Packet 1: Corporate Finance
Spring 2008
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The Objective in Corporate Finance

The Investment Principle

The Objective in Corporate Finance

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

First Principles

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

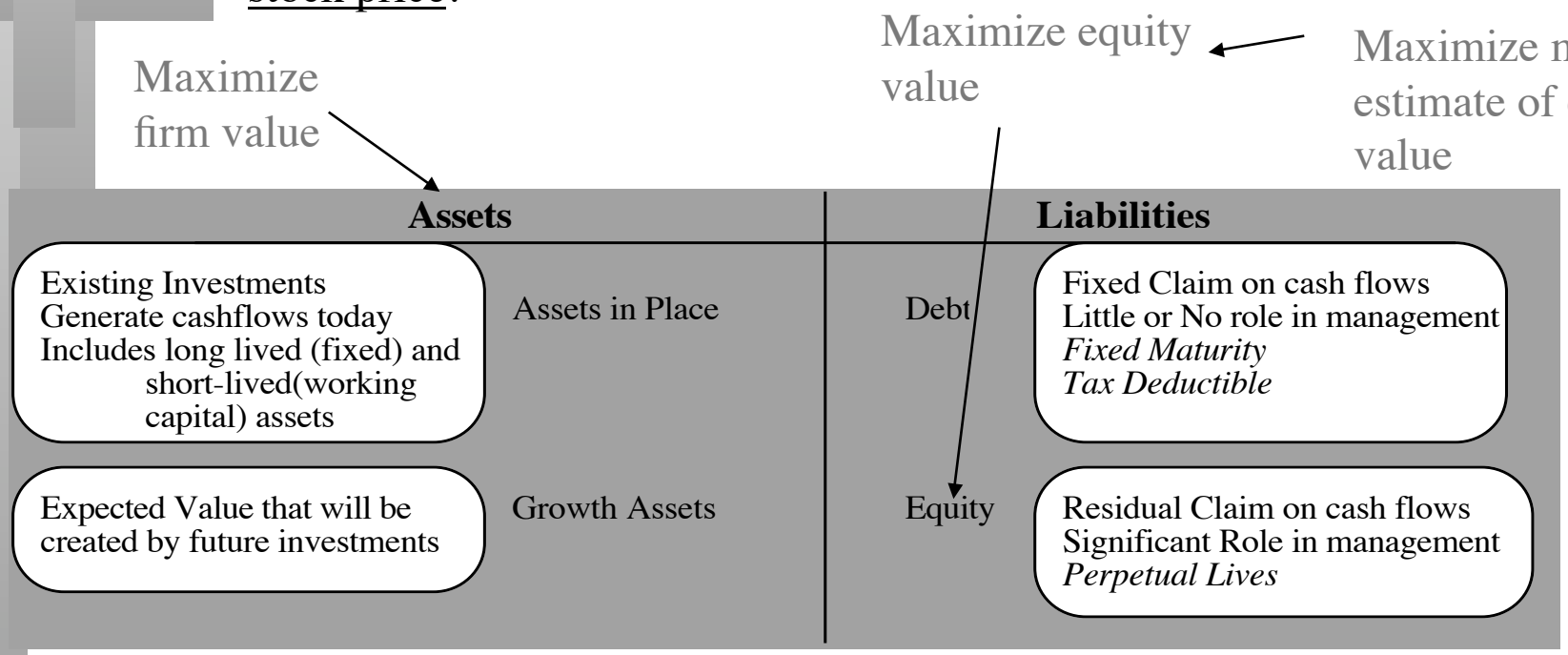
Objective: Maximize the Value of the Firm

The Classical Viewpoint

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

The Objective in Decision Making

- In traditional corporate finance, the objective in decision making is to maximize the value of the firm.
- A narrower objective is to maximize stockholder wealth. When the stock is traded and markets are viewed to be efficient, the objective is to maximize the stock price.



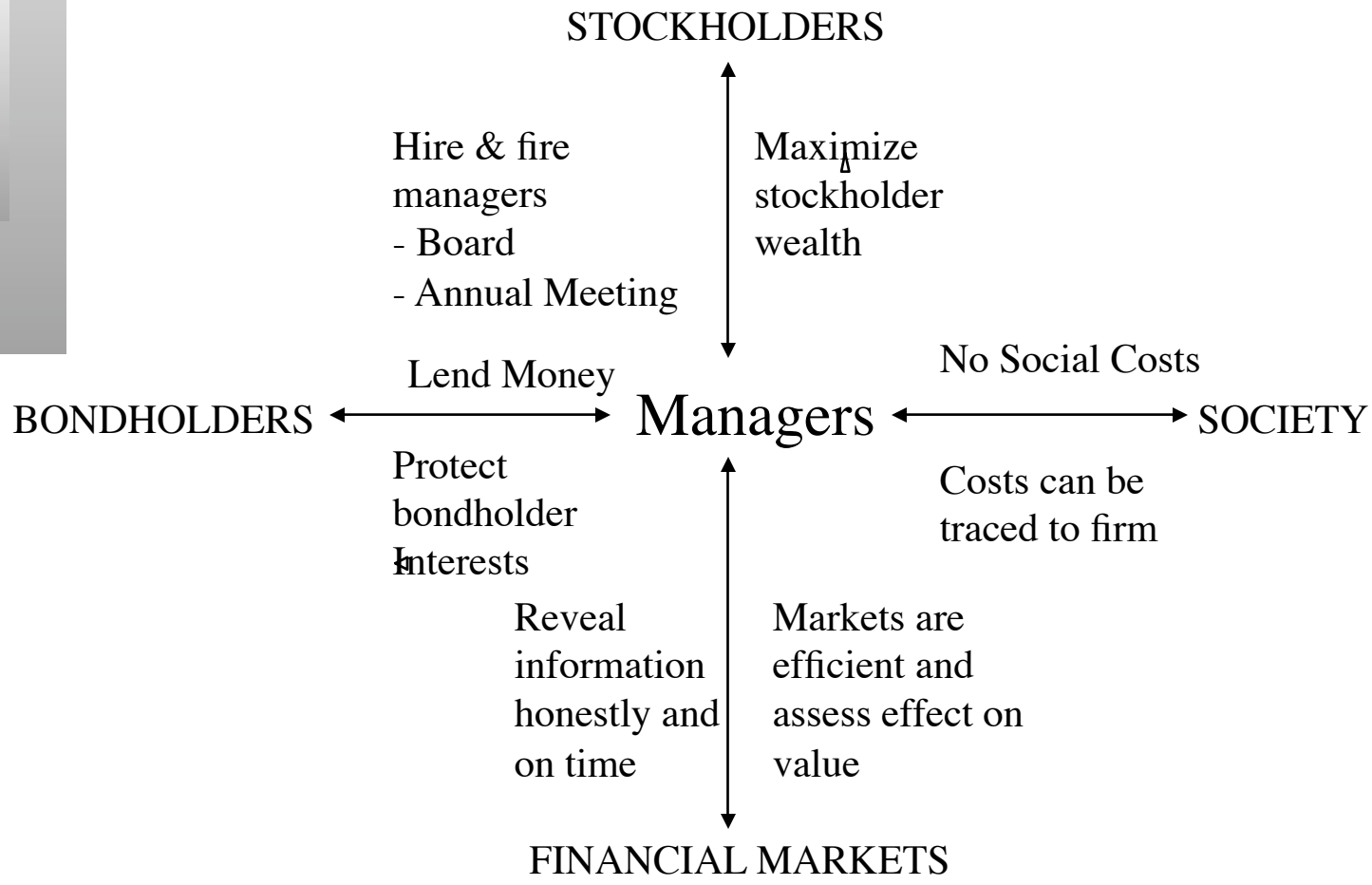
Maximizing Stock Prices is too "narrow" an objective: A preliminary response

- 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 firms that have treated employees well.
- Maximizing stock price does not mean that customers are not critical to success. In most businesses, keeping customers happy is the route to stock price maximization.
- Maximizing stock price does not imply that a company has to be a social outlaw.

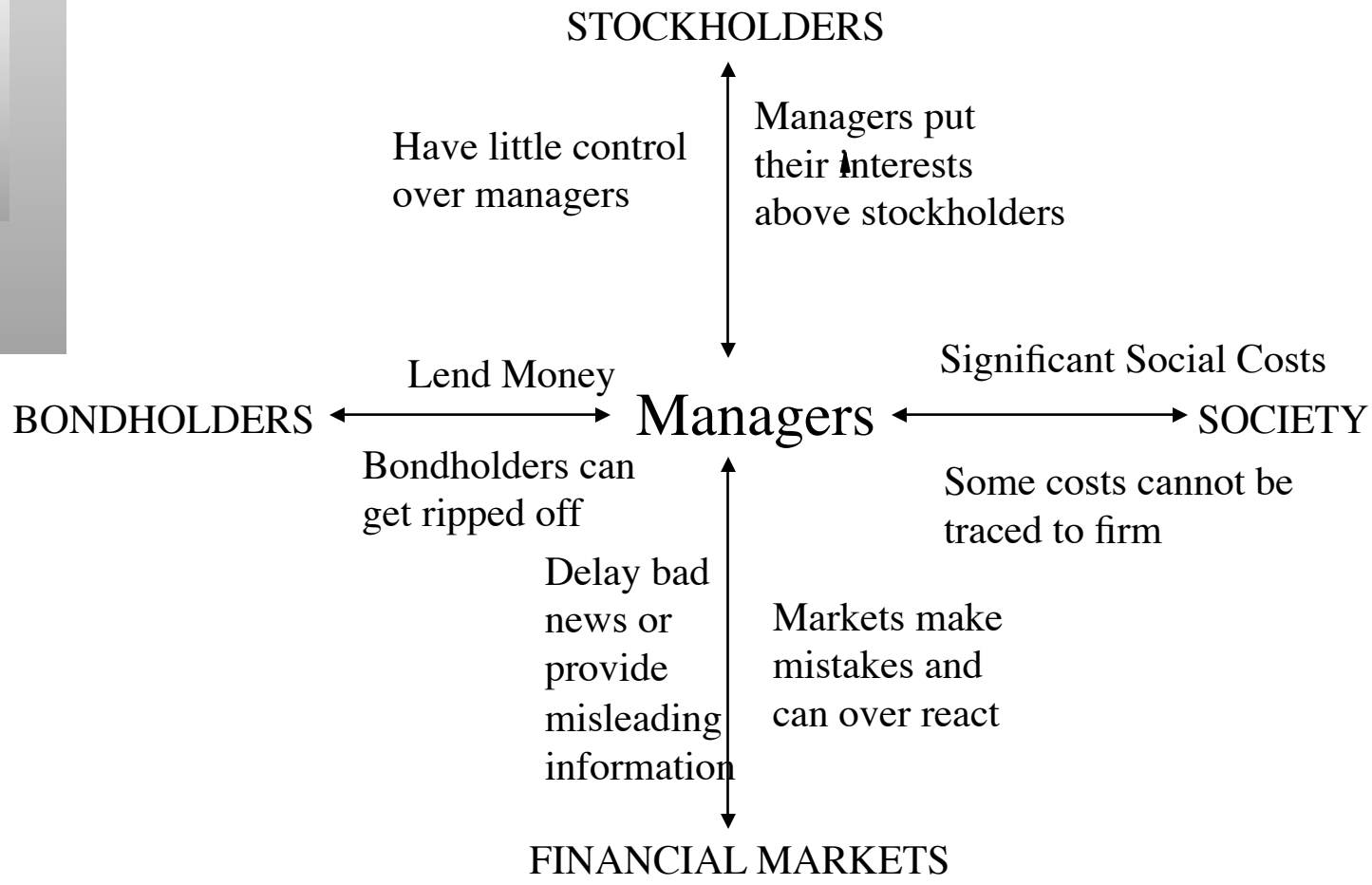
Why traditional corporate financial theory focuses on maximizing stockholder wealth.

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

The Classical Objective Function



What can go wrong?



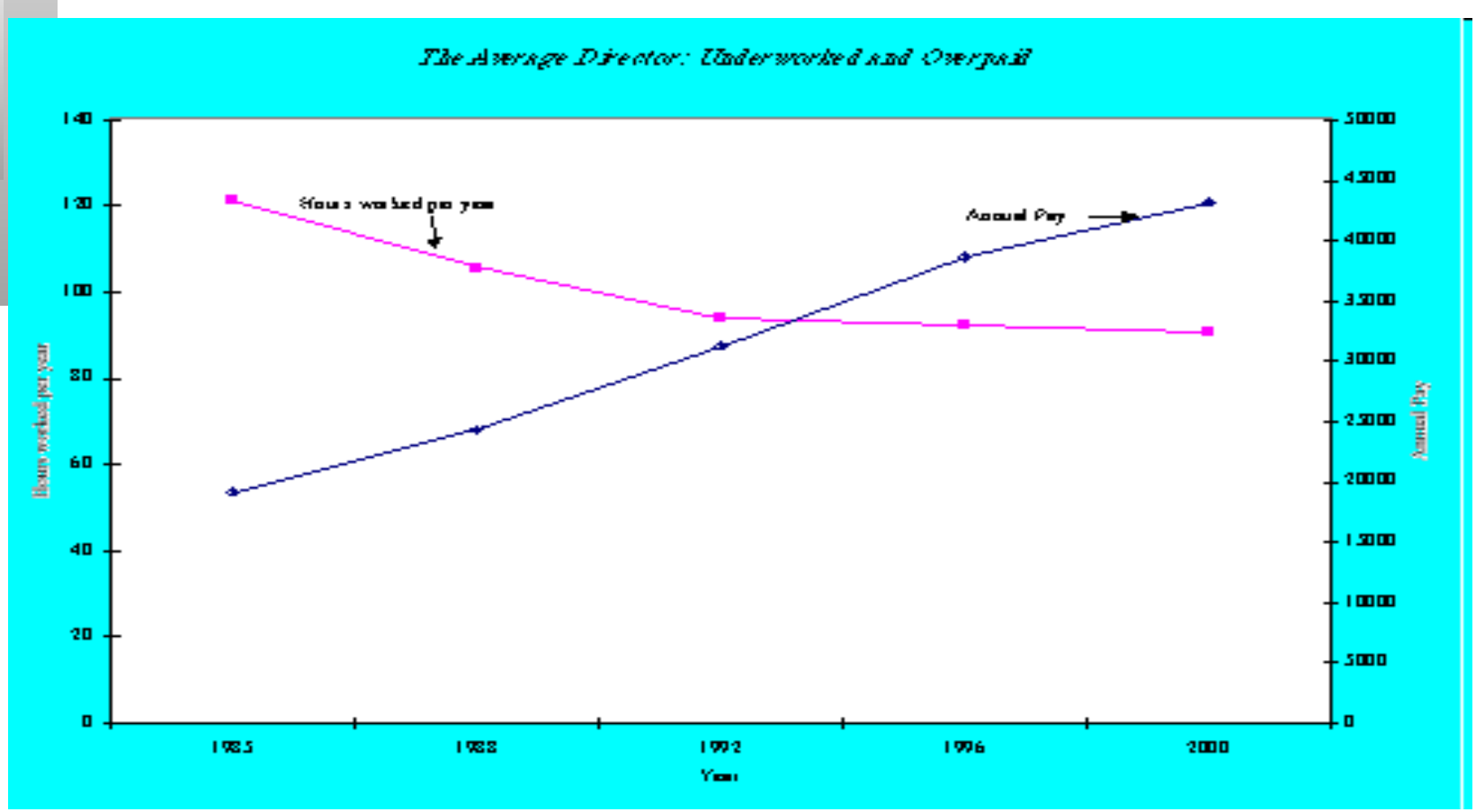
I. Stockholder Interests vs. Management Interests

- **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.

The Annual Meeting as a disciplinary venue

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

Board of Directors as a disciplinary mechanism



The CEO often hand-picks directors..

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

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.

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

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.

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

⌛Application Test: Who's on board?

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

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

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

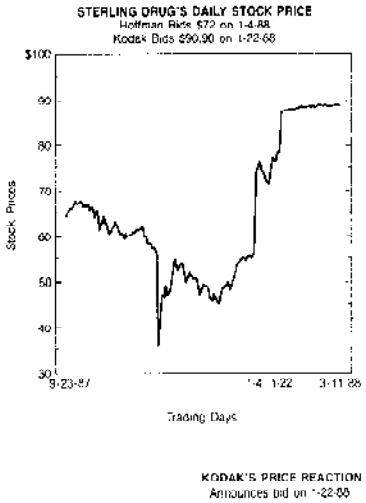
No stockholder approval needed.... Stockholder Approval needed

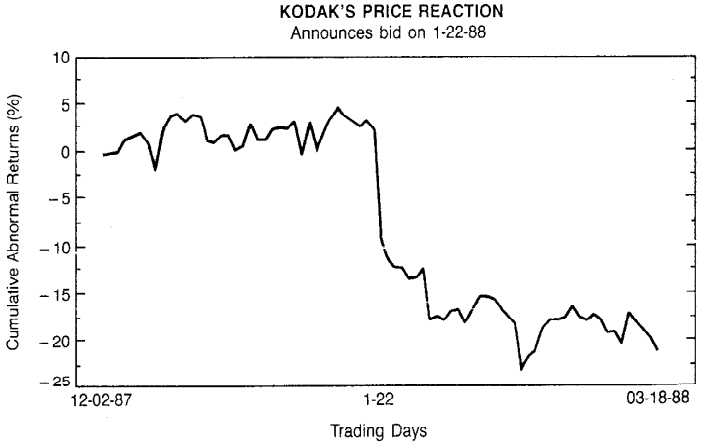
Overpaying on takeovers

- 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.

A Case Study: Kodak - Sterling Drugs

- Eastman Kodak's Great Victory



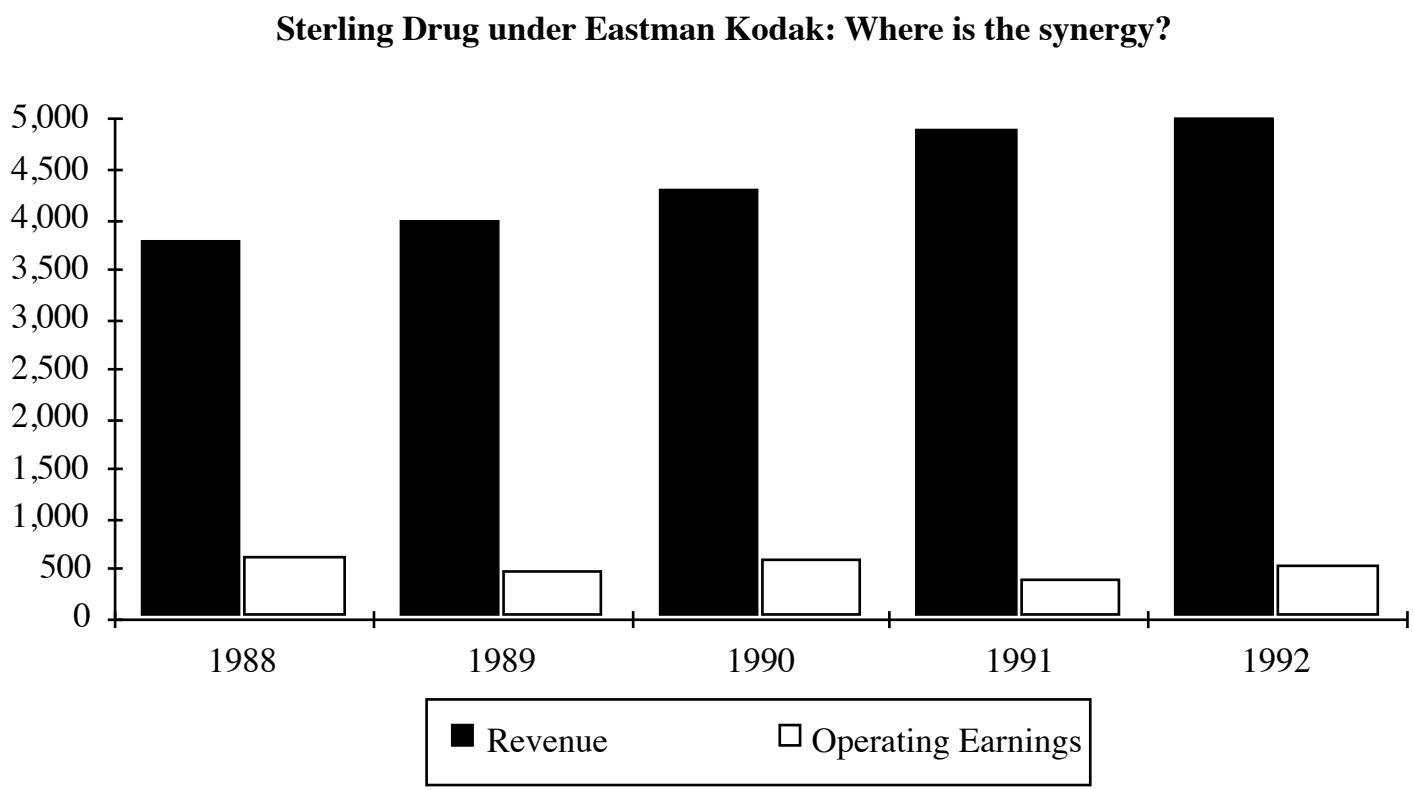


Kodak's market reaction indicates that investors expected no synergies:

Kodak's bid =	$5.1 billion
Sterling's market value 30 days prior to announcement =	3.0 billion
Premium bid	$2.1 billion
Decrease in Kodak's market value =	$2.2 billion

SOURCE: The Alcar Group, Inc.

Earnings and Revenues at Sterling Drugs



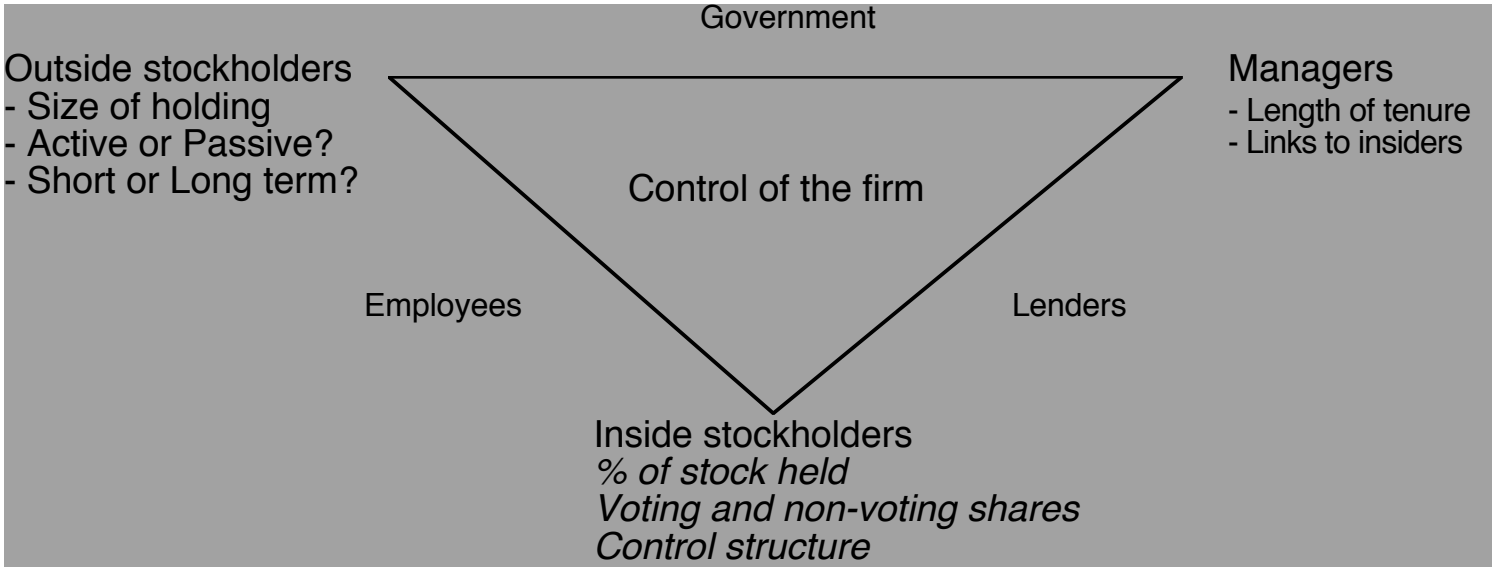
Kodak Says Drug Unit Is Not for Sale (NY Times, 8/93)

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

⌛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?



Disney's top stockholders in 2003

<HELP> for explanation. dgp Equity HDS

Enter #<GO> to select aggregate portfolio and see detailed information

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DIS US DISNEY (WALT) CO Page 1 / 100

Holder name	Portfolio Name	Source	Held	Percent Outstd	Latest Change	Filing Date
1BARCLAYS GLOBAL	BARCLAYS BANK PLC	13F	83,630M	4.095	1,750M	09/02
* 2CITIGROUP INC	CITIGROUP INCORPORAT	13F	62,857M	3.078	4,811M	09/02
* 3FIDELITY MANAGEM	FIDELITY MANAGEMENT	13F	56,125M	2.748	5,992M	09/02
4STATE STREET	STATE STREET CORPORA	13F	54,635M	2.675	2,239M	09/02
* 5SOUTHEASTRN ASST	SOUTHEASTERN ASSET M	13F	47,333M	2.318	14,604M	09/02
6ST FARM MU AUTO	STATE FARM MUTUAL AU	13F	41,938M	2.054	120,599	09/02
7VANGUARD GROUP	VANGUARD GROUP INC	13F	34,721M	1.700	-83,839	09/02
8MELLON BANK N A	MELLON BANK CORP	13F	32,693M	1.601	957,489	09/02
9PUTNAM INVEST	PUTNAM INVESTMENT MA	13F	28,153M	1.379	-11,468M	09/02
10LORD ABBETT & CO	LORD ABBETT & CO	13F	24,541M	1.202	5,385M	09/02
11MONTAG CALDWELL	MONTAG & CALDWELL IN	13F	24,466M	1.198	-11,373M	09/02
12DEUTSCHE BANK AK	DEUTSCHE BANK AG	13F	23,239M	1.138	-5,002M	09/02
13MORGAN STANLEY	MORGAN STANLEY	13F	19,655M	0.962	3,482M	09/02
14PRICE T ROWE	T ROWE PRICE ASSOCIA	13F	19,133M	0.937	2,925M	09/02
15ROY EDWARD DISNE	n/a	PROXY	17,547M	0.859	-126,710	12/01
16AXA FINANCIAL	ALLIANCE CAPITAL MAN	13F	14,283M	0.699	69,353	09/02
17JP MORGAN CHASE	JP MORGAN CHASE & CO	13F	14,209M	0.696	-462,791	09/02
Sub-totals for current page:			599,159M	29.340		

* Money market directory info available. Select portfolio, then hit IP<GO>.

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Bloomberg

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

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

Another confounding factor… Cross and Pyramid Holdings…

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

II. Stockholders' objectives vs. Bondholders' objectives

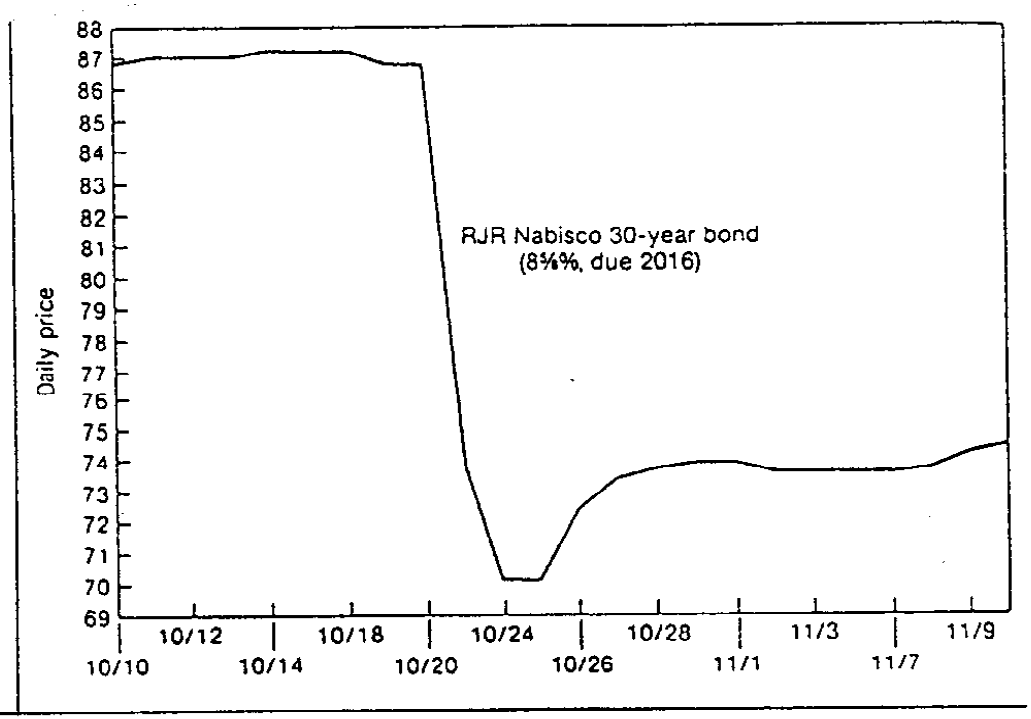
- In theory: there is no conflict of interests between stockholders and bondholders.
- In practice: Stockholder and bondholders have different objectives. Bondholders are concerned most about safety and ensuring that they get paid their claims. Stockholders are more likely to think about upside potential

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.

An Extreme Example: Unprotected Lenders?

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



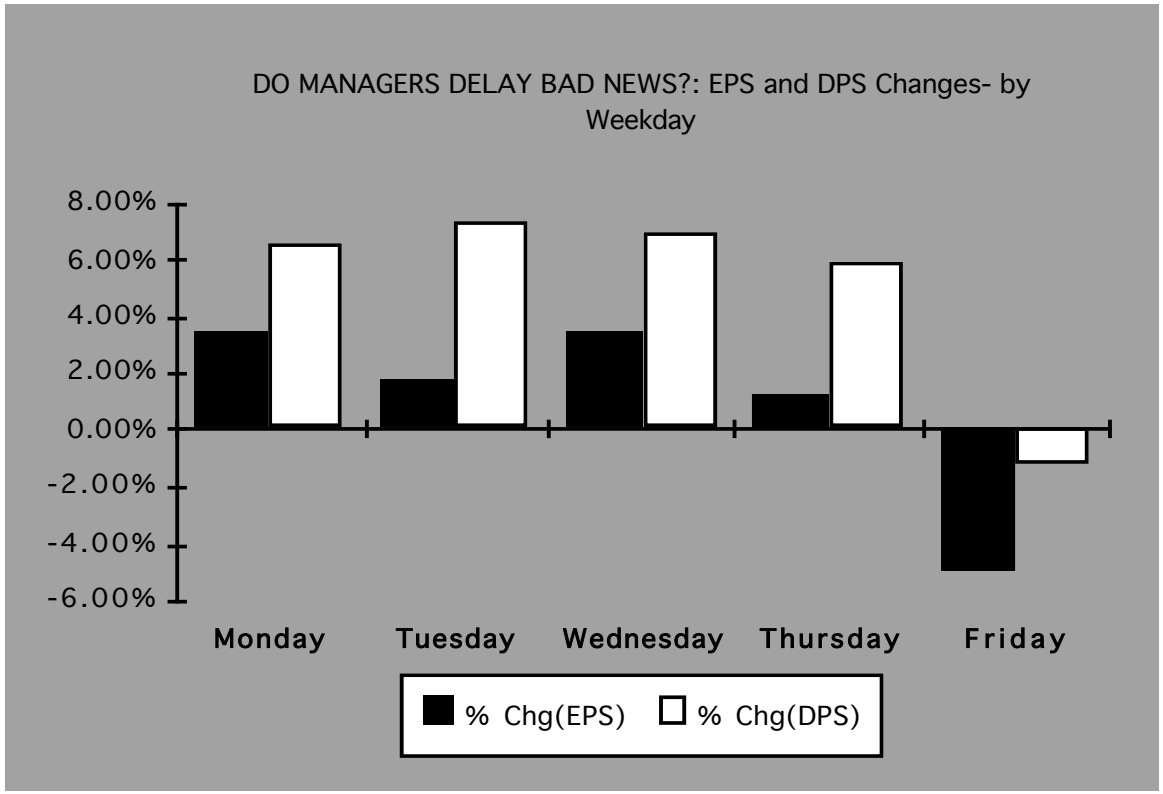
III. Firms and Financial Markets

- **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.

Managers control the release of information to the general public

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

Evidence that managers delay bad news..



Some critiques of market efficiency..

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

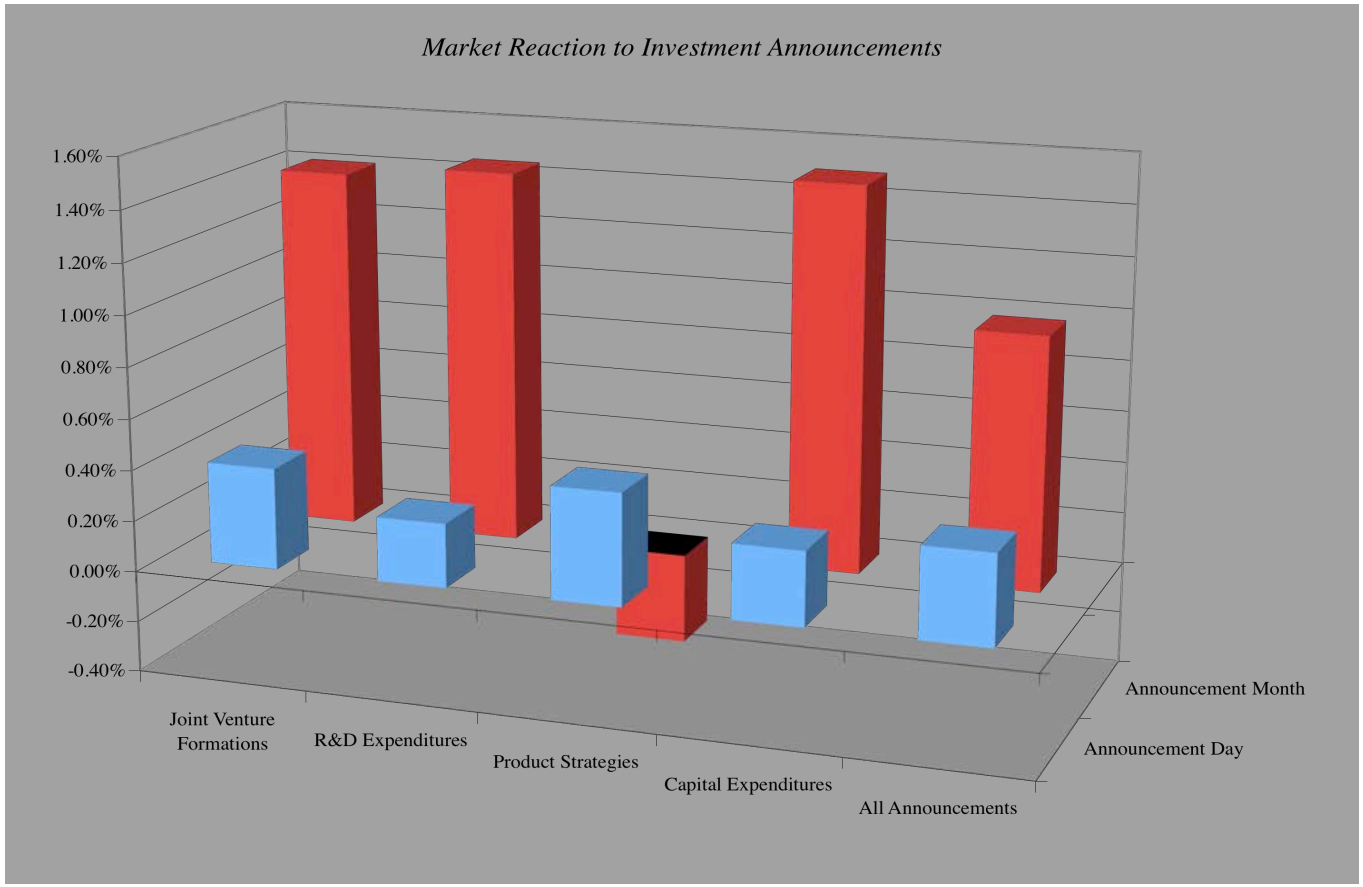
Are Markets Short term?

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

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.

Market Reaction to Investment Announcements



IV. Firms and Society

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

Social Costs and Benefits are difficult to quantify because ..

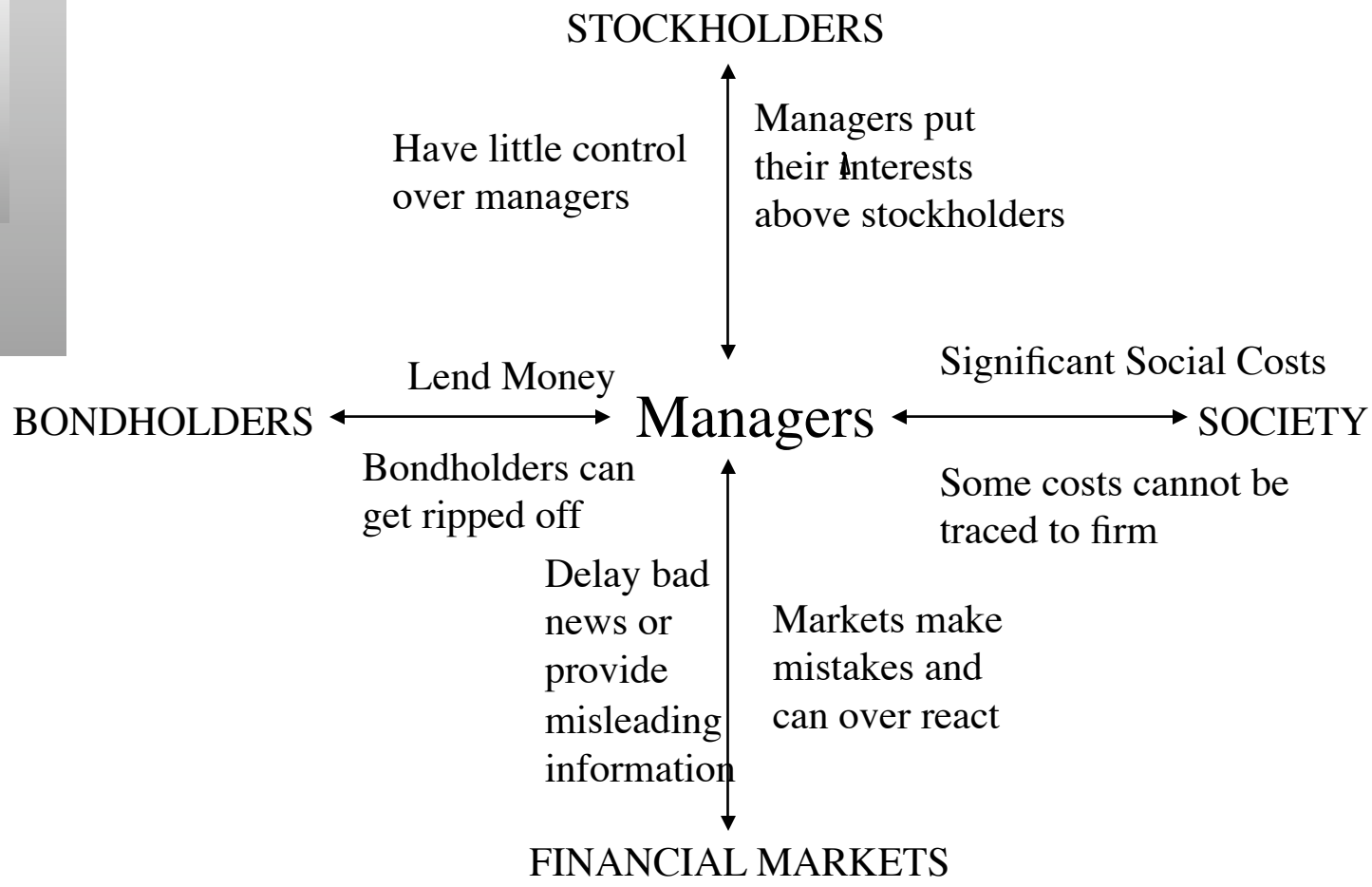
- They might not be known at the time of the decision (Example: Manville and asbestos)
- They are 'person-specific' (different decision makers weight them differently)
- They can be paralyzing if carried to extremes

A Hypothetical Example

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

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

So this is what can go wrong...



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.

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

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

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.

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

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 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

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%.

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.

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.

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)

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.

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 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.

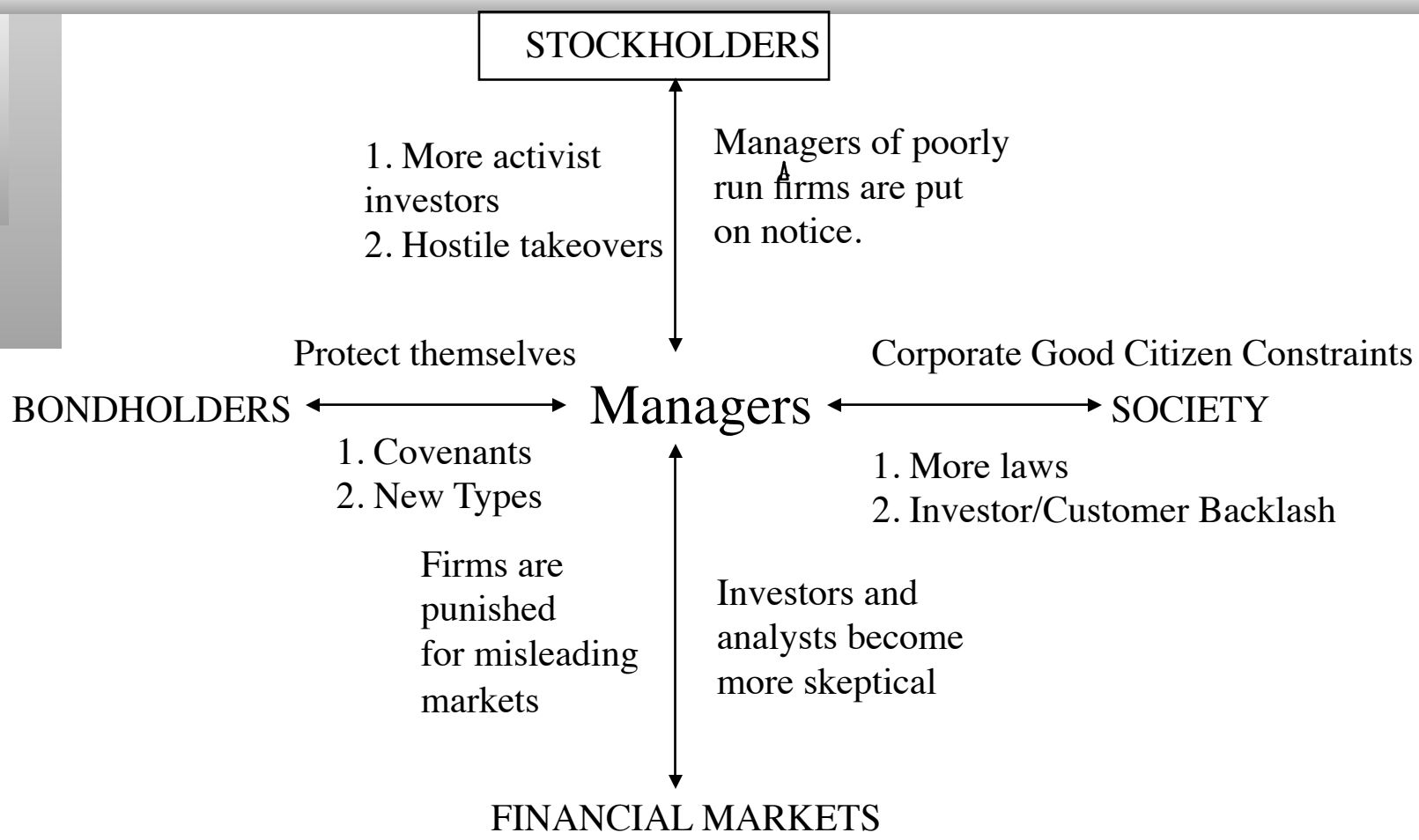
The Financial Market Response

- 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 Societal Response

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

The Counter Reaction



So what do you think?

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

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)

The Investment Principle: Estimating Hurdle Rates

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

First Principles

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

The notion of a benchmark

- Since financial resources are finite, there is a hurdle that projects have to cross before being deemed acceptable.
- This hurdle will be higher for riskier projects than for safer projects.
- A simple representation of the hurdle rate is as follows:

  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?

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.

A good risk and return model should…

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

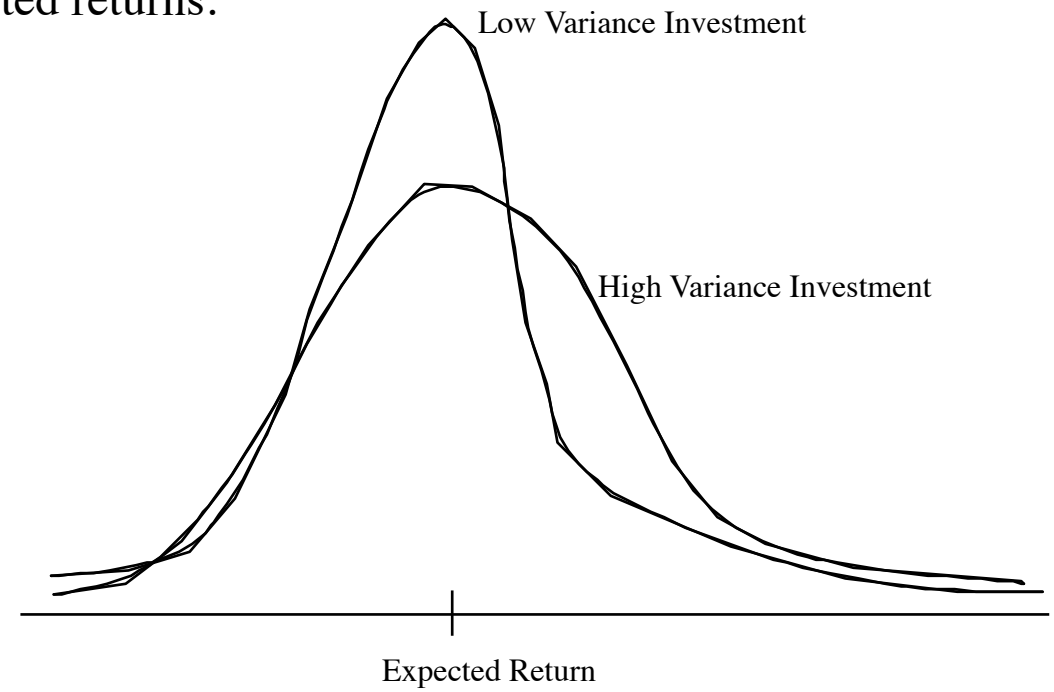
The Capital Asset Pricing Model

- 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 -

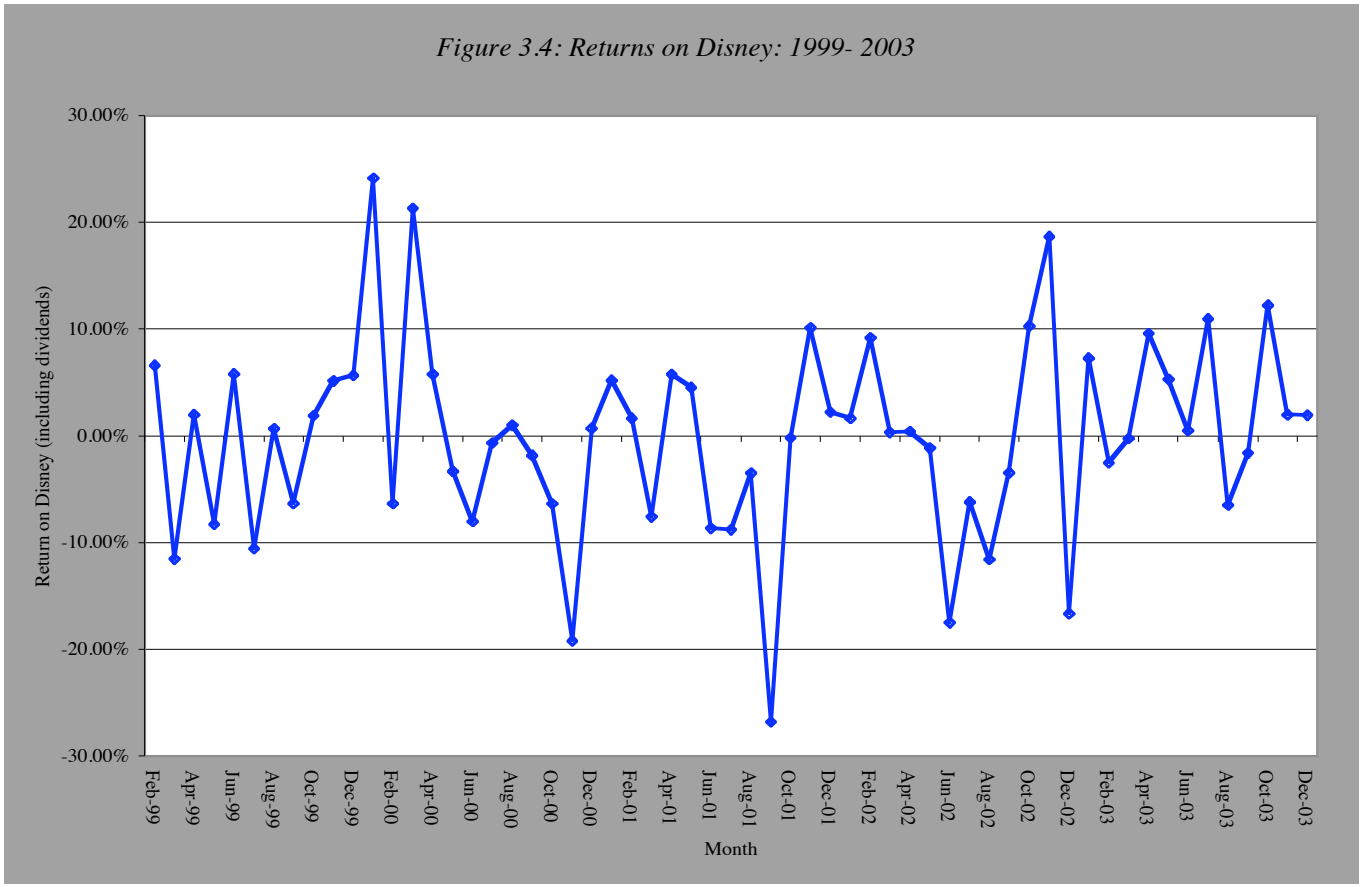
  Expected Return = Riskfree rate + Beta * Risk Premium
- Works as well as the next best alternative in most cases.

The Mean-Variance Framework

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



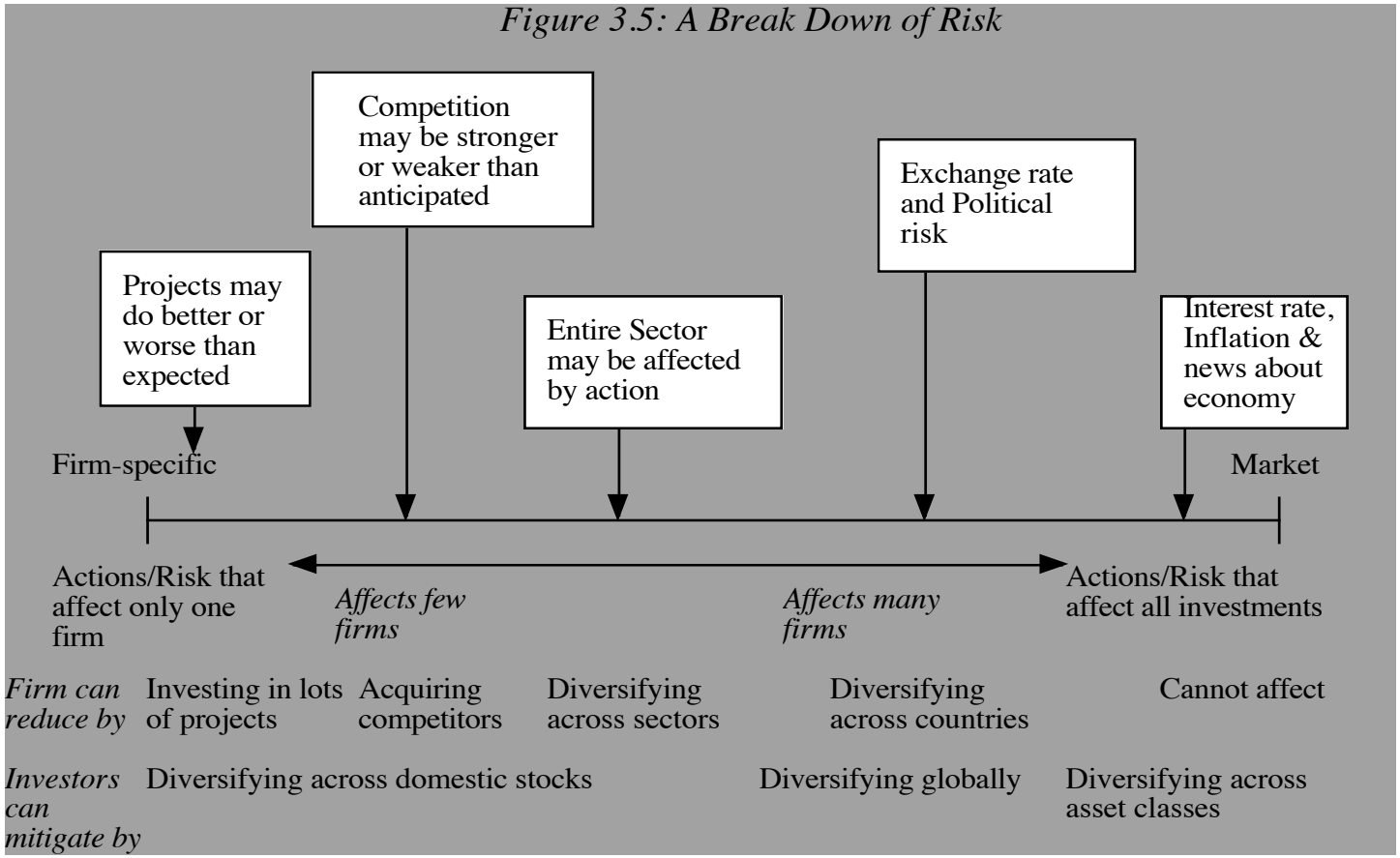
How risky is Disney? A look at the past…



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?

The Importance of Diversification: Risk Types



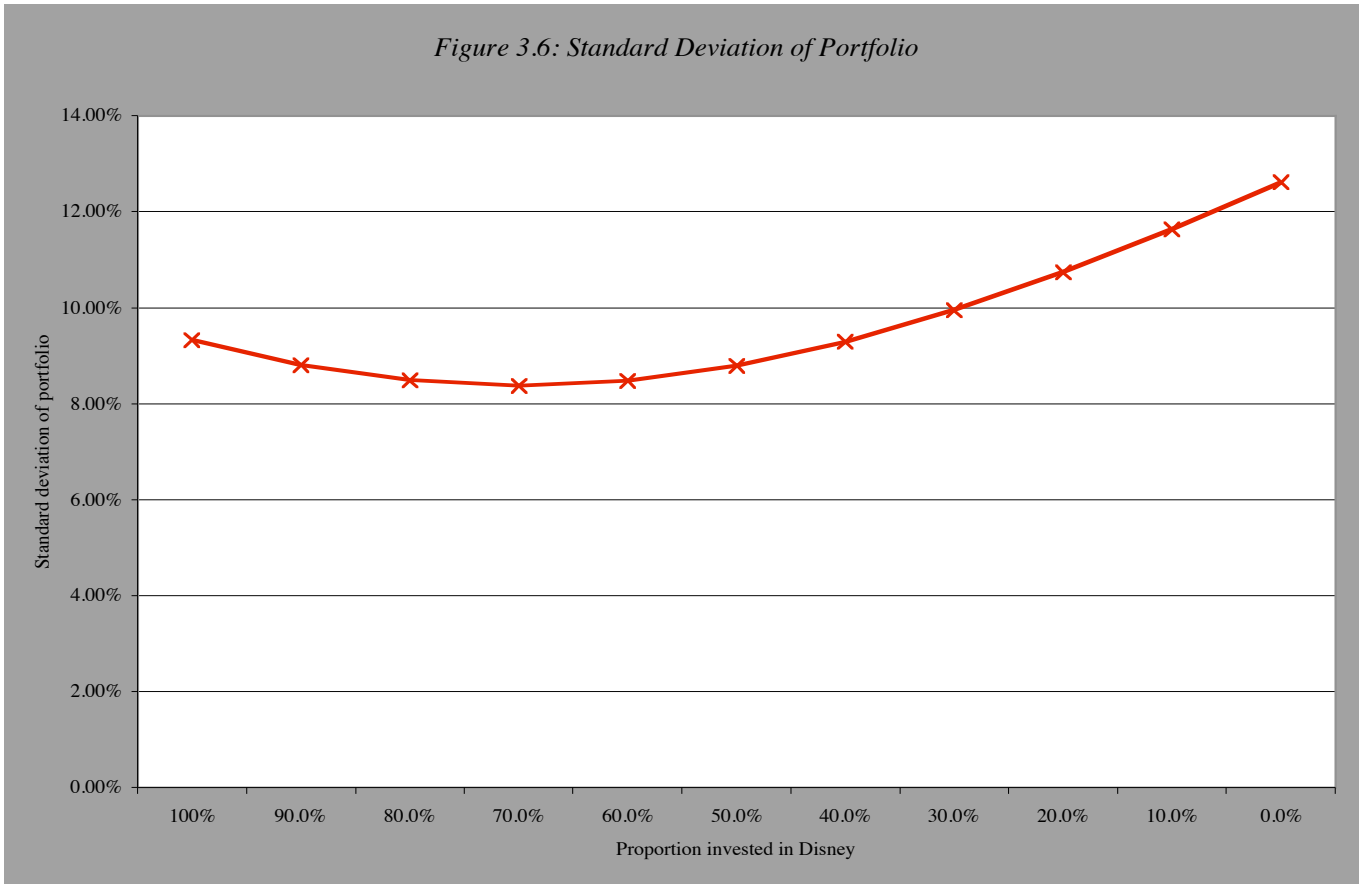
The Effects of Diversification

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

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

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

The variance of a portfolio…



The Role of the Marginal Investor

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

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

Looking at Disney's top stockholders (again)

<HELP> for explanation. dgp Equity HDS

Enter #<GO> to select aggregate portfolio and see detailed information

0011899650224-000 HOLDINGS SEARCH CUSIP 25468710

DIS US DISNEY (WALT) CO Page 1 / 100

Holder name	Portfolio Name	Source	Held	Percent Outstd	Latest Change	Filing Date
1BARCLAYS GLOBAL	BARCLAYS BANK PLC	13F	83,630M	4.095	1,750M	09/02
* 2CITIGROUP INC	CITIGROUP INCORPORAT	13F	62,857M	3.078	4,811M	09/02
* 3FIDELITY MANAGEM	FIDELITY MANAGEMENT	13F	56,125M	2.748	5,992M	09/02
4STATE STREET	STATE STREET CORPORA	13F	54,635M	2.675	2,239M	09/02
* 5SOUTHEASTRN ASST	SOUTHEASTERN ASSET M	13F	47,333M	2.318	14,604M	09/02
6ST FARM MU AUTO	STATE FARM MUTUAL AU	13F	41,938M	2.054	120,599	09/02
7VANGUARD GROUP	VANGUARD GROUP INC	13F	34,721M	1.700	-83,839	09/02
8MELLON BANK N A	MELLON BANK CORP	13F	32,693M	1.601	957,489	09/02
9PUTNAM INVEST	PUTNAM INVESTMENT MA	13F	28,153M	1.379	-11,468M	09/02
10LORD ABBETT & CO	LORD ABBETT & CO	13F	24,541M	1.202	5,385M	09/02
11MONTAG CALDWELL	MONTAG & CALDWELL IN	13F	24,466M	1.198	-11,373M	09/02
12DEUTSCHE BANK AK	DEUTSCHE BANK AG	13F	23,239M	1.138	-5,002M	09/02
13MORGAN STANLEY	MORGAN STANLEY	13F	19,655M	0.962	3,482M	09/02
14PRICE T ROWE	T ROWE PRICE ASSOCIA	13F	19,133M	0.937	2,925M	09/02
15ROY EDWARD DISNE	n/a	PROXY	17,547M	0.859	-126,710	12/01
16AXA FINANCIAL	ALLIANCE CAPITAL MAN	13F	14,283M	0.699	69,353	09/02
17JP MORGAN CHASE	JP MORGAN CHASE & CO	13F	14,209M	0.696	-462,791	09/02
Sub-totals for current page:			599,159M	29.340		

* Money market directory info available. Select portfolio, then hit IP<GO>.

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 212 1000 U.S. 1 212 318 2000
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Bloomberg

And the top investors in Deutsche and Aracruz…

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

Analyzing the investor bases…

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

The Market Portfolio

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

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.

The Risk of an Individual Asset

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

  Expected Return = Riskfree Rate+ Beta * (Expected Return on the Market Portfolio - Riskfree Rate)

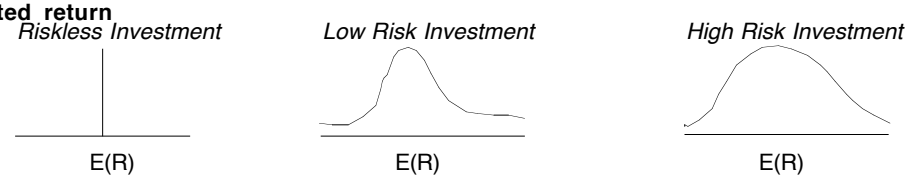
Limitations of the CAPM

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.

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



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

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

The marginal investor is assumed to hold a "diversified" portfolio. Thus, only market risk will be rewarded and priced.

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<u>market portfolio</u> **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)

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.

⌛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

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.

The Riskfree Rate and Time Horizon

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

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.

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.

What if there is no default-free entity?

- You could adjust the local currency government borrowing rate by the estimated default spread on the bond to arrive at a riskless local currency rate.
  - The default spread on the government bond can be estimated using the local currency ratings that are available for many countries.
  - For instance, assume that the Mexican 10-year peso bond has an interest rate of 8.85% and that the local currency rating assigned to the Mexican government is AA. If the default spread for AA rated bonds is 0.7%, the riskless nominal peso rate is 8.15%.
- Alternatively, you can analyze Mexican companies in U.S. dollars and use the U.S. treasury bond rate as your riskfree rate or in real terms and do all analysis without an inflation component.

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

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.

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 magnitude of wealth that each investor has. Thus, Warren Buffet's risk aversion counts more towards determining the "equilibrium" premium than yours' and mine.
- As investors become more risk averse, you would expect the "equilibrium" premium to increase.

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

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.

The Survey Approach

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

The Historical Premium Approach

- This is the default approach used by most to arrive at the premium to use in the model
- In most cases, this approach does the following
  - it defines a time period for the estimation (1928-Present, 1962-Present....)
  - it calculates average returns on a stock index during the period
    - it calculates average returns on a riskless security over the period
      - it calculates the difference between the two
      - and uses it as a premium looking forward
- The limitations of this approach are:
  - it assumes that the risk aversion of investors has not changed in a systematic way across time. (The risk aversion may change from year to year, but it reverts back to historical averages)
  - it assumes that the riskiness of the "risky" portfolio (stock index) has not changed in a systematic way across time.

Historical Average Premiums for the United States

	Arithmetic average		*Geometric Average*	
Historical Period	Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
1928-2007	7.78%	6.42%	5.94%	4.79%
1967-2007	5.94%	4.33%	4.75%	3.50%
1997-2007	5.26%	2.68%	4.69%	2.34%

- 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.

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

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.

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

- Ratings agencies such as S&P and Moody's assign ratings to countries that reflect their assessment of the default risk of these countries. These ratings reflect the political and economic stability of these countries and thus provide a useful measure of country risk. In September 2004, for instance, Brazil had a country rating of B2.
- If a country issues bonds denominated in a different currency (say dollars or euros), you can also see how the bond market views the risk in that country. In September 2004, Brazil had dollar denominated C-Bonds, trading at an interest rate of 10.01%. The US treasury bond rate that day was 4%, yielding a default spread of 6.01% for Brazil.
- Many analysts add this default spread to the US risk premium to come up with a risk premium for a country. Using this approach would yield a risk premium of 10.83% for Brazil, if we use 4.82% as the premium for the US.

Beyond the default spread

- Country ratings measure default risk. While default risk premiums and equity risk premiums are highly correlated, one would expect equity spreads to be higher than debt spreads. If we can compute how much more risky the equity market is, relative to the bond market, we could use this information. For example,
  - Standard Deviation in Bovespa (Equity) = 36%
  - Standard Deviation in Brazil C-Bond = 28.2%
  - Default spread on C-Bond = 6.01%
  - Country Risk Premium for Brazil = 6.01% (36%/28.2%) = 7.67%
- Note that this is on top of the premium you estimate for a mature market. Thus, if you assume that the risk premium in the US is 4.82% (1998-2003 average), the risk premium for Brazil would be 12.49%.

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

- You can back out an equity risk premium from stock prices:

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%

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

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).

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

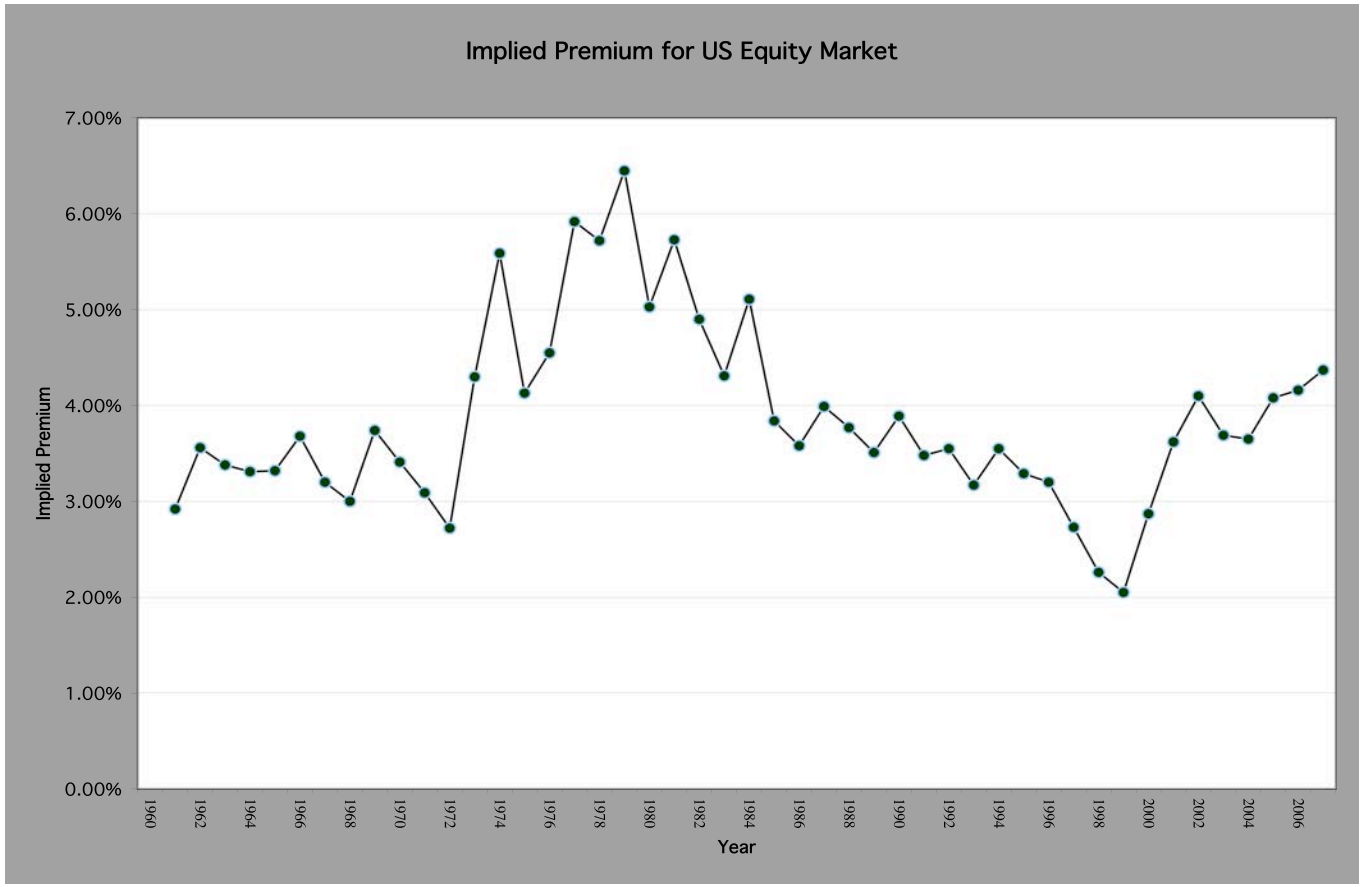
Solving for the implied premium…

- 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%

Implied Premiums in the US



⌛ Application Test: A Market Risk Premium

- Based upon our discussion of historical risk premiums so far, the risk premium looking forward should be:
  a) About 7.78%, which is what the arithmetic average premium has been since 1928, for stocks over T.Bills
  b) About 4.79%, which is the geometric average premium since 1928, for stocks over T.Bonds
  c) About 4.37%, which is the implied premium in the stock market today

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.

Estimating Performance

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

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

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

  $R_j = a \quad + b\,R_m$ ..... Regression Equation

- If

  $a > R_f\,(1\text{-}b)$ .... Stock did better than expected during regression period

  $a = R_f\,(1\text{-}b)$ .... Stock did as well as expected during regression period

  $a < R_f\,(1\text{-}b)$ .... Stock did worse than expected during regression period

- The difference between the intercept and $R_f\,(1\text{-}b)$ is <u>Jensen's alpha</u>. If it is positive, your stock did perform better than expected during the period of the regression.

Firm Specific and Market Risk

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

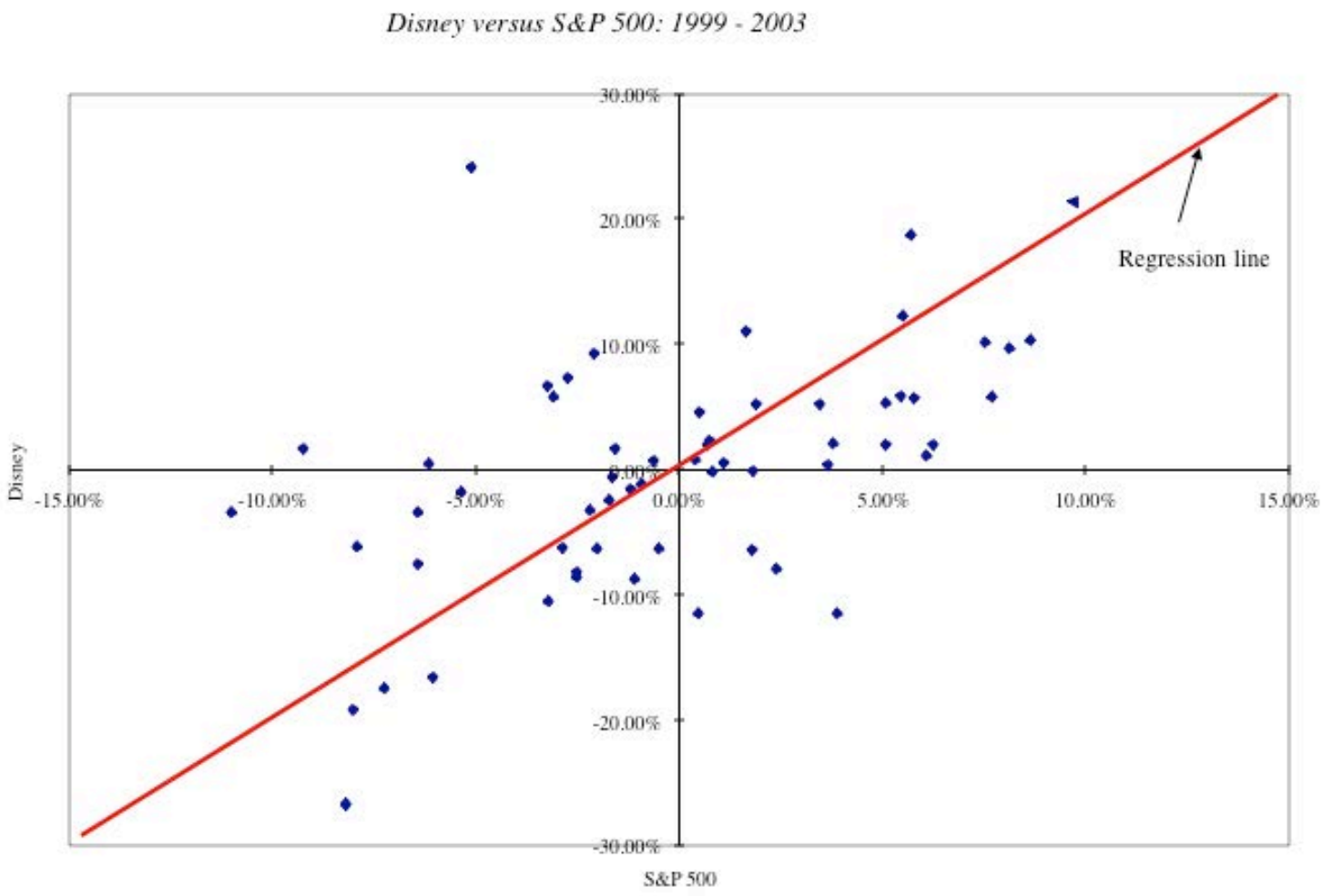
Setting up for the Estimation

- 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 = $(\text{Price}_{\text{End}} - \text{Price}_{\text{Beginning}} + \text{Dividends}_{\text{Period}}) / \text{Price}_{\text{Beginning}}$
  - Included dividends only in ex-dividend month
- Choose a market index, and estimate returns (inclusive of dividends) on the index for each interval for the period.

Choosing the Parameters: Disney

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

Disney's Historical Beta



The Regression Output

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

$$\text{Returns}_{\text{Disney}} = 0.0467\% + \underset{(0.20)}{1.01}\ \text{Returns}_{\text{S \& P 500}} \qquad (\text{R squared} = 29\%)$$

Analyzing Disney's Performance

- Intercept = 0.0467%
  - This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
  - Between 1999 and 2003,
    - Monthly Riskfree Rate = 0.313% (based upon average T.Bill rate: 99-03)
    - Riskfree Rate (1-Beta) = 0.313% (1-1.01) = -..0032%
- The Comparison is then between

Intercept	versus	Riskfree Rate (1 - Beta)
0.0467%	versus	0.313%(1-1.01)=-0.0032%

  - Jensen's Alpha = 0.0467% -(-0.0032%) = 0.05%
- Disney did 0.05% better than expected, per month, between 1999 and 2003.
  - Annualized, Disney's annual excess return = $(1.0005)^{12}$-1= 0.60%

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

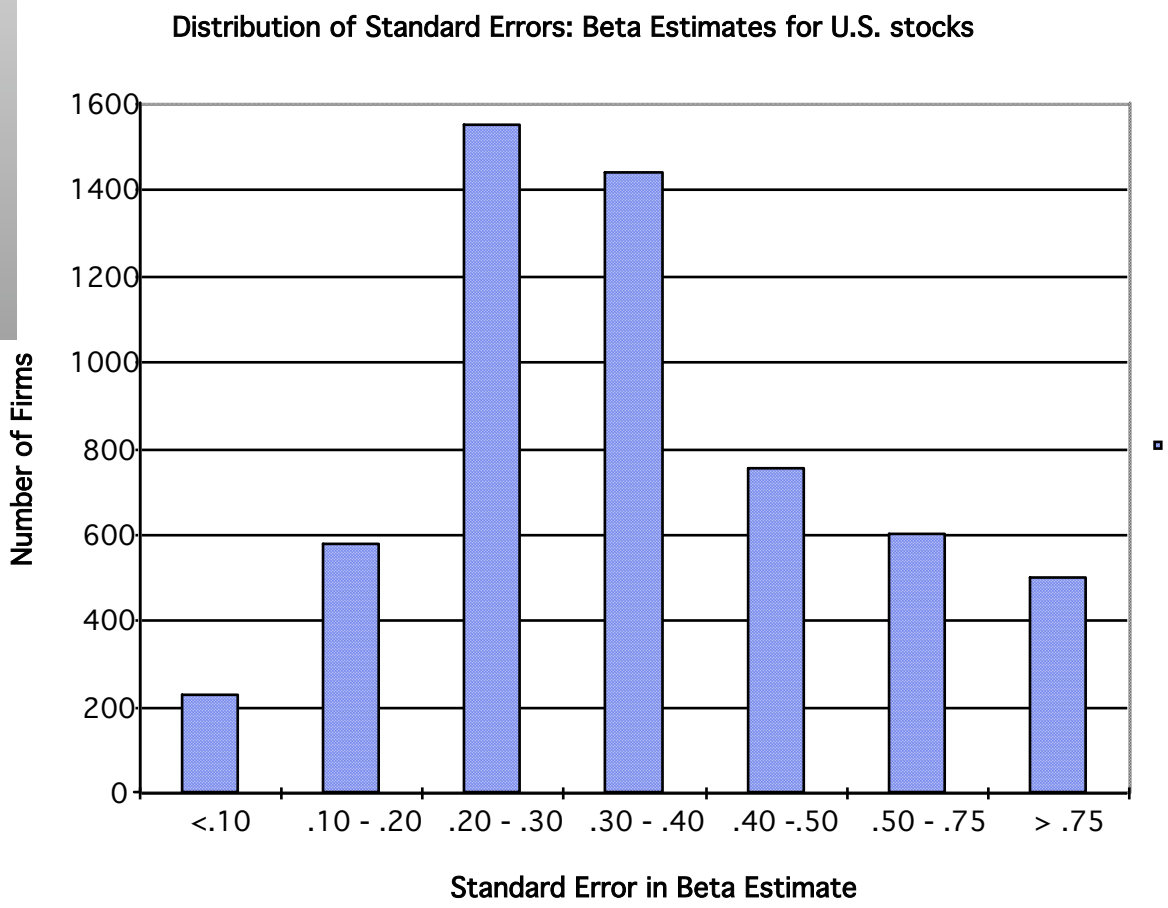
A positive Jensen's alpha… Who is responsible?

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

Estimating Disney's Beta

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

The Dirty Secret of "Standard Error"



Breaking down Disney's Risk

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

The Relevance of R Squared

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

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

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

Beta Estimation: Using a Service (Bloomberg)

<HELP> for explanation. N166 Equity BETA

HISTORICAL BETA

Number of points may be insufficient for an accurate beta.

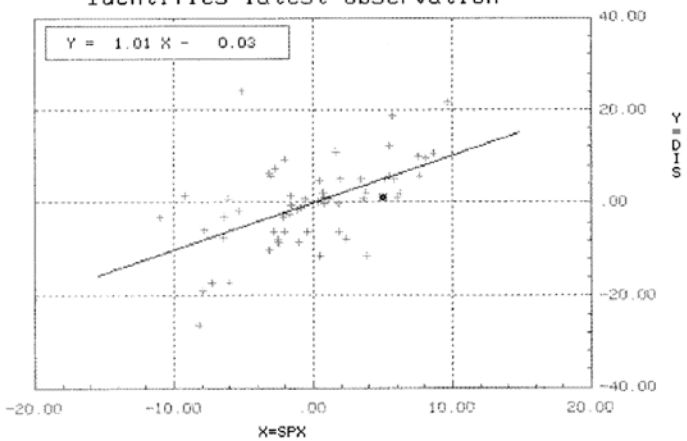
DIS US Equity — THE WALT DISNEY CO.

Relative Index SPX — S&P 500 INDEX

*Identifies latest observation

Period 1 Monthly
Range 1/29/99 To 12/31/03
Market 1 Trade

ADJ BETA	1.01
RAW BETA	1.01
Alpha(Intercept)	-0.03
R2 (Correlation)	0.29
Std Dev of Error	7.95
Std Error of Beta	0.21
Number of Points	59



ADJ BETA = (0.67) * RAW BETA
+ (0.33) * 1.0

Australia 61 2 9777 8600 Brazil 5511 3048 4500 Europe 44 20 7330 7500 Germany 49 69 920410
Hong Kong 852 2977 6000 Japan 81 3 3201 8900 Singapore 65 6212 1000 U.S. 1 212 318 2000 Copyright 2004 Bloomberg L.P.
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Estimating Expected Returns for Disney in September 2004

- Inputs to the expected return calculation
  - Disney's Beta = 1.01
  - Riskfree Rate = 4.00% (U.S. ten-year T.Bond rate)
  - Risk Premium = 4.82% (Approximate historical premium: 1928-2003)
- Expected Return = Riskfree Rate + Beta (Risk Premium)
  = 4.00% + 1.01(4.82%) = 8.87%

Use to a Potential Investor in Disney

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

a) This is the return that I can expect to make in the long term on Disney, if the stock is correctly priced and the CAPM is the right model for risk,

b) This is the return that I need to make on Disney in the long term to break even on my investment in the stock

c) Both

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

a) Buy the stock

b) Sell the stock

How managers use this expected return

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

Application Test: Analyzing the Risk Regression

- Using your Bloomberg risk and return print out, answer the following questions:
  - How well or badly did your stock do, relative to the market, during the period of the regression?

    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?

    Riskless Rate + Beta * Risk Premium

A Quick Test

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

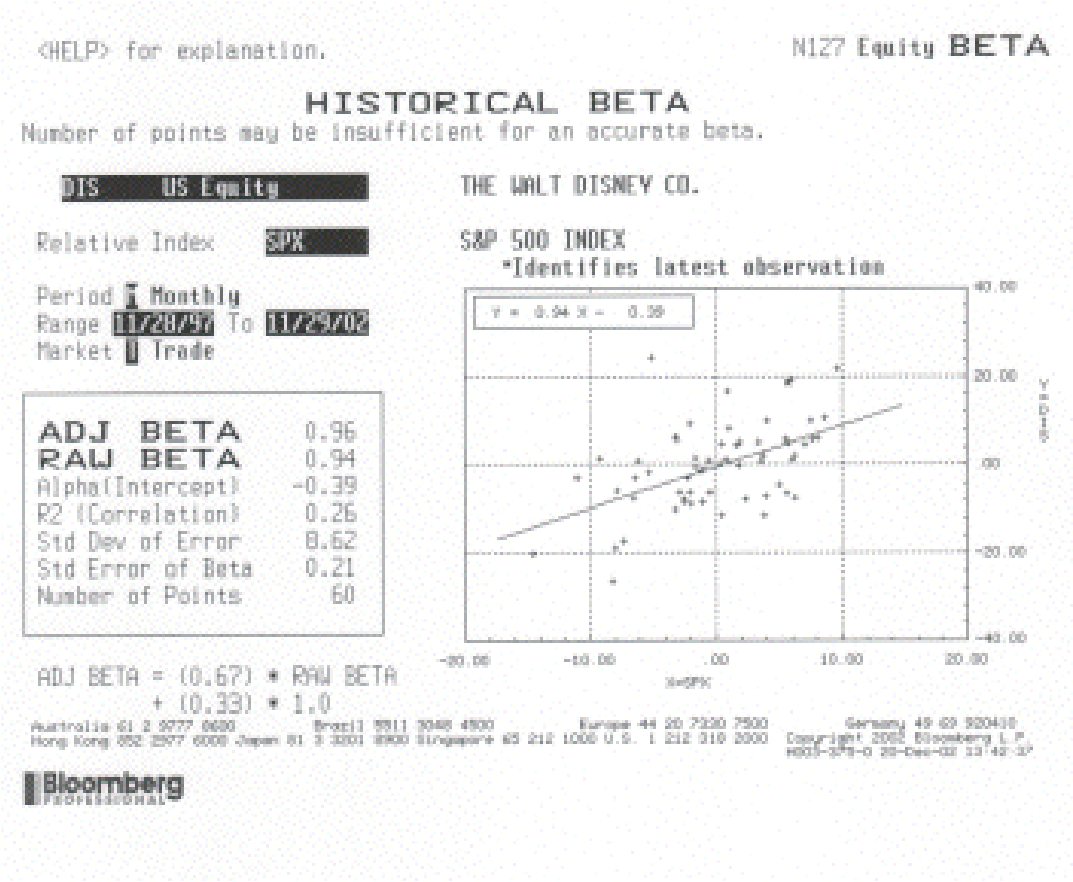
How do you bring your beta down?

Should you focus your attention on bringing your beta down?

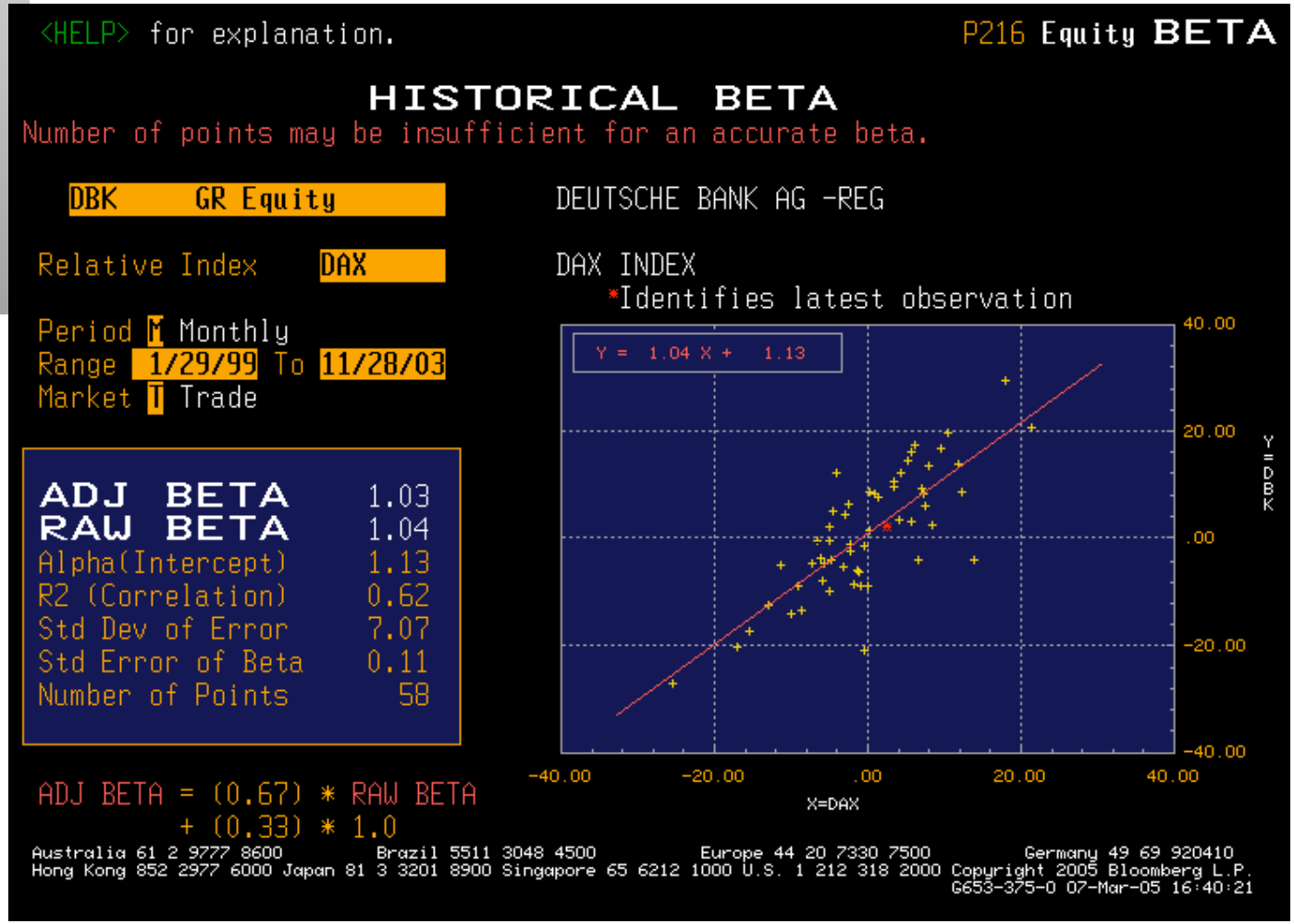
a) Yes
b) No

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

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



Beta Estimation and Index Choice: Deutsche Bank



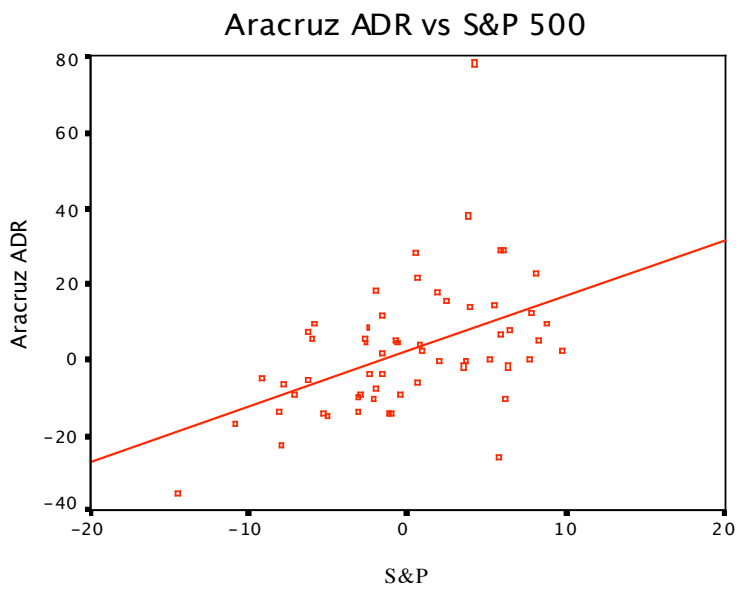
A Few Questions

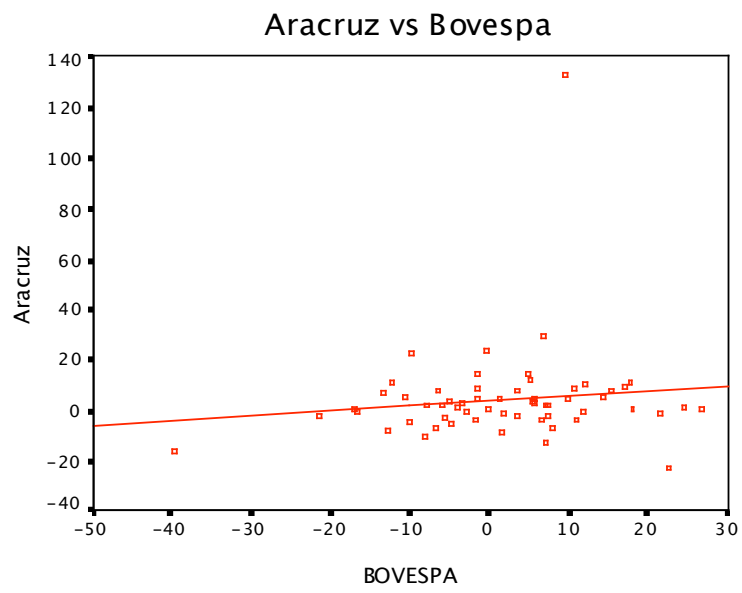
- The R squared for Deutsche Bank is very high (62%), at least relative to U.S. firms. Why is that?
- The beta for Deutsche Bank is 1.04.
  - Is this an appropriate measure of risk?
  - If not, why not?
- If you were an investor in primarily U.S. stocks, would this be an appropriate measure of risk?

Deutsche Bank: Alternate views of Risk

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

Aracruz's Beta?





Aracruz ADR = 2.80% + 1.00 S&P

Aracruz = 2.62% + 0.22 Bovespa

Beta: Exploring Fundamentals

	Real Networks: 3.24
	Qwest Communications: 2.60
Beta > 1	
	Microsoft: 1..25
	General Electric: 1.10
Beta = 1	
	Enron: 0.95
	Philip Morris: 0.65
Beta < 1	
	Exxon Mobil: 0.40
Beta = 0	
	Harmony Gold Mining: - 0.10

Determinant 1: Product Type

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

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

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.

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.

Disney's Operating Leverage: 1987- 2003

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

Reading Disney's Operating Leverage

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

A Test

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

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

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

Equity Betas and Leverage

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

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

where

β_L = Levered or Equity Beta

β_u = Unlevered Beta

t = Corporate marginal tax rate

D = Market Value of Debt

E = Market Value of Equity

Effects of leverage on betas: Disney

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

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

  = 1.01 / (1 + (1 - 0.373)) (0.275) = 0.8615

Disney : Beta and Leverage

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

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.

The Disney/Cap Cities Merger: Pre-Merger

Disney:

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

ABC:

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

Disney Cap Cities Beta Estimation: Step 1

- Calculate the unlevered betas for both firms
  - Disney's unlevered beta = 1.15/(1+0.64*0.10) = 1.08
  - Cap Cities unlevered beta = 0.95/(1+0.64*0.03) = 0.93
- Calculate the unlevered beta for the combined firm
  - Unlevered Beta for combined firm

  = 1.08 (34286/53401) + 0.93 (19115/53401)

  = 1.026

  [Remember to calculate the weights using the <u>firm values (and not just the equity values)</u> of the two firms]

Disney Cap Cities Beta Estimation: Step 2

- If Disney had used all equity to buy Cap Cities
  - Debt = $ 615 + $ 3,186 = $ 3,801 million
  - Equity = $ 18,500 + $ 31,100 = $ 49,600
  - D/E Ratio = 3,801/49600 = 7.66%
  - New Beta = 1.026 (1 + 0.64 (.0766)) = 1.08
- Since Disney borrowed $ 10 billion to buy Cap Cities/ABC
  - Debt = $ 615 + $ 3,186 + $ 10,000 = $ 13,801 million
  - Equity = $ 39,600
  - D/E Ratio = 13,801/39600 = 34.82%
  - New Beta = 1.026 (1 + 0.64 (.3482)) = 1.25

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.

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

Disney's business breakdown

Unlevered Beta
(1 - Cash/ Firm Value)

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

Disney's bottom up beta

$$\text{EV/Sales} = \frac{(\text{Market Value of Equity} + \text{Debt} - \text{Cash})}{\text{Sales}}$$

Estimated by looking at comparable firms

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

Disney's Cost of Equity

Riskfree Rate = 4%
Risk Premium = 4.82%

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

Discussion Issue

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

Estimating Aracruz's Bottom Up Beta

Comparables	*No*	*Avg β*	*D/E*	β_{Unlev}	*Cash/Val*	$\beta_{Correct}$
Emerging Markets	111	0.6895	38.33%	0.5469	6.58%	0.585
US	34	0.7927	83.57%	0.5137	2.09%	0.525
Global	288	0.6333	38.88%	0.5024	6.54%	0.538

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

  Unlevered Beta for Aracruz = (0.9293) (0.585) + (0.0707) (0) = 0.5440

- Using Aracruz's gross D/E ratio of 44.59% & a tax rate of 34%:

  Levered Beta for Aracruz as a company = 0.5440 (1+ (1-.34) (.4459)) = 0.7040

- The levered beta for just the paper business can also be computed:

  Levered Beta for paper business = 0.585 (1+ (1-.34) (.4459))) = 0.7576

Aracruz: Cost of Equity Calculation

- We will use a risk premium of 12.49% in computing the cost of equity, composed of the U.S. historical risk premium (4.82% from 1928-2003 time period) and the Brazil country risk premium of 7.67% (estimated earlier in the package)
- U.S. $ Cost of Equity

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

  = 4% + 0.7040 (12.49%) = 12.79%
- Real Cost of Equity

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

  = 2% + 0.7040 (12.49%) = 10.79%
- Nominal BR Cost of Equity

  Cost of Equity =

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

Estimating Bottom-up Beta: Deutsche Bank

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

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

Estimating Betas for Non-Traded Assets

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

Using comparable firms to estimate beta for Bookscape

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

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

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

Estimating Bookscape Levered Beta and Cost of Equity

- Since the debt/equity ratios used are market debt equity ratios, and the only debt equity ratio we can compute for Bookscape is a book value debt equity ratio, we have assumed that Bookscape is *close to the industry average* debt to equity ratio of 20.33%.
- Using a marginal tax rate of 40% (based upon personal income tax rates) for Bookscape, we get a levered beta of 0.82.

  Levered beta for Bookscape = 0.7346 (1 +(1-.40) (.2033)) = 0.82
- Using a riskfree rate of 4% (US treasury bond rate) and a historical risk premium of 4.82%:

  Cost of Equity = 4% + 0.82 (4.82%) = 7.95%

Using Accounting Earnings to Estimate Beta

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

The Accounting Beta for Bookscape

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

  Bookscape Earnings Change = 0.1003 + 0.7329 (S & P 500 Earnings Change)

  Based upon this regression, the beta for Bookscape's equity is 0.73.

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

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

  Cost of equity = 4% + 0.73 (4.82%) = 7.52%

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

Total Risk versus Market Risk

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

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

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

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

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

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.

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

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.

Estimating the Cost of Debt

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

Estimating Synthetic Ratings

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

  Interest Coverage Ratio = EBIT / Interest Expenses

- In 2003, Bookscape had operating income of $ 2 million and interest expenses of 500,000. The resulting interest coverage ratio is 4.00.
  - Interest coverage ratio = 2,000,000/500,000 = 4.00
- In 2003, Disney had operating income of $2,805 million and modified interest expenses of $ 758 million:
  - Interest coverage ratio = 2805/758 = 3.70
- In 2003, Aracruz had operating income of 887 million BR and interest expenses of 339 million BR
  - Interest coverage ratio = 887/339 = 2.62

Interest Coverage Ratios, Ratings and Default Spreads: Small Companies

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

Bookscape

Interest Coverage Ratios, Ratings and Default Spreads: Large Companies

Interest Coverage Ratio	Rating	Default Spread	
>8.5	AAA	0.35%	
6.50-8.50	AA	0.50%	
5.5-6.5	A+	0.70%	
4.25-5.5	A	0.85%	
3-4.25	A-	1.00%	Disney
2.5-3	BBB	1.50%	
2.25-2.5	BB+	2.00%	Aracruz
2-2.25	BB	2.50%	
1.75-2	B+	3.25%	
1.5-1.75	B	4.00%	
1.25-1.5	B-	6.00%	
0.8-1.25	CCC	8.00%	
0.65-0.80	CC	10.00%	
0.2-0.65	C	12.00%	
<0.2	D	20.00%	

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 A-, whereas its actual rating is BBB+. 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 2003 operating income whereas actual rating reflects normalized earnings
- Aracruz's synthetic rating is BBB, but its actual rating for dollar debt is B+. The biggest factor behind the difference is the presence of country risk. In fact, Aracruz has a local currency rating of BBB-, closer to the synthetic rating.

Estimating Cost of Debt

- For Bookscape, we will use the synthetic rating to estimate the cost of debt:
  - Rating based on interest coverage ratio = BBB
  - Default Spread based upon rating = 1.50%
  - Pre-tax cost of debt = Riskfree Rate + Default Spread = 4% + 1.50% = 5.50%
  - After-tax cost of debt = Pre-tax cost of debt (1- tax rate) = 5.50% (1-.40) = 3.30%
- For the three publicly traded firms in our sample, we will use the actual bond ratings to estimate the costs of debt:

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

Application Test: Estimating a Cost of Debt

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

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.

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.

Estimating Market Value Weights

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

Estimated MV of Disney Debt =

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

PV of Annuity, r=5.25%, n=11.53 yrs

Converting Operating Leases to Debt

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

Operating Leases at Disney

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

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

- Debt outstanding at Disney

= MV of Interest bearing Debt + PV of Operating Leases

= $12,915 + $ 1,753= $14,668 million

⌛ Application Test: Estimating Market Value

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

Current Cost of Capital: Disney

- Equity
  - Cost of Equity = Riskfree rate + Beta * Risk Premium = 4% + 1.25 (4.82%) = 10.00%
  - Market Value of Equity = $55.101 Billion
  - Equity/(Debt+Equity) = 79%
- Debt
  - After-tax Cost of debt =(Riskfree rate + Default Spread) (1-t)
    = (4%+1.25%) (1-.373) = 3.29%
  - Market Value of Debt = $ 14.668 Billion
  - Debt/(Debt +Equity) = 21%
- Cost of Capital = 10.00%(.79)+3.29%(.21) = 8.59%

↗

55.101(55.101+14.668)

Disney's Divisional Costs of Capital

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

Aracruz's Cost of Capital

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

Bookscape Cost of Capital

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

⌛ Application Test: Estimating Cost of Capital

- Using the bottom-up unlevered beta that you computed for your firm, and the values of debt and equity you have estimated for your firm, estimate a bottom-up levered beta and cost of equity for your firm.

- Based upon the costs of equity and debt that you have estimated, and the weights for each, estimate the cost of capital for your firm.

- How different would your cost of capital have been, if you used book value weights?

Choosing a Hurdle Rate

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

Back to First Principles

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

Measuring Investment Returns

"Show me the money"

from *Jerry Maguire*

First Principles

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  - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Measures of return: earnings versus cash flows

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

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"

Earnings versus Cash Flows: A Disney Theme Park

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

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.

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

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.

Depreciation and Capital Maintenance

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

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

Other Assumptions

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

Earnings on Project

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

And the Accounting View of Return

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

What should this return be compared to?

- The computed return on capital on this investment is 4.23%. 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 4% (T. Bond rate)
  - The cost of equity for Disney as a company (10%) (See page 178)
  - The cost of equity for Disney theme parks (9.12%) (See page 178)
  - The cost of capital for Disney as a company (8.59%) (See page 178)
  - The cost of capital for Disney theme parks (7.90%) (See page 178)
  - None of the above

Estimating a hurdle rate for the theme park

- We did estimate a cost of equity of 9.12% for the Disney theme park business, using a bottom-up levered beta of 1.0625 for the business.
- This cost of equity may not adequately reflect the additional risk associated with the theme park being in an emerging market.
- To count this risk, we compute the cost of equity for the theme park using a risk premium that includes a country risk premium for Thailand:
  - The rating for Thailand is Baa1 and the default spread for the country bond is 1.50%.
  - Multiplying this by the relative volatility of 2.2 of the equity market in Thailand (standard deviation of equity/standard deviation of country bond) yields a country risk premium of 3.3%.

    Cost of Equity in US $= 4% + 1.0625 (4.82% + 3.30%) = 12.63%

    Cost of Capital in US $ = 12.63% (.7898) + 3.29% (.2102) = 10.66%

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 Thailand (or any other emerging market)

Would lead us to conclude that...

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

From Project to Firm Return on Capital: Disney in 2003

- Just as a comparison of project return on capital to the cost of capital yields a measure of whether the project is acceptable, a comparison can be made at the firm level, to judge whether the existing projects of the firm are adding or destroying value.
- Disney, in 2003, had earnings before interest and taxes of $2,713 million, had a book value of equity of $23,879 million and a book value of debt of 14,130 million. With a tax rate of 37.3%, we get

  Return on Capital = 2713(1-.373)/ (23879+14130) = 4.48%

  Cost of Capital for Disney= 8.59%

  Excess Return = 4.48%-8.59% = -4.11%
- This can be converted into a dollar figure by multiplying by the capital invested, in which case it is called economic value added

  EVA = (.0448-.0859) (23879+14130) = -$1,562 million

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

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

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

Return Spread = After-tax ROC - Cost of Capital

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

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

The cash flow view of this project..

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

To get from income to cash flow, we

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

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

  Tax Benefit in year 2 = $ 537 million (.373) = $ 200 million

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

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

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

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.

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

The Working Capital Effect

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

The incremental cash flows on the project

$ 500 million has already been spent

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

2/3rd of allocated G&A is fixed.
Add back this amount (1-t)
Tax rate = 37.3%

To get from cash flow to incremental cash flows, we

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

Sunk Costs

- Any expenditure that has already been incurred, and cannot be recovered (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 should not be considered since they are not incremental.

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?

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.

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
6	$1,500	$300

What percentage of the G&A cost is variable?

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

Present Value Mechanics

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

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

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)
    =663 (1.02) /(.1066-.02) = $ 7,810 million

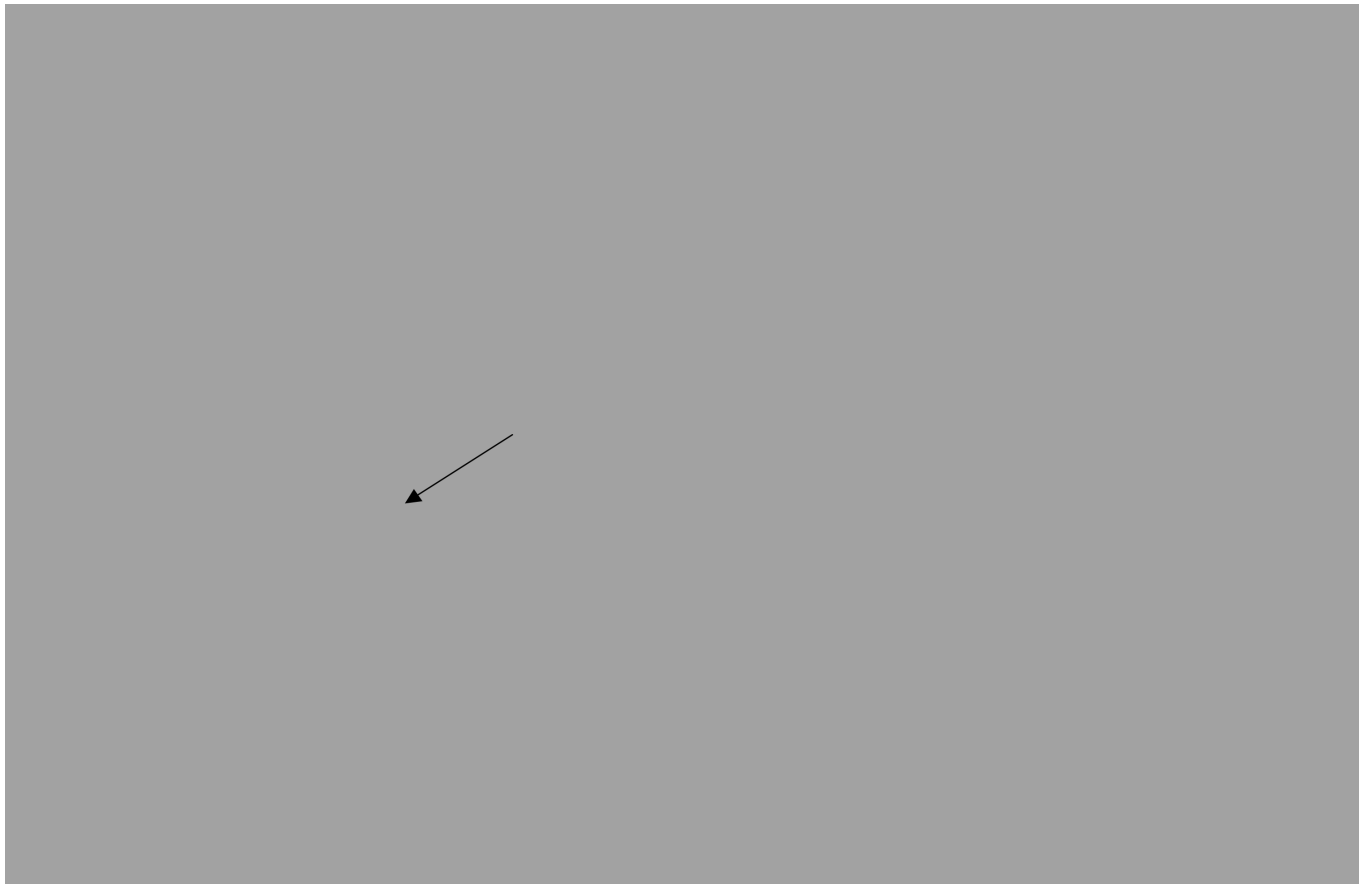
Which yields a NPV of..

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

Which makes the argument that..

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

The IRR of this project



The IRR suggests..

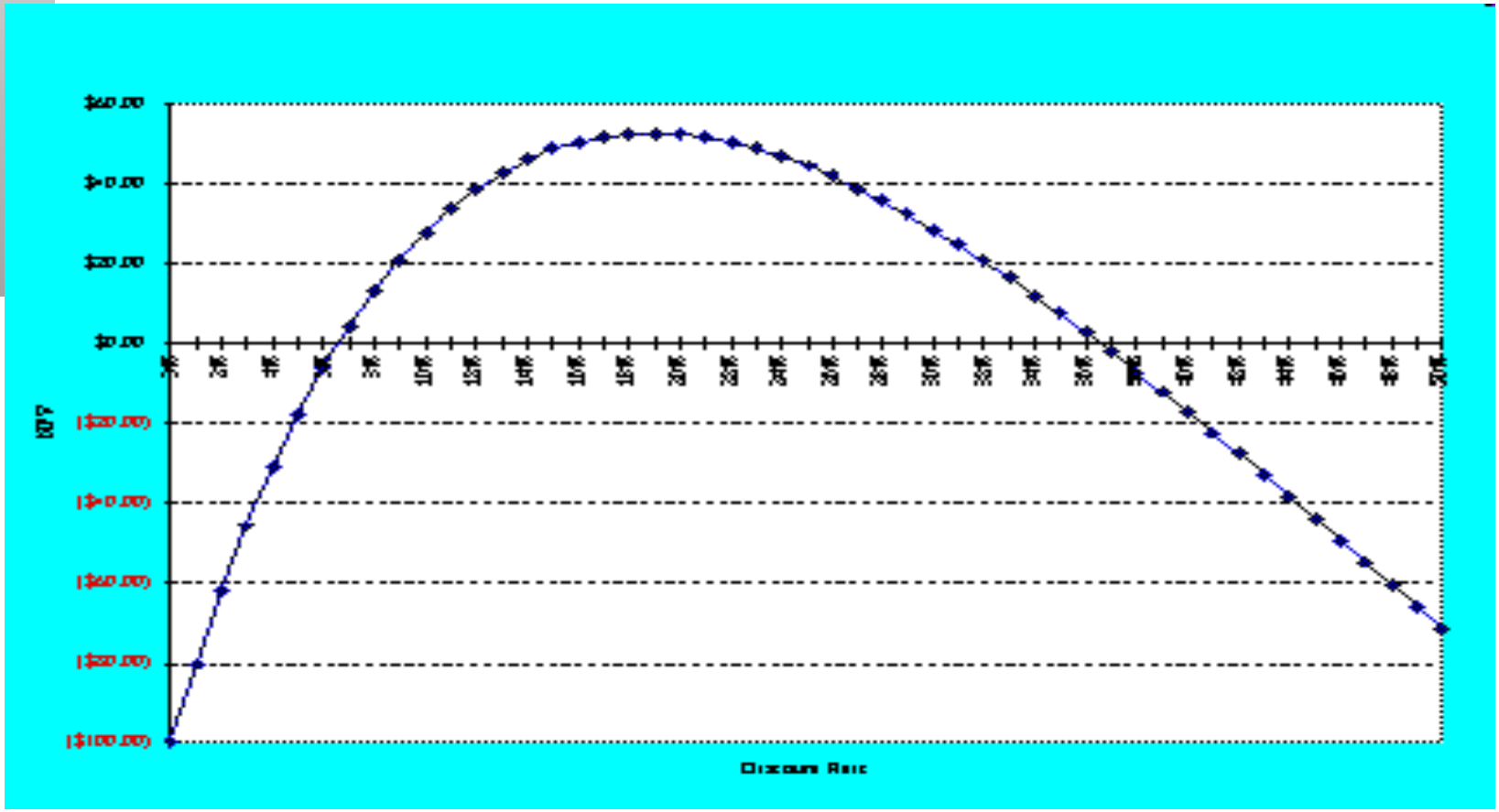
- **The project is a good one**. Using time-weighted, incremental cash flows, this project provides a return of 11.97%. This is greater than the cost of capital of 10.66%.
- The IRR and the NPV will yield **similar results** most of the time, though there are differences between the two approaches that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

Case 1: IRR versus NPV

- Consider a project with the following cash flows:

Year	*Cash Flow*
0	-1000
1	800
2	1000
3	1300
4	-2200

Project's NPV Profile



What do we do now?

- This project has two internal rates of return. The first is 6.60%, whereas the second is 36.55%.
- Why are there two internal rates of return on this project?

- If your cost of capital is 12%, would you accept or reject this project?
  a) I would reject the project
  b) I would accept this project

Explain.

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%

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?

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.

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

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.

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%

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?

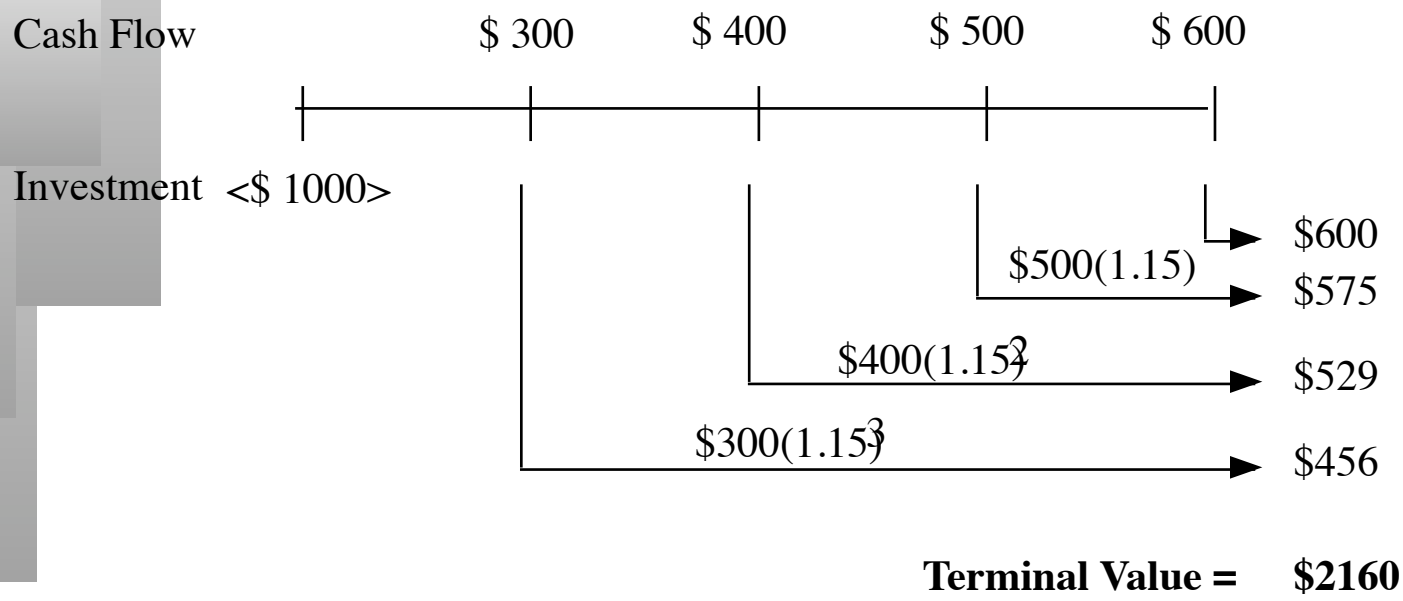
Which one would you pick?

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, 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.

Solution to Reinvestment Rate Problem



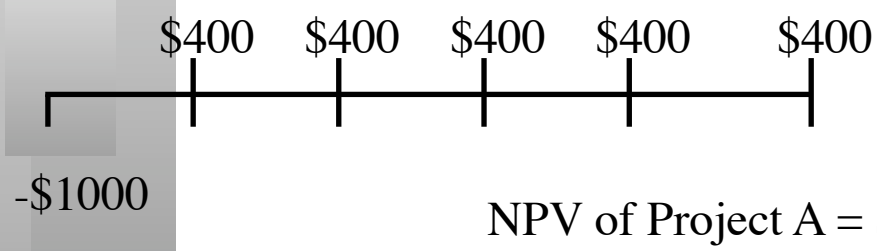
Internal Rate of Return = 24.89%
Modified Internal Rate of Return = 21.23%

Why NPV and IRR may differ..

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

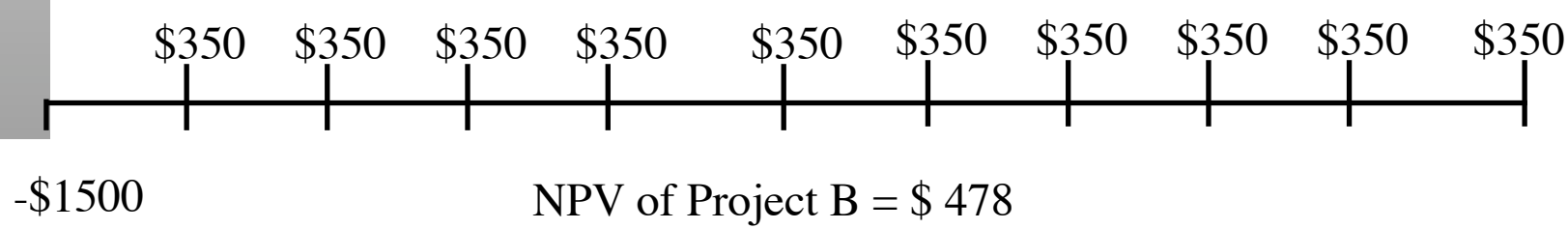
Case 4: NPV and Project Life

Project A



NPV of Project A = $ 442

Project B



NPV of Project B = $ 478

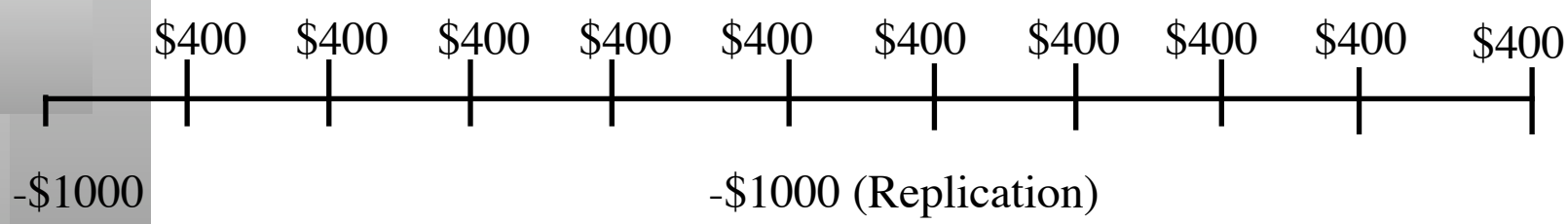
Hurdle Rate for Both Projects = 12%

Choosing Between Mutually Exclusive Projects

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

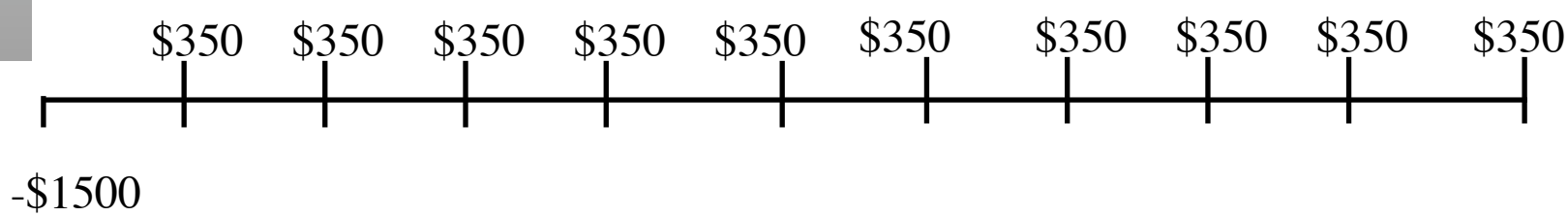
Solution 1: Project Replication

Project A: Replicated



NPV of Project A replicated = $ 693

Project B



NPV of Project B= $ 478

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

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

What firms actually use ..

Decision Rule	*% of Firms using as primary decision rule in*		
	1976	1986	1998
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%

The Disney Theme Park: The Risks of International Expansion

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

Domestic versus international expansion

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

The "Consistency Rule" for Cash Flows

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

Disney Theme Park: Project Analysis in Baht

- The inflation rates were assumed to be 10% in Thailand and 2% in the United States. The Baht/dollar rate at the time of the analysis was 42.09 BT/dollar.
- The expected exchange rate was derived assuming purchasing power parity.

  Expected Exchange Rate_t = Exchange Rate today * $(1.10/1.02)^t$
- The expected growth rate after year 10 is still expected to be the inflation rate, but it is the 10% Thai inflation rate.
- The cost of capital in Baht was derived from the cost of capital in dollars and the differences in inflation rates:

  Baht Cost of Capital =

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

Disney Theme Park: Thai Baht NPV

Discount back at 19.34%

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

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

NPV is equal to NPV in dollar terms

Dealing with Inflation

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

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

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

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

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

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.

The Hurdle Rate

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

Real Cost of Equity = 2% + 0.7576 (12.49%) = 11.46%

Breaking down debt payments by year

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

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

A ROE Analysis

e	Beg. BV: Assets	Depreciation	Capital Exp.	Ending BV: Assets	BV of Working Capital	Debt	BV: Equity	Average BV: Equity	ROE
	0	0	250,000	250,000	35,100	100,000	185,100		
	250,000	35,000	0	215,000	37,800	92,142	160,658	172,879	5.75%
1	215,000	28,000	0	187,000	40,500	83,871	143,629	152,144	13.26%
0	187,000	22,400	0	164,600	42,750	75,166	132,184	137,906	21.39%
3	164,600	17,920	0	146,680	42,750	66,004	123,426	127,805	29.12%
5	146,680	14,336	50,000	182,344	42,750	56,361	168,733	146,079	27.31%
3	182,344	21,469	0	160,875	42,750	46,212	157,413	163,073	21.78%
4	160,875	21,469	0	139,406	42,750	35,530	146,626	152,020	23.60%
4	139,406	21,469	0	117,938	42,750	24,287	136,400	141,513	25.61%
4	117,938	21,469	0	96,469	42,750	12,454	126,764	131,582	27.84%
4	96,469	21,469	0	75,000	0	0	75,000	100,882	36.72%
									23.24%

Real ROE of 23.24% is greater than

Real Cost of Equity of 11.46%

From Project ROE to Firm ROE

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

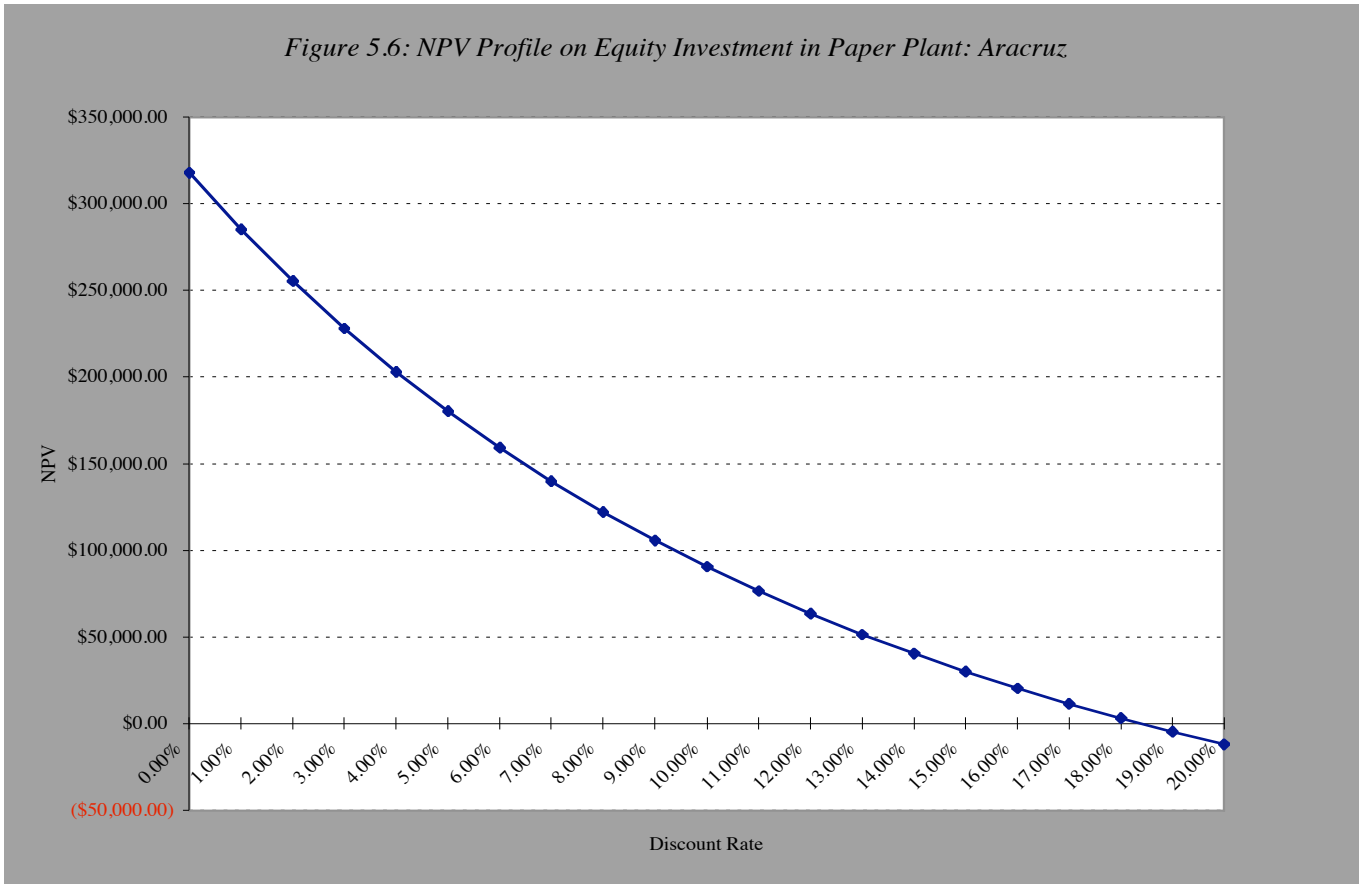
An Incremental CF Analysis

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

An Equity NPV

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

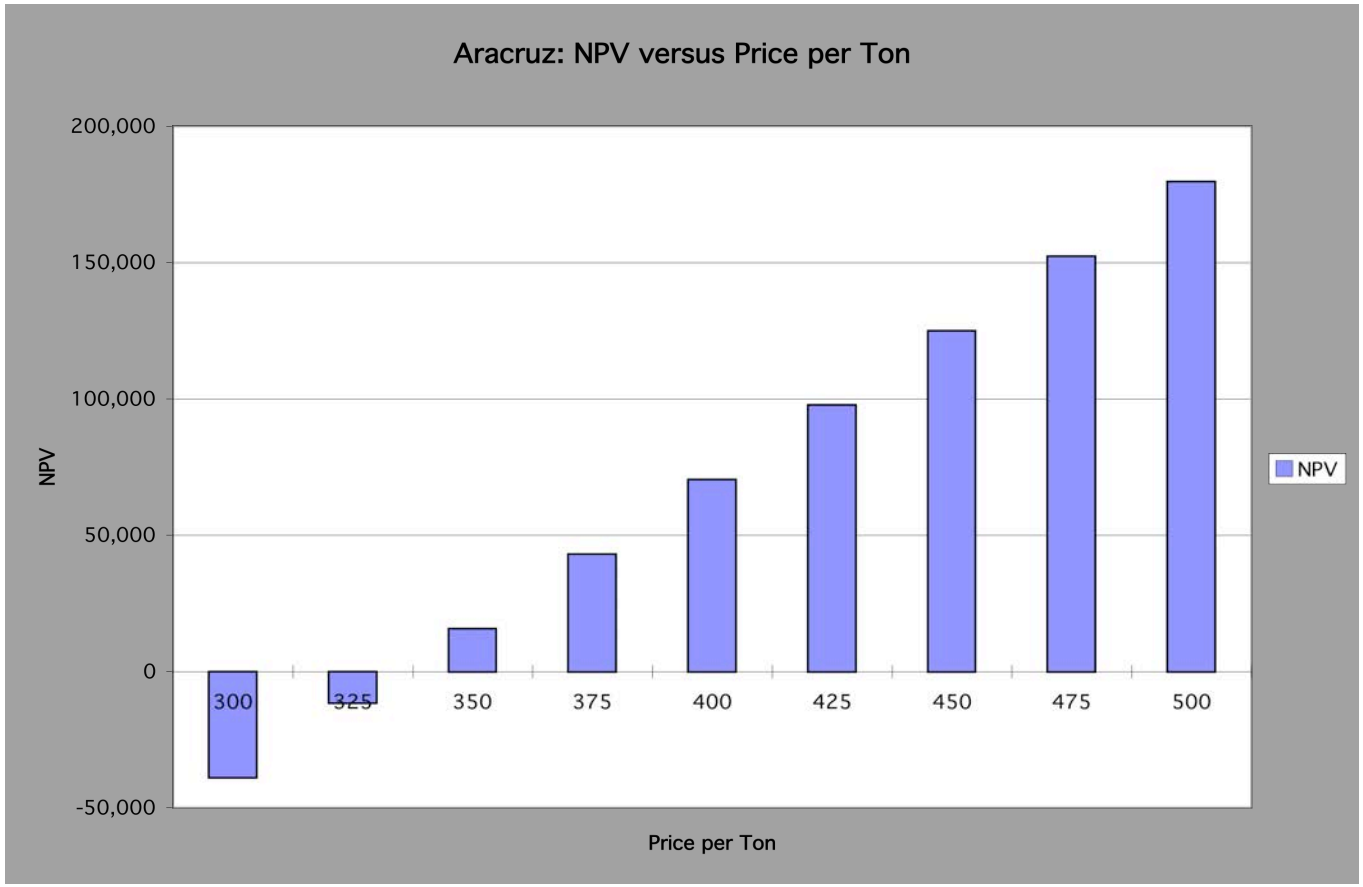
An Equity IRR



The Role of Sensitivity Analysis

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

Viability of Paper Plant: Sensitivity to Price per Ton



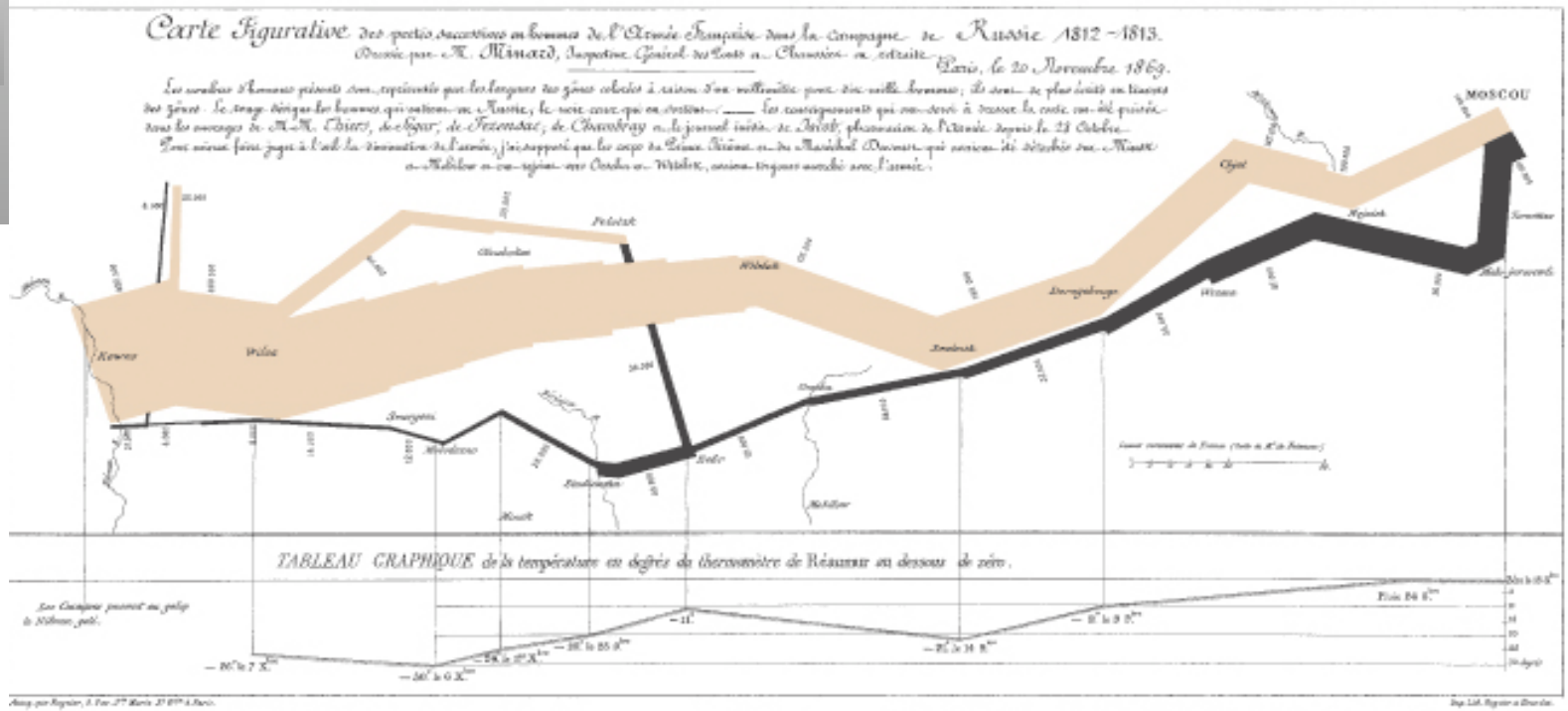
What does sensitivity analysis tell us?

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

a) Yes
b) No

Explain.

Make your ‘what if” analysis meaningful…



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.

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.

Case 1: Opportunity Costs

- Assume that Disney owns land in Bangkok already. This land is undeveloped and was acquired several years ago for $ 5 million for a hotel that was never built. It is anticipated, if this theme park is built, that this land will be used to build the offices for Disney Bangkok. The land currently can be sold for $ 40 million, though that would create a capital gain (which will be taxed at 20%). In assessing the theme park, which of the following would you do:
  a) Ignore the cost of the land, since Disney owns its already
  b) Use the book value of the land, which is $ 5 million
  c) Use the market value of the land, which is $ 40 million
  d) Other:

Case 2: Excess Capacity

- In the Aracruz example, assume that the firm will use its existing distribution system to service the production out of the new paper plant. The new plant manager argues that there is no cost associated with using this system, since it has been paid for already and cannot be sold or leased to a competitor (and thus has no competing current use). Do you agree?
  a) Yes
  b) No

Case 3: 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%.

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

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

Product and Project Cannibalization: A Real Cost?

Assume that in the Disney theme park example, 20% of the revenues at the Bangkok Disney park are expected to come from people who would have gone to Disneyland in Anaheim, California. In doing the analysis of the park, you would

a) Look at only incremental revenues (i.e. 80% of the total revenue)
b) Look at total revenues at the park
c) Choose an intermediate number

Would your answer be different if you were analyzing whether to introduce a new show on the Disney cable channel on Saturday mornings that is expected to attract 20% of its viewers from ABC (which is also owned by Disney)?

a) Yes
b) No

Project Synergies

- A project may provide benefits for other projects within the firm. If this is the case, these benefits have to be valued and shown in the initial project analysis.
- Consider, for instance, a typical Disney animated movie. Assume that it costs $ 50 million to produce and promote. This movie, in addition to theatrical revenues, also produces revenues from
  - the sale of merchandise (stuffed toys, plastic figures, clothes ..)
  - increased attendance at the theme parks
  - stage shows (see “Beauty and the Beast” and the “Lion King”)
  - television series based upon the movie

Adding a Café: Bookscape

- The initial cost of remodeling a portion of the store to make it a cafe, and of buying equipment is expected to be $150,000. This investment is expected to have a life of 5 years, during which period it will be depreciated using straight line depreciation. None of the cost is expected to be recoverable at the end of the five years.
- The revenues in the first year are expected to be $ 60,000, growing at 10% a year for the next four years.
- There will be one employee, and the total cost for this employee in year 1 is expected to be $30,000 growing at 5% a year for the next 4 years.
- The cost of the material (food, drinks ..) needed to run the cafe is expected to be 40% of revenues in each of the 5 years.
- An inventory amounting to 5% of the revenues has to be maintained; investments in the inventory are made at the beginning of each year.
- The tax rate for Bookscape as a business is 40% and the cost of capital for Bookscape is 12.14%.

NPV of Café: Stand alone analysis

	0	1	2	3	4	5
Investment	- $ 150,000					
Revenues		$60,000	$66,000	$72,600	$79,860	$87,846
Labor		$30,000	$31,500	$33,075	$34,729	$36,465
Materials		$24,000	$26,400	$29,040	$31,944	$35,138
Depreciation		$30,000	$30,000	$30,000	$30,000	$30,000
Operating Income		-$24,000	-$21,900	-$19,515	-$16,813	-$13,758
Taxes		-$9,600	-$8,760	-$7,806	-$6,725	-$5,503
AT Operating Income		-$14,400	-$13,140	-$11,709	-$10,088	-$8,255
+ Depreciation		$30,000	$30,000	$30,000	$30,000	$30,000
- Δ Working Capital	$3,000	$300	$330	$363	$399	-$4,392
Cash Flow to Firm	-$153,000	$15,300	$16,530	$17,928	$19,513	$26,138
PV at 12.14%	-$153,000	$13,644	$13,146	$12,714	$12,341	$14,742
Net Present Value	-$86,413					

The side benefits

- Assume that 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%.

	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 CF @ 12.14%	$25,861	$25,369	$24,886	$24,412	$23,947
Net Present Value	$124,474				

- The net present value of the added benefits is $124,474. Added to the NPV of the standalone Café of -86,413 yields a net present value of $38,061.

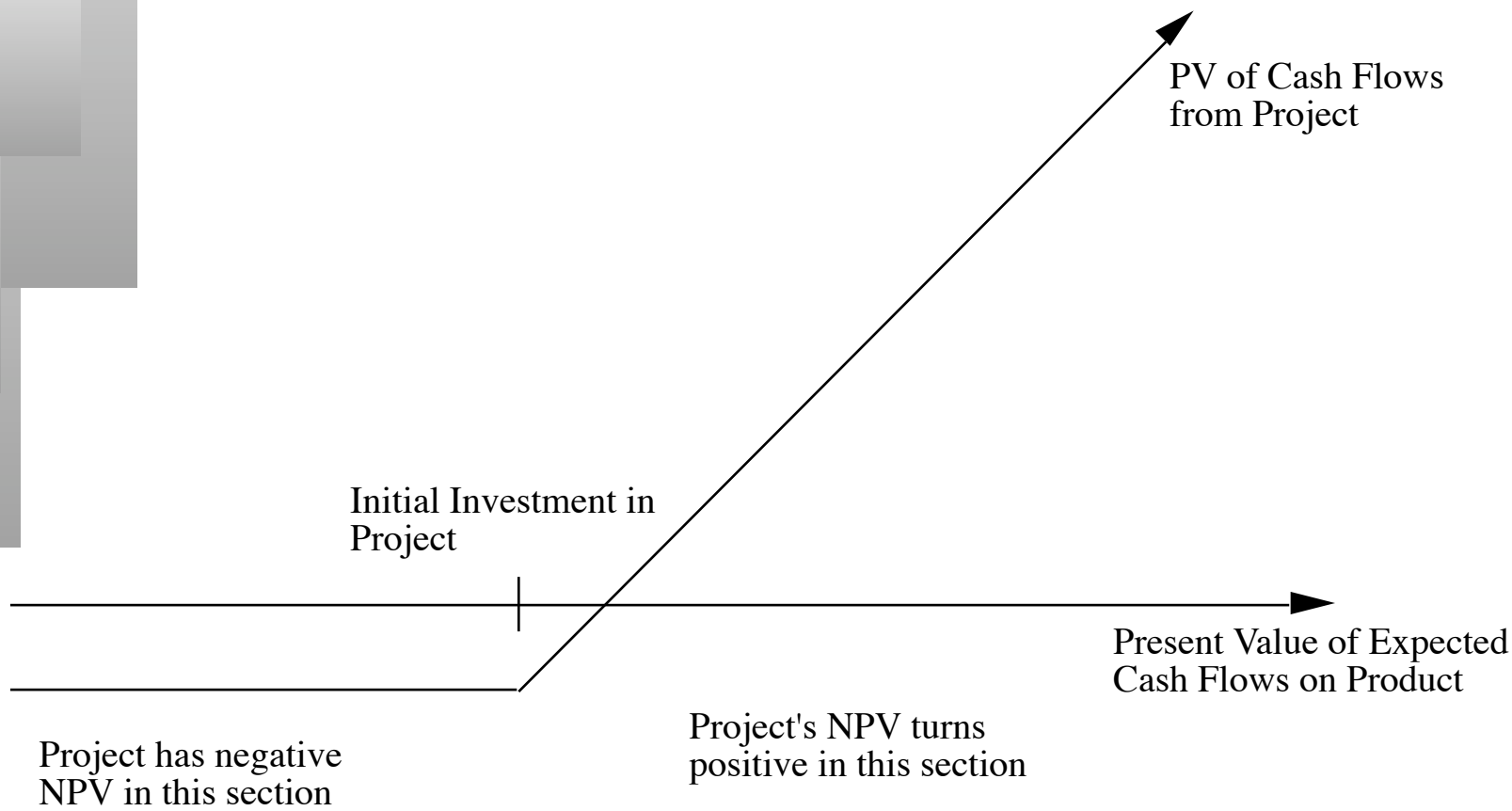
Project Options

- One of the limitations of traditional investment analysis is that it is static and does not do a good job of capturing the options embedded in investment.
  - The first of these options is the option to delay taking a project, when a firm has exclusive rights to it, until a later date.
  - The second of these options is taking one project may allow us to take advantage of other opportunities (projects) in the future
  - The last option that is embedded in projects is the option to abandon a project, if the cash flows do not measure up.
- These options all add value to projects and may make a "bad" project (from traditional analysis) into a good one.

The Option to Delay

- When a firm has exclusive rights to a project or product for a specific period, it can delay taking this project or product until a later date.
- A traditional investment analysis just answers the question of whether the project is a “good” one if taken today.
- Thus, the fact that a project does not pass muster today (because its NPV is negative, or its IRR is less than its hurdle rate) does not mean that the rights to this project are not valuable.

Valuing the Option to Delay a Project



An example: A Pharmaceutical patent

- Assume that a pharmaceutical company has been approached by an entrepreneur who has patented a new drug to treat ulcers. The entrepreneur has obtained FDA approval and has the patent rights for the next 17 years.
- While the drug shows promise, it is still very expensive to manufacture and has a relatively small market. Assume that the initial investment to produce the drug is $ 500 million and the present value of the cash flows from introducing the drug now is only $ 350 million.
- The technology and the market is volatile, and the annualized standard deviation in the present value, estimated from a simulation is 25%.

Valuing the Patent

- Inputs to the option pricing model
  - Value of the Underlying Asset (S) = PV of Cash Flows from Project if introduced now = $ 350 million
  - Strike Price (K) = Initial Investment needed to introduce the product = $ 500 million
  - Variance in Underlying Asset's Value = $(0.25)^2 = 0.0625$
  - Time to expiration = Life of the patent = 17 years
  - Dividend Yield = 1/Life of the patent = 1/17 = 5.88% (Every year you delay, you lose 1 year of protection)
  - Assume that the 17-year riskless rate is 4%. The value of the option can be estimated as follows:
- Call Value= $350 \exp^{(-0.0588)(17)} (0.5285) - 500 (\exp^{(-0.04)(17)} (0.1219) =$ $ 37.12 million

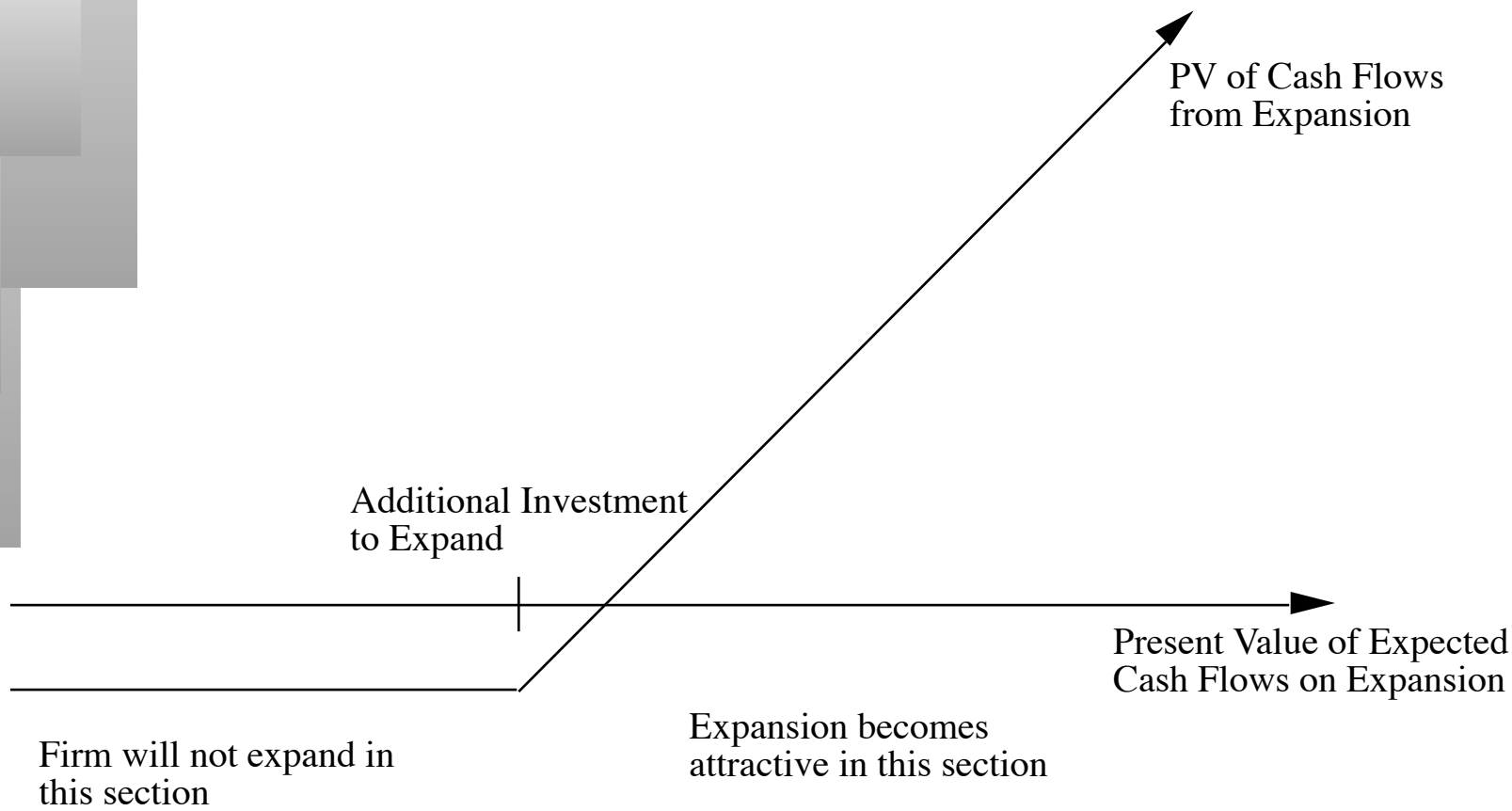
Insights for Investment Analyses

- 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 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.
- These are the options that firms often call “strategic options” and use as a rationale for taking on “negative NPV” or even “negative return” projects.

The Option to Expand



An Example of an Expansion Option

- Disney is considering investing $ 100 million to create a Spanish version of the Disney channel to serve the growing Mexican market.
- A financial analysis of the cash flows from this investment suggests that the present value of the cash flows from this investment to Disney will be only $ 80 million. Thus, by itself, the new channel has a **negative NPV of $ 20 million**.
- If the market in Mexico turns out to be more lucrative than currently anticipated, Disney **could expand** its reach to all of Latin America with **an additional investment of $ 150 million** any time over the next 10 years. While the current expectation is that the cash flows from having a Disney channel in Latin America is only $ 100 million, there is considerable uncertainty about both the potential for such an channel and the shape of the market itself, leading to significant variance in this estimate.

Valuing the Expansion Option

- Value of the Underlying Asset (S) = PV of Cash Flows from Expansion to Latin America, if done now =$ 100 Million
- Strike Price (K) = Cost of Expansion into Latin American = $ 150 Million
- We estimate the variance in the estimate of the project value by using the annualized standard deviation in firm value of publicly traded entertainment firms in the Latin American markets, which is approximately 30%.
  - Variance in Underlying Asset's Value = $0.30^2 = 0.09$
- Time to expiration = Period of expansion option = 10 years
- Riskless Rate = 4%

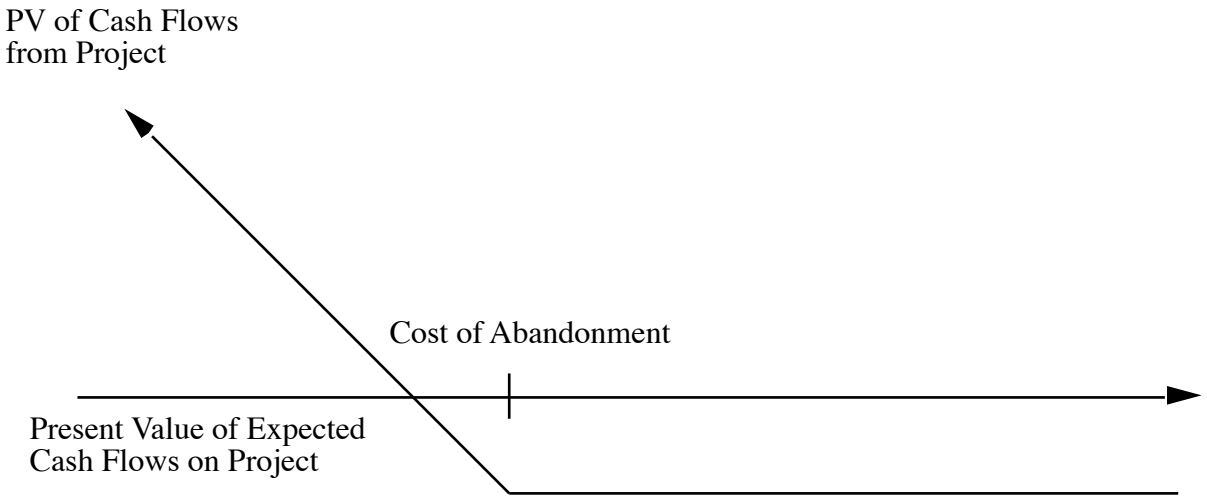
Call Value= $ 36.3 Million

Considering the Project with Expansion Option

- NPV of Disney Channel in Mexico = $ 80 Million - $ 100 Million = - $ 20 Million
- Value of Option to Expand = $ 36.3 Million
- NPV of Project with option to expand
  = - $ 20 million + $ 36.3 million
  = $ 16.3 million
- **Take the first investment, with the option to expand.**

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.



Valuing the Option to Abandon

- Disney is considering taking a 25-year project which
  - requires an initial investment of $ 255 million in an real estate partnership to develop time share properties with a South Florida real estate developer,
  - has a present value of expected cash flows is $ 254 million.
- While the net present value is negative, assume that Disney has the option to abandon this project anytime by selling its share back to the developer in the next 5 years for $ 150 million.
- A simulation of the cash flows on this time share investment yields a variance in the present value of the cash flows from being in the partnership is 0.09.

Project with Option to Abandon

- Value of the Underlying Asset (S) = PV of Cash Flows from Project = $ 254 million
- Strike Price (K) = Salvage Value from Abandonment = $ 150 million
- Variance in Underlying Asset's Value = 0.09
- Time to expiration = Abandonment period =5 years
- Dividend Yield = 1/Life of the Project = 1/25 = 0.04 (We are assuming that the project's present value will drop by roughly 1/n each year into the project)
- Assume that the five-year riskless rate is 4%.

Should Disney take this project?

- Call Value = 254 $\exp^{(0.04)(5)}$ (0.9194) -150 ($\exp^{(-0.04)(5)}$ (0.8300)
  = $ 89.27 million
- Put Value= $ 89.27 - 254 $\exp^{(0.04)(5)}$ +150 ($\exp^{(-0.04)(5)}$ = $ 4.13 million
- The value of this abandonment option has to be added on to the net present value of the project of -$ 1 million, yielding a total net present value with the abandonment option of $ 3.13 million.

First Principles

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