Finding the Right Financing Mix: The Capital Structure Decision

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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

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.

The Bankruptcy Cost Proposition

- Proposition 2: Other things being equal, the greater the indirect bankruptcy cost and/or probability of bankruptcy in the operating cashflows of the firm, the less debt the firm can afford to use.

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 3: Other things being equal, the greater the agency problems associated with lending to a firm, the less debt the firm can afford to use.

Debt and Agency Costs

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

- A Large Pharmaceutical company
- A Large Regulated Electric Utility

Why?

Loss of future financing flexibility

- When a firm borrows up to its capacity, it loses the flexibility of financing future projects with debt.
- Proposition 4: Other things remaining equal, the more uncertain a firm is about its future financing requirements and projects, the less debt the firm will use for financing current projects.

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	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

⌛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

- 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.

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

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

Fallacies about Book Value

1. People will not lend on the basis of market value.
2. Book Value is more reliable than Market Value because it does not change as much.
3. Using book value is more conservative than using market value.

Issue: Use of Book Value

Many CFOs argue that using book value is more conservative than using market value, because the market value of equity is usually much higher than book value. Is this statement true, from a cost of capital perspective? (Will you get a more conservative estimate of cost of capital using book value rather than market value?)

- Yes
- No

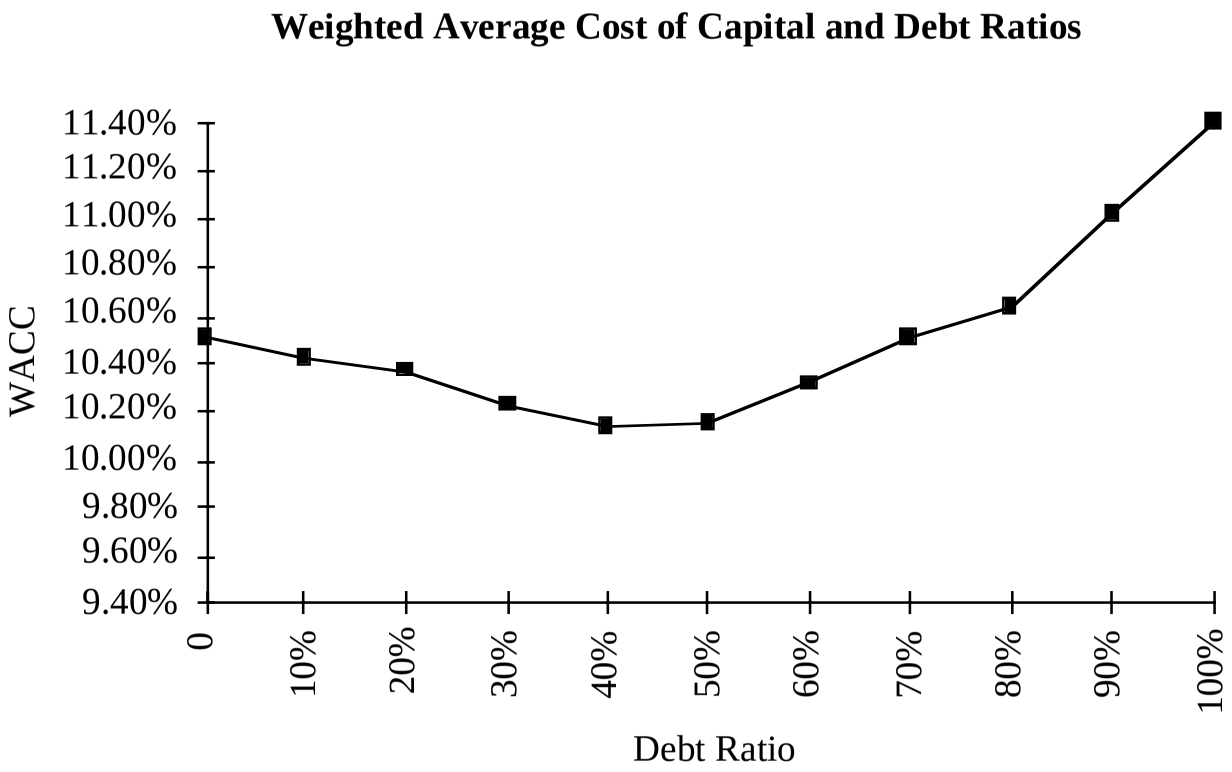
Why does the cost of capital matter?

- 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 = Riskfree rate + Beta * Risk Premium
    = 7% + 1.25 (5.5%) = 13.85%
  - Market Value of Equity = $50.88 Billion
  - Equity/(Debt+Equity) = 82%
- Debt
  - After-tax Cost of debt =(Riskfree rate + Default Spread) (1-t)
    = (7% +0.50) (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%

50.88/(50.88 +11.18)

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.

Medians of Key Ratios : 1993-1995

	AAA	*AA*	*A*	*BBB*	*BB*	*B*	*CCC*
Pretax Interest Coverage	13.50	9.67	5.76	3.94	2.14	1.51	0.96
EBITDA Interest Coverage	17.08	12.80	8.18	6.00	3.49	2.45	1.51
Funds from Operations / Total Debt (%)	98.2%	69.1%	45.5%	33.3%	17.7%	11.2%	6.7%
Free Operating Cashflow/ Total Debt (%)	60.0%	26.8%	20.9%	7.2%	1.4%	1.2%	0.96%
Pretax Return on Permanent Capital (%)	29.3%	21.4%	19.1%	13.9%	12.0%	7.6%	5.2%
Operating Income/Sales (%)	22.6%	17.8%	15.7%	13.5%	13.5%	12.5%	12.2%
Long Term Debt/ Capital	13.3%	21.1%	31.6%	42.7%	55.6%	62.2%	69.5%
Total Debt/Capitalization	25.9%	33.6%	39.7%	47.8%	59.4%	67.4%	69.1%

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

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: 1996

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%

See http://www.bondsonline.com for latest spreads

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 acquisition not considered)

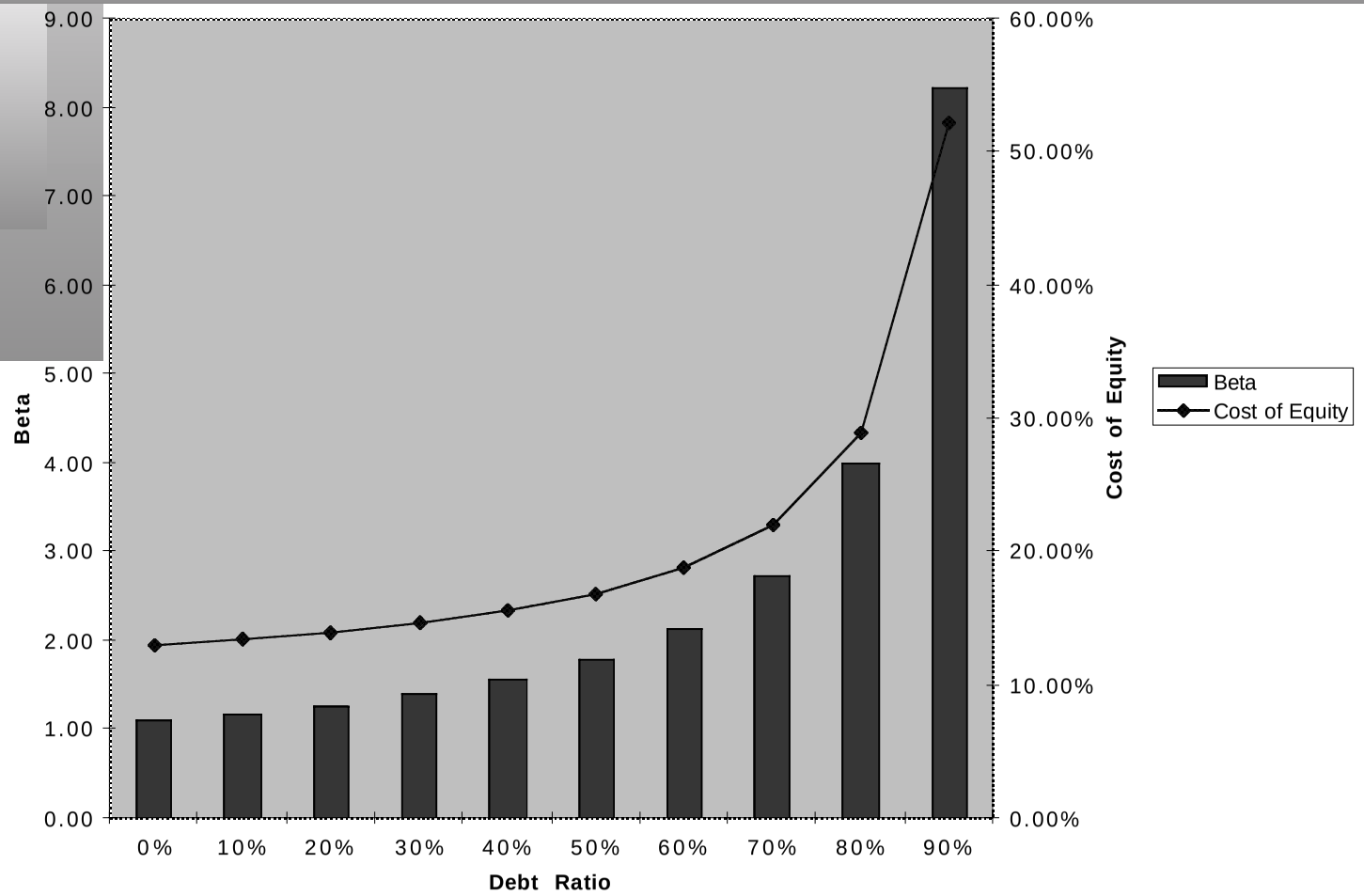
Estimating Cost of Equity

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**		
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%

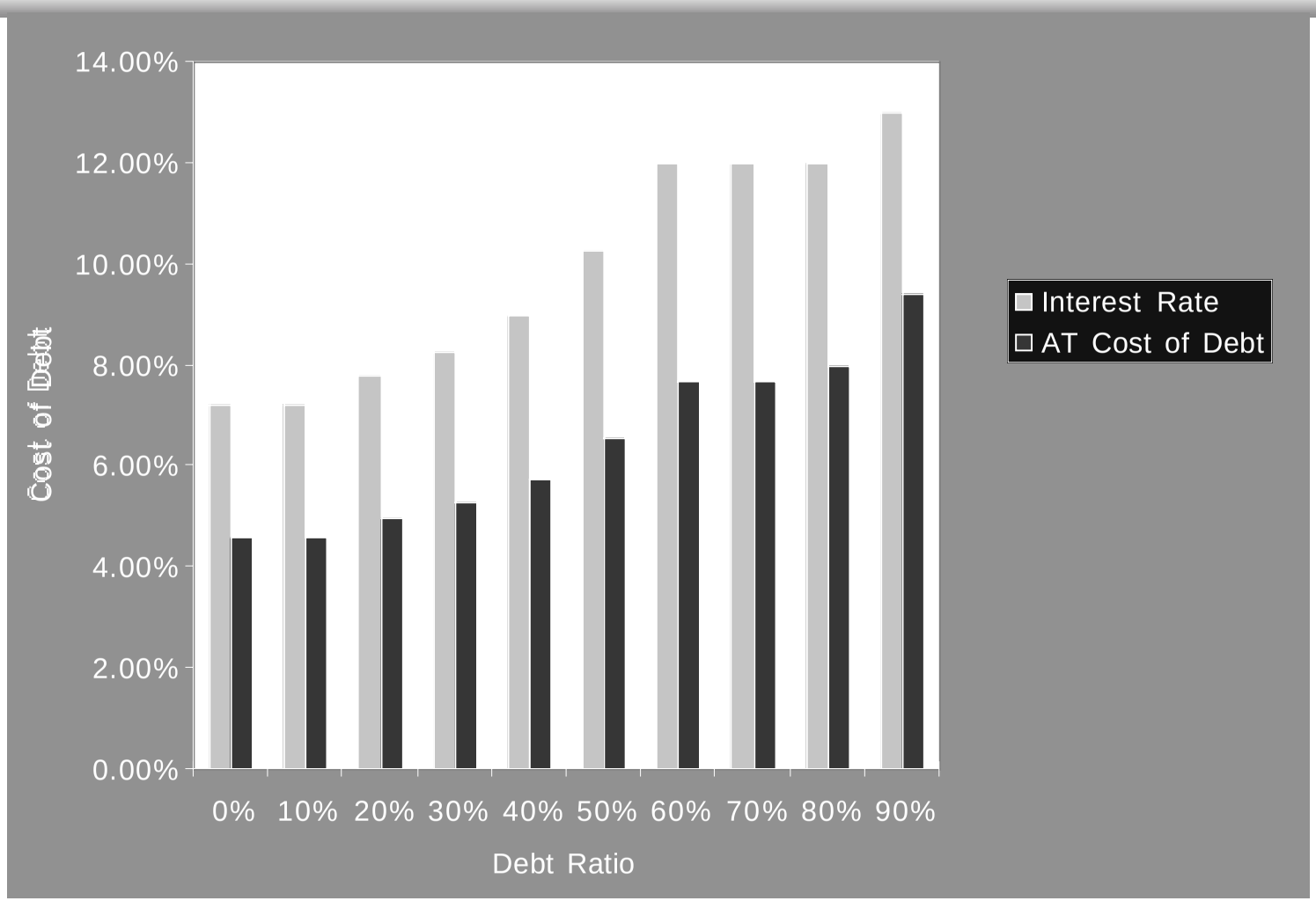
Stated versus Effective Tax Rates

- 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.

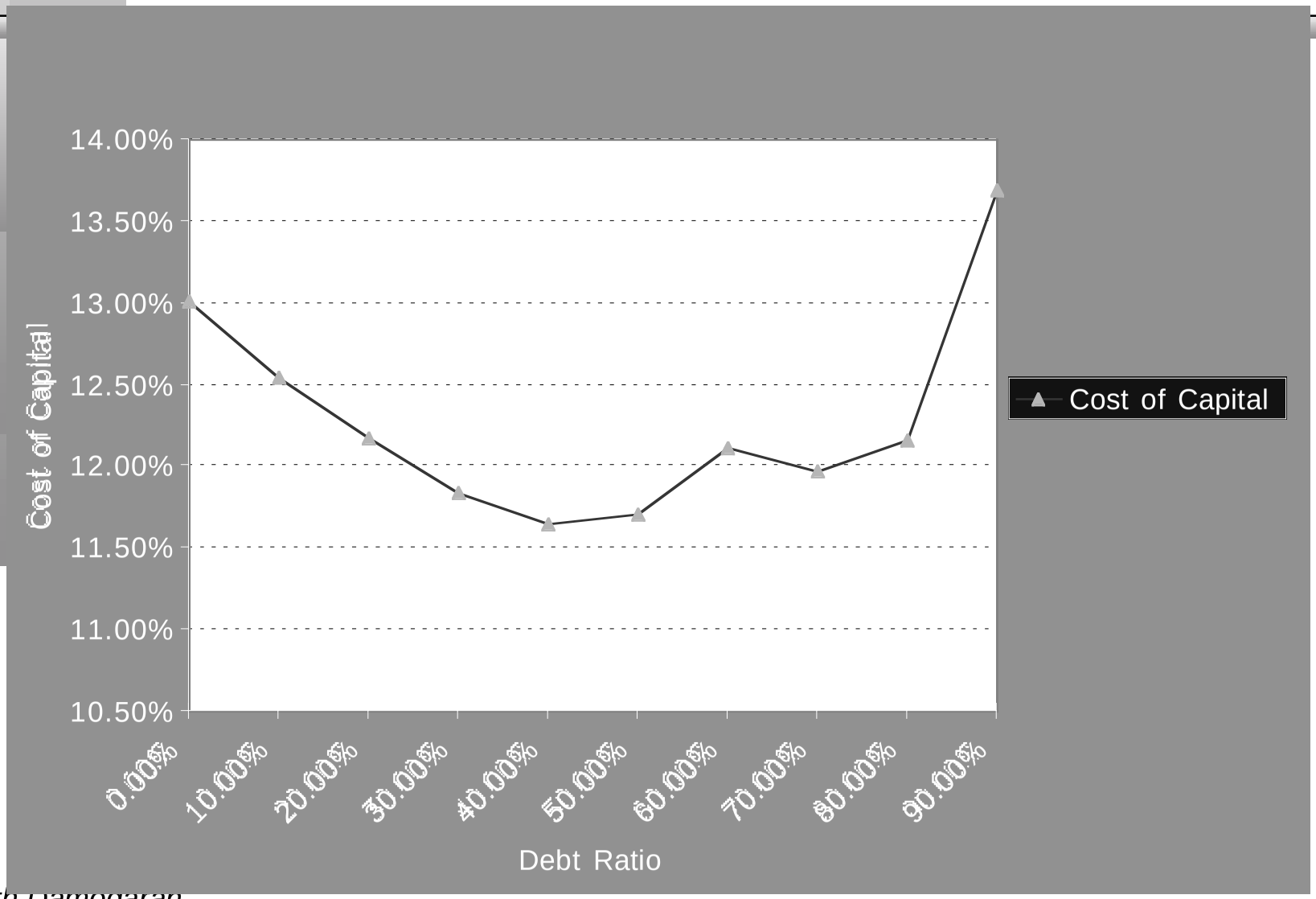
Cost of Debt


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 = $2,947(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

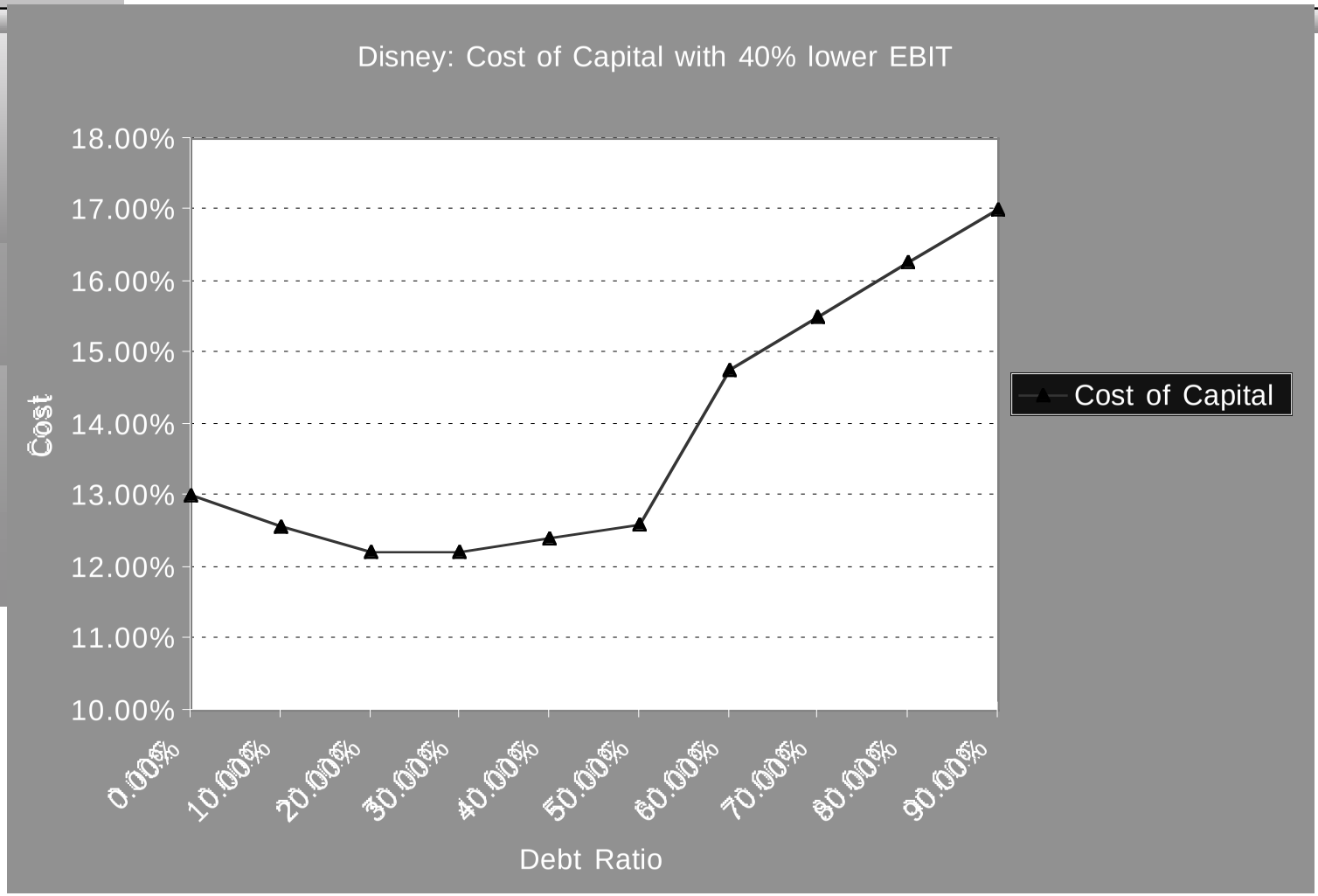
Year	*Operating Income*	*Change in Operating Income*
1981	$ 119.35	
1982	$ 141.39	18.46%
1983	$ 133.87	-5.32%
1984	$ 142.60	6.5%
1985	$ 205.60	44.2%
1986	$ 280.58	36.5%
1987	$ 707.00	152.0%
1988	$ 789.00	11.6%
1989	$ 1,109.00	40.6%
1990	$ 1,287.00	16.1%
1991	$ 1,004.00	-22.0%
1992	$ 1,287.00	28.2%
1993	$ 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 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

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 Aracruz Cellulose's Optimal Debt Ratio

- In 1996, Aracruz had earnings before interest and taxes of only 15 million BR, and claimed depreciation of 190 million Br. Capital expenditures amounted to 250 million BR.
- Aracruz had debt outstanding of 1520 million BR. While the nominal rate on this debt, especially the portion that is in Brazilian Real, is high, we will continue to do the analysis in real terms, and use a current real cost of debt of 5.5%, which is based upon a real riskfree rate of 5% and a default spread of 0.5%.
- The corporate tax rate in Brazil is estimated to be 32%.
- Aracruz had 976.10 million shares outstanding, trading 2.05 BR per share. The beta of the stock is estimated, using comparable firms, to be 0.71.

Setting up for the Analysis

- Current Cost of Capital

  Current Cost of Equity = 5% + 0.71 (7.5%) = 10.33%

  Market Value of Equity = 2.05 BR * 976.1 = 2,001 million BR

  Current Cost of Capital

  = 10.33% (2001/(2001+1520)) + 5.5% (1-.32) (1520/(2001+1520) = 7.48%

- 1996 was a poor year for Aracruz, both in terms of revenues and operating income. In 1995, Aracruz had earnings before interest and taxes of 271 million BR. We will use this as our normalized EBIT.

Aracruz's Optimal Debt Ratio

Debt Ratio	*Beta*	*Cost of Equity*	*Rating*	*Cost of Debt*	*AT Cost of Debt*	*Cost of Capital*	*Firm Value*
0.00%	0.47	8.51%	AAA	5.20%	3.54%	8.51%	2,720 BR
10.00%	0.50	8.78%	AAA	5.20%	3.54%	8.25%	2,886 BR
20.00%	0.55	9.11%	AA	5.50%	3.74%	8.03%	3,042 BR
30.00%	0.60	9.53%	A	6.00%	4.08%	7.90%	3,148 BR
40.00%	**0.68**	**10.10%**	**A-**	**6.25%**	**4.25%**	**7.76%**	**3,262 BR**
50.00%	0.79	10.90%	BB	7.00%	4.76%	7.83%	3,205 BR
60.00%	0.95	12.09%	B-	9.25%	6.29%	8.61%	2,660 BR
70.00%	1.21	14.08%	CCC	10.00%	6.80%	8.98%	2,458 BR
80.00%	1.76	18.23%	CCC	10.00%	6.92%	9.18%	2,362 BR
90.00%	3.53	31.46%	CCC	10.00%	7.26%	9.68%	2,149 BR

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.

Estimating the Optimal Debt Ratio for a Private Bookstore

- Adjusted EBIT = EBIT + Imputed Interest on Op. Lease Exp.
  = $ 2,000,000 + $ 252,000 = $ 2,252,000
- While Bookscape has no debt outstanding, the present value of the operating lease expenses of $ 3.36 million is considered as debt.
- To estimate the market value of equity, we use a multiple of 22.41 times of net income. This multiple is the average multiple at which comparable firms which are publicly traded are valued.

Estimated Market Value of Equity = Net Income * Average PE
= 1,160,000* 22.41 = 26,000,000

- The interest rates at different levels of debt will be estimated based upon a "synthetic" bond rating. This rating will be assessed using interest coverage ratios for small firms which are rated by S&P.

Interest Coverage Ratios, Spreads and Ratings: Small Firms

Interest Coverage Ratio	*Rating*	*Spread over T Bond Rate*
> 12.5	AAA	0.20%
9.50-12.50	AA	0.50%
7.5 - 9.5	A+	0.80%
6.0 - 7.5	A	1.00%
4.5 - 6.0	A-	1.25%
3.5 - 4.5	BBB	1.50%
3.0 - 3.5	BB	2.00%
2.5 - 3.0	B+	2.50%
2.0 - 2.5	B	3.25%
1.5 - 2.0	B-	4.25%
1.25 - 1.5	CCC	5.00%
0.8 - 1.25	CC	6.00%
0.5 - 0.8	C	7.50%
< 0.5	D	10.00%

Optimal Debt Ratio for Bookscape

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest Rate	AT Cost of Debt	Cost of Capital	Firm Value
0%	1.03	12.65%	AA	7.50%	4.35%	12.65%	$26,781
10%	1.09	13.01%	AA	7.50%	4.35%	12.15%	$29,112
20%	1.18	13.47%	BBB	8.50%	4.93%	11.76%	$31,182
30%	1.28	14.05%	B+	9.50%	5.51%	11.49%	$32,803
40%	1.42	14.83%	B-	11.25%	6.53%	11.51%	$32,679
50%	1.62	15.93%	CC	13.00%	7.54%	11.73%	$31,341
60%	1.97	17.84%	CC	13.00%	7.96%	11.91%	$30,333
70%	2.71	21.91%	C	14.50%	10.18%	13.70%	$22,891
80%	4.07	29.36%	C	14.50%	10.72%	14.45%	$20,703
90%	8.13	51.72%	C	14.50%	11.14%	15.20%	$18,872

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

Application Test: Your firm's optimal financing mix

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

The 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:
  - 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)
  - 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

Rating	Default Risk
AAA	0.01%
AA	0.28%
A+	0.40%
A	0.53%
A-	1.41%
BBB	2.30%
BB	12.20%
B+	19.28%
B	26.36%
B-	32.50%
CCC	46.61%
CC	52.50%
C	60%
D	75%

Disney: Estimating Unlevered Firm Value

Current Value of the Firm =	50,888 + 11,180 =	$62,068
- Tax Benefit on Current Debt =	11,180 * .36 =	$4,025
+ Expected Bankruptcy Cost =	0.28% of .25*(62,068-4025) =	$41
Unlevered Value of Firm =		$58,084

Cost of Bankruptcy for Disney = 25% of firm value

Probability of Bankruptcy = 0.28%, based on firm's current rating

Tax Rate = 36%

Market Value of Equity = $ 50,888

Market Value of Debt = $ 11,180

Disney: APV at Debt Ratios

D/ (D+E)	$ Debt	Tax Rate	Unlevered Firm Value	Tax Benefit	Rating	Prob. Default	Exp Bk Cst	Value of Firm
0%	$0	36.00%	$58,084	$0	AAA	0.01%	$2	$58,083
10%	$6,207	36.00%	$58,084	$2,234	AAA	0.01%	$2	$60,317
20%	$12,414	36.00%	$58,084	$4,469	A+	0.40%	$62	$62,491
30%	$18,621	36.00%	$58,084	$6,703	A-	1.41%	$219	$64,569
40%	$24,827	36.00%	$58,084	$8,938	BB	12.20%	$1,893	$65,129
50%	$31,034	36.00%	$58,084	$11,172	B	26.36%	$4,090	$65,166
60%	$37,241	36.00%	$58,084	$13,407	CCC	50.00%	$7,759	$63,732
70%	$43,448	36.00%	$58,084	$15,641	CCC	50.00%	$7,759	$65,967
80%	$49,655	33.59%	$58,084	$16,677	CCC	50.00%	$7,759	$67,003
90%	$55,862	27.56%	$58,084	$15,394	CC	65.00%	$10,086	$63,392

Exp. Bk. Cst: Expected Bankruptcy cost

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)

Disney's Comparables

Company Name	*Market Debt Ratio*	*Book Debt Ratio*
Disney (Walt)	18.19%	43.41%
Time Warner	29.39%	68.34%
Westinghouse Electric	26.98%	51.97%
Viacom Inc. 'A'	48.14%	46.54%
Gaylord Entertainm. 'A'	13.92%	41.47%
Belo (A.H.) 'A' Corp.	23.34%	63.04%
Evergreen Media 'A'	16.77%	39.45%
Tele-Communications Intl Inc	23.28%	34.60%
King World Productions	0.00%	0.00%
Jacor Communications	30.91%	57.91%
LIN Television	19.48%	71.66%
Regal Cinemas	4.53%	15.24%
Westwood One	11.40%	60.03%
United Television	4.51%	15.11%
Average of Large Firms	**19.34%**	**43.48%**

II. Regression Methodology

- Step 1: Run a regression of debt ratios on proxies for benefits and costs. 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 crosssectional 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 50 entertainment firms, we arrived at the following regression:

Debt Ratio = - 0.1067 + 0.69 Tax Rate+ 0.61 EBITDA/Value- 0.07 σ_{OI}

(0.90) (2.58) (2.21) (0.60)

- The R squared of the regression is 27.16%. This regression can be used to arrive at a predicted value for Disney of:

Predicted Debt Ratio = - 0.1067 + 0.69 (.4358) + 0.61 (.0837) - 0.07 (.2257) = .2314

- Based upon the capital structure of other firms in the entertainment industry, Disney should have a market value debt ratio of 23.14%.

Cross Sectional Regression: 1996 Data

- Using 1996 data for 2929 firms listed on the NYSE, AMEX and NASDAQ data bases. The regression provides the following results –

DFR =0.1906- 0.0552 PRVAR -.1340 CLSH - 0.3105 CPXFR + 0.1447 FCP

(37.97a) (2.20a) (6.58a) (8.52a) (12.53a)

where,

DFR = Debt / (Debt + Market Value of Equity)

PRVAR = Variance in Firm Value

CLSH = Closely held shares as a percent of outstanding shares

CPXFR = Capital Expenditures / Book Value of Capital

FCP= Free Cash Flow to Firm / Market Value of Equity

- While the coefficients all have the right sign and are statistically significant, the regression itself has an R-squared of only 13.57%.

An Aggregated Regression

- One way to improve the predictive power of the regression is to aggregate the data first and then do the regression. To illustrate with the 1994 data, the firms are aggregated into two-digit SIC codes, and the same regression is re-run.

DFR =0.2370- 0.1854 PRVAR +.1407 CLSH + 1.3959 CPXF -.6483 FCP

(6.06a) (1.96b) (1.05a) (5.73a) (3.89a)

- The R squared of this regression is 42.47%.

Data Source: For the latest regression, go to updated data on my web site and click on the debt regression.

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.

- Variance in Firm Value = .04
- Closely held shares as percent of shares outstanding = 4% (.04)
- Capital Expenditures as fraction of firm value = 6.00%(.06)
- Free Cash Flow as percent of Equity Value = 3% (.03)

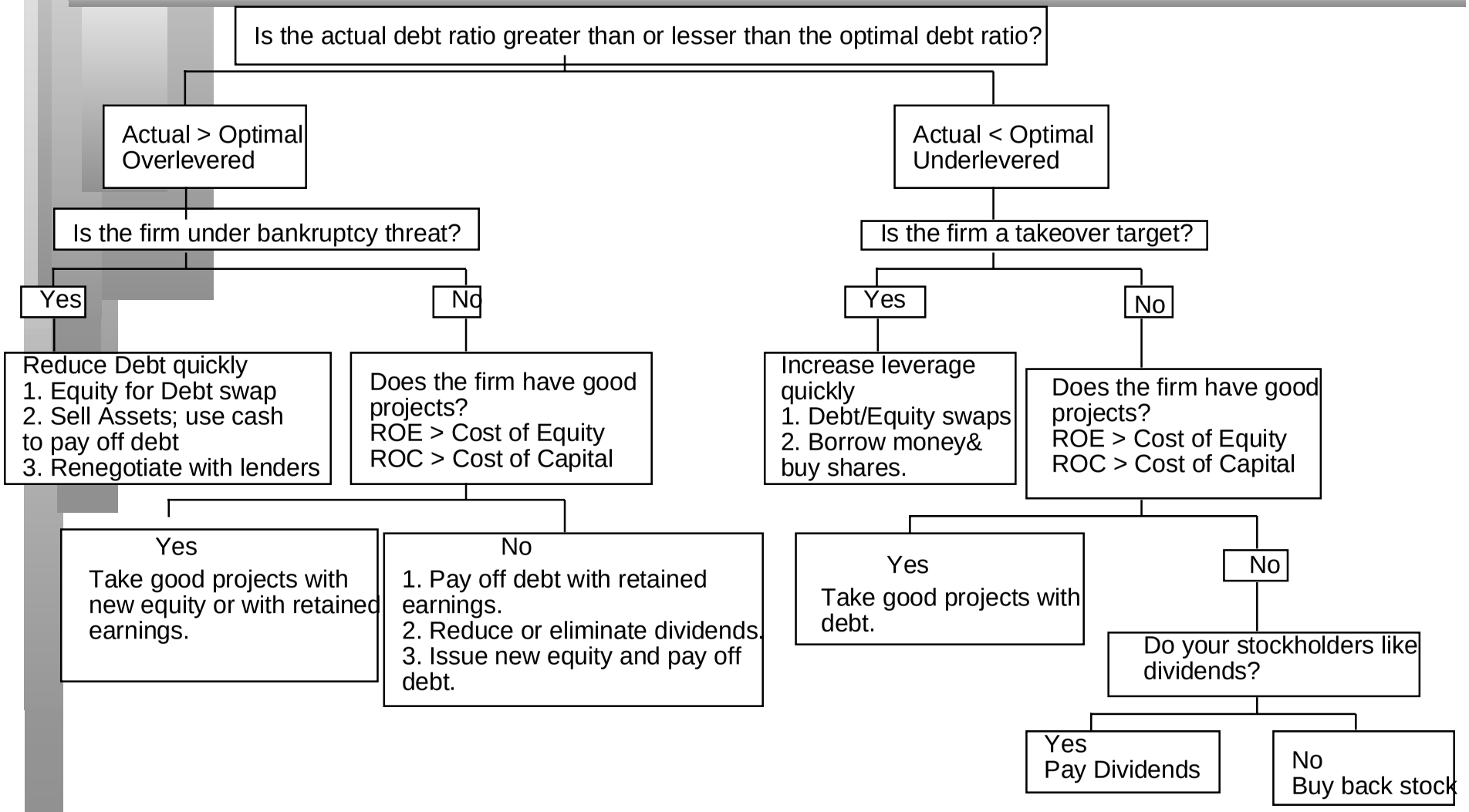
Optimal Debt Ratio

=0.2370- 0.1854 ( ) +.1407 ( ) + 1.3959( ) -.6483 ( )

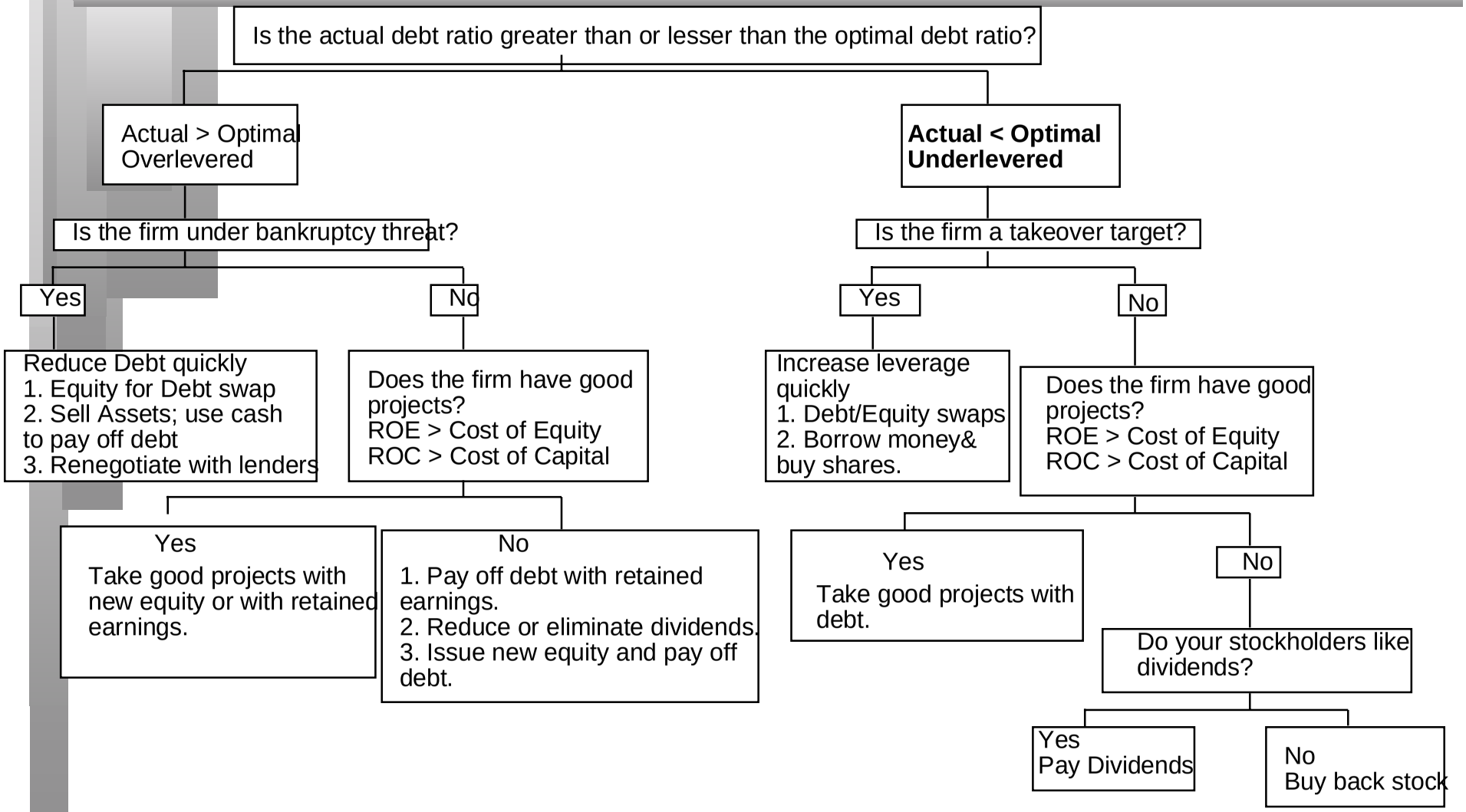
What does this optimal debt ratio tell you?

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

A Framework for Getting to the Optimal



Disney: Applying the Framework



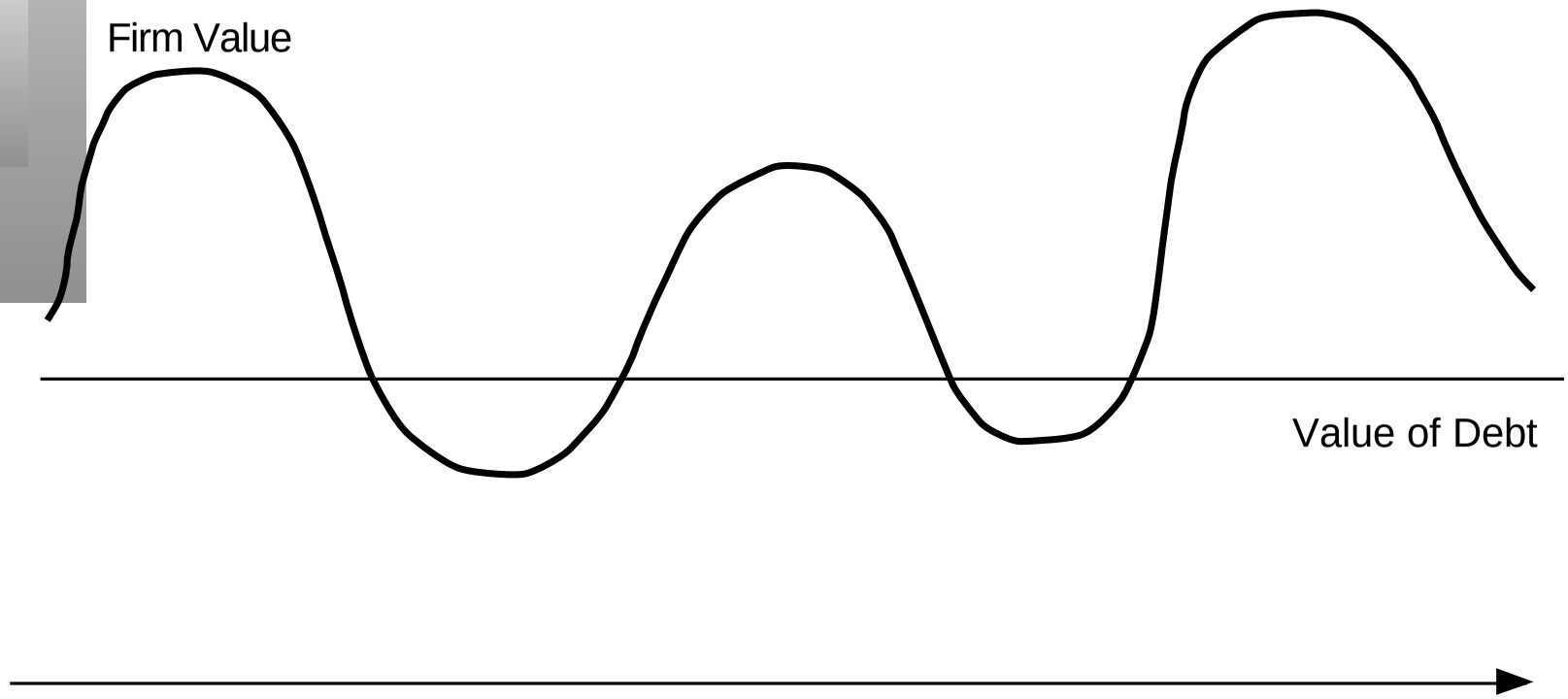
Application Test: Getting to the Optimal

- 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

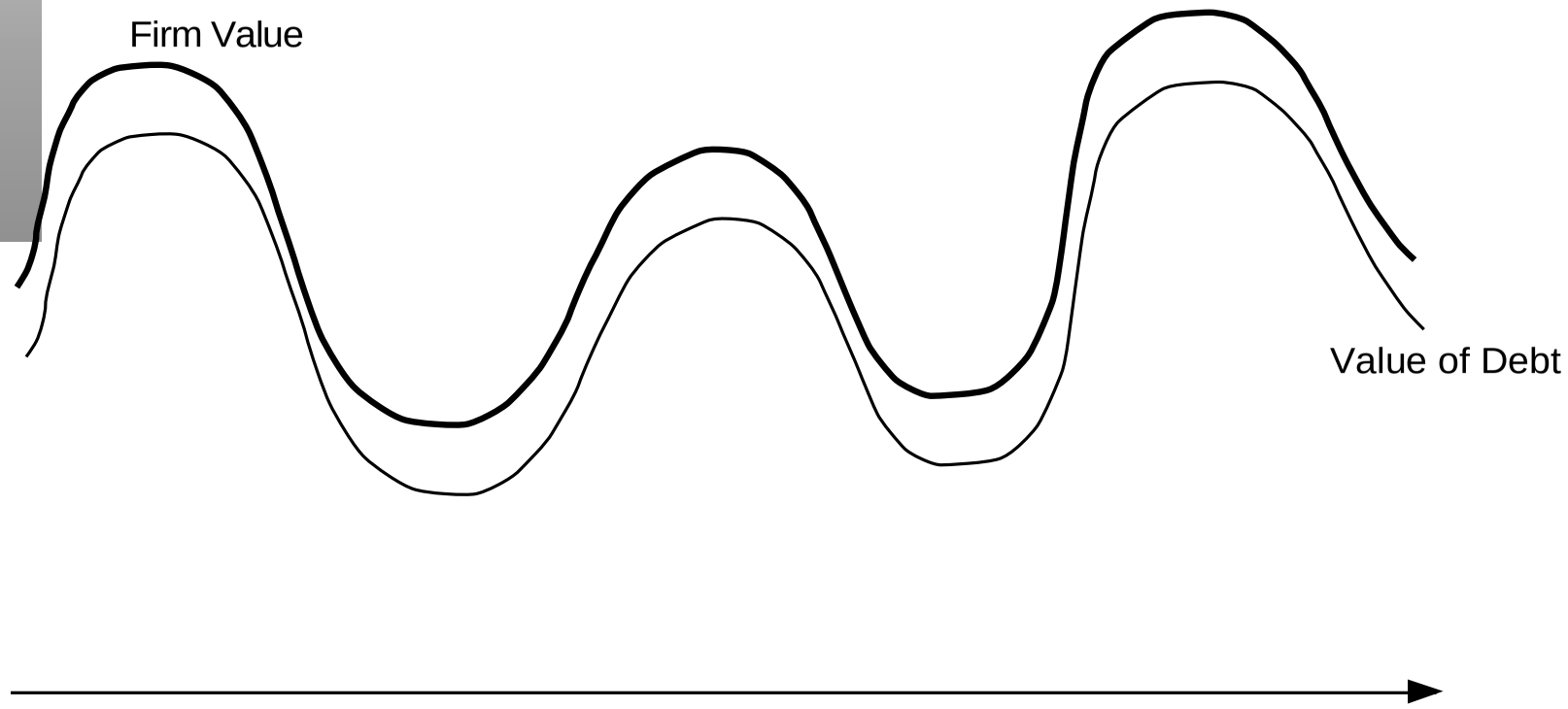
Designing Debt: The Fundamental Principle

- 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

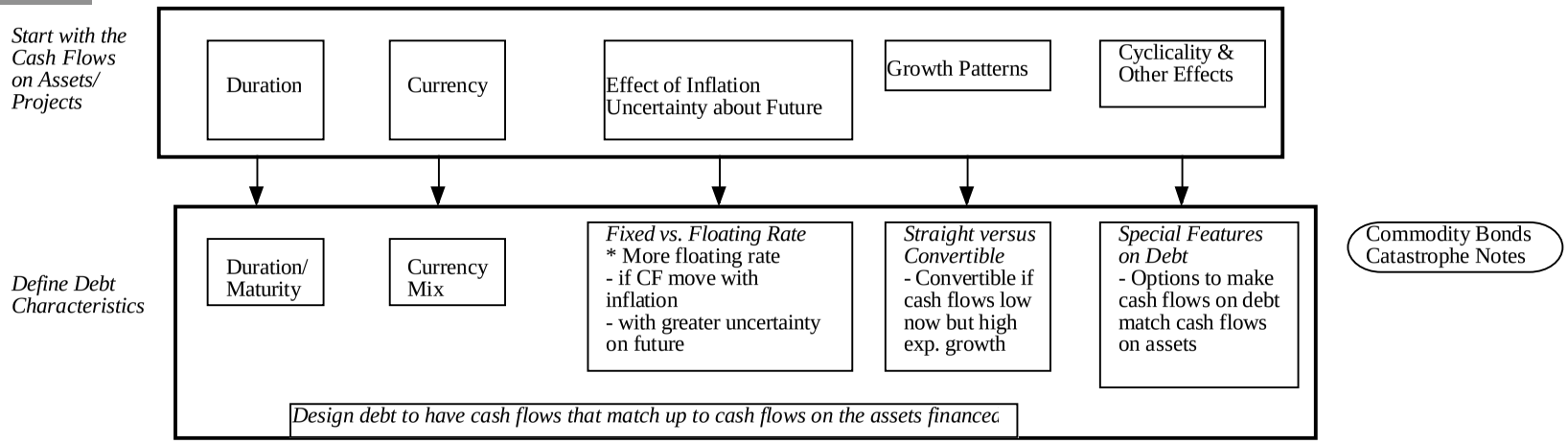


Firm with matched Debt



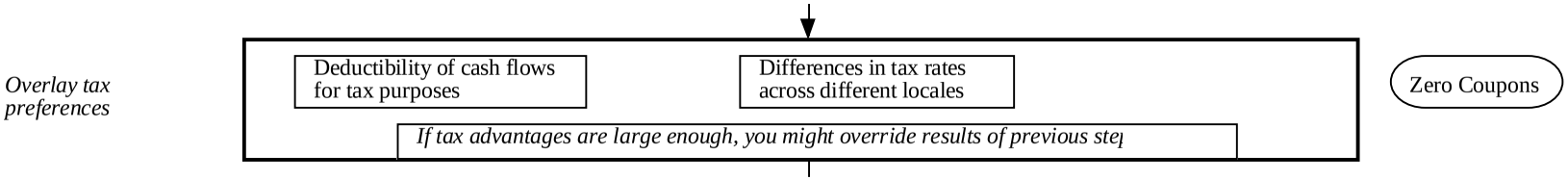
Design the perfect financing instrument

- 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

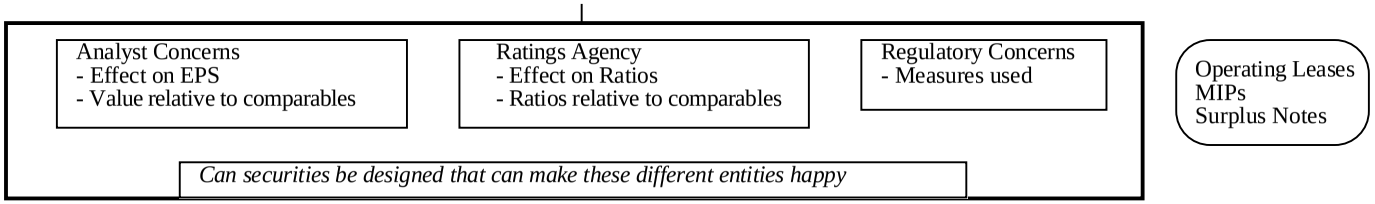
- All of this design work is lost, however, if the security that you have designed does not deliver the tax benefits.
- In addition, there may be a trade off between mismatching debt and getting greater tax benefits.



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.

Consider ratings agency & analyst concerns



Debt or Equity: The Strange Case of Trust Preferred

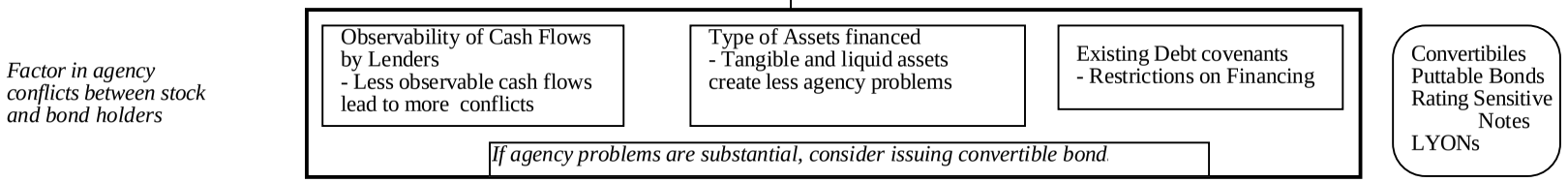
- Trust preferred stock has
  - A fixed dividend payment, specified at the time of the issue
  - That is tax deductible
  - And failing to make the payment can cause ? (Can it cause default?)
- When trust preferred was first created, ratings agencies treated it as equity. As they have become more savvy,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

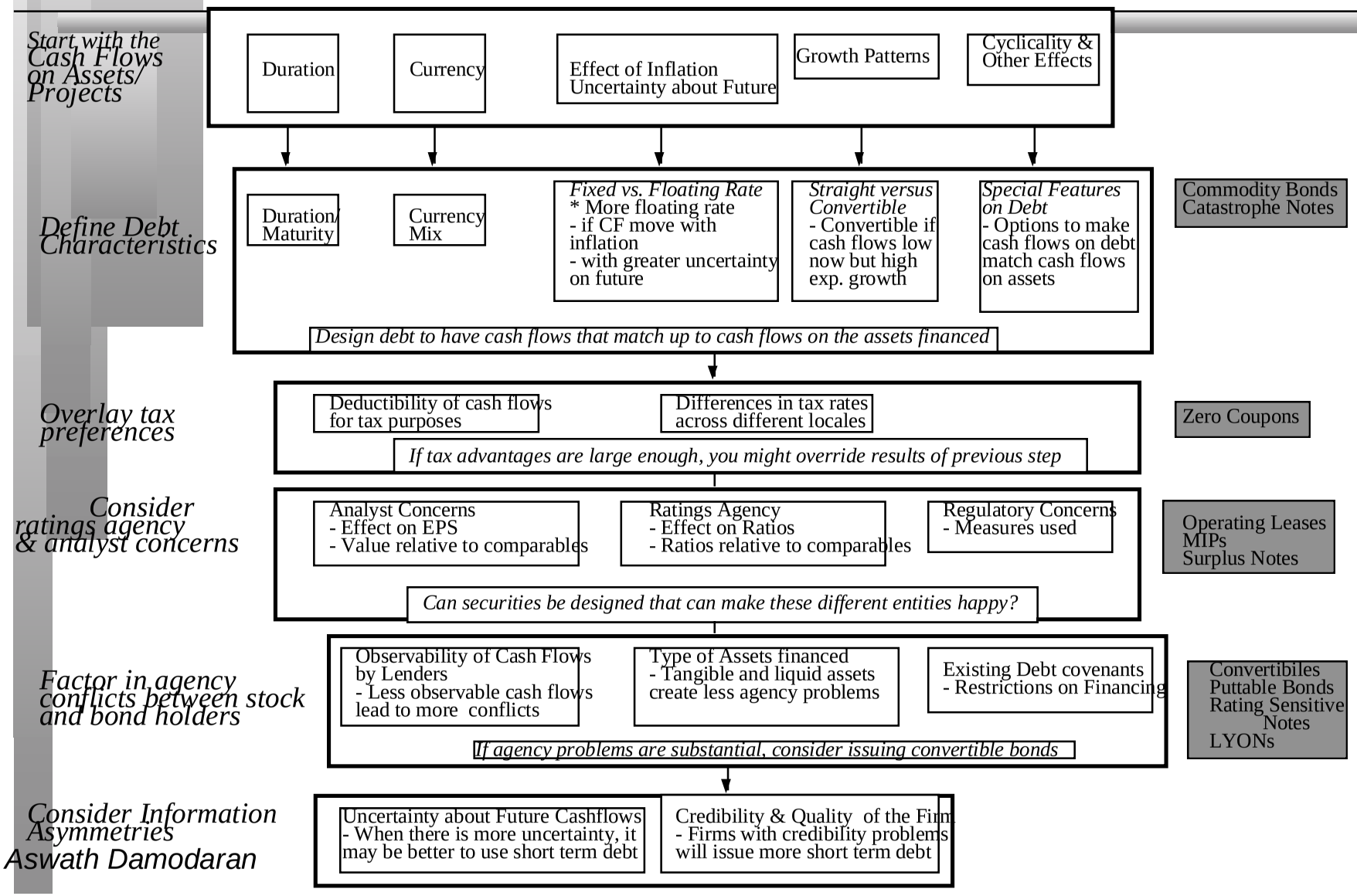
- There are some firms that face skepticism from bondholders when they go out to raise debt, because
  - Of their past history of defaults or other actions
  - They are small firms without any borrowing history
- Bondholders tend to demand much higher interest rates from these firms to reflect these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

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

II. QUANTITATIVE APPROACH

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.
   - Change in Operating Income(t)= a + b Change in Macro Economic Variable(t)
   - 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.

The Historical Data

Year	Firm Value	% Change	Operating Income	% Change
1981	$ 1,707		$ 119.35	
1982	$ 2,108	23.46%	$ 141.39	18.46%
1983	$ 1,817	-13.82%	$ 133.87	-5.32%
1984	$ 2,024	11.4%	$ 142.60	6.5%
1985	$ 3,655	80.6%	$ 205.60	44.2%
1986	$ 5,631	54.1%	$ 280.58	36.5%
1987	$ 8,371	48.7%	$ 707.00	152.0%
1988	$ 9,195	9.8%	$ 789.00	11.6%
1989	$ 16,015	74.2%	$ 1,109.00	40.6%
1990	$ 14,963	-6.6%	$ 1,287.00	16.1%
1991	$ 17,122	14.4%	$ 1,004.00	-22.0%
1992	$ 24,771	44.7%	$ 1,287.00	28.2%
1993	$ 25,212	1.8%	$ 1,560.00	21.2%
1994	$ 26,506	5.1%	$ 1,804.00	15.6%
1995	$ 33,858	27.7%	$ 2,262.00	25.4%
1996	$ 39,561	16.8%	$ 3,024.00	33.7%

The Macroeconomic Data

Long Bond Rate	nge in Interest	Real GNP	GNP Growth	Weighted Dolla	Change in Doll	Inflation Rate	Change in Infla
13.98%		3854		115.65		8.90%	
10.47%	-3.51%	3792	-1.6%	123.14	6.48%	3.80%	-5.10%
11.80%	1.33%	4047	6.7%	128.65	4.47%	3.80%	0.00%
11.51%	-0.29%	4216	4.2%	138.89	8.0%	4.00%	0.20%
8.99%	-2.52%	4350	3.2%	125.95	-9.3%	3.80%	-0.20%
7.22%	-1.77%	4431	1.9%	112.89	-10.4%	1.20%	-2.60%
8.86%	1.64%	4633	4.6%	95.88	-15.1%	4.40%	3.20%
9.14%	0.28%	4789	3.4%	95.32	-0.6%	4.40%	0.00%
7.93%	-1.21%	4875	1.8%	102.26	7.3%	4.60%	0.20%
8.07%	0.14%	4895	0.4%	96.25	-5.9%	6.10%	1.50%
6.70%	-1.37%	4894	0.0%	98.82	2.7%	3.10%	-3.00%
6.69%	-0.01%	5061	3.4%	104.58	5.8%	2.90%	-0.20%
5.79%	-0.90%	5219	3.1%	105.22	0.6%	2.70%	-0.20%
7.82%	2.03%	5416	3.8%	98.6	-6.3%	2.70%	0.00%
5.57%	-2.25%	5503	1.6%	95.1	-3.5%	2.50%	-0.20%
6.42%	0.85%	5679	3.2%	101.5	6.7%	3.30%	0.80%

Sensitivity to Interest Rate Changes

- 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 = 0.22 - 7.43 (Change in Interest Rates)

  (3.09) (1.69)

  T statistics are in brackets.

- Conclusion: The duration (interest rate sensitivity) of Disney's asset values is about 7.43 years. Consequently, its debt should have at least as long a duration.

Regression Constraints

Which of the following aspects of this regression would bother you the most?

- The low R-squared of only 10%
- The fact that Disney today is a very different firm from the firm captured in the data from 1981 to 1996
- Both
- Neither

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 –

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

- 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 of a Firm's Assets

- This measure of duration can be extended to any asset with expected cash flows on it. Thus, the duration of a project or asset can be estimated in terms of the pre-debt operating cash flows on that project.

$$\text{Duration of Project/Asset} = \frac{dPV/PV}{dr/r} = \frac{\left[\sum_{t=1}^{t=N} \frac{t * CF_t}{(1+r)^t} + \frac{N * \text{Terminal Value}}{(1+r)^N}\right]}{\left[\sum_{t=1}^{t=N} \frac{CF_t}{(1+r)^t} + \frac{\text{Terminal Value}}{(1+r)^N}\right]}$$

where,

CFt = After-tax operating cash flow on the project in year t

Terminal Value = Salvage Value at the end of the project lifetime

N = Life of the project

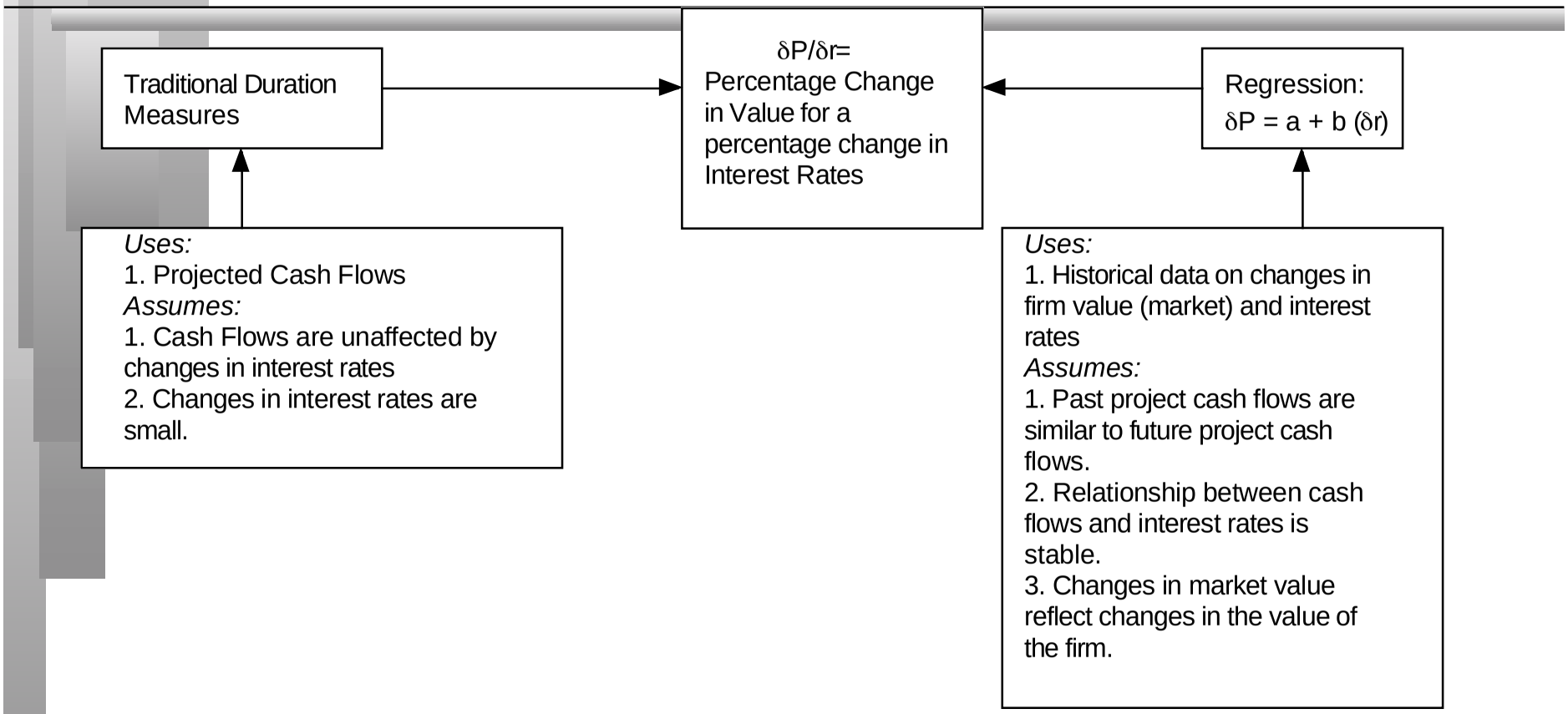
- The duration of any asset provides a measure of the interest rate risk embedded in that asset.

Duration of Disney Theme Park

Year	*FCFF*	*Terminal Value*	*Total FCFF*	*PV of FCFF*	*PV * t*
1	($39,078 Bt)		($39,078 Bt)	(31,180 Bt)	-31180.4
2	($36,199 Bt)		($36,199 Bt)	(23,046 Bt)	-46092.4
3	($11,759 Bt)		($11,759 Bt)	(5,973 Bt)	-17920
4	16,155 Bt		16,155 Bt	6,548 Bt	26193.29
5	21,548 Bt		21,548 Bt	6,969 Bt	34844.55
6	33,109 Bt		33,109 Bt	8,544 Bt	51264.53
7	46,692 Bt		46,692 Bt	9,614 Bt	67299.02
8	58,169 Bt		58,169 Bt	9,557 Bt	76454.39
9	70,423 Bt	838,720 Bt	909,143 Bt	119,182 Bt	1072635
Sum				100,214 Bt	1,233,498

Duration of the Project = $1,233,498/100,214 = 12.30$ years

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 = 0.31 - 4.99 (Change in Interest Rates)

  (2.90) (0.78)

  - Conclusion: Disney's operating income, like its firm value, has been very sensitive to interest rates, which confirms our conclusion to use long term debt.
- Generally speaking, the operating cash flows are smoothed out more than the value and hence will exhibit lower duration that the firm value.

Sensitivity to Changes in GNP

- 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 GNP over this period yields the following regression –

Change in Firm Value = 0.31 - 1.71 (GNP Growth)

(2.43) (0.45)

  - Conclusion: Disney is only mildly sensitive to cyclical movements in the economy.

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

Change in Operating Income = 0.17 + 4.06 (GNP Growth)

(1.04) (0.80)

  - Conclusion: Disney's operating income is slightly more sensitive to the economic cycle. This may be because of the lagged effect of GNP growth on operating income.

Sensitivity to Currency Changes

- 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 = 0.26 - 1.01 (Change in Dollar)

(3.46) (0.98)

  - Conclusion: Disney's value has not been very sensitive to changes in the dollar over the last 15 years.

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

Change in Operating Income = 0.26 - 3.03 (Change in Dollar)

(3.14) (2.59)

  - Conclusion: Disney's operating income has been much more significantly impacted by the dollar. A stronger dollar seems to hurt operating income.

Sensitivity to Inflation

- 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 = 0.26 - 0.22 (Change in Inflation Rate)

(3.36) (0.05)

  - 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 = 0.32 + 10.51 (Change in Inflation Rate)

(3.61) (2.27)

  - 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.

Bottom-up Estimates

Business	*Comparable Firms*	*Division Weight*	*Duration*	*Cyclicality*	*Inflation*	*Currency*
Creative Content	Motion Picture and TV program producers	35.71%	-3.34	1.39	2.30	-1.86
Retailing	High End Specialty Retailers	3.57%	-5.50	2.63	2.10	-0.75
Broadcasting	TV Broadcasting companies	30.36%	-4.50	0.70	3.03	-1.15
Theme Parks	Theme Park and Entertainment Complexes	26.79%	-10.47	0.22	0.72	-2.54
Real Estate	REITs specializing in hotel and vacation propertiers	3.57%	-8.46	0.89	-0.08	0.97
	Disney	100.00%	-5.86	0.89	2.00	-1.69

Analyzing Disney's Current Debt

Description	*Amount*	*Duration*	*Non-US $*	*Floating Rate*
Commercial paper	$4,185	0.50	0	0
US $ notes & debentures	$4,399	14.00	0	0
Dual Currency notes	$1,987	1.20	1000	0
Senior notes	$1,099	2.50	0	0
Other	$672	5.00	0	0
Total	**$12,342**	**5.85**	**1000**	**0**

Financing Recommendations

- The duration of the debt is almost exactly the duration estimated using the bottom-up approach, though it is lower than the duration estimated from the firm-specific regression.
- Less than 10% of the debt is non-dollar debt and it is primarily in Japanese yen, Australian dollars and Italian lire, and little of the debt is floating rate debt.
- Based on our analysis, we would recommend more non-dollar debt issues, with a shift towards floating rate debt, at least in those sectors where Disney retains significant pricing power.