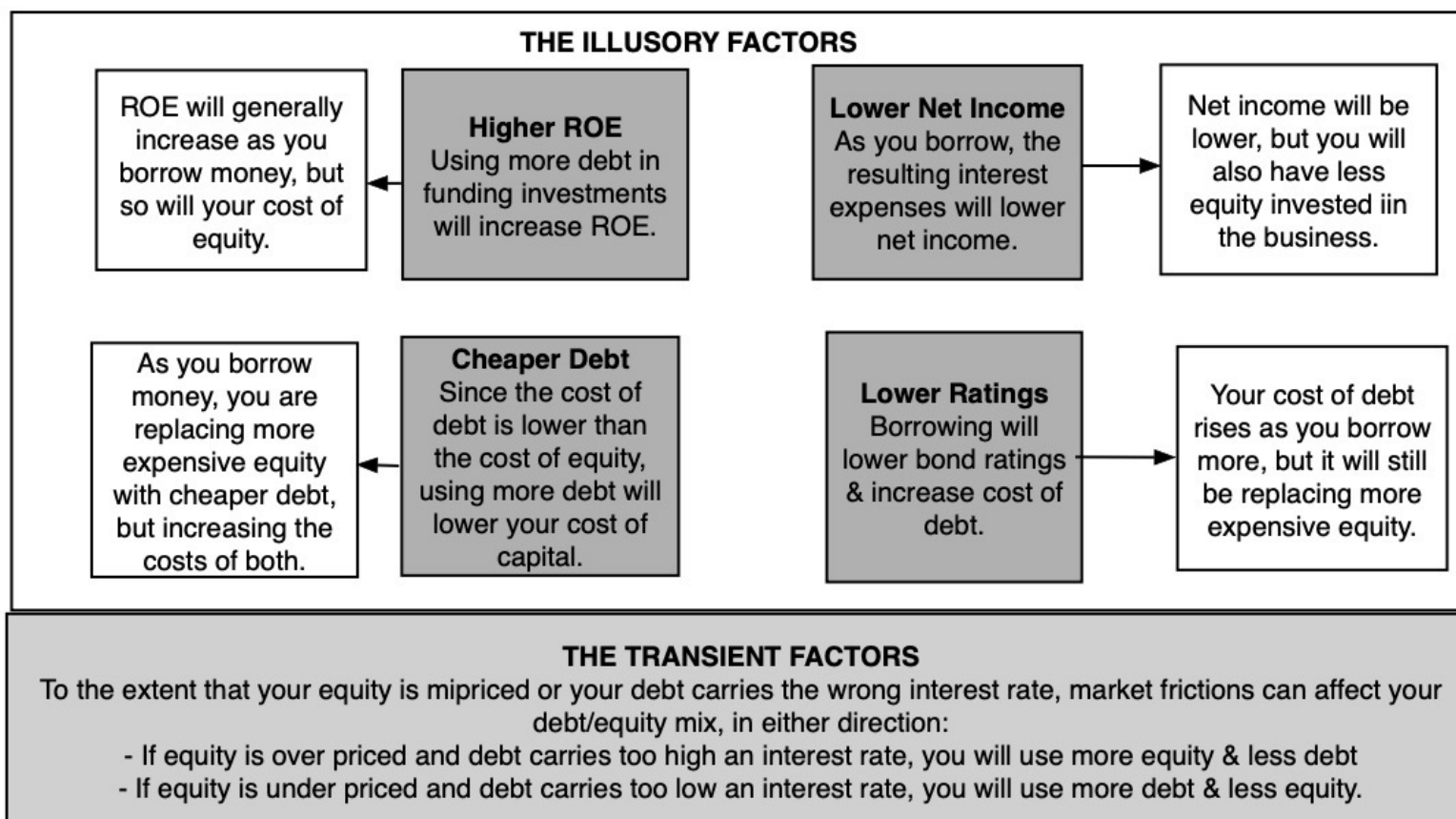


THE FINANCING MIX QUESTION

- 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?
 - a. What are the benefits of using debt instead of equity?
 - b. What are the costs of using debt instead of equity?
 - If not, why not?
- To answer this question, you have to decide what you are optimizing first, and in corporate finance, that is firm value.

THE ILLUSORY BENEFITS OF DEBT

Debt versus Equity: The Illusory Benefits



COSTS AND BENEFITS OF DEBT

- **Benefits of Debt**
 - **Tax Benefits:** The tax code is tilted in favor of debt, with interest payments being tax deductible in most parts of the world, while cash flows to equity are not.
 - **Adds discipline to management:** When managers are sloppy in their project choices, borrowing money may make them less so.
- **Costs of Debt**
 - **Bankruptcy Costs:** Borrowing money will increase your expected probability and cost of bankruptcy.
 - **Agency Costs:** What's good for stockholders is not always what's good for lenders and that creates friction and costs.
 - **Loss of Future Flexibility:** Using up debt capacity today will mean that you will not be able to draw on it in the future.

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
 - The caveat is that you need to have the income to cover interest payments to get this tax benefit.
- **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?
 - a. The real estate corporations
 - b. The real estate investment trusts
 - c. Cannot tell, without more information

TAX LAW AND DEBT

- At the end of 2017, the United States had one of the highest marginal corporate tax rates in the world (about 40%). Most companies had effective tax rates well below this, with the average effective tax rate closer to 22%.
- Which tax rate drives the tax benefit of debt and why?
 - a. Marginal tax rates
 - b. Effective tax rates
- At the end of 2017, a tax reform act passed Congress and became law, lowering the federal corporate tax rate from 36% to 21%/
 - Holding all else constant, what should you expect to see happen to debt at US companies?

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.
- It is not the bankruptcy, per se, that makes managers disciplined, but the **loss of such a job and personal wealth**.



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?
 - a. Conservatively financed (very little debt), privately owned businesses
 - b. Conservatively financed, publicly traded companies, with stocks held by millions of investors, none of whom hold a large percent of the stock.
 - c. 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 probability of bankruptcy, which will depend upon how uncertain you are about future cash flows
 - the cost of going bankrupt
 - direct costs: Legal and other Deadweight Costs
 - indirect costs: Costs arising because people perceive you to be in financial trouble
- Proposition 2: Firms with **more volatile earnings and cash flows** will have higher probabilities of bankruptcy at any given level of debt and for any given level of earnings.
- Proposition 3: Other things being equal, **the greater the indirect bankruptcy cost**, the less debt the firm can afford to use for any given level of debt.



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. A Grocery Store
 - b. An Airplane Manufacturer
 - c. 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 the **downside** of projects
 - Stockholders are far more interested in the **upside**
- In some cases, the clash of interests can lead to stockholders
 - Investing in **riskier projects** than you would want them to
 - **Returning more cash** (dividends & buybacks) 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 lender. Which of the following businesses would you perceive the greatest agency costs?
 - a. A Technology firm
 - b. A Large Regulated Electric Utility
 - c. A Real Estate Corporation
- Why?

LOSS OF FUTURE FINANCING FLEXIBILITY

- When a firm **borrowed up to its capacity**, it **loses the flexibility** of financing future projects with debt.
- Thus, if the firm is faced with an **unexpected investment opportunity** or a business shortfall, it will not be able to draw on debt capacity, if it has already used it up.
- **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

<i>Advantages of Debt</i>	<i>Disadvantages of debt</i>
<p>1. Tax Benefit: Interest expenses on debt are tax deductible but cash flows to equity are generally not. <i>Implication: The higher the marginal tax rate, the greater the benefits of debt.</i></p>	<p>1. Expected Bankruptcy Cost: The expected cost of going bankrupt is a product of the probability of going bankrupt and the cost of going bankrupt. The latter includes both direct and indirect costs. The probability of going bankrupt will be higher in businesses with more volatile earnings and the cost of bankruptcy will also vary across businesses. <i>Implication:</i> 1. Firms with more stable earnings should borrow more, for any given level of earnings. 2. Firms with lower bankruptcy costs should borrow more, for any given level of earnings.</p>
<p>2. Added Discipline: Borrowing money may force managers to think about the consequences of the investment decisions a little more carefully and reduce bad investments. <i>Implication: As the separation between managers and stockholders increases, the benefits to using debt will go up.</i></p>	<p>2. Agency Costs: Actions that benefit equity investors may hurt lenders. The greater the potential for this conflict of interest, the greater the cost borne by the borrower (as higher interest rates or more covenants). <i>Implication: Firms where lenders can monitor/ control how their money is being used should be able to borrow more than firms where this is difficult to do.</i></p>
	<p>3. Loss of flexibility: Using up available debt capacity today will mean that you cannot draw on it in the future. This loss of flexibility can be disastrous if funds are needed and access to capital is shut off. <i>Implication:</i> 1. Firms that can forecast future funding needs better should be able to borrow more. 2. Firms with better access to capital markets should be more willing to borrow more today.</p>

THE TRADE OFF FOR DISNEY, VALE, TATA MOTORS AND BAIDU

<i>Debt trade off</i>	<i>Discussion of relative benefits/costs</i>
Tax benefits	Marginal tax rates of 40% in US (Disney & Bookscape), 32.5% in India (Tata Motors), 25% in China (Baidu) and 34% in Brazil (Vale), but there is an offsetting tax benefit for equity in Brazil (interest on equity capital is deductible).
Added Discipline	The benefits should be highest at Disney, where there is a clear separation of ownership and management and smaller at the remaining firms.
Expected Bankruptcy Costs	Volatility in earnings: Higher at Baidu (young firm in technology), Tata Motors (cyclicality) and Vale (commodity prices) and lower at Disney (diversified across entertainment companies). Indirect bankruptcy costs likely to be highest at Tata Motors, since it's products (automobiles) have long lives and require service and lower at Disney and Baidu.
Agency Costs	Highest at Baidu, largely because it's assets are intangible and it sells services and lowest at Vale (where investments are in mines, highly visible and easily monitored) and Tata Motors (tangible assets, family group backing). At Disney, the agency costs will vary across its business, higher in the movie and broadcasting businesses and lower at theme parks.
Flexibility needs	Baidu will value flexibility more than the other firms, because technology is a shifting and unpredictable business, where future investment needs are difficult to forecast. The flexibility needs should be lower at Disney and Tata Motors, since they are mature companies with well-established investment needs. At Vale, the need for investment funds may vary with commodity prices, since the firm grows by acquiring both reserves and smaller companies. At Bookscape, the difficulty of accessing external capital will make flexibility more necessary.

6 APPLICATION TEST: WOULD YOU EXPECT YOUR FIRM TO GAIN OR LOSE FROM USING A LOT OF DEBT?

- Consider, for your firm,
 - a. The potential tax benefits of borrowing
 - b. The benefits of using debt as a disciplinary mechanism
 - c. The potential for expected bankruptcy costs
 - d. The potential for agency costs
 - e. The need for financial flexibility
- Based on this assessment,
 - 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?



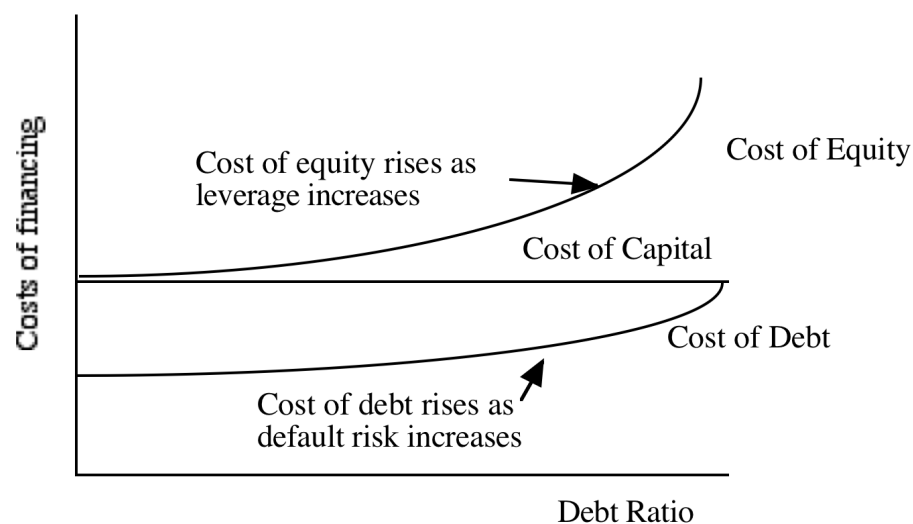
A HYPOTHETICAL...

- Assume that you live in a world where
 - (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.
- If the Miller Modigliani theorem holds:
 - A firm's value will be **determined the quality of its investments** and not by its financing mix.
 - The **cost of capital** of the firm **will not change with leverage**.

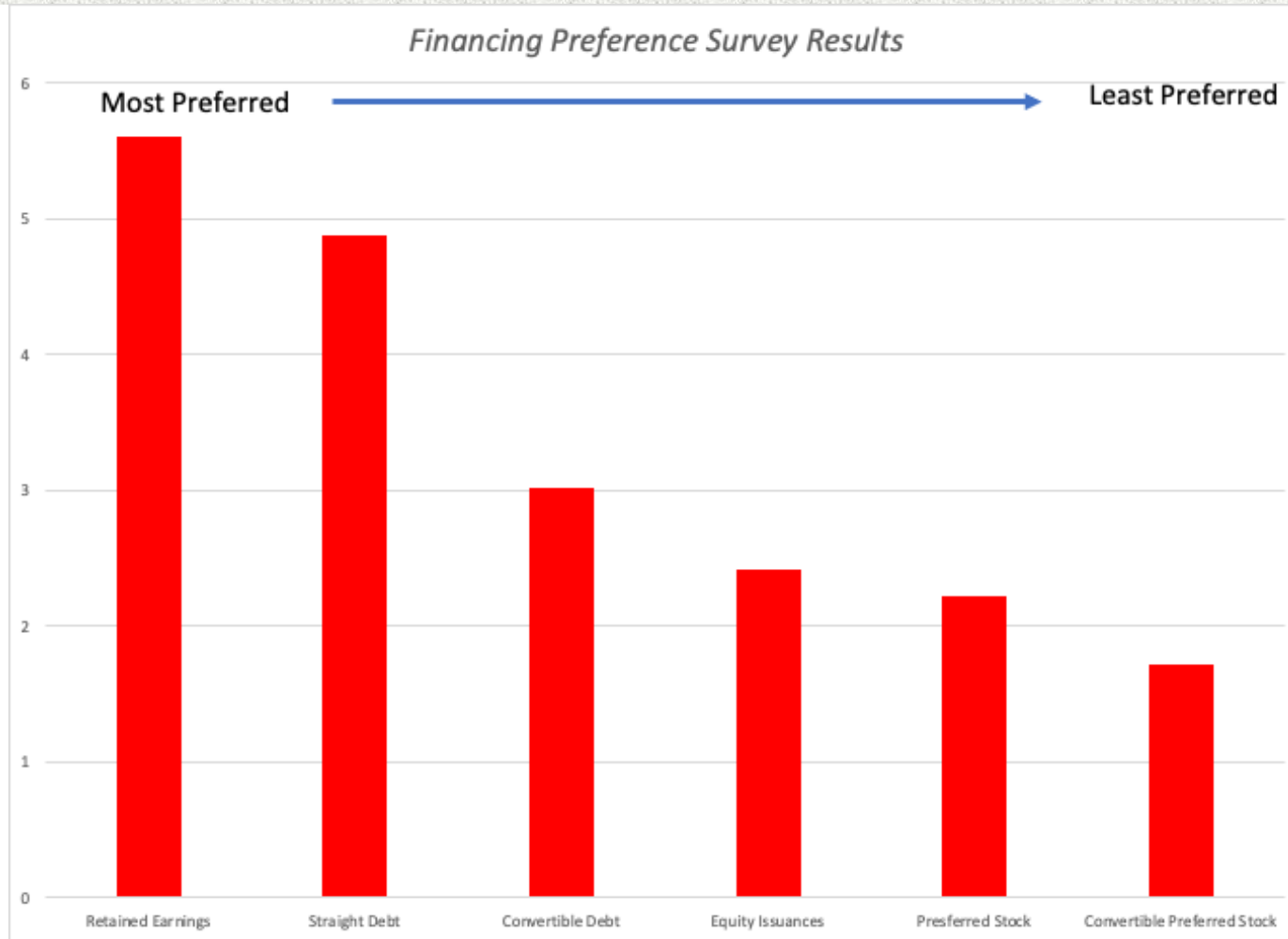
Figure 7.9: Cost of Capital in the MM World



WHAT DO FIRMS LOOK AT IN FINANCING?

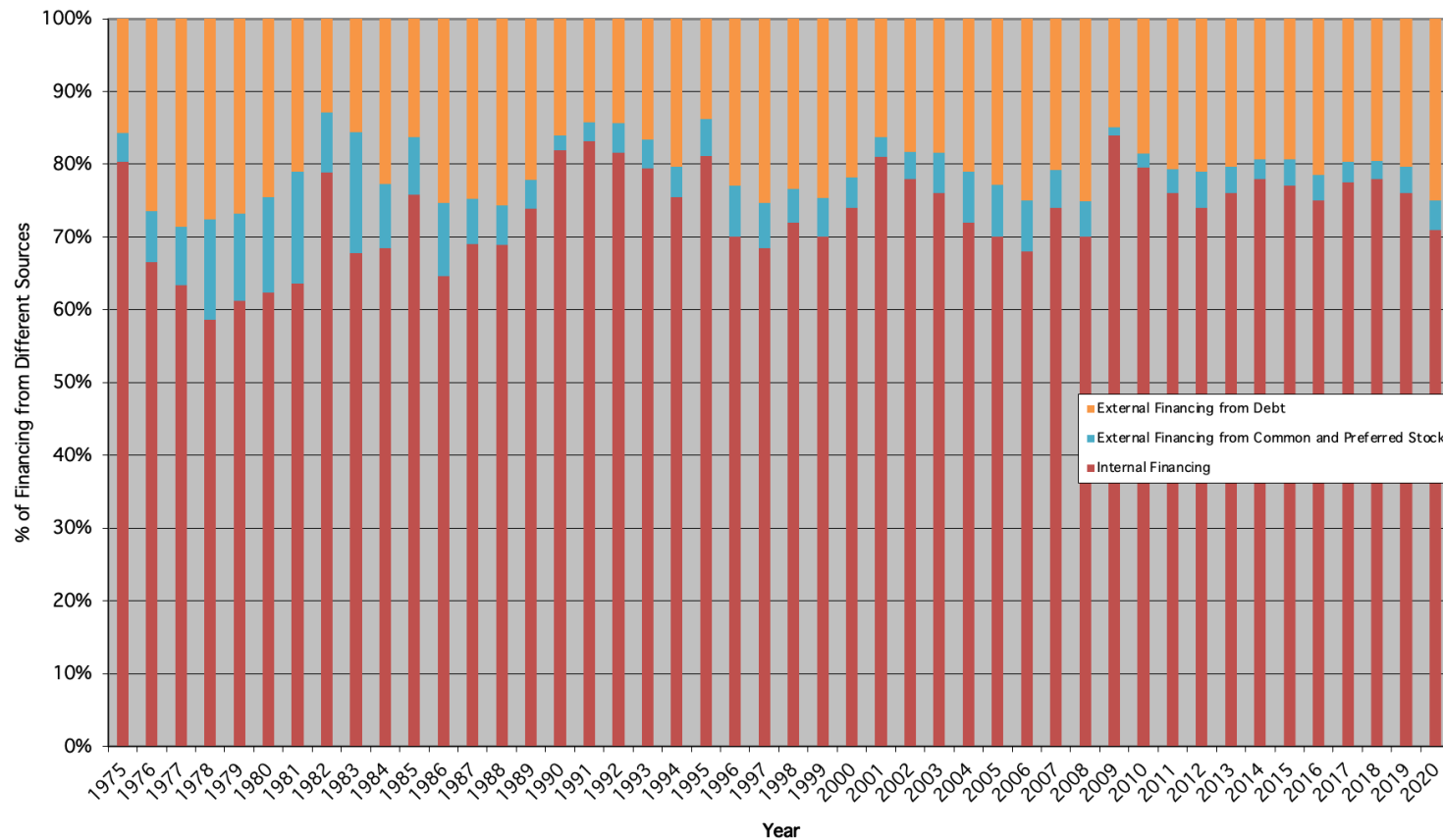
- There are some who argue that firms follow a financing hierarchy, with retained earnings being the most preferred choice for financing, followed by debt and that new equity is the least preferred choice. In particular,
 - **Managers value flexibility.** Managers value being able to use capital (on new investments or assets) without restrictions on that use or having to explain its use to others.
 - **Managers value control.** Managers like being able to maintain control of their businesses.
- With flexibility and control being key factors:
 - a. Would you rather use **internal financing (retained earnings) or external financing?**
 - b. With external financing, would you rather use **debt or equity?**

A FINANCING HIERARCHY



AND THE UNSURPRISING CONSEQUENCES..

External and Internal Financing at US Firms





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?
 - a. Nothing
 - b. Healthier than the average firm
 - c. In much more financial trouble than the average firm

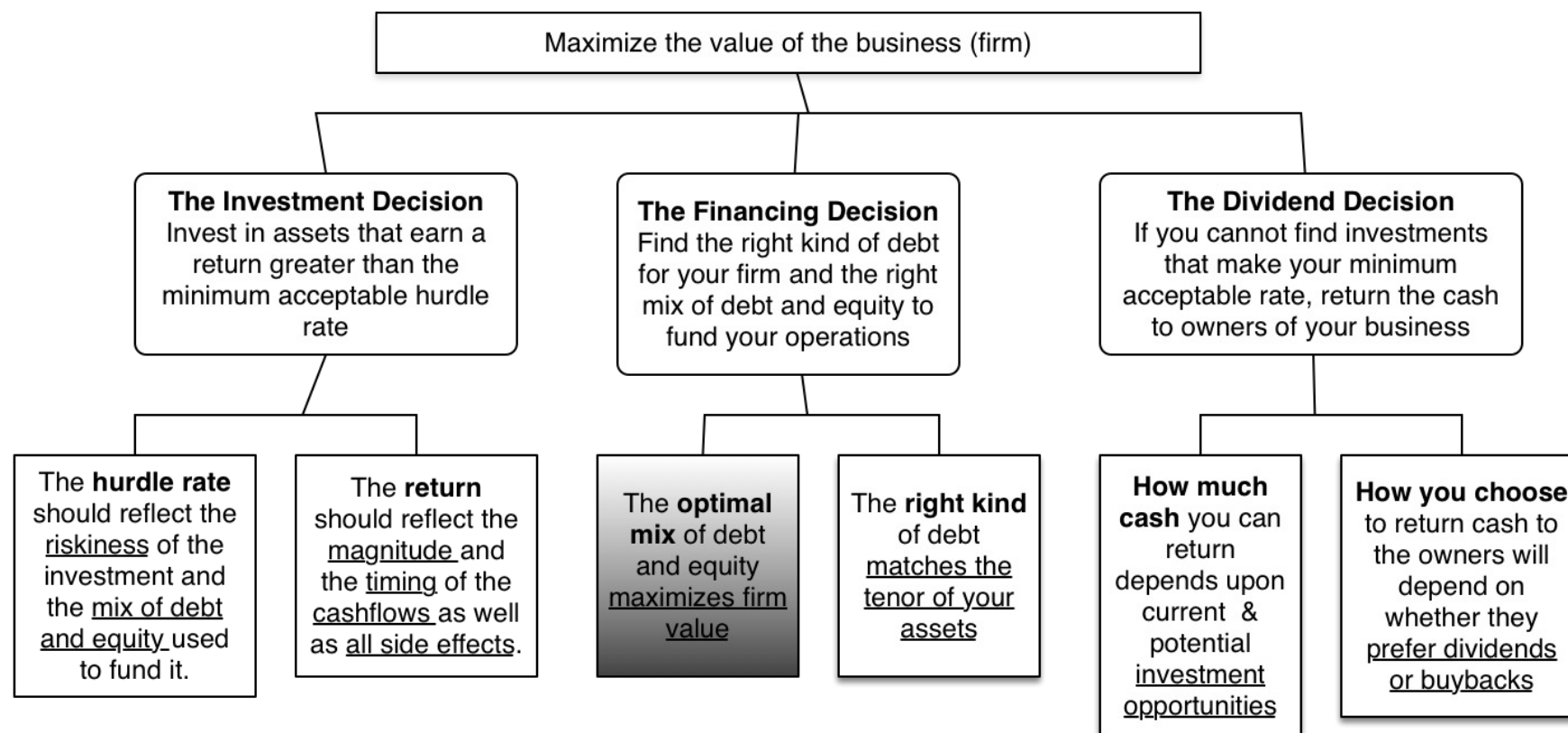
Bed Bath & Beyond Inc.
Announces Proposed Offering
of Series A Convertible
Preferred Stock and Warrants



CAPITAL STRUCTURE: FINDING THE RIGHT FINANCING MIX

You can have too much debt... or too little..

THE BIG PICTURE..



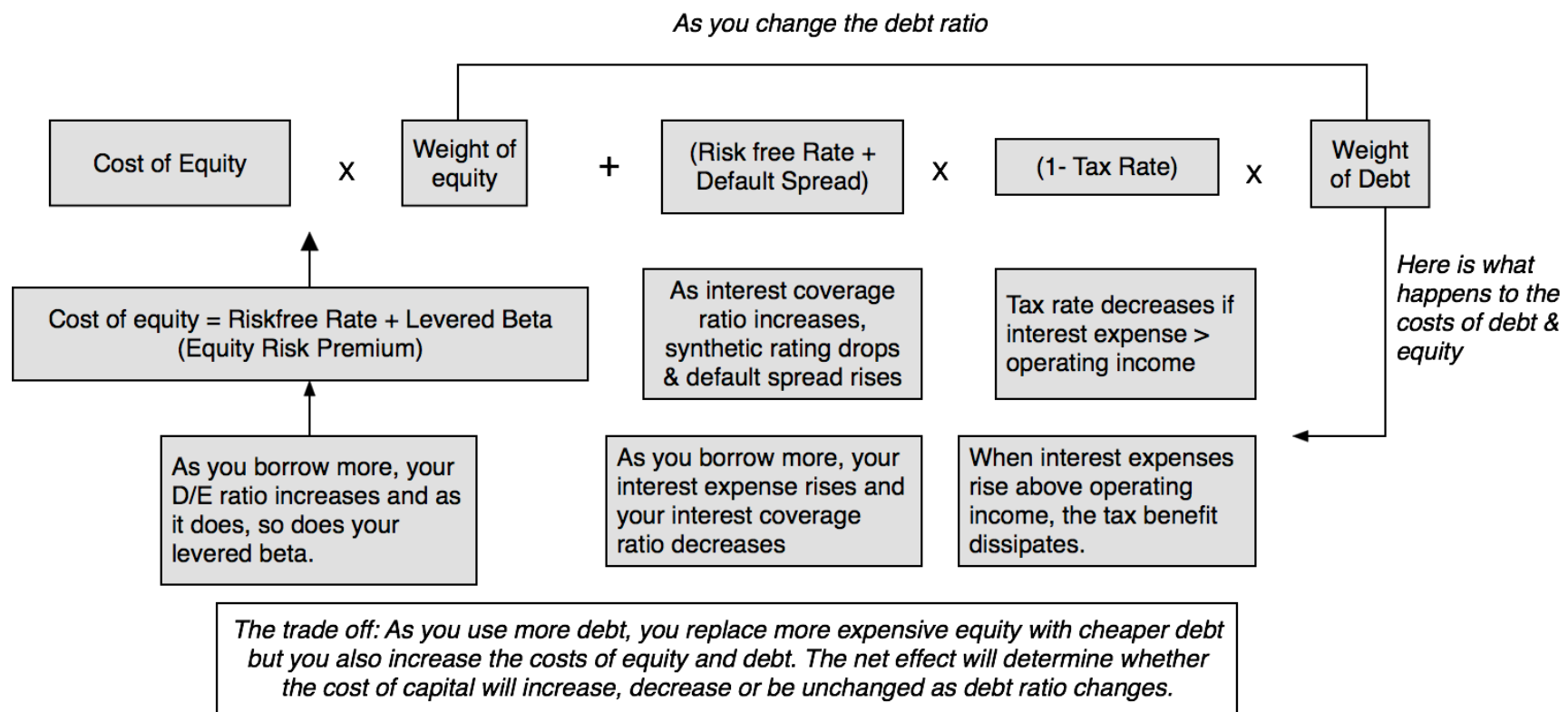
PATHWAYS TO THE OPTIMAL

1. **The Cost of Capital Approach:** The optimal debt ratio is the one that minimizes the cost of capital for a firm.
2. **The Enhanced Cost of Capital approach:** The optimal debt ratio is the one that generates the best combination of (low) cost of capital and (high) operating income.
3. **The Adjusted Present Value Approach:** The optimal debt ratio is the one that maximizes the overall value of the firm.
4. **The Peer Group Approach:** The optimal debt ratio is the one that brings the firm closes to its peer group in terms of financing mix.
5. **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.
 - If the end game for a business is maximizing its value, its **optimal** debt ratio will be the **one that minimizes the cost of capital**.
- Cost of Capital = Cost of Equity ($E/(D+E)$) + Pre-tax Cost of Debt $(1 - \text{tax rate}) (D/(D+E))$
- Within this framework, here are the key questions:
 - a. As the debt ratio changes, how does the cost of capital change?
 - b. And if the cost of capital does change, what is causing it to change?

THE DEBT TRADE OFF ON THE COST OF CAPITAL





COSTS OF DEBT & EQUITY

- An 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?
 - a. Yes
 - b. No

- Can equity ever be cheaper than debt?
 - a. Yes
 - b. No

APPLYING COST OF CAPITAL APPROACH: THE TEXTBOOK EXAMPLE

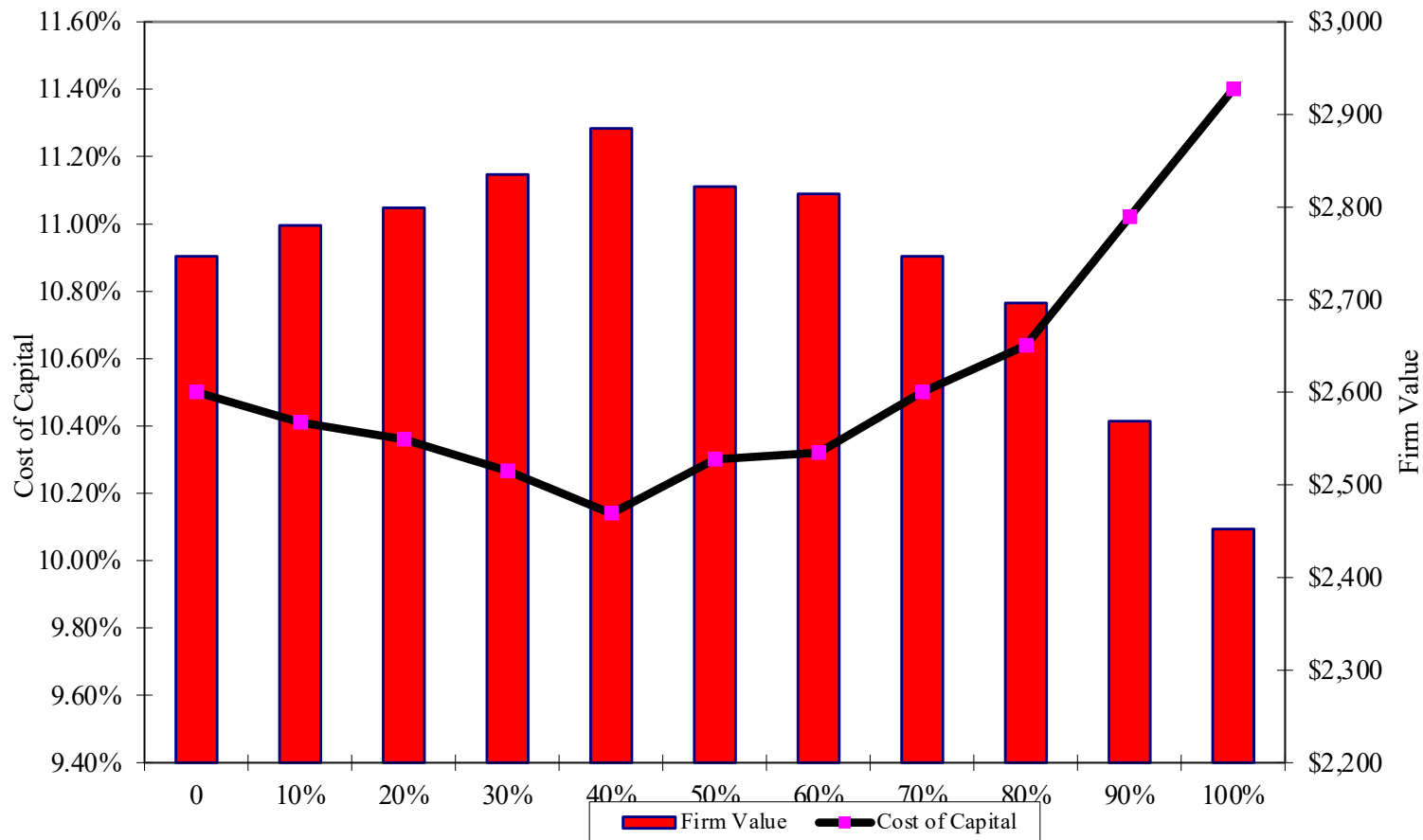
Assume the firm has \$200 million in cash flows, expected to grow 3% a year forever.

D/(D+E)	Cost of Equity	After-tax Cost of Debt	Cost of Capital	Firm Value
0	10.50%	4.80%	10.50%	\$2,747
10%	11.00%	5.10%	10.41%	\$2,780
20%	11.60%	5.40%	10.36%	\$2,799
30%	12.30%	5.52%	10.27%	\$2,835
40%	13.10%	5.70%	10.14%	\$2,885
50%	14.50%	6.10%	10.30%	\$2,822
60%	15.00%	7.20%	10.32%	\$2,814
70%	16.10%	8.10%	10.50%	\$2,747
80%	17.20%	9.00%	10.64%	\$2,696
90%	18.40%	10.20%	11.02%	\$2,569
100%	19.70%	11.40%	11.40%	\$2,452

$$\text{Value} = \frac{\text{Expected Cash flow to firm next year}}{(\text{Cost of capital} - g)} = \frac{200(1.03)}{(\text{Cost of capital} - g)}$$

THE U-SHAPED COST OF CAPITAL GRAPH...

Cost of Capital and Firm Value



CURRENT COST OF CAPITAL: DISNEY

- The **beta for Disney's stock in November 2013** was 1.0013. The T. bond rate at that time was 2.75%. Using an estimated equity risk premium of 5.76%, we estimated the cost of equity for Disney to be 8.52%:

$$\text{Cost of Equity} = 2.75\% + 1.0013(5.76\%) = 8.52\%$$

- Disney's **bond rating in May 2009** was **A**, and based on this rating, the estimated pretax cost of debt for Disney is 3.75%. Using a marginal tax rate of 36.1, the after-tax cost of debt for Disney is 2.40%.

$$\text{After-Tax Cost of Debt} = 3.75\% (1 - 0.361) = 2.40\%$$

- The cost of capital was calculated using these costs and the weights based on **market values of equity (121,878) and debt (15.961)**:

$$\text{Cost of capital} = 8.52\% \frac{121,878}{(15,961+121,878)} + 2.40\% \frac{15,961}{(15,961+121,878)} = 7.81\%$$

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.

LAYING THE GROUNDWORK:

1. ESTIMATE THE UNLEVERED BETA FOR THE FIRM

- **The Regression Beta:** One approach is to use the regression beta (1.25) and then unlever using the average debt to equity ratio (19.44%) during the period of the regression:
 - Unlevered beta = $1.25 / (1 + (1 - 0.361)(0.1944)) = 1.1119$
- **The Bottom-up Beta:** Alternatively, we can back to the source and estimate it from the betas of the businesses.

<i>Business</i>	<i>Revenues</i>	<i>EV/Sales</i>	<i>Value of Business</i>	<i>Proportion of Disney</i>	<i>Unlevered beta</i>	<i>Value</i>	<i>Proportion</i>
Media Networks	\$20,356	3.27	\$66,580	49.27%	1.03	\$66,579.81	49.27%
Parks & Resorts	\$14,087	3.24	\$45,683	33.81%	0.70	\$45,682.80	33.81%
Studio Entertainment	\$5,979	3.05	\$18,234	13.49%	1.10	\$18,234.27	13.49%
Consumer Products	\$3,555	0.83	\$2,952	2.18%	0.68	\$2,951.50	2.18%
Interactive	\$1,064	1.58	\$1,684	1.25%	1.22	\$1,683.72	1.25%
Disney Operations	\$45,041		\$135,132	100.00%	0.9239	\$135,132.11	100.00%

2. GET DISNEY'S CURRENT FINANCIALS...

	Most recent fiscal year (2012-13)	Prior year
Revenues	\$45,041	\$42,278
EBITDA	\$10,642	\$10,850
Depreciation & Amortization	\$2,192	\$1,987
EBIT	\$9,450	\$8,863
Interest Expenses	\$349	\$564
EBITDA (adjusted for leases)	\$12,517	\$11,168
Depreciation (adjusted for leases)	\$ 2,485	\$2,239
EBIT (adjusted for leases)	\$10,032	\$8,929
Interest Expenses (adjusted for leases)	\$459	\$630

STEP 1: COST OF EQUITY

Debt to Capital Ratio	D/E Ratio	Levered Beta	Cost of Equity
0%	0.00%	0.9239	8.07%
10%	11.11%	0.9895	8.45%
20%	25.00%	1.0715	8.92%
30%	42.86%	1.1770	9.53%
40%	66.67%	1.3175	10.34%
50%	100.00%	1.5143	11.48%
60%	150.00%	1.8095	13.18%
70%	233.33%	2.3016	16.01%
80%	400.00%	3.2856	21.68%
90%	900.00%	6.2376	38.69%

$$\text{Levered Beta} = 0.9239 (1 + (1 - .361) (D/E))$$

$$\text{Cost of equity} = 2.75\% + \text{Levered beta} * 5.76\%$$

STEP 2: ESTIMATING COST OF DEBT

- Start with the market value of the firm = $121,878 + \$15,961 = \$137,839$ million

D/(D+E)	0.00%	10.00%	Debt to capital
D/E	0.00%	11.11%	D/E = $10/90 = .1111$
\$ Debt	\$0	\$13,784	10% of \$137,839
EBITDA	\$12,517	\$12,517	Same as 0% debt
Depreciation	\$ 2,485	\$ 2,485	Same as 0% debt
EBIT	\$10,032	\$10,032	Same as 0% debt
Interest	\$0	\$434	Pre-tax cost of debt * \$ Debt
Pre-tax Int. cov	∞	23.10	EBIT/ Interest Expenses
Likely Rating	AAA	AAA	From Ratings table
Pre-tax cost of debt	3.15%	3.15%	Riskless Rate + Spread

THE RATINGS TABLE

<i>Interest coverage ratio is</i>	<i>Rating is</i>	<i>Spread is</i>	<i>Interest rate</i>
> 8.50	Aaa/AAA	0.40%	3.15%
6.5 – 8.5	Aa2/AA	0.70%	3.45%
5.5 – 6.5	A1/A+	0.85%	3.60%
4.25 – 5.5	A2/A	1.00%	3.75%
3 – 4.25	A3/A-	1.30%	4.05%
2.5 -3	Baa2/BBB	2.00%	4.75%
2.25 –2.5	Ba1/BB+	3.00%	5.75%
2 – 2.25	Ba2/BB	4.00%	6.75%
1.75 -2	B1/B+	5.50%	8.25%
1.5 – 1.75	B2/B	6.50%	9.25%
1.25 -1.5	B3/B-	7.25%	10.00%
0.8 -1.25	Caa/CCC	8.75%	11.50%
0.65 – 0.8	Ca2/CC	9.50%	12.25%
0.2 – 0.65	C2/C	10.50%	13.25%
<0.2	D2/D	12.00%	14.75%

T.Bond rate =2.75%

A TEST: CAN YOU DO THE 30% LEVEL?

		<i>Iteration 1 (Debt @AAA rate)</i>	<i>Iteration 2 (Debt @AA rate)</i>
$D/(D + E)$	20.00%	30.00%	30.00%
D/E	25.00%	$30/70=42.86\%$	
\$ Debt	\$27,568	\$41,352	
EBITDA	\$12,517	\$12,517	
Depreciation	\$2,485	\$2,485	
EBIT	\$10,032	\$10,032	
Interest expense	\$868	$41352 * .0315 = 1,302$	$41352 * .0345 = 1427$
Interest coverage ratio	11.55	$10032/1302=7.7$	$10032/1427=7.03$
Likely rating	AAA	AA	AA
Pretax cost of debt	3.15%	3.45%	3.45%

BOND RATINGS, COST OF DEBT AND DEBT RATIOS

Debt Ratio	\$ Debt	Interest Expense	Interest Coverage Ratio	Bond Rating	Pre-tax cost of debt	Tax rate	After-tax cost of debt
0%	\$0	\$0	∞	Aaa/AAA	3.15%	36.10%	2.01%
10%	\$13,784	\$434	23.10	Aaa/AAA	3.15%	36.10%	2.01%
20%	\$27,568	\$868	11.55	Aaa/AAA	3.15%	36.10%	2.01%
30%	\$41,352	\$1,427	7.03	Aa2/AA	3.45%	36.10%	2.20%
40%	\$55,136	\$2,068	4.85	A2/A	3.75%	36.10%	2.40%
50%	\$68,919	\$6,892	1.46	B3/B-	10.00%	36.10%	6.39%
60%	\$82,703	\$9,511	1.05	Caa/CCC	11.50%	36.10%	7.35%
70%	\$96,487	\$11,096	0.90	Caa/CCC	11.50%	32.64%	7.75%
80%	\$110,271	\$13,508	0.74	Ca2/CC	12.25%	26.81%	8.97%
90%	\$124,055	\$16,437	0.61	C2/C	13.25%	22.03%	10.33%

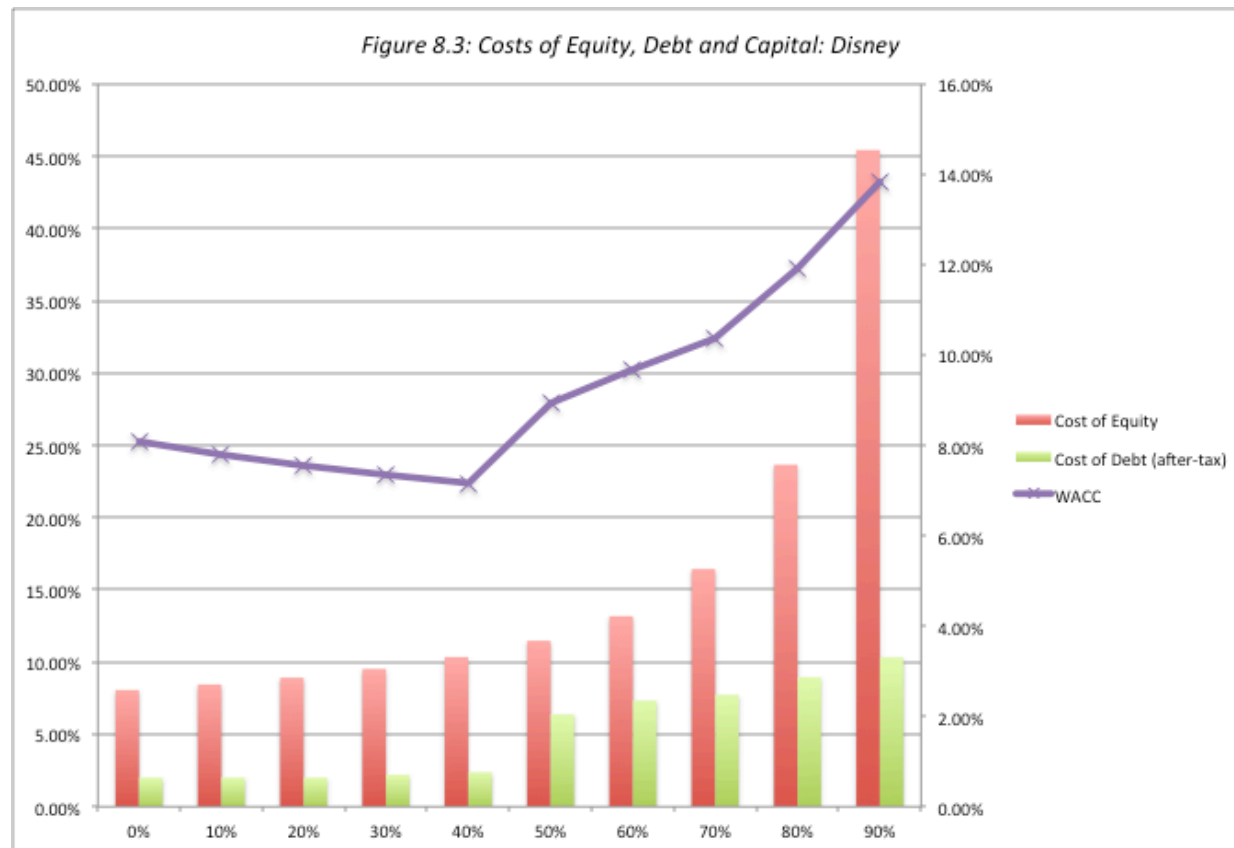
STATED VERSUS EFFECTIVE TAX RATES

- You need **taxable income for interest to provide a tax savings**. Note that the EBIT at Disney is \$10,032 million. As long as interest expenses are less than \$10,032 million, interest expenses remain fully tax-deductible and earn the 36.1% tax benefit. At an 60% debt ratio, the interest expenses are \$9,511 million and the tax benefit is therefore 36.1% of this amount.
- At a **70% debt ratio, however, the interest expenses balloon to \$11,096 million, which is greater than the EBIT of \$10,032 million**. We consider the tax benefit on the interest expenses up to this amount:
 - Maximum Tax Benefit = EBIT * Marginal Tax Rate = \$10,032 million * 0.361 = \$ 3,622 million
 - Adjusted Marginal Tax Rate = Maximum Tax Benefit/Interest Expenses = \$3,622/\$11,096 = 32.64%

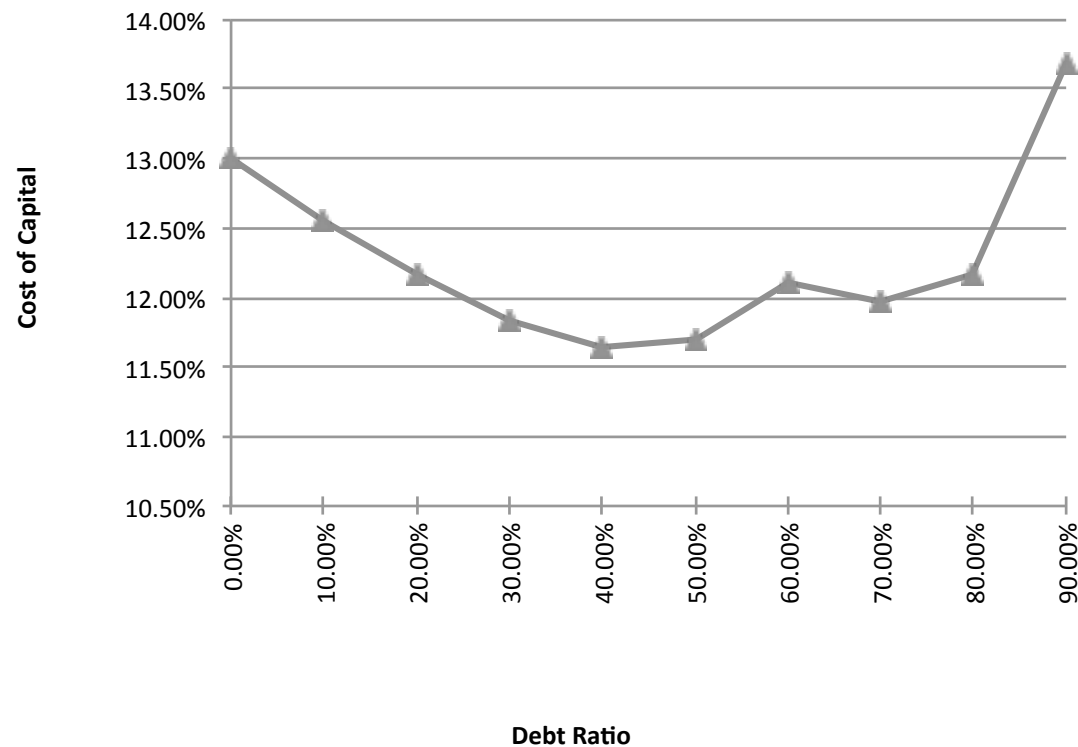
STEP 3: DISNEY'S COST OF CAPITAL SCHEDULE...

Debt Ratio	Beta	Cost of Equity	Cost of Debt (after-tax)	WACC
0%	0.9239	8.07%	2.01%	8.07%
10%	0.9895	8.45%	2.01%	7.81%
20%	1.0715	8.92%	2.01%	7.54%
30%	1.1770	9.53%	2.20%	7.33%
40%	1.3175	10.34%	2.40%	7.16%
50%	1.5143	11.48%	6.39%	8.93%
60%	1.8095	13.18%	7.35%	9.68%
70%	2.3762	16.44%	7.75%	10.35%
80%	3.6289	23.66%	8.97%	11.90%
90%	7.4074	45.43%	10.33%	13.84%

DISNEY: COST OF CAPITAL CHART



DISNEY: COST OF CAPITAL CHART: 1997



Note the kink in the cost of capital graph at 60% debt. What is causing it?

THE COST OF CAPITAL APPROACH SUGGESTS THAT DISNEY SHOULD DO THE FOLLOWING...

- Disney **currently has \$15.96 billion in debt**. The optimal dollar debt (at 40%) is **roughly \$55.1 billion**. Disney has excess debt capacity of 39.14 billion.
- To move to its optimal and gain the increase in value, Disney should borrow \$ 39.14 billion and buy back stock.
- Given the magnitude of this decision, you should expect to answer three questions:
 - a. Why should we do it?
 - b. What if something goes wrong?
 - c. What if we don't want (or cannot) buy back stock and want to make investments with the additional debt capacity?

WHY SHOULD WE DO IT?

EFFECT ON FIRM VALUE – FULL VALUATION

- **Step 1: Estimate the cash flows to Disney as a firm**

EBIT (1 – Tax Rate) =	10,032 (1 – 0.361) =	\$6,410
+ Depreciation and amortization =		\$2,485
– Capital expenditures =		\$5,239
– Change in noncash working capital		\$0
Free cash flow to the firm =		\$3,657

- **Step 2: Back out the implied growth rate in the current market value**

- Current enterprise value = \$121,878 + 15,961 - 3,931 = 133,908

- Value of firm = \$ 133,908 = $\frac{FCFF_0(1+g)}{(\text{Cost of Capital} - g)} = \frac{3,657(1+g)}{(.0781 - g)}$

- Growth rate = $(133,908 * 0.0781 - 3,657) / (133,908 + 3,657) = 0.0494$ or 4.94%

- **Step 3: Revalue the firm with the new cost of capital**

- Firm value = $\frac{FCFF_0(1+g)}{(\text{Cost of Capital} - g)} = \frac{3,657(1.0494)}{(.0716 - 0.0484)} = \$172,935$ million

- Increase in firm value = \$172,935 - \$133,908 = \$39,027 million

EFFECT ON VALUE: INCREMENTAL APPROACH

- In this approach, we start with the current market value and **isolate the effect of changing the capital structure** on the cash flow and the resulting value.
 - Enterprise Value before the change = \$133,908 million
 - Cost of financing Disney at existing debt ratio = \$ 133,908 * 0.0781 = \$10,458 million
 - Cost of financing Disney at optimal debt ratio = \$ 133,908 * 0.0716 = \$ 9,592 million
 - **Annual savings** in cost of financing = \$10,458 million – \$9,592 million = \$866 million

$$\text{Increase in Value} = \frac{\text{Annual Savings next year}}{(\text{Cost of Capital} - g)} = \frac{\$866}{(0.0716 - 0.0275)} = \$19,623 \text{ million}$$

Enterprise value after recapitalization = Existing enterprise value + PV of Savings = \$133,908 + \$19,623 = \$153,531 million

FROM FIRM VALUE TO VALUE PER SHARE: THE RATIONAL INVESTOR SOLUTION

- Because the increase in value accrues entirely to stockholders, we can estimate the increase in value per share by **dividing by the total number of shares outstanding (1,800 million)**.
 - Increase in Value per Share = $\$19,623/1800 = \10.90
 - New Stock Price = $\$67.71 + \$10.90 = \$78.61$
- Implicit in this computation is the **assumption that the increase in firm value will be spread evenly across both the stockholders who sell their stock back to the firm and those who do not** and that is why we term this the “**rational**” solution, since it leaves investors indifferent between selling back their shares and holding on to them.

THE MORE GENERAL SOLUTION, GIVEN A BUYBACK PRICE

- Start with the buyback price and compute the **number of shares outstanding after the buyback**:
 - Increase in Debt = Debt at optimal – Current Debt
 - # Shares after buyback = # Shares before – $\frac{\text{Increase in Debt}}{\text{Share Price}}$
- Then **compute the equity value after the recapitalization**, starting with the enterprise value at the optimal, adding back cash and subtracting out the debt at the optimal:
 - Equity value after buyback = Optimal Enterprise value + Cash – Debt
- Divide the equity value after the buyback by the **post-buyback number of shares**.
 - Value per share after buyback = Equity value after buyback / Number of shares after buyback

LET'S TRY A PRICE: WHAT IF WE CAN BUY SHARES BACK AT THE OLD PRICE (\$67.71)?

- Start with the buyback price and compute the number of shares outstanding after the buyback
 - Debt issued = \$ 55,136 - \$15,961 = \$39,175 million
 - # Shares after buyback = $1800 - \$39,175 / \$67.71 = 1221.43$ m
- Then compute the equity value after the recapitalization, starting with the enterprise value at the optimal, adding back cash and subtracting out the debt at the optimal:
 - Optimal Enterprise Value = \$153,531
 - Equity value after buyback = $\$153,531 + \$3,931 - \$55,136 = \$102,326$
- Divide the equity value after the buyback by the post-buyback number of shares.
 - Value per share after buyback = $\$102,326 / 1221.43 = \83.78

BACK TO THE RATIONAL PRICE (\$78.61): HERE IS THE PROOF

- Start with the buyback price and compute the number of shares outstanding after the buyback
 - # Shares after buyback = $1800 - \$39,175 / \$78.61 = 1301.65$ m
- Then compute the equity value after the recapitalization, starting with the enterprise value at the optimal, adding back cash and subtracting out the debt at the optimal:
 - Optimal Enterprise Value = \$153,531
 - Equity value after buyback = $\$153,531 + \$3,931 - \$55,136 = \$102,326$
- Divide the equity value after the buyback by the post-buyback number of shares.
 - Value per share after buyback = $\$102,326 / 1301.65 = \78.61

2. WHAT IF SOMETHING GOES WRONG? THE DOWNSIDE RISK

- Sensitivity to Assumptions

- A. “What if” analysis

- The optimal debt ratio is a function of our inputs on operating income, tax rates and macro variables. We could focus on one or two key variables – operating income is an obvious choice – and look at history for guidance on volatility in that number and **ask what if questions.**

- B. “Economic Scenario” Approach

- We can develop **possible scenarios**, based upon macro variables, and examine the optimal debt ratio under each one. For instance, we could look at the optimal debt ratio for a cyclical firm under a boom economy, a regular economy and an economy in recession.

- Constraint on Bond Ratings/ Book Debt Ratios

- Alternatively, we can put **constraints on the bond ratings** to reduce exposure to downside risk. Thus, we could require the firm to have a minimum rating, at the optimal debt ratio or to have a book debt ratio that is less than a “specified” value.

DISNEY'S OPERATING INCOME: HISTORY

Year	EBIT	% Change in EBIT	Year	EBIT	% Change in EBIT
1987	\$756		2001	\$2,832	12.16%
1988	\$848	12.17%	2002	\$2,384	-15.82%
1989	\$1,177	38.80%	2003	\$2,713	13.80%
1990	\$1,368	16.23%	2004	\$4,048	49.21%
1991	\$1,124	-17.84%	2005	\$4,107	1.46%
1992	\$1,287	14.50%	2006	\$5,355	30.39%
1993	\$1,560	21.21%	2007	\$6,829	27.53%
1994	\$1,804	15.64%	2008	\$7,404	8.42%
1995	\$2,262	25.39%	2009	\$5,697	-23.06%
1996	\$3,024	33.69%	2010	\$6,726	18.06%
1997	\$3,945	30.46%	2011	\$7,781	15.69%
1998	\$3,843	-2.59%	2012	\$8,863	13.91%
1999	\$3,580	-6.84%	2013	\$9,450	6.62%
2000	\$2,525	-29.47%			

Recession Δ Operating Income

2009 Drop of 23.06%

2002 Drop of 15.82%

1991 Drop of 22.00%

1981-82 Increased by 12%

Worst Year Drop of 29.47%

Standard deviation in %
change in EBIT = 19.17%

DISNEY: SAFETY BUFFERS?

EBIT drops by	EBIT	Optimal Debt ratio
0%	\$10,032	40%
10%	\$9,029	40%
20%	\$8,025	40%
30%	\$7,022	40%
40%	\$6,019	30%
50%	\$5,016	30%
60%	\$4,013	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.**
 - The cost of a rating constraint is the difference between the unconstrained value and the value of the firm with the constraint.
 - Managers need to be made aware of the costs of the constraints they impose.

RATINGS CONSTRAINTS FOR DISNEY

- At its optimal debt ratio of 40%, Disney has an **estimated rating of A**.
- If managers **insisted on a AA rating**, the optimal debt ratio for Disney is then 30% and the cost of the ratings constraint is fairly small:
 - Cost of AA Rating Constraint = Value at 40% Debt – Value at 30% Debt = \$153,531 m – \$147,835 m = \$ 5,696 million
- If managers **insisted on a AAA rating**, the optimal debt ratio would drop to 20% and the cost of the ratings constraint would rise:
 - Cost of AAA rating constraint = Value at 40% Debt – Value at 20% Debt = \$153,531 m – \$141,406 m = \$ 12,125 million

3. WHAT IF YOU DO NOT BUY BACK STOCK..

- The optimal debt ratio is ultimately a function of the underlying riskiness of the business in which you operate and your tax rate.
- Will the optimal be different if you invested in projects instead of buying back stock?
 - a. **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.
 - b. **Yes,** if the projects are in **entirely different types of businesses** or if the tax rate is significantly different.

EXTENSION TO A FAMILY GROUP COMPANY: TATA MOTOR'S OPTIMAL CAPITAL STRUCTURE

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	0.8601	12.76%	Aaa/AAA	9.22%	32.45%	6.23%	12.76%	1,286,997₹
10%	0.9247	13.22%	Aa2/AA	9.52%	32.45%	6.43%	12.54%	1,333,263₹
20%	1.0054	13.80%	A3/A-	10.12%	32.45%	6.84%	12.41%	1,363,774₹
30%	1.1092	14.55%	B2/B	15.32%	32.45%	10.35%	13.29%	1,185,172₹
40%	1.2475	15.54%	Caa/CCC	17.57%	32.45%	11.87%	14.07%	1,061,143₹
50%	1.4412	16.93%	Ca2/CC	18.32%	32.45%	12.38%	14.65%	984,693₹
60%	1.7610	19.23%	Ca2/CC	18.32%	30.18%	12.79%	15.37%	904,764₹
70%	2.3749	23.65%	C2/C	19.32%	24.53%	14.58%	17.30%	741,800₹
80%	3.5624	32.19%	C2/C	19.32%	21.46%	15.17%	18.58%	663,028₹
90%	7.1247	57.81%	C2/C	19.32%	19.08%	15.63%	19.85%	599,379₹

Tata Motors looks like it is over levered (29% actual versus 20% optimal), perhaps because it is drawing on the debt capacity of other companies in the Tata Group.

EXTENSION TO A FIRM WITH VOLATILE EARNINGS: VALE'S OPTIMAL DEBT RATIO

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	0.8440	8.97%	Aaa/AAA	5.15%	34.00%	3.40%	8.97%	\$98,306
10%	0.9059	9.43%	Aaa/AAA	5.15%	34.00%	3.40%	8.83%	\$100,680
20%	0.9833	10.00%	Aaa/AAA	5.15%	34.00%	3.40%	8.68%	\$103,171
30%	1.0827	10.74%	A1/A+	5.60%	34.00%	3.70%	8.62%	\$104,183
40%	1.2154	11.71%	A3/A-	6.05%	34.00%	3.99%	8.63%	\$104,152
50%	1.4011	13.08%	B1/B+	10.25%	34.00%	6.77%	9.92%	\$85,298
60%	1.6796	15.14%	B3/B-	12.00%	34.00%	7.92%	10.81%	\$75,951
70%	2.1438	18.56%	B3/B-	12.00%	34.00%	7.92%	11.11%	\$73,178
80%	3.0722	25.41%	Ca2/CC	14.25%	34.00%	9.41%	12.61%	\$62,090
90%	5.8574	45.95%	Ca2/CC	14.25%	34.00%	9.41%	13.06%	\$59,356

	Last 12 months	-1	-2	-3	Average
Revenues	\$48,469	\$48,058	\$61,123	\$47,343	\$51,248
EBITDA	\$19,861	\$17,662	\$34,183	\$26,299	\$24,501
EBIT	\$15,487	\$13,346	\$30,206	\$23,033	\$20,518
Pre-tax operating margin	31.95%	27.77%	49.42%	48.65%	39.45%

Replacing Vale's current operating income with the average over the last three years pushes up the optimal to 50%.

OPTIMAL DEBT RATIO FOR A YOUNG, GROWTH FIRM: BAIDU

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	1.3021	12.54%	Aaa/AAA	4.70%	25.00%	3.53%	12.54%	\$337,694
10%	1.4106	13.29%	A3/A-	5.60%	25.00%	4.20%	12.38%	\$343,623
20%	1.5463	14.23%	Ca2/CC	13.80%	25.00%	10.35%	13.45%	\$306,548
30%	1.7632	15.74%	Caa/CCC	14.80%	17.38%	12.23%	14.68%	\$272,853
40%	2.0675	17.85%	D2/D	16.30%	11.83%	14.37%	16.46%	\$235,510
50%	2.4810	20.72%	D2/D	16.30%	9.47%	14.76%	17.74%	\$214,337
60%	3.1012	25.02%	D2/D	16.30%	7.89%	15.01%	19.02%	\$196,657
70%	4.1350	32.20%	D2/D	16.30%	6.76%	15.20%	20.30%	\$181,672
80%	6.2024	46.54%	D2/D	16.30%	5.92%	15.34%	21.58%	\$168,808
90%	12.4049	89.59%	D2/D	16.30%	5.26%	15.44%	22.86%	\$157,646

The optimal debt ratio for Baidu is between 0 and 10%, close to its current debt ratio of 5.23%, and much lower than the optimal debt ratios computed for Disney, Vale and Tata Motors.

EXTENSION TO A PRIVATE BUSINESS

OPTIMAL DEBT RATIO FOR BOOKSCAPE

Debt value of leases = \$12,136 million (only debt)

Estimated market value of equity = Net Income * Average PE for Publicly Traded Book Retailers = 1.575 * 20 = \$31.5 million

Debt ratio = $12,136 / (12,136 + 31,500) = 27.81\%$

Debt Ratio	Total Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	1.3632	10.25%	Aaa/AAA	3.15%	40.00%	1.89%	10.25%	\$37,387
10%	1.4540	10.75%	Aaa/AAA	3.15%	40.00%	1.89%	9.86%	\$39,416
20%	1.5676	11.37%	A1/A+	3.60%	40.00%	2.16%	9.53%	\$41,345
30%	1.7137	12.18%	A3/A-	4.05%	40.00%	2.43%	9.25%	\$43,112
40%	1.9084	13.25%	Caa/CCC	11.50%	40.00%	6.90%	10.71%	\$35,224
50%	2.2089	14.90%	Ca2/CC	12.25%	37.96%	7.60%	11.25%	\$32,979
60%	2.8099	18.20%	C2/C	13.25%	29.25%	9.37%	12.91%	\$27,598
70%	3.7466	23.36%	C2/C	13.25%	25.07%	9.93%	13.96%	\$25,012
80%	5.6198	33.66%	C2/C	13.25%	21.93%	10.34%	15.01%	\$22,869
90%	11.4829	65.91%	D2/D	14.75%	17.51%	12.17%	17.54%	\$18,952

The firm value is maximized (and the cost of capital is minimized) at a debt ratio of 30%. At its existing debt ratio of 27.81%, Bookscape is at its optimal.

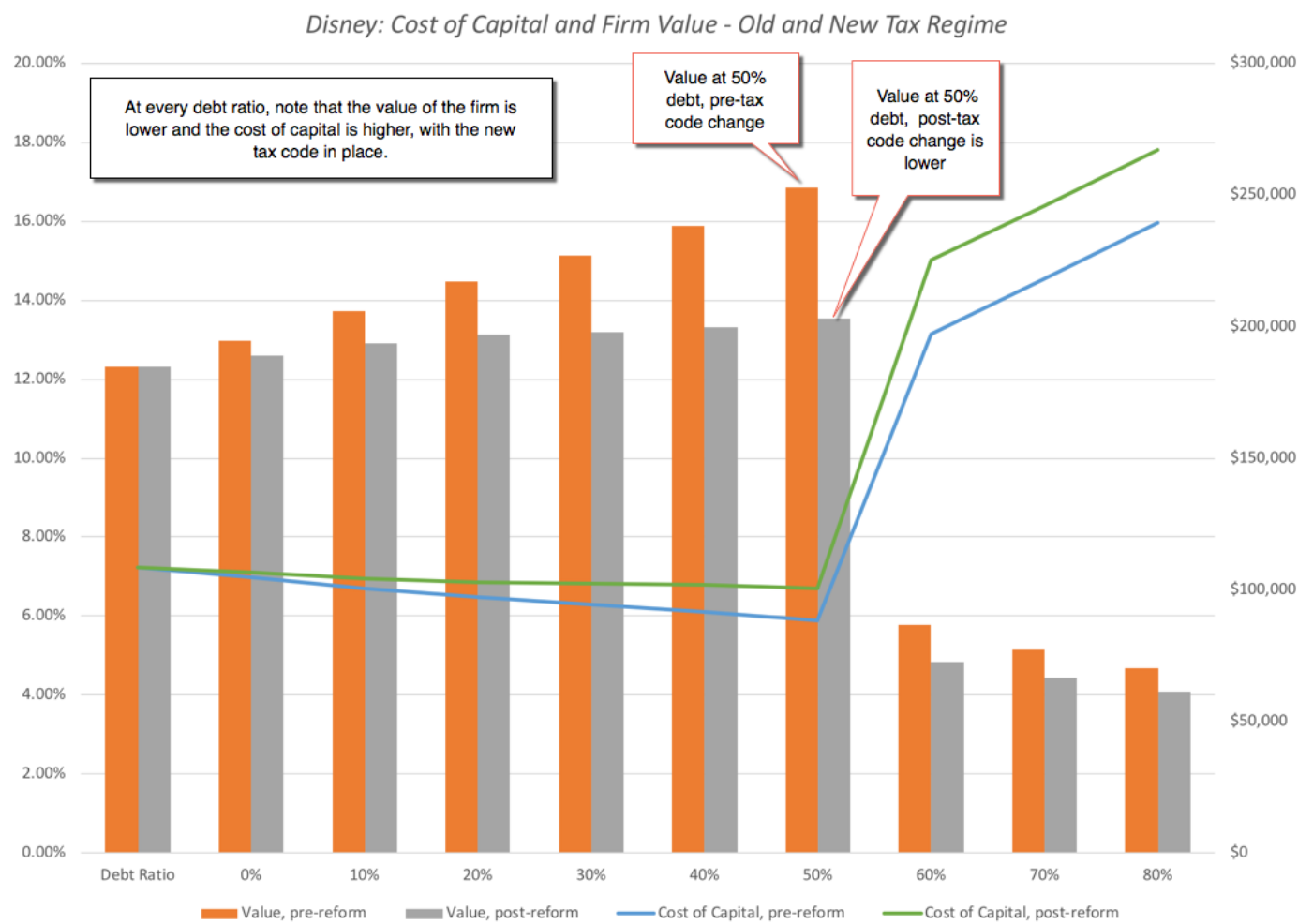
THE US TAX REFORM ACT OF 2017: EFFECTS ON THE OPTIMAL DEBT RATIO

- **Change in marginal tax rate:** The marginal federal tax rate for US companies on US income has been lowered from 35% to 21%. Holding all else constant, that will lower the optimal debt ratio for all firms.
- **Limits on interest tax deduction:** Companies can deduct interest expenses only up to 30% of EBITDA (until 2022) and 30% of EBIT (after 2022). That will add a constraint to the tax savings from debt. In the cost of capital calculation, it will show up in the tax rate that you use to compute your after-tax cost of debt, lowering the tax rate from the marginal if interest expenses > 30% of EBITDA:

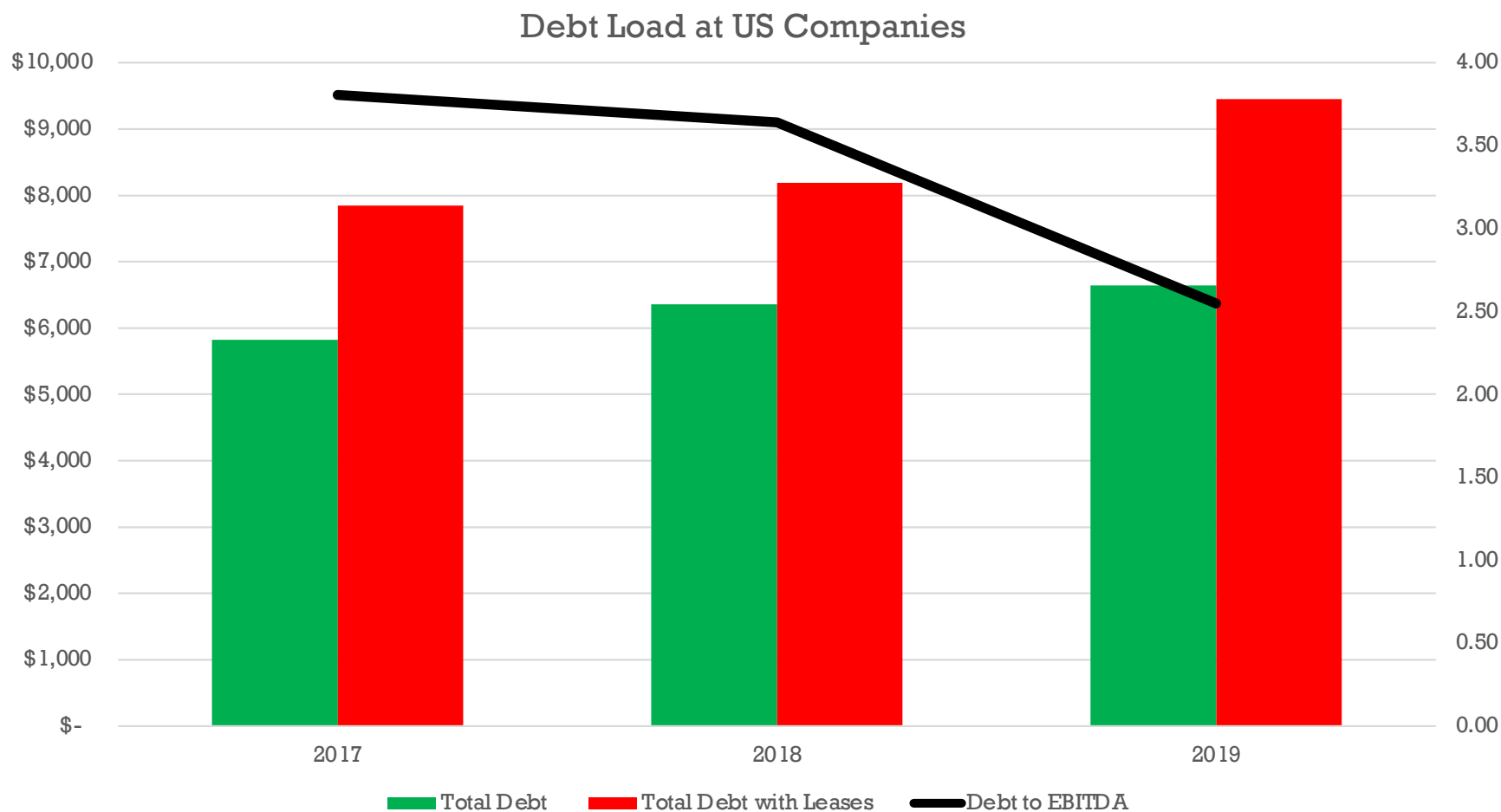
Tax rate if Interest Expense > 30% of EBITDA

= Marginal Tax rate * (.30*EBITDA) / Interest Expense

EFFECT ON TAX CODE ON DEBT IMPACT: DISNEY IN 2018



ARE US COMPANIES ADJUSTING TO THE NEW TAX CODE?



LIMITATIONS OF THE COST OF CAPITAL APPROACH

- 1. It is static:** The most critical number in the entire analysis is the operating income. If that changes, the optimal debt ratio will change.
- 2. It ignores indirect bankruptcy costs:** The operating income is assumed to stay fixed as the debt ratio and the rating changes.
- 3. It makes rigid assumptions relating beta to ratings:** It is based upon rigid assumptions of how market risk and default risk get borne as the firm borrows more money and the resulting costs.

II. ENHANCED COST OF CAPITAL APPROACH

- **Distress cost affected operating income:** In the enhanced cost of capital approach, the indirect costs of bankruptcy are built into the expected operating income.
 - As the rating of the firm declines, the **operating income is adjusted** to reflect the loss in operating income that will occur when customers, suppliers and investors react.
 - The extent of the adjustment is what you need to estimate, perhaps by **looking at other down graded firms**, and the effects of the down grading on earnings.
- **Dynamic analysis:** Rather than look at a single number for operating income, you can draw from a distribution of operating income (thus allowing for different outcomes).

ESTIMATING THE DISTRESS EFFECT- DISNEY

<i>Rating</i>	<i>Drop in EBITDA (Low)</i>	<i>Drop in EBITDA (Medium)</i>	<i>Drop in EBITDA (High)</i>
To A	No effect	No effect	2.00%
To A-	No effect	2.00%	5.00%
To BBB	5.00%	10.00%	15.00%
To BB+	10.00%	20.00%	25.00%
To B-	15.00%	25.00%	30.00%
To C	25.00%	40.00%	50.00%
To D	30.00%	50.00%	100.00%

THE OPTIMAL DEBT RATIO WITH INDIRECT BANKRUPTCY COSTS

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Enterprise Value
0%	0.9239	8.07%	Aaa/AAA	3.15%	36.10%	2.01%	8.07%	\$122,633
10%	0.9895	8.45%	Aaa/AAA	3.15%	36.10%	2.01%	7.81%	\$134,020
20%	1.0715	8.92%	Aaa/AAA	3.15%	36.10%	2.01%	7.54%	\$147,739
30%	1.1769	9.53%	Aa2/AA	3.45%	36.10%	2.20%	7.33%	\$160,625
40%	1.3175	10.34%	A2/A	3.75%	36.10%	2.40%	7.16%	\$172,933
50%	1.5573	11.72%	C2/C	11.50%	31.44%	7.88%	9.80%	\$35,782
60%	1.9946	14.24%	Caa/CCC	13.25%	22.74%	10.24%	11.84%	\$25,219
70%	2.6594	18.07%	Caa/CCC	13.25%	19.49%	10.67%	12.89%	\$21,886
80%	3.9892	25.73%	Caa/CCC	13.25%	17.05%	10.99%	13.94%	\$19,331
90%	7.9783	48.72%	Caa/CCC	13.25%	15.16%	11.24%	14.99%	\$17,311

The optimal debt ratio stays at 40% but the cliff becomes much steeper.

EXTENDING THIS APPROACH TO ANALYZING FINANCIAL SERVICE FIRMS

- **Interest coverage ratio spreads**, which are critical in determining the bond ratings, **have to be estimated separately for financial service firms**; applying manufacturing company spreads will result in absurdly low ratings for even the safest banks and very low optimal debt ratios.
- It is **difficult to estimate the debt on a financial service company's balance sheet**. Given the mix of deposits, repurchase agreements, short-term financing, and other liabilities that may appear on a financial service firm's balance sheet, one solution is to focus only on long-term debt, defined tightly, and to use interest coverage ratios defined using only long-term interest expenses.
- Financial service firms **are regulated** and have to meet capital ratios that are defined in terms of book value. If, in the process of moving to an optimal market value debt ratio, these firms violate the book capital ratios, they could put themselves in jeopardy.

CAPITAL STRUCTURE FOR A BANK: A REGULATORY CAPITAL APPROACH

- Consider a bank with \$ 100 million in loans outstanding and a book value of equity of \$ 6 million. Furthermore, assume that the regulatory requirement is that equity capital be maintained at 5% of loans outstanding. Finally, assume that this bank wants to increase its loan base by \$ 50 million to \$ 150 million and to **augment its equity capital ratio to 7% of loans** outstanding.
 - Loans outstanding after Expansion = \$ 150 million
 - Equity after expansion = 7% of \$150 = \$10.5 million
 - Existing Equity = \$ 6.0 million
 - New Equity needed = \$ 4.5 million
- Your need for “external” equity as a bank/financial service company will depend upon
 - **Growth rate:** Higher growth -> More external equity
 - **Capitalization:** Under capitalized -> More external equity
 - **Earnings level:** Less earnings -> More external equity
 - **Current dividends:** More dividends -> More external equity

DEUTSCHE BANK'S FINANCIAL MIX

	Current	1	2	3	4	5
Asset Base	439,851 €	453,047 €	466,638 €	480,637 €	495,056 €	509,908 €
Capital ratio	15.13%	15.71%	16.28%	16.85%	17.43%	18.00%
Tier 1 Capital	66,561 €	71,156 €	75,967 €	81,002 €	86,271 €	91,783 €
Change in regulatory capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €
Book Equity	76,829 €	81,424 €	86,235 €	91,270 €	96,539 €	102,051 €
ROE	-1.08%	0.74%	2.55%	4.37%	6.18%	8.00%
Net Income	-716 €	602 €	2,203 €	3,988 €	5,971 €	8,164 €
- Investment in Regulatory Capital		4,595 €	4,811 €	5,035 €	5,269 €	5,512 €
FCFE		-3,993 €	-2,608 €	-1,047 €	702 €	2,652 €

The cumulative FCFE over the next 5 years is -4,294 million Euros.
Clearly, it does not make the sense to pay dividends or buy back stock.

FINANCING STRATEGIES FOR A FINANCIAL INSTITUTION

- 1. The Self-regulatory strategy:** The objective for a bank raising equity is not to meet regulatory capital ratios but to ensure that losses from the business can be covered by the existing equity. In effect, financial service firms can assess how much equity they need to hold by evaluating the riskiness of their businesses and the potential for losses.
- 2. The Regulatory minimum strategy:** In this strategy, financial service firms try to stay with the bare minimum equity capital, as required by the regulatory ratios. In the most aggressive versions of this strategy, firms exploit loopholes in the regulatory framework to invest in those businesses where regulatory capital ratios are set too low (relative to the risk of these businesses).
- 3. Combination strategy:** In this strategy, the regulatory capital ratios operate as a floor for established businesses, with the firm adding buffers for safety where needed..

DETERMINANTS OF THE OPTIMAL DEBT RATIO:

1. THE MARGINAL TAX RATE

- The **primary benefit of debt is a tax benefit**. The higher the marginal tax rate, the greater the benefit to borrowing.
- To illustrate, here are the optimal debt ratios for the five firms that we analyzed, **allowing for different marginal tax rates**.

Tax Rate	Disney	Vale	Tata Motors	Baidu	Bookscape
0%	0%	0%	0%	0%	0%
10%	20%	0%	0%	0%	10%
20%	40%	0%	10%	10%	30%
30%	40%	30%	20%	10%	30%
40%	40%	40%	20%	10%	30%
50%	40%	40%	20%	10%	30%

2. PRE-TAX CASH FLOW RETURN

<i>Company</i>	<i>EBITDA</i>	<i>EBIT</i>	<i>Enterprise Value</i>	<i>EBITDA/EV</i>	<i>EBIT/EV</i>	<i>Optimal Debt</i>	<i>Optimal Debt Ratio</i>
Disney	\$12,517	\$10,032	\$133,908	9.35%	7.49%	\$55,136	40.00%
Vale	\$20,167	\$15,667	\$112,352	17.95%	13.94%	\$35,845	30.00%
Tata Motors	250,116₹	166,605₹	1,427,478₹	17.52%	11.67%	325,986₹	20.00%
Baidu	¥13,073	¥10,887	¥342,269	3.82%	3.18%	¥35,280	10.00%
Bookscape	\$4,150	\$2,536	\$42,636	9.73%	5.95%	\$13,091	30.00%

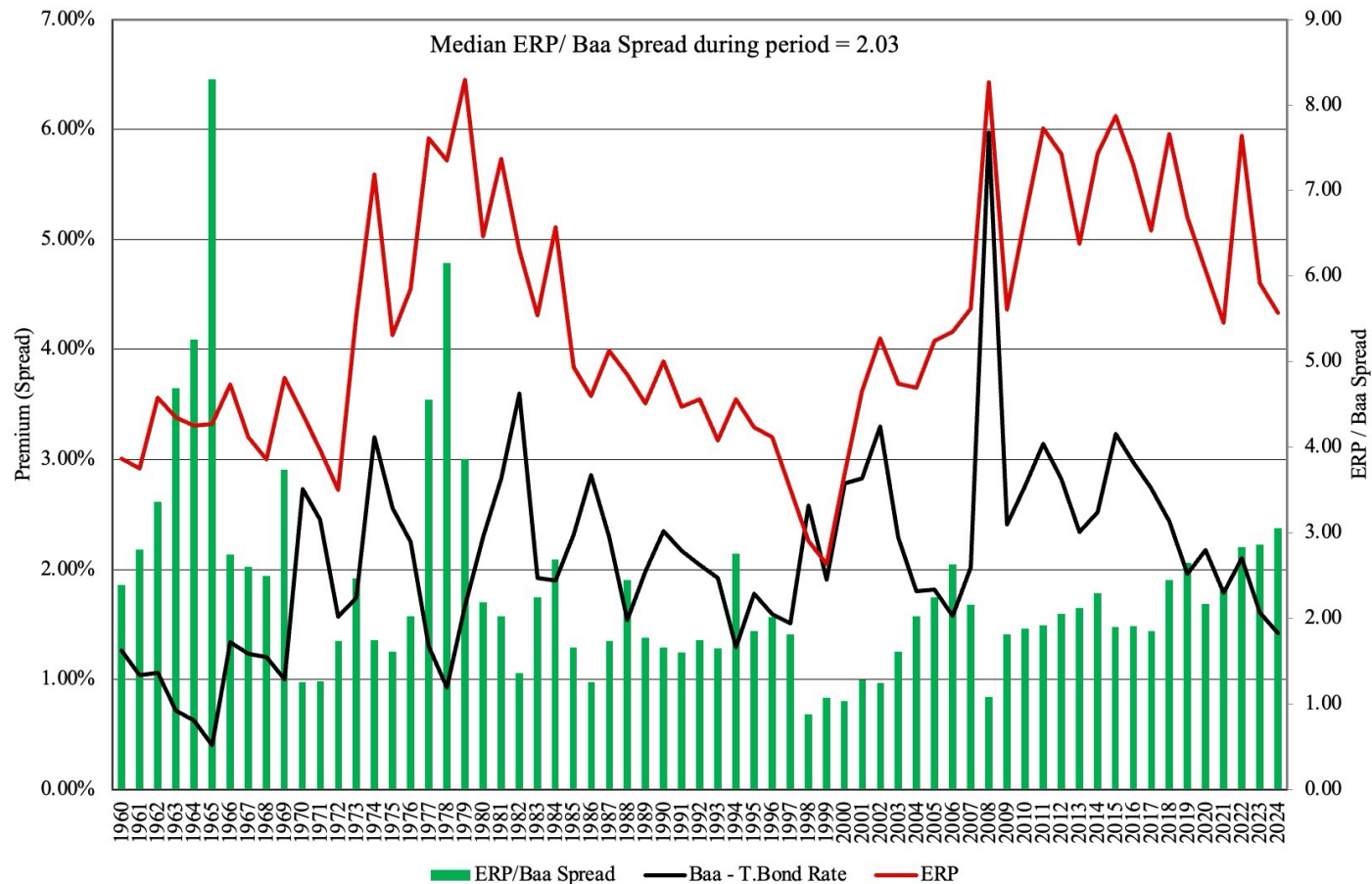
Higher cash flows, as a percent of value, give you a higher debt capacity, though less so in emerging markets with substantial country risk.

3. OPERATING RISK

- Firms that **face more risk or uncertainty** in their operations (and more variable operating income as a consequence) will have lower optimal debt ratios than firms that have more predictable operations.
- Operating risk enters the cost of capital approach in two places:
 - **Unlevered beta:** Firms that face more operating risk will tend to have higher unlevered betas. As they borrow, debt will magnify this already large risk and push up costs of equity much more steeply.
 - **Bond ratings:** For any given level of operating income, firms that face more risk in operations will have lower ratings. The ratings are based upon normalized income.

4. THE ONLY MACRO DETERMINANT: EQUITY VS DEBT RISK PREMIUMS

Equity Risk Premiums and Bond Default Spreads



6 APPLICATION TEST: YOUR FIRM'S OPTIMAL FINANCING MIX

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

III. THE APV APPROACH TO OPTIMAL CAPITAL STRUCTURE

- In the **adjusted present value approach**, the value of the firm is written as the sum of the value of the firm without debt (the unlevered firm) and the effect of debt on firm value.
- The effect of debt on value is captured in two variables – the benefits as the **present value of tax benefits** from debt and the costs as the **expected bankruptcy costs**.
 - 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, you can **back out the unlevered firm value from the enterprise value** of the firm:

Unlevered Firm Value = Current Enterprise Value - 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

Rating	Likelihood of Default
AAA	0.07%
AA	0.51%
A+	0.60%
A	0.66%
A-	2.50%
BBB	7.54%
BB	16.63%
B+	25.00%
B	36.80%
B-	45.00%
CCC	59.01%
CC	70.00%
C	85.00%
D	100.00%

Altman estimated these probabilities by looking at bonds in each ratings class ten years prior and then examining the proportion of these bonds that defaulted over the ten years.

DISNEY: ESTIMATING UNLEVERED FIRM VALUE

- Back out the **unlevered value of the firm**

$$\text{Current Enterprise Value} = \$121,878 + \$15,961 = \$137,839$$

$$- \text{Tax Benefit on Current Debt} = \$15,961 * 0.361 = \$5,762$$

$$+ \text{Expected Bankruptcy Cost} = 0.66\% * (0.25 * 137,839) = \$227$$

$$\text{Unlevered Value of Firm} = \$132,304$$

- I will assume the following parameters for Disney:
 - Cost of Bankruptcy for Disney = 25% of firm value
 - Probability of Bankruptcy = 0.66%, based on firm's current rating of A
 - Tax Rate = 36.1%

DISNEY: APV AT DEBT RATIOS

<i>Debt Ratio</i>	<i>\$ Debt</i>	<i>Tax Rate</i>	<i>Unlevered Firm Value</i>	<i>Tax Benefits</i>	<i>Bond Rating</i>	<i>Probability of Default</i>	<i>Expected Bankruptcy Cost</i>	<i>Value of Levered Firm</i>
0%	\$0	36.10%	\$132,304	\$0	AAA	0.07%	\$23	\$132,281
10%	\$13,784	36.10%	\$132,304	\$4,976	Aaa/AAA	0.07%	\$24	\$137,256
20%	\$27,568	36.10%	\$132,304	\$9,952	Aaa/AAA	0.07%	\$25	\$142,231
30%	\$41,352	36.10%	\$132,304	\$14,928	Aa2/AA	0.51%	\$188	\$147,045
40%	\$55,136	36.10%	\$132,304	\$19,904	A2/A	0.66%	\$251	\$151,957
50%	\$68,919	36.10%	\$132,304	\$24,880	B3/B-	45.00%	\$17,683	\$139,501
60%	\$82,703	36.10%	\$132,304	\$29,856	C2/C	59.01%	\$23,923	\$138,238
70%	\$96,487	32.64%	\$132,304	\$31,491	C2/C	59.01%	\$24,164	\$139,631
80%	\$110,271	26.81%	\$132,304	\$29,563	Ca2/CC	70.00%	\$28,327	\$133,540
90%	\$124,055	22.03%	\$132,304	\$27,332	Caa/CCC	85.00%	\$33,923	\$125,713

The optimal debt ratio is 40%, which is the point at which firm value is maximized.

IV. RELATIVE ANALYSIS

- The “**safest**” place for any firm to be is close to the industry **average**. Me-tooism is a survival mechanism, and pushes managers towards peer group behavior.
- 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

<i>Company</i>	<i>Debt to Capital Ratio</i>		<i>Net Debt to Capital Ratio</i>		<i>Comparable group</i>	<i>Debt to Capital Ratio</i>		<i>Net Debt to Capital Ratio</i>	
	<i>Book value</i>	<i>Market value</i>	<i>Book value</i>	<i>Market value</i>		<i>Book value</i>	<i>Market value</i>	<i>Book value</i>	<i>Market value</i>
Disney	22.88%	11.58%	17.70%	8.98%	US Entertainment	39.03%	15.44%	24.92%	9.93%
Vale	39.02%	35.48%	34.90%	31.38%	Global Diversified Mining & Iron Ore (Market cap > \$1 b)	34.43%	26.03%	26.01%	17.90%
Tata Motors	58.51%	29.28%	22.44%	19.25%	Global Autos (Market Cap > \$1 b)	35.96%	18.72%	3.53%	0.17%
Baidu	32.93%	5.23%	20.12%	2.32%	Global Online Advertising	6.37%	1.83%	-27.13%	-2.76%

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)Check this regression for statistical significance (t statistics) and predictive ability (R squared)
- **Step 2:** Estimate the **values of 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: GLOBAL AUTO FIRMS

- Using a sample of 56 global auto firms, we arrived at the following regression:
 - Debt to capital = $0.09 + 0.63 (\text{Effective Tax Rate}) + 1.01 (\text{EBITDA/Enterprise Value}) - 0.93 (\text{Cap Ex/Enterprise Value})$
 - The R squared of the regression is 21%. This regression can be used to arrive at a predicted value for Tata Motors of:
- Predicted Debt Ratio = $0.09 + 0.63 (0.252) + 1.01 (0.1167) - 0.93 (0.1949) = .1854$ or 18.54%
- Based upon the capital structure of other firms in the automobile industry, Tata Motors should have a market value debt ratio of 18.54%. **It is over levered at its existing debt ratio of 29.28%.**

EXTENDING TO THE ENTIRE MARKET

- Using 2014 data for US listed firms, we looked at the determinants of the market debt to capital ratio. The regression provides the following results –

$$\text{DFR} = 0.27 - 0.24 \text{ ETR} - 0.10 \text{ g} - 0.065 \text{ INST} - 0.338 \text{ CVOI} + 0.59 \text{ E/V}$$

(15.79) (9.00) (2.71) (3.55) (3.10) (6.85)

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

ETR = Effective tax rate in most recent twelve months

INST = % of Shares held by institutions

CVOI = Std dev in OI in last 10 years / Average OI in last 10 years

E/V = EBITDA / (Market Value of Equity + Debt - Cash)

The regression has an R-squared of 8%.

APPLYING THE REGRESSION

- Disney had the following values for these inputs in 2014. Estimate the optimal debt ratio using the debt regression.

▪ Effective Tax Rate (ETR)	= 31.02%
▪ Expected Revenue Growth	= 6.45%
▪ Institutional Holding % (INST)	= 70.2%
▪ Coefficient of Variation in OI (CVOI)	= 0.0296
▪ EBITDA/Value of firm (E/V)	= 9.35%

Optimal Debt Ratio

$$= 0.27 - 0.24 (.3102) - 0.10 (.0645) - 0.065 (.702) - 0.338 (.0296) + 0.59 (.0935)$$

$$= \mathbf{0.1886 \text{ or } 18.86\%}$$

- a. What does this optimal debt ratio tell you?
- b. Why might it be different from the optimal calculated using the weighted average cost of capital?

SUMMARIZING THE OPTIMAL DEBT RATIOS...

	<i>Disney</i>	<i>Vale</i>	<i>Tata Motors</i>	<i>Baidu</i>
<i>Actual Debt Ratio</i>	11.58%	35.48%	29.28%	5.23%
<i>Optimal</i>				
I. Operating income	35.00%	—	-	
II. Standard Cost of capital	40.00%	30.00% (actual) 50.00% (normalized)	20.00%	10.00%
III. Enhanced Cost of Capital	40.00%	30.00% (actual) 40.00% (normalized)	10.00%	10.00%
IV. APV	40.00%	30.00%	20.00%	20.00%
V. Comparable				
To industry	28.54%	26.03%	18.72%	1.83%
To market	18.86%	—	-	