Corporate Finance

Aswath Damodaran

Home Page: www.stern.nyu.edu/~adamodar

E-Mail: adamodar@stern.nyu.edu

Stern School of Business

First Principles

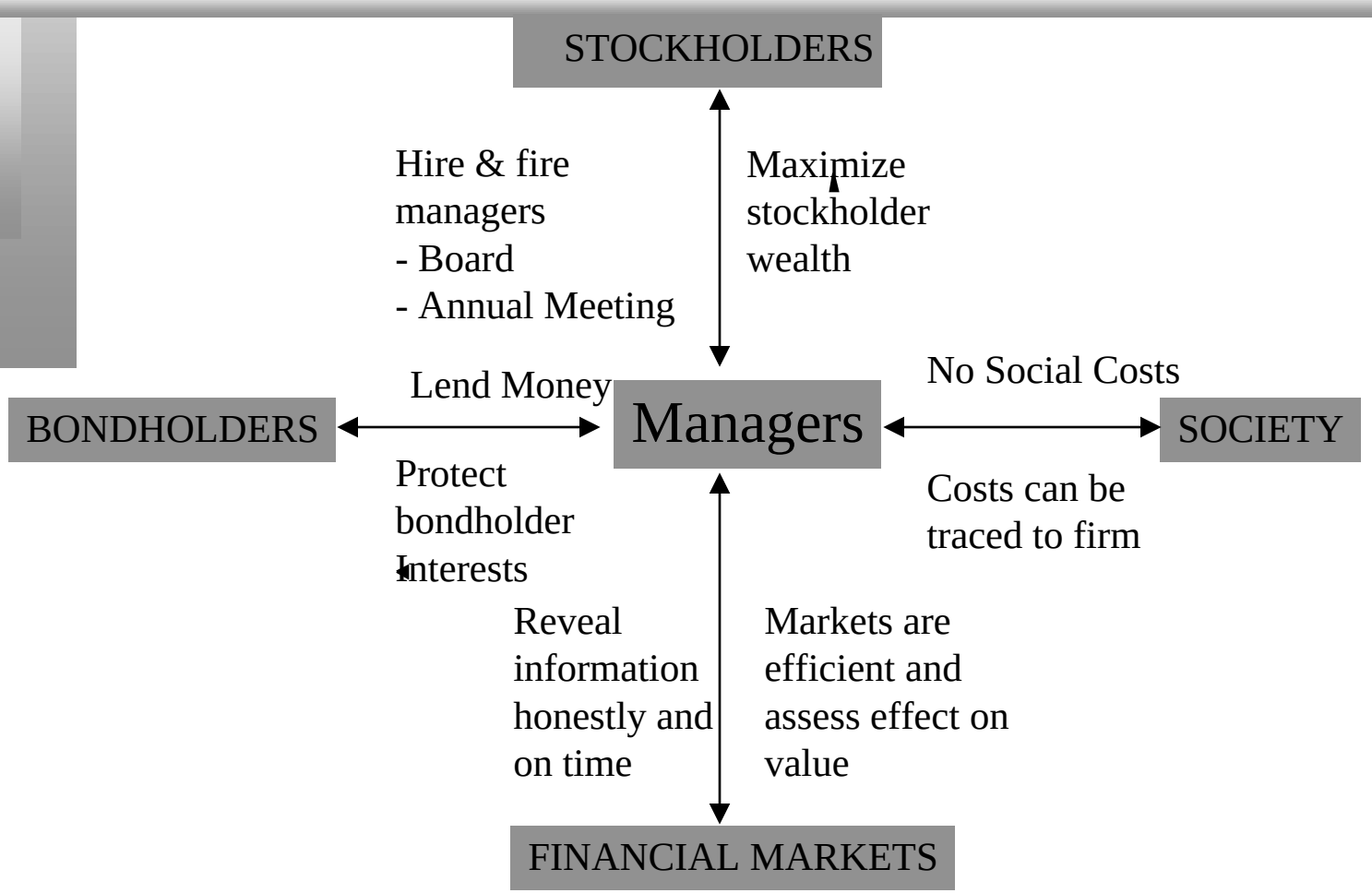
- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated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

Objective: Maximize the Value of the Firm

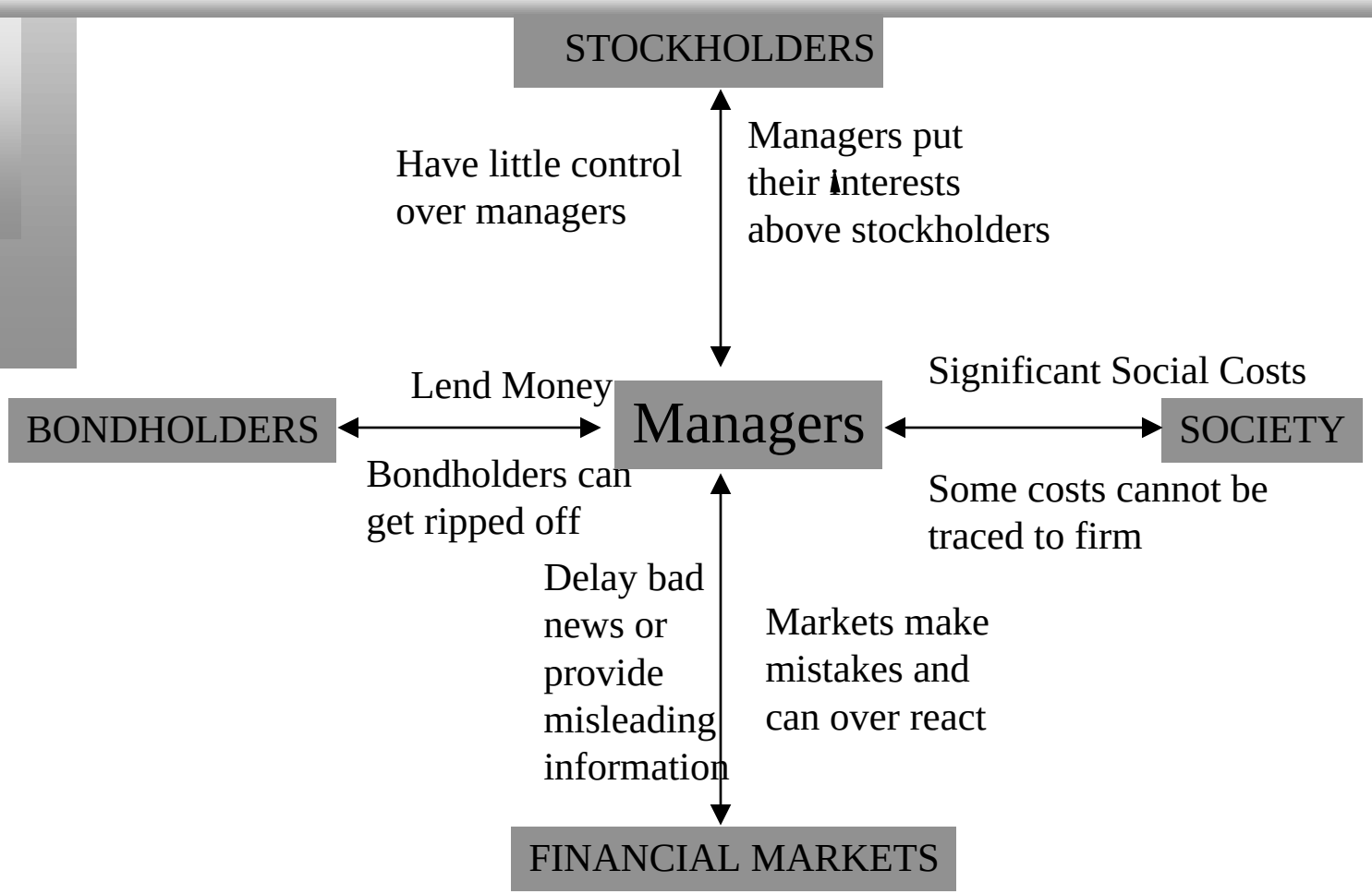
The Objective in Decision Making

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

The Classical Objective Function



What can go wrong?



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

- To choose a different mechanism for corporate governance
- To choose a different objective:
- 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.

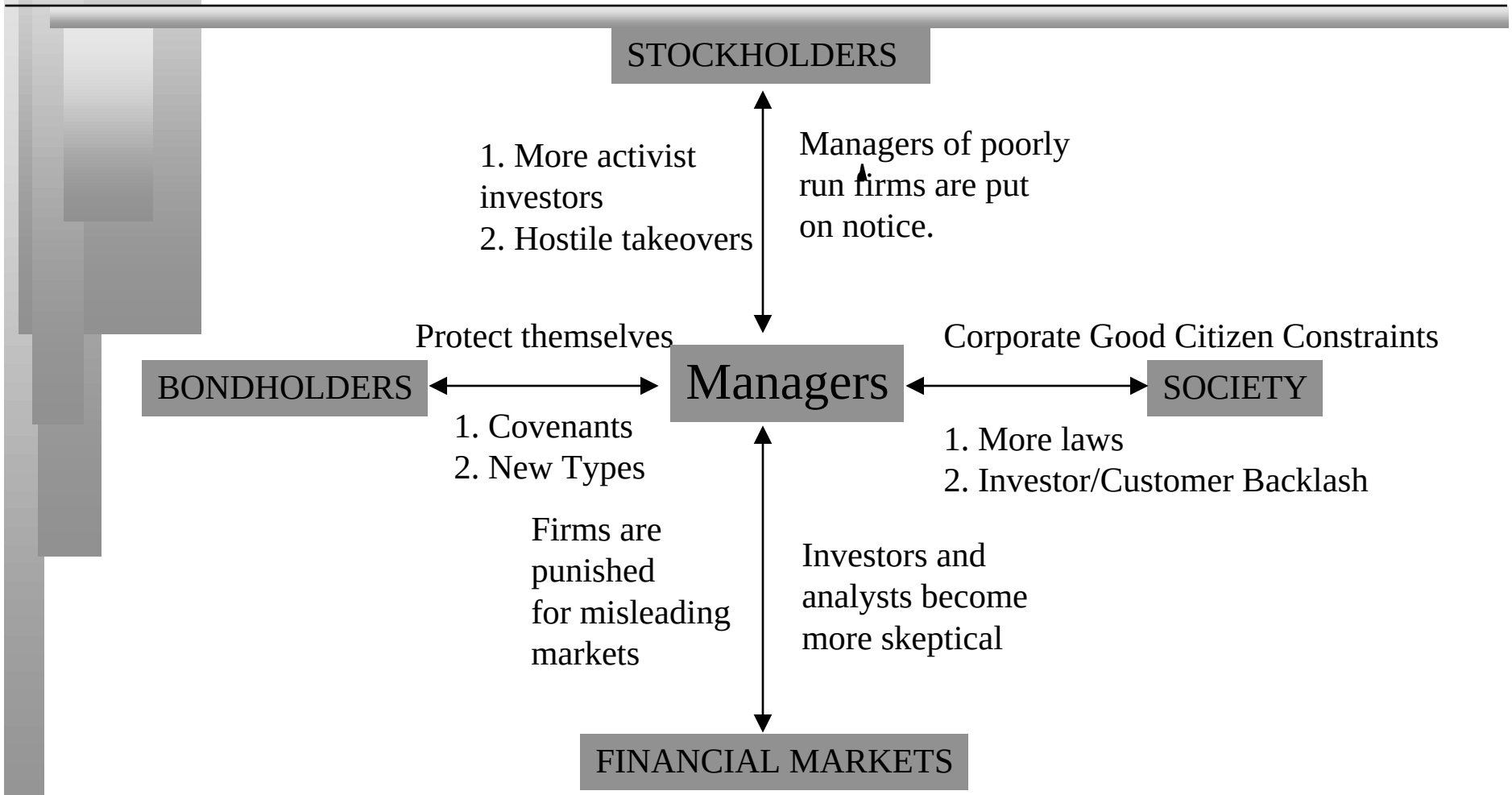
Choose a Different Objective Function

- 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 Counter Reaction



Application Test: Who owns/runs your firm?

- Looking at the top ten stockholders in your firm, consider the following:
  - Who is the marginal investor in this firm? (Is it an institutional investor or an individual investor?)
  - Are managers significant stockholders in the firm? If yes, are their interests likely to diverge from those of other stockholders in the firm?

Picking the Right Projects: Investment Analysis

Aswath Damodaran

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The notion of a benchmark

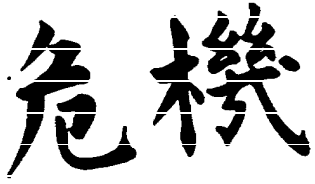
- Since financial resources are finite, there is a hurdle that projects have to cross before being deemed acceptable.
- This hurdle will be higher for riskier projects than for safer projects.
- A simple representation of the hurdle rate is as follows:

  Hurdle rate = Riskless Rate + Risk Premium

  - Riskless rate is what you would make on a riskless investment
  - Risk Premium is an increasing function of the riskiness of the project
- The two basic questions that every risk and return model in finance try 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

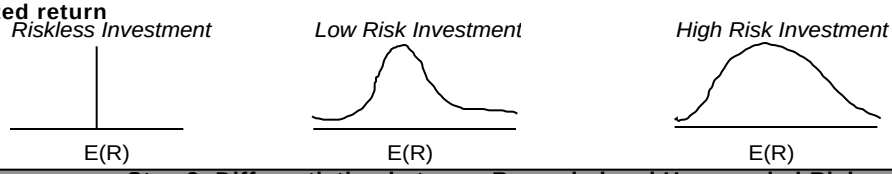


- The first symbol is the symbol for “danger”, while the second is the symbol for “opportunity”, making risk a mix of danger and opportunity.

Models of Risk and Return

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 market portfolio **Market Risk = Risk added by any investment to the market portfolio:**	If there are no arbitrage opportunities then the market risk of any asset must be captured by betas relative to factors that affect all investments. **Market Risk = Risk exposures of any asset to market factors**	Since market risk affects most or all investments, it must come from macro economic factors. **Market Risk = Risk exposures of any asset to macro economic factors.**	In an efficient market, differences in returns across long periods must be due to market risk differences. Looking for variables correlated with returns should then give us proxies for this risk. **Market Risk = Captured by the Proxy Variable(s)**
Beta of asset relative to Market portfolio (from a regression)	Betas of asset relative to unspecified market factors (from a factor analysis)	Betas of assets relative to specified macro economic factors (from a regression)	Equation relating returns to proxy variables (from a regression)

Beta's Properties

- Betas are standardized around one.
- If
  - $\beta = 1$ ... Average risk investment
  - $\beta > 1$ ... Above Average risk investment
  - $\beta < 1$ ... Below Average risk investment
  - $\beta = 0$ ... Riskless investment
- The average beta across all investments is one.

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.

Inputs required to use the CAPM -

(a) the current risk-free rate

(b) the expected return on the market index and

(c) the beta of the asset being analyzed.

The Riskfree Rate

- On a riskfree asset, the actual return is equal to the expected return.
- Therefore, there is no variance around the expected return.

Riskfree Rate and Time Horizon

- 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 2, 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.
- If the analysis is being done in real terms (rather than nominal terms) use a real riskfree rate, which can be obtained in one of two ways –
  - from an inflation-indexed government bond, if one exists
  - set equal, approximately, to the long term real growth rate of the economy in which the valuation is being done.

Measurement of the risk premium

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

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 6.7%
  - 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?

- Less than 6.7%
- Between 6.7 - 8.7%
- Between 8.7 - 10.7%
- Between 10.7 - 12.7%
- Between 12.7 - 14.7%
- More than 14.7%

Risk Aversion and Risk Premiums

- If this were the capital market line, the risk premium would be a weighted average of the risk premiums demanded by each and every investor.
- The weights will be determined by the magnitude of wealth that each investor has. Thus, Warren Bufffet'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?

- I would demand a larger premium
- I would demand a smaller premium
- 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 (1926-Present, 1962-Present....)
  - it calculates average returns on a stock index during the period
    - it calculates average returns on a riskless security over the period
      - it calculates the difference between the two
      - and uses it as a premium looking forward
- The limitations of this approach are:
  - it assumes that the risk aversion of investors has not changed in a systematic way across time. (The risk aversion may change from year to year, but it reverts back to historical averages)
  - it assumes that the riskiness of the "risky" portfolio (stock index) has not changed in a systematic way across time.

Historical Average Premiums for the United States

Historical period	Stocks - T.Bills		Stocks - T.Bonds	
	Arith	Geom	Arith	Geom
1926-1998	9.31%	7.95%	7.52%	6.38%
1962-1998	6.81%	6.03%	5.68%	5.29%
1981-1998	12.96%	10.72%	12.22%	10.09%

What is the right premium?

Arith: This is the arithmetic average of annual returns from this period

Geom: This is the compounded annual return from investing $ 1 at the start of the period

What about historical premiums for other markets?

- Historical data for markets outside the United States tends to be sketch and unreliable.
- Ibbotson, for instance, estimates the following premiums for major markets from 1970-1990

Country	*Period*	*Stocks*	*Bonds*	*Risk Premium*
Australia	1970-90	9.60%	7.35%	2.25%
Canada	1970-90	10.50%	7.41%	3.09%
France	1970-90	11.90%	7.68%	4.22%
Germany	1970-90	7.40%	6.81%	0.59%
Italy	1970-90	9.40%	9.06%	0.34%
Japan	1970-90	13.70%	6.96%	6.74%
Netherlands	1970-90	11.20%	6.87%	4.33%
Switzerland	1970-90	5.30%	4.10%	1.20%
UK	1970-90	14.70%	8.45%	6.25%

Assessing Country Risk Using Currency Ratings

Country	*Rating*	*Corporate Spread*	*Country Bond Spread*
Argentina	BB	1.75%	2.58%
Brazil	BB-	2%	2.87%
Chile	A-	0.75%	NA
Columbia	BBB-	1.50%	NA
Paraguay	BB-	2%	NA
Peru	BB	1.75%	2.04%
Uruguay	BBB-	1.50%	1.68%
Venezuela	B+	2.25%	2.60%

Ratings are foreign currency ratings

Country bond spreads based upon par Brady bond, blended yield over T. Bond.

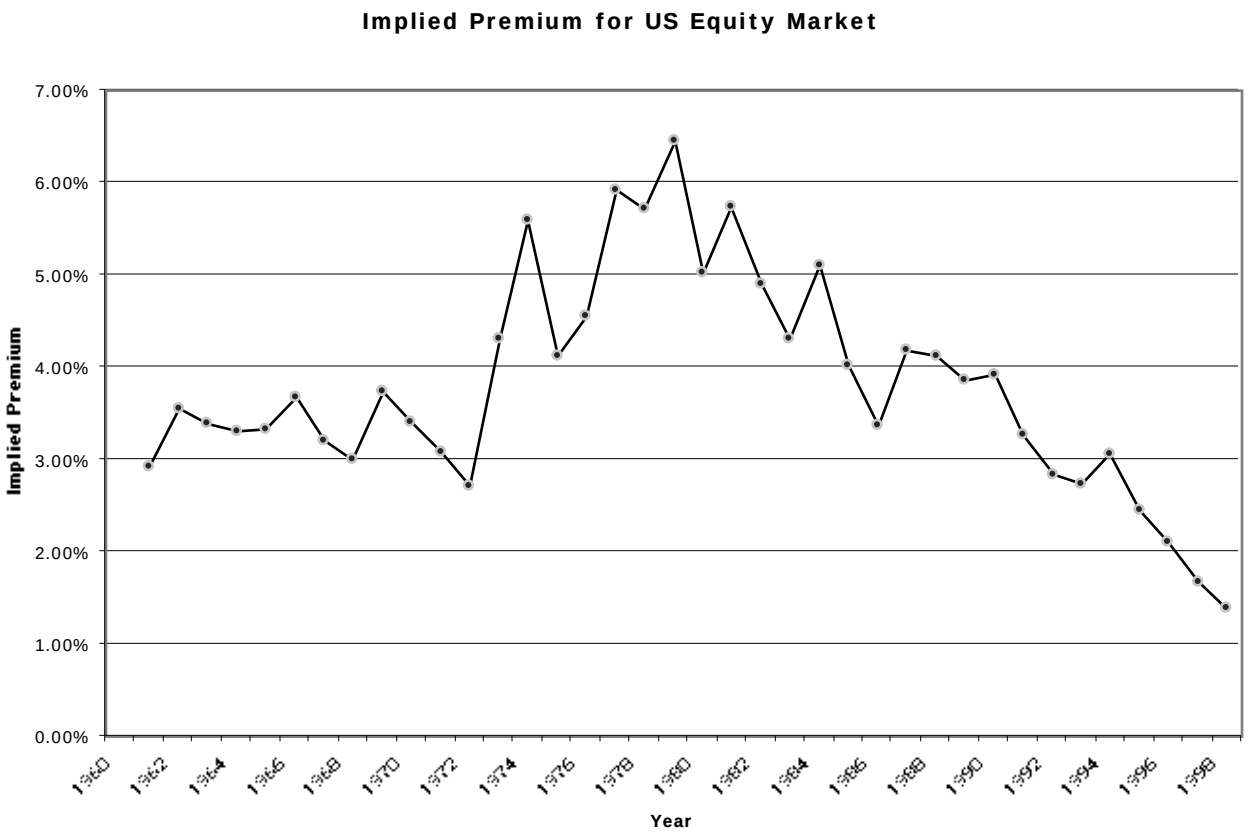
Using Country Ratings to Estimate Equity Spreads

- 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.
  - One way is to multiply the bond spread by the relative volatility of stock and bond prices in that market. For example,
    - Standard Deviation in Bovespa (Equity) = 34.3%
    - Standard Deviation in Brazil Par Brady Bond = 10.9%
    - Adjusted Equity Spread = 2.00% (34.3/10.9) = 6.29%
- The total risk premium for Brazil will then consist of two parts:
  - Risk Premium for Mature Equity market (from US) = 5.5%
  - Country risk premium for Brazil = 6.29%
  - Total Risk Premium for Brazil = 11.79%

Implied Equity Premiums

- If we use a basic discounted cash flow model, we can estimate the implied risk premium from the current level of stock prices.
- For instance, if stock prices are determined by the simple Gordon Growth Model:
  - Value = Expected Dividends next year/ (Required Returns on Stocks - Expected Growth Rate)
  - Plugging in the current level of the index, the dividends on the index and expected growth rate will yield a “implied” expected return on stocks. Subtracting out the riskfree rate will yield the implied premium.
- The problems with this approach are:
  - the discounted cash flow model used to value the stock index has to be the right one.
  - the inputs on dividends and expected growth have to be correct
  - it implicitly assumes that the market is currently correctly valued

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:
- About 10%, which is what the arithmetic average premium has been since 1981, for stocks over T.Bills
- About 6%, which is the geometric average premum since 1926, for stocks over T.Bonds
- About 2%, 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.

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

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

$R_j = a + b R_m$ ..... Regression Equation

- If

$a > R_f (1-b)$ .... Stock did better than expected during regression period

$a = R_f (1-b)$ .... Stock did as well as expected during regression period

$a < R_f (1-b)$ .... Stock did worse than expected during regression period

- This is Jensen's alpha.

Firm Specific and Market Risk

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

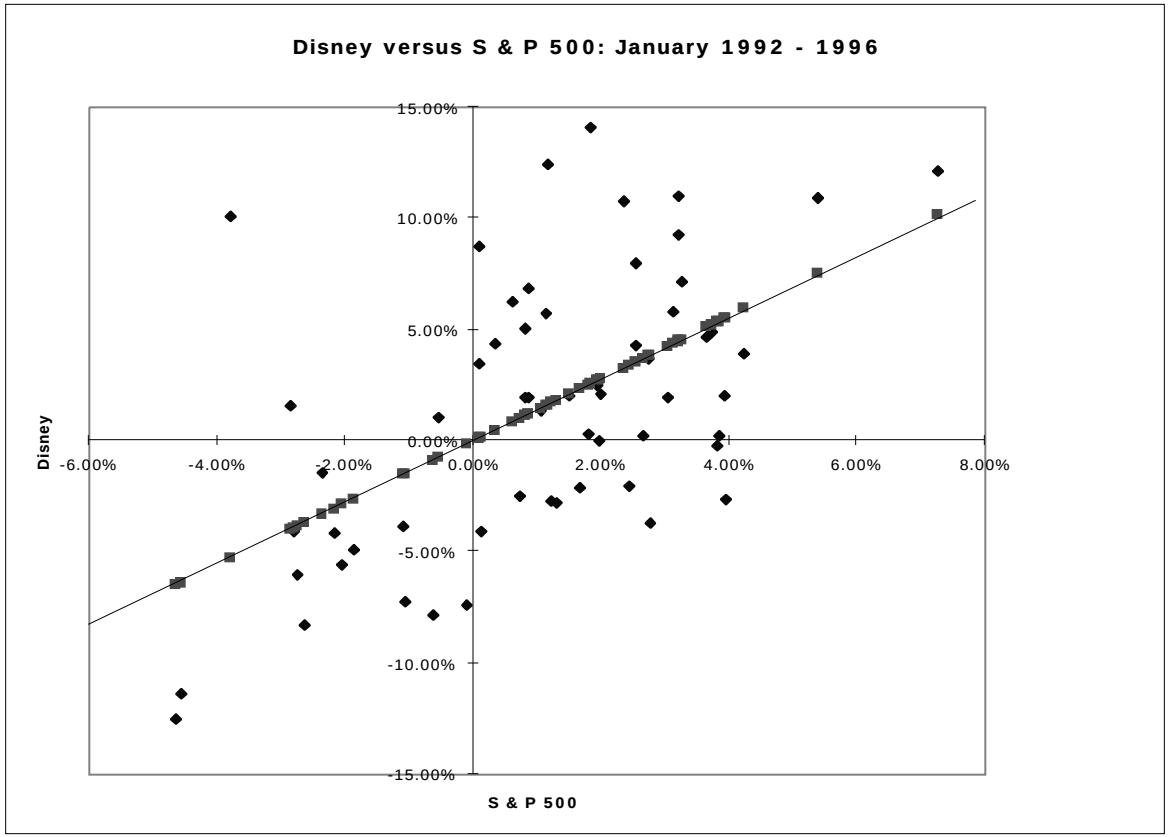
Setting up for the Estimation

- 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 April 1992,
  - Price for Disney at end of March = $ 37.87
  - Price for Disney at end of April = $ 36.42
  - Dividends during month = $0.05 (It was an ex-dividend month)
  - Return =($36.42 - $ 37.87 + $ 0.05)/$ 37.87=-3.69%
- To estimate returns on the index in the same month
  - Index level (including dividends) at end of March =
  - Index level (including dividends) at end of April =
  - Return =(415.53 - 404.35)/ 404.35 = 2.76%

Disney's Historical Beta



The Regression Output

- $\text{Returns}_{\text{Disney}} = -0.01\% + 1.40\ \text{Returns}_{\text{S \& P 500}}$ (R squared=32.41%)
  (0.27)
- Intercept = -0.01%
- Slope = 1.40

Analyzing Disney's Performance

- Intercept = -0.01%
- This is an intercept based on monthly returns. Thus, it has to be compared to a monthly riskfree rate.
- Between 1992 and 1996,
  - Monthly Riskfree Rate = 0.4% (Annual T.Bill rate divided by 12)
  - Riskfree Rate (1-Beta) = 0.4% (1-1.40) = -.16%
- The Comparison is then between

Intercept	versus	Riskfree Rate (1 - Beta)
-0.01%	versus	0.4%(1-1.40)=-0.16%

- Jensen's Alpha = -0.01% -(-0.16%) = 0.15%
- Disney did 0.15% better than expected, per month, between 1992 and 1996.
- Annualized, Disney's annual excess return = (1.0015)^12-1= 1.81%

More on Jensen's Alpha

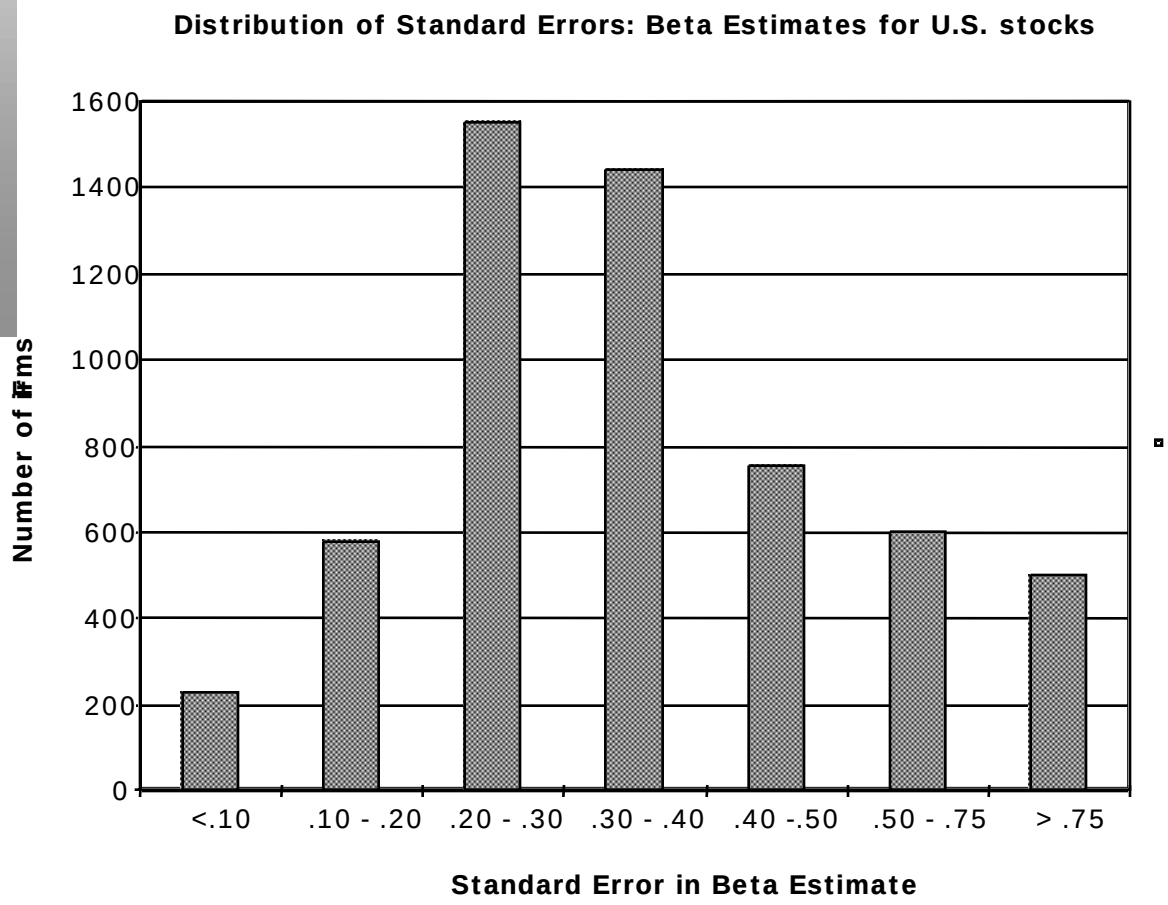
If you did this analysis on every stock listed on an exchange, what would the average Jensen's alpha be across all stocks?

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

Estimating Disney's Beta

- Slope of the Regression of 1.40 is the beta
- Regression parameters are always estimated with noise. The noise is captured in the standard error of the beta estimate, which in the case of Disney is 0.27.
- 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 = 32%
- This implies that
  - 32% of the risk at Disney comes from market sources
  - 68%, therefore, comes from firm-specific sources
- The firm-specific risk is diversifiable and will not be rewarded

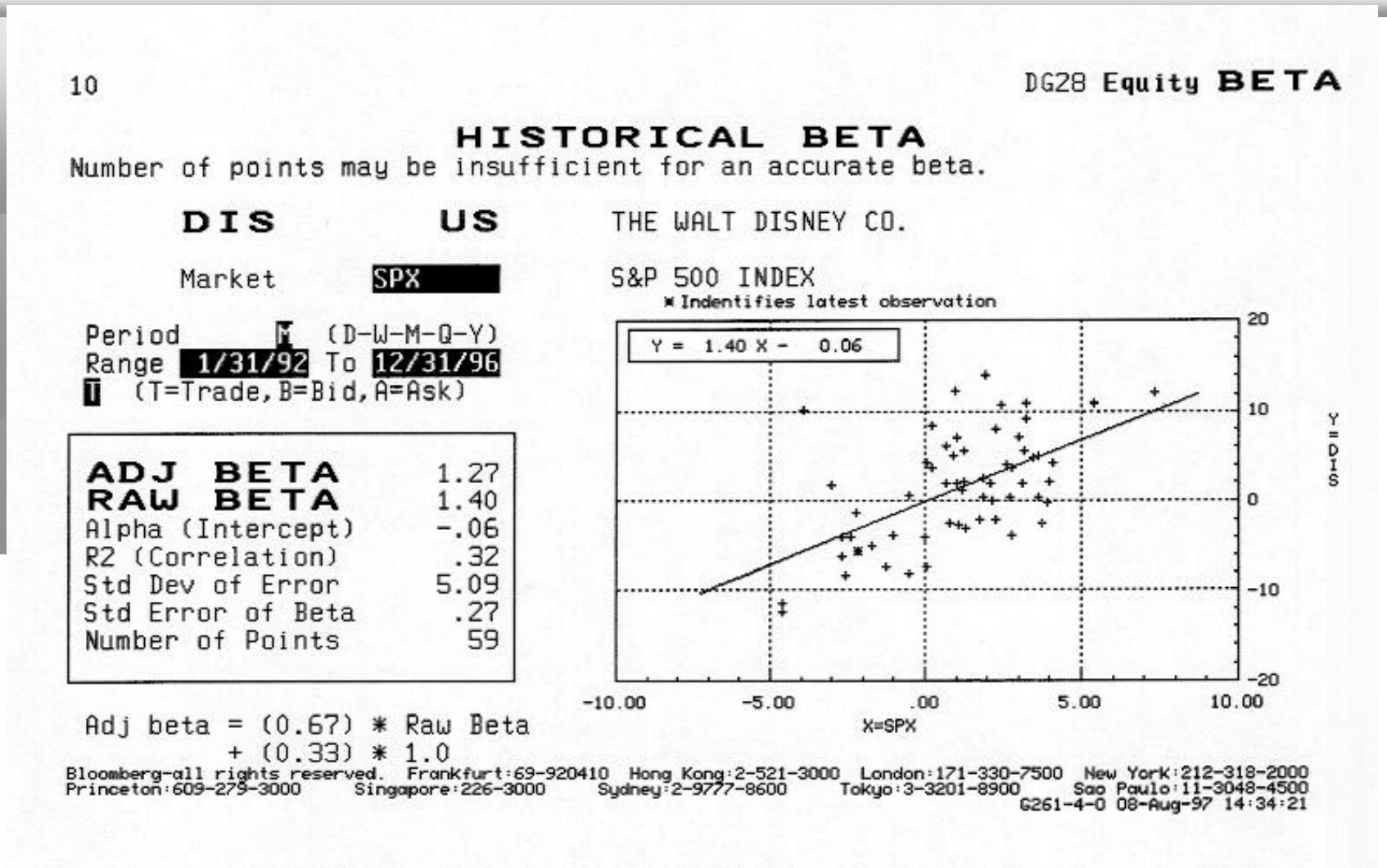
The Relevance of R Squared

You are a diversified investor trying to decide whether you should invest in Disney or Amgen. They both have betas of 1.35, but Disney has an R Squared of 32% while Amgen's R squared of only 15%. Which one would you invest in:

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

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

Beta Estimation in Practice: Bloomberg



Estimating Expected Returns: September 30, 1997

- Disney's Beta = 1.40
- Riskfree Rate = 7.00% (Long term Government Bond rate)
- Risk Premium = 5.50% (Approximate historical premium)
- Expected Return = 7.00% + 1.40 (5.50%) = 14.70%

Use to a Potential Investor in Disney

As a potential investor in Disney, what does this expected return of 14.70% tell you?

- 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,
- This is the return that I need to make on Disney in the long term to break even on my investment in the stock
- Both

Assume now that you are an active investor and that your research suggests that an investment in Disney will yield 25% a year for the next 5 years. Based upon the expected return of 14.70%, you would

- Buy the stock
- Sell the stock

How managers use this expected return

- Managers at Disney
  - need to make at least 14.70% 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 14.70%.
- What is the cost of not delivering this cost of equity?

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 2.0 for the firm and come up with a cost of equity of 18%. 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?

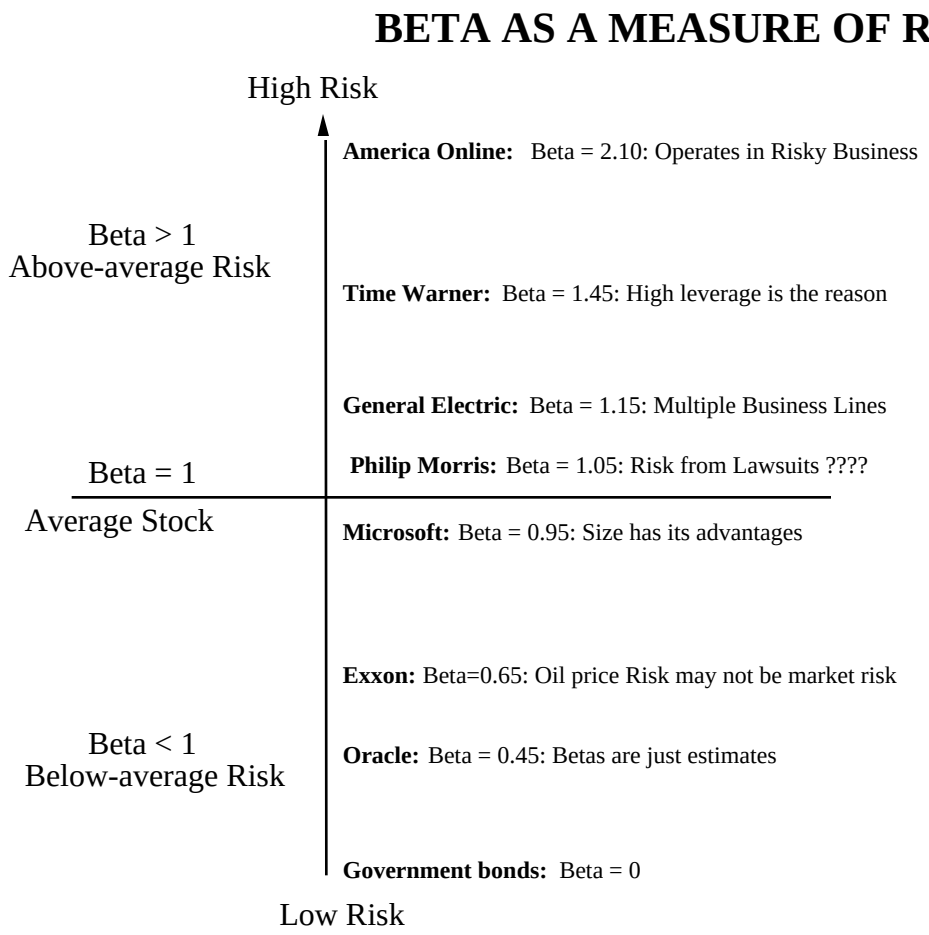
Should you focus your attention on bringing your beta down?

- Yes
- No

Application Test: Analyzing the Risk Regression

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

Beta Differences: A First Look Behind Betas



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

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.

A Look at Disney's Operating Leverage

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%	1429	27.14%
1993	8529	13.66%	1232	-13.79%
1994	10055	17.89%	1933	56.90%
1995	12112	20.46%	2295	18.73%
1996	18739	54.71%	2540	10.68%
Average		**23.80%**		**16.56%**

Reading Disney's Operating Leverage

- Operating Leverage = % Change in EBIT/ % Change in Sales
  = 16.56% / 23.80 % = 0.70
- This is lower than the operating leverage for other entertainment firms, which we computed to be 1.15. This would suggest that Disney has lower fixed costs than its competitors.
- The acquisition of Capital Cities by Disney in 1996 may be skewing the operating leverage downwards. For instance, looking at the operating leverage for 1987-1995:

  Operating Leverage1987-96 = 17.29%/19.94% = 0.87

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?

- European firms will have much higher betas than U.S. firms
- European firms will have similar betas to U.S. firms
- 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 1.40. 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 (1992 to 1996)
- The average debt equity ratio during this period was 14%.
- The unlevered beta for Disney can then be estimated:(using a marginal tax rate of 36%)

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

  = 1.40 / (1 + (1 - 0.36) (0.14)) = 1.28

Disney : Beta and Leverage

Debt to Capital	Debt/Equity Ratio	Beta	Effect of Leverage
0.00%	0.00%	1.28	0.00
10.00%	11.11%	1.38	0.09
20.00%	25.00%	1.49	0.21
30.00%	42.86%	1.64	0.35
40.00%	66.67%	1.83	0.55
50.00%	100.00%	2.11	0.82
60.00%	150.00%	2.52	1.23
70.00%	233.33%	3.20	1.92
80.00%	400.00%	4.57	3.29
90.00%	900.00%	8.69	7.40

- Riskfree Rate = 7.00% Risk Premium = 5.50%

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 beta of a firm is the weighted average of the betas of the different businesses it operates in

Bottom-up versus Top-down Beta

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

Decomposing Disney's Beta

Business	Unlevered Beta	D/E Ratio	Levered Beta	Riskfree Rate	Risk Premium	Cost of Equity
Creative Content	1.25	20.92%	1.42	7.00%	5.50%	14.80%
Retailing	1.50	20.92%	1.70	7.00%	5.50%	16.35%
Broadcasting	0.90	20.92%	1.02	7.00%	5.50%	12.61%
Theme Parks	1.10	20.92%	1.26	7.00%	5.50%	13.91%
Real Estate	0.70	59.27%	0.92	7.00%	5.50%	12.31%
Disney	1.09	21.97%	1.25	7.00%	5.50%	13.85%

Business	Estimated Va	Comparable Firms	Unlevered E	Division Weight
Creative Content	$ 22,167	Motion Picture and TV program producers	1.25	35.71%
Retailing	$ 2,217	High End Specialty Retailers	1.5	3.57%
Broadcasting	$ 18,842	TV Broadcasting companies	0.9	30.36%
Theme Parks	$ 16,625	Theme Park and Entertainment Complexes	1.1	26.79%
Real Estate	$ 2,217	REITs specializing in hotel and vacation propertiers	0.7	3.57%
Firm	$ 62,068			100.00%

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?
  - The cost of equity for Disney as a company
  - The cost of equity for each of Disney's divisions?

Estimating Betas for Non-Traded Assets

- The conventional approaches of estimating betas from regressions do not work for assets that are not traded.
- The beta for a non-traded asset can be estimated by looking at publicly traded firms that are in similar businesses.

Using comparable firms to estimate betas

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

Company Name	*Beta*	*D/E Ratio*	*Market Cap*	*$ (Mil)*
Barnes & Noble	1.10	23.31%	$	1,416
Books-A-Million	1.30	44.35%	$	85
Borders Group	1.20	2.15%	$	1,706
Crown Books	0.80	3.03%	$	55
Average	**1.10**	**18.21%**	**$**	**816**

- Unlevered Beta of comparable firms 1.10/(1 + (1-.36) (.1821)) = 0.99
- If independent bookstore has similar leverage, beta = 1.10
- If independent bookstore decides to use a debt/equity ratio of 25%:

Beta for bookstore = 0.99 (1+(1-..42)(.25)) = 1.13 (Tax rate used=42%)

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

- The owners of most private firms are not diversified. Beta measures the risk added on to a diversified portfolio. Therefore, using beta to arrive at a cost of equity for a private firm will
  - Under estimate the cost of equity for the private firm
  - Over estimate the cost of equity for the private firm
  - 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 with the market index

- In the Bookscapes example, where the market beta is 1.10 and the average correlation with the market index of the comparable publicly traded firms is 33%,
  - Total Beta = 1.10/0.33 = 3.30
  - Total Cost of Equity = 7% + 3.30 (5.5%)= 25.05%

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.

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.

What would you include in debt?

- 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

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

  Interest Coverage Ratio = 3,500/700= 5.00

  - Based upon the relationship between interest coverage ratios and ratings, we would estimate a rating of A for the firm.

Interest Coverage Ratios, Ratings and Default Spreads

If Interest Coverage Ratio is	Estimated Bond Rating	Default Spread
> 8.50	AAA	0.20%
6.50 - 8.50	AA	0.50%
5.50 - 6.50	A+	0.80%
4.25 - 5.50	A	1.00%
3.00 - 4.25	A–	1.25%
2.50 - 3.00	BBB	1.50%
2.00 - 2.50	BB	2.00%
1.75 - 2.00	B+	2.50%
1.50 - 1.75	B	3.25%
1.25 - 1.50	B –	4.25%
0.80 - 1.25	CCC	5.00%
0.65 - 0.80	CC	6.00%
0.20 - 0.65	C	7.50%
< 0.20	D	10.00%

Application Test: Estimating a Cost of Debt

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

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 $12.342 million, interest expenses of $479 million, and a current cost of borrowing of 7.5% (from its rating)

$$\text{Estimated MV of Disney Debt} = 479\left[\frac{\left(1-\frac{1}{(1.075)^3}\right)}{.075}\right] + \frac{12,342}{(1.075)^3} = \$11,180$$

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 The Home Depot

- The pre-tax cost of debt at the Home Depot is 6.25%

Yr	Operating Lease Expense	Present Value
1	$ 294	$ 277
2	$ 291	$ 258
3	$ 264	$ 220
4	$ 245	$ 192
5	$ 236	$ 174
6-15	$ 270	$ 1,450 (PV of 10-yr annuity)
	Present Value of Operating Leases =	$ 2,571

- Debt outstanding at the Home Depot = $1,205 + $2,571 = $3,776 mil

  (The Home Depot has other debt outstanding of $1,205 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 5 years)
- Estimate the
  - Weights for equity and debt based upon market value
  - Weights for equity and debt based upon book value

Application Test: Estimating Levered Beta and Cost of Equity

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

- Estimate the cost of equity based upon the bottom-up levered beta.

Estimating Cost of Capital: Disney

- Equity
  - Cost of Equity = 13.85%
  - Market Value of Equity = 675.13*75.38=$50 .88 Billion
  - Equity/(Debt+Equity) = 82%
- Debt
  - After-tax Cost of debt = 7.50% (1-.36) = 4.80%
  - Market Value of Debt = $ 11.18 Billion
  - Debt/(Debt +Equity) = 18%
- Cost of Capital = 13.85%(.82)+4.80%(.18) = 12.22%

Disney's Divisional Costs of Capital

Business	E/(D+E)	Cost of Equity	D/(D+E)	After-tax Cost of Debt	Cost of Capital
Creative Content	82.70%	14.80%	17.30%	4.80%	13.07%
Retailing	82.70%	16.35%	17.30%	4.80%	14.36%
Broadcasting	82.70%	12.61%	17.30%	4.80%	11.26%
Theme Parks	82.70%	13.91%	17.30%	4.80%	12.32%
Real Estate	62.79%	12.31%	37.21%	4.80%	9.52%
Disney	**81.99%**	**13.85%**	**18.01%**	**4.80%**	**12.22%**

Application Test: Estimating Cost of Capital

- Based upon the costs of equity and debt that you have estimated earlier, 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

Aswath Damodaran

Stern School of Business

First Principles

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Objective: Maximize the Value of the Firm

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 fifth year.
- The earnings and cash flows are estimated in nominal U.S. Dollars.

The Full Picture: Earnings on Project

	0	1	2	3	4	5	6	7	8	9	10
Revenues											
Magic Kingdom			$ 1,000	$ 1,400	$ 1,700	$ 2,000	$ 2,200	$ 2,420	$ 2,662	$ 2,928	$ 3,016
Second Theme Park						$ 500	$ 550	$ 605	$ 666	$ 732	$ 754
Resort & Properties			$ 200	$ 250	$ 300	$ 375	$ 688	$ 756	$ 832	$ 915	$ 943
Total			$ 1,200	$ 1,650	$ 2,000	$ 2,875	$ 3,438	$ 3,781	$ 4,159	$ 4,575	$ 4,713
Operating Expenses											
Magic Kingdom			$ 600	$ 840	$ 1,020	$ 1,200	$ 1,320	$ 1,452	$ 1,597	$ 1,757	$ 1,810
Second Theme Park			$ -	$ -	$ -	$ 300	$ 330	$ 363	$ 399	$ 439	$ 452
Resort & Property			$ 150	$ 188	$ 225	$ 281	$ 516	$ 567	$ 624	$ 686	$ 707
Total			$ 750	$ 1,028	$ 1,245	$ 1,781	$ 2,166	$ 2,382	$ 2,620	$ 2,882	$ 2,969
Other Expenses											
Depreciation & Amortization			$ 375	$ 378	$ 369	$ 319	$ 302	$ 305	$ 305	$ 305	$ 315
Allocated G&A Costs			$ 200	$ 220	$ 242	$ 266	$ 293	$ 322	$ 354	$ 390	$ 401
Operating Income			$ (125)	$ 25	$ 144	$ 509	$ 677	$ 772	$ 880	$ 998	$ 1,028
Taxes			$ (45)	$ 9	$ 52	$ 183	$ 244	$ 278	$ 317	$ 359	$ 370
Operating Income after Taxes			$ (80)	$ 16	$ 92	$ 326	$ 433	$ 494	$ 563	$ 639	$ 658

And The Accounting View of Return

Year	EBIT(1-t)	Beg BV	Deprecn	Cap Ex	End BV	Avge Bv	ROC
0			$0	$2,500	$2,500		
1	$0	$2,500	$0	$1,000	$3,500	$3,000	
2	($80)	$3,500	$375	$1,150	$4,275	$3,888	-2.06%
3	$16	$4,275	$378	$706	$4,604	$4,439	0.36%
4	$92	$4,604	$369	$250	$4,484	$4,544	2.02%
5	$326	$4,484	$319	$359	$4,525	$4,505	7.23%
6	$433	$4,525	$302	$344	$4,567	$4,546	9.53%
7	$494	$4,567	$305	$303	$4,564	$4,566	10.82%
8	$563	$4,564	$305	$312	$4,572	$4,568	12.33%
9	$639	$4,572	$305	$343	$4,609	$4,590	13.91%
10	$658	$4,609	$315	$315	$4,609	$4,609	14.27%
Average							7.60%

Would lead use to conclude that...

- Do not invest in this park. The **return on capital of 7.60%** is lower than the **cost of capital for theme parks of 12.32%**; 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?
  - Yes
  - No

From Project to Firm Return on Capital

- 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 1996, had earnings before interest and taxes of $5,559 million, had a book value of equity of $11,368 million and a book value of debt of $7,663 million. With a tax rate of 36%, we get

  Return on Capital = 5559 (1-.36) / (11,368+7,663) = 18.69%

  Cost of Capital for Disney= 12.22%

  Excess Return = 18.69% - 12.22% = 6.47%
- This can be converted into a dollar figure by multiplying by the capital invested, in which case it is called economic value added

  EVA = (.1869-.1222) (11,368+7,663) = $1,232 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)

The cash flow view of this project..

.	0	1	2	3	9	10
Operating Income after Taxes			$ (80)	$ 16	$ 639	$ 658
+ Depreciation & Amortization	$ -	$ -	$ 375	$ 378	$ 305	$ 315
- Capital Expenditures	$ 2,500	$ 1,000	$ 1,150	$ 706	$ 343	$ 315
- Change in Working Capital	$ -	$ -	$ 60	$ 23	$ 21	$ 7
Cash Flow on Project	$ (2,500)	$ (1,000)	$ (915)	$ (335)	$ 580	$ 651

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 incremental cash flows on the project

	0	1	2	3	9	10
Cash Flow on Project	$ (2,500)	$ (1,000)	$ (915)	$ (335)	$ 580	$ 651
- Sunk Costs	$ 500					
+ Non-incremental Allocated Costs (1-t)	$ -	$ -	$ 85	$ 94	$ 166	$ 171
Incremental Cash Flow on Project	$ (2,000)	$ (1,000)	$ (830)	$ (241)	$ 746	$ 822

To get from cash flow to incremental cash flows, we

- subtract out sunk costs
- add back the non-incremental allocated costs (in after-tax terms)

The Incremental Cash Flows

	0	1	2	3	4	5	6	7	8	9	10
Operating Income after Taxes			$ (80)	$ 16	$ 92	$ 326	$ 433	$ 494	$ 563	$ 639	$ 658
+ Depreciation & Amortization			$ 375	$ 378	$ 369	$ 319	$ 302	$ 305	$ 305	$ 305	$ 315
- Capital Expenditures	$ 2,000	$ 1,000	$ 1,150	$ 706	$ 250	$ 359	$ 344	$ 303	$ 312	$ 343	$ 315
- Change in Working Capital			$ 60	$ 23	$ 18	$ 44	$ 28	$ 17	$ 19	$ 21	$ 7
+ Non-incremental Allocated Expense(1-t)			$ 85	$ 94	$ 103	$ 114	$ 125	$ 137	$ 151	$ 166	$ 171
Cashflow to Firm	$ (2,000)	$ (1,000)	$ (830)	$ (241)	$ 297	$ 355	$ 488	$ 617	$ 688	$ 746	$ 822

To Time-Weighted Cash Flows

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

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	$A(1+g)/(r-g)$	

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 9 grow 3% (the inflation rate) forever, the present value at the end of year 9 of cash flows after that can be written as:
  - Terminal Value = CF in year 10/(Cost of Capital - Growth Rate)
    = 822/(.1232-.03) = $ 8,821 million

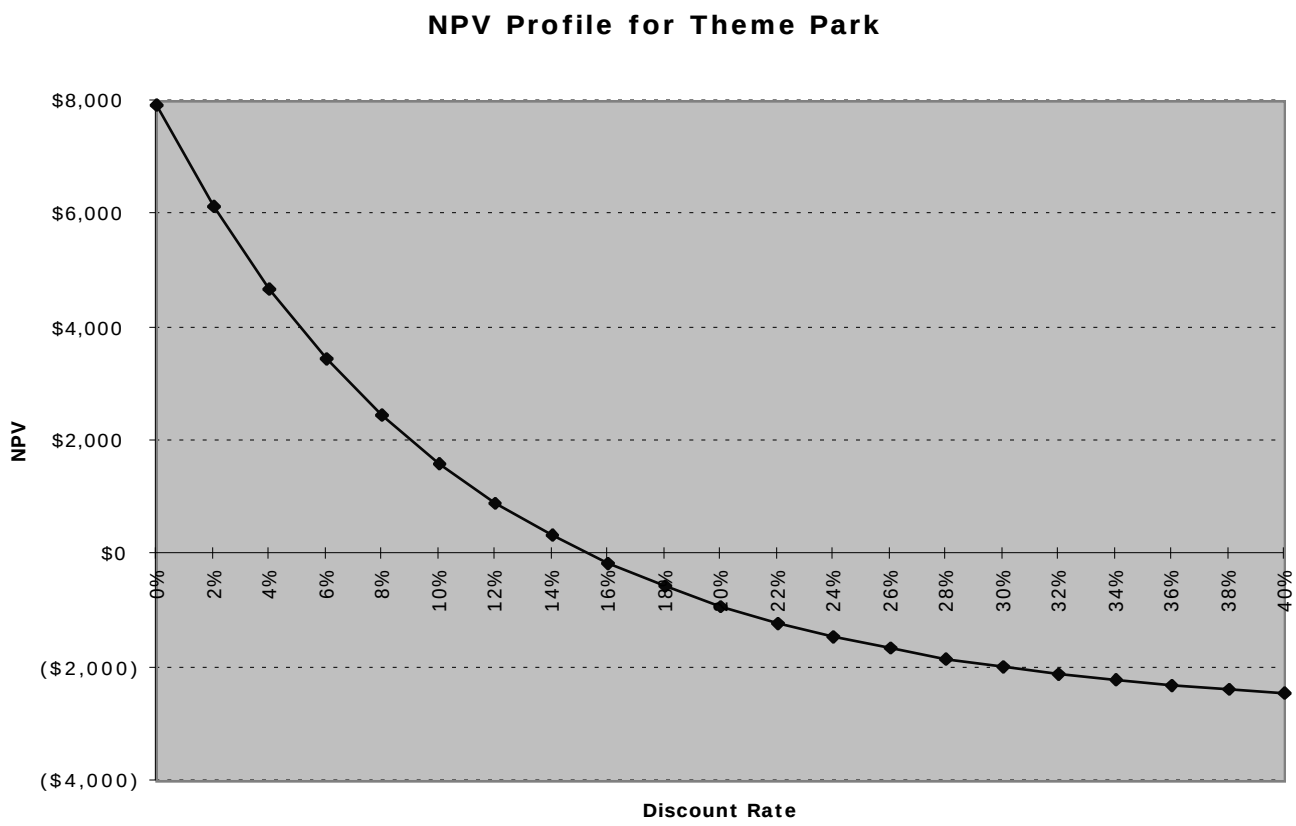
Which yields a NPV of..

Year	*Incremental CF*	*Terminal Value*	*PV at 12.32%*
0	$ (2,000)		$ (2,000)
1	$ (1,000)		$ (890)
2	$ (830)		$ (658)
3	$ (241)		$ (170)
4	$ 297		$ 187
5	$ 355		$ 198
6	$ 488		$ 243
7	$ 617		$ 273
8	$ 688		$ 272
9	$ 746	$ 8,821	$ 3,363
Net Present Value of Project =			**$ 818**

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 $818 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 15.32%. This is greater than the cost of capital of 12.32%.
- The IRR and the NPV will yield **similar results** most of the time, though there are differences between the two approaches that may cause project rankings to vary depending upon the approach used.

The 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 12.32% that we used is a cost of capital for U.S. theme parks. Would you use a higher rate for this project?
  - Yes
  - No

Should there be a risk premium for foreign projects?

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

  For Disney, this risk too is assumed to not affect the cost of capital

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?
  - Yes
  - No

Equity Analysis: The Parallels

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

The 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.

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.

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.

Finding the Right Financing Mix: The Capital Structure Decision

Aswath Damodaran

Stern School of Business

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
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Debt: The Trade-Off

Advantages of Borrowing	Disadvantages of Borrowing
1. Tax Benefit:	*1. Bankruptcy Cost:*
Higher tax rates --> Higher tax benefit	Higher business risk --> Higher Cost
2. Added Discipline:	*2. Agency Cost:*
Greater the separation between managers and stockholders --> Greater the benefit	Greater the separation between stock-holders & lenders --> Higher Cost
	3. Loss of Future Financing Flexibility:
	Greater the uncertainty about future financing needs --> Higher Cost

A Hypothetical Scenario

- Assume you operate in an environment, where
  - (a) there are no taxes
  - (b) there is no separation between stockholders and managers.
  - (c) there is no default risk
  - (d) there is no separation between stockholders and bondholders
  - (e) firms know their future financing needs

The Miller-Modigliani Theorem

- In an environment, where there are no taxes, default risk or agency costs, capital structure is irrelevant.
- The value of a firm is independent of its debt ratio.

An Alternate View

- The trade-off between debt and equity becomes more complicated when there are both tax advantages and bankruptcy risk to consider.
- When debt has a tax advantage and increases default risk, the firm value will change as the financing mix changes. The optimal financing mix is the one that maximizes firm value.

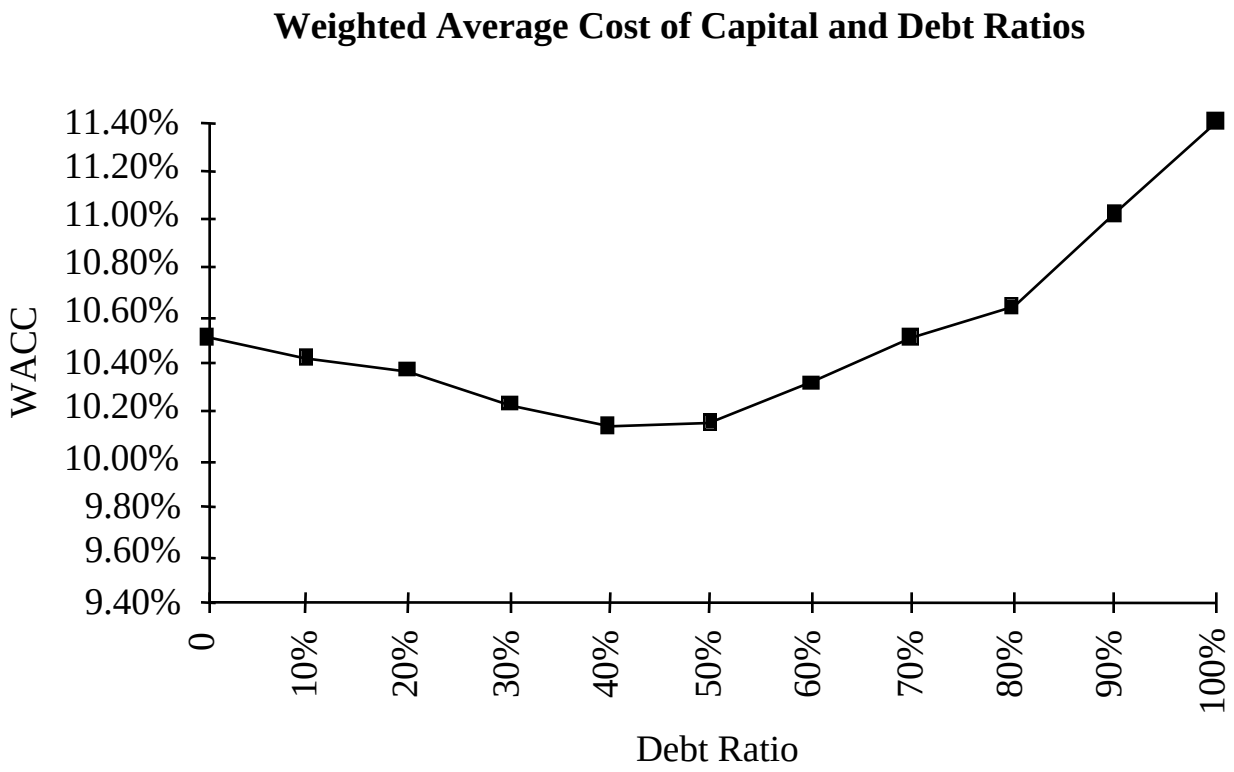
Why does the cost of capital matter?

- The cost of capital has embedded in it, both the tax advantages of debt (through the use of the after-tax cost of debt) and the increased default risk (through the use of a cost of equity and the cost of debt)
- Value of a Firm = Present Value of Cash Flows to the Firm, discounted back at the cost of capital.
- If the cash flows to the firm are held constant, and the cost of capital is minimized, the value of the firm will be maximized.

Applying Approach: The Textbook Example

D/(D+E)	ke	kd	After-tax Cost of Debt	WACC
0	10.50%	8%	4.80%	10.50%
10%	11%	8.50%	5.10%	10.41%
20%	11.60%	9.00%	5.40%	10.36%
30%	12.30%	9.00%	5.40%	10.23%
40%	13.10%	9.50%	5.70%	10.14%
50%	14%	10.50%	6.30%	10.15%
60%	15%	12%	7.20%	10.32%
70%	16.10%	13.50%	8.10%	10.50%
80%	17.20%	15%	9.00%	10.64%
90%	18.40%	17%	10.20%	11.02%
100%	19.70%	19%	11.40%	11.40%

WACC and Debt Ratios



Current Cost of Capital: Disney

- Equity
  - Cost of Equity = 13.85%
  - Market Value of Equity = $50.88 Billion
  - Equity/(Debt+Equity) = 82%
- Debt
  - After-tax Cost of debt = 7.50% (1-.36) = 4.80%
  - Market Value of Debt = $ 11.18 Billion
  - Debt/(Debt +Equity) = 18%
- Cost of Capital = 13.85%(.82)+4.80%(.18) = 12.22%

Mechanics of Cost of Capital Estimation

1. Estimate the Cost of Equity at different levels of debt:
   - Equity will become riskier -> Beta will increase -> Cost of Equity will increase.
   - Estimation will use levered beta calculation
2. Estimate the Cost of Debt at different levels of debt:
   - Default risk will go up and bond ratings will go down as debt goes up -> Cost of Debt will increase.
   - To estimating bond ratings, we will use the interest coverage ratio (EBIT/Interest expense)
3. Estimate the Cost of Capital at different levels of debt
4. Calculate the effect on Firm Value and Stock Price.

Process of Ratings and Rate Estimation

- We use the median interest coverage ratios for large manufacturing firms to develop “interest coverage ratio” ranges for each rating class.
- We then estimate a spread over the long term bond rate for each ratings class, based upon yields at which these bonds trade in the market place.

Interest Coverage Ratios and Bond Ratings

If Interest Coverage Ratio is	Estimated Bond Rating
> 8.50	AAA
6.50 - 8.50	AA
5.50 - 6.50	A+
4.25 - 5.50	A
3.00 - 4.25	A–
2.50 - 3.00	BBB
2.00 - 2.50	BB
1.75 - 2.00	B+
1.50 - 1.75	B
1.25 - 1.50	B –
0.80 - 1.25	CCC
0.65 - 0.80	CC
0.20 - 0.65	C
< 0.20	D

Spreads over long bond rate for ratings classes

Rating	*Spread*
AAA	0.20%
AA	0.50%
A+	0.80%
A	1.00%
A-	1.25%
BBB	1.50%
BB	2.00%
B+	2.50%
B	3.25%
B-	4.25%
CCC	5.00%
CC	6.00%
C	7.50%
D	10.00%

Current Income Statement for Disney: 1996

Revenues	18,739
-Operating Expenses	12,046
EBITDA	6,693
-Depreciation	1,134
EBIT	5,559
-Interest Expense	479
Income before taxes	5,080
-Taxes	847
Income after taxes	4,233

- Interest coverage ratio= 5,559/479 = 11.61

(Amortization from Capital Cities acquistion not considered)

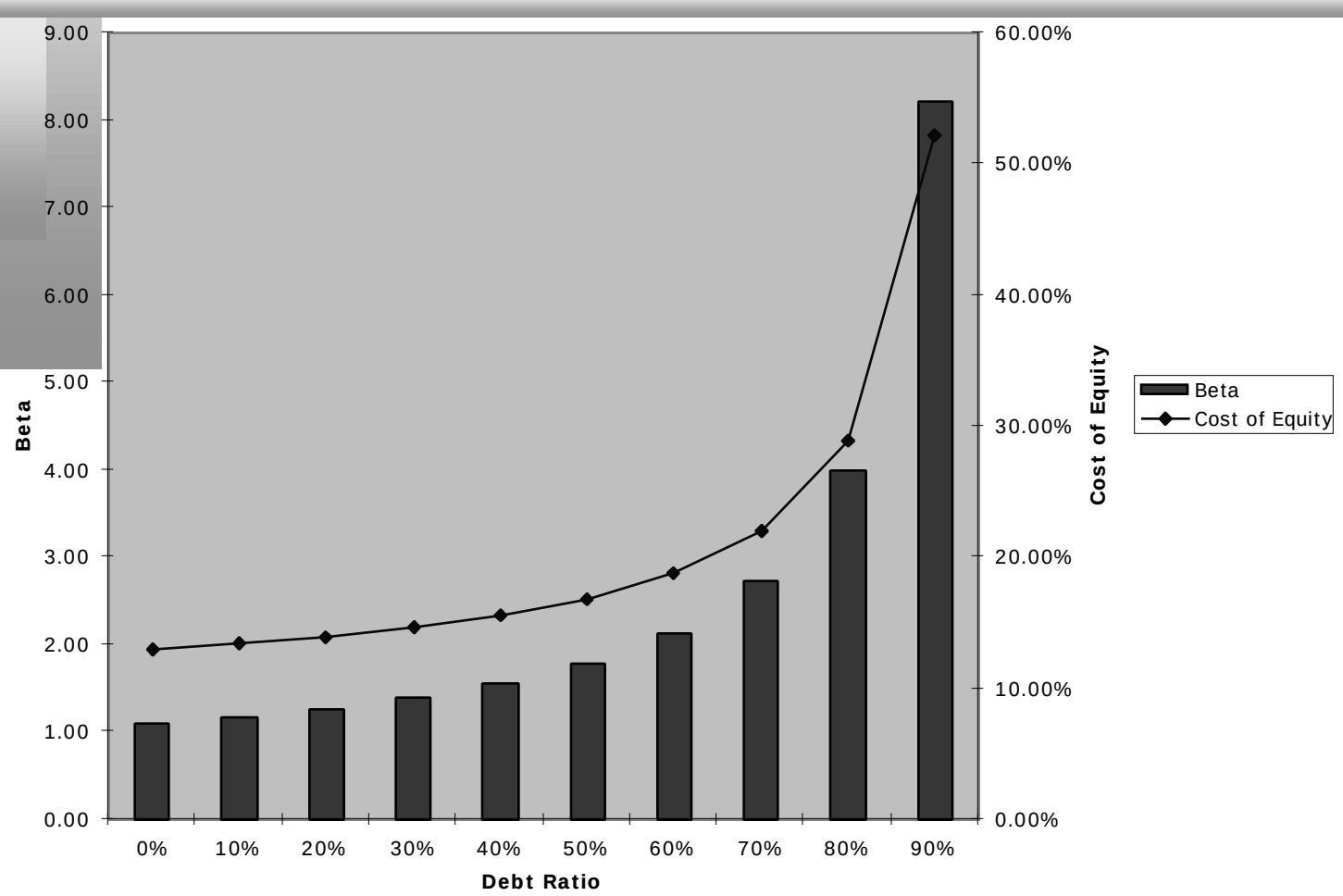
Estimating Cost of Equity

Current Beta = 1.25 Unlevered Beta = 1.09

Market premium = 5.5% T.Bond Rate = 7.00% t=36%

Debt Ratio	*D/E Ratio*	*Beta*	*Cost of Equity*
0%	0%	1.09	13.00%
10%	11%	1.17	13.43%
20%	25%	1.27	13.96%
30%	43%	1.39	14.65%
40%	67%	1.56	15.56%
50%	100%	1.79	16.85%
60%	150%	2.14	18.77%
70%	233%	2.72	21.97%
80%	400%	3.99	28.95%
90%	900%	8.21	52.14%

Disney: Beta, Cost of Equity and D/E Ratio



Estimating Cost of Debt

D/(D+E)	0.00%	10.00%	Calculation Details	Step
D/E	0.00%	11.11%	= [D/(D+E)]/(1 -[D/(D+E)])	
$ Debt	$0	$6,207	= [D/(D+E)]* Firm Value	**1**
EBITDA	$6,693	$6,693	Kept constant as debt changes.	
Depreciation	$1,134	$1,134	"	
EBIT	$5,559	$5,559		
Interest	$0	$447	= Interest Rate * $ Debt	**2**
Taxable Income	$5,559	$5,112	= EBIT - Interest	
Tax	$2,001	$1,840	= Tax Rate * Taxable Income	
Net Income	$3,558	$3,272	= Taxable Income - Tax	
Pre-tax Int. cov	∞	12.44	= EBIT/Int. Exp	**3**
Likely Rating	AAA	AAA	Based upon interest coverage	**4**
Interest Rate	7.20%	7.20%	Interest rate for given rating	**5**
Eff. Tax Rate	36.00%	36.00%	See notes on effective tax rate	
After-tax k_d	4.61%	4.61%	=Interest Rate * (1 - Tax Rate)	

Firm Value = 50,888+11,180= $62,068

The Ratings Table

If Interest Coverage Ratio is	Estimated Bond Rating	Default spread
> 8.50	**AAA**	**0.20%**
6.50 - 8.50	AA	0.50%
5.50 - 6.50	A+	0.80%
4.25 - 5.50	A	1.00%
3.00 - 4.25	A–	1.25%
2.50 - 3.00	BBB	1.50%
2.00 - 2.50	BB	2.00%
1.75 - 2.00	B+	2.50%
1.50 - 1.75	B	3.25%
1.25 - 1.50	B –	4.25%
0.80 - 1.25	CCC	5.00%
0.65 - 0.80	CC	6.00%
0.20 - 0.65	C	7.50%
< 0.20	D	10.00%

A Test: Can you do the 20% level?

D/(D+E)	*0.00%*	*10.00%*	*20.00%*	*Second Iteration*
D/E	0.00%	11.11%		
$ Debt	**$0**	**$6,207**		
EBITDA	$6,693	$6,693		
Depreciation	$1,134	$1,134		
EBIT	$5,559	$5,559		
Interest Expense	**$0**	**$447**		
Taxable Income	$5,559	$5,112		
Pre-tax Int. cov	∞	**12.44**		
Likely Rating	AAA	AAA		
Interest Rate	**7.20%**	**7.20%**		
Eff. Tax Rate	36.00%	36.00%		
Cost of Debt	**4.61%**	**4.61%**		

Bond Ratings, Cost of Debt and Debt Ratios

WORKSHEET FOR ESTIMATING RATINGS/INTEREST RATES										
D/(D+E)	0.00%	10.00%	20.00%	30.00%	40.00%	50.00%	60.00%	70.00%	80.00%	90.00%
D/E	0.00%	11.11%	25.00%	42.86%	66.67%	100.00%	150.00%	233.33%	400.00%	900.00%
$ Debt	$0	$6,207	$12,414	$18,621	$24,827	$31,034	$37,241	$43,448	$49,655	$55,862
EBITDA	$6,693	$6,693	$6,693	$6,693	$6,693	$6,693	$6,693	$6,693	$6,693	$6,693
Depreciation	$1,134	$1,134	$1,134	$1,134	$1,134	$1,134	$1,134	$1,134	$1,134	$1,134
EBIT	$5,559	$5,559	$5,559	$5,559	$5,559	$5,559	$5,559	$5,559	$5,559	$5,559
Interest	$0	$447	$968	$1,536	$2,234	$3,181	$4,469	$5,214	$5,959	$7,262
Taxable Incom	$5,559	$5,112	$4,591	$4,023	$3,325	$2,378	$1,090	$345	($400)	($1,703)
Tax	$2,001	$1,840	$1,653	$1,448	$1,197	$856	$392	$124	($144)	($613)
Pre-tax Int. cov	∞	12.44	5.74	3.62	2.49	1.75	1.24	1.07	0.93	0.77
Likely Rating	AAA	AAA	A+	A-	BB	B	CCC	CCC	CCC	CC
Interest Rate	7.20%	7.20%	7.80%	8.25%	9.00%	10.25%	12.00%	12.00%	12.00%	13.00%
Eff. Tax Rate	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	36.00%	33.59%	27.56%
Cost of debt	4.61%	4.61%	4.99%	5.28%	5.76%	6.56%	7.68%	7.68%	7.97%	9.42%

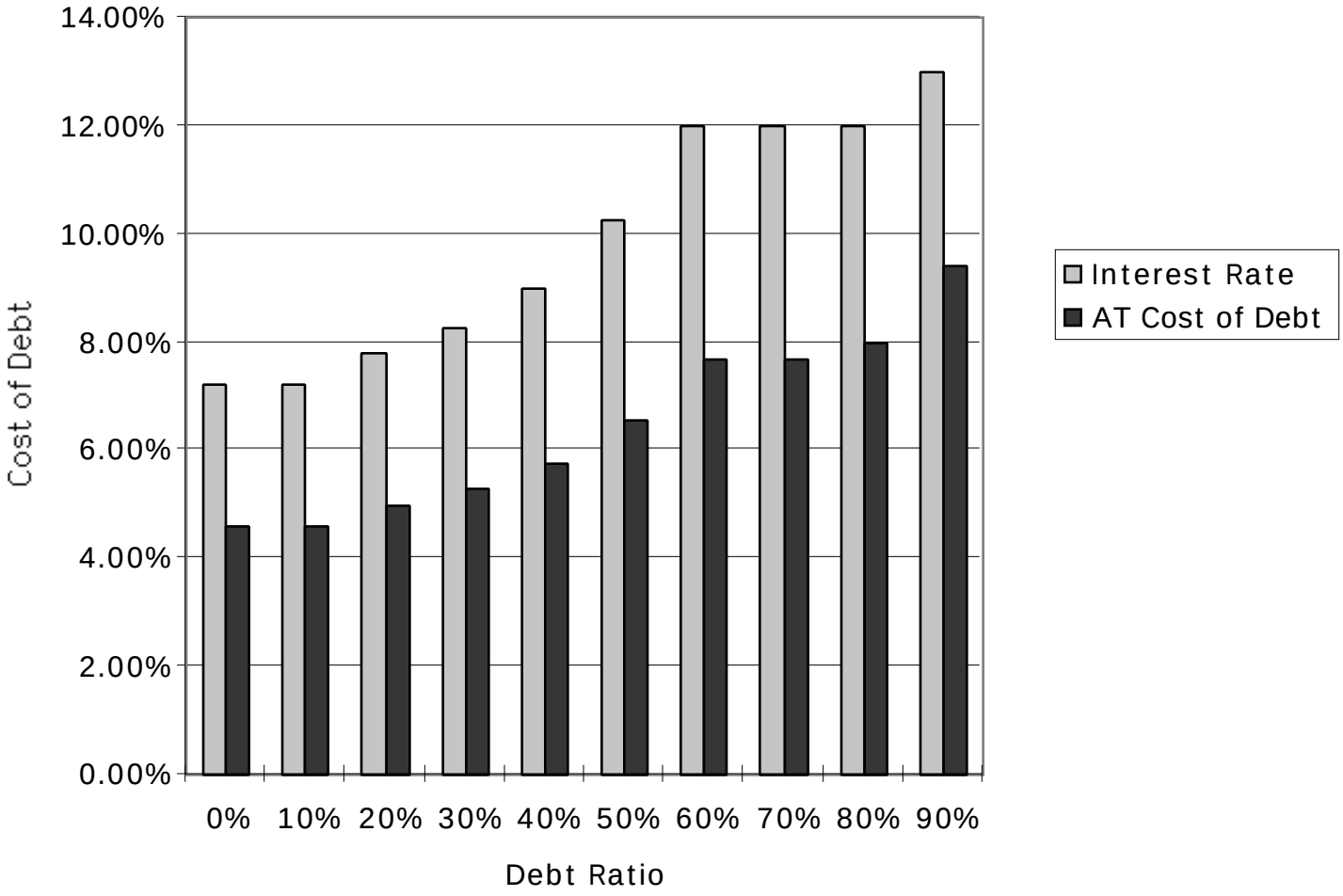
Stated versus Effective Tax Rates

- You need taxable income for interest to provide a tax savings
- In the Disney case, consider the interest expense at 70% and 80%

	70% Debt Ratio	*80% Debt Ratio*
EBIT	$ 5,559 m	$ 5,559 m
Interest Expense	$ 5,214 m	$ 5,959 m
Tax Savings	$ 1,866 m	5559*.36 =$ 2,001m
Effective Tax Rate	36.00%	2001/5959 = 33.59%
Pre-tax interest rate	12.00%	12.00%
After-tax Interest Rate	7.68%	7.97%

- You can deduct only $5,559million of the $5,959 million of the interest expense at 80%. Therefore, only 36% of $ 5,559 is considered as the tax savings.

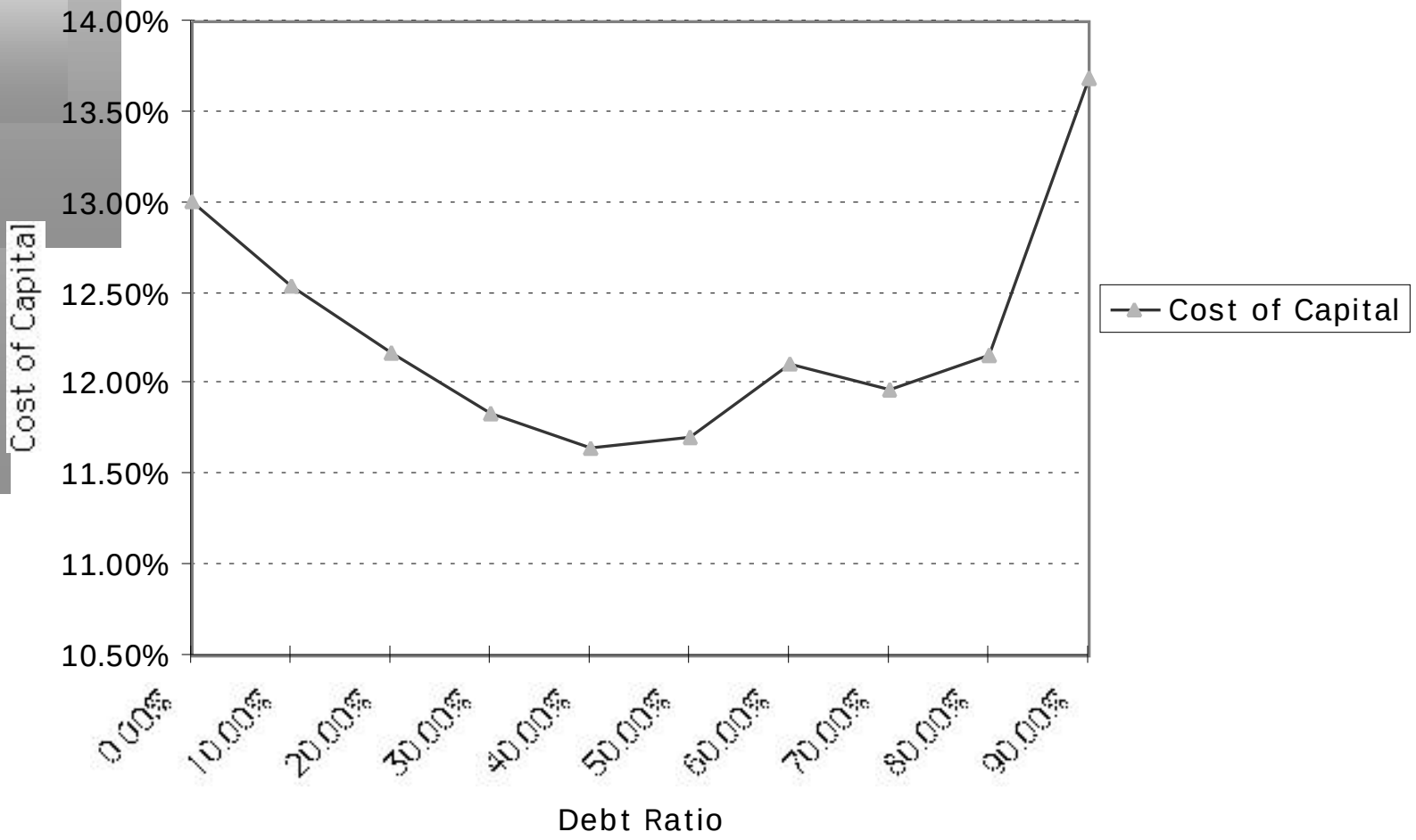
Cost of Debt


14.00%
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
Cost of Debt
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
Debt Ratio
Interest Rate
AT Cost of Debt

Disney's Cost of Capital Schedule

Debt Ratio	*Cost of Equity*	*AT Cost of Debt*	*Cost of Capital*
0.00%	13.00%	4.61%	13.00%
10.00%	13.43%	4.61%	12.55%
20.00%	13.96%	4.99%	12.17%
30.00%	14.65%	5.28%	11.84%
40.00%	15.56%	5.76%	11.64%
50.00%	16.85%	6.56%	11.70%
60.00%	18.77%	7.68%	12.11%
70.00%	21.97%	7.68%	11.97%
80.00%	28.95%	7.97%	12.17%
90.00%	52.14%	9.42%	13.69%

Disney: Cost of Capital Chart



Effect on Firm Value

- Firm Value before the change = 50,888+11,180= $ 62,068

  $WACC_b$ = 12.22% Annual Cost = $62,068 *12.22%= $7,583 million

  $WACC_a$ = 11.64% Annual Cost = $62,068 *11.64% = $7,226 million

  Δ WACC = 0.58% Change in Annual Cost = $ 357 million

- If there is no growth in the firm value, (Conservative Estimate)
  - Increase in firm value = $357 / .1164 = $3,065 million
  - Change in Stock Price = $3,065/675.13= $4.54 per share
- If there is growth (of 7.13%) in firm value over time,
  - Increase in firm value = $357 * 1.0713 /(.1164-.0713) = $ 8,474
  - Change in Stock Price = $8,474/675.13 = $12.55 per share

Implied Growth Rate obtained by

Firm value Today =FCFF(1+g)/(WACC-g): Perpetual growth formula

$62,068 = $3,222(1+g)/(.1222-g): Solve for g

A Test: The Repurchase Price

- Let us suppose that the CFO of Disney approached you about buying back stock. He wants to know the maximum price that he should be willing to pay on the stock buyback. (The current price is $ 75.38) Assuming that firm value will grow by 7.13% a year, estimate the maximum price.

- What would happen to the stock price after the buyback if you were able to buy stock back at $ 75.38?

The Downside Risk

- Doing What-if analysis on Operating Income
  - A. Standard Deviation Approach
    - Standard Deviation In Past Operating Income
    - Standard Deviation In Earnings (If Operating Income Is Unavailable)
    - Reduce Base Case By One Standard Deviation (Or More)
  - B. Past Recession Approach
    - Look At What Happened To Operating Income During The Last Recession. (How Much Did It Drop In % Terms?)
    - Reduce Current Operating Income By Same Magnitude
- Constraint on Bond Ratings

Disney's Operating Income: History

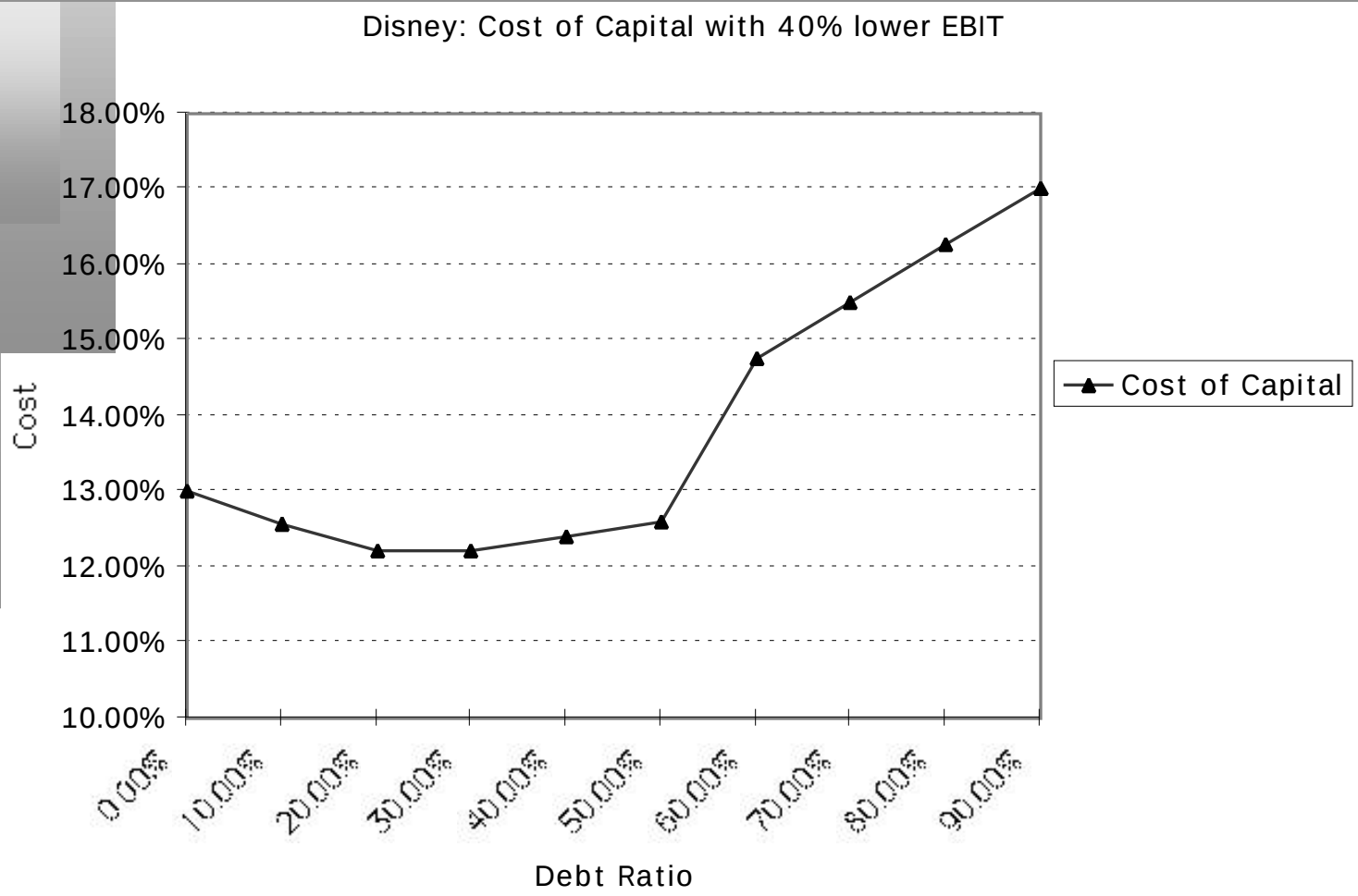
Year	*Operating Income*	*Change in Operating Income*
1981	$ 119.35	
1982	$ 141.39	18.46%
1983	$ 133.87	-5.32%
1984	$ 142.60	6.5%
1985	$ 205.60	44.2%
1986	$ 280.58	36.5%
1987	$ 707.00	152.0%
1988	$ 789.00	11.6%
1989	$ 1,109.00	40.6%
1990	$ 1,287.00	16.1%
1991	$ 1,004.00	-22.0%
1992	$ 1,287.00	28.2%
1993	$ 1,560.00	21.2%
1994	$ 1,804.00	15.6%
1995	$ 2,262.00	25.4%
1996	$ 3,024.00	33.7%

Disney: Effects of Past Downturns

Recession	*Decline in Operating Income*
1991	Drop of 22.00%
1981-82	Increased
Worst Year	Drop of 26%

- The standard deviation in past operating income is about 39%.

Disney: The Downside Scenario



Constraints on Ratings

- Management often specifies a 'desired Rating' below which they do not want to fall.
- The rating constraint is driven by three factors
  - it is one way of protecting against downside risk in operating income (so do not do both)
  - a drop in ratings might affect operating income
  - there is an ego factor associated with high ratings
- Caveat: Every Rating Constraint Has A Cost.
  - Provide Management With A Clear Estimate Of How Much The Rating Constraint Costs By Calculating The Value Of The Firm Without The Rating Constraint And Comparing To The Value Of The Firm With The Rating Constraint.

Ratings Constraints for Disney

- Assume that Disney imposes a rating constraint of BBB or greater.
- The optimal debt ratio for Disney is then 30% (see next page)
- The cost of imposing this rating constraint can then be calculated as follows:

Value at 40% Debt	= $ 70,542 million
- Value at 30% Debt	= $ 67,419 million
Cost of Rating Constraint	= $ 3,123 million

Effect of A Ratings Constraint: Disney

Debt Ratio	Rating	Firm Value
0%	AAA	$53,172
10%	AAA	$58,014
20%	A+	$62,705
30%	A-	$67,419
40%	BB	$70,542
50%	B	$69,560
60%	CCC	$63,445
70%	CCC	$65,524
80%	CCC	$62,751
90%	CC	$47,140

What if you do not buy back stock..

- The optimal debt ratio is ultimately a function of the underlying riskiness of the business in which you operate and your tax rate
- Will the optimal be different if you took projects instead of buying back stock?
  - NO. As long as the projects financed are in the same business mix that the company has always been in and your tax rate does not change significantly.
  - YES, if the projects are in entirely different types of businesses or if the tax rate is significantly different.

Analyzing Financial Service Firms

- The interest coverage ratios/ratings relationship is likely to be different for financial service firms.
- The definition of debt is messy for financial service firms. In general, using all debt for a financial service firm will lead to high debt ratios. Use only interest-bearing long term debt in calculating debt ratios.
- The effect of ratings drops will be much more negative for financial service firms.
- There are likely to regulatory constraints on capital

Interest Coverage ratios, ratings and Operating income

Interest Coverage Ratio	Rating is	Spread is	Operating Income Decline
< 0.05	D	10.00%	-50.00%
0.05 - 0.10	C	7.50%	-40.00%
0.10 - 0.20	CC	6.00%	-40.00%
0.20 - 0.30	CCC	5.00%	-40.00%
0.30 - 0.40	B-	4.25%	-25.00%
0.40 - 0.50	B	3.25%	-20.00%
0.50 - 0.60	B+	2.50%	-20.00%
0.60 - 0.80	BB	2.00%	-20.00%
0.80 - 1.00	BBB	1.50%	-20.00%
1.00 - 1.50	A-	1.25%	-17.50%
1.50 - 2.00	A	1.00%	-15.00%
2.00 - 2.50	A+	0.80%	-10.00%
2.50 - 3.00	AA	0.50%	-5.00%
> 3.00	AAA	0.20%	0.00%

Deutsche Bank: Optimal Capital Structure

Debt Ratio	Cost of Equity	Cost of Debt	WACC	Firm Value
0%	10.13%	4.24%	10.13%	DM 124,288.85
10%	10.29%	4.24%	9.69%	DM 132,558.74
20%	10.49%	4.24%	9.24%	DM 142,007.59
30%	10.75%	4.24%	8.80%	DM 152,906.88
40%	11.10%	4.24%	8.35%	DM 165,618.31
50%	11.58%	4.24%	7.91%	DM 165,750.19
60%	12.30%	4.40%	7.56%	DM 162,307.44
70%	13.51%	4.57%	7.25%	DM 157,070.00
80%	15.92%	4.68%	6.92%	DM 151,422.87
90%	25.69%	6.24%	8.19%	DM 30,083.27

Analyzing Companies after Abnormal Years

- The operating income that should be used to arrive at an optimal debt ratio is a “normalized” operating income
- A normalized operating income is the income that this firm would make in a normal year.
  - For a cyclical firm, this may mean using the average operating income over an economic cycle rather than the latest year’s income
  - For a firm which has had an exceptionally bad or good year (due to some firm-specific event), this may mean using industry average returns on capital to arrive at an optimal or looking at past years
  - For any firm, this will mean not counting one time charges or profits

Analyzing a Private Firm

- The approach remains the same with important caveats
  - It is far more difficult estimating firm value, since the equity and the debt of private firms do not trade
  - Most private firms are not rated.
  - If the cost of equity is based upon the market beta, it is possible that we might be overstating the optimal debt ratio, since private firm owners often consider all risk.

Application Test: Your firm's optimal financing mix

- Using the optimal capital structure spreadsheet provided:
  - Estimate the optimal debt ratio for your firm
  - Estimate the new cost of capital at the optimal
  - Estimate the effect of the change in the cost of capital on firm value
  - Estimate the effect on the stock price
- In terms of the mechanics, what would you need to do to get to the optimal immediately?

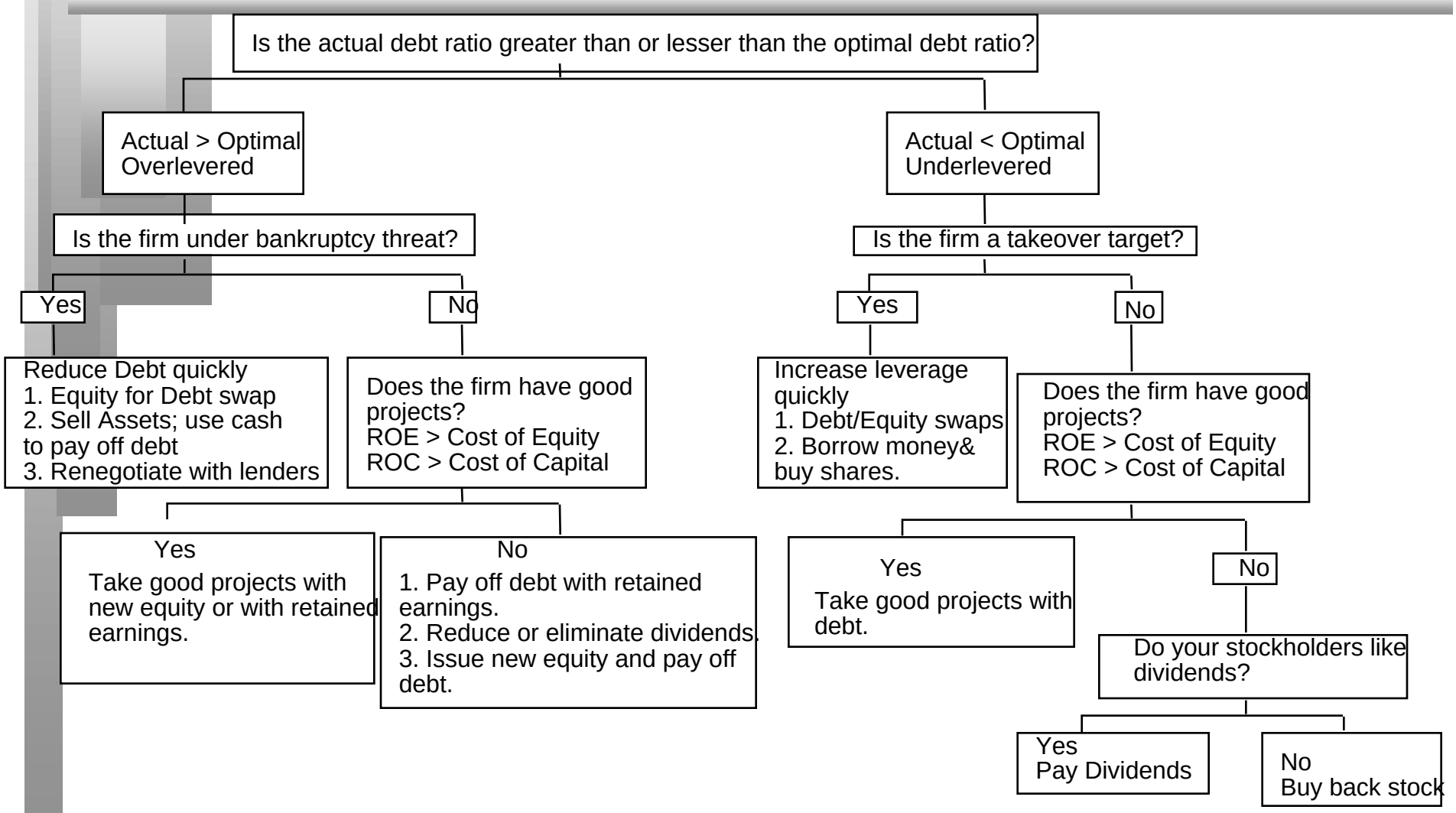
Determinants of Optimal Debt Ratios

- Firm Specific Factors
  - 1. Tax Rate
  - Higher tax rates - - > Higher Optimal Debt Ratio
  - Lower tax rates - - > Lower Optimal Debt Ratio
  - 2. Pre-Tax Returns on Firm = (Operating Income) / MV of Firm
  - Higher Pre-tax Returns - - > Higher Optimal Debt Ratio
  - Lower Pre-tax Returns - - > Lower Optimal Debt Ratio
  - 3. Variance in Earnings [Shows up when you do 'what if' analysis]
  - Higher Variance - - > Lower Optimal Debt Ratio
  - Lower Variance - - > Higher Optimal Debt Ratio
- Macro-Economic Factors
  - 1. Default Spreads

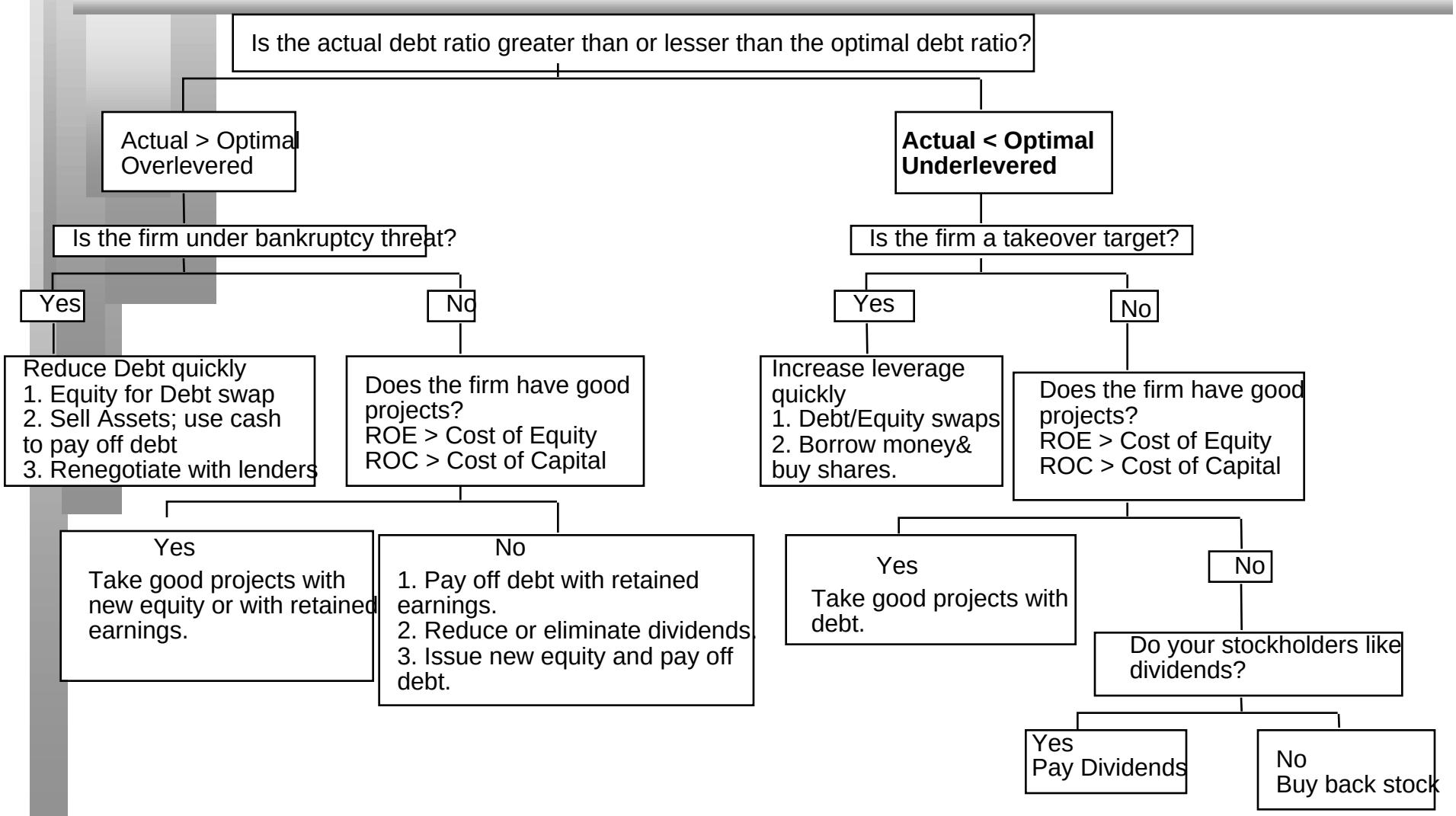
    Higher - - > Lower Optimal Debt Ratio

    Lower - - > Higher Optimal Debt Ratio

A Framework for Getting to the Optimal



Disney: Applying the Framework



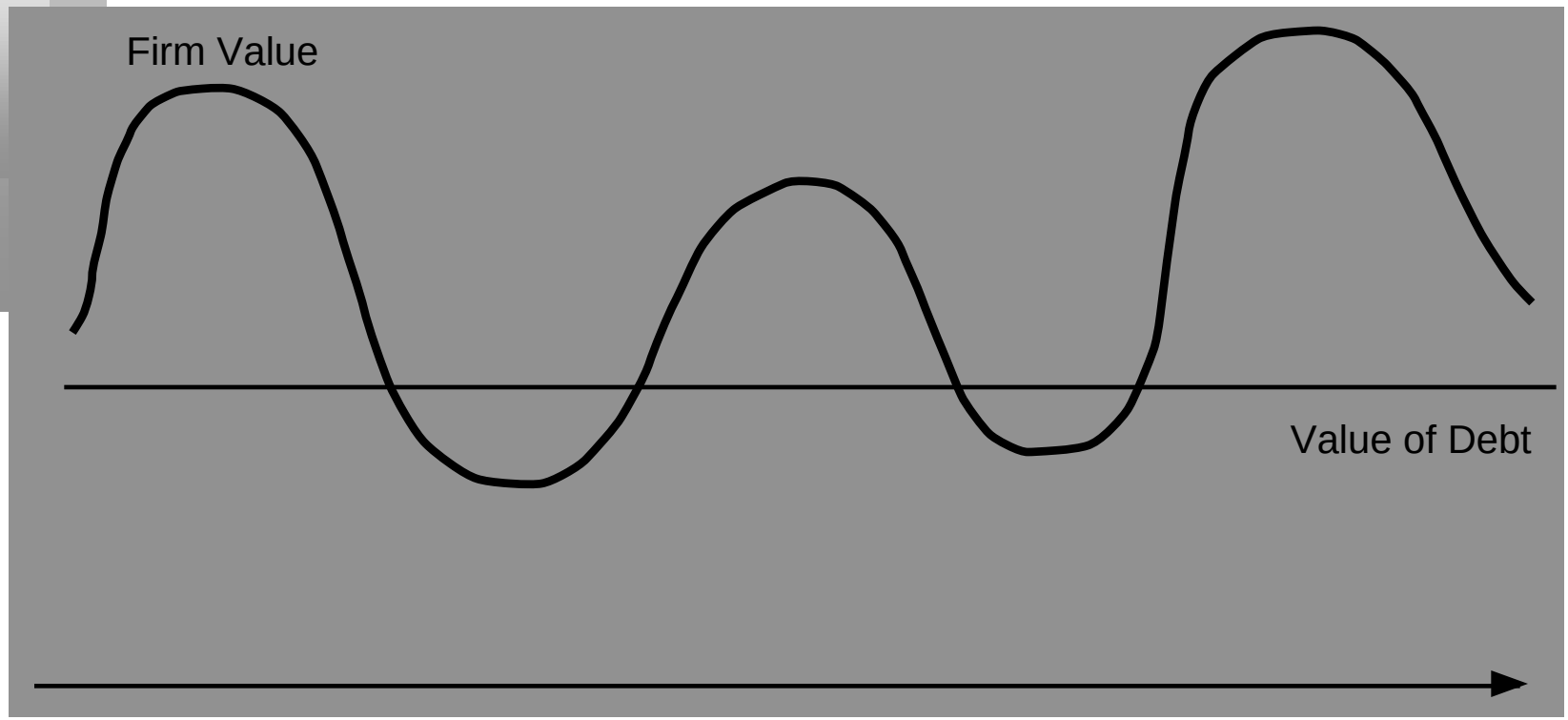
Application Test: Getting to the Optimal

- Based upon your analysis of both the firm's capital structure and investment record, what path would you map out for the firm?
  - Immediate change in leverage
  - Gradual change in leverage
  - No change in leverage
- Would you recommend that the firm change its financing mix by
  - Paying off debt/Buying back equity
  - Take projects with equity/debt

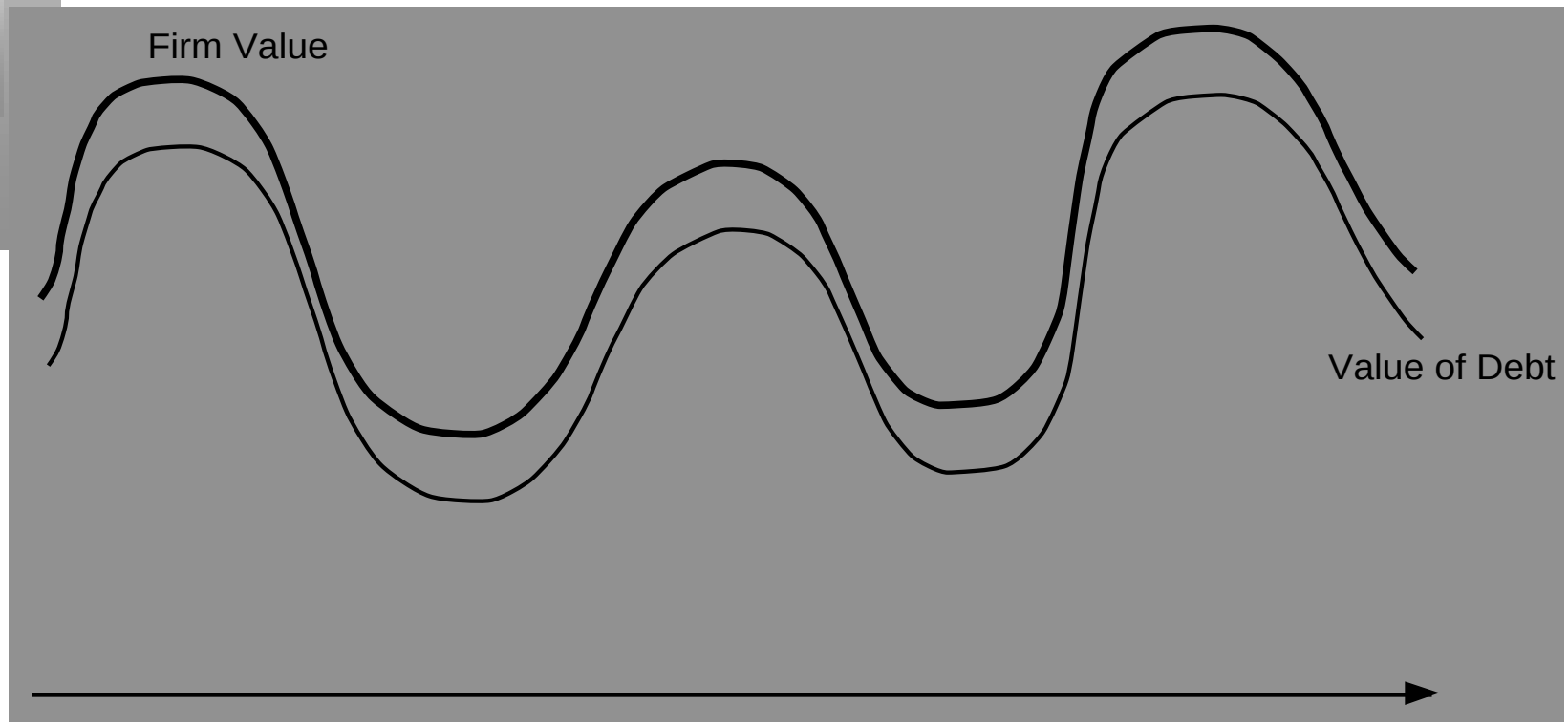
Designing Debt: The Fundamental Principle

- The objective in designing debt is to make the cash flows on debt match up as closely as possible with the cash flows that the firm makes on its assets.
- By doing so, we reduce our risk of default, increase debt capacity and increase firm value.

Firm with mismatched debt

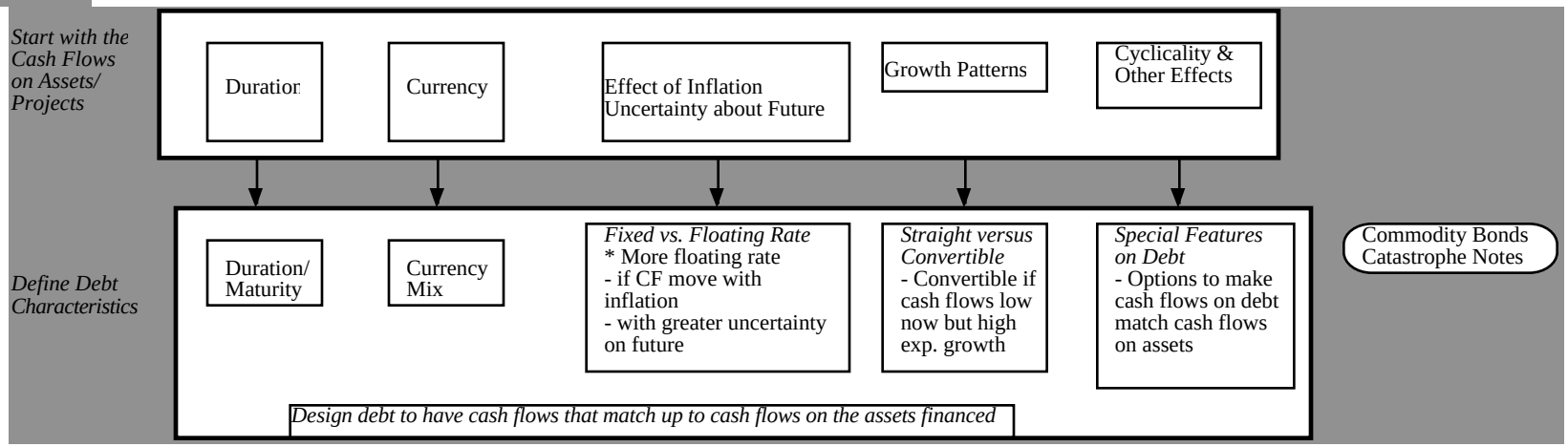


Firm with matched Debt



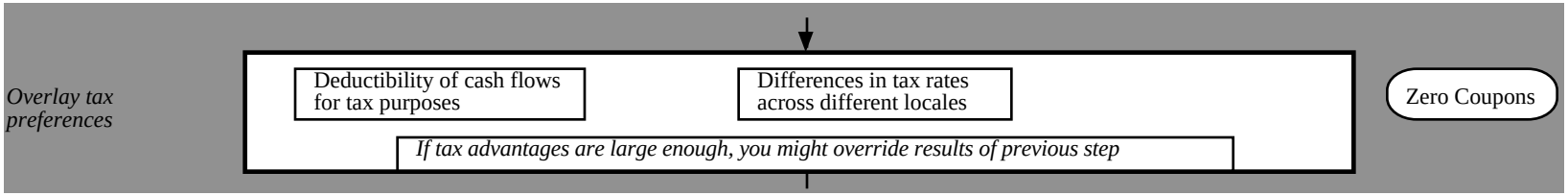
Design the perfect financing instrument

- The perfect financing instrument will
  - Have all of the tax advantages of debt
  - While preserving the flexibility offered by equity



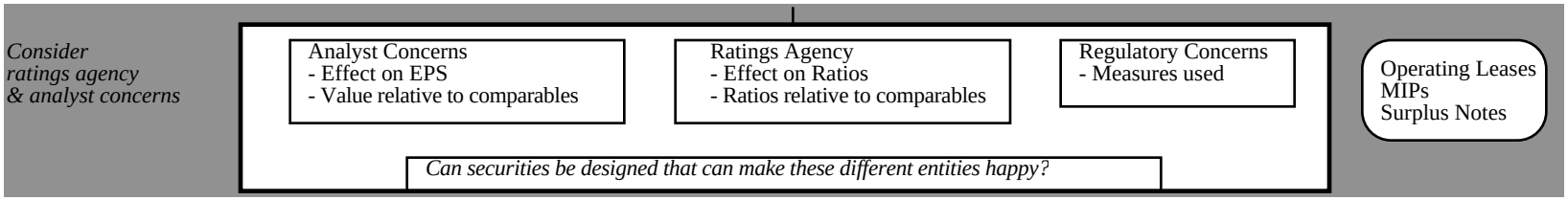
Ensuring that you have not crossed the line drawn by the tax code

- All of this design work is lost, however, if the security that you have designed does not deliver the tax benefits.
- In addition, there may be a trade off between mismatching debt and getting greater tax benefits.



While keeping equity research analysts, ratings agencies and regulators applauding

- Ratings agencies want companies to issue equity, since it makes them safer. Equity research analysts want them not to issue equity because it dilutes earnings per share. Regulatory authorities want to ensure that you meet their requirements in terms of capital ratios (usually book value). Financing that leaves all three groups happy is nirvana.



Debt or Equity: The Strange Case of Trust Preferred

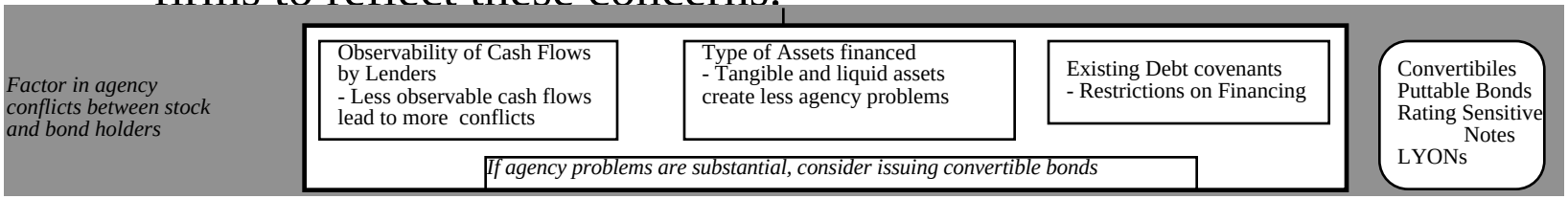
- Trust preferred stock has
  - A fixed dividend payment, specified at the time of the issue
  - That is tax deductible
  - And failing to make the payment can cause ? (Can it cause default?)
- When trust preferred was first created, ratings agencies treated it as equity. As they have become more savvy, ratings agencies have started giving firms only partial equity credit for trust preferred.

Debt, Equity and Quasi Equity

- Assuming that trust preferred stock gets treated as equity by ratings agencies, which of the following firms is the most appropriate firm to be issuing it?
  - A firm that is under levered, but has a rating constraint that would be violated if it moved to its optimal
  - A firm that is over levered that is unable to issue debt because of the rating agency concerns.

Soothe bondholder fears

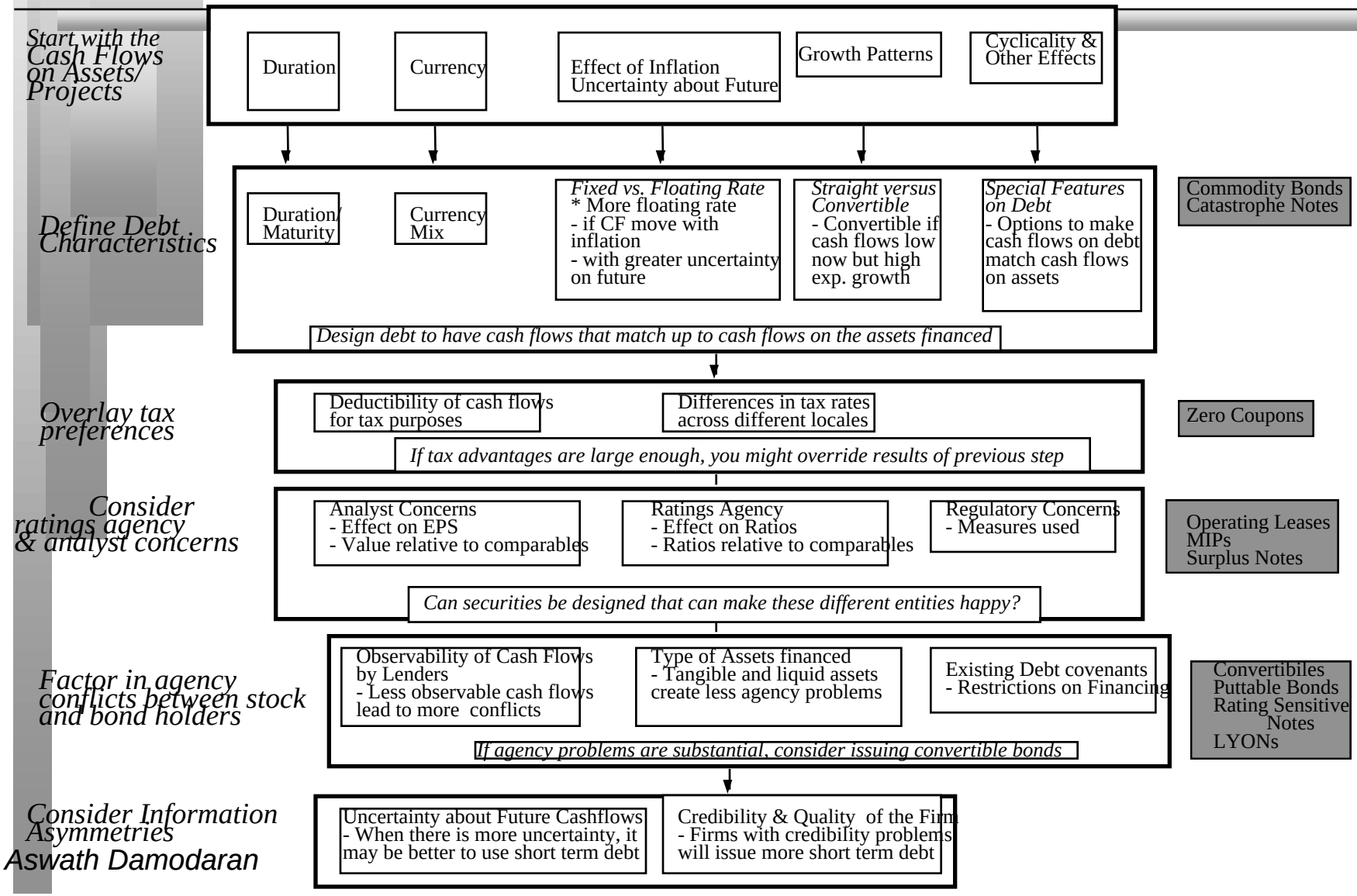
- There are some firms that face skepticism from bondholders when they go out to raise debt, because
  - Of their past history of defaults or other actions
  - They are small firms without any borrowing history
- Bondholders tend to demand much higher interest rates from these firms to reflect these concerns.



And do not lock in market mistakes that work against you

- Ratings agencies can sometimes under rate a firm, and markets can under price a firm's stock or bonds. If this occurs, firms should not lock in these mistakes by issuing securities for the long term. In particular,
  - Issuing equity or equity based products (including convertibles), when equity is under priced transfers wealth from existing stockholders to the new stockholders
  - Issuing long term debt when a firm is under rated locks in rates at levels that are far too high, given the firm's default risk.
- What is the solution
  - If you need to use equity?
  - If you need to use debt?

Designing Debt: Bringing it all together



Coming up with the financing details: Intuitive Approach

Business	*Project Cash Flow Characteristics*	*Type of Financing*
Creative Content	Projects are likely to 1. be short term 2. have cash outflows are primarily in dollars (but cash inflows could have a substantial foreign currency component 3. have net cash flows which are heavily driven by whether the movie or T.V series is a "hit"	Debt should be 1. short term 2. primarily dollar 3. if possible, tied to the success of movies.
Retailing	Projects are likely to be 1. medium term (tied to store life) 2. primarily in dollars (most in US still) 3. cyclical	Debt should be in the form of operating leases.
Broadcasting	Projects are likely to be 1. short term 2. primarily in dollars, though foreign component is growing 3. driven by advertising revenues and show success	Debt should be 1. short term 2. primarily dollar debt 3. if possible, linked to network ratings.

Financing Details: Other Divisions

Theme Parks	Projects are likely to be 1. very long term 2. primarily in dollars, but a significant proportion of revenues come from foreign tourists. 3. affected by success of movie and broadcasting divisions.	Debt should be 1. long term 2. mix of currencies, based upon tourist make up.
Real Estate	Projects are likely to be 1. long term 2. primarily in dollars. 3. affected by real estate values in the area	Debt should be 1. long term 2. dollars 3. real-estate linked (Mortgage Bonds)

Application Test: Choosing your Financing Type

- Based upon the business that your firm is in, and the typical investments that it makes, what kind of financing would you expect your firm to use in terms of
  - Duration (long term or short term)
  - Currency
  - Fixed or Floating rate
  - Straight or Convertible

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.

Returning Cash to the Owners: Dividend Policy

Aswath Damodaran

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
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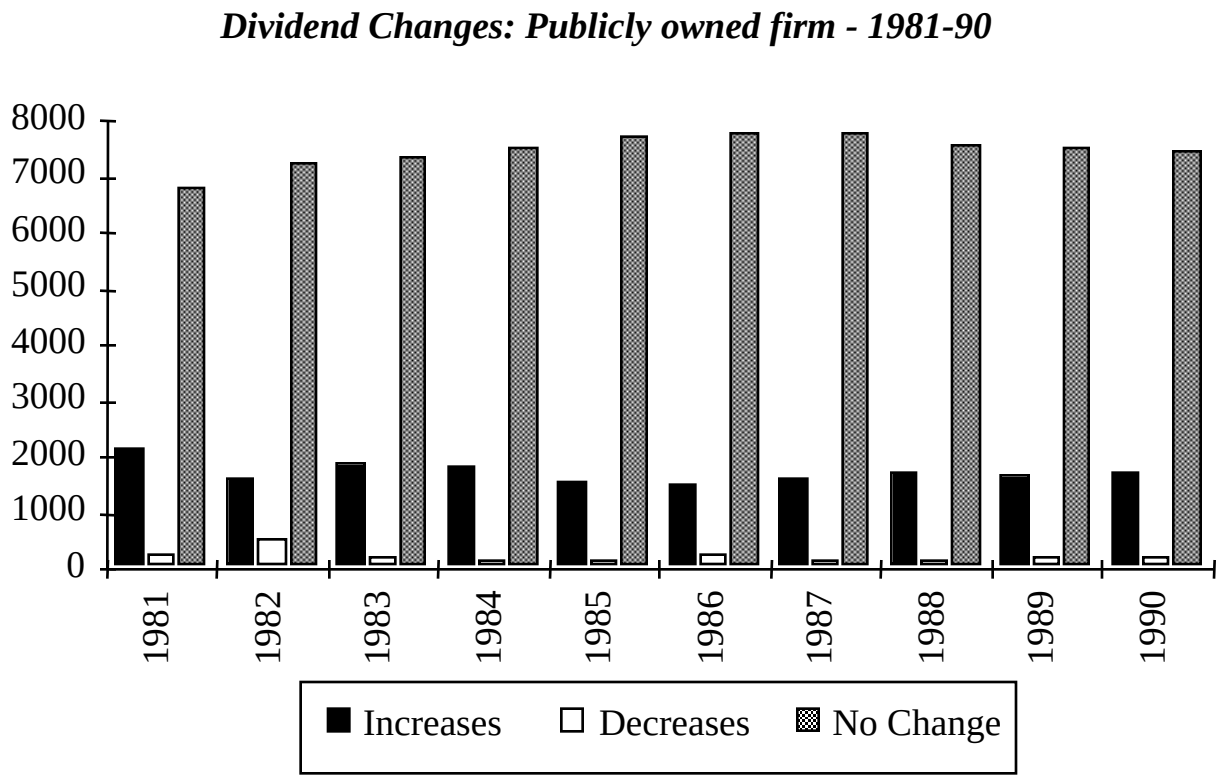
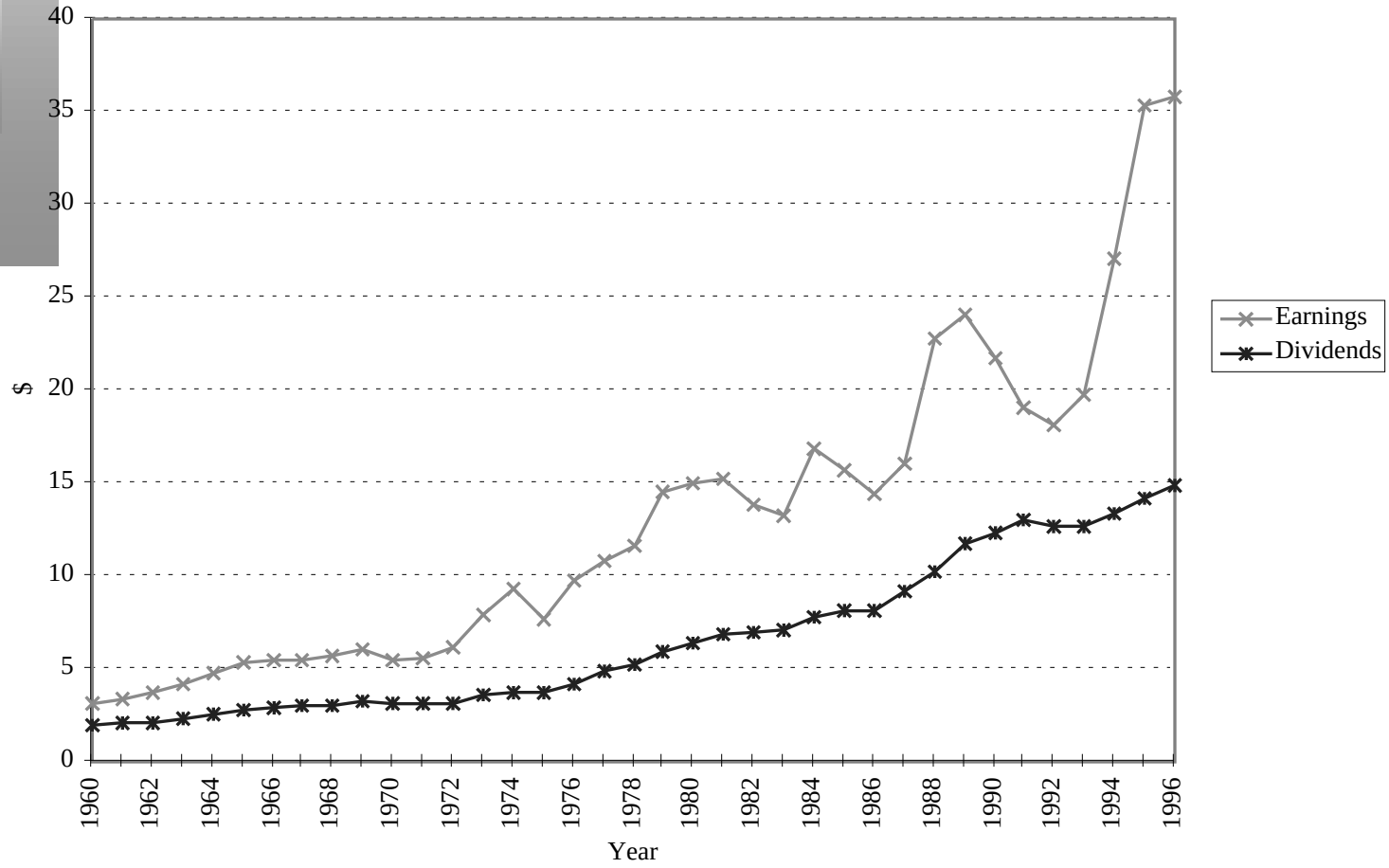
- **If there are not enough investments that earn the hurdle rate, return the cash to stockholders.**
  - **The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.**

Dividends are sticky



Dividends tend to follow earnings

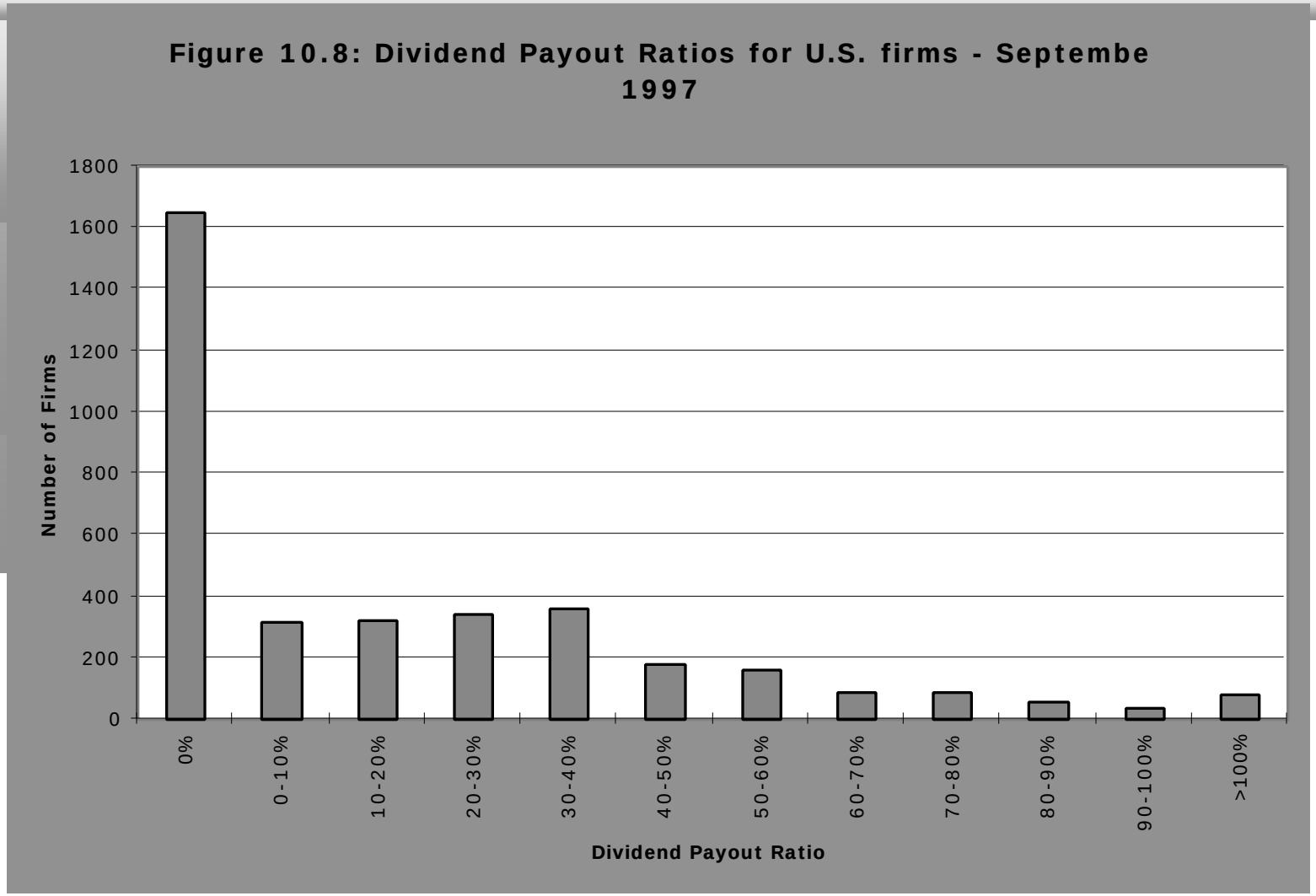
Figure 10.1: Aggregate Earnings and Dividends: S & P 500 - 1960-1996



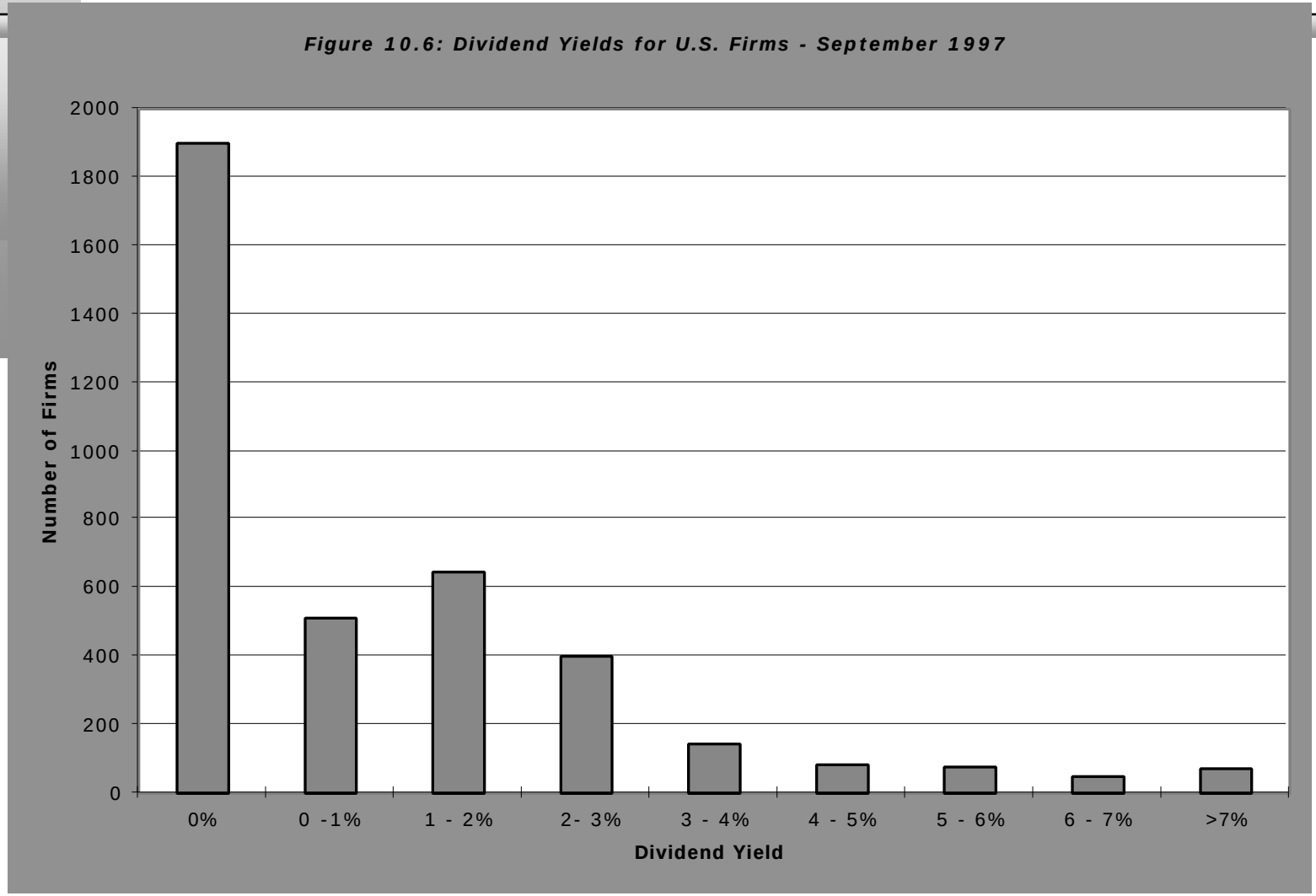
Measures of Dividend Policy

- Dividend Payout:
  - measures the percentage of earnings that the company pays in dividends
  - = Dividends / Earnings
- Dividend Yield :
  - measures the return that an investor can make from dividends alone
  - = Dividends / Stock Price

Dividend Payout Ratios in the US



Dividend Yields in the US



Three Schools Of Thought On Dividends

- 1. If
  - (a) there are no tax disadvantages associated with dividends
  - (b) companies can issue stock, at no cost, to raise equity, whenever needed
  - **Dividends do not matter, and dividend policy does not affect value.**
- 2. If dividends have a tax disadvantage,
  - **Dividends are bad, and increasing dividends will reduce value**
- 3. If stockholders like dividends, or dividends operate as a signal of future prospects,
  - **Dividends are good, and increasing dividends will increase value**

The balanced viewpoint

- If a company has excess cash, and few good projects (NPV>0), returning money to stockholders (dividends or stock repurchases) is GOOD.
- If a company does not have excess cash, and/or has several good projects (NPV>0), returning money to stockholders (dividends or stock repurchases) is BAD.

Questions to Ask in Dividend Policy Analysis

- How much could the company have paid out during the period under question?
- How much did the the company actually pay out during the period in question?
- How much do I trust the management of this company with excess cash?
  - How well did they make investments during the period in question?
  - How well has my stock performed during the period in question?

A Measure of How Much a Company Could have Afforded to Pay out: FCFE

- The Free Cashflow to Equity (FCFE) is a measure of how much cash is left in the business after non-equity claimholders (debt and preferred stock) have been paid, and after any reinvestment needed to sustain the firm's assets and future growth.

  Net Income

  + Depreciation & Amortization

  = Cash flows from Operations to Equity Investors

  - Preferred Dividends

  - Capital Expenditures

  - Working Capital Needs

  - Principal Repayments

  + Proceeds from New Debt Issues

  = Free Cash flow to Equity

Estimating FCFE when Leverage is Stable

Net Income

- (1- δ) (Capital Expenditures - Depreciation)

- (1- δ) Working Capital Needs

= Free Cash flow to Equity

δ = Debt/Capital Ratio

For this firm,

- Proceeds from new debt issues = Principal Repayments + d (Capital Expenditures - Depreciation + Working Capital Needs)

An Example: FCFE Calculation

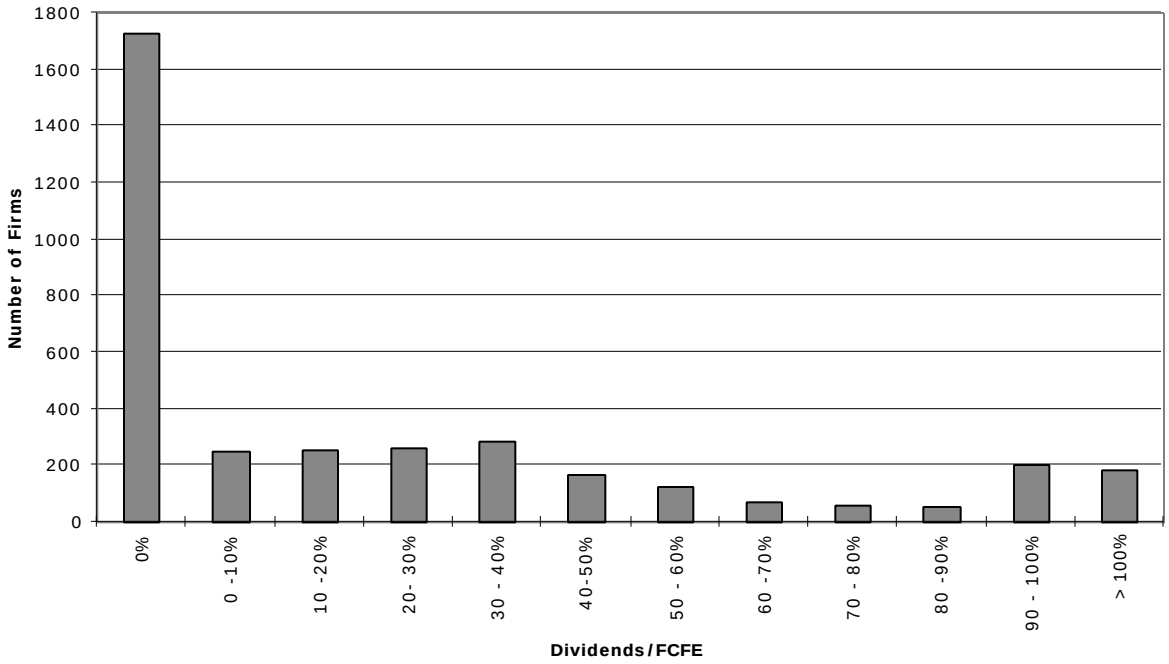
- Consider the following inputs for Microsoft in 1996. In 1996, Microsoft's FCFE was:
  - Net Income = $2,176 Million
  - Capital Expenditures = $494 Million
  - Depreciation = $ 480 Million
  - Change in Non-Cash Working Capital = $ 35 Million
  - Debt Ratio = 0%
- FCFE = Net Income - (Cap ex - Depr) (1-DR) - Chg WC (!-DR)
  = $ 2,176 - (494 - 480) (1-0) - $ 35 (1-0)
  = $ 2,123 Million

Microsoft: Dividends?

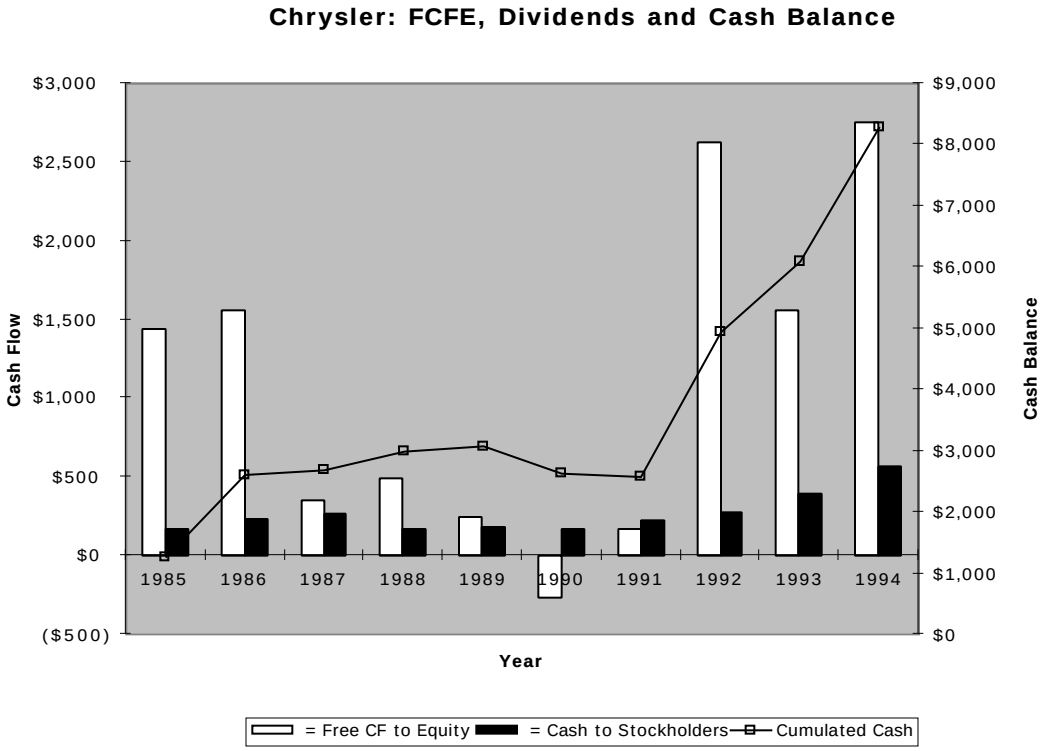
- By this estimation, Microsoft could have paid $ 2,123 Million in dividends/stock buybacks in 1996. They paid no dividends and bought back no stock. Where will the $2,123 million show up in Microsoft's balance sheet?

Dividends versus FCFE: U.S.

Figure 11.1: Dividends/FCFE : NYSE Firms in 1996



The Consequences of Failing to pay FCFE

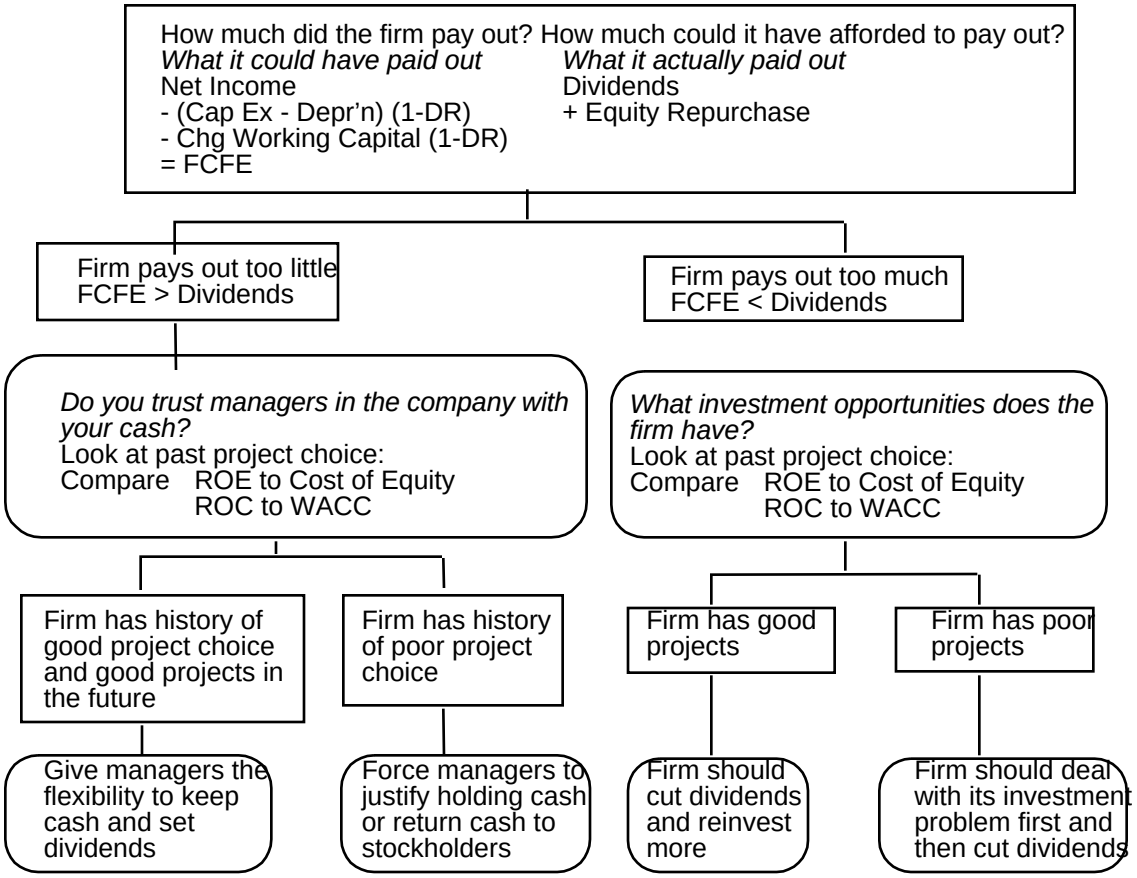


Application Test: Estimating your firm's FCFE

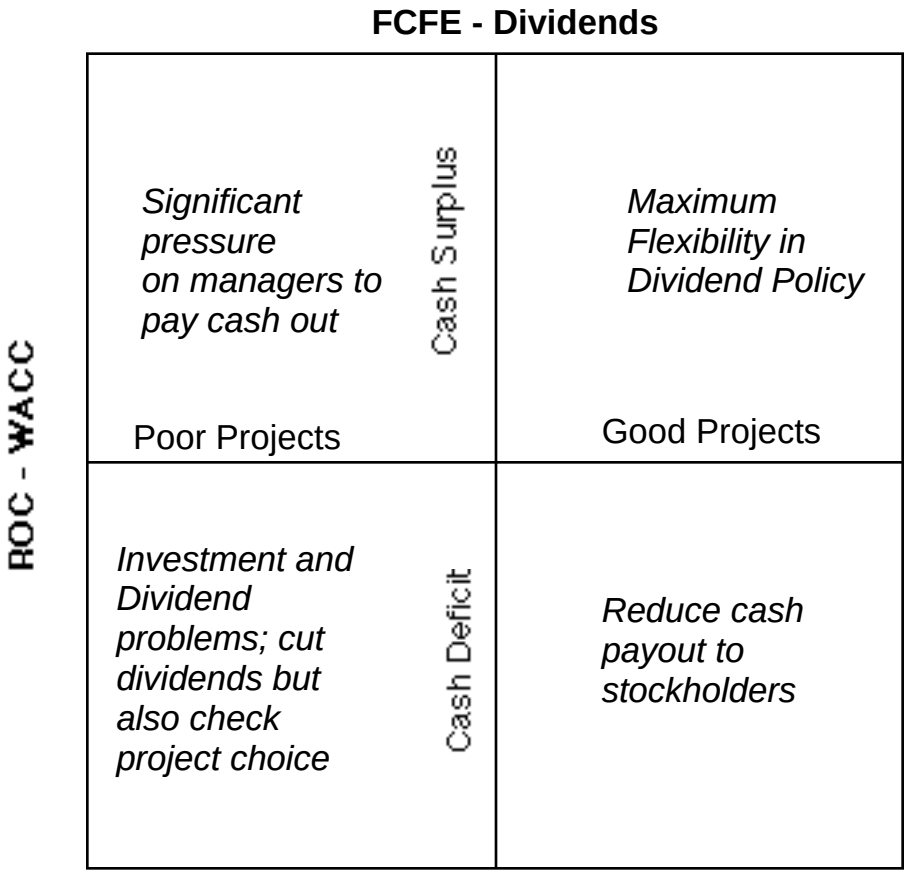
- For the most recent year, estimate the free cash flow to equity at your firm using the following formulation

In General,	If cash flow statement used
Net Income	Net Income
+ Depreciation & Amortization	+ Depreciation & Amortization
- Capital Expenditures	+ Capital Expenditures
- Change in Non-Cash Working Capital	+ Changes in Non-cash WC
- Preferred Dividend	+ Preferred Dividend
- Principal Repaid	+ Increase in LT Borrowing
+ New Debt Issued	+ Decrease in LT Borrowing
	+ Change in ST Borrowing
= FCFE	= FCFE

A Practical Framework for Analyzing Dividend Policy



A Dividend Matrix



Disney: An analysis of FCFE from 1992-1996

Year	Net Income	(Cap Ex- Depr) (1- Debt Ratio)	Chg in WC (1-Debt Ratio)	FCFE
1992	$817	$173	($81)	$725
1993	$889	$328	$161	$400
1994	$1,110	$469	$498	$143
1995	$1,380	$325	$206	$829
1996*	$1,214	$466	($470)	$1,218
Avge	**$1,082**	**$352**	**($63)**	**$667**

(The numbers for 1996 are reported without the Capital Cities Acquisition)

Disney's Dividends and Buybacks from 1992 to 1996

Year	FCFE	Dividends + Stock Buybacks
1992	$725	$105
1993	$400	$160
1994	$143	$724
1995	$829	$529
1996	$1,218	$733
Average	**$667**	**$450**

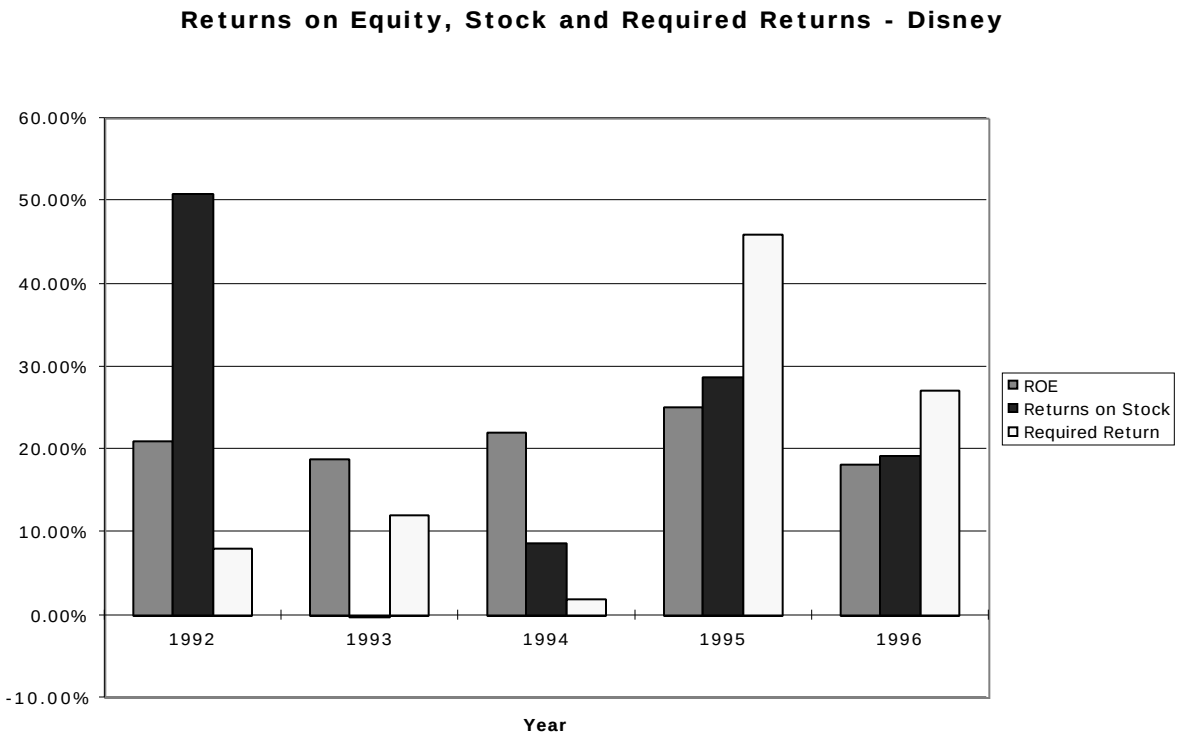
Disney: Dividends versus FCFE

- Disney paid out $ 217 million less in dividends (and stock buybacks) than it could afford to pay out. How much cash do you think Disney accumulated during the period?

Can you trust Disney's management?

- During the period 1992-1996, Disney had
  - an average return on equity of 21.07% on projects taken
  - earned an average return on 21.43% for its stockholders
  - a cost of equity of 19.09%
- Disney has taken good projects and earned above-market returns for its stockholders during the period.
- If you were a Disney stockholder, would you be comfortable with Disney's dividend policy?
- Yes
- No

Disney: Return Performance Trends



The Bottom Line on Disney Dividends

- Disney could have afforded to pay more in dividends during the period of the analysis.
- It chose not to, and used the cash for the ABC acquisition.
- The excess returns that Disney earned on its projects and its stock over the period provide it with some dividend flexibility. The trend in these returns, however, suggests that this flexibility will be rapidly depleted.
- The flexibility will clearly not survive if the ABC acquisition does not work out.

Aracruz: Dividends and FCFE: 1994-1996

	1994	*1995*	*1996*
Net Income	BR248.21	BR326.42	BR47.00
- (Cap. Exp - Depr)*(1-DR)	BR174.76	BR197.20	BR14.96
- ∂ Working Capital*(1-DR)	(BR47.74)	BR15.67	(BR23.80)
= Free CF to Equity	BR121.19	BR113.55	BR55.84
Dividends	BR80.40	BR113.00	BR27.00
+ Equity Repurchases	BR 0.00	BR 0.00	BR 0.00
= Cash to Stockholders	BR80.40	BR113.00	BR27.00

Aracruz: Investment Record

	1994	*1995*	*1996*
Project Performance Measures			
ROE	19.98%	16.78%	2.06%
Required rate of return	3.32%	28.03%	17.78%
Difference	16.66%	-11.25%	-15.72%
Stock Performance Measure			
Returns on stock	50.82%	-0.28%	8.65%
Required rate of return	3.32%	28.03%	17.78%
Difference	47.50%	-28.31%	-9.13%

Aracruz: Its your call..

- Assume that you are a large stockholder in Aracruz. They have a history of paying less in dividends than they have available in FCFE and have accumulated a cash balance of roughly 1 billion BR (25% of the value of the firm). Would you trust the managers at Aracruz with your cash?
  - Yes
  - No

Mandated Dividend Payouts

- There are many countries where companies are mandated to pay out a certain portion of their earnings as dividends. Given our discussion of FCFE, what types of companies will be hurt the most by these laws?
  - Large companies making huge profits
  - Small companies losing money
  - High growth companies that are losing money
  - High growth companies that are making money

BP: Dividends- 1983-92

	1	2	3	4	5	6	7	8	9	10
Net Income	$1,256.00	$1,626.00	$2,309.00	$1,098.00	$2,076.00	$2,140.00	$2,542.00	$2,946.00	$712.00	$947.00
- (Cap. Exp - Depr)*(1-DR)	$1,499.00	$1,281.00	$1,737.50	$1,600.00	$580.00	$1,184.00	$1,090.50	$1,975.50	$1,545.50	$1,100.00
∂ Working Capital*(1-DR)	$369.50	($286.50)	$678.50	$82.00	($2,268.00)	($984.50)	$429.50	$1,047.50	($305.00)	($415.00)
= Free CF to Equity	($612.50)	$631.50	($107.00)	($584.00)	$3,764.00	$1,940.50	$1,022.00	($77.00)	($528.50)	$262.00
Dividends	$831.00	$949.00	$1,079.00	$1,314.00	$1,391.00	$1,961.00	$1,746.00	$1,895.00	$2,112.00	$1,685.00
+ Equity Repurchases										
= Cash to Stockholders	$831.00	$949.00	$1,079.00	$1,314.00	$1,391.00	$1,961.00	$1,746.00	$1,895.00	$2,112.00	$1,685.00
Dividend Ratios										
Payout Ratio	66.16%	58.36%	46.73%	119.67%	67.00%	91.64%	68.69%	64.32%	296.63%	177.93%
Cash Paid as % of FCFE	-135.67%	150.28%	-1008.41%	-225.00%	36.96%	101.06%	170.84%	-2461.04%	-399.62%	643.13%
Performance Ratios										
1. Accounting Measure										
ROE	9.58%	12.14%	19.82%	9.25%	12.43%	15.60%	21.47%	19.93%	4.27%	7.66%
Required rate of return	19.77%	6.99%	27.27%	16.01%	5.28%	14.72%	26.87%	-0.97%	25.86%	7.12%
Difference	-10.18%	5.16%	-7.45%	-6.76%	7.15%	0.88%	-5.39%	20.90%	-21.59%	0.54%

BP: Summary of Dividend Policy

Summary of calculations

	Average	*Standard Deviation*	*Maximum*	*Minimum*
Free CF to Equity	$571.10	$1,382.29	$3,764.00	($612.50)
Dividends	$1,496.30	$448.77	$2,112.00	$831.00
Dividends+Repurchases	$1,496.30	$448.77	$2,112.00	$831.00
Dividend Payout Ratio	84.77%			
Cash Paid as % of FCFE	262.00%			
ROE - Required return	-1.67%	11.49%	20.90%	-21.59%

BP: Just Desserts!

B.P.'s Shares Plummet After Dividend Is Slashed

By MATTHEW L. WALD

British Petroleum said yesterday that it would cut its dividend by 35 percent, take a pretax restructuring charge of $1.62 billion for the second quarter and lay off 11,000 employees, or 10 percent of its worldwide work force. The moves came five weeks after Robert B. Horton, B.P.'s chairman, resigned under pressure from the company's outside directors.

Analysts anticipated a dividend cut by the oil company, the world's third largest, but the one announced was at the low end of their expectations. In response, shares of the company's American depositary rights, each of which represents 12 shares of the London-based company, dropped $3.625, or 7.38 percent, to $45.375. It was the most active issue on the New York Stock Exchange, with 5.89 million shares traded.

The Royal Dutch/Shell group also reported a disappointing quarter yesterday, with earnings on a replacement cost basis — excluding gains or losses on inventory holdings — of $868 million, down 22 percent.

Quick Recovery Seems Unlikely

Adding to the gloom at B.P., the new chief executive, David A. G. Simon, said the prospects for a quick recovery were poor. "External trading conditions are expected to remain difficult, particularly for the downstream oil and chemicals businesses, with growth prospects for the world's economies remaining uncertain," he said in a statement. Downstream oil is an industry terms for refining and marketing operations, as distinct from oil production.

Downstream margins in the United States would be hurt later this year, he predicted, when clean air rules take effect and gasoline must be reformulated to reduce pollution. "In Europe, recovery will depend upon seasonal heating oil demand," Mr. Simon said.

The crude oil market, he predicted, would remain balanced unless Iraqi oil was allowed to re-enter the market. The company said it was well positioned to take advantage of any

> The giant British oil company bet on rising oil prices.

increase in oil prices, but the company's oil production in the United States is declining. B.P. is the largest producer in Alaska.

The market for petrochemicals in Europe remains weak.

B.P.'s second quarter profits, before one-time transactions, declined to $102 million from $313 million, valuing inventories on a replacement-cost basis. James J. Marchis, an analyst at Stanford C. Bernstein, estimated that after exceptional items, earnings per share fell to 56 cents in the second quarter, compared with 82 cents a year earlier.

Analysts attributed B.P.'s problems to the company's acquisitions in the last few years, and heavy capital expenditures. Summing up the company's recent history, Frank P. Knutsel of Prudential Securities Research said, "Debt rose, interest expense rose, and profits have gone to hell."

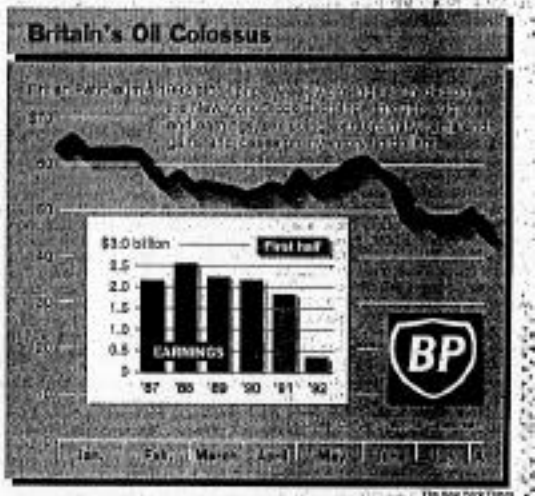
Mr. Marchis, who worked for Standard Oil of Ohio and then B.P. after B.P. acquired Sohio, said, "What you've got in a company that thought oil prices were going to go to $25 and spent like it, in terms of capital." If B.P.'s costs of finding oil are the same as the industry average, he said, then the company has been spending enough to replace 120 percent to 130 percent of its annual production, which is not a successful strategy if prices do not rise.

In addition, he said, the company had been spending twice as much on its refining and marketing operations as it was recording in depreciation.

Another analyst at a large stock brokerage house, who spoke on the condition of anonymity, said, "They took all the old Sohio stations and turned them into modern B.P. stations; they took all the B.P. stations and turned them into ultramodern stations."

The analyst said that while some of the cuts were obvious, some came

Continued on Page D8



The Limited: Summary of Dividend Policy: 1983-1992

	Summary of calculations			
	Average	*Standard Deviation*	*Maximum*	*Minimum*
Free CF to Equity	($34.20)	$109.74	$96.89	($242.17)
Dividends	$40.87	$32.79	$101.36	$5.97
Dividends+Repurchases	$40.87	$32.79	$101.36	$5.97
Dividend Payout Ratio	18.59%			
Cash Paid as % of FCFE	-119.52%			
ROE - Required return	1.69%	19.07%	29.26%	-19.84%

Growth Firms and Dividends

- High growth firms are sometimes advised to initiate dividends because its increases the potential stockholder base for the company (since there are some investors - like pension funds - that cannot buy stocks that do not pay dividends) and, by extension, the stock price. Do you agree with this argument?
  - Yes
  - No

Why?

Application Test: Assessing your firm's dividend policy

- Compare your firm's dividends to its FCFE, looking at the last 5 years of information.

- Based upon your earlier analysis of your firm's project choices, would you encourage the firm to return more cash or less cash to its owners?

- If you would encourage it to return more cash, what form should it take (dividends versus stock buybacks)?

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.**

Valuation

Aswath Damodaran

First Principles

- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
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  - The form of returns - dividends and stock buybacks - will depend upon the stockholders' characteristics.

Objective: Maximize the Value of the Firm

Discounted Cashflow Valuation: Basis for Approach

$$\text{Value} = \sum_{t=1}^{t=n} \frac{CF_t}{(1+r)^t}$$

- where,
- n = Life of the asset
- CF_t = Cashflow in period t
- r = Discount rate reflecting the riskiness of the estimated cashflows

Firm Valuation

- The value of the firm is obtained by discounting expected cashflows to the firm, i.e., the residual cashflows after meeting all operating expenses and taxes, but prior to debt payments, at the weighted average cost of capital, which is the cost of the different components of financing used by the firm, weighted by their market value proportions.

$$\text{Value of Firm} = \sum_{t=1}^{t=n} \frac{\text{CF to Firm}_t}{(1+\text{WACC})^t}$$

where,

CF to Firmt = Expected Cashflow to Firm in period t

WACC = Weighted Average Cost of Capital

Estimating Inputs: I. Discount Rates

- **Critical ingredient** in discounted cashflow valuation. Errors in estimating the discount rate or mismatching cashflows and discount rates can lead to serious errors in valuation.
- At an intutive level, the discount rate used should be consistent with both the **riskiness** and the **type of cashflow** being discounted.

Reviewing Disney's Costs of Equity & Debt

Business	Unlevered Beta	D/E Ratio	Levered Beta	Riskfree Rate	Risk Premium	Cost of Equity
Creative Content	1.25	22.23%	1.43	7.00%	5.50%	14.85%
Retailing	1.5	22.23%	1.71	7.00%	5.50%	16.42%
Broadcasting	0.9	22.23%	1.03	7.00%	5.50%	12.65%
Theme Parks	1.1	22.23%	1.26	7.00%	5.50%	13.91%
Real Estate	0.7	22.23%	0.80	7.00%	5.50%	11.40%
Disney	1.09	22.23%	1.25	7.00%	5.50%	13.85%

- Disney's Cost of Debt (based upon rating) = 7.50%

Estimating Cost of Capital: Disney

- Equity
  - Cost of Equity = 13.85%
  - Market Value of Equity = $50.88 Billion
  - Equity/(Debt+Equity) = 82%
- Debt
  - After-tax Cost of debt = 7.50% (1-.36) = 4.80%
  - Market Value of Debt = $ 11.18 Billion
  - Debt/(Debt +Equity) = 18%
- Cost of Capital = 13.85%(.82)+4.80%(.18) = 12.22%

II. Estimating Current Cash Flow to the Firm

EBIT (1 - tax rate)

+ Depreciation

- Capital Spending

- Change in Working Capital

= Cash flow to the firm

Estimating FCFF: Disney

- EBIT = $5,559 Million
- Capital spending = $ 1,746 Million
- Depreciation = $ 1,134 Million
- Non-cash Working capital Change = $ 617 Million
- Estimating FCFF

EBIT (1-t)	$	3,558
+ Depreciation	$	1,134
- Capital Expenditures	$	1,746
- Change in WC	$	617
= FCFF	$	2,329 Million

Application Test: Estimating your firm's FCFF

- Estimate the FCFF for your firm in its most recent financial year:

In general,	If using statement of cash flows
EBIT (1-t)	EBIT (1-t)
+ Depreciation	+ Depreciation
- Capital Expenditures	+ Capital Expenditures
- Change in Non-cash WC	+ Change in Non-cash WC
= FCFF	= FCFF

Estimate the dollar reinvestment at your firm:

Reinvestment = EBIT (1-t) - FCFF

III. Expected Growth in EBIT And Fundamentals

- Reinvestment Rate and Return on Capital

  g_{EBIT} = (Net Capital Expenditures + Change in WC)/EBIT(1-t) * ROC
  = Reinvestment Rate * ROC

- Proposition 2: No firm can expect its operating income to grow over time without reinvesting some of the operating income in net capital expenditures and/or working capital.
- Proposition 3: The net capital expenditure needs of a firm, for a given growth rate, should be inversely proportional to the quality of its investments.

Estimating Growth in EBIT: Disney

Actual reinvestment rate in 1996 = (Net Cap Ex+ Chg in WC)/ EBIT (1-t)

- Net Cap Ex in 1996 = (1745-1134)
- Change in Working Capital = 617
- EBIT (1- tax rate) = 5559(1-.36)
- Reinvestment Rate = (1745-1134+617)/(5559*.64)= 34.5%

- Forecasted Reinvestment Rate = 50%
- Return on Capital =18.69%
- Expected Growth in EBIT =.5(18.69%) = 9.35%
- The forecasted reinvestment rate is much higher than the actual reinvestment rate in 1996, because it includes projected acquisition. Between 1992 and 1996, adding in the Capital Cities acquisition to all capital expenditures would have yielded a reinvestment rate of roughly 50%.

Application Test: Estimating Expected Growth

- Estimate the following:
  - The reinvestment rate for your firm
  - The after-tax return on capital
  - The expected growth in operating income, based upon these inputs

IV. Getting Closure in Valuation

- A publicly traded firm potentially has an infinite life. The value is therefore the present value of cash flows forever.

$$\text{Value} = \sum_{t=1}^{t=\infty} \frac{CF_t}{(1+r)^t}$$

- Since we cannot estimate cash flows forever, we estimate cash flows for a "growth period" and then estimate a terminal value, to capture the value at the end of the period:

$$\text{Value} = \sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}$$

Stable Growth and Terminal Value

- When a firm's cash flows grow at a "constant" rate forever, the present value of those cash flows can be written as:

  Value = Expected Cash Flow Next Period / (r - g)

  where,

  r = Discount rate (Cost of Equity or Cost of Capital)

  g = Expected growth rate

- This "constant" growth rate is called a stable growth rate and cannot be higher than the growth rate of the economy in which the firm operates.
- While companies can maintain high growth rates for extended periods, they will all approach "stable growth" at some point in time.
- When they do approach stable growth, the valuation formula above can be used to estimate the "terminal value" of all cash flows beyond.

Growth Patterns

- A key assumption in all discounted cash flow models is the period of high growth, and the pattern of growth during that period. In general, we can make one of three assumptions:
  - there is no high growth, in which case the firm is already in stable growth
  - there will be high growth for a period, at the end of which the growth rate will drop to the stable growth rate (2-stage)
  - there will be high growth for a period, at the end of which the growth rate will decline gradually to a stable growth rate(3-stage)
- The assumption of how long high growth will continue will depend upon several factors including:
  - the size of the firm (larger firm -> shorter high growth periods)
  - current growth rate (if high -> longer high growth period)
  - barriers to entry and differential advantages (if high -> longer growth period)

Length of High Growth Period

- Assume that you are analyzing two firms, both of which are enjoying high growth. The first firm is Earthlink Network, an internet service provider, which operates in an environment with few barriers to entry and extraordinary competition. The second firm is Biogen, a bio-technology firm which is enjoying growth from two drugs to which it owns patents for the next decade. Assuming that both firms are well managed, which of the two firms would you expect to have a longer high growth period?
  - Earthlink Network
  - Biogen
  - Both are well managed and should have the same high growth period

Firm Characteristics as Growth Changes

Variable	High Growth Firms tend to	Stable Growth Firms tend to
Risk	be above-average risk	be average risk
Dividend Payout	pay little or no dividends	pay high dividends
Net Cap Ex	have high net cap ex	have low net cap ex
Return on Capital	earn high ROC (excess return)	earn ROC closer to WACC
Leverage	have little or no debt	higher leverage

Estimating Stable Growth Inputs

- Start with the fundamentals:
  - Profitability measures such as return on equity and capital, in stable growth, can be estimated by looking at
    - industry averages for these measure, in which case we assume that this firm in stable growth will look like the average firm in the industry
    - cost of equity and capital, in which case we assume that the firm will stop earning excess returns on its projects as a result of competition.
  - Leverage is a tougher call. While industry averages can be used here as well, it depends upon how entrenched current management is and whether they are stubborn about their policy on leverage (If they are, use current leverage; if they are not; use industry averages)
- Use the relationship between growth and fundamentals to estimate payout and net capital expenditures.

Estimating Stable Period Net Cap Ex

g_{EBIT} = (Net Capital Expenditures + Change in WC)/EBIT(1-t) * ROC
= Reinvestment Rate * ROC

- Moving terms around,

Reinvestment Rate = g_{EBIT} / Return on Capital

- For instance, assume that Disney in stable growth will grow 5% and that its return on capital in stable growth will be 16%. The reinvestment rate will then be:

Reinvestment Rate for Disney in Stable Growth = 5/16 = 31.25%

- In other words,
  - the net capital expenditures and working capital investment each year during the stable growth period will be 31.25% of after-tax operating income.

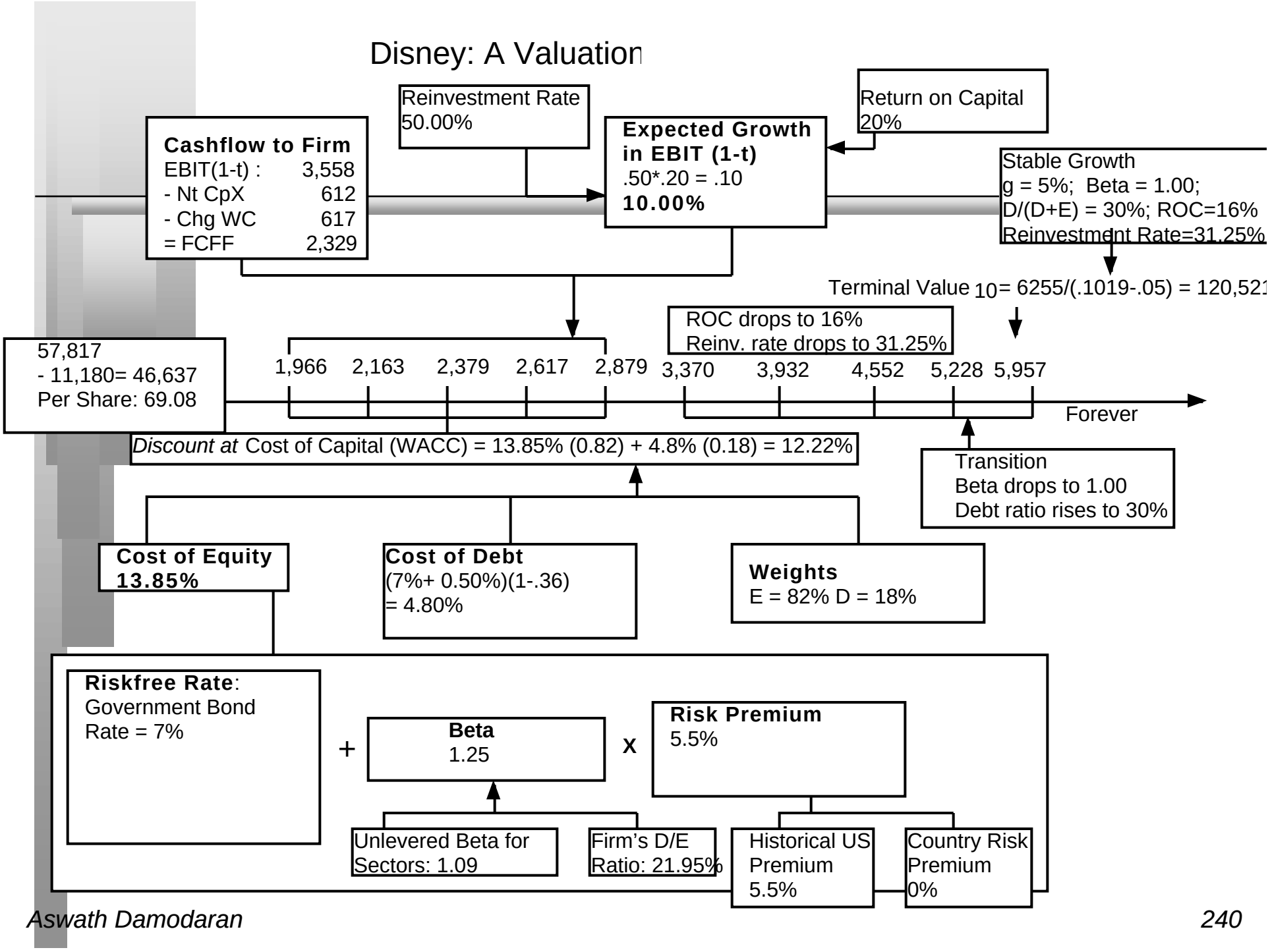
Disney Valuation

- Model Used:
  - Cash Flow: FCFF (since I think leverage will change over time)
  - Growth Pattern: 3-stage Model (even though growth in operating income is only 10%, there are substantial barriers to entry)

Disney: Inputs to Valuation

	High Growth Phase	*Transition Phase*	*Stable Growth Phase*
Length of Period	5 years	5 years	Forever after 10 years
Revenues	Current Revenues: $ 18,739; Expected to grow at same rate a operating earnings	Continues to grow at same rate as operating earnings	Grows at stable growth rate
Pre-tax Operating Margin	29.67% of revenues, based upon 1996 EBIT of $ 5,559 million.	Increases gradually to 32% of revenues, due to economies of scale.	Stable margin is assumed to be 32%.
Tax Rate	36%	36%	36%
Return on Capital	20% (approximately 1996 level)	Declines linearly to 16%	Stable ROC of 16%
Working Capital	5% of Revenues	5% of Revenues	5% of Revenues
Reinvestment Rate (Net Cap Ex + Working Capital Investments/EBIT)	50% of after-tax operating income; Depreciation in 1996 is $ 1,134 million, and is assumed to grow at same rate as earnings	Declines to 31.25% as ROC and growth rates drop: Reinvestment Rate = g/ROC	31.25% of after-tax operating income; this is estimated from the growth rate of 5% Reinvestment rate = g/ROC
Expected Growth Rate in EBIT	ROC * Reinvestment Rate = 20% * .5 = 10%	Linear decline to Stable Growth Rate	5%, based upon overall nominal economic growth
Debt/Capital Ratio	18%	Increases linearly to 30%	Stable debt ratio of 30%
Risk Parameters	Beta = 1.25, k_e = 13.88% Cost of Debt = 7.5% (Long Term Bond Rate = 7%)	Beta decreases linearly to 1.00; Cost of debt stays at 7.5%	Stable beta is 1.00. Cost of debt stays at 7.5%

Disney: A Valuation



Disney: FCFF Estimates

	Base	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Expected Growth		10%	10%	10%	10%	10%	9%	8%	7%	6%	5%
Revenues	$ 18,739	$ 20,613	$ 22,674	$ 24,942	$ 27,436	$ 30,179	$ 32,895	$ 35,527	$ 38,014	$ 40,295	$ 42,310
Oper. Margin	29.67%	29.67%	29.67%	29.67%	29.67%	29.67%	30.13%	30.60%	31.07%	31.53%	32.00%
EBIT	$ 5,559	$ 6,115	$ 6,726	$ 7,399	$ 8,139	$ 8,953	$ 9,912	$ 10,871	$ 11,809	$ 12,706	$ 13,539
EBIT (1-t)	$ 3,558	$ 3,914	$ 4,305	$ 4,735	$ 5,209	$ 5,730	$ 6,344	$ 6,957	$ 7,558	$ 8,132	$ 8,665
+ Depreciation	$ 1,134	$ 1,247	$ 1,372	$ 1,509	$ 1,660	$ 1,826	$ 2,009	$ 2,210	$ 2,431	$ 2,674	$ 2,941
- Capital Exp.	$ 1,754	$ 3,101	$ 3,411	$ 3,752	$ 4,128	$ 4,540	$ 4,847	$ 5,103	$ 5,313	$ 5,464	$ 5,548
- Change in WC	$ 94	$ 94	$ 103	$ 113	$ 125	$ 137	$ 136	$ 132	$ 124	$ 114	$ 101
= FCFF	$ 1,779	$ 1,966	$ 2,163	$ 2,379	$ 2,617	$ 2,879	$ 3,370	$ 3,932	$ 4,552	$ 5,228	$ 5,957
ROC	20%	20%	20%	20%	20%	20%	19.2%	18.4%	17.6%	16.8%	16%
Reinv. Rate		50%	50%	50%	50%	50%	46.875%	43.48%	39.77%	35.71%	31.25%

Disney: Costs of Capital

Year	1	2	3	4	5	6	7	8	9	10
Cost of Equity	13.88%	13.88%	13.88%	13.88%	13.88%	13.60%	13.33%	13.05%	12.78%	12.50%
Cost of Debt	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%	4.80%
Debt Ratio	18.00%	18.00%	18.00%	18.00%	18.00%	20.40%	22.80%	25.20%	27.60%	30.00%
Cost of Capital	12.24%	12.24%	12.24%	12.24%	12.24%	11.80%	11.38%	10.97%	10.57%	10.19%

Disney: Terminal Value

- The terminal value at the end of year 10 is estimated based upon the free cash flows to the firm in year 11 and the cost of capital in year 11.
- $FCFF_{11}$ = EBIT (1-t) - EBIT (1-t) Reinvestment Rate
  = $ 13,539 (1.05) (1-.36) - $ 13,539 (1.05) (1-.36) (.3125)
  = $ 6,255 million
- Note that the reinvestment rate is estimated from the cost of capital of 16% and the expected growth rate of 5%.
- Cost of Capital in terminal year = 10.19%
- Terminal Value = $ 6,255/(.1019 - .05) = $ 120,521 million

Disney: Present Value

Year	1	2	3	4	5	6	7	8	9	10
FCFF	$ 1,966	$ 2,163	$ 2,379	$ 2,617	$ 2,879	$ 3,370	$ 3,932	$ 4,552	$ 5,228	$ 5,957
Term Value										120,521
Present Value	$ 1,752	$ 1,717	$ 1,682	$1,649	$1,616	$ 1,692	$1,773	$ 1,849	$ 1,920	42,167
Cost of Capital	12.24%	12.24%	12.24%	12.24%	12.24%	11.80%	11.38%	10.97%	10.57%	10.19%

Determine the business risk of the firm (Beta, Default Risk)

The Investment Decision
Invest in projects that yield a return greater than the minimum acceptable hurdle rate

The Dividend Decision
If there are not enough investments that earn the hurdle rate, return the cash to the owners

The Financing Decision
Choose a financing mix that maximizes the value of the projects taken, and matches the assets being financed.

How long will high growth last?

Return on Capital 20.00%

Reinvestment Rate 50%

Equity: Beta=1.25

Debt:: Default Risk

Current EBIT(1-t) = $3,558 million

Expected Growth = ROC * RR = .50 * 20%= 10%

Cost of Capital 12.22%

Year	EBIT(1-t)	Reinvestment	FCFF	Terminal Value	PV
1	$ 3,914	$ 1,947	$ 1,966		$ 1,752
2	$ 4,305	$ 2,142	$ 2,163		$ 1,717
3	$ 4,735	$ 2,356	$ 2,379		$ 1,682
4	$ 5,209	$ 2,343	$ 2,866		$ 1,649
5	$ 5,730	$ 2,851	$ 2,879		$ 1,616
6	$ 6,344	$ 2,974	$ 3,370		$ 1,692
7	$ 6,957	$ 2,762	$ 4,196		$ 1,773
8	$ 7,558	$ 3,006	$ 4,552		$ 1,849
9	$ 8,132	$ 2,904	$ 5,228		$ 1,920
10	$ 8,665	$ 2,708	$ 5,957	$ 120,521	$ 42,167
				Value of Disney =	$ 57,817
				- Value of Debt =	$11,180
				= Value of Equity	$ 46,637
				Value of Disney/share =	$ 69.08

Transition to stable growth inputs

In stable growth:
Reinvestment Rate=31.67%
Return on Capital = 16%
Beta = 1.00
Debt Ratio = 30.00%
Cost of Capital = 10.19%

First Principles

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