Finding the Right Financing Mix: The Capital Structure Decision

"Neither a borrower nor a lender be"

Someone who obviously hated this part of corporate finance

First Principles

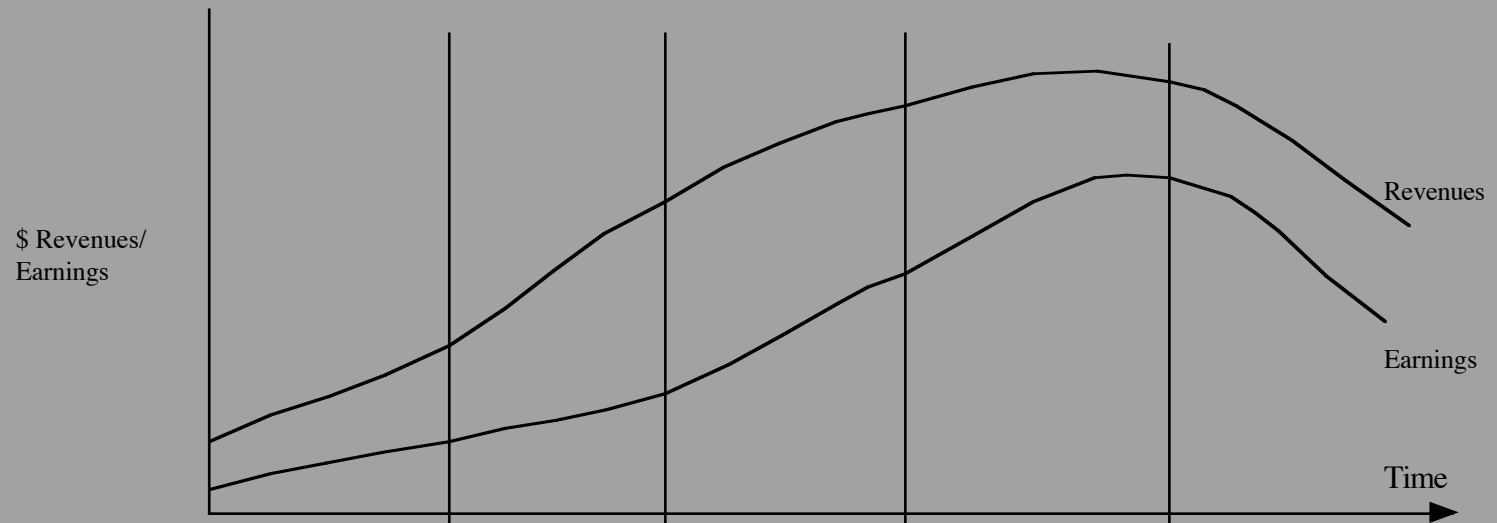
- Invest in projects that yield a return greater than the minimum acceptable hurdle rate.
  - The hurdle rate should be higher for riskier projects and reflect the financing mix used - owners' funds (equity) or borrowed money (debt)
  - Returns on projects should be measured based on cash flows generated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

Objective: Maximize the Value of the Firm

The Choices in Financing

- There are only two ways in which a business can make money.
  - The first is debt. The essence of debt is that you promise to make fixed payments in the future (interest payments and repaying principal). If you fail to make those payments, you lose control of your business.
  - The other is equity. With equity, you do get whatever cash flows are left over after you have made debt payments.
- The equity can take different forms:
  - For very small businesses: it can be owners investing their savings
  - For slightly larger businesses: it can be venture capital
  - For publicly traded firms: it is common stock
- The debt can also take different forms
  - For private businesses: it is usually bank loans
  - For publicly traded firms: it can take the form of bonds

Financing Choices across the life cycle



External funding needs	High, but constrained by infrastructure	High, relative to firm value.	Moderate, relative to firm value.	Declining, as a percent of firm value	Low, as projects dry up.
Internal financing	Negative or low	Negative or low	Low, relative to funding needs	High, relative to funding needs	More than funding needs
External Financing	Owner's Equity Bank Debt	Venture Capital Common Stock	Common stock Warrants Convertibles	Debt	Retire debt Repurchase stock
Growth stage	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline
Financing Transitions	Accessing private equity	Inital Public offering	Seasoned equity issue	Bond issues	

The Financing Mix Question

- In deciding to raise financing for a business, is there an optimal mix of debt and equity?
  - If yes, what is the trade off that lets us determine this optimal mix?
  - If not, why not?

Measuring a firm's financing mix

- The simplest measure of how much debt and equity a firm is using currently is to look at the proportion of debt in the total financing. This ratio is called the debt to capital ratio:

  Debt to Capital Ratio = Debt / (Debt + Equity)
- Debt includes all interest bearing liabilities, short term as well as long term.
- Equity can be defined either in accounting terms (as book value of equity) or in market value terms (based upon the current price). The resulting debt ratios can be very different.

Costs and Benefits of Debt

- Benefits of Debt
  - Tax Benefits
  - Adds discipline to management
- Costs of Debt
  - Bankruptcy Costs
  - Agency Costs
  - Loss of Future Flexibility

Tax Benefits of Debt

- When you borrow money, you are allowed to deduct interest expenses from your income to arrive at taxable income. This reduces your taxes. When you use equity, you are not allowed to deduct payments to equity (such as dividends) to arrive at taxable income.
- The dollar tax benefit from the interest payment in any year is a function of your tax rate and the interest payment:
  - Tax benefit each year = Tax Rate * Interest Payment
- Proposition 1: Other things being equal, the higher the marginal tax rate of a business, the more debt it will have in its capital structure.

The Effects of Taxes

You are comparing the debt ratios of real estate corporations, which pay the corporate tax rate, and real estate investment trusts, which are not taxed, but are required to pay 95% of their earnings as dividends to their stockholders. Which of these two groups would you expect to have the higher debt ratios?

- The real estate corporations
- The real estate investment trusts
- Cannot tell, without more information

Debt adds discipline to management

- If you are managers of a firm with no debt, and you generate high income and cash flows each year, you tend to become complacent. The complacency can lead to inefficiency and investing in poor projects. There is little or no cost borne by the managers
- Forcing such a firm to borrow money can be an antidote to the complacency. The managers now have to ensure that the investments they make will earn at least enough return to cover the interest expenses. The cost of not doing so is bankruptcy and the loss of such a job.

Debt and Discipline

Assume that you buy into this argument that debt adds discipline to management. Which of the following types of companies will most benefit from debt adding this discipline?

- Conservatively financed (very little debt), privately owned businesses
- Conservatively financed, publicly traded companies, with stocks held by millions of investors, none of whom hold a large percent of the stock.
- Conservatively financed, publicly traded companies, with an activist and primarily institutional holding.

Bankruptcy Cost

- The expected bankruptcy cost is a function of two variables--
  - the cost of going bankrupt
    - direct costs: Legal and other Deadweight Costs
    - indirect costs: Costs arising because people perceive you to be in financial trouble
  - the probability of bankruptcy, which will depend upon how uncertain you are about future cash flows
- As you borrow more, you increase the probability of bankruptcy and hence the expected bankruptcy cost.

- Proposition 2: Firms with more volatile earnings and cash flows will have higher probabilities of bankruptcy at any given level of debt and for any given level of earnings.

The Bankruptcy Cost Proposition

- While the direct costs of bankruptcy may not be very different across firms, the indirect costs of bankruptcy can vary widely across firms.
- Proposition 3: Other things being equal, the greater the indirect bankruptcy cost, the less debt the firm can afford to use for any given level of debt.

Debt & Bankruptcy Cost

Rank the following companies on the magnitude of bankruptcy costs from most to least, taking into account both explicit and implicit costs:

- A Grocery Store
- An Airplane Manufacturer
- High Technology company

Agency Cost

- An agency cost arises whenever you hire someone else to do something for you. It arises because your interests(as the principal) may deviate from those of the person you hired (as the agent).
- When you lend money to a business, you are allowing the stockholders to use that money in the course of running that business. Stockholders interests are different from your interests, because
  - You (as lender) are interested in getting your money back
  - Stockholders are interested in maximizing your wealth
- In some cases, the clash of interests can lead to stockholders
  - Investing in riskier projects than you would want them to
  - Paying themselves large dividends when you would rather have them keep the cash in the business.
- Proposition 4: Other things being equal, the greater the agency problems associated with lending to a firm, the less debt the firm can afford to use.

Debt and Agency Costs

Assume that you are a bank. Which of the following businesses would you perceive the greatest agency costs?

- A Large technology firm
- A Large Regulated Electric Utility

Why?

Loss of future financing flexibility

- When a firm borrows up to its capacity, it loses the flexibility of financing future projects with debt.
- Proposition 5: Other things remaining equal, the more uncertain a firm is about its future financing requirements and projects, the less debt the firm will use for financing current projects.

What managers consider important in deciding on how much debt to carry...

- A survey of Chief Financial Officers of large U.S. companies provided the following ranking (from most important to least important) for the factors that they considered important in the financing decisions

Factor	Ranking (0-5)
1. Maintain financial flexibility	4.55
2. Ensure long-term survival	4.55
3. Maintain Predictable Source of Funds	4.05
4. Maximize Stock Price	3.99
5. Maintain financial independence	3.88
6. Maintain high debt rating	3.56
7. Maintain comparability with peer group	2.47

Debt: Summarizing the Trade Off

Advantages of Borrowing

1. Tax Benefit:

Higher tax rates --> Higher tax benefit

2. Added Discipline:

Greater the separation between managers and stockholders --> Greater the benefit

Disadvantages of Borrowing

1. Bankruptcy Cost:

Higher business risk --> Higher Cost

2. Agency Cost:

Greater the separation between stock-holders & lenders --> Higher Cost

3. Loss of Future Financing Flexibility:

Greater the uncertainty about future financing needs --> Higher Cost

Application Test: Would you expect your firm to gain or lose from using a lot of debt?

- Considering, for your firm,
  - The potential tax benefits of borrowing
  - The benefits of using debt as a disciplinary mechanism
  - The potential for expected bankruptcy costs
  - The potential for agency costs
  - The need for financial flexibility
- Would you expect your firm to have a high debt ratio or a low debt ratio?
- Does the firm's current debt ratio meet your expectations?

A Hypothetical Scenario

(a) There are no taxes

(b) Managers have stockholder interests at heart and do what's best for stockholders.

(c) No firm ever goes bankrupt

(d) Equity investors are honest with lenders; there is no subterfuge or attempt to find loopholes in loan agreements.

(e) Firms know their future financing needs with certainty

What happens to the trade off between debt and equity? How much should a firm borrow?

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.

Implications of MM Theorem

- Leverage is irrelevant. A firm's value will be determined by its project cash flows.
- The cost of capital of the firm will not change with leverage. As a firm increases its leverage, the cost of equity will increase just enough to offset any gains to the leverage

What do firms look at in financing?

- Is there a financing hierarchy?
- Argument:
  - There are some who argue that firms follow a financing hierarchy, with retained earnings being the most preferred choice for financing, followed by debt and that new equity is the least preferred choice.

Rationale for Financing Hierarchy

- Managers value flexibility. External financing reduces flexibility more than internal financing.
- Managers value control. Issuing new equity weakens control and new debt creates bond covenants.

Preference rankings long-term finance: Results of a survey

Ranking	Source	Score
1	Retained Earnings	5.61
2	Straight Debt	4.88
3	Convertible Debt	3.02
4	External Common Equity	2.42
5	Straight Preferred Stock	2.22
6	Convertible Preferred	1.72

Financing Choices

You are reading the Wall Street Journal and notice a tombstone ad for a company, offering to sell convertible preferred stock. What would you hypothesize about the health of the company issuing these securities?

- Nothing
- Healthier than the average firm
- In much more financial trouble than the average firm

Pathways to the Optimal

- The Cost of Capital Approach: The optimal debt ratio is the one that minimizes the cost of capital for a firm.
- The Adjusted Present Value Approach: The optimal debt ratio is the one that maximizes the overall value of the firm.
- The Sector Approach: The optimal debt ratio is the one that brings the firm closes to its peer group in terms of financing mix.
- The Life Cycle Approach: The optimal debt ratio is the one that best suits where the firm is in its life cycle.

I. The Cost of Capital Approach

- Value of a Firm = Present Value of Cash Flows to the Firm, discounted back at the cost of capital.
- If the cash flows to the firm are held constant, and the cost of capital is minimized, the value of the firm will be maximized.

Measuring Cost of Capital

- It will depend upon:
  - (a) the components of financing: Debt, Equity or Preferred stock
  - (b) the cost of each component
- In summary, the cost of capital is the cost of each component weighted by its relative market value.

$$WACC = k_e (E/(D+E)) + k_d (D/(D+E))$$

Recapping the Measurement of cost of capital

- The cost of debt is the market interest rate that the firm has to pay on its borrowing. It will depend upon three components
  (a) The general level of interest rates
  (b) The default premium
  (c) The firm's tax rate
- The cost of equity is
  1. the required rate of return given the risk
  2. inclusive of both dividend yield and price appreciation
- The weights attached to debt and equity have to be market value weights, not book value weights.

Costs of Debt & Equity

A recent article in an Asian business magazine argued that equity was cheaper than debt, because dividend yields are much lower than interest rates on debt. Do you agree with this statement?

- Yes
- No

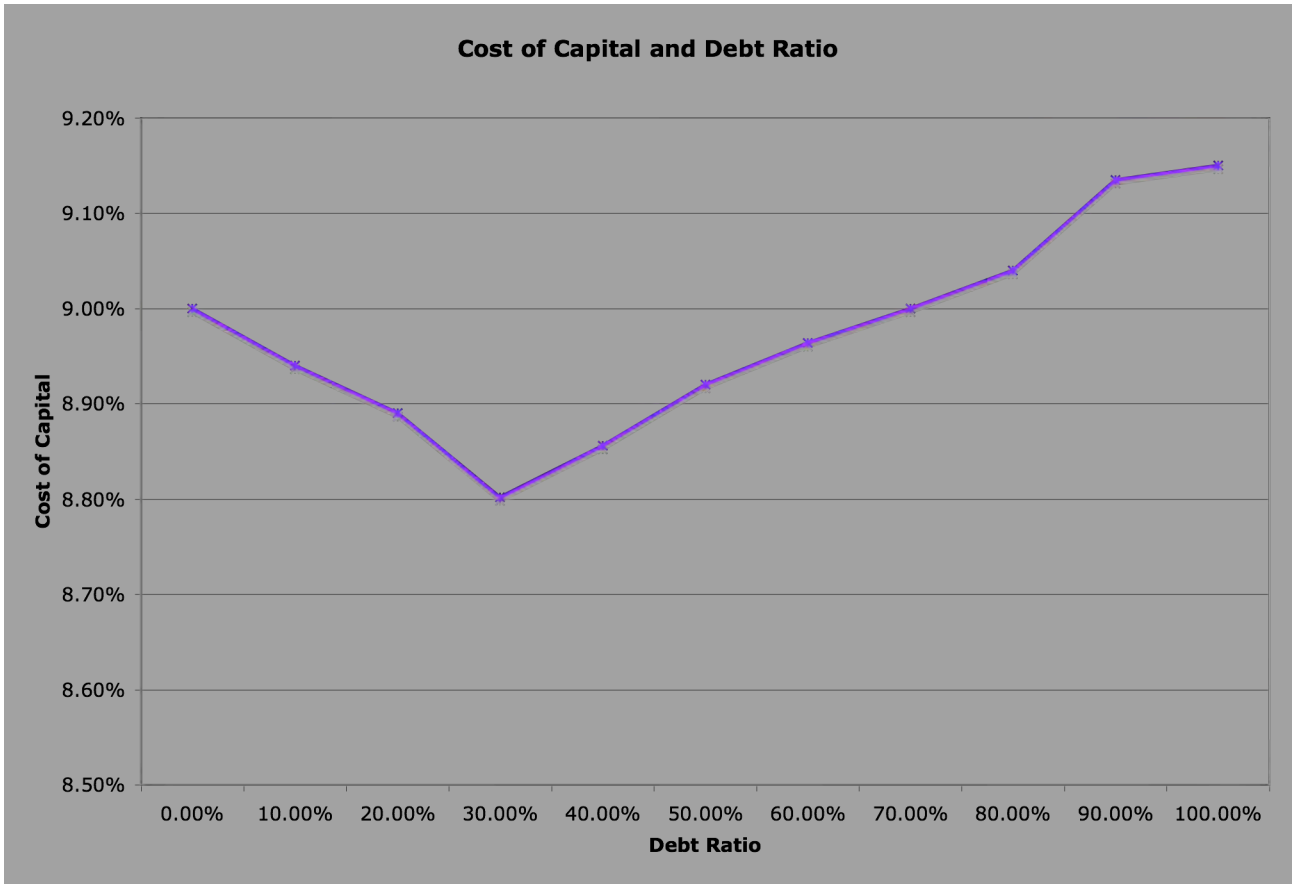
Can equity ever be cheaper than debt?

- Yes
- No

Applying Cost of Capital Approach: The Textbook Example

Debt Ratio	Cost of equity	Cost of Debt	After-tax Cost of Debt	Cost of Capital
0.00%	9.00%	6.00%	3.60%	9.00%
10.00%	9.50%	6.50%	3.90%	8.94%
20.00%	10.10%	6.75%	4.05%	8.89%
30.00%	10.80%	6.90%	4.14%	8.80%
40.00%	11.60%	7.90%	4.74%	8.86%
50.00%	12.50%	8.90%	5.34%	8.92%
60.00%	13.50%	9.90%	5.94%	8.96%
70.00%	14.60%	11.00%	6.60%	9.00%
80.00%	15.80%	12.25%	7.35%	9.04%
90.00%	17.10%	13.75%	8.25%	9.14%
100.00%	18.50%	15.25%	9.15%	9.15%

The U-shaped Cost of Capital Graph…



Current Cost of Capital: Disney

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

55.101(55.101+14.668)

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.

Interest Coverage Ratios and Bond Ratings: Large market cap, manufacturing firms

Interest Coverage Ratio	Rating
> 8.5	AAA
6.50 - 6.50	AA
5.50 – 6.50	A+
4.25 – 5.50	A
3.00 – 4.25	A-
2.50 – 3.00	BBB
2.05 - 2.50	BB+
1.90 – 2.00	BB
1.75 – 1.90	B+
1.50 - 1.75	B
1.25 – 1.50	B-
0.80 – 1.25	CCC
0.65 – 0.80	CC
0.20 – 0.65	C
< 0.20	D

For more detailed interest coverage ratios and bond ratings, try the ratings.xls spreadsheet on my web site.

Spreads over long bond rate for ratings classes: 2003

Rating	*Typical default spread*	*Market interest rate on debt*
AAA	0.35%	4.35%
AA	0.50%	4.50%
A+	0.70%	4.70%
A	0.85%	4.85%
A-	1.00%	5.00%
BBB	1.50%	5.50%
BB+	2.00%	6.00%
BB	2.50%	6.50%
B+	3.25%	7.25%
B	4.00%	8.00%
B-	6.00%	10.00%
CCC	8.00%	12.00%
CC	10.00%	14.00%
C	12.00%	16.00%
D	20.00%	24.00%

Riskless Rate = 4%

Estimating Cost of Equity

Unlevered Beta = 1.0674 (Bottom up beta based upon Disney's businesses)

Market premium = 4.82% T.Bond Rate = 4.00% Tax rate=37.3%

Debt Ratio	*D/E Ratio*	*Levered Beta*	*Cost of Equity*
0.00%	0.00%	1.0674	9.15%
10.00%	11.11%	1.1418	9.50%
20.00%	25.00%	1.2348	9.95%
30.00%	42.86%	1.3543	10.53%
40.00%	66.67%	1.5136	11.30%
50.00%	100.00%	1.7367	12.37%
60.00%	150.00%	2.0714	13.98%
70.00%	233.33%	2.6291	16.67%
80.00%	400.00%	3.7446	22.05%
90.00%	900.00%	7.0911	38.18%

Estimating Cost of Debt

Start with the current market value of the firm = 55,101 + 14668 = $69, 769 mil

D/(D+E)	0.00%	10.00%	Debt to capital
D/E	0.00%	11.11%	D/E = 10/90 = .1111
$ Debt	$0	$6,977	10% of $69,769
EBITDA	$3,882	$3,882	Same as 0% debt
Depreciation	$1,077	$1,077	Same as 0% debt
EBIT	$2,805	$2,805	Same as 0% debt
Interest	$0	$303	Pre-tax cost of debt * $ Debt
Pre-tax Int. cov	∞	9.24	EBIT/ Interest Expenses
Likely Rating	AAA	AAA	From Ratings table
Pre-tax cost of debt	4.35%	4.35%	Riskless Rate + Spread

The Ratings Table

Interest Coverage Ratio	Rating	Typical default spread	Market interest rate on debt
> 8.5	AAA	0.35%	4.35%
6.50 - 6.50	AA	0.50%	4.50%
5.50 – 6.50	A+	0.70%	4.70%
4.25 – 5.50	A	0.85%	4.85%
3.00 – 4.25	A-	1.00%	5.00%
2.50 – 3.00	BBB	1.50%	5.50%
2.05 - 2.50	BB+	2.00%	6.00%
1.90 – 2.00	BB	2.50%	6.50%
1.75 – 1.90	B+	3.25%	7.25%
1.50 - 1.75	B	4.00%	8.00%
1.25 – 1.50	B-	6.00%	10.00%
0.80 – 1.25	CCC	8.00%	12.00%
0.65 – 0.80	CC	10.00%	14.00%
0.20 – 0.65	C	12.00%	16.00%
< 0.20	D	20.00%	24.00%

A Test: Can you do the 20% level?

D/(D+E)	*0.00%*	*10.00%*	*20.00%*	*2nd Iteration*	*3rd?*
D/E	0.00%	11.11%			
$ Debt	$0	$6,977			
EBITDA	$3,882	$3,882			
Depreciation	$1,077	$1,077			
EBIT	$2,805	$2,805			
Interest	$0	$303			
Pre-tax Int. cov	∞	9.24			
Likely Rating	AAA	AAA			
Cost of debt	4.35%	4.35%			

Bond Ratings, Cost of Debt and Debt Ratios

Debt Ratio	Debt	Interest expense	Interest Coverage Ratio	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)
0%	$0	$0	∞	AAA	4.35%	37.30%	2.73%
10%	$6,977	$303	9.24	AAA	4.35%	37.30%	2.73%
20%	$13,954	$698	4.02	A-	5.00%	37.30%	3.14%
30%	$20,931	$1,256	2.23	BB+	6.00%	37.30%	3.76%
40%	$27,908	$3,349	0.84	CCC	12.00%	31.24%	8.25%
50%	$34,885	$5,582	0.50	C	16.00%	18.75%	13.00%
60%	$41,861	$6,698	0.42	C	16.00%	15.62%	13.50%
70%	$48,838	$7,814	0.36	C	16.00%	13.39%	13.86%
80%	$55,815	$8,930	0.31	C	16.00%	11.72%	14.13%
90%	$62,792	$10,047	0.28	C	16.00%	10.41%	14.33%

Stated versus Effective Tax Rates

- You need taxable income for interest to provide a tax savings
- In the Disney case, consider the interest expense at 30% and 40%

	30% Debt Ratio	*40% Debt Ratio*
EBIT	$ 2,805 m	$ 2,805 m
Interest Expense	$ 1,256 m	$ 3,349 m
Tax Savings	$ 1,256*.373=468	2,805*.373 = $ 1,046
Tax Rate	37.30%	1,046/3,349= 31.2%
Pre-tax interest rate	6.00%	12.00%
After-tax Interest Rate	3.76%	8.25%

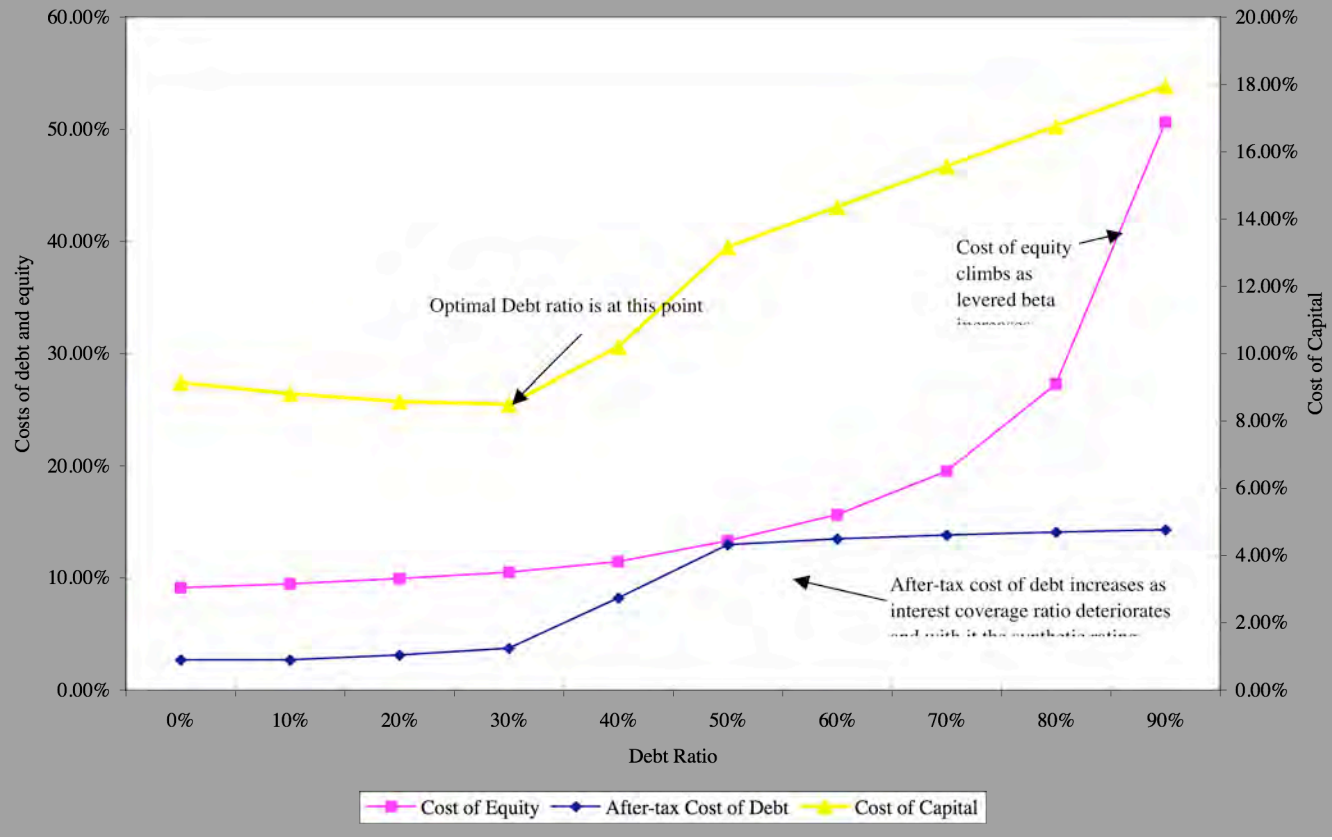
- You can deduct only $2,805 million of the $3,349 million of the interest expense at 40%. Therefore, only 37.3% of $ 2,805 million is considered as the tax savings.

Disney's Cost of Capital Schedule

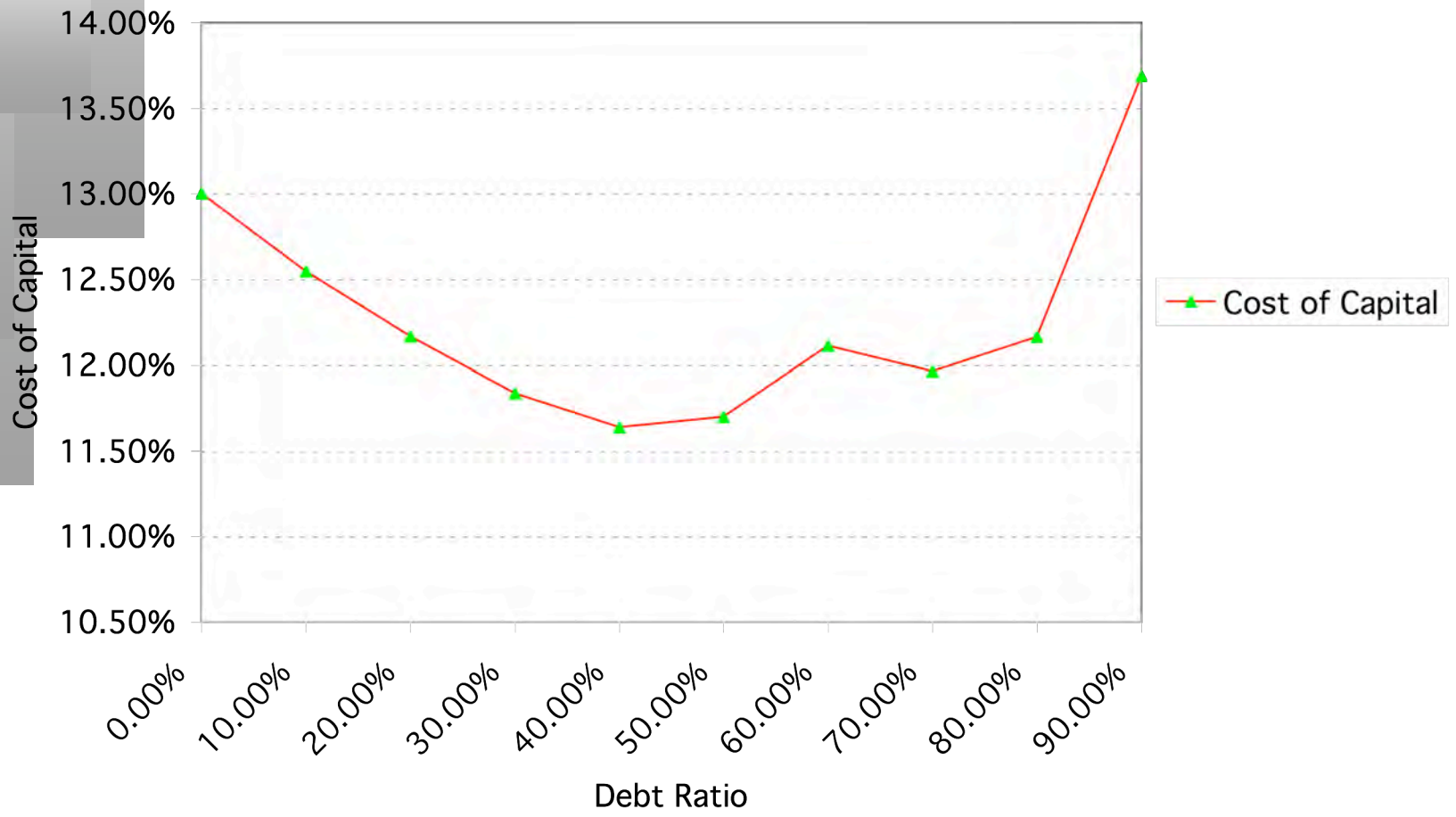
Debt Ratio	Cost of Equity	Cost of Debt (after-tax)	Cost of Capital
0%	9.15%	2.73%	9.15%
10%	9.50%	2.73%	8.83%
20%	9.95%	3.14%	8.59%
30%	10.53%	3.76%	8.50%
40%	11.50%	8.25%	10.20%
50%	13.33%	13.00%	13.16%
60%	15.66%	13.50%	14.36%
70%	19.54%	13.86%	15.56%
80%	27.31%	14.13%	16.76%
90%	50.63%	14.33%	17.96%

Disney: Cost of Capital Chart

Figure 8.3: Disney Cost of Capital at different Debt Ratios



Disney: Cost of Capital Chart: 1997



The cost of capital approach suggests that Disney should do the following…

- Disney currently has $14.18 billion in debt. The optimal dollar debt (at 30%) is roughly $21 billion. Disney has excess debt capacity of $ 7 billion.
- To move to its optimal and gain the increase in value, Disney should borrow $ 7 billion and buy back stock.
- Given the magnitude of this decision, you should expect to answer three questions:
  - Why should we do it?
  - What if something goes wrong?
  - What if we don't want (or cannot) buy back stock and want to make investments with the additional debt capacity?

1. Why should we do it? Effect on Firm Value

- Firm Value before the change = 55,101+14,668= $ 69,769

  $WACC_b$ = 8.59% Annual Cost = $69,769 *8.59%= $5,993 million

  $WACC_a$ = 8.50% Annual Cost = $69,769 *8.50% = $5,930 million

  Δ WACC = 0.09% Change in Annual Cost = $ 63 million

- If there is no growth in the firm value, (Conservative Estimate)
  - Increase in firm value = $63 / .0850= $ 741 million
  - Change in Stock Price = $741/2047.6= $0.36 per share
- If we assume a perpetual growth of 4% in firm value over time,
  - Increase in firm value = $63 /(.0850-.04) = $ 1,400 million
  - Change in Stock Price = $1,400/2,047.6 = $ 0.68 per share

Implied Growth Rate obtained by

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

$69,769 = $1,722(1+g)/(.0859-g): Solve for g -> Implied growth = 5.98%

A Test: The Repurchase Price

- Let us suppose that the CFO of Disney approached you about buying back stock. He wants to know the maximum price that he should be willing to pay on the stock buyback. (The current price is $ 26.91) Assuming that firm value will grow by 4% a year, estimate the maximum price.

- What would happen to the stock price after the buyback if you were able to buy stock back at $ 26.91?

Buybacks and Stock Prices

- Assume that Disney does make a tender offer for it's shares but pays $28 per share. What will happen to the value per share for the shareholders who do not sell back?
  a. The share price will drop below the pre-announcement price of $26.91
  b. The share price will be between $26.91 and the estimated value (above) or $27.59
  c. The share price will be higher than $27.59

What if something goes wrong? The Downside Risk

- Doing What-if analysis on Operating Income
  - A. Statistical 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. "Economic Scenario" 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	EBIT	% Chang e in EBIT
1987	756	
1988	848	12.17%
1989	1177	38.80%
1990	1368	16.23%
1991	1124	-17.84%
1992	1287	14.50%
1993	1560	21.21%
1994	1804	15.64%
1995	2262	25.39%
1996	3024	33.69%
1997	3945	30.46%
1998	3843	-2.59%
1999	3580	-6.84%
2000	2525	-29.47%
2001	2832	12.16%
2002	2384	-15.82%
2003	2713	13.80%

Disney: Effects of Past Downturns

Recession	*Decline in Operating Income*
2002	Drop of 15.82%
1991	Drop of 22.00%
1981-82	Increased
Worst Year	Drop of 29.47%

- The standard deviation in past operating income is about 20%.

Disney: The Downside Scenario

% Drop in EBITDA	*EBIT*	*Optimal Debt Ratio*
0%	$ 2,805	30%
5%	$ 2,665	20%
10%	$ 2,524	20%
15%	$ 2385	20%
20%	$ 2,245	20%

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

- At its optimal debt ratio of 30%, Disney has an estimated rating of BB+.
- Assume that Disney imposes a rating constraint of BBB or greater.
- The optimal debt ratio for Disney is then 25%
- The cost of imposing this rating constraint can then be calculated as follows:

Value at 30% Debt	= $ 71,239 million
- Value at 25% Debt	= $ 70,157 million
Cost of Rating Constraint	= $ 1,082 million

Effect of Ratings Constraints: Disney

Debt Ratio	Rating	Firm Value
0%	AAA	$62,279
10%	AAA	$66,397
20%	A-	$69,837
30%	BB+	$71,239
40%	CCC	$51,661
50%	C	$34,969
60%	C	$30,920
70%	C	$27,711
80%	C	$25,105
90%	C	$22,948

What if you do not buy back stock..

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

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

Long Term Interest Coverage Ratio	*Rating is*	*Spread is*	*Operating Income Decline*
< 0.05	D	16.00%	-50.00%
0.05 – 0.10	C	14.00%	-40.00%
0.10 – 0.20	CC	12.50%	-40.00%
0.20 - 0.30	CCC	10.50%	-40.00%
0.30 – 0.40	B-	6.25%	-25.00%
0.40 – 0.50	B	6.00%	-20.00%
0.50 – 0.60	B+	5.75%	-20.00%
0.60 – 0.75	BB	4.75%	-20.00%
0.75 – 0.90	BB+	4.25%	-20.00%
0.90 – 1.20	BBB	2.00%	-20.00%
1.20 – 1.50	A-	1.50%	-17.50%
1.50 – 2.00	A	1.40%	-15.00%
2.00 – 2.50	A+	1.25%	-10.00%
2.50 – 3.00	AA	0.90%	-5.00%
> 3.00	AAA	0.70%	0.00%

Deutsche Bank: Optimal Capital Structure

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on deb	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.44	6.15%	AAA	4.75%	38.00%	2.95%	6.15%	$111,034
10%	0.47	6.29%	AAA	4.75%	38.00%	2.95%	5.96%	$115,498
20%	0.50	6.48%	AAA	4.75%	38.00%	2.95%	5.77%	$120,336
30%	0.55	6.71%	AAA	4.75%	38.00%	2.95%	5.58%	$125,597
40%	0.62	7.02%	AAA	4.75%	38.00%	2.95%	5.39%	$131,339
50%	0.71	7.45%	A+	5.30%	38.00%	3.29%	5.37%	$118,770
60%	0.84	8.10%	A	5.45%	38.00%	3.38%	5.27%	$114,958
70%	1.07	9.19%	A	5.45%	38.00%	3.38%	5.12%	$119,293
80%	1.61	11.83%	BB+	8.30%	32.43%	5.61%	6.85%	$77,750
90%	3.29	19.91%	BB	8.80%	27.19%	6.41%	7.76%	$66,966

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 Aracruz Cellulose's Optimal Debt Ratio

- Aracruz Cellulose, the Brazilian pulp and paper manufacturing firm, reported operating income of 887 million BR on revenues of 3176 million BR in 2003. This was significantly higher than it's operating income of 346 million BR in 2002 and 196 million Br in 2001.
- In 2003, Aracruz had depreciation of 553 million BR and capital expenditures amounted to 661 million BR.
- Aracruz had debt outstanding of 4,094 million BR with a dollar cost of debt of 7.25%. Aracruz had 859.59 million shares outstanding, trading 10.69 BR per share.
- The beta of the stock is estimated, using comparable firms, to be 0.7040.
- The corporate tax rate in Brazil is estimated to be 34%.

Aracruz's Current Cost of Capital

- Current $ Cost of Equity = 4% + 0.7040 (12.49%) = 12.79%
- Market Value of Equity = 10.69 BR/share * 859.59= 9,189 million BR

Current $ Cost of Capital

= 12.79% (9,189/(9,189+4,094)) + 7.25% (1-.34) (4,094/(9189+4,094) = 10.33%

Modifying the Cost of Capital Approach for Aracruz

- The operating income at Aracruz is a function of the price of paper and pulp in global markets. While 2003 was a very good year for the company, its income history over the last decade reflects the volatility created by pulp prices. We computed Aracruz's average pre-tax operating margin over the last 10 years to be 25.99%. Applying this lower average margin to 2003 revenues generates a normalized operating income of 796.71 million BR.
- Aracruz's synthetic rating of BBB, based upon the interest coverage ratio, is much higher than its actual rating of B- and attributed the difference to Aracruz being a Brazilian company, exposed to country risk. Since we compute the cost of debt at each level of debt using synthetic ratings, we run the risk of understating the cost of debt. The difference in interest rates between the synthetic and actual ratings is 1.75% and we add this to the cost of debt estimated at each debt ratio from 0% to 90%.

Aracruz's Optimal Debt Ratio

Debt Ratio	*Beta*	*Cost of Equity*	*Bond Rating*	*Interest rate on debt*	*Tax Rate*	*Cost of Debt (after-tax)*	*WACC*	*Firm Value in BR*
0%	0.54	10.80%	AAA	6.10%	34.00%	4.03%	10.80%	12,364
10%	0.58	11.29%	AAA	6.10%	34.00%	4.03%	10.57%	12,794
20%	0.63	11.92%	A	6.60%	34.00%	4.36%	10.40%	13,118
30%	0.70	12.72%	BBB	7.25%	34.00%	4.79%	10.34%	13,256
40%	0.78	13.78%	CCC	13.75%	34.00%	9.08%	11.90%	10,633
50%	0.93	15.57%	CCC	13.75%	29.66%	9.67%	12.62%	9,743
60%	1.20	19.04%	C	17.75%	19.15%	14.35%	16.23%	6,872
70%	1.61	24.05%	C	17.75%	16.41%	14.84%	17.60%	6,177
80%	2.41	34.07%	C	17.75%	14.36%	15.20%	18.98%	5,610
90%	4.82	64.14%	C	17.75%	12.77%	15.48%	20.35%	5,138

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.

Bookscape's current cost of capital

- We assumed that Bookscape would have a debt to capital ratio of 16.90%, similar to that of publicly traded book retailers, and that the tax rate for the firm is 40%. We computed a cost of capital based on that assumption.
- We also used a "total beta"of 2.0606 to measure the additional risk that the owner of Bookscape is exposed to because of his lack of diversification.
- Cost of Capital
  - Cost of equity = Risfree Rate + Total Beta * Risk Premium
    = 4% + 2.0606 * 4.82% = 13.93%
  - Pre-tax Cost of debt = 5.5% (based upon synthetic rating of BBB)
  - Cost of capital = 13.93% (.8310) + 5.5% (1-.40) (.1690) = 12.14%

The Inputs: Bookscape

- While Bookscape has no conventional debt outstanding, it does have one large operating lease commitment. Given that the operating lease has 25 years to run and that the lease commitment is $500,000 for each year, the present value of the operating lease commitments is computed using Bookscape's pre-tax cost of debt of 5.5%:
  - Present value of Operating Lease commitments (in '000s) = $500 (PV of annuity, 5.50%, 25 years) = 6,708
- Bookscape had operating income before taxes of $ 2 million in the most recent financial year. Since we consider the present value of operating lease expenses to be debt, we add back the imputed interest expense on the present value of lease expenses to the earnings before interest and taxes.
  - Adjusted EBIT (in '000s) = EBIT + Pre-tax cost of debt * PV of operating lease expenses = $ 2,000+ .055 * $6,708 = $2,369
- Estimated Market Value of Equity (in '000s) = Net Income for Bookscape * Average PE for publicly traded book retailers = 1,320 * 16.31 = $21,525

Interest Coverage Ratios, Spreads and Ratings: Small Firms

Interest Coverage Ratio	Rating	Spread over T Bond Rate
> 12.5	AAA	0.35%
9.50-12.50	AA	0.50%
7.5 - 9.5	A+	0.70%
6.0 - 7.5	A	0.85%
4.5 - 6.0	A-	1.00%
4.0 - 4.5	BBB	1.50%
3.5 – 4.0	BB+	2.00%
3.0 - 3.5	BB	2.50%
2.5 - 3.0	B+	3.25%
2.0 - 2.5	B	4.00%
1.5 - 2.0	B-	6.00%
1.25 - 1.5	CCC	8.00%
0.8 - 1.25	CC	10.00%
0.5 - 0.8	C	12.00%
< 0.5	D	20.00%

Optimal Debt Ratio for Bookscape

Debt Ratio	*Total Beta*	*Cost of Equity*	*Bond Rating*	*Interest rate on debt*	*Tax Rate*	*Cost of Debt (after-tax)*	*WACC*	*Firm Value (G)*
0%	1.84	12.87%	AAA	4.35%	40.00%	2.61%	12.87%	$25,020
10%	1.96	13.46%	AAA	4.35%	40.00%	2.61%	12.38%	$26,495
20%	2.12	14.20%	A+	4.70%	40.00%	2.82%	11.92%	$28,005
30%	2.31	15.15%	A-	5.00%	40.00%	3.00%	11.51%	$29,568
40%	2.58	16.42%	BB	6.50%	40.00%	3.90%	11.41%	$29,946
50%	2.94	18.19%	B	8.00%	40.00%	4.80%	11.50%	$29,606
60%	3.50	20.86%	CC	14.00%	39.96%	8.41%	13.39%	$23,641
70%	4.66	26.48%	CC	14.00%	34.25%	9.21%	14.39%	$21,365
80%	7.27	39.05%	C	16.00%	26.22%	11.80%	17.25%	$16,745
90%	14.54	74.09%	C	16.00%	23.31%	12.27%	18.45%	$15,355

Determinants of Optimal Debt Ratios

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

    Higher - - > Lower Optimal Debt Ratio

    Lower - - > Higher Optimal Debt Ratio

Application Test: Your firm's optimal financing mix

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

II. The APV Approach to Optimal Capital Structure

- In the adjusted present value approach, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value
- Firm Value = Unlevered Firm Value + (Tax Benefits of Debt - Expected Bankruptcy Cost from the Debt)
- The optimal dollar debt level is the one that maximizes firm value

Implementing the APV Approach

- Step 1: Estimate the unlevered firm value. This can be done in one of two ways:
  1. Estimating the unlevered beta, a cost of equity based upon the unlevered beta and valuing the firm using this cost of equity (which will also be the cost of capital, with an unlevered firm)
  2. Alternatively, Unlevered Firm Value = Current Market Value of Firm - Tax Benefits of Debt (Current) + Expected Bankruptcy cost from Debt
- Step 2: Estimate the tax benefits at different levels of debt. The simplest assumption to make is that the savings are perpetual, in which case
  - Tax benefits = Dollar Debt * Tax Rate
- Step 3: Estimate a probability of bankruptcy at each debt level, and multiply by the cost of bankruptcy (including both direct and indirect costs) to estimate the expected bankruptcy cost.

Estimating Expected Bankruptcy Cost

- Probability of Bankruptcy
  - Estimate the synthetic rating that the firm will have at each level of debt
  - Estimate the probability that the firm will go bankrupt over time, at that level of debt (Use studies that have estimated the empirical probabilities of this occurring over time - Altman does an update every year)
- Cost of Bankruptcy
  - The direct bankruptcy cost is the easier component. It is generally between 5-10% of firm value, based upon empirical studies
  - The indirect bankruptcy cost is much tougher. It should be higher for sectors where operating income is affected significantly by default risk (like airlines) and lower for sectors where it is not (like groceries)

Ratings and Default Probabilities: Results from Altman study of bonds

Bond Rating	*Default Rate*
D	100.00%
C	80.00%
CC	65.00%
CCC	46.61%
B-	32.50%
B	26.36%
B+	19.28%
BB	12.20%
BBB	2.30%
A-	1.41%
A	0.53%
A+	0.40%
AA	0.28%
AAA	0.01%

Disney: Estimating Unlevered Firm Value

Current Market Value of the Firm = $55,101+$14,668 = $ 69,789

- Tax Benefit on Current Debt = $14,668* 0.373 = $ 5,479 million

+ Expected Bankruptcy Cost = 1.41% * (0.25* 69,789)= $ 246 million

Unlevered Value of Firm = $ 64,556 million

Cost of Bankruptcy for Disney = 25% of firm value

Probability of Bankruptcy = 1.41%, based on firm's current rating of A-

Tax Rate = 37.3%

Disney: APV at Debt Ratios

Debt Ratio	$ Debt	Tax Rate	Unlevered Firm Value	Tax Benefits	Bond Rating	Probability of Default	Expected Bankruptcy Cost	Value of Levered Firm
0%	$0	37.30%	$64,556	$0	AAA	0.01%	$2	$64,555
10%	$6,979	37.30%	$64,556	$2,603	AAA	0.01%	$2	$67,158
20%	$13,958	37.30%	$64,556	$5,206	A-	1.41%	$246	$69,517
30%	$20,937	37.30%	$64,556	$7,809	BB+	7.00%	$1,266	$71,099
40%	$27,916	31.20%	$64,556	$8,708	CCC	50.00%	$9,158	$64,107
50%	$34,894	18.72%	$64,556	$6,531	C	80.00%	$14,218	$56,870
60%	$41,873	15.60%	$64,556	$6,531	C	80.00%	$14,218	$56,870
70%	$48,852	13.37%	$64,556	$6,531	C	80.00%	$14,218	$56,870
80%	$55,831	11.70%	$64,556	$6,531	C	80.00%	$14,218	$56,870
90%	$62,810	10.40%	$64,556	$6,531	C	80.00%	$14,218	$56,870

Tax benefits decrease because Disney does not have enough operating income to cover its interest expenses.

III. Relative Analysis

I. Industry Average with Subjective Adjustments

- The "safest" place for any firm to be is close to the industry average
- Subjective adjustments can be made to these averages to arrive at the right debt ratio.
  - Higher tax rates -> Higher debt ratios (Tax benefits)
  - Lower insider ownership -> Higher debt ratios (Greater discipline)
  - More stable income -> Higher debt ratios (Lower bankruptcy costs)
  - More intangible assets -> Lower debt ratios (More agency problems)

Comparing to industry averages

	Disney	*Entertainment*	*Aracruz*	*Paper and Pulp (Emerging Market)*
Market Debt Ratio	21.02%	19.56%	30.82%	27.71%
Book Debt Ratio	35.10%	28.86%	43.12%	49.00%

Getting past simple averages

- Step 1: Run a regression of debt ratios on the variables that you believe determine debt ratios in the sector. For example,

  Debt Ratio = a + b (Tax rate) + c (Earnings Variability) + d (EBITDA/Firm Value)
- Step 2: Estimate the proxies for the firm under consideration. Plugging into the cross sectional regression, we can obtain an estimate of predicted debt ratio.
- Step 3: Compare the actual debt ratio to the predicted debt ratio.

Applying the Regression Methodology: Entertainment Firms

- Using a sample of entertainment firms, we arrived at the following regression:

Debt/Capital = 0.2156 - 0.1826 (Sales Growth) + 0.6797 (EBITDA/ Value)
(4.91) (1.91) (2.05)

- The R squared of the regression is 14%. This regression can be used to arrive at a predicted value for Disney of:

Predicted Debt Ratio = 0.2156 - 0.1826 (.0668) + 0.6797 (.0767) = 0.2555 or 25.55%

Based upon the capital structure of other firms in the entertainment industry, Disney should have a market value debt ratio of 25.55%.

Extending to the entire market: 2003 Data

- Using 2003 data for firms listed on the NYSE, AMEX and NASDAQ data bases. The regression provides the following results –

DFR = 0.0488 + 0.810 Tax Rate –0.304 CLSH + 0.841 E/V –2.987 CPXFR

(1.41[a]) (8.70[a]) (3.65[b]) (7.92[b]) (13.03[a])

where,

DFR	= Debt / (Debt + Market Value of Equity)
Tax Rate	= Effective Tax Rate
CLSH	= Closely held shares as a percent of outstanding shares
CPXFR	= Capital Expenditures / Book Value of Capital
E/V	= EBITDA/ Market Value of Firm

- The regression has an R-squared of 53.3%.

Applying the Regression

Lets check whether we can use this regression. Disney had the following values for these inputs in 1996. Estimate the optimal debt ratio using the debt regression.

Effective Tax Rate = 34.76%

Closely held shares as percent of shares outstanding = 2.2%

Capital Expenditures as fraction of firm value = 2.09%

EBITDA/Value = 7.67%

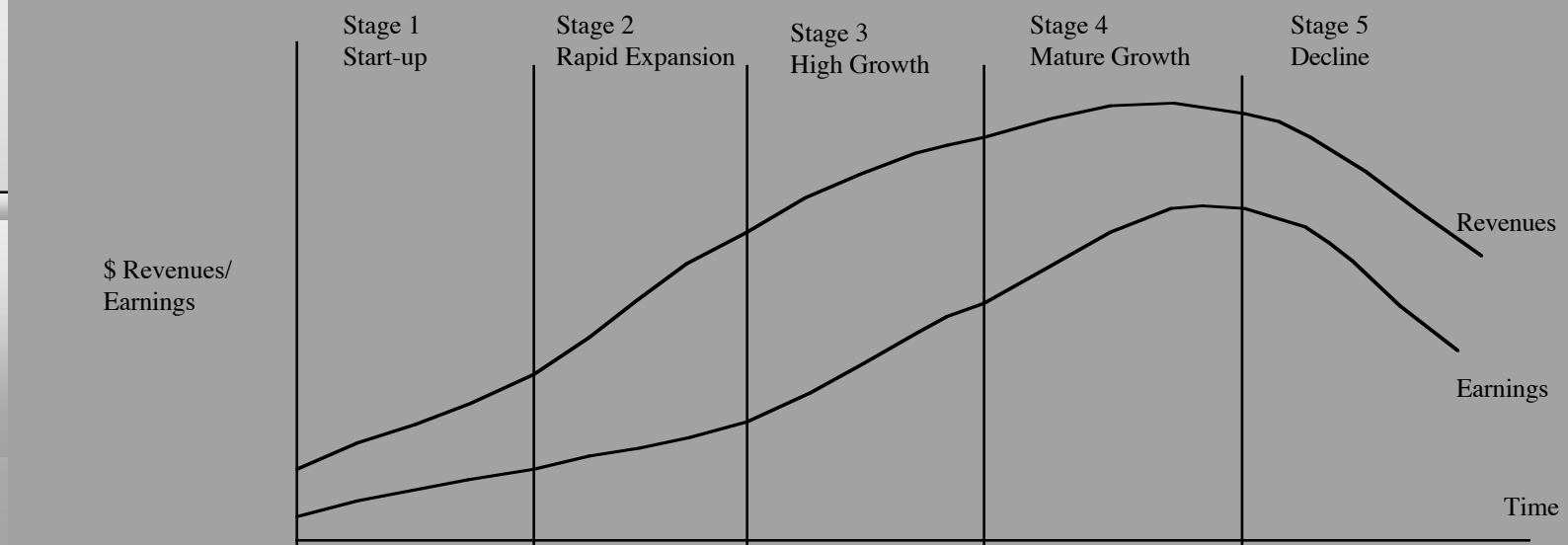
Optimal Debt Ratio

= 0.0488 + 0.810 ( ) –0.304 ( ) + 0.841( ) –2.987 ( )

What does this optimal debt ratio tell you?

Why might it be different from the optimal calculated using the weighted average cost of capital?

IV. The Debt-Equity Trade off and Life Cycle

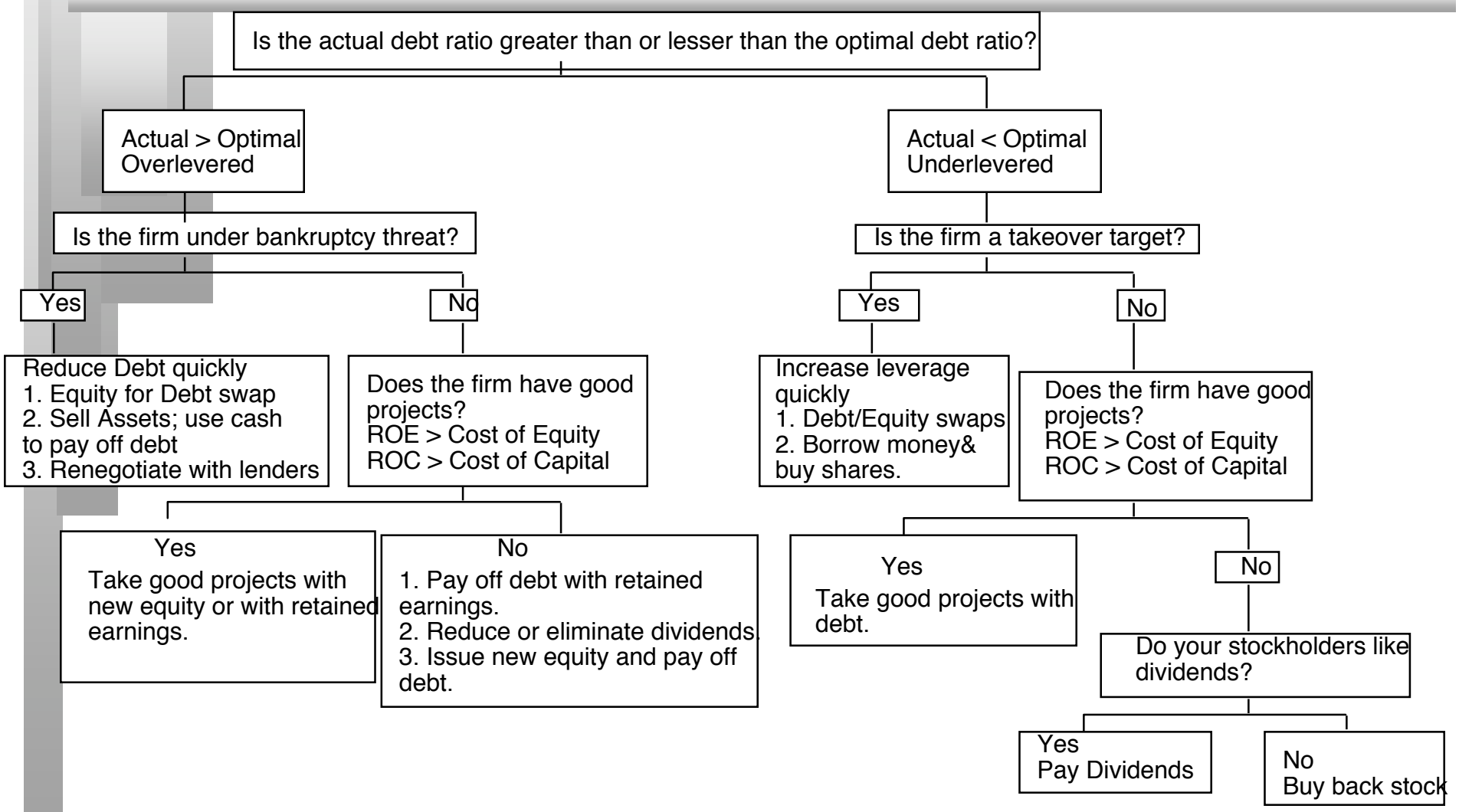


	Stage 1 Start-up	Stage 2 Rapid Expansion	Stage 3 High Growth	Stage 4 Mature Growth	Stage 5 Decline
Tax Benefits	Zero, if losing money	Low, as earnings are limited	Increase, with earnings	High	High, but declining
Added Disceipline of Debt	Low, as owners run the firm	Low. Even if public, firm is closely held.	Increasing, as managers own less of firm	High. Managers are separated from owners	Declining, as firm does not take many new investments
Bamkruptcy Cost	Very high. Firm has no or negative earnings.	Very high. Earnings are low and volatile	High. Earnings are increasing but still volatile	Declining, as earnings from existing assets increase.	Low, but increases as existing projects end.
Agency Costs	Very high, as firm has almost no assets	High. New investments are difficult to monitor	High. Lots of new investments and unstable risk.	Declining, as assets in place become a larger portion of firm.	Low. Firm takes few new investments
Need for Flexibility	Very high, as firm looks for ways to establish itself	High. Expansion needs are large and unpredicatble	High. Expansion needs remain unpredictable	Low. Firm has low and more predictable investment needs.	Non-existent. Firm has no new investment needs.
Net Trade Off	Costs exceed benefits Minimal debt	Costs still likely to exceed benefits. Mostly equity	Debt starts yielding net benefits to the firm	Debt becomes a more attractive option.	Debt will provide benefits.

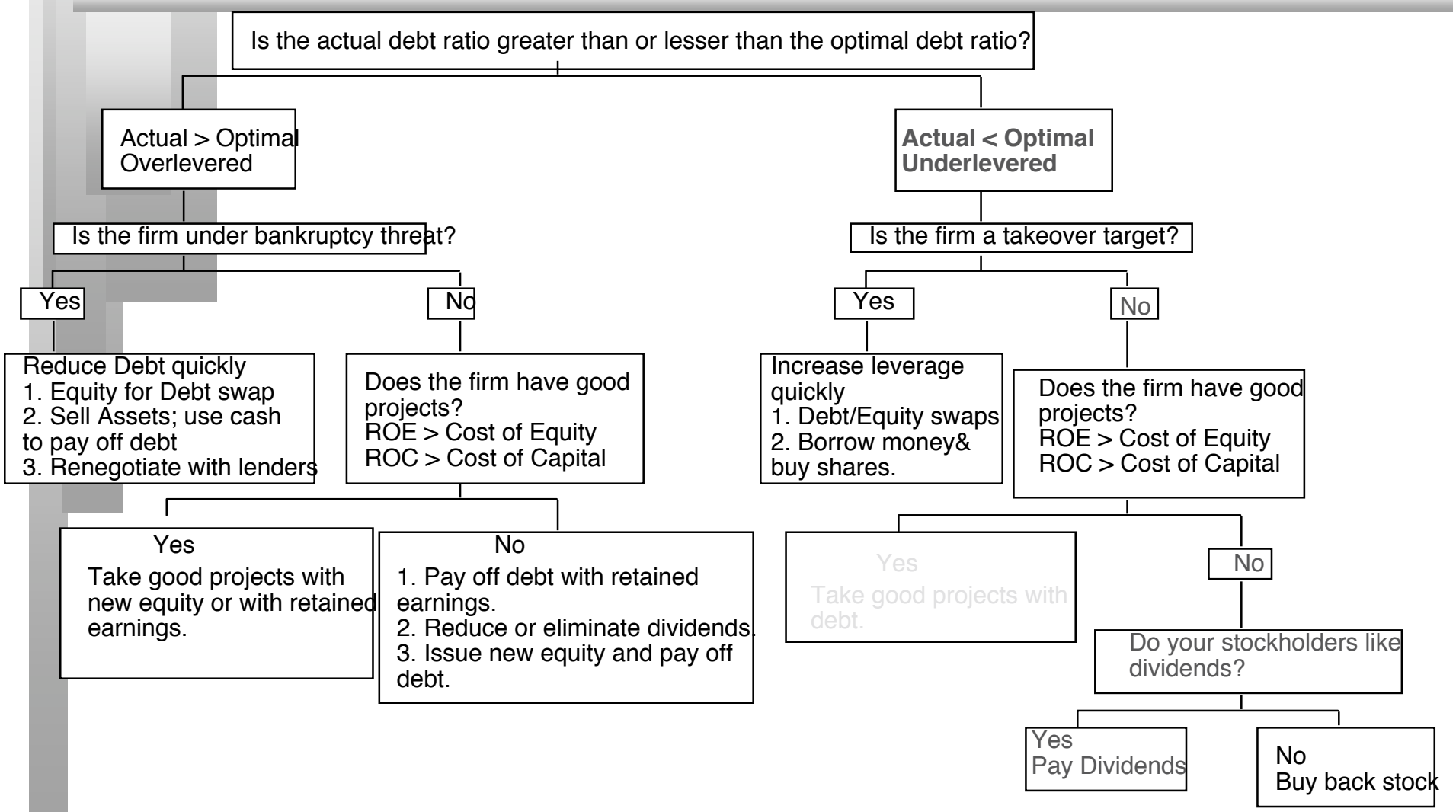
Summarizing for Disney

Approach Used	**Optimal**
1a. Cost of Capital unconstrained	30%
1b. Cost of Capital w/ lower EBIT	20%
1c. Cost of Capital w/ Rating constraint	25%
II. APV Approach	30%
IIIa. Entertainment Sector Regression	25.55%
IIIb. Market Regression	32.57%
IV. Life Cycle Approach	Mature Growth
Actual Debt Ratio	**21%**

A Framework for Getting to the Optimal



Disney: Applying the Framework



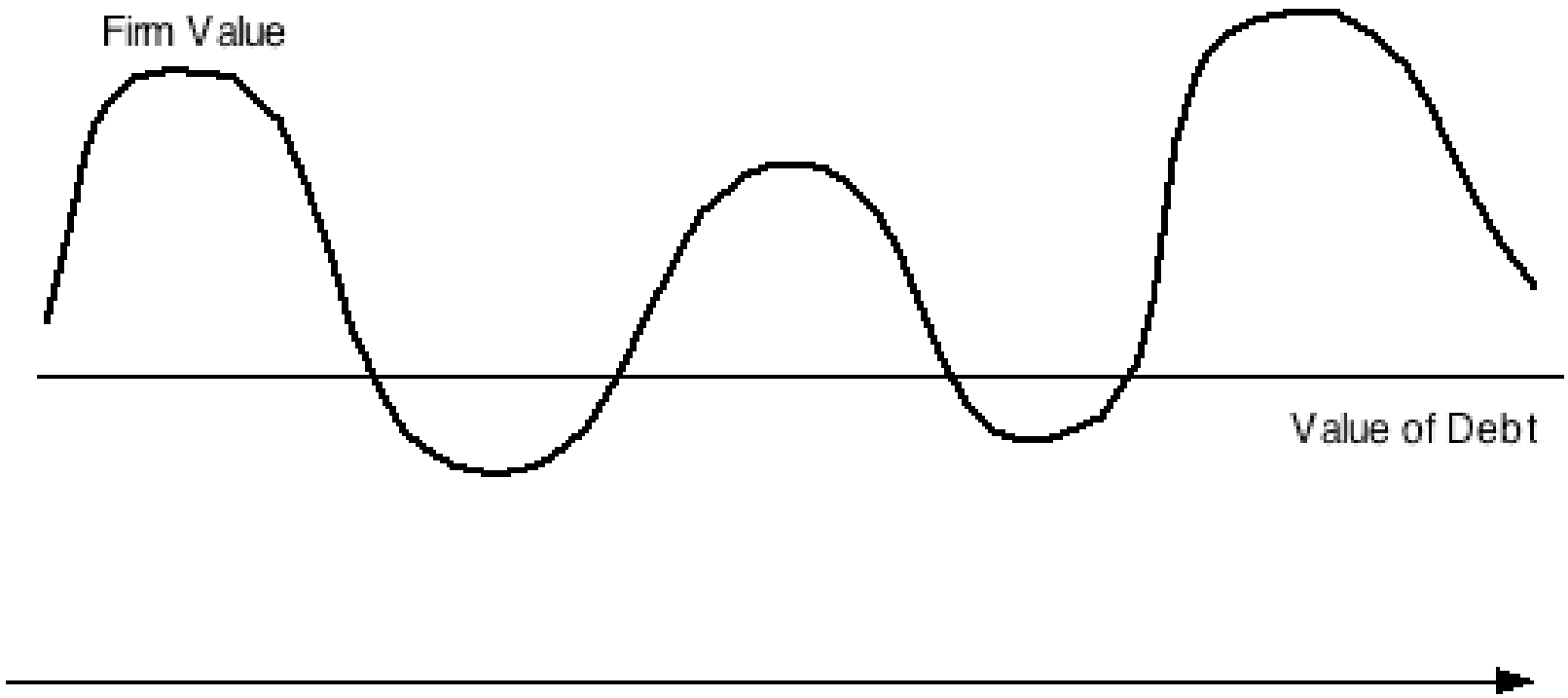
Application Test: Getting to the Optimal

- 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

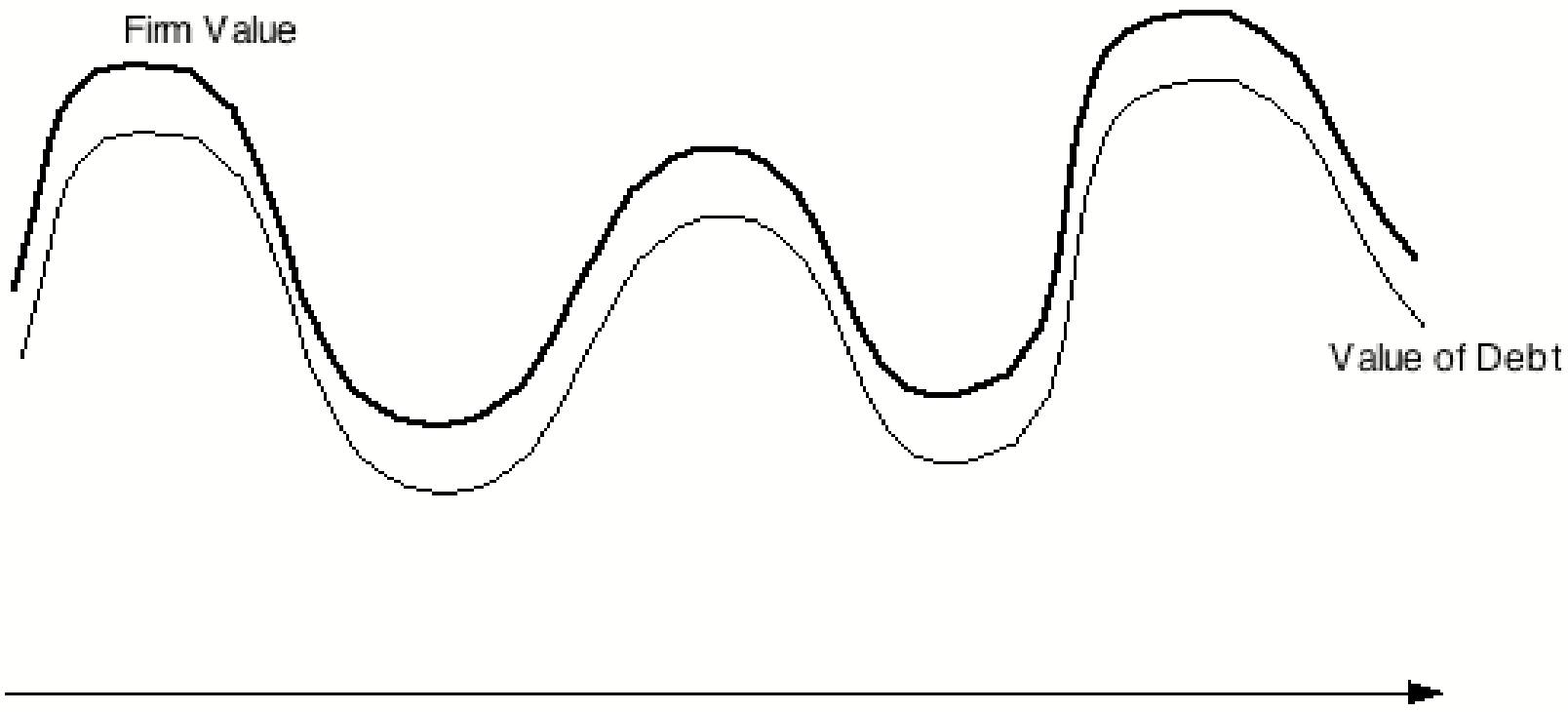
Designing Debt: The Fundamental Principle

- 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

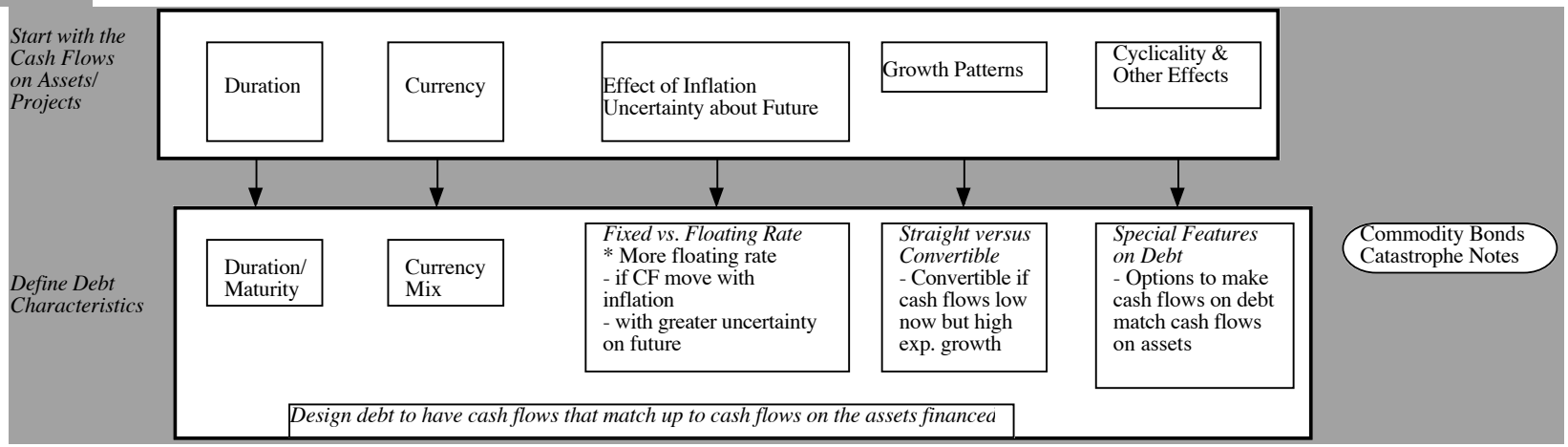


Firm with matched Debt



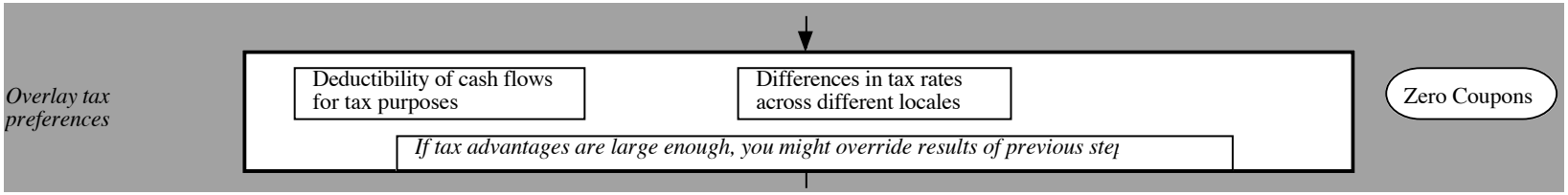
Design the perfect financing instrument

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



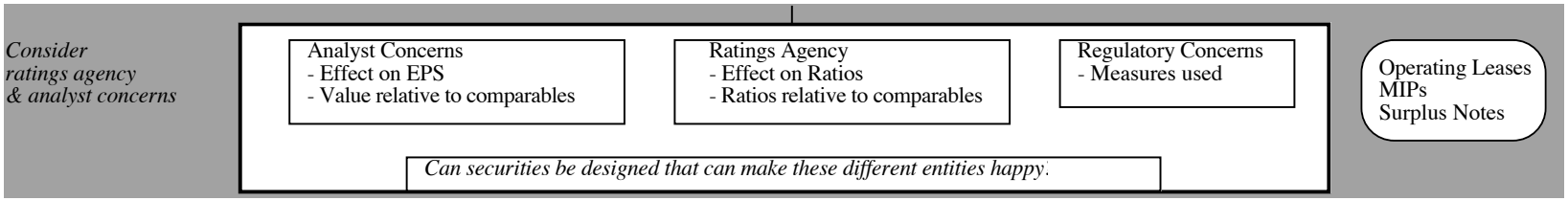
Ensuring that you have not crossed the line drawn by the tax code

- 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

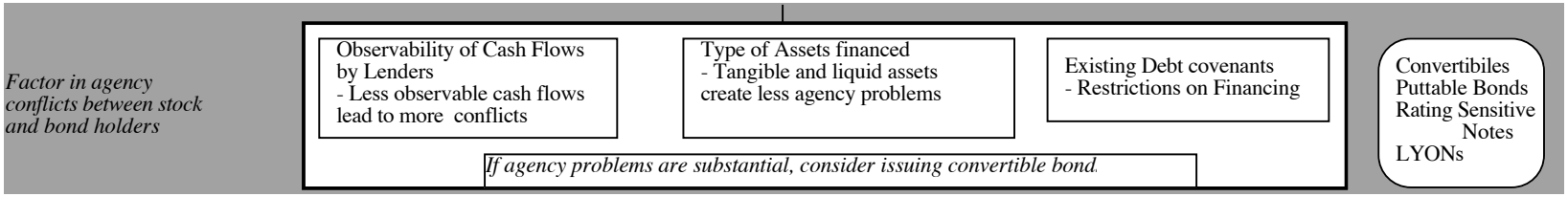
- Trust preferred stock has
  - A fixed dividend payment, specified at the time of the issue
  - That is tax deductible
  - And failing to make the payment can cause ? (Can it cause default?)
- When trust preferred was first created, ratings agencies treated it as equity. As they have become more savvy,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

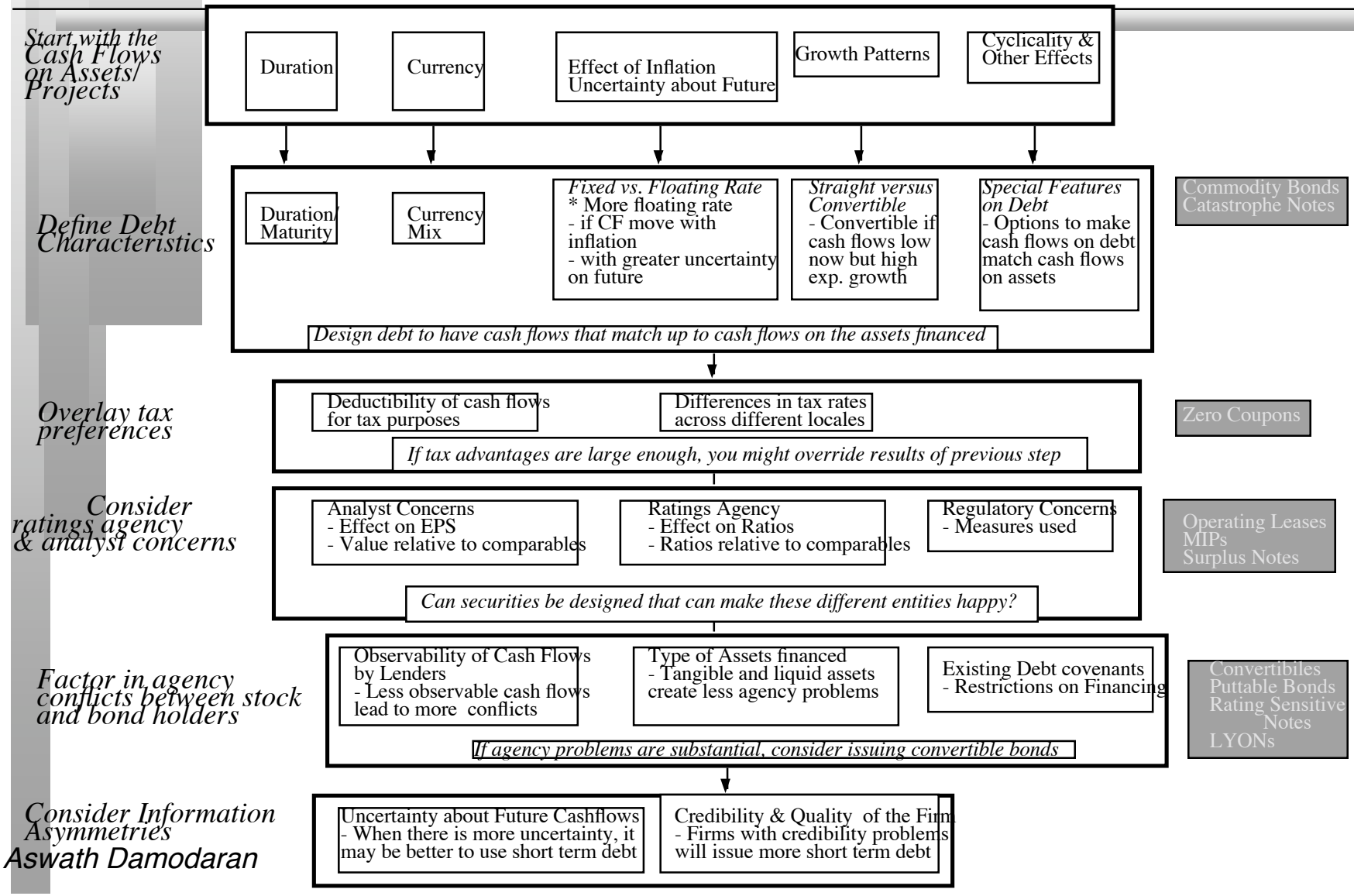
- There are some firms that face skepticism from bondholders when they go out to raise debt, because
  - Of their past history of defaults or other actions
  - They are small firms without any borrowing history
- Bondholders tend to demand much higher interest rates from these firms to reflect these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



Approaches for evaluating Asset Cash Flows

- I. Intuitive Approach
  - Are the projects typically long term or short term? What is the cash flow pattern on projects?
  - How much growth potential does the firm have relative to current projects?
  - How cyclical are the cash flows? What specific factors determine the cash flows on projects?
- II. Project Cash Flow Approach
  - Project cash flows on a typical project for the firm
  - Do scenario analyses on these cash flows, based upon different macro economic scenarios
- III. Historical Data
  - Operating Cash Flows
  - Firm Value

I. Intuitive Approach - Disney

Business	*Project Cash Flow Characteristics*	*Type of Financing*
Movies	Projects are likely to 1. Be short term 2. Have cash outflows primarily in dollars (since Disney makes most of its movies in the U.S.) but cash inflows could have a substantial foreign currency component (because of overseas sales) 3. Have net cash flows that are heavily driven by whether the movie is a "hit", which is often difficult to predict.	Debt should be 1. Short term 2. Primarily dollar debt. 3. If possible, tied to the success of movies. (Lion King or Nemo Bonds)
Broadcasting	Projects are likely to be 1. Short term 2. Primarily in dollars, though foreign component is growing 3. Driven by advertising revenues and show success	Debt should be 1. Short term 2. Primarily dollar debt 3. If possible, linked to network ratings.
Theme Parks	Projects are likely to be 1. Very long term 2. Primarily in dollars, but a significant proportion of revenues come from foreign tourists, who are likely to stay away if the dollar strengthens 3. Affected by success of movie and broadcasting divisions.	Debt should be 1. Long term 2. Mix of currencies, based upon tourist make up.
Consumer Products	Projects are likely to be short to medium term and linked to the success of the movie division. Most of Disney's product offerings are derived from their movie productions.	Debt should be a. Medium term b. Dollar debt.

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

II. Project Specific Financing

- With project specific financing, you match the financing choices to the project being funded. The benefit is that the the debt is truly customized to the project.
- Project specific financing makes the most sense when you have a few large, independent projects to be financed. It becomes both impractical and costly when firms have portfolios of projects with interdependent cashflows.

Duration of Disney Theme Park

Year	*Annual Cashflow*	*Terminal Value*	*Present Value*	*Present value *t*
0	-$2,000		-$2,000	$0
1	-$1,000		-$904	-$904
2	-$833		-$680	-$1,361
3	-$224		-$165	-$496
4	$417		$278	$1,112
5	$559		$337	$1,684
6	$614		$334	$2,006
7	$658		$324	$2,265
8	$726		$323	$2,582
9	$802		$322	$2,899
10	$837	$9,857	$3,882	$38,821
			$2,050	$48,609
	Duration =	48609/2050 = 23.71 years		

The perfect theme park debt…

- The perfect debt for this theme park would have a duration of roughly 23.71 years and be in a mix of Asian currencies, reflecting where the visitors to the park are coming from.
- If possible, you would tie the interest payments on the debt to the number of visitors at the park.

III. Firm-wide financing

Rather than look at individual projects, you could consider the firm to be a portfolio of projects. The firm's past history should then provide clues as to what type of debt makes the most sense. In particular, you can look at

1. Operating Cash Flows
   - The question of how sensitive a firm's asset cash flows are to a variety of factors, such as interest rates, inflation, currency rates and the economy, can be directly tested by regressing changes in the operating income against changes in these variables.
   - This analysis is useful in determining the coupon/interest payment structure of the debt.
2. Firm Value
   - The firm value is clearly a function of the level of operating income, but it also incorporates other factors such as expected growth & cost of capital.
   - The firm value analysis is useful in determining the overall structure of the debt, particularly maturity.

Disney: Historical Data

Period	Operating Income	Firm value
2003	$2,713	$68,239
2002	$2,384	$53,708
2001	$2,832	$45,030
2000	$2,525	$47,717
1999	$3,580	$88,558
1998	$3,843	$65,487
1997	$3,945	$64,236
1996	$3,024	$65,489
1995	$2,262	$54,972
1994	$1,804	$33,071
1993	$1,560	$22,694
1992	$1,287	$25,048
1991	$1,004	$17,122
1990	$1,287	$14,963
1989	$1,109	$16,015
1988	$789	$9,195
1987	$707	$8,371
1986	$281	$5,631
1985	$206	$3,655
1984	$143	$2,024
1983	$134	$1,817
1982	$141	$2,108

The Macroeconomic Data

Period	T.Bond Rate	Change in rate	GDP (Deflated)	% Chg in GDP	CPI	Change in CPI	Weighted Dollar	% Change in $
2003	4.29%	0.40%	10493	3.60%	2.04%	0.01%	88.82	-14.51%
2002	3.87%	-0.82%	10128	2.98%	2.03%	-0.10%	103.9	-3.47%
2001	4.73%	-1.20%	9835	-0.02%	2.13%	-1.27%	107.64	1.85%
2000	6.00%	0.30%	9837	3.53%	3.44%	0.86%	105.68	11.51%
1999	5.68%	-0.21%	9502	4.43%	2.56%	1.05%	94.77	-0.59%
1998	5.90%	-0.19%	9099	3.70%	1.49%	-0.65%	95.33	0.95%
1997	6.10%	-0.56%	8774	4.79%	2.15%	-0.82%	94.43	7.54%
1996	6.70%	0.49%	8373	3.97%	2.99%	0.18%	87.81	4.36%
1995	6.18%	-1.32%	8053	2.46%	2.81%	0.19%	84.14	-1.07%
1994	7.60%	2.11%	7860	4.30%	2.61%	-0.14%	85.05	-5.38%
1993	5.38%	-0.91%	7536	2.25%	2.75%	-0.44%	89.89	4.26%
1992	6.35%	-1.01%	7370	3.50%	3.20%	0.27%	86.22	-2.31%
1991	7.44%	-1.24%	7121	-0.14%	2.92%	-3.17%	88.26	4.55%
1990	8.79%	0.47%	7131	1.68%	6.29%	1.72%	84.42	-11.23%
1989	8.28%	-0.60%	7013	3.76%	4.49%	0.23%	95.10	4.17%
1988	8.93%	-0.60%	6759	4.10%	4.25%	-0.36%	91.29	-5.34%
1987	9.59%	2.02%	6493	3.19%	4.63%	3.11%	96.44	-8.59%
1986	7.42%	-2.58%	6292	3.11%	1.47%	-1.70%	105.50	-15.30%
1985	10.27%	-1.11%	6102	3.39%	3.23%	-0.64%	124.56	-10.36%
1984	11.51%	-0.26%	5902	4.18%	3.90%	-0.05%	138.96	8.01%
1983	11.80%	1.20%	5665	6.72%	3.95%	-0.05%	128.65	4.47%
1982	10.47%	-3.08%	5308	-1.61%	4%	-4.50%	123.14	6.48%

I. Sensitivity to Interest Rate Changes

- How sensitive is the firm's value and operating income to changes in the level of interest rates?
- The answer to this question is important because it
  - it provides a measure of the duration of the firm's projects
  - it provides insight into whether the firm should be using fixed or floating rate debt.

Firm Value versus Interest Rate Changes

- Regressing changes in firm value against changes in interest rates over this period yields the following regression –

  Change in Firm Value = 0.2081 - 4.16 (Change in Interest Rates)

  (2.91) (0.75)

  T statistics are in brackets.

- The coefficient on the regression (-4.16) measures how much the value of Disney as a firm changes for a unit change in interest rates.

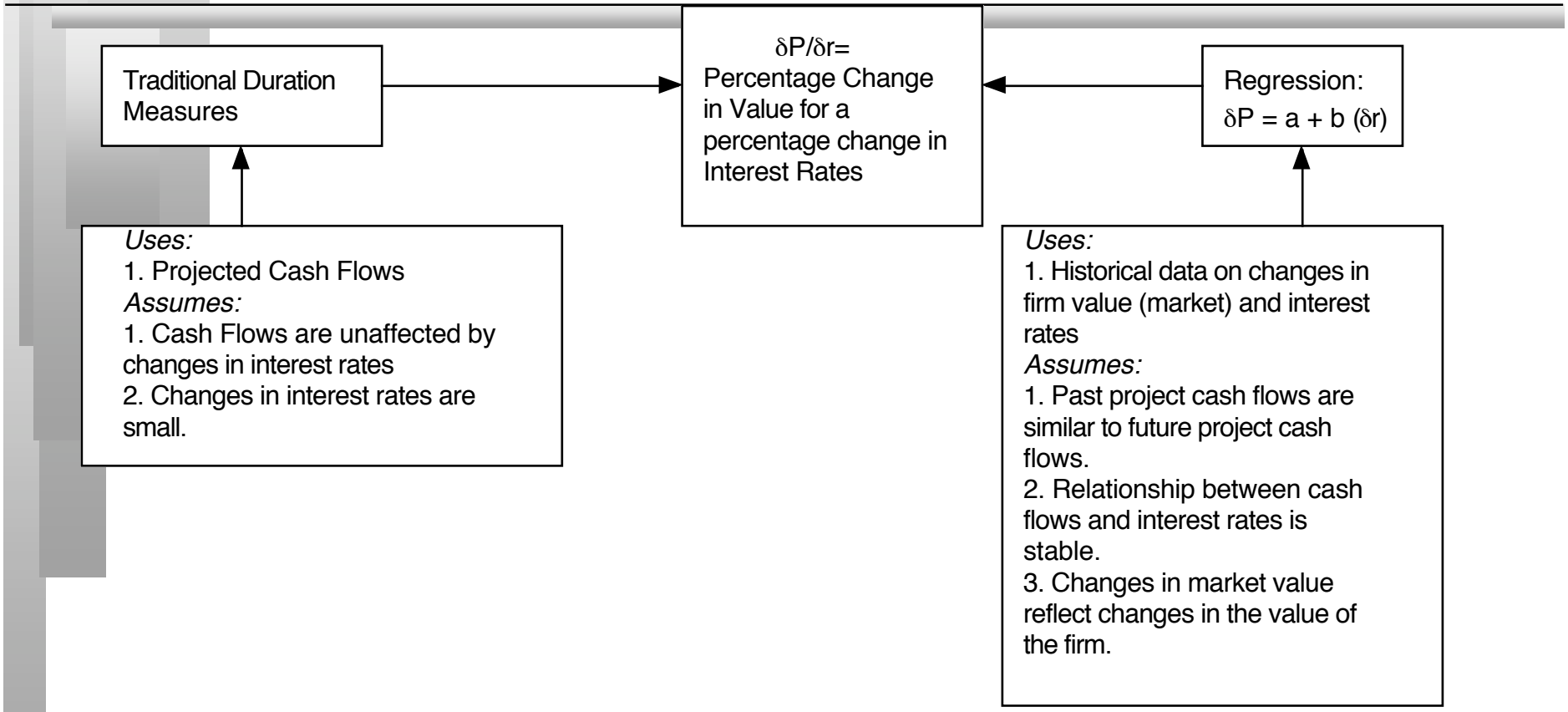
Why the coefficient on the regression is duration..

- The duration of a straight bond or loan issued by a company can be written in terms of the coupons (interest payments) on the bond (loan) and the face value of the bond to be –

$$\text{Duration of Bond} = \frac{dP/P}{dr/r} = \frac{\left[\sum_{t=1}^{t=N} \frac{t * \text{Coupon}_t}{(1+r)^t} + \frac{N * \text{Face Value}}{(1+r)^N}\right]}{\left[\sum_{t=1}^{t=N} \frac{\text{Coupon}_t}{(1+r)^t} + \frac{\text{Face Value}}{(1+r)^N}\right]}$$

- The duration of a bond measures how much the price of the bond changes for a unit change in interest rates.
- Holding other factors constant, the duration of a bond will increase with the maturity of the bond, and decrease with the coupon rate on the bond.

Duration: Comparing Approaches



Operating Income versus Interest Rates

- Regressing changes in operating cash flow against changes in interest rates over this period yields the following regression –

  Change in Operating Income = 0.2189 + 6.59 (Change in Interest Rates)
  (2.74) (1.06)

  - Conclusion: Disney's operating income,un like its firm value, has moved with interest rates.
- Generally speaking, the operating cash flows are smoothed out more than the value and hence will exhibit lower duration that the firm value.

II. Sensitivity to Changes in GDP/ GNP

- How sensitive is the firm's value and operating income to changes in the GNP/GDP?
- The answer to this question is important because
  - it provides insight into whether the firm's cash flows are cyclical and
  - whether the cash flows on the firm's debt should be designed to protect against cyclical factors.
- If the cash flows and firm value are sensitive to movements in the economy, the firm will either have to issue less debt overall, or add special features to the debt to tie cash flows on the debt to the firm's cash flows.

Regression Results

- Regressing changes in firm value against changes in the GDP over this period yields the following regression –

  Change in Firm Value = 0.2165 + 0.26 (GDP Growth)

  (1.56) (0.07)

  - Conclusion: Disney is not sensitive to economic growth

- Regressing changes in operating cash flow against changes in GDP over this period yields the following regression –

Change in Operating Income = 0.1725 + 0.66 (GDP Growth)

(1.10) (0.15)

  - Conclusion: Disney's operating income is not sensitive to economic growth either.

III. Sensitivity to Currency Changes

- How sensitive is the firm's value and operating income to changes in exchange rates?
- The answer to this question is important, because
  - it provides a measure of how sensitive cash flows and firm value are to changes in the currency
  - it provides guidance on whether the firm should issue debt in another currency that it may be exposed to.
- If cash flows and firm value are sensitive to changes in the dollar, the firm should
  - figure out which currency its cash flows are in;
  - and issued some debt in that currency

Regression Results

- Regressing changes in firm value against changes in the dollar over this period yields the following regression –

  Change in Firm Value = 0.2060 -2.04 (Change in Dollar)

  (3.40) (2.52)

  - Conclusion: Disney's value is sensitive to exchange rate changes, decreasing as the dollar strengthens.

- Regressing changes in operating cash flow against changes in the dollar over this period yields the following regression –

  Change in Operating Income = 0.1768 -1.76(Change in Dollar)

  (2.42) (1.81)

  Conclusion: Disney's operating income is also impacted by the dollar. A stronger dollar seems to hurt operating income.

IV. Sensitivity to Inflation

- How sensitive is the firm's value and operating income to changes in the inflation rate?
- The answer to this question is important, because
  - it provides a measure of whether cash flows are positively or negatively impacted by inflation.
  - it then helps in the design of debt; whether the debt should be fixed or floating rate debt.
- If cash flows move with inflation, increasing (decreasing) as inflation increases (decreases), the debt should have a larger floating rate component.

Regression Results

- Regressing changes in firm value against changes in inflation over this period yields the following regression –

  Change in Firm Value = 0.2262 + 0.57 (Change in Inflation Rate)

  (3.22) (0.13)

  Conclusion: Disney's firm value does not seem to be affected too much by changes in the inflation rate.

- Regressing changes in operating cash flow against changes in inflation over this period yields the following regression –

  Change in Operating Income = 0.2192 +9.27 (Change in Inflation Rate)

  (3.01) (1.95)

  Conclusion: Disney's operating income seems to increase in periods when inflation increases. However, this increase in operating income seems to be offset by the increase in discount rates leading to a much more muted effect on value.

Summarizing…

- Looking at the four macroeconomic regressions, we would conclude that
  - Disney's assets have a duration of 4.17 years
  - Disney is not a cyclical firm
  - Disney is hurt by a stronger dollar
  - Disney's operating income tends to move with inflation
- All of the regression coefficients have substantial standard errors associated with them. One way to reduce the error (a la bottom up betas) is to use sector-wide averages for each of the coefficients.

Bottom-up Estimates

	Coefficients on firm value regression				
	Interest Rates	GDP Growth	Inflation	Currency	Disney Weights
Movies	-3.70	0.56	1.41	-1.23	25.62%
Theme Parks	-6.47	0.22	-1.45	-3.21	20.09%
Broadcasting	-4.50	0.70	-3.05	-1.58	49.25%
Consumer Products	-4.88	0.13	-5.51	-3.01	5.04%
Disney	-4.71	0.54	-1.71	-1.89	100%

Recommendations for Disney

- The debt issued should be long term and should have duration of between 4 and 5 years.
- A significant portion of the debt should be floating rate debt, reflecting Disney's capacity to pass inflation through to its customers and the fact that operating income tends to increase as interest rates go up.
- Given Disney's sensitivity to a stronger dollar, a portion of the debt should be in foreign currencies. The specific currency used and the magnitude of the foreign currency debt should reflect where Disney makes its revenues. Based upon 2003 numbers at least, this would indicate that about 20% of the debt should be in Euros and about 10% of the debt in Japanese Yen reflecting Disney's larger exposures in Europe and Asia. As its broadcasting businesses expand into Latin America, it may want to consider using either Mexican Peso or Brazilian Real debt as well.

Analyzing Disney's Current Debt

- Disney has $13.1 billion in debt with an average maturity of 11.53 years. Even allowing for the fact that the maturity of debt is higher than the duration, this would indicate that Disney's debt is far too long term for its existing business mix.
- Of the debt, about 12% is Euro debt and no yen denominated debt. Based upon our analysis, a larger portion of Disney's debt should be in foreign currencies.
- Disney has about $1.3 billion in convertible debt and some floating rate debt, though no information is provided on its magnitude. If floating rate debt is a relatively small portion of existing debt, our analysis would indicate that Disney should be using more of it.

Adjusting Debt at Disney

- It can swap some of its existing long term, fixed rate, dollar debt with shorter term, floating rate, foreign currency debt. Given Disney's standing in financial markets and its large market capitalization, this should not be difficult to do.
- If Disney is planning new debt issues, either to get to a higher debt ratio or to fund new investments, it can use primarily short term, floating rate, foreign currency debt to fund these new investments. While it may be mismatching the funding on these investments, its debt matching will become better at the company level.