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.
- 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

Rating	*Drop in EBITDA (Low)*	*Drop in EBITDA (Medium)*	*Drop in EBITDA (High)*
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
  a. Your growth rate: Higher growth -> More external equity
  b. Existing capitalization vs Target capitalization: Under capitalized -> More external equity
  c. Current earnings: Less earnings -> More external equity
  d. 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

- 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).
- 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.
- 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:

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

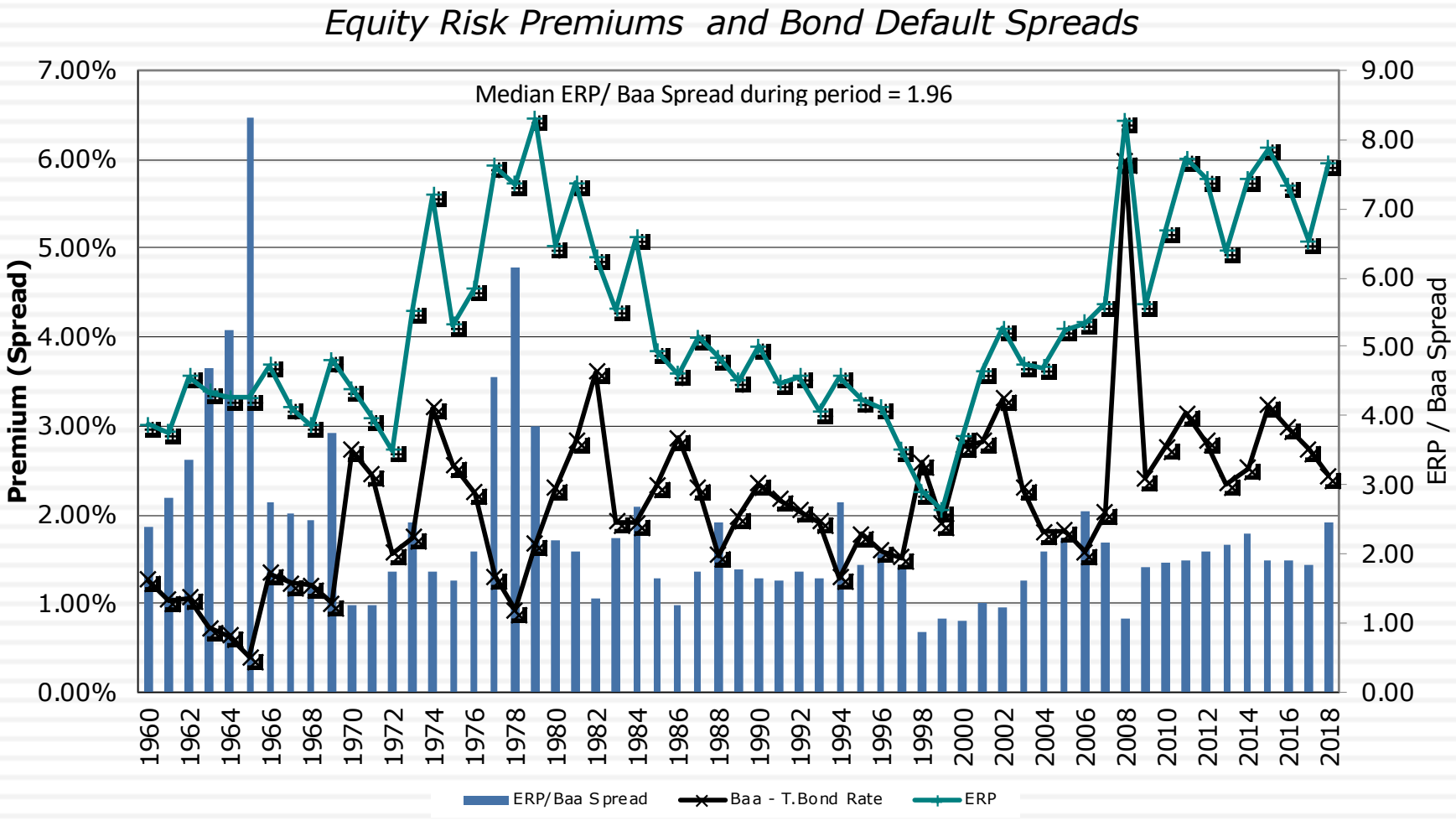
Company	*EBITDA*	*EBIT*	*Enterprise Value*	*EBITDA/EV*	*EBIT/EV*	*Optimal Debt*	*Optimal Debt Ratio*
Disney	$12,517	$10,032	$133,908	9.35%	7.49%	$55,136	40.00%
Vale	$20,167	$15,667	$112,352	17.95%	13.94%	$35,845	30.00%
Tata Motors	250,116₹	166,605₹	1,427,478₹	17.52%	11.67%	325,986₹	20.00%
Baidu	¥13,073	¥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.

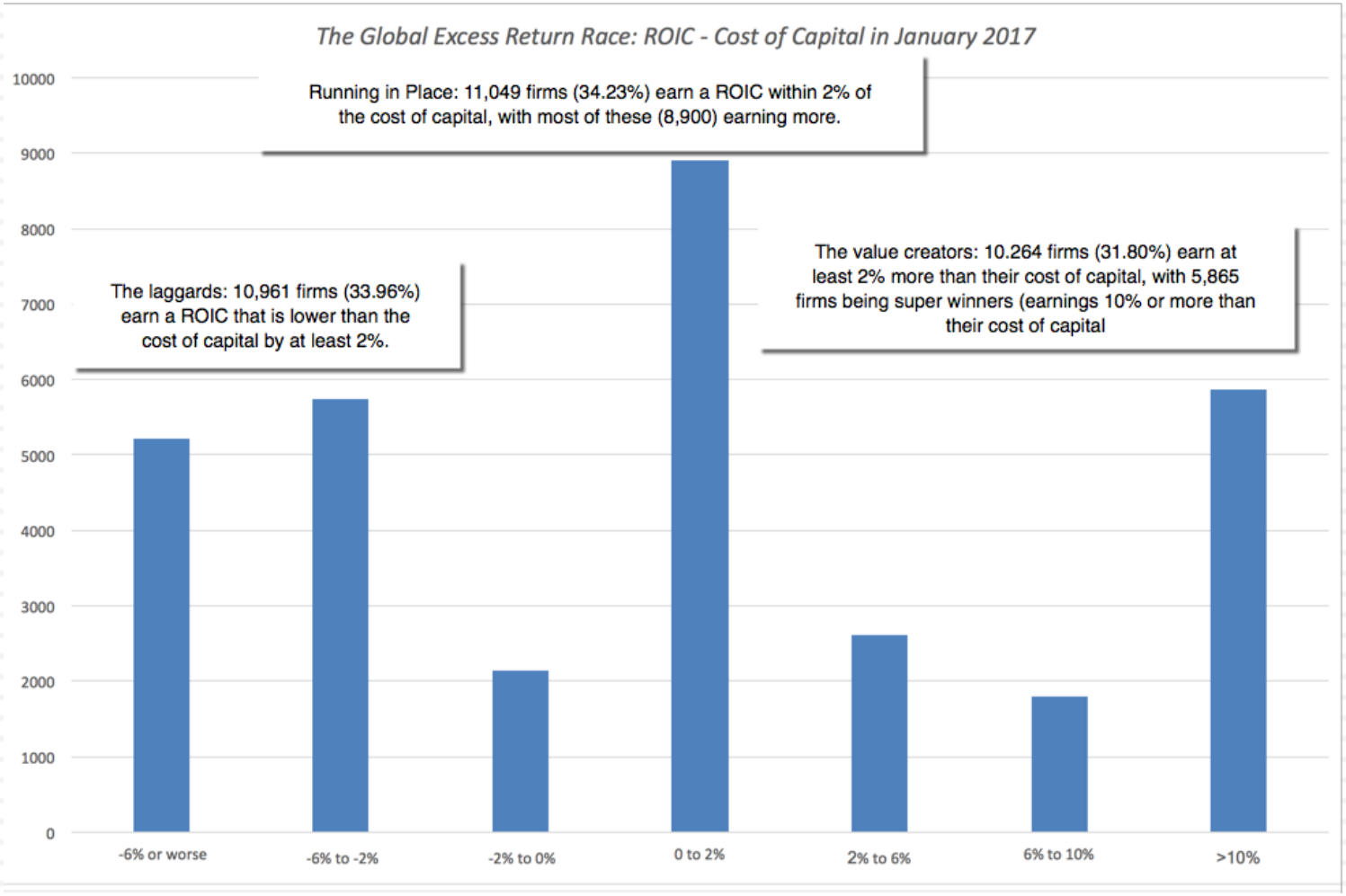
4. The only macro determinant: Equity vs Debt Risk Premiums



⌛ Application Test: Your firm's optimal financing mix

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

Return Spreads Globally….



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

  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: 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

Current Value of firm = $121,878+ $15,961	= $ 137,839
- Tax Benefit on Current Debt = $15,961 * 0.361	= $ 5,762
+ Expected Bankruptcy Cost = 0.66% * (0.25 * 137,839)	= $ 227
Unlevered Value of Firm =	= $ 132,304

- 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

Debt Ratio	*$ Debt*	*Tax Rate*	*Unlevered Firm Value*	*Tax Benefits*	*Bond Rating*	*Probability of Default*	*Expected Bankruptcy Cost*	*Value of Levered Firm*
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
- 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

	Debt to Capital Ratio		*Net Debt to Capital Ratio*			*Debt to Capital Ratio*		*Net Debt to Capital Ratio*	
Company	*Book value*	*Market value*	*Book value*	*Market value*	*Comparable group*	*Book value*	*Market value*	*Book value*	*Market value*
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 cross sectional regression, we can obtain an estimate of predicted debt ratio.

Step 3: Compare the actual debt ratio to the predicted debt ratio.

Applying the Regression Methodology: Global Auto Firms

- Using a sample of 56 global auto firms, we arrived at the following regression:

Debt to capital = 0.09 + 0.63 (Effective Tax Rate) + 1.01 (EBITDA/ Enterprise Value) - 0.93 (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 –

DFR = 0.27 - 0.24 ETR -0.10 g– 0.065 INST -0.338 CVOI+ 0.59 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%
Coeff 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)

= 0.1886 or 18.86%

- What does this optimal debt ratio tell you?

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

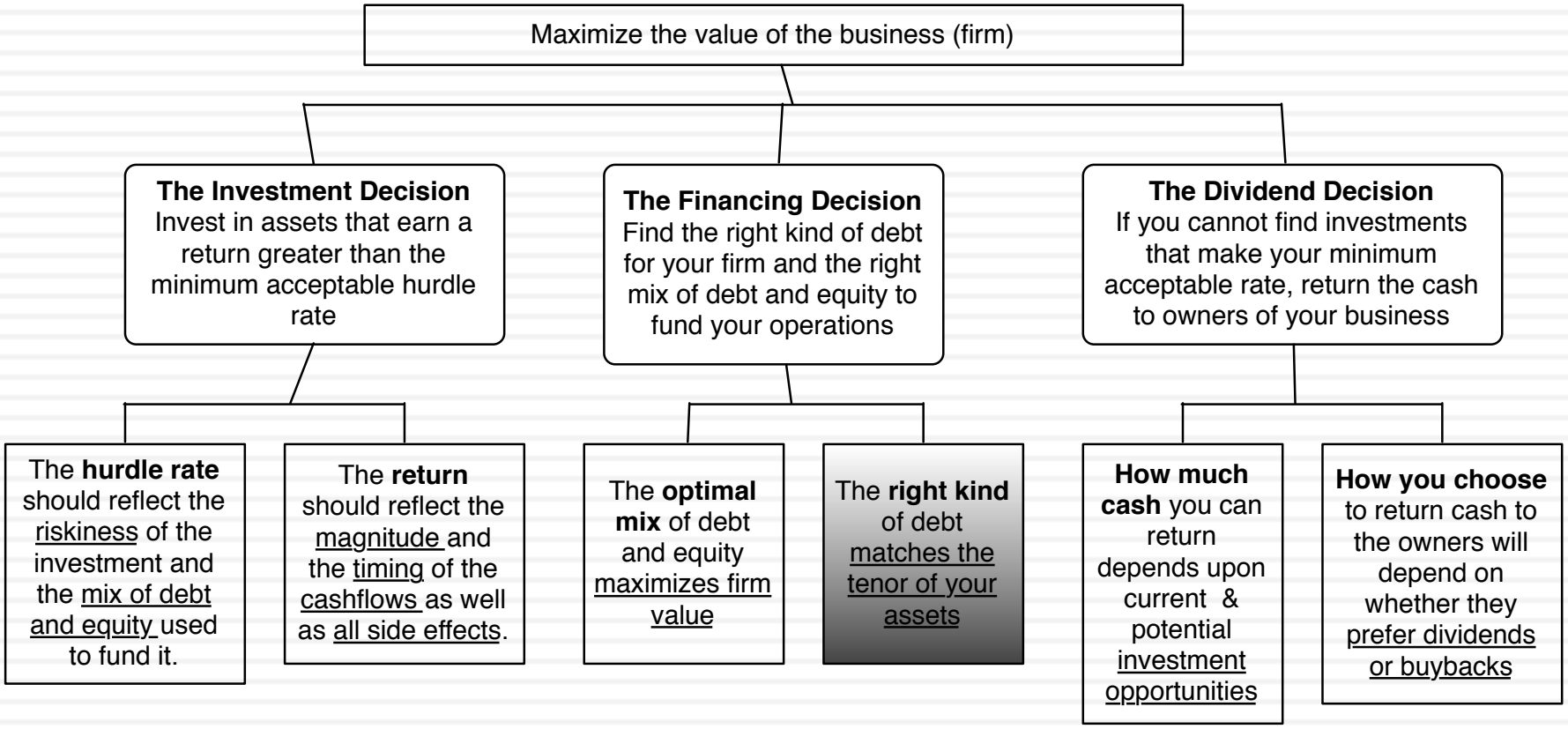
Summarizing the optimal debt ratios…

	Disney	*Vale*	*Tata Motors*	*Baidu*
Actual Debt Ratio	11.58%	*35.48%*	*29.28%*	*5.23%*
Optimal				
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%	—	-	

GETTING TO THE OPTIMAL: TIMING AND FINANCING CHOICES

You can take it slow.. Or perhaps not…

Big Picture…


Maximize the value of the business (firm)
The Investment Decision
Invest in assets that earn a return greater than the minimum acceptable hurdle rate
The Financing Decision
Find the right kind of debt for your firm and the right mix of debt and equity to fund your operations
The Dividend Decision
If you cannot find investments that make your minimum acceptable rate, return the cash to owners of your business
The hurdle rate should reflect the riskiness of the investment and the mix of debt and equity used to fund it.
The return should reflect the magnitude and the timing of the cashflows as well as all side effects.
The optimal mix of debt and equity maximizes firm value
The right kind of debt matches the tenor of your assets
How much cash you can return depends upon current & potential investment opportunities
How you choose to return cash to the owners will depend on whether they prefer dividends or buybacks

Now that we have an optimal.. And an actual.. What next?

- At the end of the analysis of financing mix (using whatever tool or tools you choose to use), you can come to one of three conclusions:
  1. The firm has the right financing mix
  2. It has too little debt (it is under levered)
  3. It has too much debt (it is over levered)
- The next step in the process is
  - Deciding how much quickly or gradually the firm should move to its optimal
  - Assuming that it does, the right kind of financing to use in making this adjustment