88% + 3.95% = 7.83%
- Risk Premium for India in May 2009
  - Standard Deviation in Sensex (Equity) = 32%
  - Standard Deviation in Indian government bond = 21.3%
  - Default spread based upon rating= 3%
  - Country Risk Premium for India = 3% (32%/21.3%) = 4.51%
  - Total Risk Premium for India = US risk premium (in '09) + CRP for India

    = 3.88% + 4.51%= 8.39%

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. We are assuming that investors, when pricing equities in an emerging market, look at what they can make on government bonds issued by that market and scale up premiums for additional risk.

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 volatile as the the US market should have an equity risk premium of 7.76% (twice 3.88%).

An alternate view of ERP: Watch what I pay, not what I say..
January 2008

Year	Dividend Yield	Buybacks/Index	Yield
2001	1.37%	1.25%	2.62%
2002	1.81%	1.58%	3.39%
2003	1.61%	1.23%	2.84%
2004	1.57%	1.78%	3.35%
2005	1.79%	3.11%	4.90%
2006	1.77%	3.38%	5.15%
2007	1.89%	4.00%	5.89%
Average yield between 2001-2007 =			4.02%

After year 5, we will assume that earnings on the index will grow at 4.02%, the same rate as the entire economy (= riskfree rate).

Between 2001 and 2007 dividends and stock buybacks averaged 4.02% of the index each year.

Analysts expect earnings to grow 5% a year for the next 5 years. We will assume that dividends & buybacks will keep pace..
Last year's cashflow (59.03) growing at 5% a year

61.98   65.08   68.33   71.75   75.34

January 1, 2008
S&P 500 is at 1468.36
4.02% of 1468.36 = 59.03

Aswath Damodaran
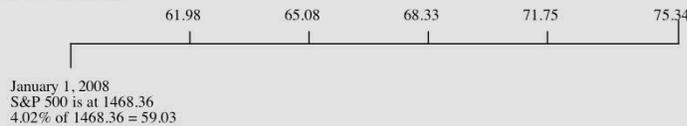
In this approach, we are computing the equivalent of a yield to maturity for stocks. In effect, we are replacing the bond price with the level of the index, the coupons with expected dividends and stock buybacks and the finite life with an infinite life. We then solve for the discount rate that will make the present value of the cashflows equal to the level of the index today.

This approach does require a number of assumptions: (1) We can estimate the expected cash flows for the future (2) We can assume a perpetual growth rate = risk free rate.

Solving for the implied premium…

- If we know what investors paid for equities at the beginning of 2007 and we can estimate the expected cash flows from equities, we can solve for the rate of return that they expect to make (IRR):

$$1468.36 = \frac{61.98}{(1+r)} + \frac{65.08}{(1+r)^2} + \frac{68.33}{(1+r)^3} + \frac{71.75}{(1+r)^4} + \frac{75.34}{(1+r)^5} + \frac{75.35(1.0402)}{(r-.0402)(1+r)^5}$$

- Expected Return on Stocks = 8.39%
- Implied Equity Risk Premium = Expected Return on Stocks - T.Bond Rate
  =8.39% - 4.02% = 4.37%

How would we read the 8.39%? That is the return that you can expect to make on stocks, given what you paid for stocks at the time of the analysis. It is implied, because it is backed out of the index level today. We get an equity risk premium by subtracting out the riskfree rate at the time of the analysis.

A year that made a difference.. The implied premium in January 2009

Year	Market value of index	Dividends	Buybacks	Cash to equity	Dividend yield	Buyback yield	Total yield
2001	1148.09	15.74	14.34	30.08	1.37%	1.25%	2.62%
2002	879.82	15.96	13.87	29.83	1.81%	1.58%	3.39%
2003	1111.91	17.88	13.70	31.58	1.61%	1.23%	2.84%
2004	1211.92	19.01	21.59	40.60	1.57%	1.78%	3.35%
2005	1248.29	22.34	38.82	61.17	1.79%	3.11%	4.90%
2006	1418.30	25.04	48.12	73.16	1.77%	3.39%	5.16%
2007	1468.36	28.14	67.22	95.36	1.92%	4.58%	6.49%
2008	903.25	28.47	40.25	68.72	3.15%	4.61%	7.77%
Normalized	903.25	28.47	24.11	52.584	3.15%	2.67%	5.82%

In 2008, the actual cash returned to stockholders was 68.72. However, there was a 41% dropoff in buybacks in Q4. We reduced the total buybacks for the year by that amount.

Analysts expect earnings to grow 4% a year for the next 5 years. We will assume that dividends & buybacks will keep pace.. Last year's cashflow (52.58) growing at 4% a year

After year 5, we will assume that earnings on the index will grow at 2.21%, the same rate as the entire economy (= riskfree rate).

54.69   56.87   59.15   61.52   63.98

January 1, 2009
S&P 500 is at 903.25
Adjusted Dividends &
Buybacks for 2008 = 52.58

$$903.25 = \frac{54.69}{(1+r)} + \frac{56.87}{(1+r)^2} + \frac{59.15}{(1+r)^3} + \frac{61.52}{(1+r)^4} + \frac{63.98}{(1+r)^5} + \frac{63.98(1.0221)}{(r-.0221)(1+r)^5}$$

Expected Return on Stocks (1/1/09) = 8.64%
Equity Risk Premium = 8.64% - 2.21% = 6.43%

Aswath Damodaran

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As markets plummeted in 2008, the equity risk premium shot up… The increase fro, 4.37% to 6.43% over the course of a year is the largest one-year increase since 1960.
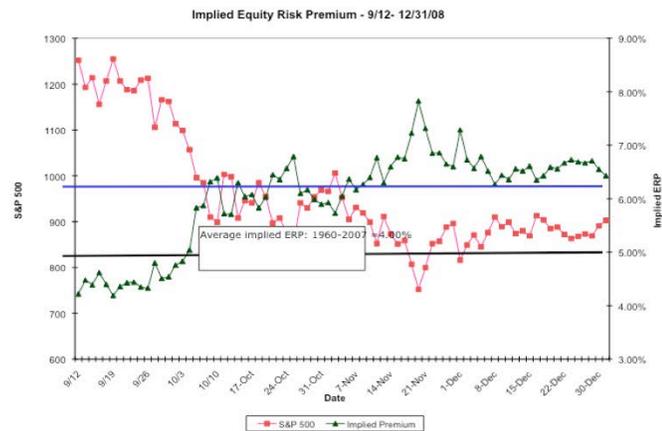
Equity risk premiums changed more in three months than they had in the previous 20 years put together. A wake-up call for those who stick with fixed premiums? That depends on whether we assume that this is an aberration or a break with the past.

The bottom line on Equity Risk Premiums in early 2009

■ <u>Mature Markets</u>: In May 2009, the number that we chose to use as the equity risk premium for all mature markets was 6%. While lower than the implied premium at the start of the year 6.43%, it is still much higher than the historical risk premium of 3.88%. It reflected our beliefs then that while the crisis was abating, it would leave a longer term impact on risk premiums.

■ For emerging markets, we will use the melded default spread approach (where default spreads are scaled up to reflect additional equity risk) to come up with the additional risk premium.

- ERP for Brazil = Mature market premium + CRP for Brazil = 6% + 3.95% = 9.95%
- ERP for India = Mature market premium + CRP for India = 6% + 4.51% = 10.51%

This is a judgment call and will depend upon your point of view in May 2009.

a.If you thought that the crisis was just a bump in the road that markets would quickly forget and move on, you would use either the historical risk premium (3.88%) or the average implied premium over time (about 4%) as your mature market premium.

b.If you thought that the crisis would continue and perhaps even worsen, you would stick with 6.43%.

In hindsight, equity risk premiums dropped dramatically over the rest of 2009 to reach about 4.73% in December 2009.

An Updated Equity Risk Premium:

■ By January 1, 2011, the worst of the crisis seemed to be behind us. Fears of a depression had receded and banks looked like they were struggling back to a more stable setting. Default spreads started to drop and risk was no longer front and center in pricing.

In 2010, the actual cash returned to stockholders was 53.96. That was up about 30% from 2009 levels.

Analysts expect earnings to grow 13% in 2011, 8% in 2012, 6% in 2013 and 4% therafter, resulting in a compounded annual growth rate of 6.95% over the next 5 years. We will assume that dividends & buybacks will tgrow 6.95% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 3.29%, the same rate as the entire economy (= riskfree rate).

57.72	61.73	66.02	70.60	75.51

January 1, 2011
S&P 500 is at 1257.64
Adjusted Dividends &
Buybacks for 2010 = 53.96

$$1257.64 = \frac{57.72}{(1+r)} + \frac{61.73}{(1+r)^2} + \frac{66.02}{(1+r)^3} + \frac{70.60}{(1+r)^4} + \frac{75.51}{(1+r)^5} + \frac{75.51(1.0329)}{(r-.0329)(1+r)^5}$$

Expected Return on Stocks (1/1/11) = 8.49%
T.Bond rate on 1/1/11 = 3.29%
Equity Risk Premium = 8.03% - 3.29% = 5.20%
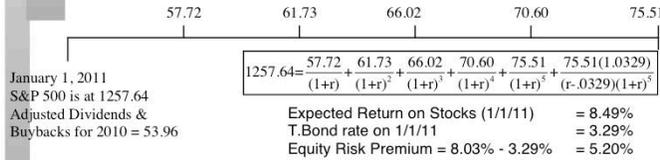
Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo! Finance, Zacks

The key lesson I would take away is that equity risk premiums are unstable and that globalization has made them more unstable. The other is that there seems to be mean reversion in the process – implied premiums, when abnormally high or low, move back towards a longer term average.

Implied Premiums in the US: 1960-2010

Implied Premium for US Equity Market
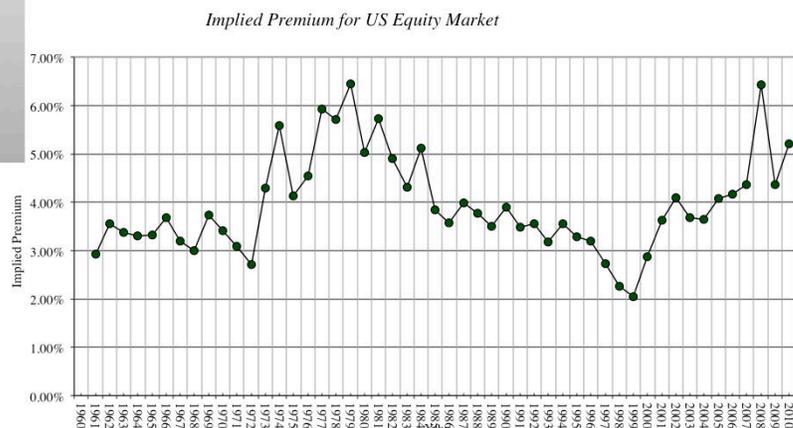
As the index changes (and it is the input most likely to change by large amounts in short periods), the implied premium will change. Note that as premiums rise, stock prices drop. Notice two historical phenomena: (1) Equity risk premiums spiked in the 1970s as inflation increased in the US (2) Equity risk premiums bottomed out at 2% at the end of 1999 at the peak of the dot-com boom.

Would you settle for a 2% premium? If your answer is no, you believe that stocks are overvalued.

- In early 2011, the implied equity risk premium in the US was 5.20% and the historical risk premium was 4.31%. Which would you use as your equity risk premium?
    a) The historical risk premium (4.31%)
    b) The current implied equity risk premium (4.74%)
    c) Something else!
- What would you use for another developed market (say Germany or France)?
    a) The historical risk premium for that market
    b) The risk premium for the United States
- What would you use for an emerging market?
    a) The historical risk premium for that market
    b) The risk premium for the United States
    c) The risk premium for the United States + Country Risk premium

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

The problem with using historical risk premiums is that you are trusting in mean reversion to a US equity market that bears no resemblance to the market today.

With implied premiums, you are assuming that the market is currently at its correct level.

An intermediate solution would be to use a number that reflects normalized values. In early 2009, for instance, this would have led to using a number lower than 6.5%.

You would use this premium for all mature markets and add an additional premium for emerging markets.

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:

Beta (Slope) = Correlation$_{jm}$ (σ_{j} / σ_{m})

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

Key point: Betas may be estimated from regressions but they should never be considered purely statistical numbers. They convey economic weight - they measure the risk added on by an asset to a diversified portfolio.

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.

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

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

$R_j = a \quad\quad\quad + b R_m \quad$ .... 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 <u>Jensen's alpha</u>. If it is positive, your stock did perform better than expected during the period of the regression.

Economic intuition:

Think of Riskfree rate (1- Beta) as the return your stock should make in a period when the market is flat (market return is zero)

The interpcet is what your stock actually made in a month in which the market was flat.

The difference measures whether your stock under or over performed the market index over the period. It is called Jensen's alpha (Michael Jensen used the measure to evaluate mutual fund performance in 1968).

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.

In some cases, the regression is run using excess returns over the risk free rate on both sides - excess return for the stock on the left hand side and excess returns for the market on the right hand side. In that case, the intercept is itself Jensen's alpha.

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 <u>market risk</u>.
- The balance ($1 - R^2$) can be attributed to <u>firm specific risk</u>.

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
  - Return = $(Price_{End} - Price_{Beginning} + Dividends_{Period})/ Price_{Beginning}$
  - 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. On each one, there are trade offs to be made, which may explain why different services make different choices.

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.) You want to get as close the mythical market portfolio as you can get…

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 2004,
  - Price for Disney at end of November 2004 = $ 26.52
  - Price for Disney at end of December 2004 = $ 27.43
  - Dividends during month = $0.237 (It was an ex-dividend month)
  - Return =($27.43 - $26.52 + $ 0.237)/$26.52= 4.33%
- To estimate returns on the index in the same month
  - Index level at end of November 2004 = 1173.92
  - Index level at end of December 2004 = 1211.92
  - Dividends on index in December 2004 = 1.831
  - Return =(1211.92 – 1173.92+1.831)/ 1173.92= 3.25%

Reports parameters used. Returns in each month include dividends, if any, in that month. For most dividend paying U.S. stocks, there will be four months in the year where there are dividends and eight months without dividends. (Will the returns in those months be better? Not if you factor in what happens to stock prices on ex dividend days)

Disney's Historical Beta

Figure 4.3: Disney versus S&P 500: 2004-2008
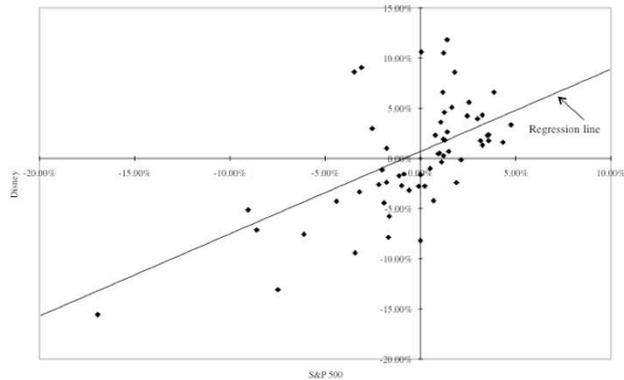
This has both the scatter plot and the regression line. Note the there is substantial error in the regression. A statistician looking at this regression would view this as evidence that it was not a good regression. A financial economist looking the same regression sees it as a reflection of the reality that most of the risk in a given investment or stock is firm-specific.

The Regression Output

■ Using monthly returns from 2004 to 2008, we ran a regression of returns on Disney stock against the S&P 500. The output is below:

$$\text{Returns}_{\text{Disney}} = 0.47\% \quad + 0.95 \text{ Returns}_{\text{S \& P 500}} \quad (\text{R squared} = 41\%)$$
$$(0.16)$$

This is the output from the regression. Note the

-Intercept of 0.47%

-Slope of 0.95 (Beta)

-R squared of the regression is 41%

-Standard Error of the Beta estimate is 0.16

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

- Intercept = 0.47%
  - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
  - Between 2004 and 2008
    - Average Annualized T.Bill rate = 3.27%
    - Monthly Riskfree Rate = 0.272% (=3.27%/12)
    - Riskfree Rate (1-Beta) = 0.272% (1-0.95) = 0.01%
- The Comparison is then between

What you expected to make		What you actually made
Intercept	versus	Riskfree Rate (1 - Beta)
0.47%	versus	0.01%

  - Jensen's Alpha = 0.47% -0.01% = 0.46%
- Disney did 0.46% better than expected, per month, between 2004 and 2008.
  - Annualized, Disney's annual excess return = $(1.0046)^{12}-1= 5.62\%$

The intercept measures what your stock actually did in a month when the market was flat (zero return) during the time period of the regression. Rf(1-beta) measures what a stock should have done (given its beta) during the same period in a month in which the market did nothing.

Disney did 5.62% better than expected on an annual basis between 2004 and 2008. The Jensen's alpha is a risk adjusted, market adjusted measure of performance. (Consider a simple example. Assume that the market was up 20% a year during the period of your regression and that you have a stock with a beta of 1.5. If you ignore the riskfree rate, this stock should have earned a return of 30% each year for the regression period. With a Jensen's alpha of 5.62%, it earned 30% + 5.62% = 35.62%.)

a. If the regression is run using excess returns on the stock and market (over an above the riskfree rate), the intercept is already Jensen's alpha:

Return on stock - Rf = a + b (Rm - Rf)

b. An alternate approach to estimating Jensen's alpha is to use the average monthly return on the stock and subtract out the expected return using the risk free rate during the period, the beta and the average monthly return on the market. You should get an identical answer:

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.

What should the Jensen's alpha of an index fund be?

- Should be zero

If I claim to be a successful stock picker and run a mutual fund, what should my Jensen's alpha be?

- Should be positive for the entire portfolio (though not all stocks may have positive Jensen's alphas)

If I pick a hundred stocks at random, what should my Jensen's alpha be?

- Zero

What if I incur a 1.5% management fee and transactions costs in picking these stocks?

- Should be -1.5% (which is roughly what the Jensen's alpha is across all actively managed mutual funds)

A positive Jensen's alpha… Who is responsible?

- Disney has a positive Jensen's alpha of 5.62% a year between 2004 and 2008. 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 entire sector may have out performed the market and the managers were able to coast on this sector wide performance.

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.

In short, don't fire a manager after one bad year or period… Look for the reasons first..

In this case, the average Jensen's alpha across entertainment companies during this period was -13.62% (annualized). This would suggest that Disney performed even better than we thought; its Jensen's alpha is almost 20% better than the sector. Iger deserves credit.

Estimating Disney's Beta

- Slope of the Regression of 0.95 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 0.16.
- 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: 0.95

Range with 67% confidence: 0.79-1.11

Range with 95% confidence: 0.63 – 1.27

The Dirty Secret of "Standard Error"

Distribution of Standard Errors: Beta Estimates for U.S. stocks
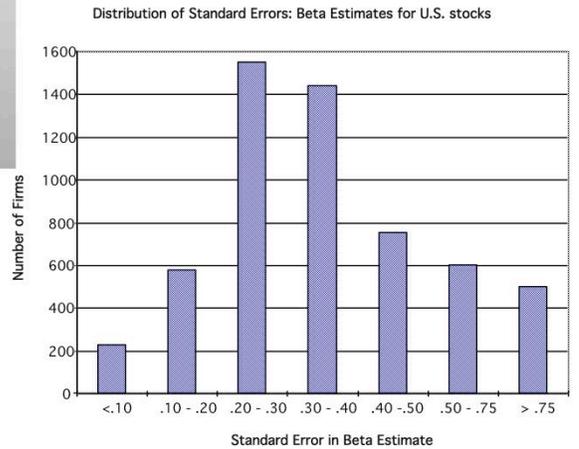
The standard errors of betas estimated in the US tend to be fairly high (the median is 0.20-0.25), with many beta estimates having standard errors of 0.40 or greater. These betas should come with warnings.

Breaking down Disney's Risk

- R Squared = 41%
- This implies that
  - 41% of the risk at Disney comes from market sources
  - 59%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded

---

This suggests that Disney is exposed to more macro risk than the typical firm in the US. The typical firm has an R squared of between 20-25%. Hence, the allure of diversification.

(Why might this be? Size and having a more diversified business mix may explain Disney's high R-squared.)

About 20% of firms have R-squared of less than 10%…

Very few firms have R-squared approaching 50%…

GE has an R-squared for the 2004-2008 time period of about 55%.

Google The R-squared is about 10% over the same period

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 0.95, but Disney has an R Squared
of 41% while Amgen's R squared of only 20.5%. 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 firm specific risk anyway. After you are done
diversifying, what you will be left with on both stocks is the market risk which
is best measured using the betas.

If you were undiversified, you would prefer Disney, which has less firm-
specific risk.

How can two companies have the same betas but different R-squared?

The R-squared measures the proportion of the risk in a stock that is market
risk.. The beta measures the units of market risk (in standardized terms).
Amgen, in this case, has far more total risk than Disney (twice as much to be
precise). Thus, 20.5% of Amgen's risk works out to the same number of units
of market risk as 41% of Disney's 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 May 2009

- ■ Inputs to the expected return calculation
  - • Disney's Beta = 0.95
  - • Riskfree Rate = 3.50% (U.S. ten-year T.Bond rate in May 2009)
  - • Risk Premium = 6% (Based on updated implied premium at the start of 2009)
- ■ Expected Return = Riskfree Rate + Beta (Risk Premium)
  = 3.50% + 0.95 (6.00%) = 9.2%

Note that this expected return would have been different if we had decided to use a different equity risk premium. The potential error in the beta will translate into a forecast error on the expected return as well.

Use to a Potential Investor in Disney

As a potential investor in Disney, what does this expected return of 9.2% 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 9.2%, 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. You are not being greedy, just prudent. After all, if you don't make higher returns when the market is going up, you will find yourself falling behind when the market is going down.

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 9.2% 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 9.2%.
- 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.

■ 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?

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

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

- 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?

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

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 21.5%. 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: An Updated Value!!

<HELP> for explanation. EquityBETA

DIS US Equity   Relative Index SPX Index   Historical Beta
Data   Last Price   Range   12/21/07 - 12/11/09   Period Weekly   Local CCY
☒Linear   ☐Beta +/-   ☐Non-Parametric

Y = WALT DISNEY CO/THE
X = S&P 500 INDEX
Item   Value
Raw BETA   1.077
Adj BETA   1.051
ALPHA(Intercept)   0.326
R^2(Correlation^2)   0.678
Std Dev Of Error   3.140
Std Error Of ALPHA   0.310
Std Error Of BETA   0.074
Number Of Points   103

● Last Observation

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 9204 1210 Hong Kong 852 2977 6000
Japan 81 3 3201 8900   Singapore 65 6212 1000   U.S. 1 212 318 2000   Copyright 2009 Bloomberg Finance L.P.
SN 636136 G653-375-0 18-Dec-2009 14:19:21

Jensen's alpha = 0.33% -
(2%/52) (1 – 1.08) = 0.34%
Annualized = (1+.0034)^52-1
= 19.30%

This is a weekly regression

Disney's performance has improved in the last 2 years, relative to the five years prior and that performance itself was better than the 5 years before that.

Disney has improved markedly as an investment. Some of this improvement can be traced to Bob Iger ascending to CEO… and some of it is chance.

Note also that this is a weekly regression… hence, we compute a weekly riskfree rate, using the average T.Bill rate for the last two years (about 2%)

Regression Diagnostics for Tata Chemicals

Jensen's α
= -0.44% - 5%/12 (1-1.18) = -0.37%
Annualized = $(1-.0037)^{12} - 1 = -4.29\%$

Expected Return
= Riskfree Rate+ Beta*Risk premium
= 4%+ 1.18 (6%+4.51%) = 19.40%

Beta = 1.18
67% range
1.04-1.32

56% market risk
44% firm specific

Deconstructing Tata Chemical's beta page, we find that

a.Tata Chemicals did worse than expected over the period – by 4.29% in an annual basis. (Here is a puzzle. Tata Chemical's stock price actually went up over this period. How do you resolve this puzzle? The Indian market went up even more….)

b.Tata Chemicals is slightly above average risk (beta less than one, but with a standard error of 0.14… Since this standard error is lower than the Disney beta standard error, does this mean that this is a better beta estimate than the Disney estimate? Not necessarily. The Sensex is a narrower index than than the S&P 500. Running a regression of a stock against a narrow index, especially if the stock is part of that index will lead to higher R-squared and lower standard error)..

Beta Estimation and Index Choice: Deutsche Bank
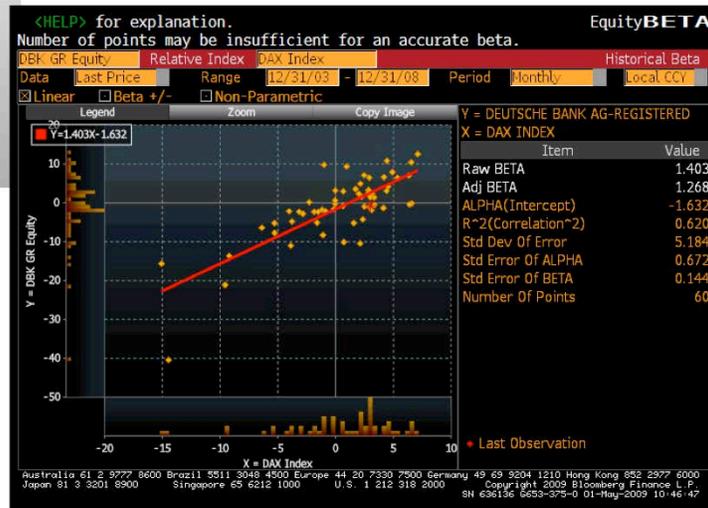
At first sight, this regression looks a lot better than the Disney regression. The spread around the regression line is tighter, the R-squared is higher and the standard error is lower.

A Few Questions

- The R squared for Deutsche Bank is very high (67%). Why is that?
- The beta for Deutsche Bank is 1.69.
  - 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 problem here is the index. The DAX has only 30 companies and Deutsche is a part of the index. The R-squared is high, because Deutsche Bank is such a large percentage of the index. When you run regressions of stocks against narrow market indices, you will get better looking regressions but not necessarily better beta estimates. 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.

What if you were a global investor? You would look at how Deutsche moves relative to a Global Equity Index, say the MSCI

	DAX	FTSE Euro 300	MSCI
Intercept	-1.63%	-1.05%	-0.48%
Beta	1.40	1.52	1.99
Std Error of beta	0.14	0.19	0.21
R^2	62%	54%	50%

As the index used expands and becomes broader, the R-squared drops off and the standard error increases.

Which one would you use? It depends upon who your marginal investors are. If they are investors who are local and stay focused only on the local market, you may be able to get away with the DAX regression. As your marginal investors become more diversified, you should move from the local index to wider indices. The least precise beta estimate (with the highest standard error) may be the most meaningful.

As investors become globalized, there is an argument to be made that we should be abandoning the use of local indices and replacing them with global indices.

Aracruz's Beta?

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…

Who do you think is the marginal investor at Aracruz?

Looking at the top 15 holders, it looks like there quite a few global institutional investors… the beta that makes the most sense for Aracruz may, in fact, be the beta against the Global equity index… The Bovespa beta is meaningless.

Real Networks: 3.24

Qwest Communications: 2.60

Beta > 1

Microsoft: 1..25

General Electric: 1.10

Beta = 1

Enron: 0.9ε

Philip Morris: 0.65

Beta < 1

Exxon Mobil: 0.40

Beta = 0

Harmony Gold Mining: - 0.10

A cross selection of regression betas for companies… Lets try a story for each one:

Real Networks: Small, high growth company in risky business

Qwest: Some business risk but much more substantial overlay of financial risk created by borrowing billions.

Microsoft: Example of beta drift towards one as companies get larger and their product base (and customer base) becomes more diversified. Microsoft's beta in the lat 1980s was much higher than 2.

GE: Most diversified US company you will find.. Beta will drift towards one for diversified companies. GE Capital's debt acts as ballast on beta

Philip Morris: Main risk is oil price risk which cuts against the rest of the market (lower oil prices are good for many companies and the economy but not for oil companies). The litigation risk will not show up in the beta because it is firm-specific. (Changing the company name to Altria will not make a difference)

Harmony Gold Mining Company: A negative beta implies that adding this stock on to a diversified portfolio will actually reduce risk (acts as insurance). Gold has historically been an insurance against inflation.

(Consequences of a negative beta: Expected return < Riskfree rate)

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

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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.

In terms of basic economics, companies that sell products/ services that have elastic demand should have higher betas than ones that sell products/services with inelastic demand.

A Simple Test

Phone service is close to being non-discretionary in the United States and Western Europe. However, in much of Asia and Latin America, there are large segments of the population for which phone service is a luxury. Given our discussion of discretionary and non-discretionary products, which of the following conclusions would you be willing to draw:

a) Emerging market telecom companies should have higher betas than developed market telecom companies.

b) Developed market telecom companies should have higher betas than emerging market telecom companies

c) The two groups of companies should have similar betas

I would expect emerging market telecom company betas to be higher… A product or service that is more discretionary will translate into more volatile earnings and more sensitivity to overall macro economic conditions and a highr beta.

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 …). Firms in the sector have high betas.

Are you destined to have a high beta, once you pick a sector?

To an extent, yes, but you can take action or make decisions to change your destiny. Consider Southwest. By using only one type of aircraft, hedging fuel costs, flying from no-name airports and having a flexible workforce, Southwest has been able to lower its fixed costs as a proportion of total costs. (Focusing less on business travel and high priced tickets has also helped them on the discretionary component).

Measures of Operating Leverage

Fixed Costs Measure = Fixed Costs / Variable Costs

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

EBIT Variability Measure = % Change in EBIT / % 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- 2008

Year	Net Sales	% Change in Sales	EBIT	% Change in EBIT
1987	$2,877		$756	
1988	$3,438	19.50%	$848	12.17%
1989	$4,594	33.62%	$1,177	38.80%
1990	$5,844	27.21%	$1,368	16.23%
1991	$6,182	5.78%	$1,124	-17.84%
1992	$7,504	21.38%	$1,287	14.50%
1993	$8,529	13.66%	$1,560	21.21%
1994	$10,055	17.89%	$1,804	15.64%
1995	$12,112	20.46%	$2,262	25.39%
1996	$18,739	54.71%	$3,024	33.69%
1997	$22,473	19.93%	$3,945	30.46%
1998	$22,976	2.24%	$3,843	-2.59%
1999	$23,435	2.00%	$3,580	-6.84%
2000	$25,418	8.46%	$2,525	-29.47%
2001	$25,172	-0.97%	$2,832	12.16%
2002	$25,329	0.62%	$2,384	-15.82%
2003	$27,061	6.84%	$2,713	13.80%
2004	$30,752	13.64%	$4,048	49.21%
2005	$31,944	3.88%	$4,107	1.46%
2006	$33,747	5.64%	$5,355	30.39%
2007	$35,510	5.22%	$6,829	27.53%
2008	$37,843	6.57%	$7,404	8.42%
Average: 87-08		13.73%		13.26%
Average: 96-08		9.91%		11.72%

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
  = 13.26% / 13.73% = 0.97
- This is lower than the operating leverage for other entertainment firms, which we computed to be 1.15. 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 Leverage$_{1996-08}$ = 11.72%/9.91% = 1.18

  Looks like Disney's operating leverage has increased since 1996. In fact, it is higher than the average for the sector.

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

Note, though, that this is an estimate with a lot of error in it. It is only if the number can be backed up with some intuitive explanation (see the Southwest example earlier) that I would act on it and change the beta that I use.

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 but the focus here is on equity earnings. Put another way, a firm with stable operating income can make its equity income much more volatile by borrowing large sums of money.

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 or Asset Beta
t = 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

Assets		Liabilities	
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 0.95. 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 (2004 to 2008)
- The average debt equity ratio during this period was 24.64%.
- The unlevered beta for Disney can then be estimated (using a marginal tax rate of 38%)

  = Current Beta / (1 + (1 - tax rate) (Average Debt/Equity))

  = 0.95 / (1 + (1 - 0.38)(0.2464))= 0.8241

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%	0.82	0.00
10.00%	11.11%	0.88	0.06
20.00%	25.00%	0.95	0.13
30.00%	42.86%	1.04	0.22
40.00%	66.67%	1.16	0.34
50.00%	100.00%	1.34	0.51
60.00%	150.00%	1.59	0.77
70.00%	233.33%	2.02	1.19
80.00%	400.00%	2.87	2.04
90.00%	900.00%	5.42	4.60

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: The Acquirer

Equity Beta
1.15

Debt = $3,186 million
Market value of equity = $31,100 million
Debt + Equity = Firm value = $31,100
+ $3186 = $34,286 million
D/E Ratio = 3186/31100 = 0.10

+

Capital Cities: The Target

Equity Beta
0.95

Debt = $ 615 million
Market value of equity = $18, 500 million
Debt + Equity = Firm value = $18,500 +
$615 = $19,115 million
D/E Ratio = 615/18500 = 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%.

Equity betas are levered betas and we will assume that the leverage built into them is the current debt to equity ratio for the two firms.

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
  The weights used are the <u>firm values (and not just the equity values)</u> of the two firms, since these are unlevered betas and thus reflects the risks of the entire businesses and not just the equity]

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 .

■ If Disney had used all equity to buy Cap Cities equity, while assuming Cap Cities debt, the consolidated numbers would have looked as follows:

- Debt = $ 3,186+ $615 = $ 3,801 million
- Equity = $ 31,100 + $18,500 = $ 49,600 m (Disney issues $18.5 billion in equity)
- D/E Ratio = 3,801/49600 = 7.66%
- New Beta = 1.026 (1 + 0.64 (.0766)) = 1.08

■ Since Disney borrowed $ 10 billion to buy Cap Cities/ABC, funded the rest with new equity and assumed Cap Cities debt:

- The market value of Cap Cities equity is $18.5 billion. If $ 10 billion comes from debt, the balance ($8.5 billion) has to come from new equity.
- Debt = $ 3,186 + $615 million + $ 10,000 = $ 13,801 million
- Equity = $ 31,100 + $8,500 = $39,600 million
- D/E Ratio = 13,801/39600 = 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

What is the significance of assuming Cap Cities debt?

If the debt had not been assumed and had to be retired, Disney would have had to raise $19,115 million ($18,500 + $615) to fund the acquisition. You would not have added $615 million in debt to the consolidated company after the transaction.

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 is a better estimate than the top down beta for the following reasons
  - The standard error of the beta estimate will be much lower
  - The betas can reflect the current (and even expected future) mix of businesses that the firm is in rather than the historical mix

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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 √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

Business	Comparable firms	Number of firms	Median levered beta	Median D/E	Unlevered beta	Median Cash/ Firm Value	Unlevered beta corrected for cash
Media Networks	Radio and TV broadcasting companies -US	19	0.83	38.71%	0.6735	4.54%	0.7056
Parks and Resorts	Theme park & Resort companies - Global	26	0.80	65.10%	0.5753	1.64%	0.5849
Studio Entertainment	Movie companies - US	19	1.57	53.89%	1.1864	8.93%	1.3027
Consumer Products	Toy companies- US	12	0.83	27.21%	0.7092	33.66%	1.0690

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: are publicly traded companies in each of these businesses. However, we had a difficult time getting enough companies in two businesses:

    1. Media networks, since the major networks (CBS, ABC, NBC and Fox) are all parts of much larger firms. We expanded the sample to include firms that fed into the network business (such as Nielsen and King World)

    2. Theme parks: There are very few publicly traded theme parks in the US. We expanded the sample by looking globally; we were able to find a few in Europe

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

A closer look at the process…
Studio Entertainment Betas

Short Name	Mkt Cap	Total Debt	D/E	Beta	Cash	Cash/Firm value	Enterprise Value	Revenues	EV/sales
RED ROCK PICTURE	$621,902	$100,000	16.08%	1.62	$2,436	0.34%	$719,466	$600,000	1.20
TIX CORP	$53,988,460	$129,000	0.24%	1.59	$9,192,000	16.99%	$44,925,460	$66,552,000	0.68
TM MEDIA GROUP I	$224	$265	118.52%	0.90	$10	2.05%	$479	$1,250	0.38
CAMELOT ENTERTAI	$815,505	$464,329	56.94%	0.85	$126	0.01%	$1,279,708	$750,000	1.71
AMER VANTAGE COS	$5,385,361	$523,000	9.71%	1.25	$5,353,000	90.60%	$555,361	$313,000	1.77
VALCOM INC	$1,126,042	$1,114,673	98.99%	1.63	$34,224	1.53%	$2,206,491	$689,521	3.20
ODYSSEY PICTURES	$6,963,004	$1,419,200	20.38%	2.24	$0	0.00%	$8,382,204	$4,279,035	1.96
LEONIDAS FILMS I	$2,342,000	$1,873,000	79.97%	0.57	$1,730,000	41.04%	$2,485,000	$1,077,000	2.31
BRILLIANT DIGITA	$11,304,810	$2,162,000	19.12%	1.36	$433,000	3.22%	$13,033,810	$5,970,000	2.18
METRO GLOBAL MED	$11,725	$40,679	346.93%	2.93	$4,514	8.61%	$47,890	$244,654	0.20
FAMILY ROOM ENT	$265,104	$77,491	29.23%	0.90	$31,655	9.24%	$310,940	$348,850	0.89
POINT.360	$13,292,890	$9,420,000	70.86%	1.30	$7,047,000	31.03%	$15,665,890	$45,913,000	0.34
IMAGE ENTERTAIN	$22,511,390	$32,394,002	143.90%	0.90	$780,000	1.42%	$54,125,392	$130,086,000	0.42
UNAPIX ENTERTAIN	$22,640	$39,196	173.13%	1.86	$0	0.00%	$61,836	$377,290	0.16
PEACH ARCH ENTER	$2,631,945	$605,205	22.99%	1.55	$1,753,328	54.16%	$1,483,821	$7,113,049	0.21
DREAMWORKS ANI-A	$2,367,548,000	$70,059,000	2.96%	1.90	$260,630,000	10.69%	$2,176,977,000	$755,660,976	2.88
KUSHNER-LOCKE CO	$13,981	$88,725	634.63%	2.99	$72,900	70.98%	$29,806	$198,670	0.15
LIONS GATE	$628,954,800	$319,717,984	50.83%	2.36	$130,713,000	13.78%	$817,959,784	$1,514,749,024	0.54
Average			105.30%	1.59		19.76%			1.18
Aggregate	$3,117,799,782	$440,227,749	14.12%	1.59	$417,777,193	11.74%	$3,140,250,338	2534923319	1.24
Median			53.89%	1.57		8.93%			0.78

This shows the raw numbers behind one of the line items on the previous page – studio entertainment. It lists the companies used, their market values of equity, total debt outstanding and cash.

We show three summary numbers – the average, the aggregate and the median. The average is skewed by outliers. While both the aggregate and median yield meaningful values, we have chosen to go with the median.

In the last three columns, I have computed the enterprise value = mkt cap + debt – cash, revenues and EV/Revenues. These will be used on the next page.

Disney's bottom up beta

■ Estimate the bottom up unlevered beta for Disney's operating assets.

Business	Revenues in 2008	EV/Sales	Estimated Value	Firm Value Proportion	Unlevered beta
Media Networks	$16,116	2.13	$34,327.78	58.92%	0.7056
Parks and Resorts	$11,504	1.51	$17,408.14	29.88%	0.5849
Studio Entertainment	$7,348	0.78	$5,754.86	9.88%	1.3027
Consumer Products	$2,875	0.27	$768.20	1.32%	1.0690
Disney	$37,843		$58,258.99	100.00%	0.7333

Step 1: Start with Disney's revenues by business.

Step 2: Estimate the value as a multiple of revenues by looking at what the market value of publicly traded firms in each business is, relative to revenues.

$$EV/Sales = \frac{\text{Mkt Equity} + \text{Debt} - \text{Cash}}{\text{Revenues}}$$

Step 3: Multiply the revenues in step 1 by the industry average multiple in step 2.

■ Disney has a cash balance of $3,795 million. If we wanted a beta for all of Disney's assets (and not just the operating assets), we would compute a weighted average:

$$\text{Beta for Disney's assets} = 0.7333\left(\frac{58,259}{(58,259+3,795)}\right) + 0\left(\frac{3,795}{(58,259+3,795)}\right) = 0.6885$$

EV/Sales = (Market Value of Equity + Market value of debt - Cash)/Sales. The number reported here is the average across the comparable firms. We are assuming that this will give us an approximate value for each business.

You can use revenue weights, if you are not inclined to estimate value, but you are then assuming that value is always proportional to revenue…

Note that we have computed two unlevered betas for Disney: one for just its operating assets and one for the firm, with its cash balance. Each will have it use later in the analysis.

Disney's Cost of Equity

■ Step 1: Allocate debt across businesses

Business	Start with this(1) Estimated Value	From comparable firms(2) D/E Ratio of comps	Estimated debt	As % (3) Proportions	Adjust to Disney's debt (3)*16,682 Allocated Debt	EV - Allocated Debt Estimated Equity	Allocated Debt/ Estimated Equity D/E Ratio
Media Networks	$34,328	38.71%	$9,581	51.44%	$8,582	$25,746	33.33%
Parks and Resorts	$17,408	65.10%	$6,864	36.86%	$6,148	$11,260	54.61%
Studio Entertainment	$5,755	53.89%	$2,015	10.82%	$1,805	$3,950	45.70%
Consumer Products	$768	27.21%	$164	0.88%	$147	$621	23.70%
			$18,624	100.00%	$16,682		
For example.							
Media Networks	$34,328	38.71%	34,328*(.3871/1.3871)	9581/18624	.5144*16,682	34328-8582	8582/25746

■ Step 2: Compute levered betas and costs of equity for Disney's operating businesses.

Business	Unlevered Beta	D/E Ratio	Levered Beta	Cost of Equity
Media Networks	0.7056	33.33%	0.8514	8.61%
Parks and Resorts	0.5849	54.61%	0.7829	8.20%
Studio Entertainment	1.3027	45.70%	1.6718	13.53%
Consumer Products	1.0690	23.70%	1.2261	10.86%
Disney	0.7333	36.91%	0.9011	8.91%

■ Step 2a: Compute the cost of equity for all of Disney's assets:

$$\text{Equity Beta}_{\text{Disney as company}} = 0.6885 \ (1 + (1 - 0.38)(0.3691)) = 0.8460$$

Riskfree Rate = 3.5%
Risk Premium = 6%

Disney does not break its debt down by division. We therefore used the information we had on Disney's consolidated debt, the values we had estimated for each business and the average debt ratios of other publicly traded firms in each business to make our allocation.

Step 1a: We estimated the debt for each division by multiplying the EV by the industry average debt ratio to get the estimated debt (in the second to last column). We used this estimated debt to get the proportions of debt in each division.

Example: Media networks: 34,328* (.3871/1.3871) = 9,581 (Note that 38.71% is a debt to equity ratio. 38.71/138.71 gives you a debt to capital ratio)

Step 1b:: We applied these proportions to Disney's actual total debt to get the allocated debt in the third column.

Example: Total debt at Disney is $16,682 million

Media Networks Debt= 16,682*.5144 = $8582 million

Step 1c: We subtracted this allocated debt from the estimated value to get to equity value.

Example: Equity in media networks: 34,328 – 8582 = 25,746

Step 1d: We estimated a D/E ratio based on the debt from step 2 and equity from step 3.

Discussion Issue

■ Assume now that you are the CFO of Disney. The head of the movie business has come to you with a new big budget movie that he would like you to fund. He claims that his analysis of the movie indicates that it will generate a return on equity of 12%. Would you fund it?

  a) Yes. It is higher than the cost of equity for Disney as a company
  b) No. It is lower than the cost of equity for the movie business.

  What are the broader implications of your choice?

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.

It also means that any multi business company should have different hurdle rates for each business, with higher rates for riskier businesses and lower rates for safer businesses.

Estimating Aracruz's Bottom Up Beta

Bottom up Betas for Paper & Pulp

	Number of firms	Median Beta	Median D/E	Median Unlevered Beta	Cash/Value	Unlevered Beta Corrected for Cash
Emerging Markets	46	1.03	4.47%	1.00	0.74%	1.01
US	13	1.16	92.29%	0.75	2.87%	0.77
Global	111	0.91	9.82%	0.86	1.24%	0.87

- The beta for emerging market paper and pulp companies of 1.01 was used as the unlevered beta for Aracruz.
- When computing the levered beta for Aracruz's paper and pulp business, we used the gross debt outstanding of 9,805 million BR and the market value of equity of 8907 million BR, in conjunction with the marginal tax rate of 34% for Brazil:
  - Gross Debt to Equity ratio = Debt/Equity = 9805/8907 = 110.08%
  - Levered Beta for Aracruz Paper business = 1.01 (1+(1-.34)(1.1008)) = 1.74

The tax rates used were 32% for emerging market companies, 40% for U.S. companies and 35% for Global companies, based upon averaging the marginal tax rates in each group.

We chose to use the emerging market company average, to reflect the possibility that the paper and pulp business in emerging markets may face different market risks than in developed markets. We would have been just as comfortable using a global average.

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 9.95% in computing the cost of equity, composed of the mature market equity risk premium (6%) and the Brazil country risk premium of 3.95% (estimated earlier).
- U.S. $ Cost of Equity

  Cost of Equity = 10-yr T.Bond rate + Beta * Risk Premium

  $= 3.5\% + 1.74 (9.95\%) = 20.82\%$
- To convert to a Nominal $R Cost of Equity

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

  $= 1.2082 (1.07/1.02) - 1 = .2675 \text{ or } 26.75\%$

  (Alternatively, you could just replace the riskfree rate with a nominal $R riskfree rate, but you would then be keeping risk premiums which were computed in dollar terms fixed while moving to a higher inflation currency)

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.

If we replace the US dollar riskfree rate with a nominal Brazilian Real riskfere rate (estimated to be 8.5% in illustration 4.1):

Cost of Equity$_{\text{Nominal \$R}}$ = Riskfree Rate$_{R\$}$ + Beta* Risk Premium = 8.5% + 1.74 (9.95%) = 25.82%

Note that this lower than the 26.75% we estimated in the slide, because of the assumption that the risk premiums will not change as you move to higher inflation currencies.

The bottom up beta for Tata Chemicals

Unlevered betas for Tata Chemical's Businesses

Business(# of comparables)	Revenues (millions)	EV/Sales (from comparable firms)	Estimated Value (millions)	Weights	Unlevered Beta	D/E Ratio	Levered Beta
Fertilizers (105)	INR 2,506	1.28	INR 3,208	62.18%	0.72	51.56%	0.965
Chemicals (31)	INR 1,586	1.23	INR 1,951	37.82%	0.68	51.56%	0.911
Tata Chemicals			INR 5,158		0.70		0.945

Cost of Equity
Rupee Riskfree rate =4%; Indian ERP = 6% + 4.51%

Business	Beta	Cost of equity
Fertilizers	0.965	4%+ 0.965 (10.51%) = 14.14%
Chemicals	0.911	4%+ 0.911(10.51%) = 13.58%
Tata Chemicals	0.945	4%+ 0.945 (10.51%) = 13.93%

We used 105 emerging market fertilizer firms and 31 emerging market chemical companies to estimate the EV/Sales ratio and the unlevered betas.

Lacking information on the breakdown of debt by division, we assumed that the divisions would be close in terms of debt capacity and used Tata's overall D/E ratio for both divisions.

We used the marginal tax rate of about 33.99% (about 34%) for India to lever the beta.

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 European commercial banks.
  - To estimate the investment banking beta, we will use the average beta of investment banks (primarily US and UK based).
  - The weights are based on revenues in each division.

Business	Comparable firms	Number	Average Beta	Weights
Commercial banking	Diversified European Banks	90	1.05	65%
Investment Banking	US investment banks	32	1.37	35%
Deutsche Bank			1.162	

- To estimate the cost of equity in Euros, we will use the German 10-year bond rate of 3.6% as the riskfree rate and the 6% as the mature market premium.

Business	Beta	Cost of Equity
Commercial banking	1.05	3.6%+1.05 (6%) = 9.90%
Invesetment Banking	1.37	3.6%+1.37 (6%) = 11.82%
Deutsche Bank	1.162	3.6%+1.162 (6%) = 10.55%

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 Euro 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).

We used the 6% mature market equity risk premium

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 no stock prices or historical returns that can be used to compute regression betas.

■ 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

Company Name	Industry Name	Beta	D/E Ratio	Unlevered Beta	Cash/Firm Value	Unlevered beta corrected for cash
Courier Corp.	Publishing	0.98	12.33%	0.91	0.46%	0.92
Educational Devel.	Publishing	0.57	0.00%	0.57	15.38%	0.67
McGraw-Hill Ryerson Ltd.	Publishing	0.26	0.00%	0.26	46.97%	0.49
Meredith Corp.	Publishing	1.37	66.85%	0.98	3.11%	1.01
Presstek Inc.	Publishing	1.68	41.09%	1.35	10.83%	1.51
PRIMEDIA Inc	Publishing	1.65	340.84%	0.54	9.20%	0.60
Scholastic Corp.	Publishing	1.13	84.49%	0.75	13.36%	0.87
Torstar 'B'	Publishing	0.48	54.21%	0.36	4.93%	0.38
Wiley (John) & Sons	Publishing	1.03	52.73%	0.78	1.93%	0.80
Barnes & Noble	Retail (Special Lines)	1.34	0.00%	1.34	48.46%	2.60
Books-A-Million	Retail (Special Lines)	1.98	97.49%	1.25	7.90%	1.36
Borders Group	Retail (Special Lines)	2.44	240.87%	1.00	7.78%	1.08
Median		**1.235**	**53.47%**	**0.94**	**8.55%**	**1.02**

To estimate the bottom up beta, we initially looked at publicly traded book retail firms but found only three firms. To add to the sample, we looked at publishing firms, arguing that their risk should be similar to that of book retailers (We are open to the critique that the operating leverage can be different in the two businesses).

To avoid outliers, we will use median values for the firms in the sample.

Estimating Bookscape Levered Beta and Cost of Equity

- Because the debt/equity ratios used in computing levered betas 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 book industry median* debt to equity ratio of 53.47 percent.
- Using a marginal tax rate of 40 percent for Bookscape, we get a levered beta of 1.35.

  Levered beta for Bookscape = $1.02 [1 + (1 - 0.40) (0.5347)] = 1.35$
- Using a riskfree rate of 3.5% (US treasury bond rate) and an equity risk premium of 6%:

  Cost of Equity = $3.5\% + 1.35 (6\%) = 11.60\%$

If you cannot get a target debt to equity ratio for a private firm, use an industry -average debt to equity ratio to compute the levered beta. It will give you a more meaningful estimate than using book debt to equity ratios.

Using Accounting Earnings to Estimate Beta

Year	S&P 500	Bookscape	Year	S&P 500	Bookscape
1980	3.01%	3.55%	1995	18.74%	11.55%
1981	1.31%	4.05%	1996	7.77%	19.88%
1982	-8.95%	-14.33%	1997	8.52%	16.55%
1983	-3.84%	47.55%	1998	0.41%	7.10%
1984	26.69%	65.00%	1999	16.74%	14.40%
1985	-6.91%	5.05%	2000	8.61%	10.50%
1986	-7.93%	8.50%	2001	-30.79%	-8.15%
1987	11.10%	37.00%	2002	18.51%	4.05%
1988	50.42%	45.17%	2003	18.79%	12.56%
1989	0.83%	3.50%	2004	23.75%	14.50%
1990	-6.87%	-10.50%	2005	12.96%	8.35%
1991	-14.79%	-32.00%	2006	14.74%	16.74%
1992	8.13%	55.00%	2007	-5.91%	2.50%
1993	28.89%	31.00%	2008	-20.78%	-12.20%
1994	18.03%	21.06%			

Accounting betas are computed by regressing accounting earnings changes at the firm against changes in earnings at the S&P 500. In this case, we used equity earnings for both….

The Accounting Beta for Bookscape

- Regressing the changes in equity earnings at Bookscape against changes in equity earnings for the S&P 500 yields the following:

  Bookscape Earnings Change = 0.08 + 0.8211 (S&P 500 Earnings Change)

  Based upon this regression, the beta for Bookscape's equity is 0.82.

  - Using changes in operating earnings for both the firm and the S&P 500 should yield the equivalent of an unlevered beta.

- The cost of equity based upon the accounting beta is:

  Cost of equity = 3.5% + 0.82 (6%) = 8.42%

The biggest problems with accounting betas are:

Earnings tend to be smoothed out

You will not have very many observations in your regression

Most private firms have financials only once a year. For a firm that has been in existence just a few years, the sample size will be extremely small.

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

■ Beta measures the risk added on to a diversified portfolio. The owners of most private firms are not diversified. 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, if they are not diversified.

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 1.35 and the average R-squared of the comparable publicly traded firms is 21.58%; the correlation with the market is 46.45%.

$$\frac{\text{Market Beta}}{\sqrt{\text{R squared}}} = \frac{1.35}{.4645} = 2.91$$

• Total Cost of Equity = 3.5% + 2.91 (6%) = 20.94%

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. A private equity or VC investor may hold several positions in their portfolio, pushing up the R-squared of their portfolio with the market and pushing down the total beta.

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.)

This approach can be extended to cover investors who are partially diversified such as venture capitalists and private equity investors. Instead of using the correlation of firms in the business with the market, we would use the correlation of the investor's portfolio with the market. As the investor gets more diversified, the correlation will rise and the total beta will fall towards the market beta.

⌛ 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, particularly 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.

Applying this test to items on the liability side of the balance sheet, we would conclude that

-All interest bearing debt, short term as well as long term, is debt

-Accounts payable and suppliers should not be considered debt because they don't carry explicit interest expenses; they should be considered as part of working capital. Alternatively, you can try to make the implicit interest expenses (the discount you could have received by paying early rather than late) explicit and treat it as debt.

-Other liabilities such as under funded pension or health care obligations are best not considered as debt (though there may be exceptions) since the commitments are flexible.

Estimating the Cost of Debt

- If the firm has bonds outstanding, and the bonds are traded, the <u>yield to maturity</u> on a long-term, straight (no special features) bond can be used as the interest rate.
- If the firm is rated, use <u>the rating and a typical default spread</u> 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, <u>use the interest rate on the borrowing</u> or
    - estimate a synthetic rating for the company, and use the <u>synthetic rating</u> 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.

There are two key components to the cost of debt:

a. You want a long-term cost (I use a 10-year cost) of debt even if your debt is short term. You do not want to reward companies that play the term structure by giving them a lower cost of debt and capital. In effect, you are assuming that the rolled over cost of short term debt = cost of long term debt.

b. You want a current cost. In other words, you do not care about the debt and interest expenses on the books. The book interest rate (interest expense/ book debt) is not a good measure of the cost of debt because it does not reflect the current cost of borrowing any may even be lower than the riskfree rate.

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, we can use just the interest coverage ratio:

Interest Coverage Ratio = EBIT / Interest Expenses

∎ For the four non-financial service companies, we obtain the following:

Company	Operating income	Interest Expense	Interest coverage ratio
Disney	$6,819	$821	8.31
Aracruz	R$ 574	R$ 155	3.70
Tata Chemicals	INR 6,263	INR 1,215	5.15
Bookscape	$3,575	$575	6.22

Basing the rating on just an interest coverage ratio will give you an approximation for the rating. 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.

The operating income used to compute the rating does not have to be last year's number. It can be an average over time or a normalized value.

Interest Coverage Ratios, Ratings and Default Spreads- Early 2009

Interest Coverage Ratio: Small market cap(<$5 billion)	Interest Coverage Ratio: Large market cap (>US $ 5 billion)	Rating	Typical Default
> 12.5	>8.5	AAA	1.25%
9.50–12.50	6.5-8.5	AA	1.75%
7.50–9.50	5.5-6.5	A+	2.25%
6.00–7.50	4.25- 5.5	A	2.50%
4.50–6.00	3- 4.25	A–	3.00%
4.00-4.50	2.5-3.0	BBB	3.50%
3.50–4.00	2.25-2.5	BB+	4.25%
3.00–3.50	2.0-2.25	BB	5.00%
2.50–3.00	1.75-2.0	B+	6.00%
2.00–2.50	1.5-1.75	B	7.25%
1.50–2.00	1.25-1.5	B–	8.50%
1.25–1.50	0.8-1.25	CCC	10.00%
0.80–1.25	0.65-0.8	CC	12.00%
0.50–0.80	0.2-0.65	C	15.00%
< 0.65	<0.2	D	20.00%

Disney, Market Cap > $ 5 billion: 8.31   →   AA
Aracruz: Market Cap< $5 billion: 3.70   →   BB+
Tata: Market Cap< $ 5 billion: 5.15   →   A-
Bookscape: Market Cap<$5 billion: 6.22   →   A

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 versus Actual Ratings: Disney and Aracruz

- Disney and Aracruz are rated companies and their actual ratings are different from the synthetic rating.
- Disney's synthetic rating is AA, whereas its actual rating is A. The difference can be attributed to any of the following:
  - Synthetic ratings reflect only the interest coverage ratio whereas actual ratings incorporate all of the other ratios and qualitative factors
  - Synthetic ratings do not allow for sector-wide biases in ratings
  - Synthetic rating was based on 2008 operating income whereas actual rating reflects normalized earnings
- Aracruz's synthetic rating is BB+, but the actual rating for dollar debt is BB. The biggest factor behind the difference is the presence of country risk but the derivatives losses at the firm in 2008 may also be playing a role.
- Deutsche Bank had an A+ rating. We will not try to estimate a synthetic rating for the bank. Defining interest expenses on debt for a bank is difficult…

The synthetic ratings process will deliver reasonably close ratings for any firm with debt of substance. It will tend to overstate ratings for firms with little debt (technology firms often will get AAA ratings because their interest coverage ratios are so high). The fact that these ratings are too high is not an issue because these companies also have so little debt in their capital structure - the cost of capital is very close to the cost of equity.

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.

Estimating Cost of Debt

- For Bookscape, we will use the synthetic rating (A) to estimate the cost of debt:
  - Default Spread based upon A rating = 2.50%
  - Pre-tax cost of debt = Riskfree Rate + Default Spread = 3.5% + 2.50% = 6.00%
  - After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 6.00% (1-.40) = 3.60%
- For the three publicly traded firms that are rated in our sample, we will use the actual bond ratings to estimate the costs of debt:

Company	S&P Rating	Risk-Free Rate	Default Spread	Cost of Debt	Tax Rate	After-Tax Cost of Debt
Disney	A	3.50% (US $)	2.50%	6.00%	38%	3.72%
Deutsche Bank	A+	3.60% (Euros)	2.25%	5.85%	29.50%	4.12%
Aracruz	BB	3.50% (US $)	5%	8.50%	34%	5.61%

- For Tata Chemicals, we will use the synthetic rating of A-, but we also consider the fact that India faces default risk (and a spread of 3%).
  - Pre-tax cost of debt = Riskfree Rate(Rs) + Country Spread + Company spread
    = 4% + 3% + 3% = 10%
  - After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 10% (1-.34) = 6.6%

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

The marginal tax rate comes from the tax code and as relatively little to do with your company. For US companies, it should be 35%+. For non-US companies, it will reflect the tax rates in those countries (low in HK and Singapore, higher in Europe and Latin America...)

For Tata Chemicals, we added the country default spread on to the company default spread to reflect the fact that Tata has to bear the burden of country risk when it borrows. (We skipped this step with Aracruz because we used the actual rating, which already reflects Brazil country risk)

For Disney, Deutsche Bank and Aracruz, we chose to use the actual ratings rather than the synthetic rating, because it does contain more information.

Default looms larger.. And spreads widen.. The effect of the market crisis – January 2008 to January 2009

Earlier, we looked at equity risk premiums and how they have moved higher in the crisis of 2008. In this graph, we note the same phenomena with debt. If you plug in the updated default spreads into the cost of debt computation for Disney, we would end up with a pre-tax cost of debt of almost 9%; note that the higher equity risk premia will lead to a higher cost of equity as well.

The more general lesson is that default spreads need to be updated at regular intervals to get good estimates of the cost of debt.

(I use a website, bondsonline.com, but it charges $35 for a snapshot. I update approximately twice a year)

Updated Default Spreads

Rating	Default Spread: Over 10-year riskfree rate in January 2011
AAA	0.50%
AA	0.65%
A+	0.85%
A	1.00%
A-	1.10%
BBB	1.60%
BB	3.35%
B+	3.75%
B	5.00%
B-	5.25%
CCC	8.00%
CC	10.00%
C	12.00%
D	15.00%

This table should be updated frequently and should have current default spreads in it. These will be the spreads you use for your synthetic ratings today and not the spreads from early 2009.

■ 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 tables from prior pages)
  - 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% of higher for US companies. 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} = Preferred Dividend per share/ 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 = $629.91

Conversion Option= Market value of convertible – Value of straight bond

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?

Disney: From book value to market value for debt…

- In Disney's 2008 financial statements, the debt due over time was footnoted.

Due in	Maturity	Amount due	% due
2009	1	$3,513	24.33%
2010	2	$1,074	7.44%
2011	3	$1,205	8.35%
2012	4	$1,479	10.24%
2013	5	$1,842	12.76%
Thereafter	10	$5,324	36.88%
Weighted Average	5.38 years	$14,437	

No maturity was given for debt due after 5 years. I assumed 10 years.

- Disney's total debt due, in book value terms, on the balance sheet is $16,003 million and the total interest expense for the year was $728 million. Assuming that the maturity that we computed above still holds and using 6% as the pre-tax cost of debt:

$$\text{Estimated MV of Disney Debt} = 728 \left[\frac{1 - \dfrac{1}{(1.06)^{5.38}}}{.06} \right] + \frac{16,003}{(1.06)^{5.38}} = \$14,962 \text{ million}$$

We first consolidate all of the debt outstanding and obtain an face value weighted average maturity for the debt of 5.38 years.

We then compute the market value of debt, setting the book value = face value, the interest expense = coupon, the average maturity = debt maturity and the pre-tax cost of debt based on the synthetic rating as the cost of debt.

Alternatively, we can compute the market value of each debt item separately and add up the values.

And operating leases…

- The pre-tax cost of debt at Disney is 6%.

Year	Commitment	Present Value
1	$392.00	$369.81
2	$351.00	$312.39
3	$305.00	$256.08
4	$265.00	$209.90
5	$198.00	$147.96
6 & 7	$309.50	$424.02
Debt Value of leases =		$1,720.17

Disney reported $619 million in commitments after year 5. Given that their average commitment over the first 5 years of $302 million, we assumed two years @ $309.5 million each.

- Debt outstanding at Disney
= MV of Interest bearing Debt + PV of Operating Leases
= $14,962 + $ 1,720= $16,682 million

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

Disney reports a lump sum as the amount due after year 6…. We break it up into annual payments based upon the average lease payments over the first 5 years…You could also use the year 5 payment as the basis for making this adjustment (Putting it all in year 6 will overstate the present value).

To get to the total market value of debt, we add the estimated market value of interest bearing debt to the present value of operating leases (already a market value number since you used the current pre-tax cost of borrowing to arrive at the value).

⧗ 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

For most firms, the book debt ratio will be much higher than the market debt ratio. Using the book debt ratio will therefore yield a lower cost of capital (which undercuts the conservatism argument used by defenders of book value weights)

Current Cost of Capital: Disney

- **Equity**
  - Cost of Equity = Riskfree rate + Beta * Risk Premium
    = 3.5% + 0.9011 (6%) = 8.91%
  - Market Value of Equity = $45.193 Billion
  - Equity/(Debt+Equity) = 73.04%
- **Debt**
  - After-tax Cost of debt =(Riskfree rate + Default Spread) (1-t)
    = (3.5%+2.5%) (1-.38) = 3.72%
  - Market Value of Debt = $ 16.682 Billion
  - Debt/(Debt +Equity) = 26.96%
- Cost of Capital = 8.91%(.7304)+3.72%(.2696) = 7.51%

45.193/ (45.193+16.682)

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 7.51%?

Divisional Costs of Capital: Disney and Tata Chemicals

Disney

Business	Cost of Equity	After-tax cost of debt	E/(D+E)	D/(D+E)	Cost of capital
Media Networks	8.61%	3.72%	75.00%	25.00%	7.39%
Parks and Resorts	8.20%	3.72%	64.68%	35.32%	6.62%
Studio Entertainment	13.53%	3.72%	68.64%	31.36%	10.45%
Consumer Products	10.86%	3.72%	80.84%	19.16%	9.49%
Disney	8.91%	3.72%	73.04%	26.96%	7.51%

Tata Chemicals

Business	Cost of equity	Pre-tax cost of debt	After-tax cost of debt	D/(D+E)	Cost of capital
Fertilizers	14.14%	10.0%	6.60%	34.02%	11.58%
Chemicals	13.58%	10.0%	6.60%	34.02%	11.21%
Tata Chemicals	13.93%	10.0%	6.60%	34.02%	11.44%

For Disney, we used the division specific debt ratio weights we estimated earlier (when estimating the levered beta). We did assume that all divisions borrow at Disney's pre-tax cost of debt. If the divisions issued debt independently, we would have considered using division-specific costs of debt.

For Tata Chemicals, we used the same debt ratio and cost of debt for both divisions.

Aracruz : Currency effects.. And a side bar on Deutsche Bank..

Aracruz

	Cost of equity	Pre-tax Cost o	After-tax cost	D/(D+E)	Cost of capital
US dollars	20.82%	8.50%	5.61%	52.47%	12.84%
Nominal $R	26.75%	13.82%	10.79%	52.47%	18.37%
Real	18.45%	6.37%	3.54%	52.47%	10.63%

$$\text{Cost of capital in \$R} = 1.1284 \frac{(1.07)}{(1.02)} - 1 = 18.37\%$$

Inflation rate in US $ = 2%
Inflation rate in $R = 7%

$$\text{Real Cost of capital} = 1.1284 \frac{(1)}{(1.02)} - 1 = 10.63\%$$

■ Earlier we computed a cost of equity of 10.55% for Deutsche Bank. We won't even try to estimate the cost of capital. Why?

The cost of capital for Aracruz will be higher in $R, because we expect inflation to be 7% in $R and only 2% in US dollars. In real terms, we remove inflation entirely from the mix.

For banks, defining debt is a nightmare and capital should really be defined only in equity terms.

Bookscape's Cost of Capital

■ Earlier, we noted that the cost of equity would be much higher for an undiversified investor than a diversified one and use a contrast between total and market beta to illustrate the point.

■ The cost of capital illustrates the divide:

	Cost of equity	Pre-tax Cost of debt	After-tax cost of debt	D/(D+E)	Cost of capital
Market Beta	11.60%	6.00%	3.60%	34.84%	8.81%
Total Beta	20.94%	6.00%	3.60%	34.84%	14.90%

If we carry this through to its logical limits:

a.Private companies operate under a disadvantage relative to publicly traded companies, because their owners are not efficient risk bearers.

b.Private businesses will reject investments that are attractive an otherwise similar public company

■ 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?

To go from unlevered to levered betas and then to the cost of capital, you have to

a.Define debt and compute market value

b.Compute the present value of operating leases

c.Compute the levered beta, using the market value of equity and the consolidated market value of debt (including lease commitmetns)

d.Compute the cost of capital, using the debt and equity 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.

If returns and cash flows are equity based (return on equity or cash flow to equity), the appropriate hurdle rate is the cost of equity.

If returns and cash flows are firm or operating asset based (return on capital or cashflows to firm), the appropriate hurdle rate is the cost of capital.

Back to First Principles
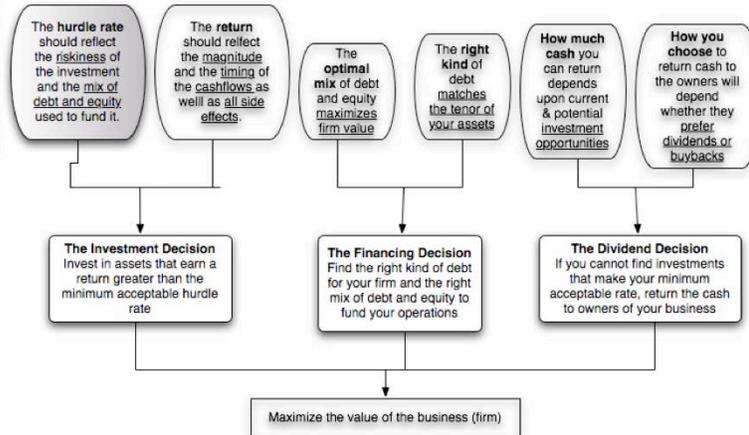
Took us a while but we have the mechanics of the hurdle rate down..

Measuring Investment Returns
I: The Mechanics of Investment Analysis

"Show me the money"

from *Jerry Maguire*

If there is a theme to how we think about returns in corporate finance, this line from Jerry Maguire brings it home. We trust the concrete over the vague and cash flows over earnings.

First Principles

Chapters 5 & 6: Measuring Returns on Investments

The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The **return** should relfect the magnitude and the timing of the cashflows as well as all side effects.

The **optimal mix** of debt and equity maximizes firm value

The **right kind** of debt matches the tenor of your assets

How much cash you can return depends upon current & potential investment opportunities

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Maximize the value of the business (firm)

The next section of the notes will focus on measuring returns on investments, provide an argument for why cash flows make more sense than earnings and weighing those cash flows and discuss how best to bring in side benefits and costs into the returns.

Measures of return: earnings versus cash flows

- Principles Governing Accounting Earnings Measurement
  - <u>Accrual Accounting</u>: 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.
  - <u>Operating versus Capital Expenditures</u>: 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), financial expenses (expenses associated with the use of debt) 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. In effect, adding in the change in working capital converts accrual earnings to cash earnings.

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 when cash flows and earnings are different, cash flows provide a more reliable measure of what an investment generates.

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

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

Setting the table: What is an investment/project?

- An investment/project can range the spectrum from big to small, money making to cost saving:
  - Major strategic decisions to enter new areas of business or new markets.
  - Acquisitions of other firms are projects as well, notwithstanding attempts to create separate sets of rules for them.
  - Decisions on new ventures within existing businesses or markets.
  - Decisions that may change the way existing ventures and projects are run.
  - Decisions on how best to deliver a service that is necessary for the business to run smoothly.
- Put in broader terms, every choice made by a firm can be framed as an investment.

The discussion of what is a "good investment" that follows applies to pretty much everything that firms do… Put another way, the rules we develop are general ones and cannot be altered or modified just because a specific investment is too big or too small…

Here are four examples…

- <u>Rio Disney</u>: We will consider whether Disney should invest in its first theme parks in South America. These parks, while similar to those that Disney has in other parts of the world, will require us to consider the effects of country risk and currency issues in project analysis.
- <u>New Paper Plant for Aracruz</u>: Aracruz, as a paper and pulp company, is examining whether to invest in a new paper plant in Brazil.
- <u>An Online Store for Bookscape</u>: Bookscape is evaluating whether it should create an online store to sell books. While it is an extension of their basis business, it will require different investments (and potentially expose them to different types of risk).
- <u>Acquisition of Sentient by Tata Chemicals</u>: Sentient is a US firm that manufactures chemicals for the food processing business. This cross-border acquisition by Tata Chemicals will allow us to examine currency and risk issues in such a transaction.

These investments range the spectrum, from small to large, extensions of existing businesses to acquisitions. The emphasis will be that the principles of investment analysis do not change, no matter what type of investment you are looking at.

Earnings versus Cash Flows: A Disney Theme Park

- The theme parks to be built near Rio, modeled on Euro Disney in Paris and Disney World in Orlando.
- The complex 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 Brazilian $R. 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 fourth 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 second item should be on "already spent".

While we often classify all these investments as "initial investments", they occur over time. Companies seldom make large investments at an instant in time.

Also worth adding: Disney will fund this investment using the same mix of debt and equity that it uses for theme parks currently.

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	$1.750
4	$1,700	$300	$500	$2.500
5	$2,000	$500	$625	$3.125
6	$2,200	$550	$688	$3,438
7	$2,420	$605	$756	$3,781
8	$2,662	$666	$832	$4,159
9	$2,928	$732	$915	$4,575
10	$2,987	$747	$933	$4,667

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. (For instance, Disney would make these forecasts by looking at the history of Disneyland., EuroDisney and DisneyWorld).

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.

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	12.50%	50.00%
3	11.00%	60.00%
4	9.50%	70.00%
5	8.00%	80.00%
6	8.00%	90.00%
7	8.00%	100.00%
8	8.00%	105.00%
9	8.00%	110.00%
10	8.00%	110.00%

■The capital maintenance expenditures are low in the early years, when the parks are still new but increase as the parks age.

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 amusement park 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 fixed assets. Note that capital expenditures moves towards depreciation over time, reflecting the fact that on a long lived project, the cash inflow from depreciation will have to be reinvested back into the project to preserve the earning power of the assets.

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 38%.

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.

Laying the groundwork:
Book Capital, Working Capital and Depreciation

	0	1	2	3	4	5	6	7	8	9	10
Book Value of Pre-project inv	$500	$450	$400	$350	$300	$250	$200	$150	$100	$50	$0
Depreciation: Pre-Project		$50	$50	$50	$50	$50	$50	$50	$50	$50	$50
Magic Kingdom	$2,000	$1,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Epcot Rio	$0	$0	$1,000	$500	$0	$0	$0	$0	$0	$0	$0
Capital Maintenance		$0	$188	$252	$276	$258	$285	$314	$330	$347	$350
- Depreciation on fixed assets		$0	$375	$419	$394	$322	$317	$314	$314	$316	$318
Book Value of new Fixed Assets	$2,000	$3,000	$3,813	$4,145	$4,027	$3,962	$3,931	$3,931	$3,946	$3,978	$4,010
Book Value of Working Capital			$63	$88	$125	$156	$172	$189	$208	$229	$233
Total Capital Invested in Project	$2,500	$3,450	$4,275	$4,582	$4,452	$4,368	$4,302	$4,270	$4,254	$4,257	$4,243

12.5% of book
value at end of
prior year
($3,000)

The depreciation each year is computed by multiplying the book value of fixed assets at the end of the previous year and multiplying by the depreciation percentage specified in the earlier table. IN year 2, for instance, the depreciation is 12.5% of the book value of fixed assets at the end of year 1 ($3,000), yielding $375 million.

The $ 500 million that has been spent already on the project was capitalized. It is depreciated straight line over the 10 years. (If it had been expensed, this would not be necessary)

Step 1: Estimate Accounting Earnings on Project

	0	1	2	3	4	5	6	7	8	9	10
Magic Kingdom - Revenues		$0	$1,000	$1,400	$1,700	$2,000	$2,200	$2,420	$2,662	$2,928	$2,987
Epcot Rio - Revenues		$0	$0	$0	$300	$500	$550	$605	$666	$732	$747
Resort & Properties - Revenues		$0	$250	$350	$500	$625	$688	$756	$832	$915	$933
Total Revenues			**$1,250**	**$1,750**	**$2,500**	**$3,125**	**$3,438**	**$3,781**	**$4,159**	**$4,575**	**$4,667**
Magic Kingdom – Direct Expenses		$0	$600	$840	$1,020	$1,200	$1,320	$1,452	$1,597	$1,757	$1,792
Epcot Rio – Direct Expenses		$0	$0	$0	$180	$300	$330	$363	$399	$439	$448
Resort & Property – Direct Expenses		$0	$188	$263	$375	$469	$516	$567	$624	$686	$700
Total Direct Expenses			**$788**	**$1,103**	**$1,575**	**$1,969**	**$2,166**	**$2,382**	**$2,620**	**$2,882**	**$2,940**
Depreciation & Amortization		$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
Allocated G&A Costs		$0	$188	$263	$375	$469	$516	$567	$624	$686	$700
Operating Income		**($50)**	**($150)**	**($84)**	**$106**	**$315**	**$389**	**$467**	**$551**	**$641**	**$658**
Taxes		($19)	($57)	($32)	$40	$120	$148	$178	$209	$244	$250
Operating Income after Taxes		**($31)**	**($93)**	**($52)**	**$66**	**$196**	**$241**	**$290**	**$341**	**$397**	**$408**

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

Note that loss in year 1. While this loss can be carried forward and offset against profits in future years, we have chosen to claim the losses against Disney's profits from other projects in year 1. (You would rather save taxes now than the same taxes in the future…)

Where are the interest expenses? They do not show up because we are computing earnings to the firm - operating income - rather than earnings to equity - net income.

And the Accounting View of Return

■ a

| Year | After-tax Operating Income | Book value of | | | | Average BV of Capital | ROC (a) | ROC (b) |
		Pre-project investment	Fixed assets	Working capital	Total Capital			
0		$500	$2,000	$0	$2,500		NA	NA
1	-$31	$450	$3,000	$0	$3,450	$2,975	-1.04%	-1.24%
2	-$93	$400	$3,813	$63	$4,275	$3,863	-2.41%	-2.70%
3	-$52	$350	$4,145	$88	$4,582	$4,429	-1.18%	-1.22%
4	$66	$300	$4,027	$125	$4,452	$4,517	1.46%	1.44%
5	$196	$250	$3,962	$156	$4,368	$4,410	4.43%	4.39%
6	$241	$200	$3,931	$172	$4,302	$4,335	5.57%	5.52%
7	$290	$150	$3,931	$189	$4,270	$4,286	6.76%	6.74%
8	$341	$100	$3,946	$208	$4,254	$4,262	8.01%	8.00%
9	$397	$50	$3,978	$229	$4,257	$4,255	9.34%	9.34%
10	$408	$0	$4,010	$233	$4,243	$4,250	9.61%	9.59%
Average							4.05%	3.99%

(a)   Based upon average book capital over the year
(b)   Based upon book capital at the start of each year

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). We have computed a simple average return on capital over the next 10 years…

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

- The computed return on capital on this investment is about 4%. To make a judgment on whether this is a sufficient return, we need to compare this return to a "hurdle rate". Which of the following is the right hurdle rate? Why or why not?
  - ❏ The riskfree rate of 3.5% (T. Bond rate)
  - ❏ The cost of equity for Disney as a company (8.91%)
  - ❏ The cost of equity for Disney theme parks (8.20%)
  - ❏ The cost of capital for Disney as a company (7.51%)
  - ❏ The cost of capital for Disney theme parks (6.62%)
  - ❏ None of the above

First, since we have computed return on capital, the comparison should be to the cost of capital.

Second, since it is a theme park investment, it should be the cost of capital for theme parks.

Here is the catch. This theme park is in Brazil, an emerging market. Thus, the cost of capital of 6.62% that we estimated for existing theme parks, which are in developed markets, may be too low.

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 is 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 some political risk, which would mean that it too should not affect the discount rate. However, there are aspects of political risk especially in emerging markets that will be difficult to diversify and may 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 Brazil (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.

Estimating a hurdle rate for Rio Disney

- We did estimate a cost of capital of 6.62% for the Disney theme park business, using a bottom-up levered beta of 0.7829 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- The only concern we would have with using this cost of equity for this project is that it may not adequately reflect the additional risk associated with the theme park being in an emerging market (Brazil).

  Country risk premium for Brazil = 2.50% (34/21.5) = 3.95%

  Cost of Equity in US$= 3.5% + 0.7829 (6%+3.95%) = 11.29%

  We multiplied the default spread for Brazil (2.50%) by the relative volatility of Brazil's equity index to the Brazilian government bond. (34%/21.5%)

- Using this estimate of the cost of equity, Disney's theme park debt ratio of 35.32% and its after-tax cost of debt of 3.72% (see chapter 4), we can estimate the cost of capital for the project:

  Cost of Capital in US$ = 11.29% (0.6468) + 3.72% (0.3532) = 8.62%

Here is the other half of the equation:

1. The hurdle rate for an investment should reflect its risk. (That is why we use the bottom-up beta that we estimated for theme parks earlier rather than the bottom-up beta for Disney as a company). In addition, the exposure to country risk is incorporated into the investment.

2. We use Disney's theme park debt ratio for this theme park, on the assumption that it is not a stand-alone investment with its own debt capacity. If it were, we would have considered using project specific financing weights. (It is usually not a good idea to compute the cost of capital for a project based on how it is financed, since firms can use disproportionate amounts of debt on some projects not because the projects can afford to carry debt but because they (the firms) have excess debt capacity.

Would lead us to conclude that...

- Do not invest in this park. The **return on capital of 4.05%** is lower than the **cost of capital for theme parks of 8.62%**; 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.

In general, while firms claim that using the same life for all projects is not discriminatory, it clearly creates a bias against longer term projects.

A Tangent: From New to Existing Investments: ROC for the entire firm

How "good" are the existing investments of the firm?

	Assets			Liabilities	
	Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived(working capital) assets	Assets in Place		Debt	Fixed Claim on cash flows Little or No role in management *Fixed Maturity Tax Deductible*
	Expected Value that will be created by future investments	Growth Assets		Equity	Residual Claim on cash flows Significant Role in management *Perpetual Lives*

Measuring ROC for existing investments..

Company	EBIT (1-t)	BV of Debt	BV of Equity	Cash	BV of Capital	Return on Capital	Cost of Capital	ROC - Cost of Capital
Disney	$4,359	$16,892	$30,753	$3,670	$43,975	9.91%	7.51%	2.40%
Aracruz	R$ 379	R$ 3,090	R$ 5,361	R$ 22	R$ 8,430	4.49%	10.63%	-6.14%
Bookscape	$2.15	$9.59	$6.00	$0.40	$15.59	13.76%	14.90%	-1.14%
Tata Chemicals	INR 4,134	INR 12,614	INR 23,928	INR 725	INR 36,542	11.31%	11.44%	-0.12%

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.

•Some computational details:

- •Why do we use book value of debt and equity?

Because we want to focus on capital invested in assets in place. Market value has two problems. It includes growth assets and it updates the value to reflect returns earned. In fact, if you computed market value of just assets in place correctly, you should always earn your cost of capital.

Why end of last year?

To stay consistent with end-of-the-year cash flows and earnings that we use in the rest of the analysis. If we used mid-year conventions, we

Old wine in a new bottle.. Another way of presenting the same results…

- The key to value is earning excess returns. Over time, there have been attempts to restate this obvious fact in new and different ways. For instance, Economic Value Added (EVA) developed a wide following in the the 1990s:

  EVA = (ROC – Cost of Capital) (Book Value of Capital Invested)

- The excess returns for the four firms can be restated as follows:

Company	ROC - Cost of Capital	BV of Capital	EVA
Disney	2.40%	$43,975	$1,057
Aracruz	-6.14%	R$ 8,430	-R$ 517
Bookscape	-1.14%	$15.59	-$0.18
Deutsche Bank	NMF	NMF	NMF
Tata Chemicals	-0.12%	INR 36,542	-INR 45

The EVA is a measure of dollar value created in a single time period. Thus, it will be affected by how capital is measured and the ups and downs of year-to-year operating income.

EVA just restates the excess returns (ROC – Cost of capital) in dollar value terms. Thus, it will always have the same sign as the excess return, but it will be larger for larger companies. Thus, you cannot compare the EVA across companies but you can compare the EVA for the same company from year to year.

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

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

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

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

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

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

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

Note also that:

1. A negative EVA in a single period should not be taken as an indicator that the company is a bad or poorly managed company. It may reflect the fact that the firm had a bad year or that macro economic variables conspired to reduce operating income in that period (a recession for a cyclical firm, a downturn in commodity prices for a commodity company).

2. Even a string of negative EVAs may not be an indicator of a poorly run firm or business. Young businesses and infrastructure companies often have negative EVAs for extended periods (while they are building up infrastructure) before they turn positive.

The cash flow view of this project..

	0	1	2	3	4	5	6	7	8	9	10
Operating Income		-$50	-$150	-$84	$106	$315	$389	$467	$551	$641	$658
Taxes		-$19	-$57	-$32	$40	$120	$148	$178	$209	$244	$250
Operating Income after Taxes		-$31	-$93	-$52	$66	$196	$241	$290	$341	$397	$408
+ Depreciation & Amortization		$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
- Capital Expenditures	$2,500	$1,000	$1,188	$752	$276	$258	$285	$314	$330	$347	$350
- Change in Working Capital	$0	$0	$63	$25	$38	$31	$16	$17	$19	$21	$5
Cash flow to Firm	-$2,500	-$981	-$918	-$360	$196	$279	$307	$323	$357	$395	$422

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:

Tax Benefit = Depreciation * Tax Rate

Disney Theme Park: Depreciation tax savings (Tax rate = 38%)

	1	2	3	4	5	6	7	8	9	10
Depreciation	$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
Depreciaton * t	$19	$162	$178	$169	$141	$139	$138	$138	$139	$140

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.

As your tax rates increase, the benefit to depreciation also increases. 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) is really a debate that affects earnings but not 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 one 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 project.

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 it over three years. 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.

Here are the two times when you may prefer to capitalize and depreciate, rather than expense:

a. When you are losing money and expect to make money in the future (and are worried about losing loss carry forwards)

b. When you expect your tax rates to go up over time.

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 supplier 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,

Non-cash WC = Inventory + Accounts Receivable - 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 invest that cash in treasury bills or commercial paper (where they earn a low but a fair rate of return), 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 wasting cash balances, i.e., cash in the form of currency but this requirement should be small. If that is the case, that cash can be counted into working capital.

Question to consider: Can non-cash working capital be a source of cash in some businesses?

Yes… There are businesses that have little need for inventory and take full advantage of supplier credit, thus making working capital a negative number and a source of cash.

The incremental cash flows on the project

$ 500 million has already been spent & $ 50 million in depreciation will exist anyway

	0	1	2	3	4	5	6	7	8	9	10
Operating Income		-$50	-$150	-$84	$106	$315	$389	$467	$551	$641	$658
Taxes		-$19	-$57	-$32	$40	$120	$148	$178	$209	$244	$250
Operating Income after Taxes		-$31	-$93	-$52	$66	$196	$241	$290	$341	$397	$408
+ Depreciation & Amortization		$50	$425	$469	$444	$372	$367	$364	$364	$366	$368
- Capital Expenditures	$2,500	$1,000	$1,188	$752	$276	$258	$285	$314	$330	$347	$350
- Change in Working Capital	$0	$0	$63	$25	$38	$31	$16	$17	$19	$21	$5
Cash flow to Firm	-$2,500	-$981	-$918	-$360	$196	$279	$307	$323	$357	$395	$422
+ Pre-Project Investment	500										
- Pre-project Deprecn * t		$19	$19	$19	$19	$19	$19	$19	$19	$19	$19
+ Fixed G&A (1-t)		$0	$78	$109	$155	$194	$213	$234	$258	$284	$289
Incremental Cash flow to Firm	-$2,000	-$1,000	-$859	-$270	$332	$454	$501	$538	$596	$660	$692

2/3rd of allocated G&A is fixed.
Add back this amount (1-t)
Tax rate = 38%

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

The tax savings on the depreciation on the sunk cost is also subtracted out, since that tax savings would accrue to the firm even if it did not take this investment.

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.

A more direct way of getting to incremental cash flows..

	0	1	2	3	4	5	6	7	8	9	10
Revenues		$0	$1,250	$1,750	$2,500	$3,125	$3,438	$3,781	$4,159	$4,575	$4,667
Direct Expenses		$0	$788	$1,103	$1,575	$1,969	$2,166	$2,382	$2,620	$2,882	$2,940
Incremental Depreciation		$0	$375	$419	$394	$322	$317	$314	$314	$316	$318
Incremental G&A		$0	$63	$88	$125	$156	$172	$189	$208	$229	$233
Incremental Operating Income		$0	$25	$141	$406	$678	$783	$896	$1,017	$1,148	$1,175
- Taxes		$0	$10	$53	$154	$258	$298	$340	$386	$436	$447
Incremental after-tax Operating income		$0	$16	$87	$252	$420	$485	$555	$630	$712	$729
+ Incremental Depreciation		$0	$375	$419	$394	$322	$317	$314	$314	$316	$318
- Capital Expenditures	$2,000	$1,000	$1,188	$752	$276	$258	$285	$314	$330	$347	$350
- Change in non-cash Working Capital		$0	$63	$25	$38	$31	$16	$17	$19	$21	$5
Cashflow to firm	-$2,000	-$1,000	-$860	-$270	$332	$453	$502	$538	$596	$660	$692

On the previous table, we first subtracted out all expenses (including the non-incremental expenses) and then added them back to get back to incremental cash flow. In the process, we risked getting tripped up by tax computations.

In this table, we just consider only the incremental items, when computing operating income, thus making our lives a lot easier when computing incremental cash flow.

Sunk Costs

- Any expenditure that has <u>already been incurred</u>, and <u>cannot be recovered</u> (even if a project is rejected) is called a sunk cost. A test market for a consumer product and R&D expenses for a drug (for a pharmaceutical company) would be good examples.
- When analyzing a project, sunk costs <u>should not be considered</u> since they are not incremental.

<u>A Behavioral Aside</u>: It is a well established finding in psychological and behavioral research that managers find it almost impossible to ignore sunk costs.

Sunk costs should not be considered an investment analysis. After all, rejecting an investment that adds value is self-defeating even if the value added < Sunk costs….

It is human nature, though, to try to make back what has already been lost. It is what keeps casinos going…

In what is known as the Concorde fallacy, managers were presented with a hypothetical scenario. Assume that you have spent $ 9 million, developing a new technology, and that you will need to spend an additional million to complete your development. Assume now that a competitor has just come up with a much better technology (that will make yours obsolete). The subjects of this experiment were asked to decide whether they would invest the extra million, in light of this new information.

a.When managers were just asked about investing an extra million in a technology that would be obsolete when it came out (and not told about the $ 9 million already spent) they all rejected the investment.

b.When made aware of what had already been spent, 40% chose to make the additional investment.

Test Marketing and R&D: The Quandary of Sunk Costs

- A consumer product company has spent $ 100 million on test marketing. Looking at only the incremental cash flows (and ignoring the test marketing), the project looks like it will create $25 million in value for the company. Should it take the investment?
    - ❏ Yes
    - ❏ No
- Now assume that every investment that this company has shares the same characteristics (Sunk costs > Value Added). The firm will clearly not be able to survive. What is the solution to this problem?

Companies with substantial test marketing and R&D expenses have to put into place processes where these costs are assessed before they occur since it is too late to do it afterwards. These assessments will be based upon fairly primitive information but they are necessary. For instance, proposals for basic research will have to include probabilities that the research will lead to commercial products and the potential markets for such products.

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, as is earnings)
- For large firms, these allocated costs can be significant and 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.

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.

Breaking out G&A Costs into fixed and variable components: A simple example

■ Assume that you have a time series of revenues and G&A costs for a company.

Year	Revenues	G&A Costs
1	$1,000	$250
2	$1,200	$270
3	$1,500	$300

What percentage of the G&A cost is variable?

If the pattern of this three year period tells the whole story, roughly 40% of the G&A cost is variable. Note that the incremental G&A/incremental revenues was 10% in both years 2 and 3. Using this 10% on total revenue in year 1 yields the variable G&A cost of $100 million in year 1 which is 40% of the total G&A costs.

In the real world, it is likely that this relationship will be far more jagged. You will need more data and your estimates will have more error. One way to estimate the variable G&A costs as a proportion of revenues, if you have a long time series of data, is to run a regression of G&A Costs against revenues:

G&A = a + b Revenues

The coefficient on revenue should provide a measure of how much G&A cots increase for every dollar increase in revenue.

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

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

The present value factors are in a sense time-weighing factors. The riskier a cash flow and the further it is in the future, the lower the weight you attach to that cash flow.

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	$A \left[\dfrac{1 - \dfrac{1}{(1+r)^n}}{r} \right]$	$A \left[\dfrac{(1+r)^n - 1}{r} \right]$
3. Growing Annuity	$A(1+g) \left[\dfrac{1 - \dfrac{(1+g)^n}{(1+r)^n}}{r - g} \right]$	
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. If cash flows occur at the end of each period, the equations can be modified by multiplying each one by (1+r) to get end-of-the-period equivalents.

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 > 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 is 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 10 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)

    $$=692 \, (1.02) \, /(.0862-.02) = \$ \, 10,669 \text{ million}$$

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 off 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 $ 10,669 million at the end of year 10. (The perpetual growth model gives the value of the asset at the beginning of the year of the cash flow. We used year 11 cash flows in the numerator and have the terminal value as of the start of year 11, which is also the end of year 10)

Which yields a NPV of..

Year	Annual Cashflow	Terminal Value	Present Value
0	-$2,000		-$2,000
1	-$1,000		-$921
2	-$860		-$729
3	-$270		-$211
4	$332		$239
5	$453		$300
6	$502		$305
7	$538		$302
8	$596		$307
9	$660		$313
10	$692	$10,669	$4,970
	Net Present Value =		$2,877

This is the net present value calculation using the cost of capital of 8.62%, the theme park cost of capital adjusted for emerging market risk in Brazil.

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 $2,877 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 $ 2,877 million will have to be measured against these expectations.

The additive nature of NPV is useful in a variety of contexts:

a.The value of a business that is composed of many projects can be written as the sum of the NPVs of the projects.

b.When a firm over pays on an acquisition, it is the equivalent of accepting a negative NPV investment, and the value of its equity should drop by the overpayment.

The IRR of this project

Figure 5.5: NPV Profile for Disney Theme Park
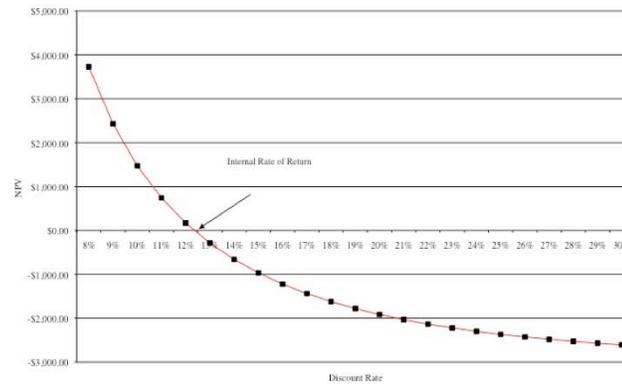
This is a net present value profile, where NPV is plotted against discount rates. The IRR is that discount rate at which NPV is zero.

The steepness of the slope tells us something about how sensitive this investment is to changes in the discount rate. (It is the equivalent of the duration of a bond, which tells you how sensitive bond prices are to changes in interest rates).

Notice that the NPV is much more sensitive to changes in discount rates, when discount rates are low, than when they are high. (This may have consequences for how value will change in low interest rate scenarios as opposed to high interest rate ones).

The IRR suggests..

- **The project is a good one**. Using time-weighted, incremental cash flows, this project provides a return of 12.35%. This is greater than the cost of capital of 8.62%.
- 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.

Does the currency matter?

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

No. It should not. A good project should be good in any currency. But showing this in practice requires us to make some key assumptions about how exchange rates will evolve over time.

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 ($R), the discount rate has to be a dollar ($R) 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.

Disney Theme Park: Project Analysis in $R

- The inflation rates were assumed to be 7% in Brazil and 2% in the United States. The $R/dollar rate at the time of the analysis was 2.04 $R/dollar.
- The expected exchange rate was derived assuming purchasing power parity.

    Expected Exchange Rate$_t$ = Exchange Rate today * $(1.07/1.02)^t$

- The expected growth rate after year 10 is still expected to be the inflation rate, but it is the 7% $R inflation rate.
- The cost of capital in $R was derived from the cost of capital in dollars and the differences in inflation rates:

    $R Cost of Capital =

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

    $$= (1.0862)(1.07/1.02) - 1 = 13.94\%$$

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: $R NPV

Discount back at 13.94%

Year	Cashflow ($)	R$/$	Cashflow (R$)	Present Value
0	-$ 2,000.00	R$ 2.04	-R$ 4,080.00	-R$ 4,080.00
1	-$ 1,000.00	R$ 2.14	-R$ 2,140.00	-R$ 1,878.14
2	-$ 859.50	R$ 2.24	-R$ 1,929.49	-R$ 1,486.19
3	-$ 270.06	R$ 2.35	-R$ 635.98	-R$ 429.92
4	$ 332.50	R$ 2.47	R$ 821.40	R$ 487.32
5	$ 453.46	R$ 2.59	R$ 1,175.12	R$ 611.87
6	$ 501.55	R$ 2.72	R$ 1,363.46	R$ 623.06
7	$ 538.06	R$ 2.85	R$ 1,534.43	R$ 615.39
8	$ 595.64	R$ 2.99	R$ 1,781.89	R$ 627.19
9	$ 659.64	R$ 3.14	R$ 2,070.10	R$ 639.48
10	$ 11,360.86	R$ 3.29	R$ 37,400.49	R$ 10,139.72
				R$ 5,869.78

NPV = R$ 5,870/2.04= $ 2,877 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.

If you are not consistent about estimating the cash flows and the discount rates, the net present values may deviate but only because you have brought your point of view on the currency into the analysis.

Uncertainty in Project Analysis: What can we do?

- Based on our expected cash flows and the estimated cost of capital, the proposed theme park looks like a very good investment for Disney. Which of the following may affect your assessment of value?
  a) Revenues may be over estimated (crowds may be smaller and spend less)
  b) Actual costs may be higher than estimated costs
  c) Tax rates may go up
  d) Interest rates may rise
  e) Risk premiums and default spreads may increase
  f) All of the above
- How would you respond to this uncertainty?
  a) Will wait for the uncertainty to be resolved
  b) Will not take the investment
  c) Ignore it.
  d) Other

All of the above will affect the actual value of the project. However, note that if your estimates are unbiased, there should be almost a good a chance that the outcome will be better than expected rather than worse than expected.

The uncertainty will never be resolved (new uncertainties will creep up) and if you do wait, you will never invest. The only two choices are to ignore it, arguing that the discount rate already reflects your uncertainty or to try to at least get a better handle on uncertainty before you make your final decision.

One simplistic (but effective) solution: See how quickly you can get your money back…

- If your biggest fear is losing the billions that you invested in the project, one simple measure that you can compute is the number of years it will take you to get your money back.

Year	Cash Flow	Cumulated CF	PV of Cash Flow	Cumulated DCF
0	-$2,000	-$2,000	-$2,000	-$2,000
1	-$1,000	-$3,000	-$921	-$2,921
2	-$860	-$3,860	-$729	-$3,649
3	-$270	-$4,130	-$211	-$3,860
4	$332	-$3,797	$239	-$3,621
5	$453	-$3,344	$300	-$3,321
6	$502	-$2,842	$305	-$3,016
7	$538	-$2,304	$302	-$2,714
8	$596	-$1,708	$307	-$2,407
9	$660	-$1,049	$313	-$2,093
10	$692	-$357	$303	-$1,790
11	$706	$350	$284	-$1,506
12	$720	$1,070	$267	-$1,239
13	$735	$1,804	$251	-$988
14	$749	$2,554	$236	-$753
15	$764	$3,318	$221	-$531
16	$780	$4,097	$208	-$324
17	$795	$4,892	$195	-$129
18	$811	$5,703	$183	$55
19	$827	$6,531	$172	$227
20	$844	$7,374	$162	$388

Payback = 10.5 years

Discounted Payback = 17.7 years

There are some decision makers who use payback as a decision rule. In other words, any investment that pays off in less than X years is a good investment. That strikes us as dangerous for many reasons. Payback asks and answers a very narrow question, which is when you make your initial investment back. Once that happens, we lose interest in the project, no matter how large or small the cash flows are after that.

Payback does offer more promise as a risk measure, especially in long term projects where you are concerned about whether the project will last as long as you thought and the cash flows in the later years. In more practical terms, you may accept only those investments that have positive NPV and pay off in less than X years.

A slightly more sophisticated approach: Sensitivity Analysis and What-if Questions…

- The NPV, IRR and accounting returns for an investment will change as we change the values that we use for different variables.
- One way of analyzing uncertainty is to check to see how sensitive the decision measure (NPV, IRR..) is to changes in key assumptions. While this has become easier and easier to do over time, there are caveats that we would offer.

Caveat 1: When analyzing the effects of changing a variable, we often hold all else constant. In the real world, variables move together.

Caveat 2: The objective in sensitivity analysis is that we make better decisions, not churn out more tables and numbers.

    Corollary 1: Less is more. Not everything is worth varying…

    Corollary 2: A picture is worth a thousand numbers (and tables).

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.

It is probably a good idea to also focus on variables where you have some effect over the outcome. Thus, asking what will happen if competition increases and margins shrink is useful, since you may be able to increase advertising and fight off the competition but working out what will happen if the economy goes into a recession will yield little of value (unless it affects how much you borrow to fund the investment.)

And here is a really good picture…
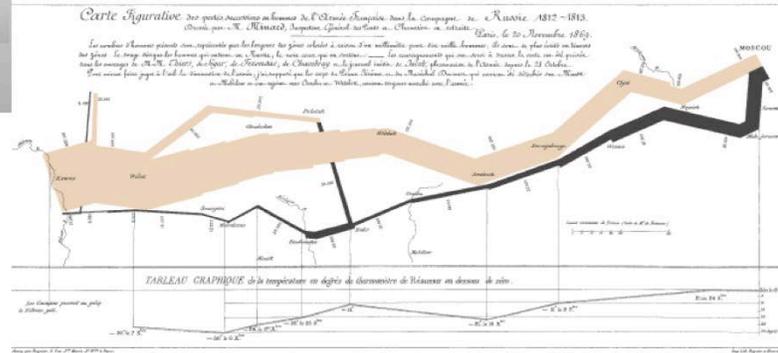
A good way to show the effects of sensitivity analysis is with a graph and a good graph tells a story. This is one of my all-time favorites, from a book on charting by Edward Tufte (The Visual Display of Information)…

This graph shows the size of Napoleon's army on his ill-fated attempt to invade Russia on one axis and the temperature on the other. It tells the story without any text… Note that the army shrinks on its way back from Moscow as temperatures drop below freezing.

The final step up: Incorporate probabilistic estimates.. Rather than expected values..

Actual Revenues as % of Forecasted Revenues (Base case = 100%)

Equity Risk Premium (Base Case = 6% (US)+ 3.95% (Brazil) = 9.95%

Operating Expenses at Parks as % of Revenues (Base Case = 60%)

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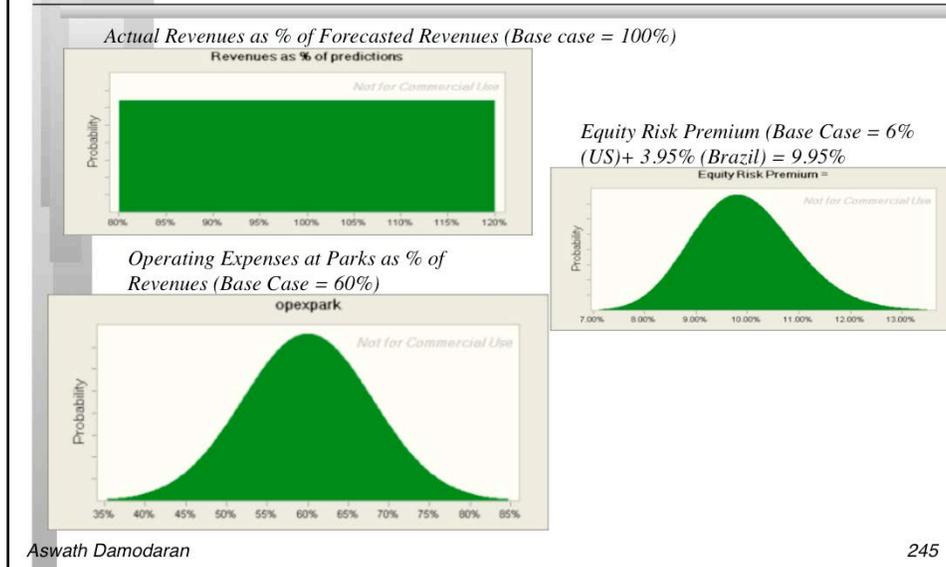
The key to doing simulations is

a.Picking the variables that you want to use probability distributions for (Hint: Don't pick every input. Choose only the key inputs)

b.Choosing the type of distribution to use for each input (Review your probability distributions... And the paper I have on my site on how to pick the right one)

c.Estimating the parameters of the distribution (Use both historical and industry wide data…)

The resulting simulation…

Average = $2.95 billion
Median = $2.73 billion

Net Present Value
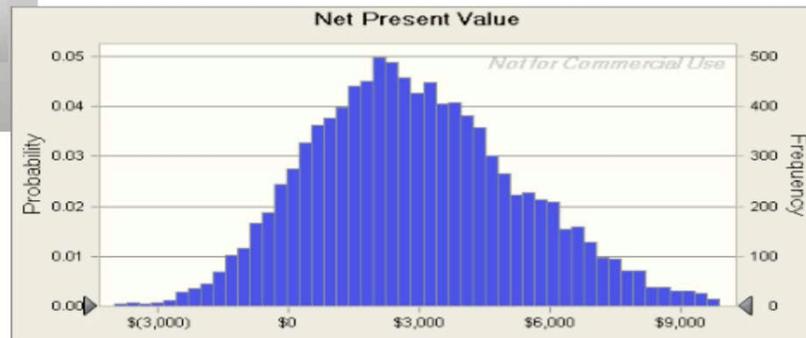
NPV ranges from -$4 billion to +$14 billion. NPV is negative 12% of the time.

This is the output from 10,000 simulations. I used Crystal Ball.

The average should be close to your base case value, though it will not be identical because of the distributional assumptions. The key issues are the spread in the distribution and the probability that the number is a negative value…. You also have the best and worst case scenarios embedded in the distribution.

■ Assume that you are the person at Disney who is given the results of the simulation. The average and median NPV are close to your base case values of $2.877 billion. However, there is a 12% probability that the project could have a negative NPV and that the NPV could be a large negative value? How would you use this information?

   a) I would accept the investment and print the results of this simulation and file them away to show that I exercised due diligence.

   b) I would reject the investment, because 12% is higher than my threshold value for losing on a project.

   c) Other

Not a. If the purpose of the analysts is to provide cover to decision makers, it does not add any real value to the firm. (It does to the decision maker)

Not b. Seems to be double counting. After all, we have captured the risk in the discount rate already….. If a firm is not diversified or in danger of default, though, it may make sense to alter your decision to reflect the results from the simulation.

I would actually choose c. I would accept this investment, but use the results of the simulation to guide how I manage the project in the aftermath. Thus, if the variability in the NPV is coming primarily from a macro variable (say the cost of a commodity), I would consider hedging that risk. If it is coming from labor costs, I would try to negotiate a long term contract with my workers to stabilize costs.

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. (Note that while we borrowed money, we did not consider any of the cash flows associated with borrowing. The earnings were before interest expenses and the cash flows were before debt repayments.

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 6.3725%, 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 terms and to equity investors. Thus, the hurdle rate has to be a real cost of equity.
- In the earlier section, we estimated costs of equity, debt and capital in US dollars, $R and real terms for Aracruz's paper business.

	Cost of equity	Pre-tax Cost of debt	After-tax cost of debt	D/(D+E)	Cost of capital
US dollars	20.82%	8.50%	5.61%	52.47%	12.84%
$R	26.75%	13.82%	10.79%	52.47%	18.37%
Real	18.45%	6.3725%	3.54%	52.47%	10.63%

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

Year	Beginning Debt	Interest expense	Principal Repaid	Total Payment	Ending Debt
1	R$ 100,000	R$ 6,373	R$ 7,455	R$ 13,828	R$ 92,545
2	R$ 92,545	R$ 5,897	R$ 7,930	R$ 13,828	R$ 84,615
3	R$ 84,615	R$ 5,392	R$ 8,436	R$ 13,828	R$ 76,179
4	R$ 76,179	R$ 4,855	R$ 8,973	R$ 13,828	R$ 67,206
5	R$ 67,206	R$ 4,283	R$ 9,545	R$ 13,828	R$ 57,661
6	R$ 57,661	R$ 3,674	R$ 10,153	R$ 13,828	R$ 47,508
7	R$ 47,508	R$ 3,027	R$ 10,800	R$ 13,828	R$ 36,708
8	R$ 36,708	R$ 2,339	R$ 11,488	R$ 13,828	R$ 25,220
9	R$ 25,220	R$ 1,607	R$ 12,220	R$ 13,828	R$ 12,999
10	R$ 12,999	R$ 828	R$ 12,999	R$ 13,828	R$ 0

Start by estimating the annual payment, using the loan amount of 100 million and the interest rate of 6.3725%, 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.

Net 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 Rate (in '000	585	630	675	713	713	713	713	713	713	713
Price per ton	400	400	400	400	400	400	400	400	400	400
Revenues (in Real BR 0(	R$ 234,000	R$ 252,000	R$ 270,000	R$ 285,000	R$ 285,000	R$ 285,000	R$ 285,000	R$ 285,000	R$ 285,000	R$ 285,000
- Direct Expenses	R$ 155,300	R$ 163,400	R$ 171,500	R$ 178,250	R$ 178,250	R$ 178,250	R$ 178,250	R$ 178,250	R$ 178,250	R$ 178,250
- Depreciation	R$ 35,000	R$ 28,000	R$ 22,400	R$ 17,920	R$ 14,336	R$ 21,469	R$ 21,469	R$ 21,469	R$ 21,469	R$ 21,469
Operating Income	**R$ 43,700**	**R$ 60,600**	**R$ 76,100**	**R$ 88,830**	**R$ 92,414**	**R$ 85,281**	**R$ 85,281**	**R$ 85,281**	**R$ 85,281**	**R$ 85,281**
- Interest Expenses	R$ 6,373	R$ 5,897	R$ 5,392	R$ 4,855	R$ 4,283	R$ 3,674	R$ 3,027	R$ 2,339	R$ 1,607	R$ 828
Taxable Income	R$ 37,327	R$ 54,703	R$ 70,708	R$ 83,975	R$ 88,131	R$ 81,607	R$ 82,254	R$ 82,942	R$ 83,674	R$ 84,453
- Taxes	R$ 12,691	R$ 18,599	R$ 24,041	R$ 28,552	R$ 29,965	R$ 27,746	R$ 27,966	R$ 28,200	R$ 28,449	R$ 28,714
Net Income	**R$ 24,636**	**R$ 36,104**	**R$ 46,667**	**R$ 55,424**	**R$ 58,167**	**R$ 53,860**	**R$ 54,287**	**R$ 54,742**	**R$ 55,225**	**R$ 55,739**

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

Year	Net Income	Beg. BV: Assets	Depreciation	Capital Exp.	Ending BV: Assets	BV of Working Capital	Debt	BV: Equity	Average BV: Equity	ROE
0		R$ 0	R$ 0	R$ 250,000	R$ 250,000	R$ 35,100	R$ 100,000	R$ 185,100		
1	R$ 24,636	R$ 250,000	R$ 35,000	R$ 0	R$ 215,000	R$ 37,800	R$ 92,545	R$ 160,255	R$ 172,678	14.27%
2	R$ 36,104	R$ 215,000	R$ 28,000	R$ 0	R$ 187,000	R$ 40,500	R$ 84,615	R$ 142,885	R$ 151,570	23.82%
3	R$ 46,667	R$ 187,000	R$ 22,400	R$ 0	R$ 164,600	R$ 42,750	R$ 76,179	R$ 131,171	R$ 137,028	34.06%
4	R$ 55,424	R$ 164,600	R$ 17,920	R$ 0	R$ 146,680	R$ 42,750	R$ 67,206	R$ 122,224	R$ 126,697	43.75%
5	R$ 58,167	R$ 146,680	R$ 14,336	R$ 50,000	R$ 182,344	R$ 42,750	R$ 57,661	R$ 167,433	R$ 144,828	40.16%
6	R$ 53,860	R$ 182,344	R$ 21,469	R$ 0	R$ 160,875	R$ 42,750	R$ 47,508	R$ 156,117	R$ 161,775	33.29%
7	R$ 54,287	R$ 160,875	R$ 21,469	R$ 0	R$ 139,406	R$ 42,750	R$ 36,708	R$ 145,448	R$ 150,783	36.00%
8	R$ 54,742	R$ 139,406	R$ 21,469	R$ 0	R$ 117,938	R$ 42,750	R$ 25,220	R$ 135,468	R$ 140,458	38.97%
9	R$ 55,225	R$ 117,938	R$ 21,469	R$ 0	R$ 96,469	R$ 42,750	R$ 12,999	R$ 126,220	R$ 130,844	42.21%
10	R$ 55,739	R$ 96,469	R$ 21,469	R$ 0	R$ 75,000	R$ 0	R$ 0	R$ 75,000	R$ 100,610	55.40%
										36.19%

Real ROE of 36.19% is greater than
Real Cost of Equity of 18.45%

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 firms, we can compute return on equity and cost of equity to pass judgment on whether firms are creating value to its equity investors.

Equity Excess Returns and EVA: 2008

Company	Net Income	BV of Equity	ROE	Cost of Equity	ROE - Cost of Equity	Equity EVA
Disney	$4,427	$30,753	14.40%	8.91%	5.49%	$1,688.34
Aracruz	-R$ 4,213	5361	-78.59%	18.45%	-97.05%	($5,202.85)
Bookscape	$1.50	$6.00	25.00%	20.94%	4.06%	$0.24
Deutsche Bank	-€ 3,835.00	€ 38,466.00	-9.97%	10.72%	-20.69%	($7,958.62)
Tata Chemicals	INR 9,644	23,928	40.30%	13.93%	26.37%	$6,309.81
Tata Chemicals(w/o extraordinary loss)	INR 3,700	23928	15.46%	13.93%	1.53%	$366.10

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 Aracruz's ROE is a real return on equity because companies in Brazil are allowed to adjust book value for inflation.

	0	1	2	3	4	5	6	7	8	9	10
Net Income		R$ 24,636	R$ 36,104	R$ 46,667	R$ 55,424	R$ 58,167	R$ 53,860	R$ 54,287	R$ 54,742	R$ 55,225	R$ 55,739
+ Depreciation & Amortization		R$ 35,000	R$ 28,000	R$ 22,400	R$ 17,920	R$ 14,336	R$ 21,469	R$ 21,469	R$ 21,469	R$ 21,469	R$ 21,469
- Capital Expenditures	R$ 150,000	R$ 0	R$ 0	R$ 0	R$ 0	R$ 50,000	R$ 0	R$ 0	R$ 0	R$ 0	R$ 0
- Change in Working Capital	R$ 35,100	R$ 2,700	R$ 2,700	R$ 2,250	R$ 0	R$ 0	R$ 0	R$ 0	R$ 0	R$ 0	-R$ 42,750
- Principal Repayments		R$ 7,455	R$ 7,930	R$ 8,436	R$ 8,973	R$ 9,545	R$ 10,153	R$ 10,800	R$ 11,488	R$ 12,220	R$ 12,999
Cashflow to Equity	-R$ 185,100	R$ 49,481	R$ 53,474	R$ 58,382	R$ 64,371	R$ 12,958	R$ 65,176	R$ 64,956	R$ 64,722	R$ 64,473	R$ 106,958

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 salvage value is shown in the final year.

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	49,481 BR	41,773 BR
2	53,474 BR	38,110 BR
3	58,382 BR	35,126 BR
4	64,371 BR	32,696 BR
5	12,958 BR	5,556 BR
6	65,176 BR	23,594 BR
7	64,956 BR	19,851 BR
8	64,722 BR	16,698 BR
9	64,473 BR	14,043 BR
10	181,958 BR	33,458 BR
NPV		75,806 BR

The caswhflows to equity are real cashflows and are discounted back at the real cost of equity. This project is a good project and has a net present value of 75,806 million BR.

An Equity IRR

Figure 5.6: NPV Profile on Equity Investment in Paper Plant: Aracruz
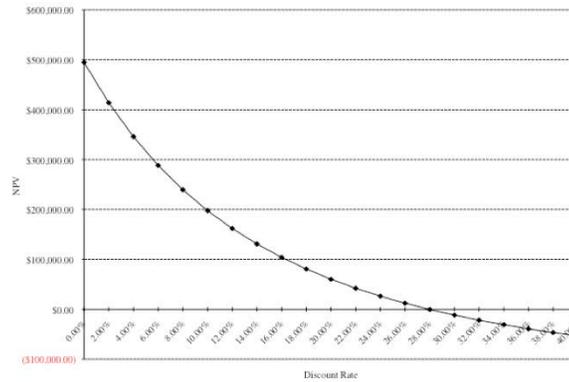
The IRR for this project, using real equity cashflows, is 28%, higher than the cost of equity of 18.45%….

Real versus Nominal Analysis

- In computing the NPV of the plant, we estimated real cash flows and discounted them at the real cost of equity. We could have estimated the cash flows in nominal terms (either US dollars or $R) and discounted them at a nominal cost of equity (either US dollar or $R). Would the answer be different?

a) Yes

b) No

Explain

If we remain consistent about using the same expected inflation to increase the cash flows and adjust the cost of equity, there should be no effect on value.

Dealing with Macro Uncertainty: The Effect of Paper Prices..

■ Like the Disney Theme Park, the Aracruz paper plant's actual value will be buffeted as the variables change. The biggest source of variability is an external factor –the price of paper and pulp.

Figure 5.9: Aracruz Paper Plant: Effect of Changing pulp prices
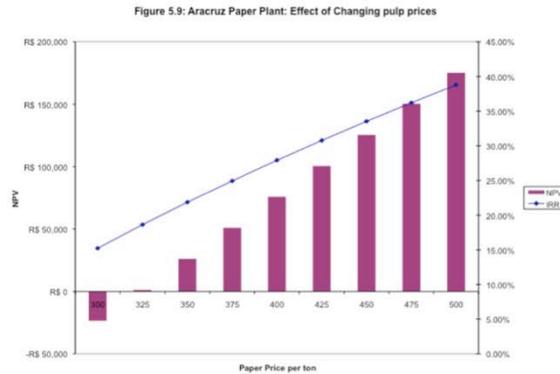
The breakeven price is about $325. if pulp prices fall below that value, this plant will become value destructive.

A key difference between breakeven analysis and simulation is that you can change only on variable at a time in breakeven analysis, while holding all else constant…. To the extent that the other variables (other than revenues) are affected by pulp prices I may get a poor measure of the effect on NPV of changing pulp prices.

Figure 5.10: Aracruz Paper Plant: Effect of Changing Exchange Rates
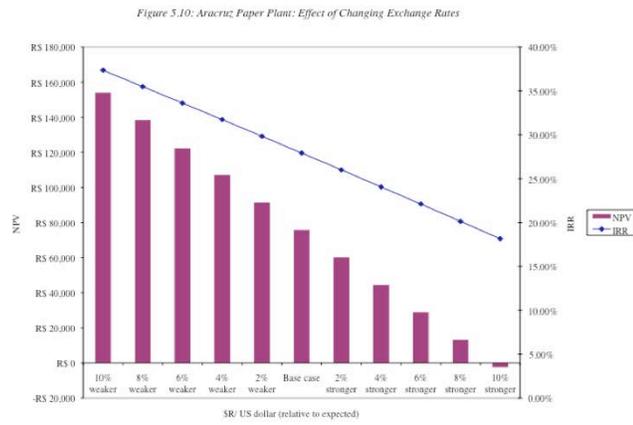
Aracruz's costs are in $R and its revenues are in US dollars. Hence, it benefits when the reai weakens and hurts when the reai strengthens.

- The value of this plant is very much a function of paper and pulp prices. There are futures, forward and option markets on paper and pulp that Aracruz can use to hedge against paper price movements. Should it?
  - a) Yes
  - b) No

  Explain.
- The value of the plant is also a function of exchange rates. There are forward, futures and options markets on currency. Should Aracruz hedge against exchange rate risk?
  - a) Yes
  - b) No

Explain.

Aracruz is not unique in this respect. All commodity companies are exposed to commodity price risk. However, here is the catch. Many investors in these companies invest in them because they want to play the commodity price game. Thus, investors who believe that oil prices will go up often buy oil companies. If these companies then hedge against oil price variability, they are undercutting that rationaler. On an empirical basis, there have been studies that have compared commodity prices that hedge against commodity price movements against companies that do not, as investments. The general consensus seems to be that companies that do not hedge are much better investments, even on a risk adjusted basis, than companies that do.

Here are the possible exceptions. A commodity company that prides itself on its operating prowess may choose to isolate that strength by hedging against commodity price risk. Thus, an oil company that is consistently more efficient about finding and exploiting new oil reserves may hedge against oil price to show the market its strength.

On exchange rates, the answer is more nuanced. Investors do not buy Aracruz to bet on exchange rates. To the extent that Aracruz's managers feel that their competitive advantage is in the paper and pulp business and not in forecasting exchange rates, there is an argument to be made that hedging against exchange rate risk is not expensive and can allow managers to focus on what matters. (This may also explain why airlines like Southwest and Singapore Airlines

Acquisitions and Projects

- An acquisition is an investment/project like any other and all of the rules that apply to traditional investments should apply to acquisitions as well. In other words, for an acquisition to make sense:
  - It should have positive NPV. The present value of the expected cash flows from the acquisition should exceed the price paid on the acquisition.
  - The IRR of the cash flows to the firm (equity) from the acquisition > Cost of capital (equity) on the acquisition
- In estimating the cash flows on the acquisition, we should count in any possible cash flows from synergy.
- The discount rate to assess the present value should be based upon the risk of the investment (target company) and not the entity considering the investment (acquiring company).

All too often, firms seem to use different and often far looser rules to assess acquisitions than they do traditional investments. In many cases, acquisitions are justified, even when the make no financial sense, using fuzzy words such as strategic considerations and synergy. We are not denying that these considerations exist but we would argue that we these words have to be converted into expected cash flows (uncertain though we might be) and assess these cash flows exactly the same way that we assess all other cash flows.

Tata Chemicals and Sensient Technologies

- Sensient Technologies is a publicly traded US firm that manufactures color, flavor and fragrance additives for the food business. Tata Chemicals is an Indian company that manufactures fertilizers and chemicals.
- Based upon 2008 financial statements, the firm reported
  - Operating income of $162 million on revenues of $1.23 billion for the year
  - A tax rate of 37% of its income as taxes in 2008
  - Depreciation of $44 million and capital expenditures of $54 million.
  - An Increase in Non-cash working capital of $16 million during the year.
- Sensient currently has a debt to capital ratio of 28.57% (translating into a debt to equity ratio of 40%) and faces a pre-tax cost of debt of 5.5%.

Sensient is in a very different business, country and currency than Tata Chemicals.

We have used 2008 numbers as base year numbers, but we did check each number against prior years to make sure that we were not using any outliers. If we had found an unusual value in 2008, we would have reverted to average numbers between 2004 and 2008.

We are also assuming that Sensient's existing debt ratio is a fair debt ratio, given their cash flows and risk.

Estimating the Cost of Capital for the Acquisition

- In assessing the cost of capital for the acquisition, we will
  - Estimate all values in US dollar terms (rather than rupees)
  - Use Sensient's risk, debt and tax characteristics in making our assessments.
- While Sensient Technologies is classified as a specialty chemical company, its revenues are derived almost entirely from the food processing business. Consequently, we feel that the unlevered beta of food processing companies in the United States is a better measure of risk; in January 2009, we estimated an unlevered beta of 0.65 for this sector.
- Using the US corporate tax rate of 37% (to reflect the fact that Sensient's income will be taxed in the US), Sensient's current debt to capital ratio of 28.57% (D/E=40%) and its pre-tax cost of debt of 5.5%:
  - Levered Beta = 0.65 (1+ (1-.37) (.40)) = 0.8138
  - Cost of Equity= 3.5% + 0.8138 (6%) = 8.38%
  - Cost of capital = 8.38% (1-.2857) + 5.5% (1-.37) (.2857) = 6.98%

Note that the discount rate is assessed in dollars because all of the cash flows will be estimated in dollars.

To compute the cost of capital, we use Sensient-specific numbers rather than the numbers from Tata Chemicals. The only inputs where there could have been some variation are in the debt ratio and cost of debt. If Sensient had been under levered (had too little debt) or over levered (too much debt), a case can be made for replacing the current debt ratio and cost of debt with the optimal. Again, this would have nothing to do with Tata Chemicals capacity to borrow money…

Estimating the Cash Flow to the Firm and Growth for Sensient

- Using the operating income ($162 million), capital expenditures ($54 million), depreciation ($44 million) and increase in non-cash working capital ($16 million), we estimate the cash flow to the firm for Sensient Technologies in 2008 :

  Cash Flow to the firm = After-tax Operating Income + Depreciation – Capital Expenditures – Change in Non-cash Working Capital = 162 (1-.37) + 44 – 54 – 16 = $76.06 million

- We will assume that the firm is mature and that all of the inputs to this computation – earnings, capital expenditures, depreciation and working capital – will grow 2% a year in perpetuity.

We have kept the valuation simple by assuming perpetual growth in the inputs… If there had been the possibility of high growth, the mechanics would become more complex but the principles would not change.

Value of Sensient Technologies: Before Synergy

■ We can estimate the value of the firm, based on these inputs:

Value of Operating Assets $\dfrac{\text{Expected Cashflow to the firm next year}}{\text{(Cost of Capital - Stable growth rate)}}$

$$\frac{\$76.06\,(1.02)}{(.0698 \ - \ .02)} = \$1{,}559 \text{ million}$$

■ Adding the cash balance of the firm ($8 million) and subtracting out the existing debt ($460 million) yields the value of equity in the firm:

Value of Equity = Value of Operating Assets + Cash – Debt

= $1,559 + $ 8 - $460 million = $1,107 million

■ The market value of equity in Sensient Technologies in May 2009 was $1,150 million.

■ To the extent that Tata Chemicals pays the market price, it will have to generate benefits from synergy that exceed $43 million.

When we discount cash flows to the firm at the cost of capital, we are valuing the operating assets of the firm. We add cash and subtract out debt to get to the value of equity.

We will return to examine how best to value synergy later in the presentation.

Measuring Investment Returns
II. Investment Interactions, Options and Remorse…

Now that we have looked at how best to assess an investment that stands alone (independent investments), it is time to make life complicated.

Independent investments are the exception…

- In all of the examples we have used so far, the investments that we have analyzed have stood alone. Thus, our job was a simple one. Assess the expected cash flows on the investment and discount them at the right discount rate.
- In the real world, most investments are not independent. Taking an investment can often mean rejecting another investment at one extreme (mutually exclusive) to being locked in to take an investment in the future (pre-requisite).
- More generally, accepting an investment can create side costs for a firm's existing investments in some cases and benefits for others.

At most firms, an investment cannot be assessed by itself since it affects not only other investments that the firm has on its books already but future investments.

I. Mutually Exclusive Investments

- We have looked at how best to assess a stand-alone investment and concluded that a good investment will have positive NPV and generate accounting returns (ROC and ROE) and IRR that exceed your costs (capital and equity).
- In some cases, though, firms may have to choose between investments because
  - They are mutually exclusive: Taking one investment makes the other one redundant because they both serve the same purpose
  - The firm has limited capital and cannot take every good investment (i.e., investments with positive NPV or high IRR).
- Using the two standard discounted cash flow measures, NPV and IRR, can yield different choices when choosing between investments.

In some cases, exclusivity will be thrust upon you because two investments serve the same purpose. This is the case, for instance, when you choose between different distribution or computer systems to serve your needs or between alternative marketing strategies.

In other cases, the exclusivity is created by the fact that you do not have the capital (or the access to it) to take every good investment that comes along. Thus, good investments compete against each other.

Comparing Projects with the same (or similar) lives..

- When comparing and choosing between investments with the same lives, we can
  - Compute the accounting returns (ROC, ROE) of the investments and pick the one with the higher returns
  - Compute the NPV of the investments and pick the one with the higher NPV
  - Compute the IRR of the investments and pick the one with the higher IRR
- While it is easy to see why accounting return measures can give different rankings (and choices) than the discounted cash flow approaches, you would expect NPV and IRR to yield consistent results since they are both time-weighted, incremental cash flow return measures.

Discounted cash flow measures (NPV and IRR) share the same DNA and yield the same conclusions when looking at independent investments. If an investment has a positive NPV, the IRR> Discount rate. However, this may no longer hold when you are comparing two or more investments, as we will see by looking at three cases where the choices vary.

Case 1: IRR versus NPV

■ Consider two projects with the following cash flows:

Year	Project 1 CF	Project 2 CF
0	-1000	-1000
1	800	200
2	1000	300
3	1300	400
4	-2200	500

Provides cash flows on a single project. You could compute the net present value or compute the IRR.

Project's NPV Profile
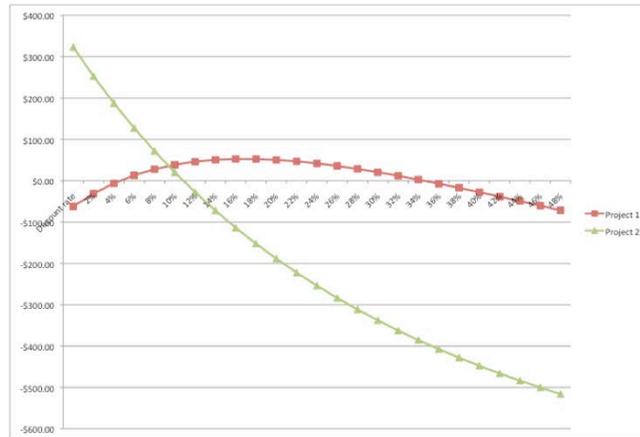
Project 1 has two Internal Rates of Return (IRR) - one is around 7% and the other is over 36%…

Project 2 has one internal rate of return: about 12%

What do we do now?

- Project 1 has two internal rates of return. The first is 6.60%, whereas the second is 36.55%. Project 2 has one internal rate of return, about 12.8%.
- Why are there two internal rates of return on project 1?

- If your cost of capital is 12%, which investment would you accept?
  - a) Project 1
  - b) Project 2

Explain.

Because there are two sign changes fn the cash flows, one in year 1 and one in year 4.

I would accept project 2, if the discount rate is 12% because it has a higher 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%

These investments are mutually exclusive. Note the difference in scale. IRR, as a percent measure, will be biased towards smaller investments whereas NPV as a dollar value, will be biased towards larger investments.

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 face 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 that 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…

Cause	Number of firms	Percent of total
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 s not external (lack of access to markets, inability to convey information, transactions costs) but by internal factors (management is conservative, restrictions on human capital…)

Many firms also create implicit capital constraints by setting their hurdle rates higher than their cost of 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%
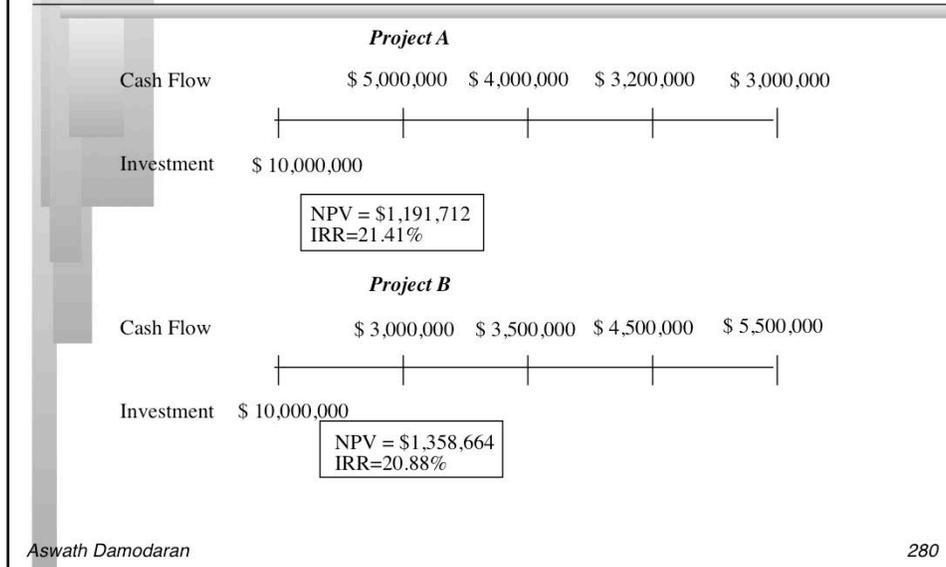
The projects have the same scale. Why are the two approaches yielding different rankings? (They are both discounted cash flow approaches, but they must be time-weighting the cash flows slightly differently to yield different rankings)

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 reinvestment assumption becomes. 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

Figure 6.3: IRR versus Modified Internal Rate of Return

Cash Flow ... $ 300 ... $ 400 ... $ 500 ... $ 600

Investment ... <$ 1000>

$500(1.15) → $600 / $575

$400(1.15)^2 → $529

$300(1.15)^3 → $456

Terminal Value = $2160

Internal Rate of Return = 24.89%
Modified Internal Rate of Return = 21.23%
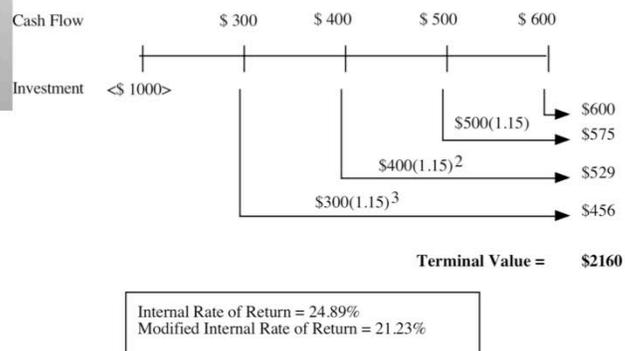
This is the modified IRR. Its rankings are going to be very similar to those yielded by the PI approach.

Why NPV and IRR may differ.. Even if projects have the same lives

- 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.

Comparing projects with different lives..

Project A

$400 $400 $400 $400 $400

-$1000

NPV of Project A = $ 442
IRR of Project A = 28.7%

Project B

$350 $350 $350 $350 $350 $350 $350 $350 $350 $350

-$1500

NPV of Project B = $ 478
IRR for Project B = 19.4%

Hurdle Rate for Both Projects = 12%
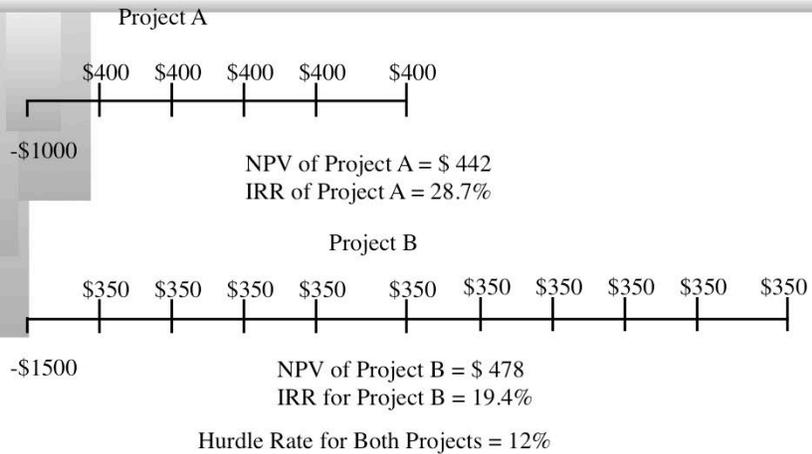
The NPV of the shorter life project will generally be lower than the NPV of the longer-life project. This is an issue only if they are mutually exclusive, i.e. you can pick only one.

Why NPVs cannot be compared.. When projects have different lives.

- The net present values of mutually exclusive projects with different lives cannot be compared, since there is a bias towards longer-life projects. To compare the NPV, we have to
  - replicate the projects till they have the same life (or)
  - convert the net present values into annuities
- The IRR is unaffected by project life. We can choose the project with the higher IRR.

If you pick projects based on NPV, you will tend to accept longer life projects over shorter life projects. In effect, you are assuming that you have no other excess return investments on the horizon after these projects run out.

You can use IRR, but it comes with its own baggage (reinvestment rate assumptions, scaling issues)

Solution 1: Project Replication

Project A: Replicated

$400 $400 $400 $400 $400 $400 $400 $400 $400 $400

-$1000   -$1000 (Replication)

NPV of Project A replicated = $ 693

Project B

$350 $350 $350 $350 $350 $350 $350 $350 $350 $350

-$1500

NPV of Project B= $ 478
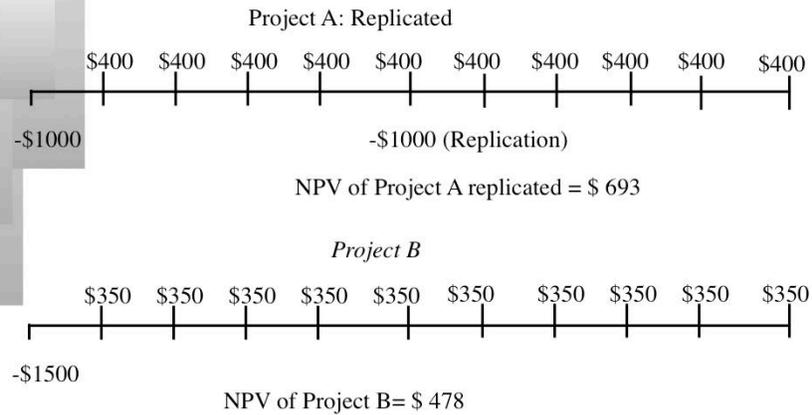
Here, we have done the replication assuming that the cash flows are identical for the second replication. (This does not have to be the case)

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 years)
  = $ 122.62
- Equivalent Annuity for 10-year project
  = $478 * PV(A,12%,10 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. (Implicitly, you are making the same assumptions).

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

■ Do you think your choice has been affected by the events of the last quarter of 2008? If so, why? If not, why not?

If you believe that access to capital markets is easy, you will tend to go with the NPV rule.

One effect of a market crisis like 2008 is that it makes us all more leery about assuming capital market access and may push people to go back to the IRR rule, with perhaps a reinvestment rate modification (MIRR) since we are also probably less likely to assume a constant stream of good projects coming our way.

What firms actually use ..

Decision Rule	% of Firms using as primary decision rule in		
	1998	1976	1986
IRR	53.6%	49.0%	42.0%
Accounting Return	25.0%	8.0%	7.0%
NPV	9.8%	21.0%	34.0%
Payback Period	8.9%	19.0%	14.0%
Profitability Index	2.7%	3.0%	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.

II. 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…For instance, a Disney animated movie will often make four times as much revenue for Disney from merchandise sales and theme park revenues as it does in gate receipts. Thus, this is not a minor issue.

A. 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. Companies constantly redeploy assets that they own to new investments rather than buy new assets. These assets do have alternate uses and have to be costed out.

This can involve

Real assets, like land, buildings or equipment

Individuals, who work for the firm already on other project or divisions

Excess capacity in computer systems, distribution systems etc.

Case 1: Foregone Sale?

■ Assume that Disney owns land in Rio 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 Rio. 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.

$$\$ 40 \text{ million} - 0.2 (40 - 5) = \$ 33 \text{ million}$$

This is the cash flow you would have generated if the project was not taken.

Case 2: Incremental Cost?
An Online Retailing Venture for Bookscape

■ The initial investment needed to start the service, including the installation of additional phone lines and computer equipment, will be $1 million. These investments are expected to have a life of four years, at which point they will have no salvage value. The investments will be depreciated straight line over the four-year life.

■ The revenues in the first year are expected to be $1.5 million, growing 20% in year two, and 10% in the two years following.

■ The salaries and other benefits for the employees are estimated to be $150,000 in year one, and grow 10% a year for the following three years.

■ The cost of the books will be 60% of the revenues in each of the four years.

■ The working capital, which includes the inventory of books needed for the service and the accounts receivable will be 10% of the revenues; the investments in working capital have to be made at the beginning of each year. At the end of year 4, the entire working capital is assumed to be salvaged.

■ The tax rate on income is expected to be 40%.

Bookscape is considering this expansion into online retailing.

■ Wee will re-estimate the beta for this online project by looking at publicly traded Internet retailers. The unlevered total beta of internet retailers is 4.25, and we assume that this project will be funded with the same mix of debt and equity (D/E = 53.47%, Debt/Capital = 34.84%) that Bookscape uses in the rest of the business. We will assume that Bookscape's tax rate (40%) and pretax cost of debt (6%) apply to this project.

Levered Beta $_{Online\ Service}$ = 4.25 [1 + (1 − 0.4) (0.5357)] = 5.61

Cost of Equity $_{Online\ Service}$ = 3.5% + 5.61 (6%) = 37.18%

Cost of Capital$_{Online\ Service}$ = 37.18% (0.6516) + 6% (1 − 0.4) (0.3484) = 25.48%

The unlevered market beta for internet retailers is 1.70, and the average correlation of these stocks with the market is 0.40. The unlevered total beta is therefore 1.70/0.4 = 4.25.

The cost of capital that we use for this investment is much higher than Bookscape's cost of capital of 14.9% because this investment is much riskier than the rest of Bookscape's business.

Incremental Cash flows on Investment

|	0	1	2	3	4
Revenues		$1,500,000	$1,800,000	$1,980,000	$2,178,000
Operating Expenses					
Labor		$150,000	$165,000	$181,500	$199,650
Materials		$900,000	$1,080,000	$1,188,000	$1,306,800
Depreciation		$250,000	$250,000	$250,000	$250,000
Operating Income		$200,000	$305,000	$360,500	$421,550
Taxes		$80,000	$122,000	$144,200	$168,620
After-tax Operating Income		$120,000	$183,000	$216,300	$252,930
+ Depreciation		$250,000	$250,000	$250,000	$250,000
- Change in Working Capital	$150,000	$30,000	$18,000	$19,800	-$217,800
+ Salvage Value of Investment					$0
ATCF	-$1,150,000	$340,000	$415,000	$446,500	$720,730
Present Value	-$1,150,000	$270,957	$263,568	$225,989	$290,710

NPV of investment = -$98,775

The NPV for this project is negative.

The side costs…

- It is estimated that the additional business associated with online ordering and the administration of the service itself will add to the workload for the current general manager of the bookstore. As a consequence, the salary of the general manager will be increased from $100,000 to $120,000 next year; it is expected to grow 5 percent a year after that for the remaining three years of the online venture. After the online venture is ended in the fourth year, the manager's salary will revert back to its old levels.

- It is also estimated that Bookscape Online will utilize an office that is currently used to store financial records. The records will be moved to a bank vault, which will cost $1000 a year to rent.

These are the side costs to the firm from taking the investment.

NPV with side costs…

Additional salary costs

	1	2	3	4	Total
Increase in Salary	$20,000	$21,000	$22,050	$23,153	
After-tax expense	$12,000	$12,600	$13,230	$13,892	
Present Value	$9,563	$8,002	$6,696	$5,603	$29,865

Office Costs

Additional Storage Costs =	$1,000.00
After-tax expense =	$600.00
Present value of costs=	$1,404.92

NPV adjusted for side costs= -98,775- $29,865 - $1405 = $130,045

Opportunity costs aggregated into cash flows

Year	Cashflows	Opportunity costs	w with opportunit	Present Value
0	-$1,150,000		-$1,150,000	-$1,150,000
1	$340,000	$12,600	$327,400	$260,916
2	$415,000	$13,200	$401,800	$255,184
3	$446,500	$13,830	$432,670	$218,989
4	$720,730	$14,492	$706,238	$284,865
Adjusted NPV				-$130,045

We can either consider the side costs separately and add them to the NPV or incorporate them into the cash flows/ The answer is the same using either.

Case 3: 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.

Case 4: Excess Capacity: A More Complicated Example

- Assume that a cereal company has a factory with a capacity to produce 100,000 boxes of cereal and that it expects to uses only 50% of capacity to produce its existing product (Bran Banana) next year. This product's sales are expected to grow 10% a year in the long term and the company has an after-tax contribution margin (Sales price - Variable cost) of $4 a unit.
- It is considering introducing a new cereal (Bran Raisin) and plans to use the excess capacity to produce the product. The sales in year 1 are expected to be 30,000 units and grow 5% a year in the long term; the after-tax contribution margin on this product is $5 a unit.
- The book value of the factory is $ 1 million. The cost of building a new factory with the same capacity is $1.5 million. The company's cost of capital is 12%.

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.

A Framework for Assessing The Cost of Using Excess Capacity

- If I do not add the new product, when will I run out of capacity?
- If I add the new product, when will I run out of capacity?
- When I run out of capacity, what will I do?
  1. Cut back on production: cost is PV of after-tax cash flows from lost sales
  2. Buy new capacity: cost is difference in PV between earlier & later investment

Answering these three questions will help you map out the cost to the company of what will happen in the future.

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 which will bring this cost down.)

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 Rio
Disney park are expected to come from people who would have gone to
Disney theme parks in the US. 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.

B. Project Synergies

- A project may provide benefits for other projects within the firm. 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
- In investment analysis, however, these synergies are either left unquantified and used to justify overriding the results of investment analysis, i.e,, used as justification for investing in negative NPV projects.
- If synergies exist and they often do, these benefits have to be valued and shown in the initial project analysis.

Disney is a master at creating project synergies. In analyzing new investments, we have two choices in how we deal with synergies.

a. Assume that they exist and will be large enough to offset any negatives associated with the investment. (This is all too common in big investments, where companies fall back on the "strategic benefits" argument to overwhelm financial considerations).

b. Try to quantify the benefits and bring them into the cash flows and returns and make sure that the project meets its financial hurdles.

Example 1: Adding a Café to a bookstore: Bookscape

- Assume that you are considering adding a café to the bookstore. Assume also that based upon the expected revenues and expenses, the café standing alone is expected to have a net present value of -$91,097.
- The cafe will increase revenues at the book 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%.

Side Benefits	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 Additional Cash Flows	$25,239	$24,163	$23,132	$22,146	$21,201
PV of Synergy Benefits	$115,882				
Net Present Value (without synergies) =	-$91,097				
Net Present Value (with synergies) =	$24,785				

- The net present value of the added benefits is $115,882. Added to the NPV of the standalone Café of -$91,097 yields a net present value of $24,785.

This is a café being added on to an existing bookstore. The revenues shown here are the revenues at the café.

With the side benefits, the café looks like a good investment.

Interesting side questions;

1. 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)

2. If we had used different discount rates, whose discount rate should be used to discount the synergies?

- Earlier, we valued Sensient Technologies for an acquisition by Tata Chemicals and estimated a value of $ 1,559 million for the operating assets and $ 1,107 million for the equity in the firm. In estimating this value, though, we treated Sensient Technologies as a stand-alone firm.
- Assume that Tata Chemicals foresees potential synergies in the combination of the two firms, primarily from using its distribution and marketing facilities in India to market Sensient's food additive products to India's rapidly growing processed food industry.
  - It will take Tata Chemicals approximately 3 years to adapt Sensient's products to match the needs of the Indian processed food sector – more spice, less color.
  - Tata Chemicals will be able to generate Rs 1,500 million in after-tax operating income in year 4 from Sensient's Indian sales, growing at a rate of 4% a year after that in perpetuity from Sensient's products in India.

In most acquisitions, synergy is provided as a motive and used to justify large premiums. While synergy does exist, we believe that it is often not valued correctly (or at all) and that acquirers pay too much for it.

In our earlier assessment of the value of Sensient to Tata, we ignored synergy all together. Now we are considering what form the synergy will take.

Estimating the cost of capital to use in valuing synergy..

- To estimate the cost of equity:
  - All of the perceived synergies flow from Sensient's products. We will use the levered beta of 0.8138 of Sensient in estimating cost of equity.
  - The synergies are expected to come from India; consequently, we will add the country risk premium of 4.51% for India.
- We will assume that Sensient will maintain its existing debt to capital ratio of 28.57%, its current dollar cost of debt of 5.5% and its marginal tax rate of 37%.
  - Cost of debt in US $ = 5.5% (1-.37) = 3.47%
  - Cost of capital in US $ = 12.05% (1-.2857) + 3.47% (.2857) = 9.60%
- Cost of capital in Rs $= (1 + \text{Cost of Capital}_{\text{US \$}}) \dfrac{(1 + \text{Inflation Rate}_{\text{Rs}})}{(1 + \text{Inflation Rate}_{\text{US \$}})} - 1$

$$(1.\overline{0}96) \frac{(1.03)}{(1.02)} - 1 = 10.67\%$$

To estimate the right discount rate to use to value synergy, we have to assess where the cash flows are coming from,. The right discount rate to use for synergy will therefore vary from case to case.. While we used Sensient's risk and debt characteristics to estimate the value of synergy in this case, we may use the combined firm's cost of capital, if synergy takes a different form.

- ■ We can now discount the expected cash flows back at the cost of capital to derive the value of synergy:

  - Value of synergy$_{Year 3}$ = $\dfrac{\text{Expected Cash Flow}_{Year 4}}{(\text{Cost of Capital} - g)}$ = $\dfrac{1500}{(.1067 - .04)}$ = Rs 22,476 million

  - Value of synergy today = $\dfrac{\text{Value of Synergy}_{year 3}}{(1 + \text{Cost of Capital})^3}$ = $\dfrac{22,476}{(1.1067)^3}$ = Rs 16,580 million

- ■ Earlier, we estimated the value of equity in Sensient Technologies, with no synergy, to be $1,107 million. Converting the synergy value into dollar terms at the current exchange rate of Rs 47.50/$, the total value that Tata Chemicals can pay for Sensient's equity:

  - Value of synergy in US $ = Rs 16,580/47.50 = $ 349 million
  - Value of Sensient Technologies = $1,107 million + $349 million = $1,456 million

Note that we are not recommending that Tata pay $1,456 million for synergy. To create value, you have to pay less than what you derive in return. Thus, Tata should be looking for ways in which It can pay below $1,456 million on this acquisition.

III. 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 <u>option to delay</u> 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 <u>take advantage of other opportunities</u> (projects) in the future
    - The last option that is embedded in projects is the <u>option to abandon</u> 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. These options can not only have significant economic value but can lead us to reverse the decisions that we would have made with conventional capital budgeting analysis.

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. The rights to a "bad" project can still have value.

PV of Cash Flows

Initial Investment in Project

NPV is positive in this section

Present Value of Expected Cash Flows on Product
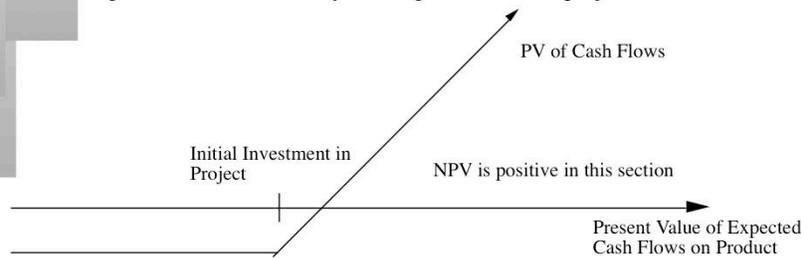
Traditional investment analysis just looks at the question of whether a project is a good one, if taken today. It does not say the rights to this project are worthless.

Consequently, the rights to a bad project can be worth money, if viewed as an option.

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.

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) has a more-than-compensating value.

PV of Cash Flows
from Expansion

Additional Investment
to Expand

Cash Flows on Expansion

Firm will not expand in
this section

Expansion becomes
attractive in this section
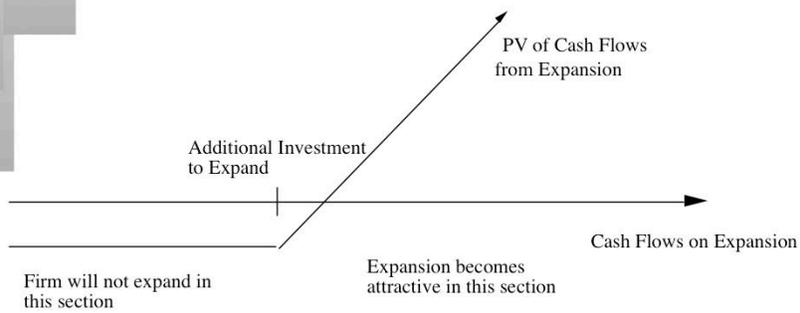
A project may be the first in a sequence and give you the right to far more lucrative investments in the future.

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.

PV of Cash Flows
from Project

Cost of Abandonment

Present Value of Expected
Cash Flows on Project
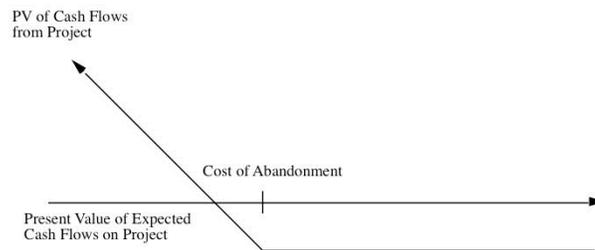
You would like to abandon a project, once you know that it will create only negative cash flows for you. This is not always possible, because of contracts you might have entered into with employees or customers.

IV. Assessing Existing or Past investments…

- While much of our discussion has been focused on analyzing new investments, the techniques and principles enunciated apply just as strongly to existing investments.
- With existing investments, we can try to address one of two questions:
  - Post –mortem: We can look back at existing investments and see if they have created value for the firm.
  - What next? We can also use the tools of investment analysis to see whether we should keep, expand or abandon existing investments.

While looking at new investments is a key part of investment analysis, we cannot ignore investments made in the past. Not only can they offer lessons for the future but they can also be used to improve our assessments of new investments.

Analyzing an Existing Investment

Figure 6.13: Analysis of Existing Project

Cashflow estimates from

New analysis:	A_0	A_1	NF_0	NF_1	NF_2	NF_3	NF_4	NF_5	NF_6	NF_7 NF_8
Initial Analysis :	F_0	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9 F_{10}

Sunk   Future Cash Flows

Project Analysis at this stage
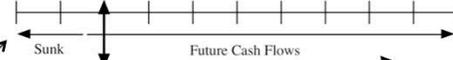
F_n = Forecast of cash flows in period n in initial analysis
A_n = Actual Cash Flow in period n
NF_n = New forecast of cash flows in period n at end of period 2

In a post-mortem, you look at the actual cash flows, relative to forecasts.

You can also reassess your expected cash flows, based upon what you have learned, and decide whether you should expand, continue or divest (abandon) an investment

When looking at an existing investment, you can look back (in regret or celebration) and forward (to make the best assessment of what to do next)

a. Post Mortem Analysis

- The actual cash flows from an investment can be greater than or less than originally forecast for a number of reasons but all these reasons can be categorized into two groups:
  - Chance: The nature of risk is that actual outcomes can be different from expectations. Even when forecasts are based upon the best of information, they will invariably be wrong in hindsight because of unexpected shifts in both macro (inflation, interest rates, economic growth) and micro (competitors, company) variables.
  - Bias: If the original forecasts were biased, the actual numbers will be different from expectations. The evidence on capital budgeting is that managers tend to be over-optimistic about cash flows and the bias is worse with over-confident managers.
- While it is impossible to tell on an individual project whether chance or bias is to blame, there is a way to tell across projects and across time. If chance is the culprit, there should be symmetry in the errors – actuals should be about as likely to beat forecasts as they are to come under forecasts. If bias is the reason, the errors will tend to be in one direction.

When assessing risky investments, you will always be wrong (at least in hindsight). However, why you are wrong makes a difference, If is due to chance, you will be at least partially protected by having a portfolio of projects, The larger that portfolio, the more likely it is that your mistakes will average out over time. With bias, though, the law of averages will not work for you.

That is the part of the reason why the objective in designing an investment analysis process should be minimizing bias and not minimizing errors.

There are two beneifts to post-mortems. The first is that you can hold the project analysts responsible for their own forecasts. The second is that you can use the information from the actuals to reassess your forecasts for the rest of the project life.

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} < 0 \qquad \text{........} \qquad \text{Liquidate the project}$$

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} < \text{Salvage Value} \qquad \text{........} \qquad \text{Terminate the project}$$

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} < \text{Divestiture Value} \qquad \text{........} \qquad \text{Divest the project}$$

$$\sum_{t=0}^{t=n} \frac{NF_n}{(1+r)^n} > 0 > \text{Divestiture Value} \qquad \text{........} \qquad \text{Continue the project}$$

At first sight, whether to liquidate or continue a project seems like a no brainer. Projects that deliver cash flows that are less than expected should be terminated whereas those that deliver more than expected cash flows should be continued and even expanded. Unfortunately, it is not that simple. Terminating a project will not mean that you will get the capital your originally invested in it back. Thus, even a bad project may be worth continuing because divesting it now yields too low a value. Conversely, your best projects may be worth divesting if someone is willing to pay a much higher price for them than what you would make from continuing the investment.

Example: Disney California Adventure

- Disney opened the Disney California Adventure (DCA) Park in 2001, at a cost of $1.5 billion, with a mix of roller coaster ridesand movie nostalgia. Disney expected about 60% of its visitors to Disneyland to come across to DCA and generate about $ 100 million in annual after-cash flows for the firm.
- By 2008, DCA had not performed up to expectations. Of the 15 million people who came to Disneyland in 2007, only 6 million visited California Adventure, and the cash flow averaged out to only $ 50 million between 2001 and 2007.

In early 2008, Disney faced three choices:

- Shut down California Adventure and try to recover whatever it can of its initial investment. It is estimated that the firm recover about $ 500 million of its investment.
- Continue with the status quo, recognizing that future cash flows will be closer to the actual values ($ 50 million) than the original projections.
- Invest about $ 600 million to expand and modify the par, with the intent of increasing the number of attractions for families with children, is expected to increase the percentage of Disneyland visitors who come to DCA from 40% to 60% and increase the annual after tax cash flow by 60% (from $ 50 million to $ 80 million) at the park.

DCA has been a huge investment for Disney that has not paid off. Disney has to do something, but what?

- Continuing Operation: Assuming the current after-tax cash flow of $ 50 million will continue in perpetuity, growing at the inflation rate of 2% and discounting back at the theme park cost of capital of 6.62% yields a value for continuing with the status quo

    Value of DCA = $\dfrac{\text{Expected Cash Flow next year}}{\text{(Cost of capital - g)}}$ = $\dfrac{50(1.02)}{(.0662 - .02)}$ = $1.103 billion

- Abandonment: Abandoning this investment currently would allow Disney to recover only $ 500 million of its original investment.

    Abandonment value of DCA = $ 500 million

- Expansion: The up-front cost of $ 600 million will lead to more visitors in the park and an increase in the existing cash flows from $ 50 to $ 80 million.

    Value of CF from expansion = $\dfrac{\text{Increase in CF next year}}{\text{(Cost of capital - g)}}$ = $\dfrac{30(1.02)}{(.0662 - .02)}$ = $662 million

Abandonment makes no sense since the value of abandonment is less than the value from continuing. Since the NPV from expansion is positive, the optimal solution is to invest the additional $ 600 million into the park.

First Principles

Chapters 5 & 6: Measuring Returns on Investments

The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The **return** should relfect the magnitude and the timing of the cashflows as well as all side effects.

The **optimal mix** of debt and equity maximizes firm value

The **right kind** of debt matches the tenor of your assets

How much cash you can return depends upon current & potential investment opportunities

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Maximize the value of the business (firm)

Reviewing the big picture…

Corporate Finance
Lecture Note Packet 2
Capital Structure, Dividend Policy and Valuation

B40.2302

Aswath Damodaran

Capital Structure: The Choices and the Trade off

"Neither a borrower nor a lender be"
 *Someone who obviously hated this part of corporate finance*

There is a deep seated feeling, reinforced by centuries of religious edicts, that good people do not borrow and that only the craven and the weak borrow to fund their businesses. In corporate finance, we take a much more sanguine view of debt. It is just another way of raising capital to fund a business. It is no more or less sinful that using equity…

First Principles

Chapters 7 & 8: Financing Choices and an Optimal Mix

The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The **return** should relfect the magnitude and the timing of the cashflows as welll as all side effects.

The **optimal mix** of debt and equity maximizes firm value

The **right kind** of debt matches the tenor of your assets

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Invest in assets that earn a return greater than the minimum acceptable hurdle rate

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Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Maximize the value of the business (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.

Figure 7.1: Debt versus Equity

Fixed Claim	Residual Claim
Tax Deductible	Not Tax Deductible
High Priority in Financial Trouble	Lowest Priority in Financial Trouble
Fixed Maturity	Infinite
No Management Control	Management Control

Debt	**Hybrid Securities**	**Equity**
Bank Debt	Convertible Debt	Owner's Equity
Commercial Paper	Preferred Stock	Venture Capital
Corporate Bonds	Option-linked Bonds	Common Stock
		Warrants
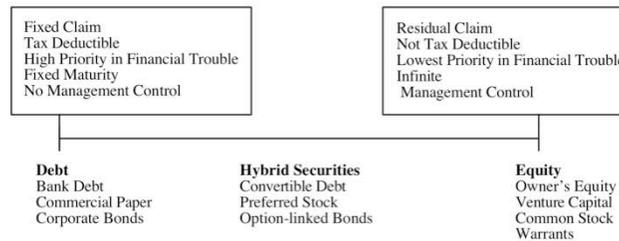
Rather than categorizing financing based on what it is called or categorized as by accountants, we should be thinking whether financing is debt or equity by looking at the following questions:

1. Are the payments on the securities contractual or residual?

If contractually set, it is closer to debt.

If residual, it is closer to equity.

2. Are the payments tax-deductible?

If yes, it is closer to debt.

If no, if is closer to equity.

3. Do the cash flows on the security have a high priority or a low priority if the firm is in financial trouble?

If it has high priority, it is closer to debt.

If it has low priority, it is closer to equity.

4. Does the security have a fixed life?

If yes, it is closer to debt.

If no, it is closer to equity.

5. Does the owner of the security get a share of the control of management of the firm?

If no, it is closer to debt.

If yes, if is closer to equity

Figure 7.4: Financing Patterns for G-7 Countries – 1984-91
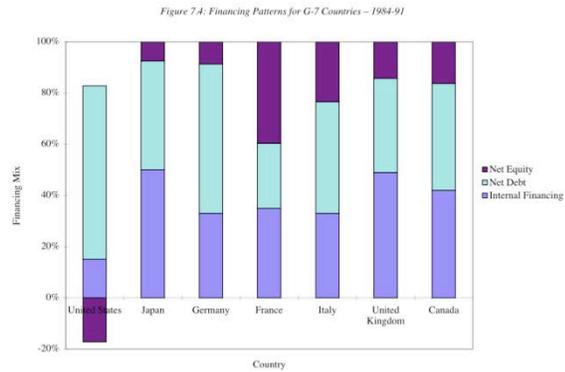
Net equity refers to the difference between new equity issues and stock buybacks.

Firms in the United States, during the period of this comparison, bought back more stock than they issued, leading to negative net equity.

A comparison of financing patterns in the United States, Germany, and Japan reveals that German and Japanese firms were much more dependent on bank debt than firms in the United States, which are much likely to issue bonds.

Things are starting to change as corporate bond markets have expanded in Europe and even in some emerging markets.

And a much greater dependence on bank loans outside the US…
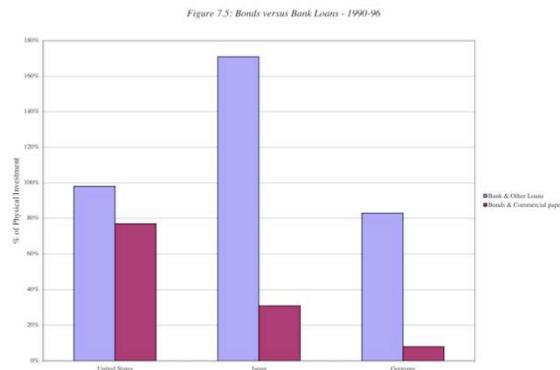
Figure 7.5: Bonds versus Bank Loans - 1990-96

When borrowing money, US companies have historically had more access to bond markets than firms in other markets which are far more dependent on banks.

Interesting follow up questions:

1.If you can issue bonds, why would you use bank loans instead? (Answer: You may be able to supply proprietary information to a bank that you could not make public…. Special relationships with banks…)

2.In markets where there is no choice and you have to borrow from a bank, would you expect see lower debt ratios? Higher interest rates? (Answer: Not necessarily, but access to debt may be available only to well established firms that have long-standing relationships with banks. Smaller and younger firms may find themselves shut out of the process..)

Disney used the corporate bond market much more extensively than Aracruz and Tata Chemicals in 2008, with 92% of its debt taking the form of bonds, reflecting both its standing as a large market capitalization company and its access to capital markets as a US-based company.

While Disney has the higher proportion of short term debt of the three companies, it is the only one of the three companies with debt maturing in more than 10 years. That may also be a reflection of its use of the bond market, since banks, especially in emerging markets, may be unwilling to commit to long term loans.

Disney is the only one of the three companies with a significant portion of floating rate debt, where the interest will vary across time, as a function of index rates (LIBOR, in the case of Disney).

All three companies borrow predominantly in their domestic currencies. Disney does have some Japanese debt and Tata Chemicals has two small US dollar bond issues.

Disney's corporate bonds follow the conventional form and have only coupon payments during their lifetime, with the face value due at the end (bullet payments). In contrast, the bank loans used by Aracruz and Tata Chemicals require that the principal be repaid over the course of the debt (term loans).

A large portion of Disney's bonds can be called back by the firm, if it chooses to do so, an option that will probably be exercised if interest rates drop significantly. A small portion of the bonds can be put back by the bondholders to the firm, a protection against actions that Disney may take that reduce the value of the bonds.

|	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
External funding needs	High, but constrained by infrastructure	High, relative to firm value.	Moderate, relative to firm value.	Declining, as a percent of firm value	Low, as projects dry up.
Internal financing	Negative or low	Negative or low	Low, relative to funding needs	High, relative to funding needs	More than funding needs
External Financing	Owner's Equity Bank Debt	Venture Capital Common Stock	Common stock Warrants Convertibles	Debt	Retire debt Repurchase stock
Growth stage	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline
Financing Transitions	Accessing private equity	Inital Public offering	Seasoned equity issue	Bond issues	

The forms that debt and equity take will change as a firm moves through its lifecycle. Early in the process, equity will take the form of owner's wealth or savings and debt will be bank debt. As the firm evolves, the equity choices will expand first to include venture capital and private equity. When the firm goes public, its choices expand further.

There are three transitional periods: (1) Going from being a private business entirely funded by the owner to accessing the private equity markets (venture capital) (2) Going from private to public with an initial public offering and (3) Public companies making seasoned offerings of debt and equity.

The Transitional Phases..

- The transitions that we see at firms – from fully owned private businesses to venture capital, from private to public and subsequent seasoned offerings are all motivated primarily by the need for capital.
- In each transition, though, there are costs incurred by the existing owners:
  - When venture capitalists enter the firm, they will demand their fair share and more of the ownership of the firm to provide equity.
  - When a firm decides to go public, it has to trade off the greater access to capital markets against the increased disclosure requirements (that emanate from being publicly lists), loss of control and the transactions costs of going public.
  - When making seasoned offerings, firms have to consider issuance costs while managing their relations with equity research analysts and rat

As a firm goes through the lifecycle, there are usually three transition points worth watching…

Note, though, that whether and when these transition points occur can vary widely across firms. For some firms like Google and Amazon, the transition from owner funded businesses to large publicly traded companies was speedy. Other firms, like Cargill and Koch, never make the transition and stay privately owned businesses as they grow, using internal funding to grow over time. Still others never make it to the transitional phases and fade away, go bankrupt or are acquired.

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:

  Debt to Capital Ratio = Debt / (Debt + 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. When firms raise financing, though, they do so in market value terms.

When "debt ratios" are used in analysis, it is best to define them up front. For the rest of this analysis, we will debt ratio to mean market value, total debt ratios, with debt including the present value of operating lease commitments.

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?
    - What are the benefits of using debt instead of equity?
    - What are the costs of using debt instead of equity?
- If not, why not?

This is the basic question that we will cover in the first part of the analysis.

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. If the benefits exceed the costs, you should borrow. If not, it is better to use 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 the United States 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.

Implications:

1.Debt ratios for firms should go up as corporate tax rates increase.

2.Debt ratios of firms incorporated in high-tax locales should be higher than debt ratios of firms in low-tax or tax exempt locales.

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. On reason might be that they can borrow at a lower rate at the REIT level than at the property level. Another might be that they have views on the market pricing of their stock. If they feel that they are being under priced, they may choose to borrow money as bridge financing (until they feel their equity is fairly priced again).

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 publicly traded 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.

There are two pieces of evidence that you can point to in support of this proposition.

First, poorly managed, poorly run firms, where managers are not significant stockholders, are more likely to be targeted for leveraged buyouts.

Second, there is evidence of improvements in operating efficiency at firms that increase their debt ratio substantially.

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 should be the best candidates for debt (with discipline as the argument)

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 probability of bankruptcy, which will depend upon how uncertain you are about future cash flows
  - 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

Proposition 2: Firms with more volatile earnings and cash flows will have higher probabilities of bankruptcy at any given level of debt and for any given level of earnings.

Proposition 3: Other things being equal, the greater the indirect bankruptcy cost, the less debt the firm can afford to use for any given level of debt.

Studies (see Warner) seem to indicate that the direct costs of bankruptcy are fairly small (10% or less or firm value)

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. We would expect indirect bankruptcy costs to vary across firms and be higher at

a. Firms that sell durable products with long lives that require replacement parts and service

b. Firms that provide goods or services for which quality is an important attribute but is difficult to determine in advance.

c. Firms producing products whose value to customers depends on the services and complementary products supplied by independent companies

As an example, when Apple Computer was perceived to be in financial trouble in early 1997, first-time buyers and businesses stopped buying Apple computers and software firms stopped coming up with upgrades for Mac 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.

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 manufacturers 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 their 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 4: 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…. Equity investors describe the projects that they will be funding with debt as safe and secure. However…

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.

Lenders recognize this tendency and factor them into their lending by

-charging a higher interest rate up front for the loan

-Putting restrictive covenants on the loan

These create costs for the borrower.

Debt and Agency Costs

Assume that you are a bank. Which of the following businesses would you perceive the greatest agency costs?

- ❑ A Large technology firm
- ❑ A Large Regulated Electric Utility

Why?

Lenders will probably perceive less agency costs in the regulated utility because:

a. The assets are tangible and easy to monitor (much easier to monitor a power plant than R&D)

b. The regulatory authorities will operate as brake on the investment activities of the utility and thus do the lender's work for them.

Loss of future financing flexibility

- When a firm borrows up to its capacity, it loses the flexibility of financing future projects with debt.
- Proposition 5: 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?

•The flexibility that firms want to maintain is the flexibility to be able to fund that once in a lifetime investment that may come along or to protect themselves against that devastating downside risk…

•If we assumed perfect capital markets, you would not need flexibility, which must imply that flexibility is valued most highly by firms with the least access to capital markets (private firms, small firms…)

Debt: Summarizing the trade off

Advantages of Debt	Disadvantages of debt
1. Tax Benefit: Interest expenses on debt are tax deductible but cash flows to equity are generally not. *Implication: The higher the marginal tax rate, the greater the benefits of debt.*	**1. Expected Bankruptcy Cost**: The expected cost of going bankrupt is a product of the probability of going bankrupt and the cost of going bankrupt. The latter includes both direct and indirect costs. The probability of going bankrupt will be higher in businesses with more volatile earnings and the cost of bankruptcy will also vary across businesses. *Implication:* *1. Firms with more stable earnings should borrow more, for any given level of earnings.* *2. Firms with lower bankruptcy costs should borrow more, for any given level of earnings.*
2. Added Discipline: Borrowing money may force managers to think about the consequences of the investment decisions a little more carefully and reduce bad investments. *Implication: As the separation between managers and stockholders increases, the benefits to using debt will go up.*	**2. Agency Costs**: Actions that benefit equity investors may hurt lenders. The greater the potential for this conflict of interest, the greater the cost borne by the borrower (as higher interest rates or more covenants). *Implication: Firms where lenders can monitor/ control how their money is being used should be able to borrow more than firms where this is difficult to do.*
	3. Loss of flexibility: Using up available debt capacity today will mean that you cannot draw on it in the future. This loss of flexibility can be disastrous if funds are needed and access to capital is shut off. *Implication:* *1. Firms that can forecast future funding needs better should be able to borrow more.* *2. Firms with better access to capital markets should be more willing to borrow more today.*

Brings together the costs and the benefits of debt, with the implications.

The Trade off for three companies..

Item	Disney	Aracruz	Tata Chemicals
Tax benefits	Significant. The firm has a marginal tax rate of 38%. It does have large depreciation tax shields.	Significant. The firm has a marginal tax rate of 34%, as well. It does not have very much in noninterest tax shields.	Significant. The firm has a 33.99% tax rates It does have significant non-interest tax shields in the form of depreciation.
Added discipline	Benefits will be high, because managers are not large stockholders.	Benefits are smaller, because the voting shares are closely held by insiders.	Since the Tata family runs the firm, the benefits from added discipline are small.
Bankruptcy costs	Movie and broadcasting businesses have volatile earnings. Direct costs of bankruptcy are likely to be small, but indirect costs can be significant.	Variability in paper prices makes earnings volatile. Direct and indirect costs of bankruptcy likely to be moderate, since assets are marketable (timber, paper plants)	Firm is mature, with fairly stable earnings and cash flows from its chemicals and fertilizer business. Indirect bankruptcy costs should be low, since physical assets are marketable.
Agency costs	High. Although theme park assets are tangible and fairly liquid, is much more difficult to monitor movie and broadcasting businesses.	Low. Assets are tangible and liquid.	Biggest concern is that debt may be utilized in other (riskier) Tata companies.
Flexibility needs	Low in theme park business but high in media businesses because technological change makes future investment uncertain.	Low. Business is mature and investment needs are well established.	Low. Tata Chemicals is a mature company with established reinvestment needs.

None of these firms seems like a candidate for a really high debt ratio. With each firm, one or another cost gets in the way.

1.For Disney, the biggest impediments to borrowing more are the variability of its income and the fact that its assets are mostly "intangible" and difficult to monitor.

2.For Aracruz, it is the variability in paper prices.

3.For Tata Chemicals, it is the cross holding structure and the fear that the debt will be channeled to other subsidiaries.

Notwithstanding these issues, I would expect Disney to have more debt than other entertainment companies because it is larger and more diverse than its competitors. I would also expect to see significant debt on both Tata's and Aracruz's balance sheets, given the tax benefits.

⌛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

(a) There are no taxes

(b) Managers have stockholder interests at heart and do what's best for stockholders.

(c) No firm ever goes bankrupt

(d) Equity investors are honest with lenders; there is no subterfuge or attempt to find loopholes in loan agreements.

(e) Firms know their future financing needs with certainty

What happens to the trade off between debt and equity? How much should a firm borrow?

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.
- If the Miller Modigliani theorem holds:
  - A firm's value will be determined the quality of its investments and not by its financing mix.
  - 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.

Figure 7.9: Cost of Capital in the MM World
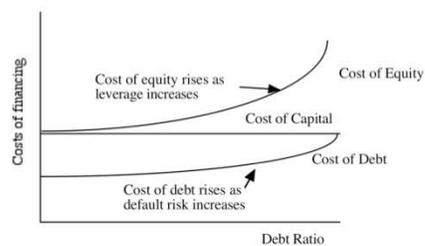
With the assumptions on the previous page:

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%.

What do firms look at in financing?

- Is there a financing hierarchy?

  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.

  In particular,

  - <u>Managers value flexibility</u>. Managers value being able to use capital (on new investments or assets) without restrictions on that use or having to explain its use to others.
  - <u>Managers value control</u>. Managers like being able to maintain control of their businesses.

  With flexibility and control being key factors:

  - Would you rather use internal financing (retained earnings) or external financing?
  - With external financing, would you rather use debt or equity?

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.

Managers make financing decisions, not stockholders. The survey results indicate that what they value will have consequences for what kind of financing gets used. And they seem to value flexibility and control…

What type of financing gives you the most flexibility and the least need to answer to anyone?

-Internal financing or External financing (With internal financing, you do not have to file with the SEC or explain to investors what you plan to do with the money… you may, in hindsight, have to come up with a good story to tell your stockholders about why you retained earnings…)

-New debt or new equity (If you do have to access external financing, it is a closer call. While new debt may come with covenants (which restrict your operating flexibility) and the need to explain your actions to ratings agencies or banks, issuing new equity requires filings with the SEC and the possible loss of control.

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.

straight debt over convertible debt,

debt over new common stock and

Any financing over preferred stock (Is that due to debt having a tax advantage?)

And the unsurprising consequences..

Figure 7.3: External and Internal Financing at US Firms
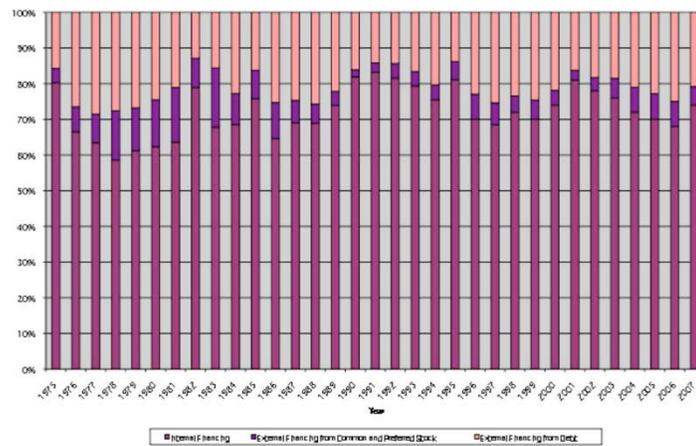
At US companies, internal financing has comprised the bulk of financing over much of history. When raising external funds from markets, firms are far more likely to use debt than equity….

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.

Capital Structure:
Finding the Right Financing Mix

While we can talk about the trade off between debt and equity in qualitative terms, ultimately we have to get down to the details. In this section, we will look at approaches that can be used to estimate the right debt ratio for a firm.

The Big Picture..

Chapters 7 & 8: Financing Choices and an Optimal Mix

The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The **return** should reflect the magnitude and the timing of the cashflows as welll as all side effects.

The **optimal mix** of debt and equity maximizes firm value

The **right kind** of debt matches the tenor of your assets

How much cash you can return depends upon current & potential investment opportunities

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Maximize the value of the business (firm)

Is there an optimal mix? And can we find it for a given firm? Time to get down to pragmatic questions.

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 Enhanced Cost of Capital approach: The optimal debt ratio is the one that generates the best combination of (low) cost of capital and (high) operating income.
- 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.

We will look at all five approaches, though they may yield different results.

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

- Recapping our discussion of cost of capital:
- The cost of debt is the market interest rate that the firm has to pay on its long term borrowing today, net of tax benefits. It will be a function of:
  - (a) The long-term riskfree rte
  - (b) The default spread for the company, reflecting its credit risk
  - (c) The firm's marginal tax rate
- The cost of equity reflects the expected return demanded by marginal equity investors. If they are diversified, <u>only the portion of the equity risk that cannot be diversified away</u> (beta or betas) will be priced into the cost of equity.
- The cost of capital is the cost of each component weighted by its <u>relative market value</u>.

  Cost of capital = Cost of equity (E/(D+E)) + After-tax cost of debt (D/(D+E))

The cost of equity reflects the non-diversifiable risk in a business and the cost of debt is the rate at which a business can borrow today. In a sense, this is what it would cost you to refinance the entire firm from scratch today.

The cost of capital is the weighted average of the cost of all the different sources of financing.

Note that there are only two components in the computation – debt and equity. But what about hybrids?

a. Convertible debt: It is best to break convertible debt into its debt and equity components, with the bond portion being treated as debt and the conversion option as equity.

b. Preferred stock is messier. It is not debt (because preferred dividends are not tax deductible) and not equity (because preferred dividends are fixed). There are two ways of dealing with it:

-Treat it 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)

-Treat it as debt but gross up the amount to reflect the absence of tax advantages on preferred dividends. Thus, $ 100 million in preferred stock, when the marginal tax rate is 40% can be grossed up as follows:

💡 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.

Applying Cost of Capital Approach: The Textbook Example

D/(D+E)	Cost of Equity	After-tax Cost of Debt	Cost of Capital	Firm Value
0	10.50%	4.80%	10.50%	$2,747
10%	11.00%	5.10%	10.41%	$2,780
20%	11.60%	5.40%	10.36%	$2,799
30%	12.30%	5.52%	10.27%	$2,835
40%	13.10%	5.70%	10.14%	$2,885
50%	14.50%	6.10%	10.30%	$2,822
60%	15.00%	7.20%	10.32%	$2,814
70%	16.10%	8.10%	10.50%	$2,747
80%	17.20%	9.00%	10.64%	$2,696
90%	18.40%	10.20%	11.02%	$2,569
100%	19.70%	11.40%	11.40%	$2,452

Assume the firm has $200 million in cash flows, expected to grow 3% a year forever.

$$\text{Value} = \frac{\text{Expected Cash flow to firm next year}}{(\text{Cost of capital} - g)} = \frac{200(1.03)}{(\text{Cost of capital} - g)}$$

This is a simple example, where both the costs of debt and equity are given. The firm has cash flows, before debt and after taxes and reinvestment, of $200 million and is in stable growth (growing 3% a year). 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.

To get firm value, we used the same cash flow ($200 million) and same growth rate and changed the cost of capital.

The U-shaped Cost of Capital Graph…

Figure 8.2: Cost of Capital and Firm Value
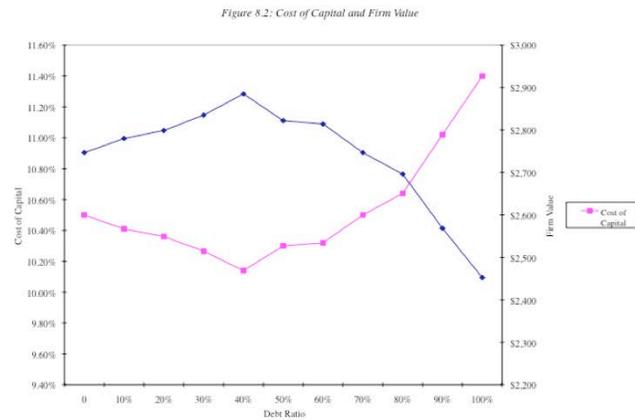
Really adds nothing to the previous page.. But it is in every text book… the famous U-shaped cost of capital graph..

If you had this graph available to you, the optimal capital structure would be obvious. In most firms, all we know at the time we begin the analysis is one point on the graph - the current cost of capital. Our challenge is fleshing out the rest of the graph.

Current Cost of Capital: Disney

- The beta for Disney's stock in May 2009 was 0.9011. The T. bond rate at that time was 3.5%. Using an estimated equity risk premium of 6%, we estimated the cost of equity for Disney to be 8.91%:

  Cost of Equity = 3.5% + 0.9011(6%) = 8.91%

- Disney's bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 6%. Using a marginal tax rate of 38%, the after-tax cost of debt for Disney is 3.72%.

  After-Tax Cost of Debt = 6.00% (1 – 0.38) = 3.72%

- The cost of capital was calculated using these costs and the weights based on market values of equity (45,193) and debt (16,682):

  $$\text{Cost of capital} = 8.91\% \frac{45,193}{(16,682+45,193)} + 3.72\% \frac{16,682}{(16,682+45,193)} = 7.51\%$$

The one point we do know for Disney…

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.

Laying the groundwork:
1. Estimate the unlevered beta for the firm

- To get to the unlevered beta, we can start with the levered beta (0.9011) and work back to an unlevered beta:

$$\text{Unlevered beta} = \frac{\text{Levered Beta}}{\left(1 + (1-t)\dfrac{\text{Debt}}{\text{Equity}}\right)} = \frac{0.9011}{\left(1 + (1-.38)\dfrac{16,682}{45,193}\right)} = 0.7333$$

- Alternatively, we can back to the source and estimate it from the betas of the businesses.

Business	Revenues in 2008	EV/Sales	Estimated Value	Firm Value Proportion	Unlevered beta
Media Networks	$16,116	2.13	$34,327.78	58.92%	0.7056
Parks and Resorts	$11,504	1.51	$17,408.14	29.88%	0.5849
Studio Entertainment	$7,348	0.78	$5,754.86	9.88%	1.3027
Consumer Products	$2,875	0.27	$768.20	1.32%	1.0690
Disney	$37,843		$58,258.99	100.00%	0.7333

Since we will be changing the debt ratio, we need to estimate the beta of Disney's businesses… We can then use this unlevered beta to get to the beta at every debt ratio.

2. Get Disney's current financials…

	Last fiscal year	Trailing 12 months
Revenues	$37,843	$36,990
EBITDA	$8,986	$8,319
Depreciation & Amortization	$1,582	$1,593
EBIT	$7,404	$6,726
Interest Expenses	$712	$728
EBITDA (adjusted for leases)	$9,989	$8,422
EBIT(adjusted for leases)	$7,708	$6,829
Interest Expenses (adjusted for leases)	$815	$831

This is a key step, Since you are determining your firm's capacity to borrow long term, this is the stage at which you can modify these numbers to reflect the firm's long term earning capacity rather than the vagaries of a single year of operations. With commodity companies, you may choose to use an average income across a commodity price cycle.

These numbers also reflect our efforts to bring leases into the financial expense column and to treat lease commitments as debt.

I. Cost of Equity

Debt to Capital Ratio	D/E Ratio	Levered Beta	Cost of Equity
0%	0.00%	0.7333	7.90%
10%	11.11%	0.7838	8.20%
20%	25.00%	0.8470	8.58%
30%	42.86%	0.9281	9.07%
40%	66.67%	1.0364	9.72%
50%	100.00%	1.1879	10.63%
60%	150.00%	1.4153	11.99%
70%	233.33%	1.7941	14.26%
80%	400.00%	2.5519	18.81%
90%	900.00%	4.8251	32.45%

Levered Beta = 0.7333 (1 + (1-.38) (D/E))
Cost of equity = 3.5% + Levered Beta * 6%

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.

$Beta_{Levered}$ = Unlevered Beta (1 + (1-t) (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:

$$\beta_{levered} = \beta_u\ [1+(1-t)D/E] - \beta_{debt}\ (1-t)\ D/E$$

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 = 45,193 + $16,682 = $61,875 million

D/(D+E)	0.00%	10.00%	Debt to capital
D/E	0.00%	11.11%	D/E = 10/90 = .1111
$ Debt	$0	$6,188	10% of $61,875
EBITDA	$8,422	$8,422	Same as 0% debt
Depreciation	$1,593	$1,593	Same as 0% debt
EBIT	$6,829	$6,829	Same as 0% debt
Interest	$0	$294	Pre-tax cost of debt * $ Debt
Pre-tax Int. cov	∞	23.24	EBIT/ Interest Expenses
Likely Rating	AAA	AAA	From Ratings table
Pre-tax cost of debt	4.75%	4.75%	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 4.75%) and that my starting firm value (market value of equity + debt) remains my firm value. While neither assumption is realistic, we can revisit these numbers in subsequent iterations, if necessary.

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

Interest Coverage Ratio	Rating	Typical Default Spread	Pre-tax cost of debt	
>8.5	AAA	1.25%	4.75%	
6.5-8.5	AA	1.75%	5.25%	
5.5-6.5	A+	2.25%	5.75%	
4.25- 5.5	A	2.50%	6.00%	T.Bond rate in early 2009 = 3.5%
3- 4.25	A–	3.00%	6.50%	
2.5-3.0	BBB	3.50%	7.00%	
2.25-2.5	BB+	4.25%	7.75%	
2.0-2.25	BB	5.00%	8.50%	
1.75-2.0	B+	6.00%	9.50%	
1.5-1.75	B	7.25%	10.75%	
1.25-1.5	B–	8.50%	12.00%	
0.8-1.25	CCC	10.00%	13.50%	
0.65-0.8	CC	12.00%	15.50%	
0.2-0.65	C	15.00%	18.50%	
<0.2	D	20.00%	23.50%	

These are interest coverage ratio/ratings classes for large manufacturing firms (Market cap > $ 5 billion) and the default spreads at the time of the analysis. This is the default spread over and above the long term (10 year) treasury bond rate at the time of this analysis.

These default spreads can be obtained in one of two ways:

a. Getting a sampling of liquid bonds within each ratings class and averaging out their yields to maturity.

b. Finding a source that provides default spreads by ratings class (bondsonline.com used to provide these for free but now requires a fee)

The interest coverage ratio needs 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. 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.

A Test: Can you do the 30% level?

D/(D + E)	10.00%	20.00%	30%	
D/E	11.11%	25.00%		
$ Debt	$6,188	$12,375		
EBITDA	$8,422	$8,422		
Depreciation	$1,593	$1,593		
EBIT	$6,829	$6,829		
Interest	$294	$588		
Pretax int. cov	23.24	11.62		
Likely rating	AAA	AAA		
Pretax cost of debt	4.75%	4.75%		

You have to start by assuming the AAA rate but you will end up with a rating that is different (AA)

You can redo the analysis using the AA rate and you can stop because you end up with the same rating at the end. (Sometimes you will need a third iteration>

		Iteration 1	Iteration 2
		(Debt @AAA rate)	(Debt @AA rate)
D/(D + E)	20.00%	30.00%	30.00%
D/E	25.00%	42.86%	42.86%
$ Debt	$12,375	$18,563	$18,563
EBITDA	$8,422	$8,422	$8,422
Depreciation	$1,593	$1,593	$1,593
EBIT	$6,829	$6,829	$6,829
Interest	$588	18563*.0475=$881	18563*.0525 =$974
Pretax int. cov	11.62	7.74	7.01
Likely rating	AAA	AA	AA

Bond Ratings, Cost of Debt and Debt Ratios

Debt Ratio	$ Debt	Interest Expense	Interest coverage ratio	Bond Rating	Interest rate on debt	Tax Rate	After-tax cost of debt
0%	$0	$0	∞	AAA	4.75%	38.00%	2.95%
10%	$6,188	$294	23.24	AAA	4.75%	38.00%	2.95%
20%	$12,375	$588	11.62	AAA	4.75%	38.00%	2.95%
30%	$18,563	$975	7.01	AA	5.25%	38.00%	3.26%
40%	$24,750	$1,485	4.60	A	6.00%	38.00%	3.72%
50%	$30,938	$2,011	3.40	A-	6.50%	38.00%	4.03%
60%	$37,125	$2,599	2.63	BBB	7.00%	38.00%	4.34%
70%	$43,313	$5,198	1.31	B-	12.00%	38.00%	7.44%
80%	$49,500	$6,683	1.02	CCC	13.50%	38.00%	8.37%
90%	$55,688	$7,518	0.91	CCC	13.50%	34.52%	8.84%

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 decreases after the 80% 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.

Marginal tax rates and Taxable Income…

■ You need taxable income for interest to provide a tax savings. Note that the EBIT at Disney is $6,829 million. As long as interest expenses are less than $6,829 million, interest expenses remain fully tax-deductible and earn the 38% tax benefit. At an 80% debt ratio, the interest expenses are $6,683 million and the tax benefit is therefore 38% of this amount.

■ At a 90% debt ratio, however, the interest expenses balloon to $7,518 million, which is greater than the EBIT of $6,829 million. We consider the tax benefit on the interest expenses up to this amount:

Maximum Tax Benefit = EBIT * Marginal Tax Rate = $6,829 million * 0.38 = $2,595 million

Adjusted Marginal Tax Rate = Maximum Tax Benefit/Interest Expenses = $2,595/$7,518 = 34.52%

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	Beta	Cost of Equity	Cost of Debt (after-tax)	Cost of capital
0%	0.73	7.90%	2.95%	7.90%
10%	0.78	8.20%	2.95%	7.68%
20%	0.85	8.58%	2.95%	7.45%
30%	0.93	9.07%	3.26%	7.32%
40%	1.04	9.72%	3.72%	7.32%
50%	1.19	10.63%	4.03%	7.33%
60%	1.42	11.99%	4.34%	7.40%
70%	1.79	14.26%	7.44%	9.49%
80%	2.55	18.81%	8.37%	10.46%
90%	5.05	33.83%	8.84%	11.34%

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 and 40%... We did try for a more precise answer by working in 1% increments and arrived at an optimal of 43% with a cost of capital of 7.28%. (We moved in 1% increments from 30% top 50%)

This will maximize firm value, if operating cashflow (EBITDA) is unaffected by changes in leverage and the consequent changes in ratings. (In other words, we are assuming no indirect bankruptcy costs… If we did, the optimal might be affected, especially if it is at low rating).

Disney: Cost of Capital Chart

Figure 8.3: Costs of Debt, Equity and Capital - Disney
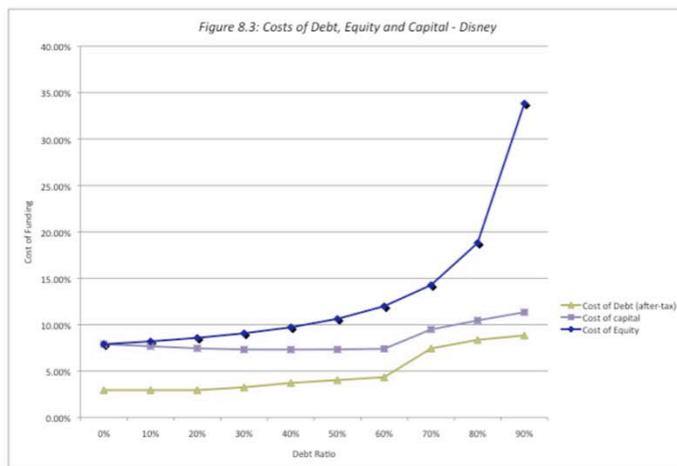
The cost of capital is minimized at 40% but notes that the cost of capital does not rise smoothly. Note that surge in cost of capital between 30 and 40%. This is not unusual and represents a tipping point, where you go from being comfortable with your debt to pushing the limit…. Interest coverage ratios decrease, pushing up the cost of debt, pushing up interest expenses, pushing down interest coverage ratios, thus creating a spiral.

For those who may still be fixated on the assuming that we made that debt has a zero beta, when computing levered betas, we re-estimated the optimal allowing debt to have a beta (We backed into a beta for debt by taking the default spread at debt rating, assuming that 25% of that spread was due to market risk and estimating an imputed beta)

Debt Ratio	Beta of Equity	Beta of Debt	Cost of Equity	Cost of Debt (after-tax)	Cost of capital
0%	0.73	0.05	7.90%	2.95%	7.90%
10%	0.78	0.05	8.18%	2.95%	7.66%
20%	0.84	0.05	8.53%	2.95%	7.42%
30%	0.91	0.07	8.95%	3.26%	7.24%
40%	0.99	0.10	9.46%	3.72%	7.16%
50%	1.11	0.13	10.16%	4.03%	7.10%
60%	1.28	0.00	11.18%	4.34%	7.08%
70%	1.28	0.35	11.19%	7.44%	8.57%
80%	1.52	0.42	12.61%	8.37%	9.22%
90%	2.60	0.42	19.10%	8.84%	9.87%

Disney: Cost of Capital Chart: 1997
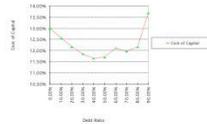
Note the kink in the cost of capital curve at 70%. This occurs largely because the cost of debt in this calculation is discontinuous. It changes only when the rating changes. In reality, the cost of debt, even within a ratings class, will vary depending upon where in the class the firm falls (low AA rated versus high AA rated).

We can make the cost of debt a continuous function of default risk or interest coverage ratios.

The cost of capital approach suggests that Disney should do the following…

- Disney currently has $16.68 billion in debt. The optimal dollar debt (at 40%) is roughly $24.75 billion. Disney has excess debt capacity of $ 8.07 billion.
- To move to its optimal and gain the increase in value, Disney should borrow $ 8 billion and buy back stock.
- Given the magnitude of this decision, you should expect to answer three questions:
  - Why should we do it?
  - What if something goes wrong?
  - What if we don't want (or cannot) buy back stock and want to make investments with the additional debt capacity?

The cost of capital approach holds investments constant and changes the financial mix to see the effect on the cost of capital. Consequently, the recommendation that flows out of it is a recapitalization: borrow money and buy back stock to increase the debt ratio or issue stock and repay debt to lower the debt ratio.

1. Why should we do it?
Effect on Firm Value – Full Valuation Approach

- Step 1: Estimate the cash flows to Disney as a firm

EBIT (1 – Tax Rate) = 6829 (1 – 0.38) =	$4,234
+ Depreciation and amortization =	$1,593
– Capital expenditures =	$1,628
– Change in noncash working capital	$0
Free cash flow to the firm =	$4,199

- Step 2: Back out the implied growth rate in the current market value

$$\text{Value of firm} = \$ 61,875 = \frac{FCFF_0(1 + g)}{(\text{Cost of Capital } - g)} = \frac{4,199(1 + g)}{(.0751 - g)}$$

  Growth rate = (Firm Value * Cost of Capital – CF to Firm)/(Firm Value + CF to Firm)
  = (61,875* 0.0751 – 4199)/(61,875 + 4,199) = 0.0068 or 0.68%

- Step 3: Revalue the firm with the new cost of capital

$$\text{Firm value} = \frac{FCFF_0(1 + g)}{(\text{Cost of Capital } - g)} = \frac{4,199(1.0068)}{(.0732 - 0.0068)} = \$63,665 \text{ million}$$

  The firm value increases by $1,790 million (63,665 – 61,875 = 1,790)

We are assuming that the firm is correctly valued now, not because of any belief in market efficiency but to isolate the effect of changing the cost of capital. In other words, whatever the market's expectations are now (realistic or unrealistic), those expectations stay unchanged as we move from the old to the new capital structure.

This approach will tend to break down with growth or money losing companies because the valuation models you will need for those are far more complicated.

An Alternate Approach
Effect on Value: Capital Structure Isolation…

- In this approach, we start with the current market value and isolate the effect of changing the capital structure on the cash flow and the resulting value.
- Firm Value before the change = 45,193 + $16,682 = $61,875 million

WACC$_b$ = 7.51%	Annual Cost = 61,875 * 0.0751 = $4,646.82 million
WACC$_a$ = 7.32%	Annual Cost = 61,875 * 0.0732 = $ 4,529.68 million
Δ WACC = 0.19%	Change in Annual Cost = $117.14 million

- If we assume a perpetual growth of 0.68% in firm value over time,

$$\text{Increase in firm value} = \frac{\text{Annual Savings next year}}{(\text{Cost of Capital - g})} = \frac{\$117.14}{(0.0732 - 0.0068)} = \$1,763 \text{ million}$$

  - The total number of shares outstanding before the buyback is 1856.732 million.
  Change in Stock Price = $1,763/1856.732 = $ 0.95 per share

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 $ 24.34 and there are 1856.732 million shares outstanding).

If we assume that investors are rational, i.e., that the investor who sell their shares back want the same share of firm value increase as those who remain:

- Increase in Value per Share = $1,763/1856.732 = $ 0.95
- New Stock Price = $24.34 + $0.95= $25.29

Buying shares back $25.29 will leave you as a stockholder indifferent between selling and not selling.

■ What would happen to the stock price after the buyback if you were able to buy stock back at $ 24.34?

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 25.29

If the firm can buy the stock back at the current price of $ 24.34, 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 $ 8,068 billion (Debt at 40% optimal – Current Debt) and the stock price of $ 24.34. We then divide the increase in firm value of $ 1,763 million by the remaining shares outstanding:

Change in Stock Price = $1,763 million/(– [8068/24.34]) = $1.16 per share

Buybacks and Stock Prices

- Assume that Disney does make a tender offer for it's shares but pays $27 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 $24.34
    b. The share price will be between $24.34 and the estimated value (above) of $25.29
    c. The share price will be higher than $25.29

If Disney buys shares back at $27, 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/ $ 27 = 8068/27 = 298.81

Dollar Premium paid to stockholders = 298.81 * (27-24.34) = $795 million

Premium for remaining stockholders = 1763 – 795 = $968 million

Increase in stock price for remaining stockholders = 968/(1856.732 – 298.81) = $0.62

Stock price after buyback = $24.34 + 0.62 = $24.96

2. What if something goes wrong?
The Downside Risk

- Sensitivity to Assumptions
    - A. "What if" analysis

        The optimal debt ratio is a function of our inputs on operating income, tax rates and macro variables. We could focus on one or two key variables – operating income is an obvious choice – and look at history for guidance on volatility in that number and ask what if questions.

    - B. "Economic Scenario" Approach

        We can develop possible scenarios, based upon macro variables, and examine the optimal debt ratio under each one. For instance, we could look at the optimal debt ratio for a cyclical firm under a boom economy, a regular economy and an economy in recession.

- Constraint on Bond Ratings/ Book Debt Ratios

    Alternatively, we can put constraints on the optimal debt ratio to reduce exposure to downside risk. Thus, we could require the firm to have a minimum rating, at the optimal debt ratio.

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.

Explore the past:
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%
2004	$4,048	49.21%
2005	$4,107	1.46%
2006	$5,355	30.39%
2007	$6,829	27.53%
2008	$7,404	8.42%

Key questions:
What does a bad year look like for Disney?
How much volatility is there in operating income?

Recession	Decline in Operating Income
2008-09	Drop of about 10%
2002	Drop of 15.82%
1991	Drop of 22.00%
1981-82	Increased

These are percentage changes in operating income at Disney.

What comprises a bad year for one company may not for another company. We need to discriminate on our what if analysis.

Disney's operating income has been volatile but not unduly so (relative to other entertainment companies…)

What if?
Examining the sensitivity of the optimal debt ratio..

EBITDA drops by	EBITDA	Optimal Debt ratio
0%	$8,319	40%
5%	$7,903	40%
10%	$7,487	40%
15%	$7,071	40%
20%	$6,655	30%

The optimal debt ratio stays at 40% until EBITDA drops by 20%... Put another way, Disney has a fairly large buffer when it comes to using its excess debt capacity.

In effect, this should provide a buffer for managers who may be concerned about the risks of moving to a 40% optimal debt ratio.

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
  • a drop in ratings might affect operating income (indirect bankruptcy costs)
  • there is an ego factor associated with high ratings

■ Caveat: Every Rating Constraint Has A Cost.
  • Every rating constraint has a cost
  • Managers should be provided with an estimate of the cost of a specified ratings constraint so that they can decide whether the benefits exceed the costs.

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.

- At its optimal debt ratio of 40%, Disney has an estimated rating of A.
- If managers insisted on a AA rating, the optimal debt ratio for Disney is then 30% and the cost of the ratings constraint is fairly small:

  Cost of AA Rating Constraint = Value at 40% Debt – Value at 30% Debt

  = $63,651 – $63,596 = $55 million

- If managers insisted on a AAA rating, the optimal debt ratio would drop to 20% and the cost of the ratings constraint would rise:

  Cost of AAA rating constraint = Value at 40% Debt – Value at 20% Debt

  = $63,651 - $62,371 = $1,280 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.

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.

3. 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.

While Tata Chemical looks over levered, it is possible that the company is borrowing money on the basis of the Tata Group's financial strength…. Thus, to assess whether there is too much or too little debt, we should be looking at the overall group's optimal and actual debt ratio.

Extension to a firm with volatile earnings:
Aracruz's Optimal Debt Ratio

Cost of debt includes default spread for Brazil.

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	1.01	13.52%	AAA	7.25%	34.00%	4.79%	13.52%	R$ 17,424
10%	1.08	14.26%	A-	9.00%	34.00%	5.94%	13.42%	R$ 17,600
20%	1.17	15.17%	B-	14.50%	34.00%	9.57%	14.05%	R$ 16,511
30%	1.29	16.36%	CC	18.00%	33.83%	11.91%	15.03%	R$ 15,062
40%	1.53	18.75%	C	21.00%	21.75%	16.43%	17.82%	R$ 11,994
50%	1.87	22.13%	D	26.00%	14.05%	22.35%	22.24%	R$ 9,012
60%	2.34	26.79%	D	26.00%	11.71%	22.95%	24.49%	R$ 7,975
70%	3.12	34.55%	D	26.00%	10.04%	23.39%	26.74%	R$ 7,140
80%	4.68	50.08%	D	26.00%	8.78%	23.72%	28.99%	R$ 6,452
90%	9.36	96.66%	D	26.00%	7.81%	23.97%	31.24%	R$ 5,875

Using Aracruz's actual operating income in 2008, an abysmal year, yields an optimal debt ratio of 0%.
Applying Aracruz's average pretax operating margin between 2004 and 2008 of 27.24% to 2008 revenues of
$R 3,697 million to get a normalized operating income of R$ 1,007 million. That is the number used in
computing the optimal debt ratio in this table.

Two key differences:

1.Used normalized operating income instead of actual operating income

2.Cost of debt includes company default spread (based upon rating) and country default spread for Brazil.

This is the optimal debt ratio with normalized operating income. The costs of equity and capital are computed in US dollar terms. The actual debt ratio is 52%, which is well above the optimal.

Extension to a private business
Optimal Debt Ratio for Bookscape

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	Cost of capital	Firm Value (G)
0%	1.98	15.38%	AAA	4.75%	40.00%	2.85%	15.38%	$20,701.79
10%	2.11	16.18%	AAA	4.75%	40.00%	2.85%	14.84%	$21,728.94
20%	2.28	17.17%	AAA	4.75%	40.00%	2.85%	14.30%	$22,858.84
30%	2.49	18.44%	A	6.00%	40.00%	3.60%	13.99%	$23,572.02
40%	2.77	20.14%	A-	6.50%	40.00%	3.90%	13.64%	$24,403.93
50%	3.17	22.51%	BB	8.50%	40.00%	5.10%	13.81%	$24,000.23
60%	3.76	26.08%	B	10.75%	40.00%	6.45%	14.30%	$22,861.61
70%	4.75	32.02%	B-	12.00%	40.00%	7.20%	14.65%	$22,128.00
80%	6.73	43.90%	CC	15.50%	40.00%	9.30%	16.22%	$19,282.19
90%	13.20	82.73%	CC	15.50%	37.03%	9.76%	17.06%	$18,039.01

No market value because it is a private firm. Hence, we estimated value:
Estimated Market Value of Equity (in '000s) = Net Income for Bookscape *
Average PE for Publicly Traded Book Retailers = 1,500 * 10 = $15,000
Estimated Market Value of Debt = PV of leases= $9.6 milliion

The optimal debt ratio for the private firm is 40%. The firm value is maximized at that point. The actual debt ratio is very close to the optimal.

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.

Limitations of the Cost of Capital approach

- <u>It is static</u>: The most critical number in the entire analysis is the operating income. If that changes, the optimal debt ratio will change.
- <u>It ignores indirect bankruptcy costs</u>: The operating income is assumed to stay fixed as the debt ratio and the rating changes.
- <u>Beta and Ratings</u>: It is based upon rigid assumptions of how market risk and default risk get borne as the firm borrows more money and the resulting costs.

While the traditional cost of capital approach is a powerful tool, it has its limitations. In particular, the fact that it leaves the operating income fixed as ratings and debt ratios change implies that we are ignoring indirect bankruptcy costs and thus over estimating optimal debt ratios.

II. Enhanced Cost of Capital Approach

- <u>Distress cost affected operating income</u>: In the enhanced cost of capital approach, the indirect costs of bankruptcy are built into the expected operating income. As the rating of the firm declines, the operating income is adjusted to reflect the loss in operating income that will occur when customers, suppliers and investors react.
- <u>Dynamic analysis:</u> Rather than look at a single number for operating income, you can draw from a distribution of operating income (thus allowing for different outcomes).

The most significant innovation is that the operating income is a function of the ratings. As he firm borrows more and its rating drops, its operating income will drop to reflect the indirect bankruptcy costs.

Rating	Drop in EBITDA
A- or higher	No effect
A-	2.00%
BBB	10.00%
BB+	20.00%
B-	25.00%
CCC	40.00%
D	50.00%

Indirect bankruptcy costs manifest themselves, when the rating drops to A- and then start becoming larger as the rating drops below investment grade.

To estimate these values, we looked at firms that had been downgraded and looked the change in operating income in the next year. There is a lot of estimation noise in these values…. And a lot of variation across firms.

The Optimal Debt Ratio with Indirect Bankruptcy Costs

Debt Ratio	Bond Rating	Cost of Capital	Firm Value (G)
0%	AAA	7.90%	$58,522
10%	AAA	7.68%	$60,384
20%	AAA	7.45%	$62,368
30%	A+	7.42%	$62,707
40%	CCC	9.18%	$24,987
50%	C	12.77%	$17,569
60%	C	14.27%	$15,630
70%	C	15.77%	$14,077
80%	C	17.27%	$12,804
90%	C	18.77%	$11,743

The optimal debt ratio drops to 30% from the original computation of 40%.

When both operating income and cost of capital change, the optimal debt ratio may no longer be at the point where cost of capital is minimized. Firm value may be maximized at a different point, with higher operating income and a a higher cost of capital.

Extending this approach to analyzing Financial Service Firms

- Interest coverage ratio spreads, which are critical in determining the bond ratings, have to be estimated separately for financial service firms; applying manufacturing company spreads will result in absurdly low ratings for even the safest banks and very low optimal debt ratios.
- It is difficult to estimate the debt on a financial service company's balance sheet. Given the mix of deposits, repurchase agreements, short-term financing, and other liabilities that may appear on a financial service firm's balance sheet, one solution is to focus only on long-term debt, defined tightly, and to use interest coverage ratios defined using only long-term interest expenses.
- Financial service firms are regulated and have to meet capital ratios that are defined in terms of book value. If, in the process of moving to an optimal market value debt ratio, these firms violate the book capital ratios, they could put themselves in jeopardy.

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.

An alternative approach based on Regulatory Capital

- Rather than try to bend the cost of capital approach to breaking point, we will adopt a different approach for financial service firms where we estimate debt capacity based on regulatory capital.
- Consider a bank with $ 100 million in loans outstanding and a book value of equity of $ 6 million. Furthermore, assume that the regulatory requirement is that equity capital be maintained at 5% of loans outstanding. Finally, assume that this bank wants to increase its loan base by $ 50 million to $ 150 million and to augment its equity capital ratio to 7% of loans outstanding.

Loans outstanding after Expansion	= $ 150 million
* Equity/Capital ratio desired	= 7%
= Equity after expansion	= $10.5 million
Existing Equity	= $ 6.0 million
New Equity needed	= $ 4.5 million

This can come from retained earnings or from new equity issues.

As regulatory capital ratios increase, banks will have to raise more equity to grow.

Conservative banks will raise more equity than aggressive banks.

- The Regulatory minimum strategy: In this strategy, financial service firms try to stay with the bare minimum equity capital, as required by the regulatory ratios. In the most aggressive versions of this strategy, firms exploit loopholes in the regulatory framework to invest in those businesses where regulatory capital ratios are set too low (relative to the risk of these businesses).
- The Self-regulatory strategy: The objective for a bank raising equity is not to meet regulatory capital ratios but to ensure that losses from the business can be covered by the existing equity. In effect, financial service firms can assess how much equity they need to hold by evaluating the riskiness of their businesses and the potential for losses.
- Combination strategy: In this strategy, the regulatory capital ratios operate as a floor for established businesses, with the firm adding buffers for safety where needed..

The Regulatory minimum strategy is likely to yield the highest profits and ROE during good times but is most likely to expose the firm to problems in bad times. To the extent that governments bail firms out when trouble strikes, firms are going to move towards this strategy because they do not see a downside.

The self regulatory strategy is the only option for firms that have no regulatory overlay or downside protection from an external entity but want to ensure their own survival. For hundreds of years, banks self regulated with mixed results. This is a more resource intensive approach, since you have to examine the risk in your business carefully and make your assessments of possible downside risk.

Combination strategy: In this strategy, you start with regulatory minimum but add to it, based upon how much risk you want to run of facing downside risk. Thus, conservative banks will keep higher capital ratios than required, which will lead to lower ROE.

Deutsche Bank's Financing Mix

- Deutsche Bank has generally been much more conservative in its use of equity capital. In October 2008, it raised its Tier 1 Capital Ratio to 10%, well above the Basel 1 regulatory requirement of 6%.
- While its loss of 4.8 billion Euros in the last quarter of 2008 did reduce equity capital, Deutsche Bank was confident (at least as of the first part of 2009) that it could survive without fresh equity infusions or government bailouts. In fact, Deutsche Bank reported net income of 1.2 billion Euros for the first quarter of 2009 and a Tier 1 capital ratio of 10.2%.
- If the capital ratio had dropped below 10%, the firm would have had to raise fresh equity.

Assessing the financing mix for a bank or financial service firm boils down to equity. In effect, the firm can have too little or too much book equity, and that judgment is made based upon capital ratios (actual versus required). Unlike non-financial service firms, where debt can be reduced or increased to change the ratio, financial service firms generally have much less flexibility.

So, what can cause book equity to vary across time? Retained earnings obviously. Profits will increase book equity and losses will reduce them. Any dividends paid reduce book equity. For banks, loan losses can reduce book equity dramatically. In other words, a bank can go from being comfortably over funded to significantly under funded overnight.

The one issue in this approach is that it is framed by regulatory defintiions.of equity. Thus, preferred stock is usually counted as equity. After the crisis of 2008, there was a debate about whether wartrants should be counted in book equity.

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Determinants of the Optimal Debt Ratio:
1. The marginal tax rate

■ The primary benefit of debt is a tax benefit. The higher the marginal tax rate, the greater the benefit to borrowing:

Tax Rate	Disney	Aracruz	Tata Chemicals	Bookscape
0%	0%	0%	0%	0%
10%	0%	0%	0%	20%
20%	20%	0%	0%	20%
30%	30%	10%	0%	40%
40%	50%	10%	10%	40%
50%	60%	20%	20%	50%

Note that with zero taxes, the optimal debt ratio goes to zero. Intuitively, if the costs of borrowing (higher bankruptcy cost, agency costs) and the primary benefit disappears, there will always by a net cost to borrowing.

If debt is cheaper than equity on a pre-tax basis (and it generally is), why do we not gain by borrowing?

Because the additional debt makes both debt and equity more expensive. (Ratings drop and betas increase…)

2. Pre-tax Cash flow Return

- Firms that have more in operating income and cash flows, relative to firm value (in market terms), should have higher optimal debt ratios. We can measure operating income with EBIT and operating cash flow with EBITDA.

  Cash flow potential = EBITDA/ (Market value of equity + Debt)

- Disney, for example, has operating income of $6,829 million, which is 11% of the market value of the firm of $61,875 million in the base case, and an optimal debt ratio of 40%. Increasing the operating income to 15% of the firm value will increase the optimal debt ratio to 60%.

- In general, growth firms will have lower cash flows, as a percent of firm value, and lower optimal debt ratios.

This is the answer to the puzzle of why growth firms, even extremely profitable ones like Apple and Google, tend to have low optimal debt ratios. While they may generate huge dollar profits, their market values are

3. Operating Risk

- Firms that face more risk or uncertainty in their operations (and more variable operating income as a consequence) will have lower optimal debt ratios than firms that have more predictable operations.
- Operating risk enters the cost of capital approach in two places:
  - Unlevered beta: Firms that face more operating risk will tend to have higher unlevered betas. As they borrow, debt will magnify this already large risk and push up costs of equity much more steeply.
  - Bond ratings: For any given level of operating income, firms that face more risk in operations will have lower ratings. The ratings are based upon normalized income.

A risky firm can be very profitable in a good year. However, it should be cautious about borrowing on the basis of that income, since earnings can drop quickly.

4. The only macro determinant: Equity vs Debt Risk Premiums

Figure 9: Equity Risk Premiums and Bond Default Spreads
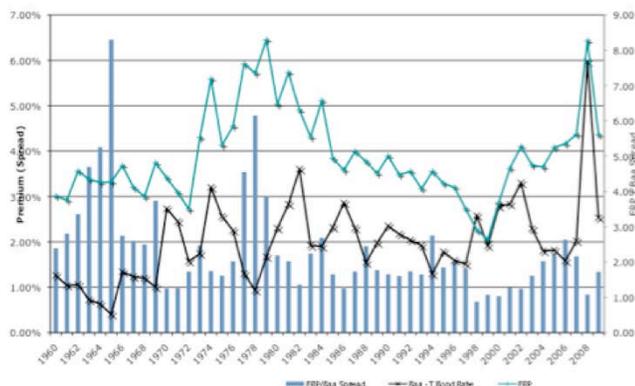
The cost of equity is determined by the equity risk premium and the cost of debt by the default spread. When ERP rise (fall) relative to default spreads, firms will borrow more (less).

This graph has the implied equity risk premium and the default spread on a Baa rated bond going back to 1960. While they generally move together, there have been periods of disconnect between the two.

In the late 1990s, equity risk premiums dropped relative to default spreads: Firms should have shifted to equity from debt and optimal debt ratios should have decreased.

Between 2004 and 2007, default spreads dropped while equity risk premiums remained unchanged. It was a golden age for leveraged transactions.

In 2008, risk premia climbed across the board but default spreads increased at a far faster pace than equity risk premium. On a relative basis, debt became more expensive relative to equity.

We would expect optimal debt ratios to decrease across the board as a consequence. . (Between 2004 and 2007, default spreads fell while equity risk premiums stagnated… ushering in the age of leveraged recaps and buyouts)

⧖ 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?

The best way to see how capital structure is determined by fundamentals is to try it for a real firm and see how the optimal changes as you change the inputs.

III. 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
- Firm Value = Unlevered Firm Value + (Tax Benefits of Debt - 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, Unlevered Firm Value = Current Market Value of Firm - Tax Benefits of Debt (Current) + 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
  - Tax benefits = Dollar Debt * 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 go up as you borrow money, since you count in the tax benefits but you don't consider the bankrutpcy 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. There have been attempts to measure the magnitude of indirect bankruptcy costs and they conclude that

-indirect bankruptcy costs can be as high as 20-30% of firm value

-Indirect bankrtupcy costs as a percent of firm value are different for different firms. In general, they tend to be higher for firms that produce longer life assets than for assets that have shorter lives and for firms where reputation matters more…

Ratings and Default Probabilities: Results from Altman study of bonds

Rating	Likelihood of Default
AAA	0.07%
AA	0.51%
A+	0.60%
A	0.66%
A-	2.50%
BBB	7.54%
BB	16.63%
B+	25.00%
B	36.80%
B-	45.00%
CCC	59.01%
CC	70.00%
C	85.00%
D	100.00%

Altman estimated these probabilities by looking at bonds in each ratings class ten years prior and then examining the proportion of these bonds that defaulted over the ten years.

This table is updated every year by Ed Altman at the Stern School of Business. It is the probability that a bond is each of these ratings classes will default and is based upon actual default rates over 10 years of bonds in each ratings class. This is from the 2008 update.

Disney: Estimating Unlevered Firm Value

Current Market Value of the Firm = = $45,193 + $16,682   = $ 61,875

 - Tax Benefit on Current Debt = $16,682 * 0.38   = $ 6,339

 + Expected Bankruptcy Cost = 0.66% * (0.25 * 61,875)   = $ 102

Unlevered Value of Firm =   = $ 55,638

Cost of Bankruptcy for Disney = 25% of firm value

Probability of Bankruptcy = 0.66%, based on firm's current rating of A

Tax Rate = 38%

To implement APV, you have to first estimate the unlevered firm value.We are using a short-cut to derive the tax benefit from current debt and the indirect bankruptcy cost is an assumption (we went right for the mid-point of the 10-40% range for all companies.

Disney: APV at Debt Ratios

Debt Ratio	$ Debt	Tax Rate	Unlevered Firm Value	Tax Benefits	Expected Bankruptcy Cost	Value of Levered Firm
0%	$0	38.00%	$55,638	$0	$10	$55,629
10%	$6,188	38.00%	$55,638	$2,351	$10	$57,979
20%	$12,375	38.00%	$55,638	$4,703	$11	$60,330
30%	$18,563	38.00%	$55,638	$7,054	$94	$62,598
40%	$24,750	38.00%	$55,638	$9,405	$107	$64,936
50%	$30,938	38.00%	$55,638	$11,756	$421	$66,973
60%	$37,125	38.00%	$55,638	$14,108	$6,417	$63,329
70%	$43,313	38.00%	$55,638	$16,459	$10,636	$61,461
80%	$49,500	38.00%	$55,638	$18,810	$10,983	$63,466
90%	$55,688	34.52%	$55,638	$19,223	$11,044	$63,817

The optimal debt ratio is 50%,
which is the point at which firm
value is maximized.

Disney's optimal debt ratio is 50%, which is slightly higher than the optimal debt ratio from the cost of capital approach.

IV. 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

Company	Book Debt Ratio	Market Debt Ratio	Comparable group	Book Debt Ratio		Market Debt Ratio	
				Average	Median	Average	Median
Disney	32.89%	26.96%	US Entertainment companies	47.76%	43.59%	36.90%	37.83%
Aracruz	91.01%	52.47%	Emerging Market Paper companies	38.11%	40.74%	33.75%	34.22%
Tata Chemicals	42.95%	34.02%	Emerging Market chemical companies	33.88%	34.76%	25.56%	21.34%

Based on this comparison, Disney is operating at a debt ratio lower than those of other firms in the industry in both market and book value terms, whereas Aracruz and Tata Chemicals have debt ratios much higher than the averages for their sector.

The underlying assumptions in this comparison are that firms within the same industry are **comparable** and that, on average, these firms are operating at or close to their optimal. Both assumptions can be questioned, however. Firms within the same industry can have different product mixes, different amounts of operating risk, different tax rates, and different project returns. In fact, most do. For instance, Disney is considered part of the entertainment industry, but its mix of businesses is very different from that of Lion's Gate, which is primarily a movie company, or Liberty Media, which is primarily a cable broadcasting company. Furthermore, Disney's size and risk characteristics are very different from that of Westwood One, which is also considered part of the same industry group. The other problem is that, as we noted in Chapter 4, both Disney and Tata Chemicals are multi-business companies and picking a sector to compare these firms is difficult to do.

Getting past simple averages

Step 1: Run a regression of debt ratios on the variables that you believe determine debt ratios in the sector. For example,

Debt Ratio = a + b (Tax rate) + c (Earnings Variability) + d (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 80 entertainment firms, we arrived at the following regression:

  Debt to Capital = 0.049 + 0.543 (Effective tax rate) + 0.692 (EBITDA/Firm Value)

  (1.07)   (4.10[a])   (4.08[a])

- The R squared of the regression is 40%. This regression can be used to arrive at a predicted value for Disney of:

Predicted Debt Ratio = 0.049 + 0.543 (0.372) + 0.692 (0.1735) = 0.3710 or 37.10%

Based upon the capital structure of other firms in the entertainment industry, Disney should have a market value debt ratio of 37.1%.

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

■ Using 2008 data for firms listed on the NYSE, AMEX and NASDAQ data bases. The regression provides the following results –

$DFR = 0.327 - 0.064$ Intangible % $- 0.138$ CLSH $+ 0.026$ E/V $- 0.878$ G_{EPS}

       $(25.45[a])$ $(2.16[a])$ $(2.88[a])$ $(1.25)(12.6[a])$

where,

    DFR   = Debt / (Debt + Market Value of Equity)

    Intangible % = Intangible Assets/ Total Assets (in book value terms)

    CLSH = Closely held shares as a percent of outstanding shares

    E/V = EBITDA/ (Market Value of Equity + Debt- Cash)

    G_{EPS} = Expected growth rate in EPS

■ The regression has an R-squared of 13%.

This looks at the entire market and uses the following variables (from Value Line CD-ROM)

Tax Rate *as proxy for*	tax benefits	
Closely held shares	for	disciplinary power of debt
EBITDA/Value	for	capacity to generate cash flows
Intangible assets	"	Agency costs
Growth in EPS	for	Expected growth possibilities and need for flexibility

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 2008. Estimate the optimal debt ratio using the debt regression.

- Intangible Assets = 24%
- Closely held shares as percent of shares outstanding = 7.7%
- EBITDA/Value = 17.35%
- Expected growth in EPS = 6.5%

Optimal Debt Ratio

$= 0.327 - 0.064 (0.24) - 0.138 (0.077) + 0.0.26 (0.1735) - 0.878 (0.065)$

$= 0.2891$ or 28.91%

What does this optimal debt ratio tell you?

Why might it be different from the optimal calculated using the weighted average cost of capital?

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 29%. Since its actual debt ratio is 27%, 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.

Summarizing the optimal debt ratios…

	Disney	Aracruz	Tata Chemicals
Actual Debt Ratio	27%	52.58%	34.02%
Optimal			
I. Operating income	50.00%	—	-
II. Standard Cost of capital	40.00%	10.00%	10.00%
III. Enhanced Cost of Capital	30.00%	10.00%	10.00%
IV. APV	50.00%	20.00%	10.00%
V. Comparable			
To industry	37.10%	34.22%	21.34%
To market	28.91%	—	-

Disney ranges from mildly to significantly under levered no matter which approach you use and Aracruz and Tata Chemicals look over levered no matter which approach you use…

Getting to the Optimal:
Timing and Financing Choices

There is no one path to get from the actual to the optimal. It will vary from firm to firm, and even for the same firm, across time.

Big Picture…

Chapter 9: The Financing Details
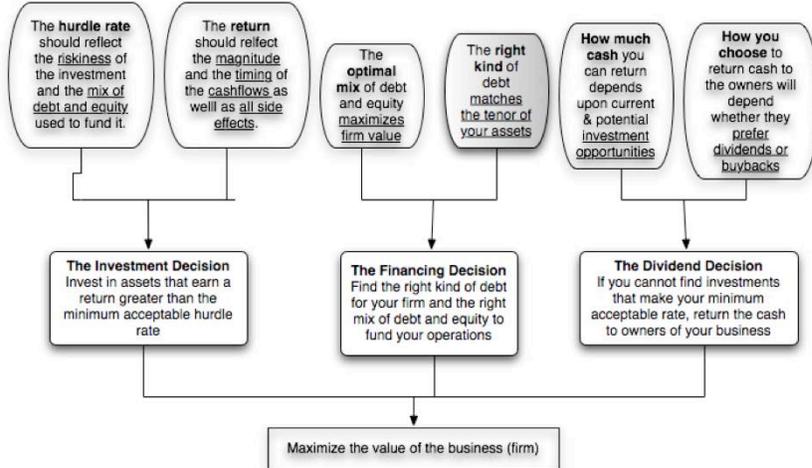
Completes the financing principle part of the analysis…

Now that we have an optimal.. And an actual.. What next?

- At the end of the analysis of financing mix (using whatever tool or tools you choose to use), you can come to one of three conclusions:
  - The firm has the right financing mix
  - It has too little debt (it is under levered)
  - It has too much debt (it is over levered)
- The next step in the process is
  - Deciding how much quickly or gradually the firm should move to its optimal
  - Assuming that it does, the right kind of financing to use in making this adjustment

When a firm is under or over levered, the natural reaction of the analyst looking at the numbers is that the firm should fix the problem instantaneously. However, there is a cost to abrupt shifts in capital structures:

a.You could be wrong in your assessment of the optimal: In other words, you may have misestimated the optimal, in which case the firm may have to back track, if it has followed your recommendations. That is expensive to do (and sometimes fatal).

b.Macro variables may shift: If there is a shift in the macro environment (interest rates and risk premiums could change), your recommendations can be wrong in hindisight

c.Adjustment costs: Changes in capital structure can change the way a company is managed and decision makers may not be ready to make the shift. Managers at highly levered firms have to make decisions differently (and perhaps focus on different decision rules) than managers at lightly levered firms. Increasing the debt ratio for a firm overnight can create adjustment problems for these managers.

A Framework for Getting to the Optimal

Is the actual debt ratio greater than or lesser than the optimal debt ratio?

Actual > Optimal
Overlevered

Is the firm under bankruptcy threat?

Yes → Reduce Debt quickly
1. Equity for Debt swap
2. Sell Assets; use cash to pay off debt
3. Renegotiate with lenders

No → Does the firm have good projects?
ROE > Cost of Equity
ROC > Cost of Capital

Yes → Take good projects with new equity or with retained earnings.

No →
1. Pay off debt with retained earnings.
2. Reduce or eliminate dividends.
3. Issue new equity and pay off debt.

Actual < Optimal
Underlevered

Is the firm a takeover target?

Yes → Increase leverage quickly
1. Debt/Equity swaps
2. Borrow money& buy shares.

No → Does the firm have good projects?
ROE > Cost of Equity
ROC > Cost of Capital

Yes → Take good projects with debt.

No → Do your stockholders like dividends?

Yes → Pay Dividends

No → Buy back stock

Aswath Damodaran

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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 BB 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

Is the actual debt ratio greater than or lesser than the optimal debt ratio?

Actual > Optimal
Overlevered

Actual < Optimal
Actual (26%) < Optimal (40%)

Is the firm under bankruptcy threat?

Is the firm a takeover target?

Yes

No

Yes

No. Large mkt cap & positive Jensen's α

Reduce Debt quickly
1. Equity for Debt swap
2. Sell Assets; use cash to pay off debt
3. Renegotiate with lenders

Does the firm have good projects?
ROE > Cost of Equity
ROC > Cost of Capital

Increase leverage quickly
1. Debt/Equity swaps
2. Borrow money& buy shares.

Does the firm have good projects?
ROE > Cost of Equity
ROC > Cost of Capital

Yes
Take good projects with new equity or with retained earnings.

No
1. Pay off debt with retained earnings.
2. Reduce or eliminate dividends.
3. Issue new equity and pay off debt.

Yes. ROC > Cost of capital
Take good projects With debt.

No

Do your stockholders like dividends?

Yes
Pay Dividends

No
Buy back stock

This is the analysis for Disney in 2009.

I am assuming that future projects will be more successful than current projects..

Over time, our assessments have changed:

In 2003, we would have pushed for higher dividends (since Disney was earning terrible returns on capital and we did not trust management)

In 2000, Disney would have been a takeover target (because its market cap had dropped and its performance was awful on both accounting and stock price returns)

In 1997, Disney would not have been a takeover target (high market cap, good performance) and its excess debt capacity would have been directed to good investments.

- 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.

The Mechanics of Changing Debt Ratio over time…
quickly…

To decrase the debt ratio

Sell operating assets and use cash to pay down debt.

Issue new stock to retire debt or get debt holders to accept equity in the firm.

Assets	Liabilities
Cash	Debt
Opearing Assets in place	
Growth Assets	Equity

Sell operating assets and use cash to buy back stock or pay or special dividend

Borrow money and buy back stock or pay a large special dividend

To increase the debt ratio

To change the debt ratio, we can use either a pure recapitalization (where the assets remain unchanged but the liability side changes) or a mixed strategy where both sides of the balance sheet change. Which one you adopt will depend upon the market you are in (when capital markets are open and liquid, it is easier to do recapitalizations), the nature of your assets (liquid assets are easier to sell) and the magnitude of the change (bigger changes are more likely to require mixed strategies).

The mechanics of changing debt ratios over time…
gradually…

- ■ To change debt ratios over time, you use the same mix of tools that you used to change debt ratios gradually:
  - Dividends and stock buybacks: Dividends and stock buybacks will reduce the value of equity.
  - Debt repayments: will reduce the value of debt.
- ■ The complication of changing debt ratios over time is that firm value is itself a moving target.
  - If equity is fairly valued today, the equity value should change over time to reflect the expected price appreciation:

    Expected Price appreciation = Cost of equity – Dividend Yield
  - Debt will also change over time, in conjunction as firm value changes.

When debt ratios are changed over time, the biggest complication is that the firm value itself will change over time as a function of new investments made and expected growth in both equity and debt values. Put another way, trying to get to 40% of the firm value 5 years from now is more complicated than getting to 40% of firm value today… since firm value 5 years from now will be different from firm value today.

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.

Your objective is issue securities that bring you all of the tax benefits of debt while providing you with the flexibility of equity. 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

Firm Value
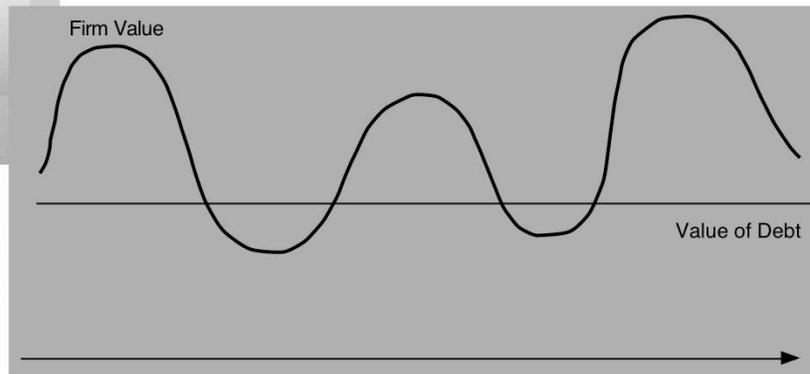
Value of Debt

Note that the firm goes bankrupt in the two periods, when the firm value falls below the value of the debt.

Firm with matched Debt

Firm Value

Value of Debt
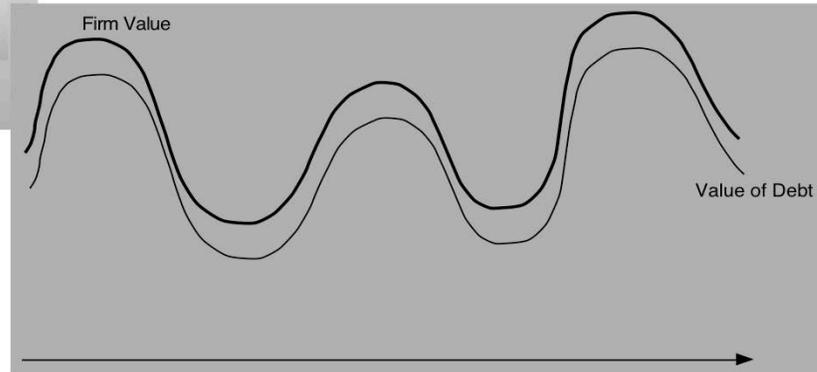
The same firm never goes bankrupt, even though it has borrowed a lot more.

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
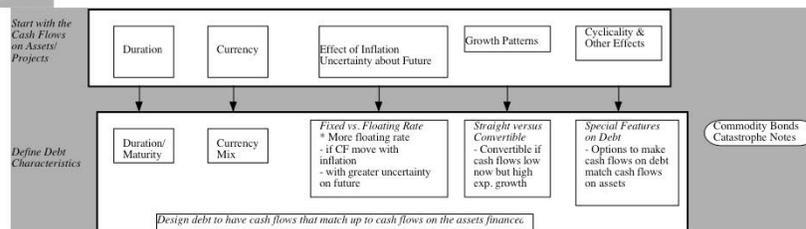
There is ample scope for creativity in trying to design the perfect bond. The idea is to design debt that looks and acts like equity, in terms of the cash flows.

Consider each aspect;

Duration: Companies with long term projects (Boeing) should use long term debt. Companies with short term projects (Dell) should use short term debt.

Currency: Companies that get a high proportion of their revenues from non-domestic operations should use more foreign currency debt (especially if the currency mix is stable.

Inflation: Companies with pricing power can pass inflation through into their cash flows. These companies should be much better candidates for floating rate debt (because interest expenses on the debt will rise and fall with inflation).

Growth pattern: Mature companies with level , steady cash flows should be much better candidates for straight debt, whereas growth companies are much better candidates for convertible debt.

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.

Overlay tax preferences	Deductibility of cash flows for tax purposes	Differences in tax rates across different locales	Zero Coupons
	If tax advantages are large enough, you might override results of previous step		
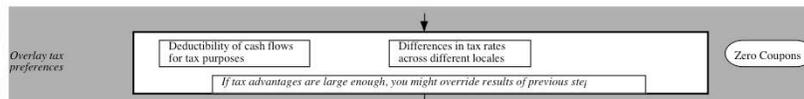
Note though that all is lost if the tax authorities do not allow you to subtract interest expenses for tax purposes.

It is also possible that you could increase your tax benefits by deviating from your perfect bond and issuing bonds in the wrong currency or the wrong maturity.

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 MIPs Surplus Notes
	Can securities be designed that can make these different entities happy.			

Aswath Damodaran

This is a tough balancing act to pull off. 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	Convertibiles 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.

Designing Debt: Bringing it all together

Start with the Cash Flows on Assets/Projects

| Duration | Currency | Effect of Inflation / Uncertainty about Future | Growth Patterns | Cyclicality & Other Effects |

Define Debt Characteristics

| Duration/Maturity | Currency Mix | Fixed vs. Floating Rate * More floating rate - if CF move with inflation - with greater uncertainty on future | Straight versus Convertible - Convertible if cash flows low now but high exp. growth | Special Features on Debt - Options to make cash flows on debt match cash flows on assets |

Commodity Bonds Catastrophe Notes

Design debt to have cash flows that match up to cash flows on the assets financed

Overlay tax preferences

| Deductibility of cash flows for tax purposes | Differences in tax rates across different locales |

Zero Coupons

If tax advantages are large enough, you might override results of previous step

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 MIPs Surplus Notes

Can securities be designed that can make these different entities happy?

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 bonds

Consider Information Asymmetries

| Uncertainty about Future Cashflows - When there is more uncertainty, it may be better to use short term debt | Credibility & Quality of the Firm - Firms with credibility problems will issue more short term debt |

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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

Business	Project Cash Flow Characteristics	Type of Financing
Studio entertainment	Movie projects are likely to 1. Be short-term 2. Have cash outflows primarily in dollars (because Disney makes most of its movies in the U.S.), but cash inflows could have a substantial foreign currency component (because of overseas revenues) 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 Mulan bonds)
Media networks	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 (Nielsen ratings)	Debt should be 1. Short-term 2. Primarily dollar debt 3. If possible, linked to network ratings
Park resorts	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 studio entertainment and media networks divisions	Debt should be 1. Long-term 2. Mix of currencies, based on tourist makeup
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 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 (t)	Annual Cashflow	Terminal Value	Present Value @ 8.62%	Present value *t
0	-$2,000		-$2,000	$0
1	-$1,000		-$921	-$921
2	-$860		-$729	-$1,457
3	-$270		-$211	-$632
4	$332		$239	$956
5	$453		$300	$1,500
6	$502		$305	$1,833
7	$538		$302	$2,112
8	$596		$307	$2,460
9	$660		$313	$2,821
10	$692	$10,669	$4,970	$49,704
			$2,877	$58,375

Duration of the Project = 58,375/2,877 = 20.29 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 10.

The perfect theme park debt…

- The perfect debt for this theme park would have a duration of roughly 20 years and be in a mix of Latin American currencies (since it is located in Brazil), 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.

It is entirely possible that the park will pull visitors from a wider global area (say Australia and New Zealand), in which case we should alter the currency mix.

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

Date	Operating Income (OI)	Firm Value (V)	% Chg in OI	% Chg in V
2008	$7,404	$72,357	8.42%	-6.55%
2007	$6,829	$77,428	27.53%	-2.13%
2006	$5,355	$79,116	30.39%	35.81%
2005	$4,107	$58,256	1.46%	3.09%
2004	$4,048	$56,510	49.21%	8.41%
2003	$2,713	$52,125	13.80%	19.03%
2002	$2,384	$43,792	-15.82%	-7.02%
2001	$2,832	$47,099	12.16%	-46.31%
2000	$2,525	$87,716	-22.64%	34.80%
1999	$3,264	$65,073	-15.07%	1.50%
1998	$3,843	$64,110	-2.59%	-1.63%
1997	$3,945	$65,173	30.46%	19.16%
1996	$3,024	$54,695	33.68%	70.95%
1995	$2,262	$31,995	25.43%	38.75%
1994	$1,804	$23,059	15.59%	3.69%
1993	$1,560	$22,238	21.23%	8.65%
1992	$1,287	$20,467	28.18%	26.57%
1991	$1,004	$16,171	-21.98%	27.90%
1990	$1,287	$12,643	16.01%	-24.90%
1989	$1,109	$16,834	40.64%	-2.64%
1988	$789	$17,290	11.65%	65.50%
1987	$707	$10,447	53.02%	85.24%
1986	$462	$5,640	25.15%	61.24%
1985	$369	$3,498	157.99%	24.37%

Disney has changed changed considerably over time in terms of its business mix. It has increasingly moved into the broadcasting business and its animated movies are only a small portion of its overall movie offerings.

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

Date	T.Bond Rate	Change in rate	GDP (Deflated)	% Chg in GDP	CPI	Change in CPI	Weighted Dollar	% Change in $
2008	2.52%	-1.44%	11989	-1.18%	-0.14%	-4.26%	81.01	10.88%
2007	4.02%	-0.65%	12133	2.93%	4.30%	2.19%	73.06	-11.30%
2006	4.70%	0.30%	11787	3.40%	2.07%	-1.84%	82.37	-2.28%
2005	4.39%	0.16%	11399	3.68%	3.99%	0.66%	84.29	3.98%
2004	4.22%	0.13%	10994	3.72%	3.30%	1.34%	81.06	-3.92%
2003	4.08%	0.05%	10600	4.32%	1.93%	-0.65%	84.37	-14.59%
2002	4.03%	-0.97%	10161	2.80%	2.60%	1.44%	98.78	-11.17%
2001	5.05%	-0.18%	9884	-0.04%	1.14%	-2.50%	111.20	7.45%
2000	5.24%	-0.98%	9888	2.24%	3.73%	0.96%	103.49	7.73%
1999	6.28%	1.56%	9671	4.70%	2.74%	1.04%	96.06	1.68%
1998	4.65%	-1.03%	9237	4.51%	1.68%	0.11%	94.47	-4.08%
1997	5.74%	-0.63%	8838	4.33%	1.57%	-1.43%	98.49	9.40%
1996	6.41%	0.80%	8471	4.43%	3.04%	0.31%	90.03	4.14%
1995	5.57%	-2.09%	8112	2.01%	2.72%	-0.08%	86.45	-0.71%
1994	7.82%	1.92%	7952	4.12%	2.80%	0.27%	87.07	-5.37%
1993	5.79%	-0.83%	7637	2.50%	2.52%	-0.72%	92.01	0.56%
1992	6.68%	-0.02%	7451	4.15%	3.26%	0.64%	91.50	6.89%
1991	6.70%	-1.26%	7154	1.09%	2.60%	-2.89%	85.60	0.69%
1990	8.06%	0.12%	7077	0.65%	5.65%	0.43%	85.01	-8.00%
1989	7.93%	-1.11%	7031	2.66%	5.20%	0.51%	92.40	2.04%
1988	9.14%	0.26%	6849	3.66%	4.67%	0.60%	90.55	1.05%
1987	8.86%	1.53%	6607	4.49%	4.05%	2.54%	89.61	-12.01%
1986	7.22%	-1.61%	6323	2.83%	1.47%	-2.33%	101.84	-15.26%
1985	8.98%	-2.27%	6149	4.19%	3.89%	3.89%	120.18	-13.51%
1984	11.51%		5902				138.96	

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 –

Change in Firm Value = 0.1949   - 2.94 (Change in Interest Rates)

(2.89) (0.50)

T statistics are in brackets.

■ The coefficient on the regression (-2.94) 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 –

$$\text{Duration of Bond} = \frac{dP/P}{dr/r} = \frac{\left[\sum_{t=1}^{t=N} \frac{t * \text{Coupon}_t}{(1+r)^t} + \frac{N * \text{Face Value}}{(1+r)^N}\right]}{\left[\sum_{t=1}^{t=N} \frac{\text{Coupon}_t}{(1+r)^t} + \frac{\text{Face Value}}{(1+r)^N}\right]}$$

- 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

```
┌──────────────────────┐        ┌────────────────────┐        ┌──────────────────┐
│ Traditional Duration │        │ δP/δr=             │        │ Regression:      │
│ Measures             │ ─────► │ Percentage Change  │ ◄───── │ δP = a + b (δr)  │
│                      │        │ in Value for a     │        │                  │
└──────────────────────┘        │ percentage change in│       └──────────────────┘
          ▲                     │ Interest Rates     │                 ▲
          │                     └────────────────────┘                 │
┌──────────────────────────┐                         ┌──────────────────────────────┐
│ Uses:                    │                         │ Uses:                        │
│ 1. Projected Cash Flows  │                         │ 1. Historical data on changes│
│ Assumes:                 │                         │ in firm value (market) and   │
│ 1. Cash Flows are        │                         │ interest rates               │
│ unaffected by changes in │                         │ Assumes:                     │
│ interest rates           │                         │ 1. Past project cash flows   │
│ 2. Changes in interest   │                         │ are similar to future project│
│ rates are small.         │                         │ cash flows.                  │
└──────────────────────────┘                         │ 2. Relationship between cash │
                                                      │ flows and interest rates is  │
                                                      │ stable.                      │
                                                      │ 3. Changes in market value   │
                                                      │ reflect changes in the value │
                                                      │ of the firm.                 │
                                                      └──────────────────────────────┘
```

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 industy

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 = 0.1958 + 6.59 (Change in Interest Rates)

  (2.74) (1.06)

  - Conclusion: Disney's operating income, unlike 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? Cyclical firms should have operating income that moves with the economy. Value might not, since markets can look past cycles. In this case, the operating income regression may be the more valuable one.

Regression Results

- Regressing changes in firm value against changes in the GDP over this period yields the following regression –

  Change in Firm Value = 0.0826   + 8.89 (GDP Growth)

                         (0.65)   (2.36)

  - Conclusion: Disney is sensitive to economic growth

- Regressing changes in operating cash flow against changes in GDP over this period yields the following regression –

  Change in Operating Income = 0.04   + 6.06 (GDP Growth)

                         (0.22)   (1.30)

  - Conclusion: Disney's operating income is sensitive to economic growth as well.

Disney has increasingly become a cyclical firm. (In previous iterations in 1997 and 2003, it was insensitive to economic growth…) This may reflect its increasing dependence on broadcasting (where advertising is cyclical) and non-animated movies.

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 –

  Change in Firm Value =   0.17   -2.04 (Change in Dollar)

  (2.63)   (0.80)

  - 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 –

  Change in Operating Income = 0.19   -1.57(Change in Dollar)

  (2.42)   (1.73)

  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.

While firm value also goes down, the effect is slightly less significant.

# 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 –

  Change in Firm Value =   0.18   + 2.71 (Change in Inflation Rate)

                              (2.90)   (0.80)

  Conclusion: Disney's firm value does seem to increase with inflation, but not by much (statistical significance is low)

- Regressing changes in operating cash flow against changes in inflation over this period yields the following regression –

  Change in Operating Income = 0.22 +8.79 (Change in Inflation Rate)

                                 (3.28)   (2.40)

  Conclusion: Disney's operating income seems to increase in periods when inflation increases, suggesting that Disney does have pricing power.

Operating income tends to move with inflation, but firm value does not as much. (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 collectively have a duration of about 3 years
  - Disney is increasingly affected by economic cycles
  - 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.

Summarizes the results of the regressions… Caveat: The regressions have low R-squareds and any or all of these estimates could be wrong by a large amount.

Bottom-up Estimates

Business	Sensitivity of firm value to				
	Interest rates	GDP Growth	Inflation	Currency	Disney weights
Studio entertainment	-3.7	0.56	1.41	-1.23	9.88%
Media networks	-4.5	0.7	-3.05	-1.58	58.92%
Park resorts	-6.47	0.22	-1.45	-3.21	29.88%
Consumer products	-4.88	0.13	-5.51	-3.01	1.32%
Disney	*-5.01*	*0.54*	*-2.16*	*-2.05*	

These weights reflect the estimated values of the businesses

Since the standard errors on the regression estimates are so high, this alternative may yield more precise estimates of the each of the coefficients. To obtain these bottom up values, we ran the regressions for each firm in the sector and averaged out the coefficients.

Recommendations for Disney

- The debt issued <u>should be long term</u> and should have duration of about 5 years.
- A <u>significant portion of the debt should be floating rate debt</u>, 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.
- <u>Given Disney's sensitivity to a stronger dollar, a portion of the debt should be in foreign currencies</u>. The specific currency used and the magnitude of the foreign currency debt should reflect where Disney makes its revenues. Based upon 2008 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.

Converts the numbers into tangible recommendations…

Analyzing Disney's Current Debt

- Disney has $16 billion in debt with a face-value weighted average maturity of 5.38 years. Allowing for the fact that the maturity of debt is higher than the duration, this would indicate that Disney's debt is of the right maturity.
- Of the debt, about 10% is yen denominated debt but the rest is in US dollars. Based on our analysis, we would suggest that Disney increase its proportion of debt in other currencies to about 20% in Euros and about 5% in Chinese Yuan.
- Disney has no convertible debt and about 24% of its debt is floating rate debt, which is appropriate given its status as a mature company with significant pricing power. In fact, we would argue for increasing the floating rate portion of the debt to about 40%.

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 fixed rate, dollar debt for 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 floating rate, foreign currency debt to fund these new investments. Although 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.

Debt Design for other firms..

Company	The "right" debt
Bookscape	• Long-term, because the store is a long-term investment; • Dollar-denominated, because all the cash flows are in dollars; and • Fixed rate debt, because Bookscape's lack of pricing power makes it unlikely that they can keep pace with inflation. *Existing debt: is an operating lease, which matches up to the right debt.*
Aracruz	• Long term, because a typical paper plant has a life in excess of twenty years; • Dollar-denominated, because the cash inflows are primarily in dollars; and • Given the volatility of paper prices, we would try to link the interest rate on debt to pulp prices, if possible. *Existing debt: is too $R based and has average maturity of 3.2 years. While Aracruz is in no position to renegotiate this debt right now, it should consider shifting to longer term, US $ based debt.*
Tata Chemicals	• Medium to long term debt, reflecting the life of the plant and equipment used to produce its fertilizer and chemical products • Fixed rate debt, since the company is unlikely to have much pricing power in this business. • Rupee denominated debt, since almost 90% of Tata Chemical's revenues come from India. *Existing debt: matches up for the most part though average duration (3 years) is lower than we would expect.*

We don't even try to assess Deutsche's right debt because its assets are constantly changing and debt plays a different role in a bank… it is more raw material than source of capital.

Returning Cash to the Owners: Dividend Policy

"Companies don't have cash. They hold cash for their stockholders."

First Principles

Chapter 10: Dividend Policy
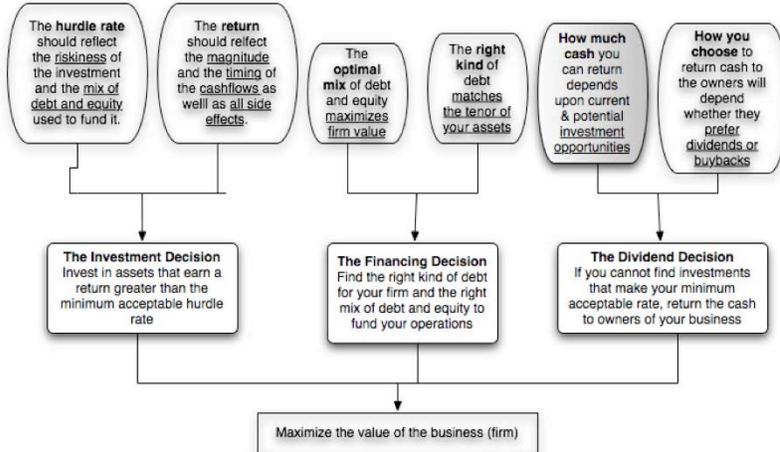
Third and final principle of corporate finance.

Steps to the Dividend Decision…

How much did you borrow?

Cashflows to Debt
(Principal repaid,
Interest
Expenses)

How good are your investment choices

Reinvestment back
into the business

Cashflow
from
Operations

Cashflows from
Operations to
Equity Investors

What is a reasonable cash balance

Cash held back
by the company

Cash available
for return to
stockholders

*What do your
stockholders prefer?*

Stock Buybacks

Cash Paid out

Dividends

Dividend policy is affected by investment and financing decisions…. And dividend decisions may affect investment and financing decisions. In other words, analyzing dividends has to be part and parcel of analyzing the whole company.

I. Dividends are sticky

Dividend Changes by year: US companies
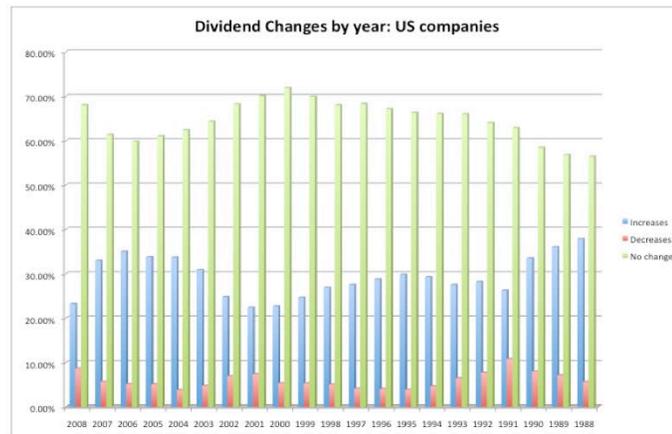
Most companies in most years pay out what they did last year as dividends. Among firms that change dividends, increases are more common than decreases.

The last quarter of 2008 put stickiness to the test.. Number of S&P 500 companies that…

Quarter	Dividend Increase	Dividend initiated	Dividend decrease	Dividend suspensions
Q1 2007	102	1	1	1
Q2 2007	63	1	1	5
Q3 2007	59	2	2	0
Q4 2007	63	7	4	2
Q1 2008	93	3	7	4
Q2 2008	65	0	9	0
Q3 2008	45	2	6	8
Q4 2008	32	0	17	10

If there was a quarter than should have shaken up the policy of leaving dividends unchanged, it should have been the last quarter of 2008, when markets collapsed globally and there were fears of a credit crisis. In the face of this mountain of bad news, more companies still increased dividends than suspended or cut them.

II. Dividends tend to follow earnings

Dividends and Earnings: 1960- 2008
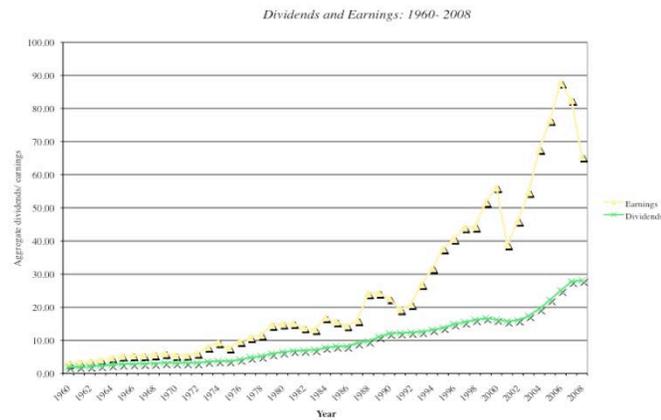
Dividends tend to follow earnings. They don't lead them and they are not contemporaneous. In other words, don't expect a company to pay out more in dividends if their earnings go up… If earnings go up two years in a row, maybe.. Three years in a row and the odds increase.

Figure 10.11: Dividends on S&P 500 Companies
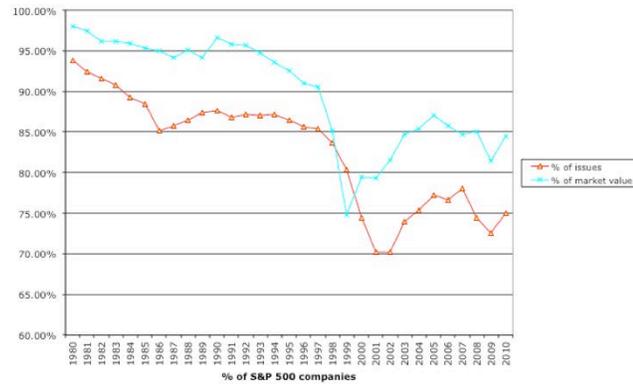
In 2003, for the first time in decades, the tax rate on dividends was cut to 15% to match the tax rate on capital gains. How firms responded in terms of dividend policy is a good test of the tax effect.

More firms initiated dividends in 2003 and more dividends were paid, but the effect was muted. Stock buybacks still overwhelmed dividends.

The lesson: Taxes may affect dividend policy but they are not the key determinant.

IV. More and more firms are buying back stock, rather than pay dividends...

Stock Buybacks and Dividends: Aggregate for US Firms - 1989-2010
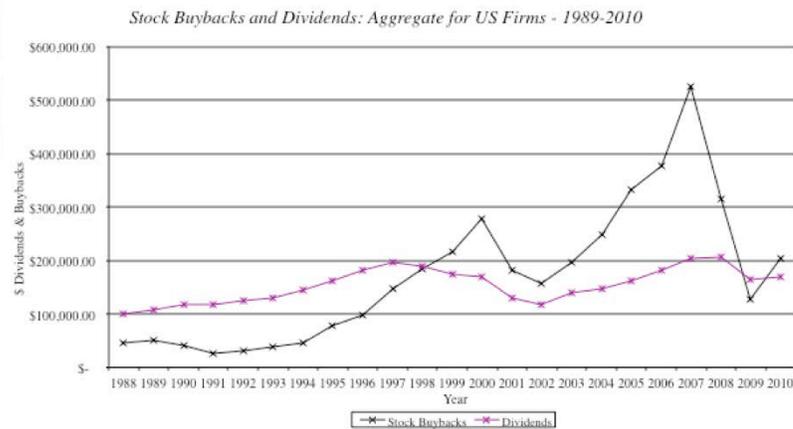
This trend accelerated through the 1990s. It can be partially explained by

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.

V. And there are differences across countries…

Figure 10.9: Dividend Payout Ratios - G7 Countries
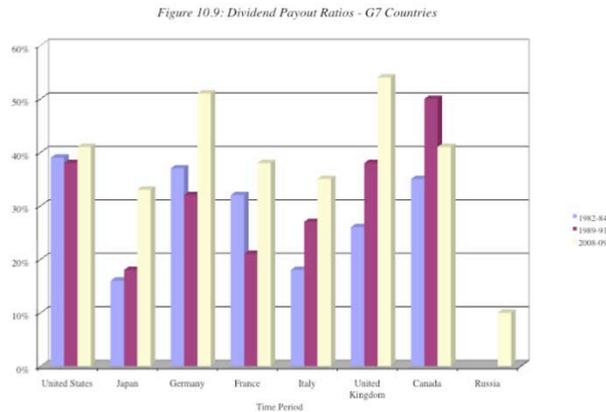
Aswath Damodaran

Dividend policy vary across countries.

1. *Differences in Stage of Growth***:** Just as higher-growth companies tend to pay out less of their earnings in dividends countries with higher growth pay out less in dividends. For instance, Japan had much higher expected growth in 1982–84 than the other G-7 countries and paid out a much smaller percentage of its earnings as dividends. As Japan's growth declined, its payout ratio has risen.

2. *Differences in Tax Treatment***:** Unlike the United States, where dividends are doubly taxed, some countries provide at least partial protection against the double taxation of dividends. For instance, Germany taxes corporate retained earnings at a higher rate than corporate dividends and the United Kingdom allows investors to offset corporate taxes against taxes due on dividends, thus reducing the effective tax rate on dividends.

3. *Differences in Corporate Control:* When there is a separation between ownership and management, as there is in many large publicly traded firms, and where stockholders have little control over managers, the dividends paid by firms will be lower. Managers, left to their own devices, have an incentive to accumulate cash. Russia, with its abysmal corporate governance system, has a dividend payout ratio of less than 10% in 2009.

4. Stock buyback restrictions: Especially in earlier perods, non_US companies faced restrictions on stock buybacks.

Not surprisingly, the dividend payout ratios of companies in most emerging markets are much lower than the dividend payout ratios in the G-7 countries. The higher growth and relative power of incumbent management in these countries contribute to keeping these payout ratios low.

Measures of Dividend Policy

- Dividend Payout = Dividends/ Net Income
  - Measures the percentage of earnings that the company pays in dividends
  - If the net income is negative, the payout ratio cannot be computed.
- Dividend Yield = Dividends per share/ Stock price
  - Measures the return that an investor can make from dividends alone
  - Becomes part of the expected return on the investment.

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 2011

The median payout ratio is about 20%-25% for firms that pay dividends.

More firms (about 2/3rds of all US firms), however, do not pay dividends than do pay dividends. The trend in the number of non-dividend paying firms has been upwards over the last few decades.

Finally, a few interesting outliers.

The firms that have dividend payout ratios of more than 100% may seem irrational but there are three possible explanations:

a.Firms having a bad year in earnings, but expect earnings to bounce back.. They continue to pay dividends based upon their normalized earnings

b.Very stable firms that have little capital expenditures but large depreciation. Their cash flows (which they use for dividends) vastly exceed earnings. These firms are gradually liquidating themselves over time.

c.Firms that are under levered are paying more in dividends than earnings and funding the difference with new debt to increase debt ratios.

Dividend Yields in the United States: January 2011
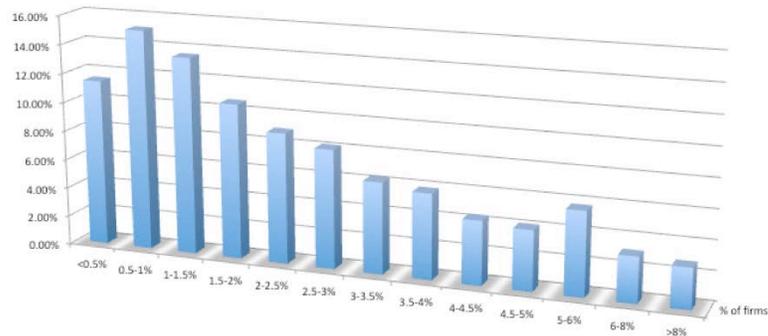
Here again, there is a trend. Over the last two decades, the dividend yield for U.S. firms has decreased across the board.

In 2009, the dividend yields shot up, not because dividends increased but stock prices decreased. In 2010, they were back down again, as stock prices rebounded.

Bottom line: Volatility in dividend yields is caused more by changes in the denominator (stock prices) than in the numerator (dividends)

Figure 10.7: Life Cycle Analysis of Dividend Policy

$ Revenues/ Earnings					Revenues / Earnings
External funding needs	High, but constrained by infrastructure	High, relative to firm value.	Moderates, relative to firm value.	Low, as projects dry up.	Low, as projects dry up.
Internal financing	Negative or low	Negative or low	Low, relative to funding needs	High, relative to funding needs	More than funding needs
Capacity to pay dividends	None	None	Very low	Increasing	High
Growth stage	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline	Years

One way of assessing dividend policy is to look at where a firm stands in the life cycle. As firms grow and mature, their capacity to generate excess cash flows and pay dividends should increase….

Dividend Yields and Payout Ratios: Growth Classes

Figure 10.8: Dividend Yield and Payout Ratio - Growth Class
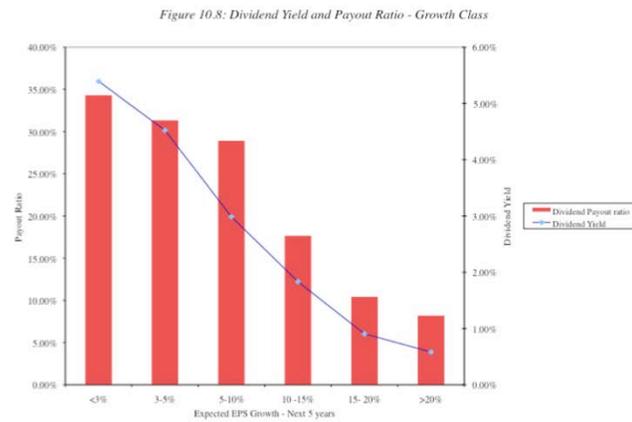
Some backing for the life cycle story.

These are US firms, categorized based upon expected growth in earnings. As earnings growth increases, both dividend yields and payout ratios decrease.

	Disney		Aracruz		Tata Chemicals		Deutsche Bank	
	2007	2008	2007	2008	2007	2008	2007	2008
Dividends per share	$0.35	$0.35	R$ 0.43	R$ 0.33	Rs 8.00	Rs 9.00	4.00 €	0.50 €
Earnings per share	$2.25	$2.28	R$ 1.01	-R$ 4.09	Rs 42.82	Rs 20.65	13.65 €	-7.61 €
Stock price at end of year	$32.28	$22.69	R$ 15.97	R$ 3.98	Rs 413.05	Rs 165.25	89.47 €	27.83 €
Dividend Yield	1.08%	1.54%	2.69%	8.19%	1.94%	5.45%	4.47%	1.8%
Dividend Payout	15.56%	15.35%	42.43%	-7.97%	18.68%	43.58%	29.30%	-6.57%

Of the four companies, Deutsche Bank had the highest dividend yield in 2007 but slashed dividends drastically for 2008, as the market crisis unfolded.

Disney paid the same dividends per share each year and had relatively stable payout ratios and dividend yields over the two periods.

The payout ratio for Tata Chemicals jumped in 2008, mostly because the stock price dropped by more than 50% during the year.

Both Deutsche and Aracruz paid dividends in 2008, in spite of negative earnings, a testimonial to the stickiness of dividends.

Aracruz, like most Brazilian companies, maintains two classes of shares—voting share (called common and held by insiders) and nonvoting shares (called preferred shares, held by outside investors). The dividend policies are different for the two classes with preferred shares getting higher dividends. In fact, the failure to pay a mandated dividend to preferred stockholders (usually set at a payout ratio of 35 percent) can result in preferred stockholders getting some voting control of the firm. Effectively, this puts a floor on the dividend payout ratio unless the voting shareholders are willing to concede control and give voting rights to the preferred shareholders, in return for cutting dividends.

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 create a tax disadvantage for investors (relative to capital gains)
    - **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.

There is truth in each of these schools of thought. The key to sensible dividend analysis is extracting that which makes sense from each school and bringing them all together in a composite analysis.

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 <u>good</u>.
- 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 <u>bad</u>.

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.

I. The Dividends don't matter school
The Miller Modigliani Hypothesis

- The Miller-Modigliani Hypothesis: **Dividends do not affect value**
- Basis:
  - If a firm's investment policies (and hence cash flows) don't change, the value of the firm cannot change as it changes dividends.
  - If a firm pays more in dividends, it will have to issue new equity to fund the same projects. By doing so, it will reduce expected price appreciation on the stock but it will be offset by a higher dividend yield.
  - 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 to investors 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.

Intuitively, the MM proposition argues that your total returns on a stock will be unaffected by dividend policy.

II. The Dividends are "bad" school: And the evidence to back them up…
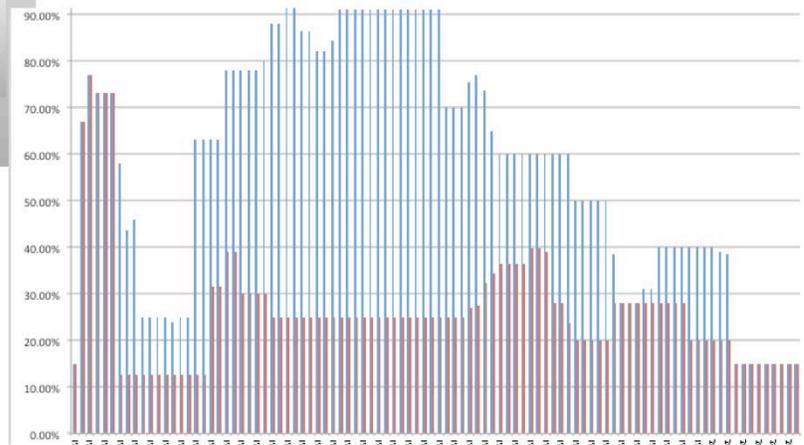
This has generally been true in the United States, but is not always the case in other markets. For instance, in the UK, where investors are allowed to offset the corporate tax paid on dividends against their taxes, dividends may have a tax advantage for some investors over capital gains.

There are several markets where capital gains are not taxed at all and some where neither dividends nor capital gains are taxed.

What do investors in your stock think about dividends? Clues on the ex-dividend day!

Assume that you are the owner of a stock that is approaching an ex-dividend day and you know that dollar dividend with certainty. In addition, assume that you have owned the stock for several years.

Initial buy
At $P
P_b
P_a

Ex-dividend day

Dividend = $ D

Let P = Price at which you bought the stock a "while" back
  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

One of the toughest questions to answer is whether stockholders in your firms specifically pay higher taxes on dividends or capital gains. You may be able to look at how the stock price behaves on the ex-dividend day to get an answer.

Cashflows from Selling around Ex-Dividend Day

- The cash flows from selling before the ex-dividend day 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 -
$$P_b - (P_b - P)\, t_{cg} = P_a - (P_a - P)\, t_{cg} + D(1-t_o)$$
- Some basic algebra leads us to the following:

$$\frac{P_b - P_a}{D} = \frac{1 - t_o}{1 - t_{cg}}$$

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.

Intuitive Implications

■ The relationship between the price change on the ex-dividend day and the dollar dividend will be determined by the difference between the tax rate on dividends and the tax rate on capital gains for the typical investor in the stock.

Tax Rates	Ex-dividend day behavior
If dividends and capital gains are taxed equally	Price change = Dividend
If dividends are taxed at a higher rate than capital gains	Price change < Dividend
If dividends are taxed at a lower rate than capital gains	Price change > Dividend

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 empirical evidence…

1966-1969
- Ordinary tax rate = 70%
- Capital gains rate = 28%
- Price chg/ Dividend = 0.78

1981-1985
- Ordinary tax rate = 50%
- Capital gains rate = 20%
- Price chg/ Dividend = 0.85

1986-1990
- Ordinary tax rate = 28%
- Capital gains rate = 28%
- Price chg/ Dividend = 0.90

Aswath Damodaran   480
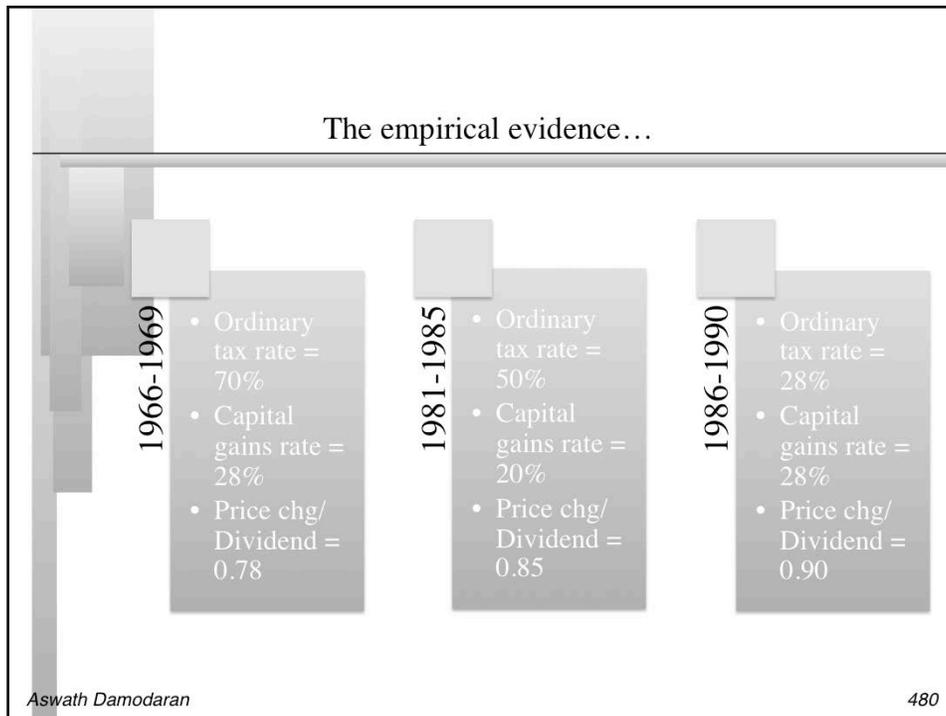
As the difference in marginal tax rates has narrowed from what it used be prior to 1981, the trend in the ex-dividend day measure has been towards one. This may also reflect the greater role played by pension funds (which are tax exempt) in the process.

Note, thought, 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

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. I will profit as long as the transactions costs are less than the difference between the dividend and the price drop.

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

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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)

There is the story of a pension fund manager in Oregon, who after reading about dividend capture, decided to try it out on one stock in a big way. The day happened to be October 19, 1987. Needless to say, he lost his job.

Two bad 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. Stocks that pay dividends will therefore be more highly valued than stocks that do not.
- **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. The cost of raising new financing in future years, especially by issuing new equity, can be staggering.

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. An alternative is issue a special dividend.

The Cost of Raising Capital

Issuance Costs for Stocks and Bonds
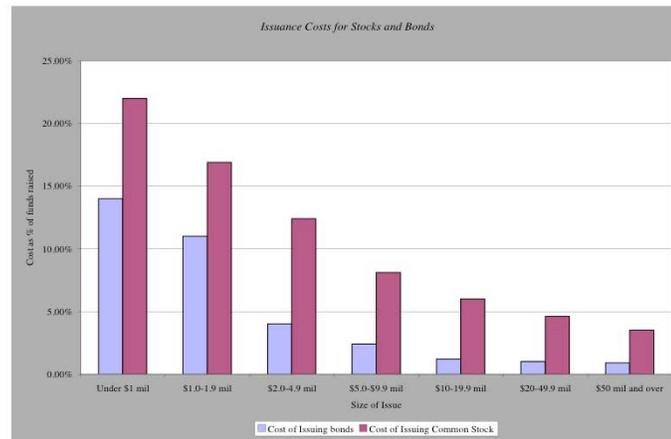
If a small firm has excess cash and is uncertain about its future investment needs, it is prudent to hold the cash rather than return it to its stockholders.

Larger firms with more access to capital markets should be more inclined to use the cash to buy back stock.

Three "good" reasons for paying dividends…

1. **Clientele Effect**: The investors in your company like dividends.
2. **The Signalling Story**: Dividends can be signals to the market that you believe that you have good cash flow prospects in the future.
3. **The Wealth Appropriation Story**: Dividends are one way of transferring wealth from lenders to equity investors (this is good for equity investors but bad for lenders)

Given how many firms pay dividends, there must be good reasons for companies to start paying dividends, continue paying dividends or increase dividends.

1. The Clientele Effect
The "strange case" of Citizen's Utility
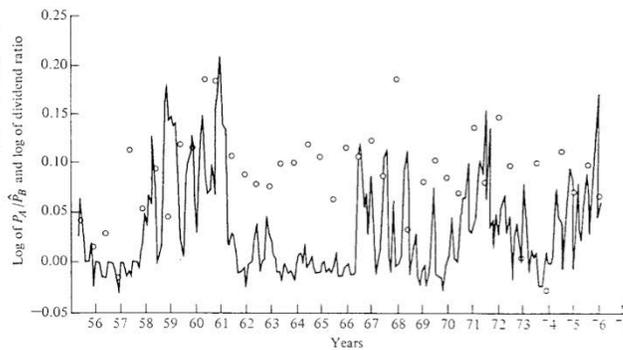
Class A shares pay cash dividend;

Class B shares offer the same amount as a stock dividend & can be converted to class A shares

Aswath Damodaran

To add: Class B shares can be converted into class A shares at any time. In effect, investors are being offered dividends or an equivalent capital gain.

Since the tax rate on dividends vastly exceeded the tax rate on capital gains over this period, you would expect the capital gains shares to trade at a premium.

When the ratio is greater than one, class A shares trade at a premium on class B shares. Over this period, class A shares consistently traded at a premium over class B shares, ranging from 5-15%.

Evidence from Canadian firms

Company	Premium for cash dividend shares
Consolidated Bathurst	+ 19.30%
Donfasco	+ 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 across companies	+ 7.54%

The same phenomenon seems to apply to these Canadian utilities, with cash dividend and capital gain shares, that were studied in a paper a few years ago.

Here again, our conclusions should be restricted to stockholders holding this stock. For whatever reason, they prefer dividends to capital gains.

What type of stockholders do you think hold these companies?

Young or Old

Rich or Poor

Mutual Funds or Pension funds

Older, poorer investors and pension funds are big investors in high dividend paying stocks.

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.

Implication: The clientele effect has weakened in recent years, as the tax rates on dividends and capital gains have converged.

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.

Many phone companies have separately traded stocks for their wireless arms - one reason may be that the wireless business requires more risk, more growth and more reinvestment. and can afford to pay out less in dividends.

2. Dividends send a signal"
Increases in dividends are good news..

(a) Dividend decrease

(b) Dividend increase
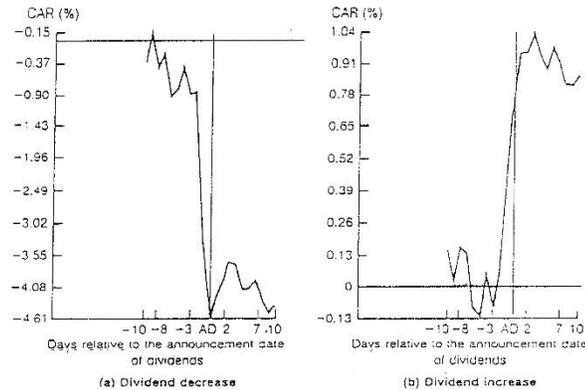
A firm which announces an increase in dividends is sending a signal that it expects future cash flows to be strong enough to sustain this dividend. This allows it to set itself apart from other firms, which might say they have great prospects but do not have the confidence in them to raise dividends.

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..Increasing dividends is bad news…

TABLE 1 EARNINGS GROWTH RATES IN YEARS SURROUNDING FIRST-TIME DIVIDEND PAYMENTS BY 131 FIRMS IN THE PERIOD 1970 TO 1979*	Year Relative to Dividend Initiation	Number of Firms	Mean Earnings Growth Rate	Median Earnings Growth Rate
	−4	130	14.9%	17.4%
	−3	129	−7.1	7.6
	−2	128	12.9	10.5
	−1	131	42.7**	28.0
	1	130	55.0**	40.2
	2	130	22.0**	35.9
	3	130	35.0**	28.2
	4	128	3.5	19.5
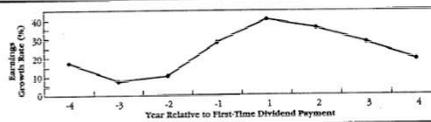
* In our original research we compute earnings performance as earnings changes standardized by stock prices. Here we convert these values to earnings growth rates by assuming that the average price earnings ratio for the sample firms is ten.
** Significantly different from zero at the 10% level or lower.

FIGURE 1
MEDIAN EARNINGS GROWTH RATES IN YEARS SURROUNDING FIRST TIME DIDIDEND PAYMENTS*

*In our original research we compare earnings performance as earnings changes standardized by stock prices. Here we convert these values to earnings growth ratios 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.

3. Dividend increases may be good for stocks… but bad for bonds..

EXCESS RETURNS ON STRAIGHT BONDS AROUND DIVIDEND CHANGES

Day (0: Announcement date)
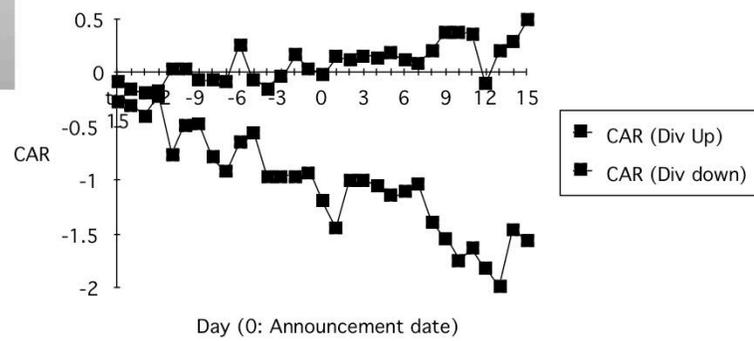
Bondholders view dividend increases as bad news. It makes the bonds much riskier. To the extent that the dividend increase was unanticipated and was not built into interest rate, this transfers wealth from bondholders to stockholders.

What managers believe about dividends…

Statement of Management Beliefs	Agree	No Opinion	Disagree
1. A firm's dividend payout ratio affects the price of the stock.	61%	33%	6%
2. Dividend payments provide a signaling device of future prospects.	52%	41%	7%
3. The market uses divided announcements as information for assessing firm value.	43%	51%	6%
4. Investors have different perceptions of the relative riskiness of dividends and retained earnings.	56%	42%	2%
5. Investors are basically indifferent with regard to returns from dividends and capital gains.	6%	30%	64%
6. A stockholder is attracted to firms that have dividend policies appropriate to the stockholder's tax environment.	44%	49%	7%
7. Management should be responsive to shareholders' preferences regarding dividends.	41%	49%	10%

This survey was from 1985. In an updated and comprehensive survey of dividend policy published in 2004, Brav, Graham, Harvey, and Michaely conclude that management's focus is not on the level of dividends but on changes in these dividends. Indicating a shift from views in prior studies, many managers in this survey saw little gain from increasing dividends, even in response to higher earnings and preferred stock buybacks instead. In fact, many managers in companies that paid dividends regret the level of dividends paid by their firms, indicating that they would have set the dividend at a much lower level if they had the choice. In contrast to the survey quoted in the last paragraph, managers also rejected the idea that dividends operate as useful financial signals. From the survey, the authors conclude that the rules of the game for dividends are the following: do not cut dividends, have a dividend policy similar to your peer group, preserve a good credit rating, maintain flexibility, and do not take actions that reduce earnings per share. A. Brav, J. R. Graham, C. R. Harvey, and R. Michaely, 2004, "Payout Policy in the 21st Century," Working Paper, Duke University, Durham, NC.

Assessing Dividend Policy:
Or how much cash is too much?

The Big Picture…

Chapter 11: Analyzing Cash Returned to Stockholders

The **hurdle rate** should reflect the riskiness of the investment and the mix of debt and equity used to fund it.

The **return** should relfect the magnitude and the timing of the cashflows as welll as all side effects.

The **optimal mix** of debt and equity maximizes firm value

The **right kind** of debt matches the tenor of your assets

How much cash you can return depends upon current & potential investment opportunities

How you choose to return cash to the owners will depend whether they prefer dividends or buybacks

The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate

The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations

The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business

Maximize the value of the business (firm)

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 did the the company actually pay out during the period in question?

Step 2: How much could the company have paid out during the period under 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.

- As firms increasing use stock buybacks, we have to measure cash returned to stockholders as not only dividends but also buybacks.
- For instance, for the four companies we are analyzing the cash returned looked as follows.

	Disney		Aracruz		Tata Chemicals		Deutsche Bank	
Year	Dividends	Buybacks	Dividends	Buybacks	Dividends	Buybacks	Dividends	Buybacks
2004	$430	$335	$74	$0	Rs 1,307	$0	€ 924	€ 0
2005	$490	$2,420	$109	$0	Rs 1,338	$0	€ 1,386	€ 0
2006	$519	$6,898	$199	$0	Rs 1,589	$0	€ 1,995	€ 0
2007	$637	$6,923	$139	$0	Rs 1,716	$0	€ 2,255	€ 0
2008	$664	$4,453	$252	$0	Rs 2,010	$0	€ 285	€ 0

All four companies paid dividends over the five-year period, but there are interesting differences between the companies. Disney, and Tata Chemicals increased dividends in each of the five years, but Aracruz had more volatile dividends over the period, with dividends dropping significantly in 2007. This reflects the convention of focusing on absolute dividends in the United States and India, but the practice of maintaining payout ratios in Brazil. Deutsche Bank had a precipitous drop in dividends in 2008, reflecting the effects of the market crisis and the desire to maintain regulatory capital ratios.

Looking at stock buybacks, Disney has been the most active player buying stock in all five years, with buybacks exceeding $ 6 billion in 2006 and 2007. None of the other companies have bought back stock. The key difference with treasury stock that stays on the books is that the number of shares in the company remains unchanged. In the U.S., companies are not allowed to keep treasury stock on their books for extended periods.

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.

Disney's FCFE

Year	Net Income	Capital Expenditures	Depreciation	Chg in WC	Change in Net Debt	FCFE
1999	$1,300	$6,113	$3,779	-$363	$176	-$495
2000	$920	$1,091	$2,195	-$1,184	$2,118	$5,326
2001	-$158	$2,015	$1,754	$244	-$77	-$740
2002	$1,236	$3,176	$1,042	$27	-$1,892	-$2,817
2003	$1,267	$1,034	$1,077	-$264	$1,145	$2,719
2004	$2,345	$1,484	$1,210	$51	$2,203	$4,223
2005	$2,533	$1,691	$1,339	$270	$699	$2,610
2006	$3,374	$1,300	$1,437	-$136	-$941	$2,706
2007	$4,687	$627	$1,491	$45	-$2,696	$2,810
2008	$4,427	$2,162	$1,582	$485	-$528	$2,834
Aggregate	$21,931	$20,693	$16,906	-$825	$207	$19,176
Average					$21	$1,918

The depreciation numbers also include amortization and the capital expenditures include cash acquisitions. Increases in noncash working capital, shown as positive numbers, represent a drain on the cash, whereas decreases in noncash working capital, shown as negative numbers, represent positive cash flows. In 1999, for example, noncash working capital decreased by $363 million, increasing the cash available for stockholders in that year by the same amount. Finally, the net cash flow from debt is the cash generated by the issuance of new debt, netted out against the cash outflow from the repayment of old debt. Again, using 1999 as an example, Disney issued $176 million more in new debt than it paid off on old debt, and this represents a positive cash flow in that year. We have computed two measures of FCFE, one before the net debt cash flow and one after. Using 1999 as an illustration, we compute each as follows:

$FCFE_{Before\ Debt\ CF}$ = Net Income + Depreciation – Capital Expenditures – Change in Noncash Working Capital = 1300+3779-6113-(-363) = -$ 671 million

$FCFE_{After\ Debt\ CF}$ = $FCFE_{Before\ Debt\ CF}$ + Net Debt CF = -$671 + $176 = -$495 million

Comparing Payout Ratios to Cash Returned Ratios.. Disney

Year	Dividends	Earnings	Payout Ratio	Cash Returned	FCFE	Cash/FCFE
1999	$0.00	$1,300.00	0.00%	$19.00	-$495.00	-3.84%
2000	$434.00	$920.00	47.17%	$600.00	$5,326.00	11.27%
2001	$438.00	-$158.00	-277.22%	$1,511.00	-$740.00	-204.19%
2002	$428.00	$1,236.00	34.63%	$428.00	-$2,817.00	-15.19%
2003	$429.00	$1,267.00	33.86%	$429.00	$2,719.00	15.78%
2004	$430.00	$2,345.00	18.34%	$765.00	$4,223.00	18.12%
2005	$490.00	$2,533.00	19.34%	$2,910.00	$2,610.00	111.49%
2006	$519.00	$3,374.00	15.38%	$7,417.00	$2,706.00	274.09%
2007	$637.00	$4,687.00	13.59%	$7,560.00	$2,810.00	269.04%
2008	$664.00	$4,427.00	15.00%	$5,117.00	$2,834.00	180.56%
Aggregate	$4,469.00	$21,931.00	20.38%	$26,756.00	$19,176.00	139.53%

While payout ratios are used widely to assess how much companies are paying out, the cash/FCFE ratio is both more comprehensive (since it includes buybacks) and more meaningful (because it looks at the cash available for dividends rather than earnings). In Disney's case, for example, while the payout ratio may look low, the firm has been returning all of the cash it can and more over the ten year period.

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%

■ FCFE = Net Income - (Cap ex - Depr) (1-DR) - Chg WC (!-DR)
  = $ 2,176 - (494 - 480) (1-0) - $ 35 (1-0)
  = $ 2,127 Million

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).

FCFE for a Bank?

- To estimate the FCFE for a bank, we redefine reinvestment as investment in regulatory capital. Since any dividends paid deplete equity capital and retained earnings increase that capital, the FCFE is:

  $FCFE_{Bank}$= Net Income – Increase in Regulatory Capital (Book Equity)

- As a simple example, consider a bank with $ 10 billion in loans outstanding and book equity (Tier 1 capital) of $ 750 million. Assume that the bank wants to maintain its existing capital ratio of 7.5%, intends to grow its loan base by 10% (to $11 billion) and expects to generate $ 150 million in net income next year.

  FCFE = $150 million – (11,000-10,000)* (.075) = $75 million

- If this bank wants to increase its regulatory capital ratio to 8% (for precautionary purposes) while increasing its loan base to $ 11 billion

  FCFE = $ 150 million – ($ 880 - $750) = $20 million

We draw on the regulatory capital measure to estimate FCFE. Since it is difficult to estimate traditional cap ex and working capital for a bank, we look at additions to regulatory capital as the primary capital expenditure. Thus, conservative banks or banks that want to increase their capital ratio will tend to pay less dividends, as will growing banks.

See how much dividend you could pay, if you were willing to maintain a 6% capital ratio ($90 million) or if your growth were only 5% ($112.5 million).

Deutsche Bank's FCFE

	Current	2009	2010	2011	2012	2013	Steady state (2014)
Asset Base	312,882 €	325,398 €	338,414 €	351,950 €	366,028 €	380,669 €	392,089 €
Capital ratio	10.20%	10.16%	10.12%	10.08%	10.04%	10.00%	10.00%
Regulatory Capital	31,914 €	33,060 €	34,247 €	35,477 €	36,749 €	38,067 €	39,209 €
Change in regulatory capital		1,146 €	1,187 €	1,229 €	1,273 €	1,318 €	1,142 €
ROE	9.40%	9.52%	9.64%	9.76%	9.88%	10.00%	10.00%
Net Income	3,000 €	3,147 €	3,302 €	3,463 €	3,631 €	3,807 €	3,921 €
- Investment in Regulatory Capital		1,146 €	1,187 €	1,229 €	1,273 €	1,318 €	1,142 €
FCFE		2,001 €	2,114 €	2,233 €	2,358 €	2,489 €	2,779 €

We are assuming the following:

1. We begin with the current values for the asset base and regulatory capital at the end of 2008:

Current value of Asset Base (end of 2008)   = 312.885 billion Euros

Current value of Regulatory Capital (Book Equity) = 31.914 billion Euros

Current capital ratio = 10.2%

2. We assume that the expected growth in the asset base will be 4% a year for the next 5 years and 3% thereafter.

3. We assume a target regulatory capital ratio of 10% in year 5, based on Deutsche Bank's own statements in early 2009; note that this value is well above the regulatory requirement of 6-7% and reflects Deutsche Bank's conservative outlook.

4. We assume only a modest improvement in the return on equity from the current value of 9.40% to 10% in year 5 and beyond.

Dividends versus FCFE: Cash Deficit versus Buildup
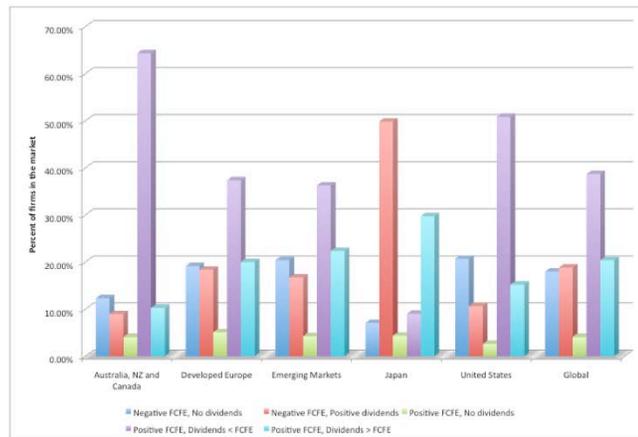
These firms can be categorized in three groups:

1.Firms that cannot afford to pay dividends and recognize the reality: These are the firms with negative FCFE and pay no dividends

2.Firms that run a cash deficit: Firms that pay out dividends that exceed FCFE or pay out dividends in the face of negative FCFE

3.Firms that build up a cash balance: Firms that have positive FCFE and pay no dividends or pay out less in dividends than they have available in FCFE

Looking across companies,

a.About 50% of companies globally accumulate cash The proportion is highest in the US and Australia/Canada/NZ.

b.A non-trivial proportion of firms worsen cash deficits with dividend policy. Japan has the highest proportion of these firms.

The Consequences of Failing to pay FCFE

Chrysler: FCFE, Dividends and Cash Balance
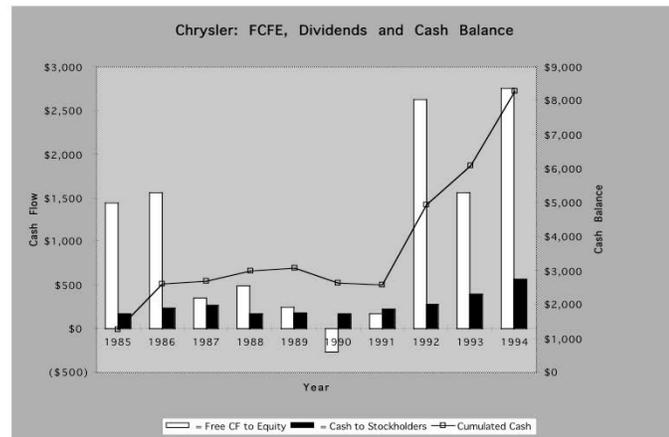
This shows the accumulation of a large cash balance at Chrysler. Starting with a zero cash balance in 1985, I added back the difference between FCFE and dividends each year to the cash balance. In the last few years, that difference has led to an accumulation in cash.

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,	If cash flow statement used
Net Income	Net Income
+ Depreciation & Amortization	+ Depreciation & Amortization
- Capital Expenditures	+ Capital Expenditures
- Change in Non-Cash Working Capital	+ Changes in Non-cash WC
- Preferred Dividend	+ Preferred Dividend
- Principal Repaid	+ Increase in LT Borrowing
+ New Debt Issued	+ Decrease in LT Borrowing
	+ Change in ST Borrowing
= FCFE	= FCFE
Compare to	
Dividends (Common)	-Common Dividend
+ Stock Buybacks	- 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

How much did the firm pay out? How much could it have afforded to pay out?

What it could have paid out	*What it actually paid out*
Net Income	Dividends
- (Cap Ex - Depr' n) (1-DR)	+ Equity Repurchase
- Chg Working Capital (1-DR)	
= FCFE	

Firm pays out too little
FCFE > Dividends

Firm pays out too much
FCFE < Dividends

Do you trust managers in the company with your cash?
Look at past project choice:
Compare ROE to Cost of Equity
ROC to WACC

What investment opportunities does the firm have?
Look at past project choice:
Compare ROE to Cost of Equity
ROC to WACC

Firm has history of good project choice and good projects in the future

Firm has history of poor project choice

Firm has good projects

Firm has poor projects

Give managers the flexibility to keep cash and set dividends

Force managers to justify holding cash or return cash to stockholders

Firm should cut dividends and reinvest more

Firm should deal with its investment problem first and then cut dividends

---

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

<table>
<tr><td rowspan="2"></td><td colspan="2">Quality of projects taken: ROE versus Cost of Equity</td></tr>
<tr><td>Poor projects</td><td>Good projects</td></tr>
<tr><td>Cash Surplus</td><td>Cash Surplus + Poor Projects
Significant pressure to pay out more to stockholders as dividends or stock buybacks</td><td>Cash Surplus + Good Projects
Maximum flexibility in setting dividend policy</td></tr>
<tr><td>Cash Deficit</td><td>Cash Deficit + Poor Projects
Cut out dividends but real problem is in investment policy.</td><td>Cash Deficit + Good Projects
Reduce cash payout, if any, to stockholders</td></tr>
</table>

(Row label on left axis: Dividends paid out relative to FCFE)

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

- 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?

- 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?

During that period, Microsoft also generated extraordinary returns on the projects its took (ROE > 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)

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.

Pstscript: Microsoft announced a $40 billion stock buyback in 2006

Case 1: Disney in 2003

- ■ FCFE versus Dividends
  - Between 1994 & 2003, Disney generated $969 million in FCFE each year.
  - Between 1994 & 2003, Disney paid out $639 million in dividends and stock buybacks each year.
- ■ Cash Balance
  - Disney had a cash balance in excess of $ 4 billion at the end of 2003.
- ■ Performance measures
  - Between 1994 and 2003, Disney has generated a return on equity, on it's projects, about 2% less than the cost of equity, on average each year.
  - Between 1994 and 2003, Disney's stock has delivered about 3% less than the cost of equity, on average each year.
  - The underperformance has been primarily post 1996 (after the Capital Cities acquisition).

In

Can you trust Disney's management?

- Given Disney's track record between 1994 and 2003, if you were a Disney stockholder, would you be comfortable with Disney's dividend policy?
  - ❏ Yes
  - ❏ No
- Does the fact that the company is run by Michael Eisner, the CEO for the last 10 years and the initiator of the Cap Cities acquisition have an effect on your decision.
  - ❏ 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).

That conclusion is reinforced by the fact that the managers responsible for the damage are still at the helm of the firm.

The Bottom Line on Disney Dividends in 2003

- Disney <u>could have afforded</u> to pay more in dividends during the period of the analysis.
- It <u>chose not to</u>, 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.
- <u>Bottom line</u>: Large cash balances would 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)

Following up: Disney in 2009

- Between 2004 and 2008, Disney made significant changes:
  - It replaced its CEO, Michael Eisner, with a new CEO, Bob Iger, who at least on the surface seemed to be more receptive to stockholder concerns.
  - It's stock price performance improved (positive Jensen's alpha)
  - It's project choice improved (ROC moved from being well below cost of capital to above)
- The firm also shifted from cash returned < FCFE to cash returned > FCFE and avoided making large acquisitions.
- If you were a stockholder in 2009 and Iger made a plea to retain cash in Disney to pursue investment opportunities, would you be more receptive?
  a) Yes
  b) No

I would trust Disney's management more now than I used to. I would probably agree that they should retain more cash, especially in light of last year's liquidity crisis, but it would not be a blank check. I would watch their new investments (say the acquisition of Marvel to see if they are continue to be deserving of my trust.

Case 2: Aracruz Celulose - Assessment of dividends paid in 2003

- **FCFE versus Dividends**
  - Between 1999 and 2003, Aracruz generated $37 million in FCFE each year.
  - Between 1999 and 2003, Aracruz paid out $80 million in dividends and stock buybacks each year.
- **Performance measures**
  - Between 1999 and 2003, Aracruz has generated a return on equity, on it's projects, about 1.5% more than the cost of equity, on average each year.
  - Between 1999 and 2003, Aracruz's stock has delivered about 2% more than the cost of equity, on average each year.

Aracruz was clearly paying too much in dividends and seemed to be performing well both in terms of operating measures and stock returns.

Aracruz: Its your call..

- Aracruz's managers have asked you for permission to cut dividends (to more manageable levels). Are you likely to go along?
  - ❏ Yes
  - ❏ No
- The reasons for Aracruz's dividend problem lie in it's equity structure. Like most Brazilian companies, Aracruz has two classes of shares - common shares with voting rights and preferred shares without voting rights. However, Aracruz has committed to paying out 35% of its earnings as dividends to the preferred stockholders. If they fail to meet this threshold, the preferred shares get voting rights. If you own the preferred shares, would your answer to the question above change?
  - ❏ 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. After all, preferred stockholders have not had voting rights and have received large dividends to compensate for the lack of control. At the minimum, I would demand voting rights in exchange for giving up dividends.

The broader lesson: Many emerging market companies have created multiple classes of shares, with different voting rights. The lower voting right shares are often compensated with a higher dividend. Sooner or later, these firms will be confronted by the conflict between their desire to maintain voting control and the need to have a sustainable dividend policy.

Mandated Dividend Payouts

- Assume now that the government decides to mandate a minimum dividend payout for all companies. Given our discussion of FCFE, what types of companies will be hurt the most by such a mandate?
  - ❑ Large companies making huge profits
  - ❑ Small companies losing money
  - ❑ High growth companies that are losing money
  - ❑ High growth companies that are making money

What if the government mandates a maximum dividend payout? (No company can pay more than the mandated payout ratio)

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.

- In 2008, Aracruz had a catastrophic year, with losses in excess of a billion. The reason for the losses, though, was speculation on the part of the company's managers on currency derivatives. The FCFE in 2008 was -$1.226 billion but the company still had to pay out $448 million in dividends. As owners of the non-voting, dividend receiving shares, would you reassess your unwillingness to accept dividend cuts now?
  a) Yes
  b) No

The reason that Aracruz is still in the hole is because the company has been unwilling to revisit the voting/non-voting share divergence. In fact, the same managers who own the voting shares and have driven the firm to the brink of ruin want the non-voting shareholders to bail them out. If the answer was no in 2003, it is "Hell, no" in 2009.

Case 3: BP: Summary of Dividend Policy: 1982-1991

	Average	Standard Deviation	Maximum	Minimum
Summary of calculations				
Free CF to Equity	$571.10	$1,382.29	$3,764.00	($612.50)
Dividends	$1,496.30	$448.77	$2,112.00	$831.00
Dividends+Repurchases	$1,496.30	$448.77	$2,112.00	$831.00
Dividend Payout Ratio	84.77%			
Cash Paid as % of FCFE	262.00%			
ROE - Required return	-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

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, by cutting dividends, BP became a much healthier firm, with higher returns and lower leverage, after the dividend cut.

Managing changes in dividend policy

	Periods Around Announcement Date		
Category	Prior Quarter	Announcement Period	Quarter After
Simultaneous announcement of earnings decline/loss (N = 176)	−7.23%	−8.17%	+1.80%
Prior announcement of earnings decline or loss (N = 208)	−7.58%	−5.52%	+1.07%
Simultaneous announcement of investment or growth opportunities (N = 16)	−7.69%	−5.16%	+8.79%

There are several lessons for a firm that plans to change its dividend policy. First, no matter how good the rationale may be to cut dividends, it should expect markets to react negatively to the initial announcement for two reasons. The first reason is the well-founded skepticism with which markets greet any statement by the firm about dividend cuts. A second is that large dividend changes typically make the existing investor clientele unhappy. Although other stockholders may be happy with the new dividend policy, the transition will take time, during which stock prices fall. Second, if a firm has good reasons for cutting dividends, such as an increase in project availability, it will gain at least partial protection by providing information to markets about these projects.

Case 4: The Limited: Summary of Dividend Policy: 1983-1992

Summary of calculations

	Average	Standard Deviation	Maximum	Minimum
Free CF to Equity	($34.20)	$109.74	$96.89	($242.17)
Dividends	$40.87	$32.79	$101.36	$5.97
Dividends+Repurchases	$40.87	$32.79	$101.36	$5.97
Dividend Payout Ratio	18.59%			
Cash Paid as % of FCFE	-119.52%			
ROE - Required return	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 its 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 investors 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.

5. Tata Chemicals: The Cross Holding Effect: 2009

	Average	Standard Deviation	Maximum	Minimum
Free CF to Equity	INR 2,258	INR 6,557	INR 11,176	(INR 7,141)
Dividends	INR 1,592	INR 290	INR 2,010	INR 1,307
Dividends+Repurchases	INR 1,592	INR 290	INR 2,010	INR 1,307
Dividend Payout Ratio	25.65%			
Cash Paid as % of FCFE	70.50%			
ROE	17.34%			
Return on Stock	17.97%			
Required Return	19.89%			
ROE - Required return	-2.55%			
Actual - Required Return	-1.91%			

Much of the cash held back was invested in other Tata companies.

Tata Chemicals accumulated cash by paying out far less in dividends than it had available in FCFE. The difference, though, rather than accumulating in cash was reinvested in other Tata companies. While you may feel that this is not a bad choice, it is a choice you should be making as a stockholder (and not the company). It is one of the costs of investing in family group companies.

Quality of projects taken: ROE versus Cost of Equity

	Poor projects	Good projects
Cash Surplus	Intel *Cash Surplus + Poor Projects* Significant pressure to pay out more to stockholders as dividends or stock buybacks	Apple *Cash Surplus + Good Projects* Maximum flexibility in setting dividend policy
	Tata Chemicals	
Cash Deficit	*Cash Deficit + Poor Projects* Cut out dividends but real problem is in investment policy. Aracruz	Disney *Cash Deficit + Good Projects* Reduce cash payout, if any, to stockholders

Dividends paid out relative to FCFE

Summarizes the discussion from the last few pages… with a few examples as of 2009.

Apple is accumulating cash but is immune from "return the cash" critics because it has done so well…

Intel is also accumulating cash but is likely to come under pressure to return the cash.

Tata Chemicals is breaking even in terms of the types of projects that it takes. It falls in the middle.

Aracruz has an untenable dividend policy but it has been put in that spot because of the bad investments (and deriviatives bets) it has made. While it should cut dividends, it needs to fix its investment policy

Disney is returning too much to stockholders. Unless this is a deliberate attempt to use its excess debt capacity, it should scale back on buybacks.

⧗ 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)?

Customize a solution for your firm's dividend policy... but think about your earlier analysis of its capital structure as well.

Company Name	Market Cap	Payout Ratio	Dividend Yield
Astral Media Inc. 'A'	$1,221.70	0.00%	0.00%
CBS Corp. 'B'	$5,103.70	53.52%	14.22%
Central European Media Enterps	$827.70	0.00%	0.00%
Corus Entertainment Inc	$806.50	0.00%	0.00%
CTC Media Inc	$715.10	0.00%	0.00%
Discovery Communications Inc	$3,860.60	NA	0.00%
Disney (Walt)	$41,114.70	17.11%	1.67%
DreamWorks Animation	$2,074.30	0.00%	0.00%
Hearst-Argyle Television Inc	$589.10	40.59%	4.46%
IAC/InterActiveCorp	$2,215.30	NA	0.00%
Lions Gate Entertainment Corp	$705.60	NA	0.00%
News Corp.	$23,245.30	9.07%	1.35%
Regal Entertainment Group	$1,447.60	176.09%	12.70%
Scripps Networks	$3,422.30	NA	0.00%
Time Warner	$34,112.40	22.17%	2.63%
Viacom Inc. 'B'	$10,669.30	0.00%	0.00%
World Wrestling Ent.	$749.50	198.45%	13.79%
Average		39.77%	2.99%

Of the seventeen companies in this group, only seven paid dividends. Relative to the other companies in this sector, Disney pays low dividends. The interesting question, though, is whether Disney should be setting dividend policy based on entertainment firms, most of which are smaller, riskier and much less diversified than Disney, or on large firms in other businesses that resemble it in terms of cash flows and risk.

Peer Group Approach: Deutsche Bank

Company Name	Dividend Yield	Dividend Payout
HSBC Holdings plc (LSE:HSBA)	0.00%	0.00%
Banco Santander, S.A. (CATS:SAN)	0.00%	0.00%
Intesa Sanpaolo SpA (CM:ISP)	0.00%	0.00%
Banco Bilbao Vizcaya Argentaria (CATS:BBVA)	0.00%	0.00%
BNP Paribas (ENXTPA:BNP)	0.00%	0.00%
UBS AG (VIRTX:UBSN)	0.00%	0.00%
UniCredito Italiano S.p.A. (CM:UCG)	0.00%	0.00%
Royal Bank of Scotland Group plc (LSE:RBS)	22.06%	98.61%
Credit Suisse Group (VIRTX:CSGN)	8.68%	0.00%
Societe Generale Group (ENXTPA:GLE)	0.00%	0.00%
Standard Chartered PLC (LSE:STAN)	2.84%	22.98%
Credit Agricole SA (ENXTPA:ACA)	0.00%	0.00%
Barclays plc (LSE:BARC)	0.00%	0.00%
Nordea Bank AB (OM:NDA SEK)	9.00%	45.03%
Deutsche Bank AG (DB:DBK)	15.80%	119.37%
Banca Monte dei Paschi di Siena SpA (CM:BMPS)	0.00%	0.00%
Lloyds TSB Group plc (LSE:LLOY)	35.76%	87.14%
Banco Popular Espanol SA (CATS:POP)	0.00%	0.00%
KBC Group NV (ENXTBR:KBC)	17.04%	152.94%
Svenska Handelsbanken AB (OM:SHB A)	11.54%	60.24%
National Bank of Greece SA (ATSE:ETE)	2.64%	12.49%
Unione di Banche Italiane Scpa (CM:UBI)	8.89%	64.61%
Average	6.10%	30.16%

On both dividend yield and payout ratios, Deutsche Bank pays a much higher dividend than the typical European bank, if we use dividends paid in May 2008. However, Deutsche Bank had cut the dividends it will be paying in May 2009 by almost 90%, reducing both its dividend yield and payout ratio well below the industry average.

Peer Group Approach: Aracruz and Tata Chemicals

		Paper & Pulp			Tata	Diversified Chemicals		
	Aracruz	Emerging	US	Global	Chemicals	Emerging	US	Global
Dividend Yield	8.19%	3.15%	2.08%	2.81%	5.45%	3.87%	2.54%	3.18%
Payout	NA	43.93%	28.92%	35.55%	43.58%	34.33%	19.75%	26.20%

Aracruz has a higher dividend yield than comparable companies, but that statistic reflects the collapse of its stock price, and Aracruz's payout ratio cannot be computed because it lost money in 2008. In summary, this does back up our earlier contention that Aracruz is paying out too much in dividends and has to cut dividends. Tata Chemicals pays more in dividends than comparable companies on both a yield and payout basis.

Going beyond averages… Looking at the market

■ Regressing dividend yield and payout against expected growth across all US companies in January 2009 yields:

$$PYT = 0.683 - 0.185\,ROE - 1.07\,STD - 0.313\,EGR$$
$$\quad\quad (27.41) \quad (3.06) \quad\quad (10.85) \quad\quad (2.60)$$

$$R^2 = 13.3\%$$

$$YLD = 0.039 - 0.039\,STD - 0.010\,INS - 0.093\,EGR$$
$$\quad\quad (37.38) \quad (9.39) \quad\quad (2.62) \quad\quad (16.23)$$

$$R^2 = 32.2\%$$

- PYT = Dividend Payout Ratio = Dividends/Net Income
- YLD = Dividend Yield = Dividends/Current Price
- ROE – Return on Equity
- EGR = Expected growth rate in earnings over next 5 years (analyst estimates)
- STD = Standard deviation in equity values
- INS = Insider holdings as a percent of outstanding stock

T statistics are in brackets. While the R-squared is unimpressive, the t statistics are all significant. Thus, we will use the regression with the recognition that predicted values will be noisy.

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.

Using the market regression on Disney

- To illustrate the applicability of the market regression in analyzing the dividend policy of Disney, we estimate the values of the independent variables in the regressions for the firm.
  - Insider holdings at Disney (as % of outstanding stock) = 7.70%
  - Standard Deviation in Disney stock prices = 19.30%
  - Disney's ROE = 13.05%
  - Expected growth in earnings per share (Analyst estimates) = 14.50%
- Substituting into the regression equations for the dividend payout ratio and dividend yield, we estimate a predicted payout ratio:

  Predicted Payout = 0.683 – 0.185 (.1305) -1.07 (.1930) – 0.313 (.145) =0.4069

  Predicted Yield = 0.039 – 0.039 (.1930) – 0.010 (.077) – 0.093 (.145) = .0172
- Based on this analysis, Disney with its dividend yield of 1.67% and a payout ratio of approximately 20% is paying too little in dividends. This analysis, however, fails to factor in the huge stock buybacks made by Disney over the last few years.

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. We are assuming linear relationships between each of the independent variables and the dividend measures.

Valuation

Cynic: A person who knows the price of
everything but the value of nothing..
Oscar Wilde

If corporate finance is all about maximizing value, you do have to know how to estimate value.

First Principles
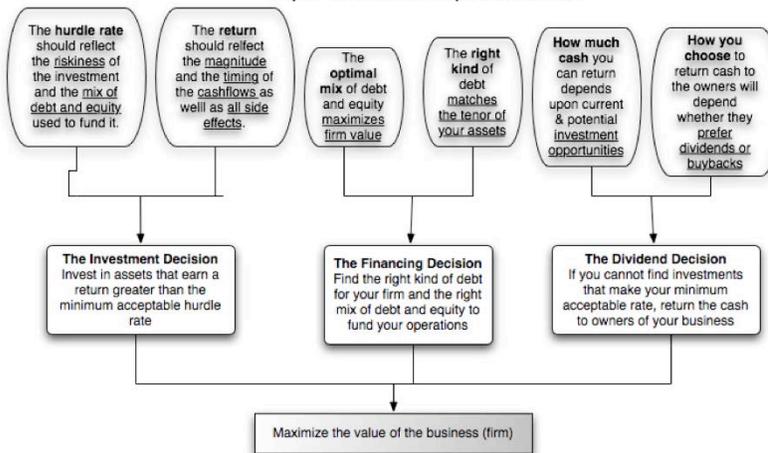
Back, full circle to the objective.

Three approaches to valuation

- <u>Intrinsic valuation</u>: The value of an asset is a function of its fundamentals – cash flows, growth and risk. In general, discounted cash flow models are used to estimate intrinsic value.
- <u>Relative valuation</u>: The value of an asset is estimated based upon what investors are paying for similar assets. In general, this takes the form of value or price multiples and comparing firms within the same business.
- <u>Contingent claim valuation</u>: When the cash flows on an asset are contingent on an external event, the value can be estimated using option pricing models.

While there are hundreds of valuation models in practice, they will all fall into one of these three categories. There are some who argue that liquidation value is a fourth approach, but we estimate the values of assets in liquidation using either discounted cash flow or relative valuation models.

Intrinsic value and relative value will converge in efficient markets, but can diverge in inefficient markets. One way to frame how companies approach corporate finance is in terms of whether they focus on maximizing intrinsic value or relative value.

Discounted Cashflow Valuation: Basis for Approach

$$\text{Value of an asset} = \sum_{t=1}^{t=n} \frac{\text{Expected Cash flow in period t}}{(1+r)^t}$$

where,

- n = Life of the asset
- r = Discount rate reflecting the riskiness of the estimated cashflows

In discounted cash flow, the value of any asset is the present value of the expected cash flows on the assets. The discount rate becomes the vehicle for considering risks and the cash flow is an expectation across all possible outcomes.

Note: There is a misconception that computing the expected cash flow across multiple scenarios is somehow risk adjusting the cash flow. It is not.

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 Firmt = 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.

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.

The Ingredients that determine value.

Cashflows can be
a. After debt payments to equity
- Dividends
- Free Cashflow to Equity
b. Before debt payments to firm
- Free Cashflolw to Firm

Growth rate can be
a. In Equity Earnings
- Net Income
- Earnings per share
b. In Operating Earnings

Firm is in stable growth which it can sustain forever

Expected Cashflows during extraordinary growth phase

Terminal Value

Discount the cashflows and terminal value to the present

Present value is
a. Value of equity, if cashflows to equity discounted at cost of equity
b. Value of operating assets of the firm, if cshflows to firm discounted at the cost of capital

Discount Rate can be
a. Cost of equity, if cashflows are equity cashflows
b. Cost of capital, if cashflows are to the firm

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.

How we estimate each of these numbers depends on whether we are taking an equity perspective or a firm perspective.

The answer to the fourth question matters because we cannot estimate cash flows forever and a publicly traded company, at least in theory, can last forever. If cash flows grow at the same rate forever, we can short circuit the cash flow estimation and compute the present value of all cash flows beyond that point in time with one equation (CF/ (r-g)).

I. Estimating Cash Flows
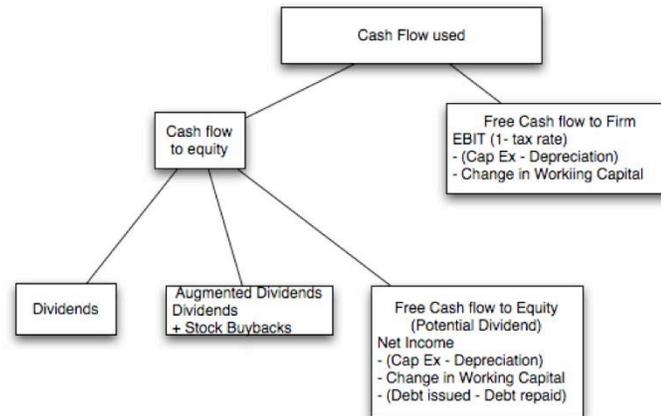
Shows the different cash flows that can be used in valuation.

In equity valuation,

-The simplest and most direct measure of cash flow is dividends paid (Implicitly we are assuming that companies pay out their residual cash flows as dividends)

-A slightly modified approach is to add stock buybacks to dividends. Since buybacks tend to be lumpy, you may need to average buybacks over time.

-FCFE: You estimate the residual cash flow, after every conceivable need has been met. Again, there can be volatility in the reinvestment numbers that may need to be normalized.

In firm valuation, you are computing the cash flow to all claim holders in the firm. In effect, you are computing the cash flow before debt payments. That is why we start with operating income (EBIT) and act like we pay taxes on the EBIT. In effect, we ignore any tax benefits from interest expenses, since those will be captured in the cost of capital (through the use of an after-tax cost of debt)

Cap Ex includes acquisitions and the effect of R&D. (R&D is capitalized)

Dividends and Modified Dividends for Deutsche Bank

- In 2007, Deutsche Bank paid out dividends of 2,146 million Euros on net income of 6,510 million Euros. In early 2008, we valued Deutsche Bank using the dividends it paid in 2007. We are assuming the dividends are not only reasonable but sustainable.
- In early 2009, in the aftermath of the crisis, Deutsche Bank's dividend policy was in flux. The net income had plummeted and capital ratios were being reassessed. To forecast future dividends, we first forecast net income (ROE* Asset Base) and then estimated the investments in regulatory capital:

	Current	1	2	3	4	5
Asset Base	312,882 €	325,398 €	338,414 €	351,950 €	366,028 €	380,669 €
Capital ratio	10.20%	10.16%	10.12%	10.08%	10.04%	10.00%
Regulatory Capital	31,914 €	33,060 €	34,247 €	35,477 €	36,749 €	38,067 €
Change in Regulatory Capital		1,146 €	1,187 €	1,229 €	1,273 €	1,318 €
ROE	9.40%	9.52%	9.64%	9.76%	9.88%	10.00%
Net Income	3,000 €	3,147 €	3,302 €	3,463 €	3,631 €	3,807 €
- Investment in Regulatory Capital		1,146 €	1,187 €	1,229 €	1,273 €	1,318 €
FCFE (Potential Dividend)		2,001 €	2,114 €	2,233 €	2,358 €	2,489 €

Dividends may be the most tangible and observable of all cash flows, but we are implicitly assuming that firms are paying out what they can afford to in dividends. While this may be reasonable for mature firms in stable economies, the assumption can break down (even for these firms). Deutsche Bank is a classic example.

In early 2008, most analysts would have considered Deutsche Bank (with its large size, diversified asset base and long history) to be in steady state and valued it by taking the dividends it paid in 2007 and building on those dividends. The banking crisis of 2008 should have led to a reassessment of that assumption.

Estimating FCFE : Tata Chemicals

Year	Net Income	Cap Ex	Depreciation	Change in WC	Change in Debt	Equity Reinvestment	Equity Reinvestment Rate
2003-04	$3,418	$357	$1,442	-$557	-$2,771	$1,129	33.04%
2004-05	$4,550	$692	$1,377	-$493	$5,448	-$6,626	-145.64%
2005-06	$5,156	$11,730	$1,389	$2,823	$867	$12,297	238.51%
2006-07	$6,338	$1,196	$1,504	-$1,662	-$4,411	$2,442	38.53%
2007-08	$11,571	$28,956	$1,488	$88	$17,054	$10,502	90.76%
Aggregate	$31,033	$42,930	$7,199	$200	$16,187	$19,744	63.62%

Like most firms, Tata Chemicals has volatile capital expenditures and its usage of debt varies widely over time. In making our projections, we will also look at averages over time.

Estimating FCFF: Disney

	2008	2008 normalized
EBIT	$7,030	$7,030
EBIT (`1-t)	$4,359	$4,359
+ Depreciaton	$1,839	$1,839
- Cap Ex	$2,752	$3,939
- Change in WC	$241	$241
FCFF	$3,205	$2,018
Reinvestment	$1,154	$2,341
Reinvestment Rate	26.48%	53.71%

We include $516 million in acquisitions made during 2008 in capital expenditures, but this is a volatile item. Disney does not make large acquisitions every year, but it does so infrequently - $ 7.5 billion to buy Pixar in 2006 and $ 11.5 billion to buy Capital Cities in 1996. Averaging out acquisitions from 1994-2008, we estimate an average annual value of $1,761 million for acquisitions over this period. Replacing the current year's acquisition with this normalized value yields a higher reinvestment rate

II. 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.

Cost of Equity: Deutsche Bank
2008 versus 2009

- In early 2008, we estimated a beta of 1.162 for Deutsche Bank, which used in conjunction with the Euro risk-free rate of 4% (in January 2008) and a risk premium of 4.50% (the mature market risk premium in early 2008), yielded a cost of equity of 9.23%.

  Cost of Equity$_{Jan\ 2008}$ = Riskfree Rate$_{Jan\ 2008}$ + Beta* Mature Market Risk Premium

  = 4.00% + 1.162 (4.5%) = 9.23%

  (We used the same beta for early 2008 and early 2009. We could have looked at the betas for banks in early 2008 and used that number instead)

- In early 2009, the Euro riskfree rate had dropped to 3.6% and the equity risk premium had risen to 6% for mature markets:

  Cost of equity$_{jan\ 2009}$ = Riskfree Rate$_{Jan\ 2009}$ + Beta (Equity Risk Premium)

  = 3.6% + 1.162 (6%) = 10.572%

The cost of equity can change over time, even if the beta for a firm does not change. In this case, the increase in the equity risk premium is pushing up the cost of equity. Even if the dividends were not expected to change, the value of equity in Deutsche will go down.

Cost of Equity: Tata Chemicals

- We will be valuing Tata Chemicals in rupee terms. (That is a choice. Any company can be valued in any currency).
- Earlier, we estimated a beta for equity of 0.945 for Tata Chemical's operating assets . With a nominal rupee risk-free rate of 4 percent and an equity risk premium of 10.51% for India (also estimated in Chapter 4), we arrive at a cost of equity of 13.93%.

  Cost of Equity = 4% + 0.945 (10.51%) = 13.93%

Currency is a choice. While it is usually easiest to get financial information in the local currency, there may be times when you choose to value a company in a different currency. Thus, if getting a riskfree rate in the local currency is difficult to do, you may decide to value a company in dollars or Euros.

We used the equity beta of just the operating assets in this valuation. That is because we will be computing the FCFE only from operating assets (we will exclude the interest income from cash from net income). If we had chosen to include the cash from financial holdings as part of net income, we would have adjusted the beta for Tata Chemical's cross holdings.

Current Cost of Capital: Disney

- The beta for Disney's stock in May 2009 was 0.9011. The T. bond rate at that time was 3.5%. Using an estimated equity risk premium of 6%, we estimated the cost of equity for Disney to be 8.91%:

  Cost of Equity = 3.5% + 0.9011(6%) = 8.91%

- Disney's bond rating in May 2009 was A, and based on this rating, the estimated pretax cost of debt for Disney is 6%. Using a marginal tax rate of 38%, the after-tax cost of debt for Disney is 3.72%.

  After-Tax Cost of Debt = 6.00% (1 − 0.38) = 3.72%

- The cost of capital was calculated using these costs and the weights based on market values of equity (45,193) and debt (16,682):

- Cost of capital =

$$8.91\% \frac{45,193}{(16,682+45,193)} + 3.72\% \frac{16,682}{(16,682+45,193)} = 7.51\%$$

The one point we do know for Disney…

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%?

But costs of equity and capital can and should change over time…

Year	Beta	Cost of equity	Cost of debt	Debt Ratio	Cost of capital
1	0.90	8.91%	3.72%	26.73%	7.52%
2	0.90	8.91%	3.72%	26.73%	7.52%
3	0.90	8.91%	3.72%	26.73%	7.52%
4	0.90	8.91%	3.72%	26.73%	7.52%
5	0.90	8.91%	3.72%	26.73%	7.52%
6	0.92	9.03%	3.72%	26.73%	7.61%
7	0.94	9.14%	3.72%	26.73%	7.69%
8	0.96	9.26%	3.72%	26.73%	7.78%
9	0.98	9.38%	3.72%	26.73%	7.87%
10	1.00	9.50%	3.72%	26.73%	7.95%

In the case of Disney, the only input I changed was the beta but every input can shift. (The reason the shift is relatively minor for Disney is because it is a large and fairly mature firm)

For evolving firms, with rapidly changing growth rates, the beta, the cost of debt and the debt ratio can all change over time as the firm matures.

III. Expected Growth
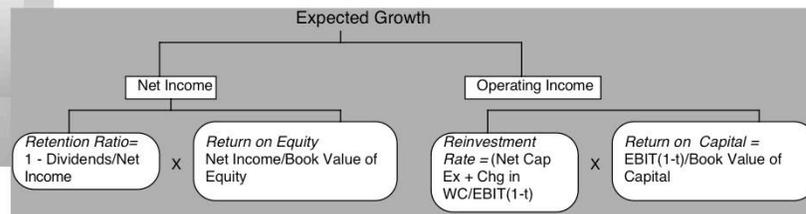
Note that the approaches are similar, with the only difference being in how we define how much the firm reinvests and how well it reinvests.

- In 2007, Deutsche Bank reported net income of 6.51 billion Euros on a book value of equity of 33.475 billion Euros at the start of the year (end of 2006), and paid out 2.146 billion Euros as dividends.

Return on Equity = $\dfrac{\text{Net Income}_{2007}}{\text{Book Value of Equity}_{2006}} = \dfrac{6{,}510}{33{,}475} = 19.45\%$

Retention Ratio = $1 - \dfrac{\text{Dividends}}{\text{Net Income}} = 1 - \dfrac{2{,}146}{6{,}510} = 67.03\%$

- If Deutsche Bank maintains the return on equity (ROE) and retention ratio that it delivered in 2007 for the long run:

Expected Growth Rate $_{\text{Existing Fundamentals}}$ = 0.6703 * 0.1945 = 13.04%

- If we replace the net income in 2007 with average net income of $3,954 million, from 2003 to 2007:

Normalized Return on Equity = $\dfrac{\text{Average Net Income}_{2003\text{-}07}}{\text{Book Value of Equity}_{2006}} = \dfrac{3{,}954}{33{,}475} = 11.81\%$

Normalized Retention Ratio = $1 - \dfrac{\text{Dividends}}{\text{Net Income}} = 1 - \dfrac{2{,}146}{3{,}954} = 45.72\%$

Expected Growth Rate $_{\text{Normalized Fundamentals}}$ = 0.4572 * 0.1181 = 5.40%

When forecasting future growth, we want estimates of the future retention ratio and future return on equity. While the current year's numbers may be a good place to start, we should have no qualms about replacing those numbers with normalized values.

Estimating growth in Net Income: Tata Chemicals

Year	Net Income	Cap Ex	Depreciation	Change in WC	Change in Debt	Equity Reinvestment	Equity Reinvestment Rate
2003-04	INR 3,418	INR 357	INR 1,442	-INR 557	-INR 2,771	INR 1,129	33.04%
2004-05	INR 4,550	INR 692	INR 1,377	-INR 493	INR 5,448	-INR 6,626	-145.64%
2005-06	INR 5,156	INR 11,730	INR 1,389	INR 2,823	INR 867	INR 12,297	238.51%
2006-07	INR 6,338	INR 1,196	INR 1,504	-INR 1,662	-INR 4,411	INR 2,442	38.53%
2007-08	INR 11,571	INR 28,956	INR 1,488	INR 88	INR 17,054	INR 10,502	90.76%
Aggregate	INR 31,033	INR 42,930	INR 7,199	INR 200	INR 16,187	INR 19,744	63.62%

$$\text{Normalized Equity Reinvestment Rate} = \frac{\text{Equity Reinvestment}_{Total\ 2004-08}}{\text{Net Income}_{Total\ 2004-08}} = \frac{19,744}{31,033} = 63.62\%$$

Year	Net Income	BV of Equity	ROE
2003-04	INR 3,418	INR 20,353	16.80%
2004-05	INR 4,550	INR 19,978	22.78%
2005-06	INR 5,156	INR 39,451	13.07%
2006-07	INR 6,338	INR 37,258	17.01%
2007-08	INR 11,571	INR 61,952	18.68%
Aggregate	INR 31,033	INR 178,992	17.34%

$$\text{Normalized Return on Equity} = \frac{\text{Net Income}_{Total\ 2004-08}}{\text{Book Value of Equity}_{Total\ 2004-08}} = \frac{31,033}{178,992} = 17.34\%$$

Expected Growth in Net Income = 63.62% * 17.34% = 11.03%

More evidence of normalization. Rather than trust the most recent year's numbers, we aggregated values over the previous five years to arrive at the ROE and equity reinvestment rate.

ROE and Leverage

- A high ROE, other things remaining equal, should yield a higher expected growth rate in equity earnings.
- The ROE for a firm is a function of both the quality of its investments and how much debt it uses in funding these investments. In particular

$$ROE = ROC + D/E (ROC - i (1-t))$$

where,

ROC = (EBIT (1 - tax rate)) / Book Value of Capital

= EBIT (1- t) / Book Value of Capital

D/E = Debt/ Equity ratio

i = Interest rate on debt

t = Tax rate on ordinary income.

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 equity 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.

Estimating Growth in EBIT: Disney

- We begin by estimating the reinvestment rate and return on capital for Disney in 2008 using the numbers from the latest financial statements. We converted operating leases into debt and adjusted the operating income and capital expenditure accordingly.

$$\text{Reinvestment Rate}_{2008} = \frac{(2,752 - 1,839 + 241)}{7,030 \, (1 - .38)} = 26.48\%$$

- We include $516 million in acquisitions made during 2008 in capital expenditures, but this is a volatile item. Disney does not make large acquisitions every year, but it does so infrequently - $ 7.5 billion to buy Pixar in 2006 and $ 11.5 billion to buy Capital Cities in 1996. Averaging out acquisitions from 1994-2008, we estimate an average annual value of $1,761 million for acquisitions over this period:

$$\text{Reinvestment Rate}_{\text{Normalized}} = \frac{(3,939 - 1,839 + 241)}{7,030 \, (1 - .38)} = 53.72\%$$

- We compute the return on capital, using operating income in 2008 and capital invested at the start of 2008 (end of 2007):

$$\text{Return on Capital}_{2008} = \frac{\text{EBIT} \, (1 - t)}{(\text{BV of Equity} + \text{BV of Debt} - \text{Cash})} = \frac{7,030 \, (1 - .38)}{(30,753 + 16,892 - 3,670)} = 9.91\%$$

- If Disney maintains its 2008 normalized reinvestment rate of 53.72% and return on capital for the next few years, its growth rate will be 5.32 percent.

- Expected Growth Rate from Existing Fundamentals = 53.72% * 9.91% = 5.32%

The book value of debt is augmented by the $1,720 million in present value of operating lease commitments. The unadjusted operating income for Disney was $6,726 million. The operating lease adjustment adds the current year's operating lease expense to capital expenditures ($550 million), and subtracts out the depreciation on the leased asset to depreciation ($246 million) to arrive at an adjusted operating income of $7,030 million. See earlier FCFF page for details on cap ex and working capital.

We considered normalizing the ROC as well but Disney has been on an upward trend and we believe that the changes made at the firm over the last 5 years will allow this ROC to be sustained in the future.

IV. Getting Closure in Valuation

- 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:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

- 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 forever.

- This "constant" growth rate is called a <u>stable growth rate</u> and <u>cannot be higher than the growth rate of the economy</u> in which the firm operates.

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.

Getting to stable growth…

- 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.

Choosing a Growth Period: Examples

	Disney	Aracruz	Tata Chemicals
Firm size/market size	Firm is one of the largest players in the entertainment and theme park business, but the businesses are being redefined and are expanding.	Firm has a small market share of the paper/pulp business, but the business is mature.	Firm has a large market share of Indian (domestic) market, but is small by global standards. Domestic market is also growing.
Current excess returns	Firm is earning more than its cost of capital, after a long period of negative excess returns.	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 capital that is roughly equal to its cost of capital.
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 rain forests. Has invested in newer, updated plants and has skilled workforce.	Has cost advantages, because of lower labor and production costs in India.
Length of high-growth period	Ten years, entirely because of its strong competitive advantages (which have been wasted over the past few years), but the excess returns are likely to be small.	Five years, largely due to access to cheap raw material.	Five years, primarily because of high real growth in India.

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.

Estimating Stable Period Inputs: Disney

Respect the cap: The growth rate forever is assumed to be 3%. This is set lower than the riskfree rate (3.5%).

Stable period excess returns: The return on capital for Disney will drop from its high growth period level of 9.91% to a stable growth return of 9%. This is still higher than the cost of capital of 7.95% but the competitive advantages that Disney has are unlikely to dissipate completely by the end of the 10th year.

Reinvest to grow: The expected growth rate in stable growth will be 3%. In conjunction with the return on capital of 9%, this yields a stable period reinvestment rate of 33.33%:

Reinvestment Rate = Growth Rate / Return on Capital = 3% /9% = 33.33%

Adjust risk and cost of capital: The beta for the stock will drop to one, reflecting Disney's status as a mature company.

Cost of Equity = Riskfree Rate + Beta * Risk Premium = 3.5% + 6% = 9.5%

The debt ratio for Disney will stay at 26.73%. Since we assume that the cost of debt remains unchanged at 6%, this will result in a cost of capital of 7.95%

Cost of capital = 9.5% (.733) + 6% (1-.38) (.267) = 7.95%

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.

The riskfree rate is a useful proxy for the nominal growth rate in the economy.

Riskfree rate = Expected inflation + Expected real interest rate

Nominal growth rate in economy = Expected inflation + Expected real growth rate

In the long term, expected real growth rate should converge on the expected real interest rate

V. From firm value to equity value per share

Approach used	To get to equity value per share
Discount dividends per share at the cost of equity	Present value is value of equity per share
Discount aggregate FCFE at the cost of equity	Present value is value of aggregate equity. Subtract the value of equity options given to managers and divide by number of shares.
Discount aggregate FCFF at the cost of capital	PV = Value of operating assets + Cash & Near Cash investments + Value of minority cross holdings -Debt outstanding = Value of equity -Value of equity options =Value of equity in common stock / Number of shares

The present value of the cash flows yields different output, depending upon the model used. If the ultimate mission is to compute the value of equity per share, getting there can take quite a trek, especially if you use a firm valuation model.

In effect, you have add the values of any assets whose earnings are not part of operating income (cash and minority cross holdings), subtract out the market value of non equity claims (debt foremost but also leases) and then net out the value of equity in options granted to managers and others to get to the value of equity in common stock. Since we have already considered the effect of options outstanding, this value can then be divided by the primary (not diluted) number of shares to get to value per share.

Valuing Deutsche Bank in early 2008

■ To value Deutsche Bank, we started with the normalized income over the previous five years (3,954 million Euros) and the dividends in 2008 (2,146 million Euros). We assumed that the payout ratio and ROE, based on these numbers will continue for the next 5 years:
- Payout ratio = 2,146/3954 = 54.28%
- Expected growth rate = (1-.5428) * .1181 = 0.054 or 5.4% (see earlier slide)
- Cost of equity = 9.23%

Year	Net Income	Payout Ratio	Dividends	PV @ 9.23%
2008	4,167 €	54.28%	2,262 €	2,071 €
2009	4,392 €	54.28%	2,384 €	1,998 €
2010	4,629 €	54.28%	2,513 €	1,928 €
2011	4,879 €	54.28%	2,648 €	1,861 €
2012	5,143 €	54.28%	2,791 €	1,795 €
				9,653 €

In early 2008, we were operating under the belief that Deutsche Bank, as a mature, regulated bank, was paying out what it could afford in dividends. Thus, we used the conventional dividend discount model, with a high growth period of 5 years.

Deutsche Bank in stable growth

- At the end of year 5, the firm is in stable growth. We assume that the cost of equity drops to 8.5% (as the beta moves to 1) and that the return on equity also drops to 8.5 (to equal the cost of equity).

Stable Period Payout Ratio = $1 - g/ROE = 1 - 0.03/0.085 = 0.6471$ or 64.71%

Expected Dividends in Year 6 = Expected Net Income$_5$ $*(1+g_{Stable})*$ Stable Payout Ratio
$$= €5,143 (1.03) * 0.6471 = €3,427 \text{ million}$$

Terminal Value =

$$\frac{\text{Expected Dividends}_6}{(\text{Cost of Equity - g})} = \frac{3,247}{(.085 - .03)} = 62,318 \text{ million Euros}$$

PV of Terminal Value =

$$\frac{\text{Terminal Value}_n}{(1 + \text{Cost of Equity}_{High\ growth})^n} = \frac{62,318}{(1.0923)^5} = 40,079 \text{ mil Euros}$$

Value of equity = €9,653+ €40,079 = €49,732 million Euros

Value of equity per share=

$$\frac{\text{Value of Equity}}{\#\ \text{Shares}} = \frac{49,732}{474.2} = 104.88 \text{ Euros/share}$$

Stock was trading at 89 Euros per share at the time of the analysis.

Note that the dividends in year 6 have to be recomputed with the new payout ratio and that the present value of the terminal value is computed using the current cost of equity (even though the terminal value itself is computed using a new cost of equity. The rationale: You have to live through the first 5 years to get to the terminal value. The risk and discount rate that applies is the rate over those 5 years.

What does the valuation tell us? One of three possibilities…

- ■ <u>Stock is under valued</u>: This valuation would suggest that Deutsche Bank is significantly overvalued, given our estimates of expected growth and risk.
- ■ <u>Dividends may not reflect the cash flows generated by Deutsche Bank</u>. The FCFE could have been significantly lower than the dividends paid.
- ■ <u>Estimates of growth and risk are wrong</u>: It is also possible that we have over estimated growth or under estimated 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.

Valuing Tata Chemicals in early 2009:
The high growth period

■ We used the normalized return on equity of 17.34% (see earlier table) and the current book value of equity (Rs 35,717 million) to estimate net income:

Normalized Net Income = 35,717 *.1734 = Rs, 6,193 million

(We removed interest income from cash to arrive at the normalized return on equity)

■ We use the average equity reinvestment rate of 63.62 percent and the normalized return on equity of 17.34% to estimate growth:

Expected Growth in Net Income = 63.62% * 17.34% = 11.03%

■ We assume that the current cost of equity (see earlier page) of 13.93% will hold for the next 5 years.

	2009	2010	2011	2012	2013	Sum
Net Income	Rs 6,876	Rs 7,634	Rs 8,476	Rs 9,411	Rs 10,449	
Equity Reinvestment Rate	63.62%	63.62%	63.62%	63.62%	63.62%	
FCFE	Rs 2,501	Rs 2,777	Rs 3,084	Rs 3,423	Rs 3,801	
Cost of Equity	13.93%	13.93%	13.93%	13.93%	13.93%	
Present Value	Rs 2,195	Rs 2,160	Rs 2,085	Rs 2,032	Rs 1,980	Rs 10,433

In early 2009, we chose to value Tata Chemicals using a FCFE model. Implicitly we are assuming that Tata Chemicals is comfortable with its existing debt ratio.

Stable growth and value….

- After year five, we will assume that the beta will increase to 1 and that the equity risk premium will decline to 7.5 percent (we assumed India country risk would drop). The resulting cost of equity is 11.5 percent.

  Cost of Equity in Stable Growth = 4% + 1(7.5%) = 11.5%

- We will assume that the growth in net income will drop to 4% and that the return on equity will rise to 11.5% (which is also the cost of equity).

  Equity Reinvestment Rate$_{\text{Stable Growth}}$ = 4%/11.5% = 34.78%

  FCFE in Year 6 = 10,449(1.04)(1 – 0.3478) = Rs 7,087 million

  Terminal Value of Equity = 7,087/(0.115 – 0.04) = Rs 94,497 million

  Value of equity = PV of FCFE during high growth + PV of terminal value + Cash

  $\qquad$ = 10,433 + 94,497/1.1393^5 +1,759 = Rs 61,423 million

  Dividing by 235.17 million shares yields a value of equity per share of Rs 261, about 20% higher than the stock price of Rs 222 per share.

We reduced the country risk premium for India from 4.5% to 1.5%. We assume that India will become safer as its economy grows.

When computing the FCFE, we started with net income that did not include the interest income from cash but did include income from cross holdings. Thus, we have to add cash to the present value to bring it into the valuation.

Alternatively, we could have done the following:

a.Used the total net income (which includes interest income from cash)

b.Used an unlevered beta for all of the assets (rather than just operating assets) = Unlevered beta for operating assets (Proportion of the value from operating assets). This will yield a lower cost of equity

c.Compute the PV of the cash flows from equity and treat the present value as the value of equity

Disney: Inputs to Valuation

	High Growth Phase	Transition Phase	Stable Growth Phase
Length of Period	5 years	5 years	Forever after 10 years
Tax Rate	38%	38%	38%
Return on Capital	9.91%	Declines linearly to 9%	Stable ROC of 9%
Reinvestment Rate (Net Cap Ex + Working Capital Investments/EBIT)	53.72% (based on normalized acquisition costs)	Declines to 33.33% as ROC and growth rates drop: Reinvestment Rate = g/ROC	33.33% of after-tax operating income, estimated from stable growth rate of 3% and return on capital of 9%. Reinvestment rate = 3/9=33.33%
Expected Growth Rate in EBIT	ROC * Reinvestment Rate = 9.91%*53.72% = 5.32%	Linear decline to Stable Growth Rate of 3%	3%
Debt/Capital Ratio	26.7%	Stays unchanged	Stays unchanged
Risk Parameters	Beta = 0.9033, k_e = 8.91%% Pre-tax Cost of Debt = 6% Cost of capital = 7.52%	Beta changes linearly to 1.00; Cost of debt stays at 6% Cost of capital goes to 7.95%	Beta = 1.00; k_e = 9.5% Cost of debt stays at 6% Cost of capital = 7.95%

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 - Status Quo in 2009
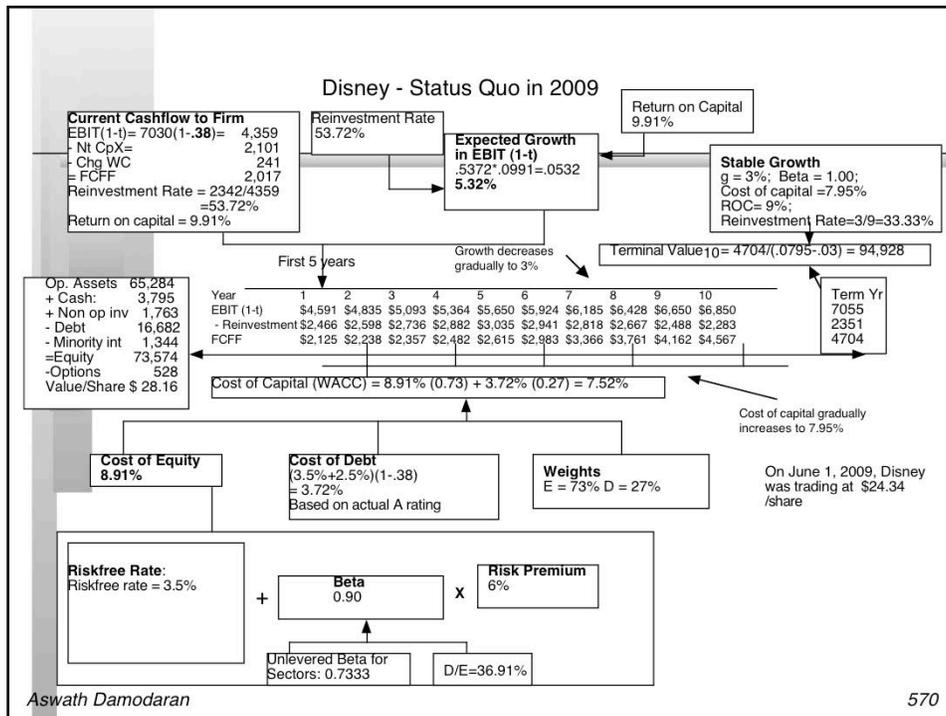
Brings it all together. Stock looks under valued… or maybe the valuation is wrong…

Note that the non operating investment is the value of their minority holdings in Hong Kong Disney (they own 43% and the Chinese government owns 57%) and the minority interests represents the value of external equity investors in fully consolidated ventures. In both cases, we used book value because we had no way of accessing the market value.

The equity options is the value of management options, valued using an option pricing model, and adjusted for taxes.

Investment decision affects risk of assets being finance and financing decision affects hur...

The Investment Decision
Invest in projects that earn a return greater than a minimum acceptable hurdle rate

The Dividend Decision
If you cannot find investments that earn more than the hurdle rate, return the cash to the owners of the businesss.

The Financing Decision
Choose a financing mix that minimizes the hurdle rate and match your financing to your assets.

Strategic investments determine length of growth period

Existing Investments ROC = 9.91%

New Investments
Return on Capital 9.91%

Reinvestment Rate 53.72%

Financing Mix D=27%; E= 73%

Financing Choices Fixed rate US $ debt with duration of years

Current EBIT (1-t) $ 4,359

Expected Growth Rate = 9.91% * 53.72% = 5.32%

Cost of capital = 8.91% (.73) + 3.72% (.27) = 7.52%

Year	Expected grow	EBIT (1-t)	Reinvestment	Reinvestment	FCFF	Terminal Value	Cost of capital	PV
2009	5.32%	$4,591	53.72%	$2,466	$2,125		7.52%	$1,976
2010	5.32%	$4,835	53.72%	$2,598	$2,238		7.52%	$1,936
2011	5.32%	$5,093	53.72%	$2,736	$2,357		7.52%	$1,896
2012	5.32%	$5,364	53.72%	$2,882	$2,482		7.52%	$1,857
2013	5.32%	$5,650	53.72%	$3,035	$2,615		7.52%	$1,819
2014	4.86%	$5,924	49.64%	$2,941	$2,983		7.61%	$1,929
2015	4.39%	$6,185	45.57%	$2,818	$3,366		7.69%	$2,022
2016	3.93%	$6,428	41.49%	$2,667	$3,761		7.78%	$2,095
2017	3.46%	$6,650	37.41%	$2,488	$4,162		7.87%	$2,150
2018	3.00%	$6,850	33.33%	$2,283	$4,567	$94,928	7.95%	$47,604

Value of operating assets =	$65,284
+ Cash	$3,795.00
+ Cross holdings	$1,763.00
- Debt	$16,682.15
- Minority interests	$1,344.00
- Equity Options	$527.90
Value of equity in stock =	$52,288.17
Value per share =	$28.16

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Shows the link between our valuation and the earlier corporate financial analysis.

Ways of changing value…

Aswath Damodaran 572
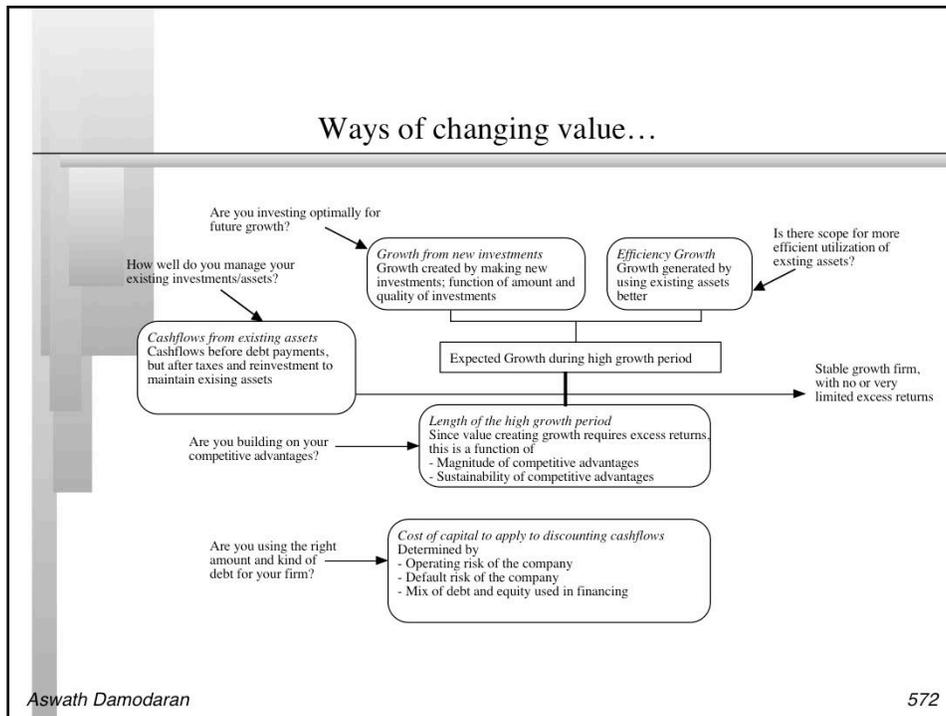
To change value, you have to take actions that affect one of four inputs:

a.Cash flows from existing assets

b.Expected growth

c.Cost of capital

d.Length of the growth period

Disney - Restructured

Current Cashflow to Firm
EBIT(1-t)= 7030(1-.38)= 4,359
- Nt CpX= 2,101
- Chg WC 241
= FCFF 2,017
Reinvestment Rate = 2342/4359
=53.72%
Return on capital = 9.91%

Reinvestment Rate
53.72%

Return on Capital
12%

Expected Growth in EBIT (1-t)
.5372*.12=.0645
6.45%

Stable Growth
g = 3%; Beta = 1.00;
Cost of capital =7.19%
ROC= 9%;
Reinvestment Rate=3/9=33.33%

First 5 years

Growth decreases gradually to 3%

Terminal Value$_{10}$= 5067/(.0719-.03) = 120,982

Op. Assets 81,089
+ Cash: 3,795
+ Non op inv 1,763
- Debt 16,682
- Minority int 1,344
=Equity 68621
-Options 528
Value/Share $ 36.67

Year	1	2	3	4	5	6	7	8	9	10	Term Yr
EBIT (1-t)	$4,640	$4,939	$5,257	$5,596	$5,957	$6,300	$6,619	$6,909	$7,164	$7,379	7600
- Reinvestment	$2,492	$2,653	$2,824	$3,006	$3,200	$3,127	$3,016	$2,866	$2,680	$2,460	2533
FCFF	$2,147	$2,286	$2,433	$2,590	$2,757	$3,172	$3,603	$4,043	$4,484	$4,919	5067

Cost of Capital (WACC) = 9.74% (0.60) + 3.72% (0.40) = 7.33%

Cost of capital gradually decreases to 7.19%

Cost of Equity
9.74%

Cost of Debt
(3.5%+2.5%)(1-.38)
= 3.72%
Based on synthetic A rating

Weights
E = 60% D = 40%

On June 1, 2009, Disney was trading at $24.34 /share

Riskfree Rate:
Riskfree rate = 3.5%

+

Beta
1.04

X

Risk Premium
6%

Unlevered Beta for Sectors: 0.7333

D/E=66.67%

Note that with two changes, a higher return on capital on new investments over the high growth phase (from 9,.91% to 12%) and moving to the optimal debt ratio of 40%, we can raise the value per share from $28.16 to $36.67. The difference of $8.51 can be viewed as the value of control. In general, the better managed a firm is, the lower will be the value of control.

First Principles

As we begin, so we end.