Valuation Inferno: Dante meets DCF…

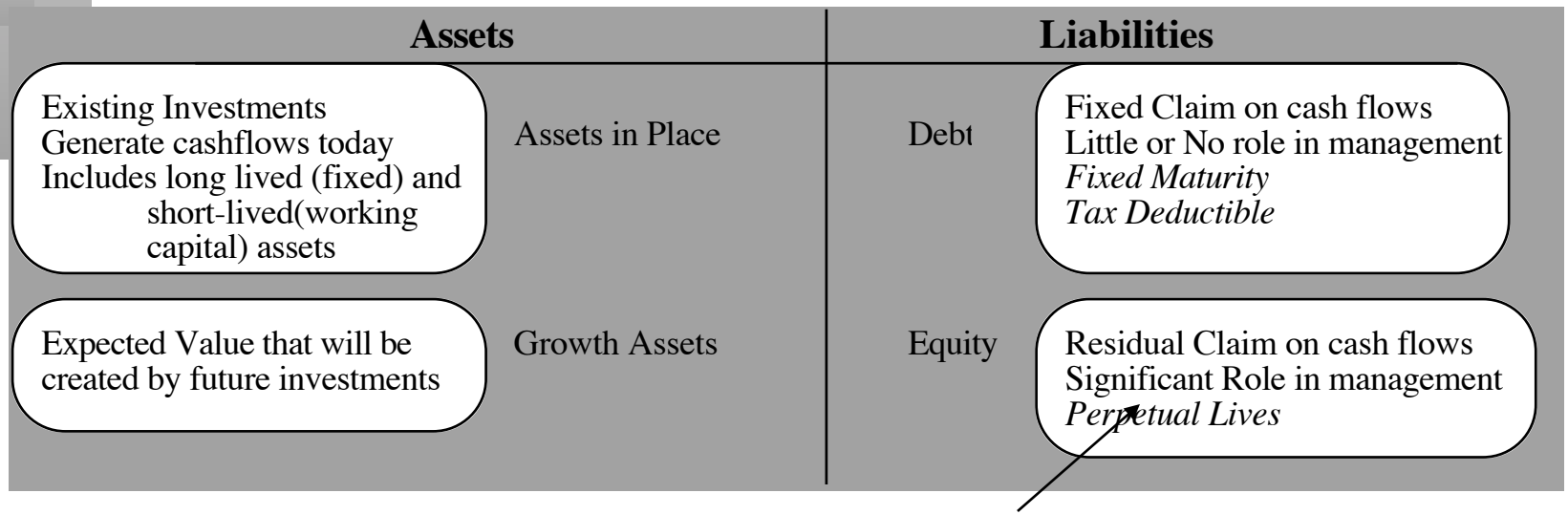
"*Abandon every hope, ye who enter here*"

Aswath Damodaran

www.damodaran.com

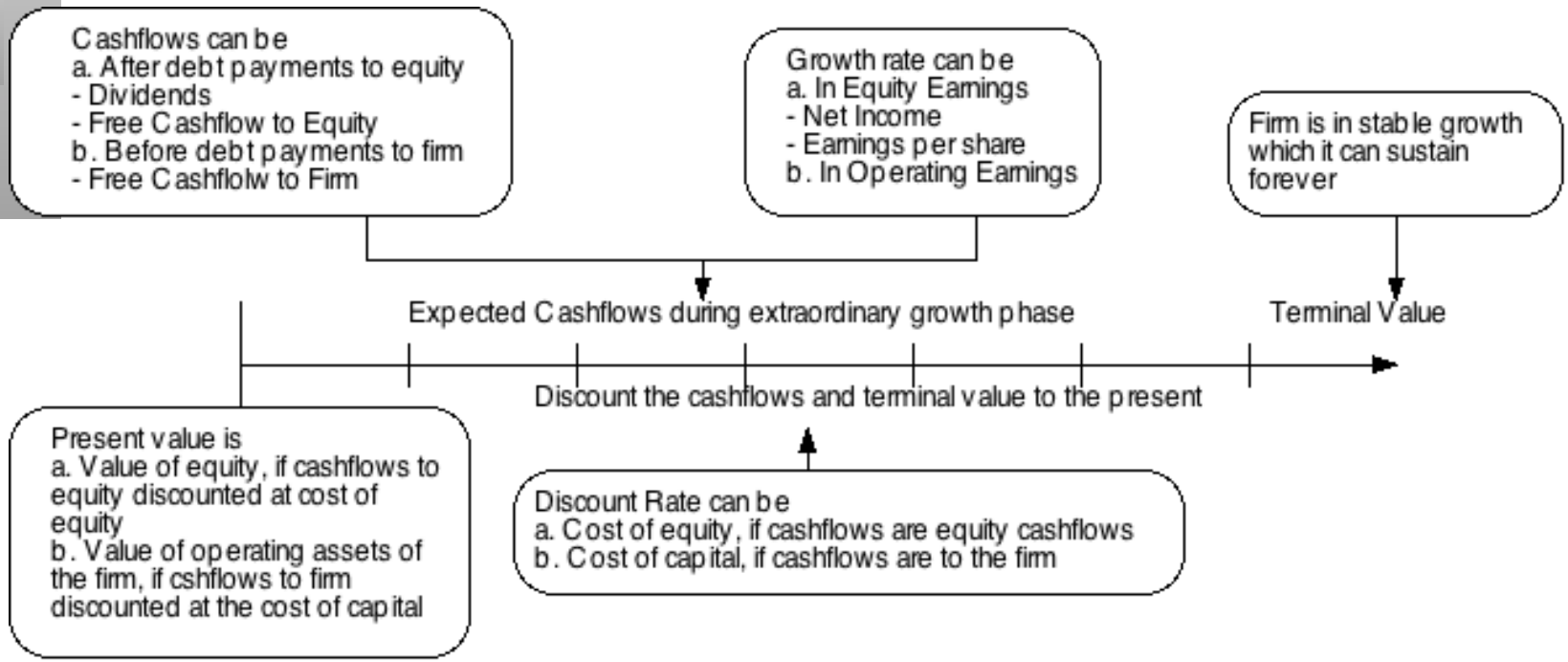
DCF Choices: Equity versus Firm

Firm Valuation: Value the entire business by discounting cash flow to the firm at cost of capital

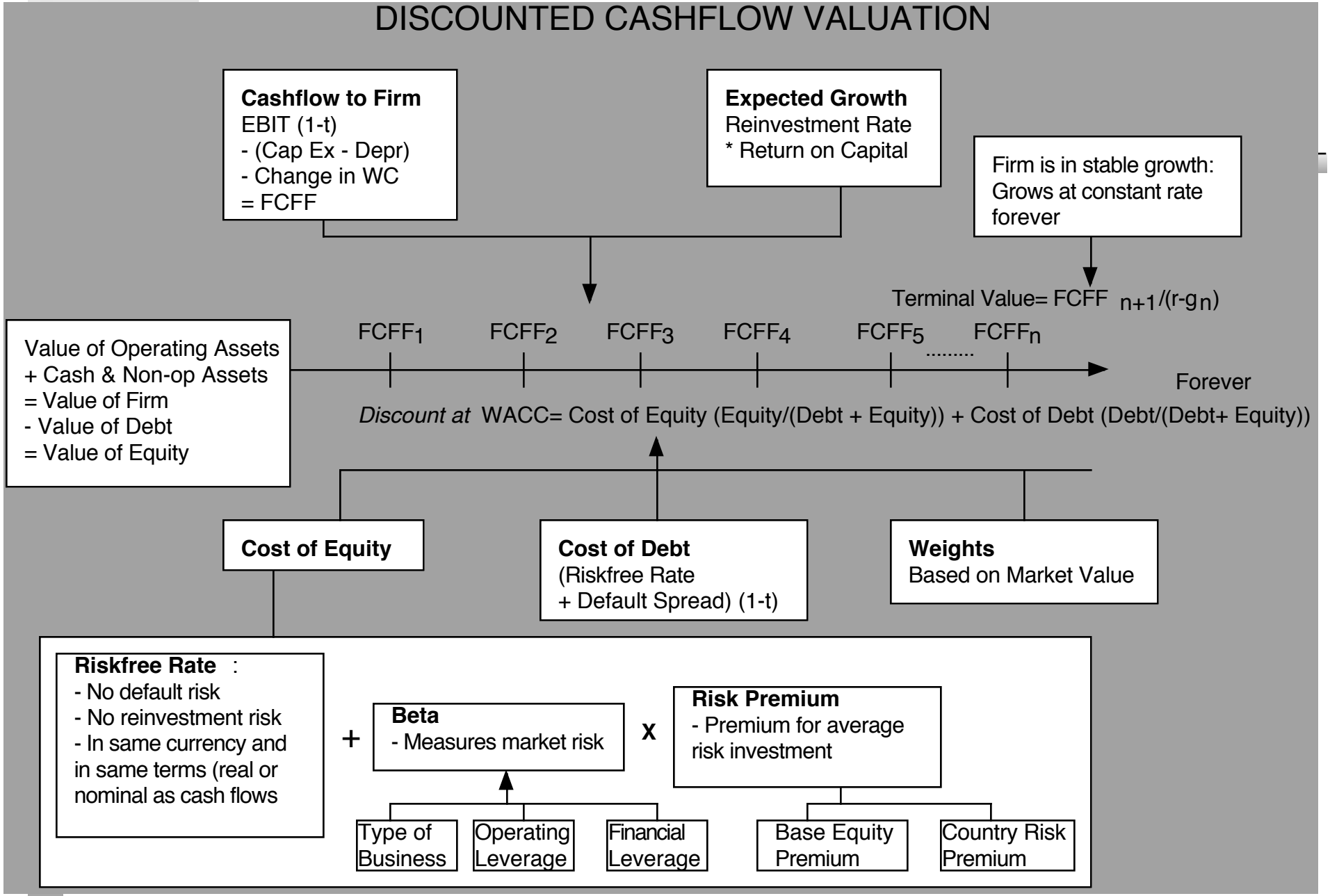


Equity valuation: Value just the equity claim in the business by discounting cash flows to equity at the cost of equity

The Value of a business rests on...



DISCOUNTED CASHFLOW VALUATION



Tata Motors: April 2010

Average reinvestment rate from 2005-09: 179.59%; without acquisitions: 70%

Current Cashflow to Firm
EBIT(1-t) : Rs 20,116
- Nt CpX Rs 31,590
- Chg WC Rs 2,732
= FCFF - Rs 14,205
Reinv Rate = (31590+2732)/20116 = 170.61%; Tax rate = 21.00%
Return on capital = 17.16%

Reinvestment Rate 70%

Return on Capital 17.16%

Expected Growth from new inv.
.70*.1716=0.1201

Stable Growth
g = 5%; Beta = 1.00
Country Premium= 3%
Cost of capital = 10.39%
Tax rate = 33.99%
ROC= 10.39%;
Reinvestment Rate=g/ROC =5/ 10.39= 48.11%

Terminal Value5= 23493/(.1039-.05) = Rs 435,686

Rs Cashflows

Year	1	2	3	4	5	6	7	8	9	10
EBIT (1-t)	22533	25240	28272	31668	35472	39236	42848	46192	49150	51607
- Reinvestment	15773	17668	19790	22168	24830	25242	25138	24482	23264	21503
FCFF	6760	7572	8482	9500	10642	13994	17711	21710	25886	30104

45278
21785
23493

Op. Assets Rs210,813
+ Cash: 11418
+ Other NO 140576
- Debt 109198
=Equity 253,628

Value/Share Rs 614

Discount at Cost of Capital (WACC) = 14.00% (.747) + 8.09% (0.253) = 12.50%

Growth declines to 5% and cost of capital moves to stable period level.

Cost of Equity 14.00%

Cost of Debt
(5%+ 4.25%+3)(1-.3399)
= 8.09%

Weights
E = 74.7% D = 25.3%

On April 1, 2010
Tata Motors price = Rs 781

Riskfree Rate:
Rs Riskfree Rate= 5%

+ **Beta** 1.20 X **Mature market premium** 4.5% + **Lambda** 0.80 X Country Equity Risk Premium 4.50%

Unlevered Beta for Sectors: 1.04

Firm's D/E Ratio: 33%

Country Default Spread 3% X Rel Equity Mkt Vol 1.50

The nine circles of valuation hell.. With a special bonus circle…

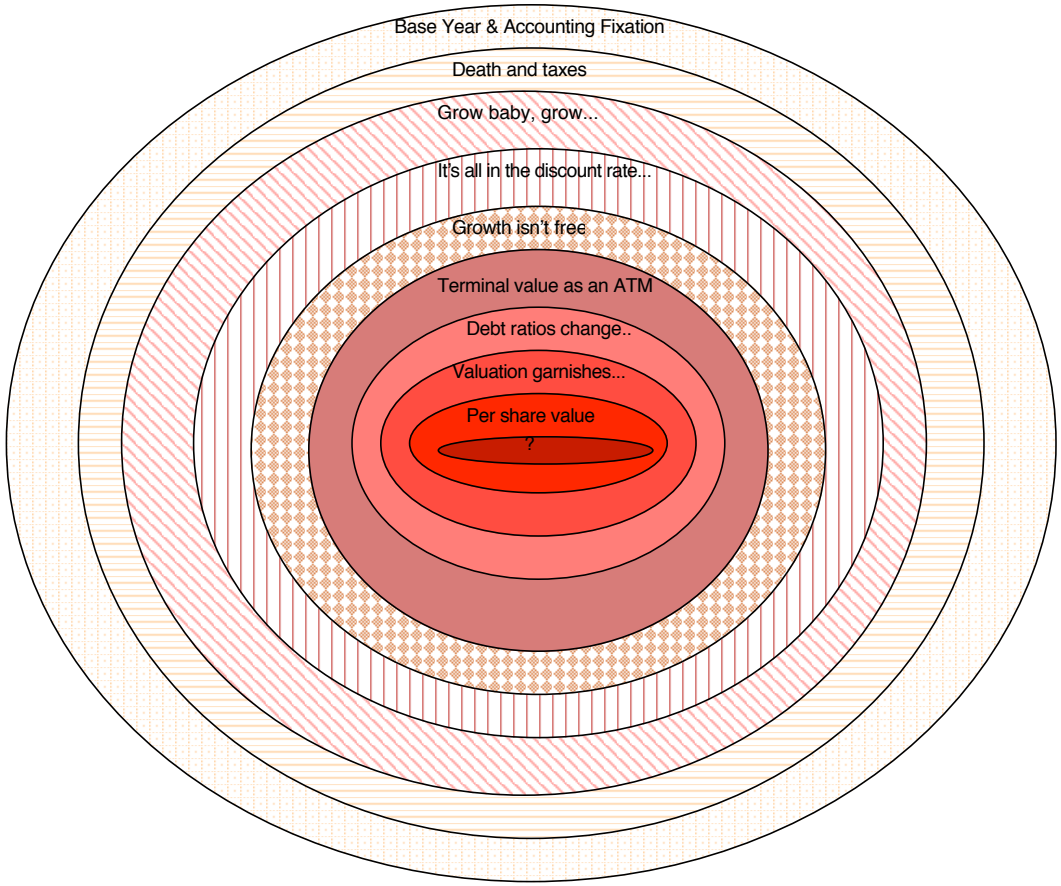


Illustration 1: Base Year fixation….

- You are valuing Exxon Mobil, using data from the most recent fiscal year (2008). The following provides the key numbers:

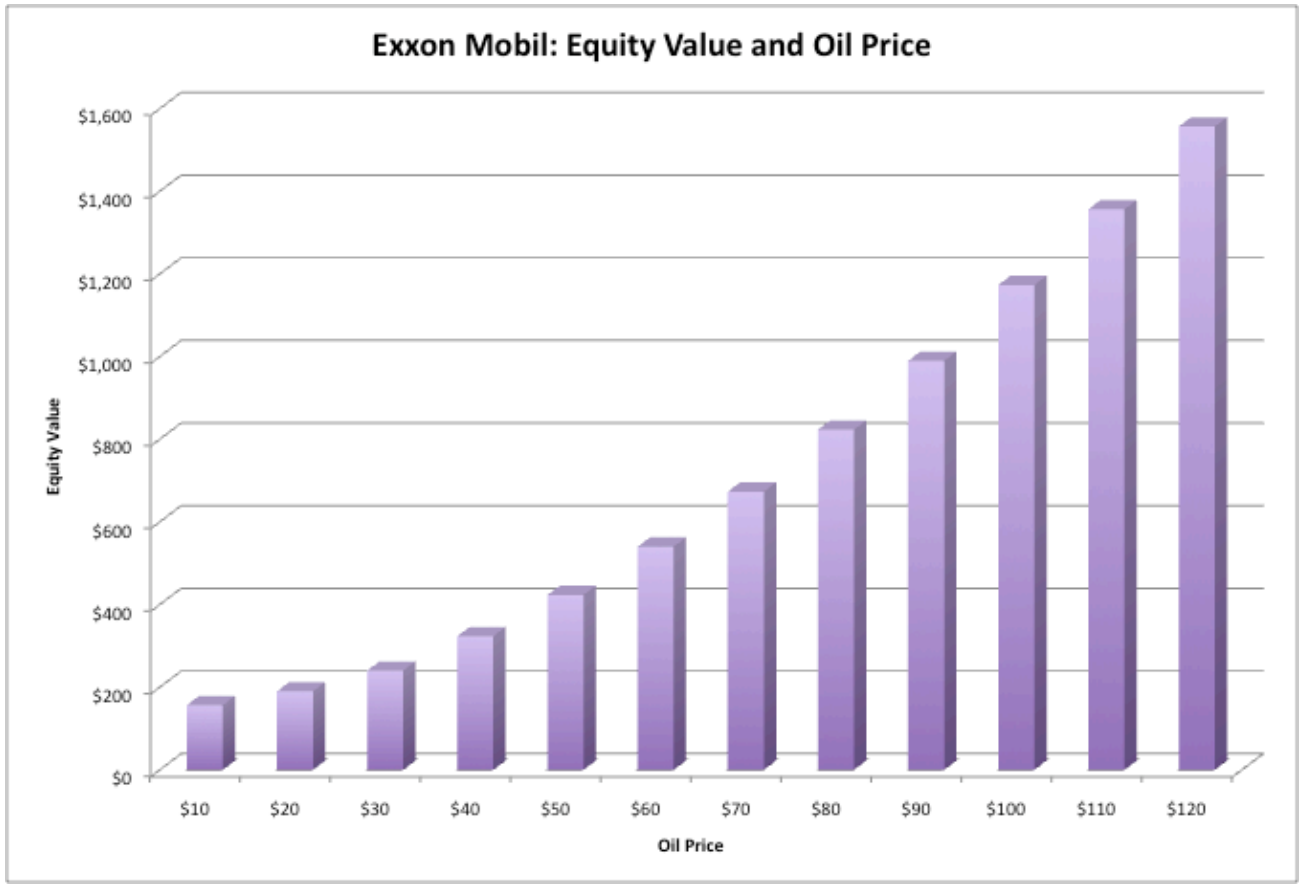
Revenues	$477 billion
EBIT (1-t)	$ 58 billion
Net Cap Ex	$ 3 billion
Chg WC	$ 1 billion
FCFF	$ 54 billion

- The cost of capital for the firm is 8% and you use a very conservative stable growth rate of 2% to value the firm. The market cap for the firm is $330 billion and it has $ 10 billion in debt outstanding.

  a. How under or over valued is the equity in the firm?

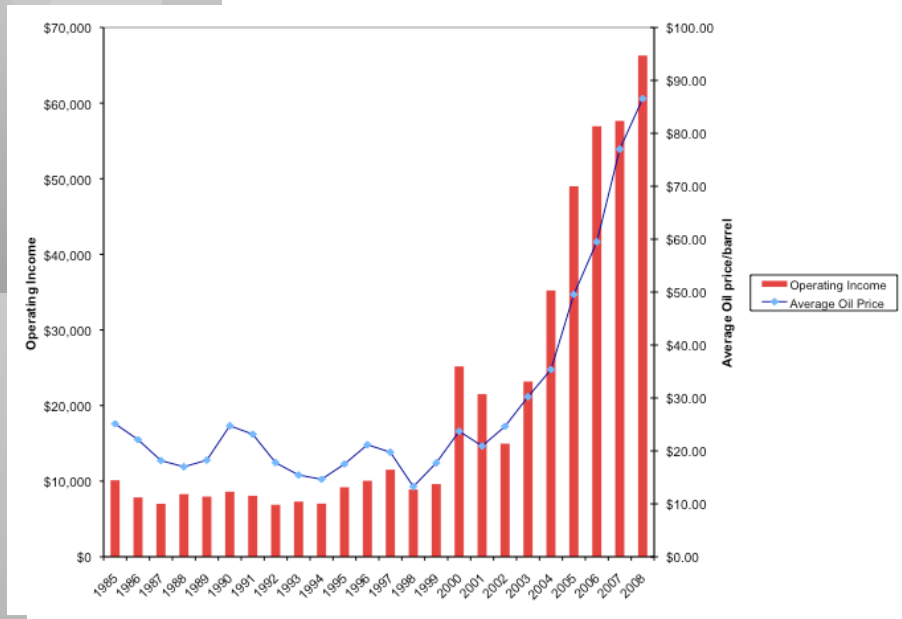
  b. Would you buy the stock based on this valuation? Why or why not?

Normalization… not easy to do… but you don't have a choice…

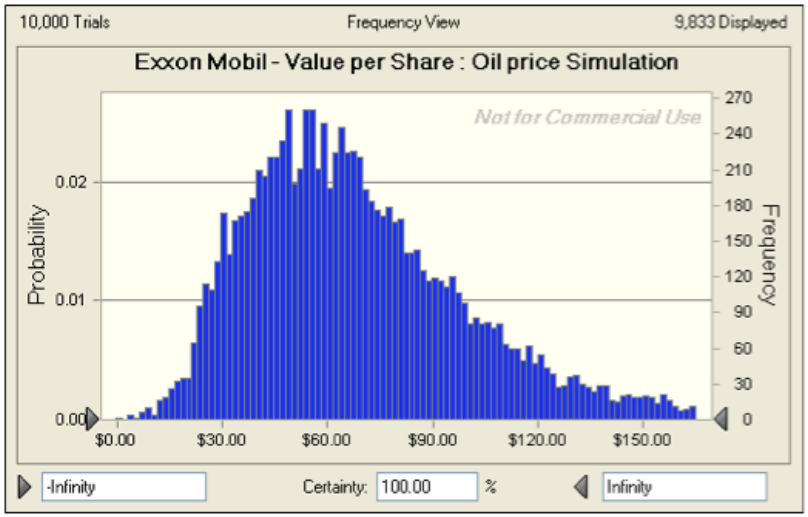


And one possible response…

Step 1: Look at history



Step 3: Run simulation



Step 2: Look for relationship

Regression of Exxon income against oil price

Op Inc = -6,934 + 911 (Price per barrel of oil)

R squared = 94%

Illustration 2: Taxes and Value

- Assume that you have been asked to value a company and have been provided with the most recent year's financial statements:

EBITDA	140
- DA	40
EBIT	100
- Interest exp	20
Taxable income	80
Taxes	32
Net Income	48

Free Cash flow to firm
EBIT (1- tax rate)
-(Cap Ex – Depreciation)
- Change in non-cash WC
=FCFF

Assume also that cash flows will be constant and that there is no growth in perpetuity. What is the free cash flow to the firm?

a) 88 million (Net income + Depreciation)
b) 108 million (EBIT – taxes + Depreciation)
c) 100 million (EBIT (1-tax rate)+ Depreciation)
d) 60 million (EBIT (1- tax rate))
e) 48 million (Net Income)
f) 68 million (EBIT – Taxes)

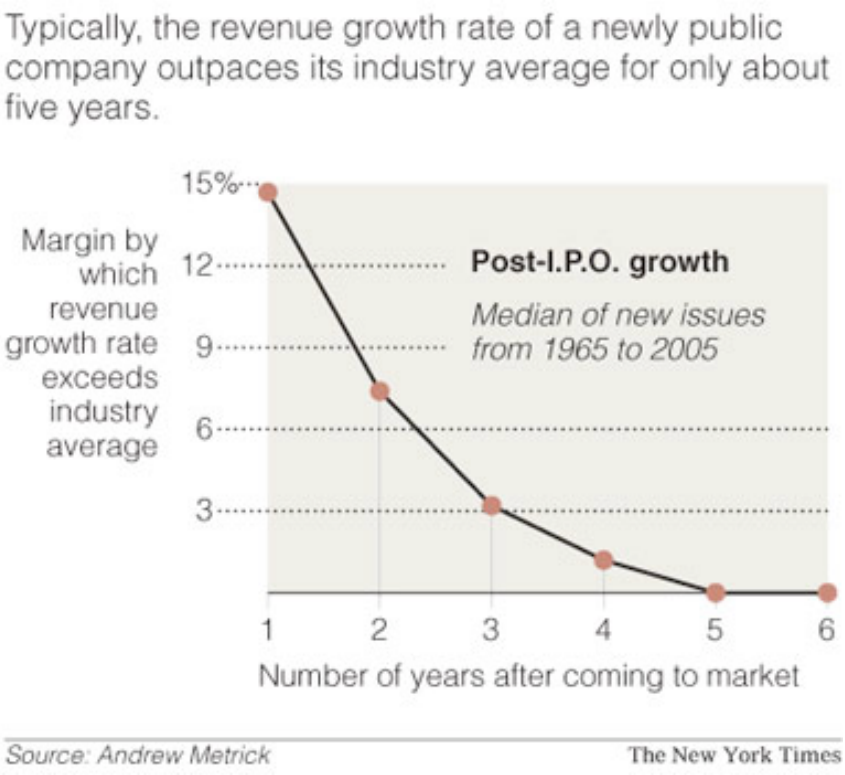
Illustration 3: High Growth for how long…

Assume that you are valuing a young, high growth firm with great potential, just after its initial public offering. How long would you set your high growth period?

- < 5 years
- 5 years
- 10 years
- >10 years

Reasons to be cautious..

Growth fades quickly



And does not scale up easily

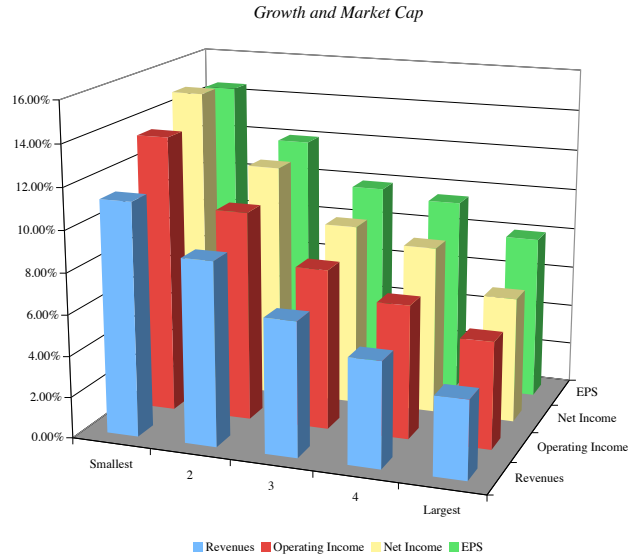


Illustration 4: The Cost of Capital

- The cost of capital for Chippewa Technologies, a US firm with 20% of its revenues from Brazil, has been computed using the following inputs:

Cost of equity

= Riskfree Rate = 5% + Beta + 1.20 (ERP) (5%) + Small firm premium + 3% = **14%**

Replaced current T.Bond rate of 3% with normalized rate of 5%

"Adjusted" Beta from Bloomberg

Both from Ibbotson data base, derived from 1926-2009 data
ERP: Stocks - T.Bonds (Arithmetic average)
Small firm: Small stocks - Overall market

Cost of capital

= Cost of equity (Equity/ (Debt + Equity)) + Cost of debt (1- tax rate) (Debt/ (Debt + Equity)
= 14% (1000/2000) + 3% (1-.30) (1000/2000) = **8.05%**

From above

Used market value of equity

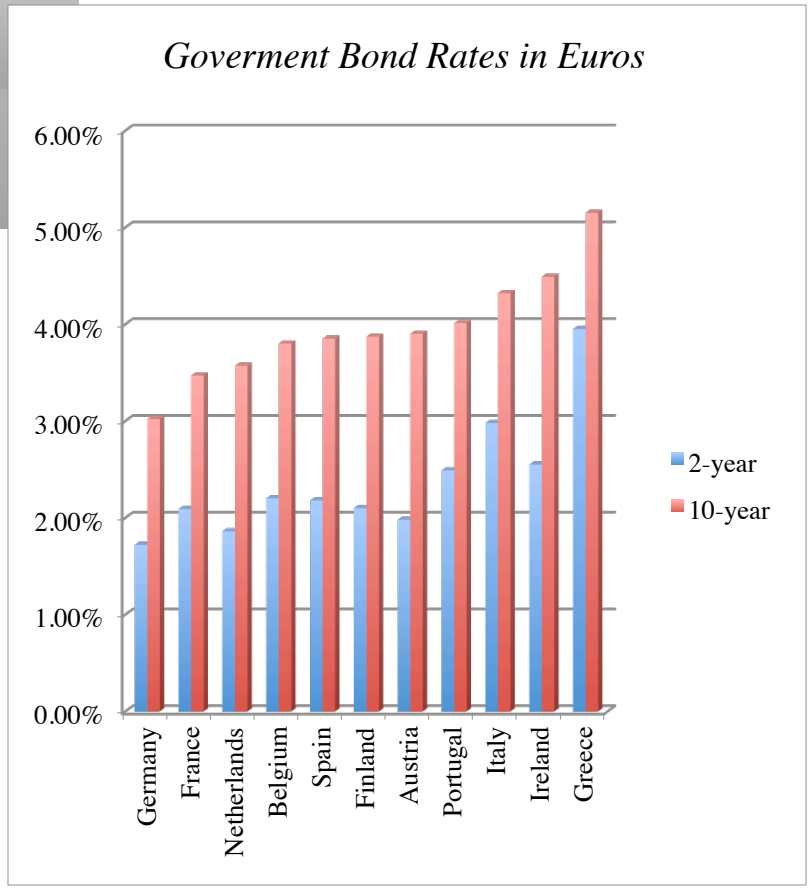
Company is not rated and has no bonds. Used book interest rate = Int exp/ BV of debt

Used effective tax rate of 30%

To be conservative, counted all liabilities, other than equity, as debt and used book value.

4.1: What is the riskfree rate?

When we use the T.Bond rate as a riskfree rate, we are assuming that there is no default risk in the US treasury. Is that reasonable? What if it is not?



- The Indian government had 10-year Rupee bonds outstanding, with a yield to maturity of about 8% on April 1, 2010. In January 2010, the Indian government had a local currency sovereign rating of Ba2. The typical default spread for Ba2 rated country bonds in early 2010 was 3%.
- The riskfree rate in Indian Rupees is

a) The yield to maturity on the 10-year bond (8%)

b) The yield to maturity on the 10-year bond + Default spread (8%+3% =11%)

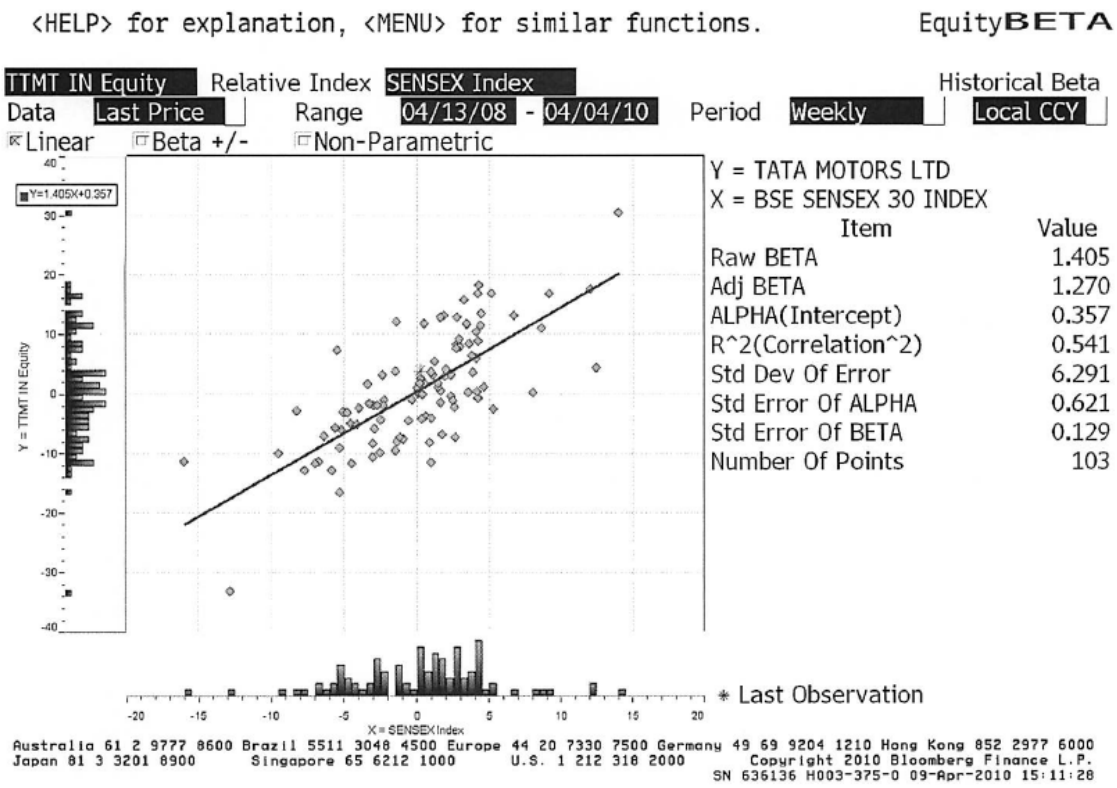
c) The yield to maturity on the 10-year bond – Default spread (8%-3% = 5%)

d) None of the above

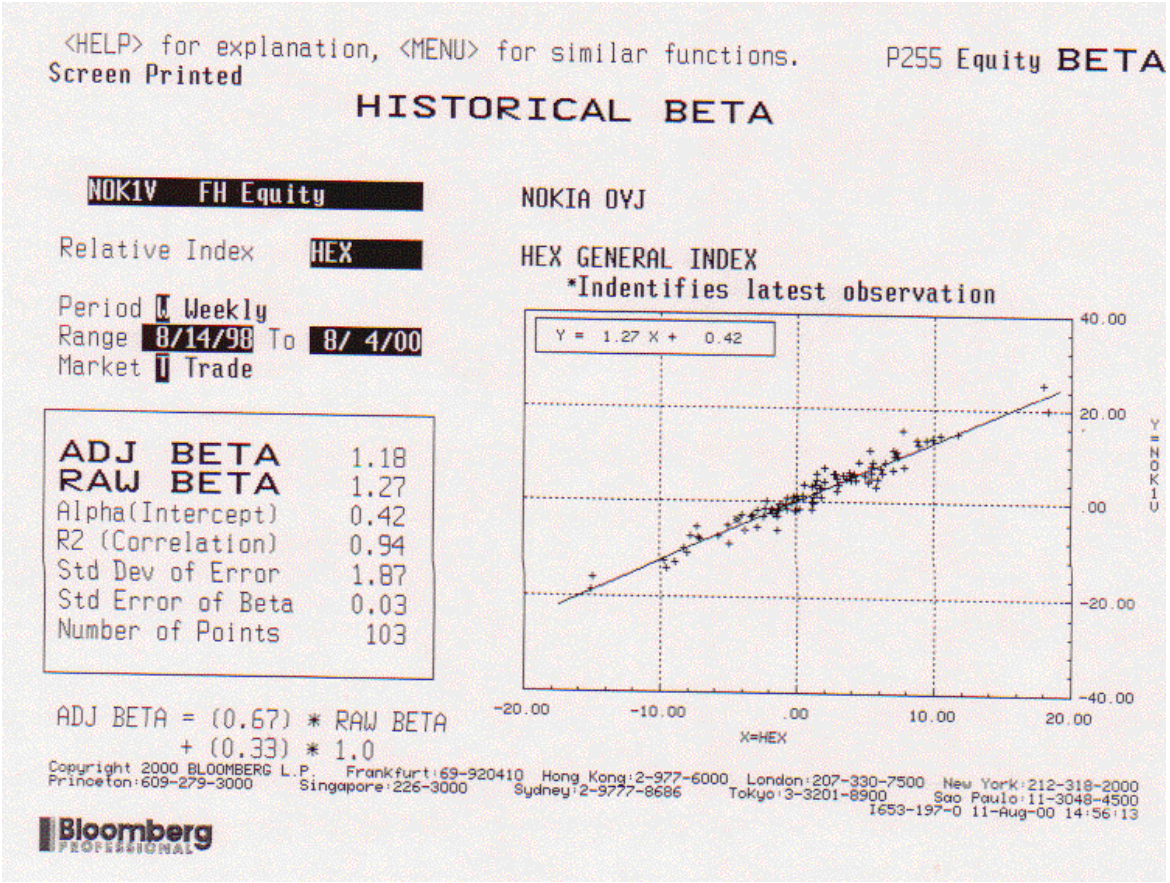
4.2: Don't let your macro views color your valuation

- If you believe that interest rates will go up (down), that exchange rates will move adversely (in your favor) and that the economy will weaken (strengthen), should you try to bring them into your individual company valuations?
  - Yes
  - No
- If you do, and you conclude that a stock is overvalued (undervalued), how should I read this conclusion?

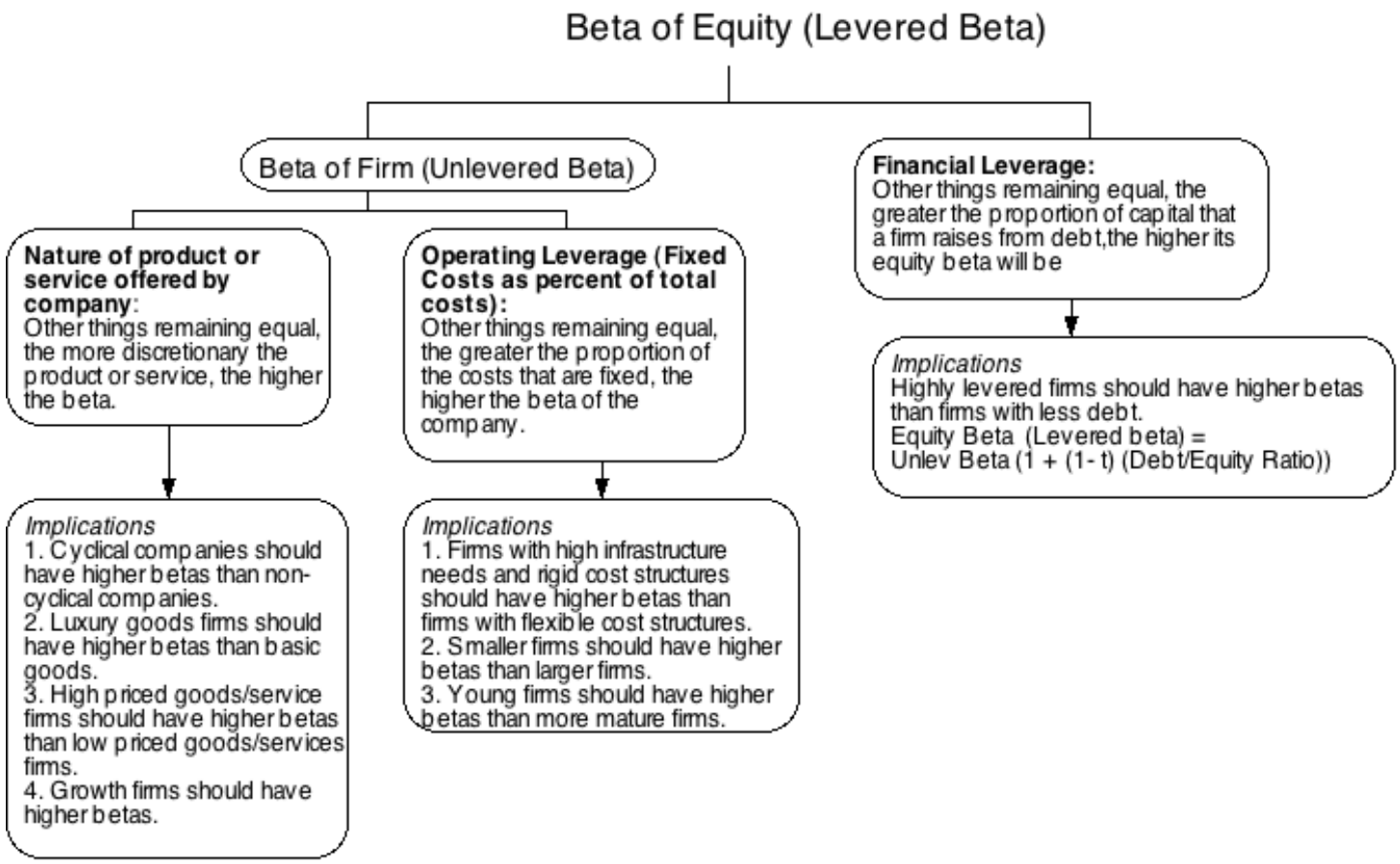
4.3: Betas do not come from regressions..



And cannot be trusted even when they look good…



Determinants of Betas



Bottom Up Beta Estimates for Tata Companies

	Tata Chemicals	*Tata Steel*	*Tata Motors*	*TCS*
Business breakdown	Chemicals & Fertilizers	Steel	Automobiles	Software & Information Processing
Unlevered beta	0.94	1.23	0.98	1.05
D/E Ratio	43.85%	42.03%	33.87%	0.03%
Levered Beta	1.21	1.57	1.20	1.05

A closer look at Tata Chemicals

	% of revenues	Unlevered Beta
Chemicals	42%	1.05
Fertilizers	58%	0.86
Company		0.94

4.4. And equity risk premiums matter…

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2010	7.62%	6.03%	5.67%	4.31%
	2.25%	2.38%		
1961-2010	5.83%	4.13%	4.44%	3.09%
	2.42%	2.69%		
2001-2010	1.37%	-2.26%	-0.79%	-4.11%
	6.73%	9.00%		

← *Historical premium*

In 2010, the actual cash returned to stockholders was 53.96. That was up about 30% from 2009 levels.

Analysts expect earnings to grow 13% in 2011, 8% in 2012, 6% in 2013 and 4% therafter, resulting in a compounded annual growth rate of 6.95% over the next 5 years. We will assume that dividends & buybacks will tgrow 6.95% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 3.29%, the same rate as the entire economy (= riskfree rate).

57.72 61.73 66.02 70.60 75.51

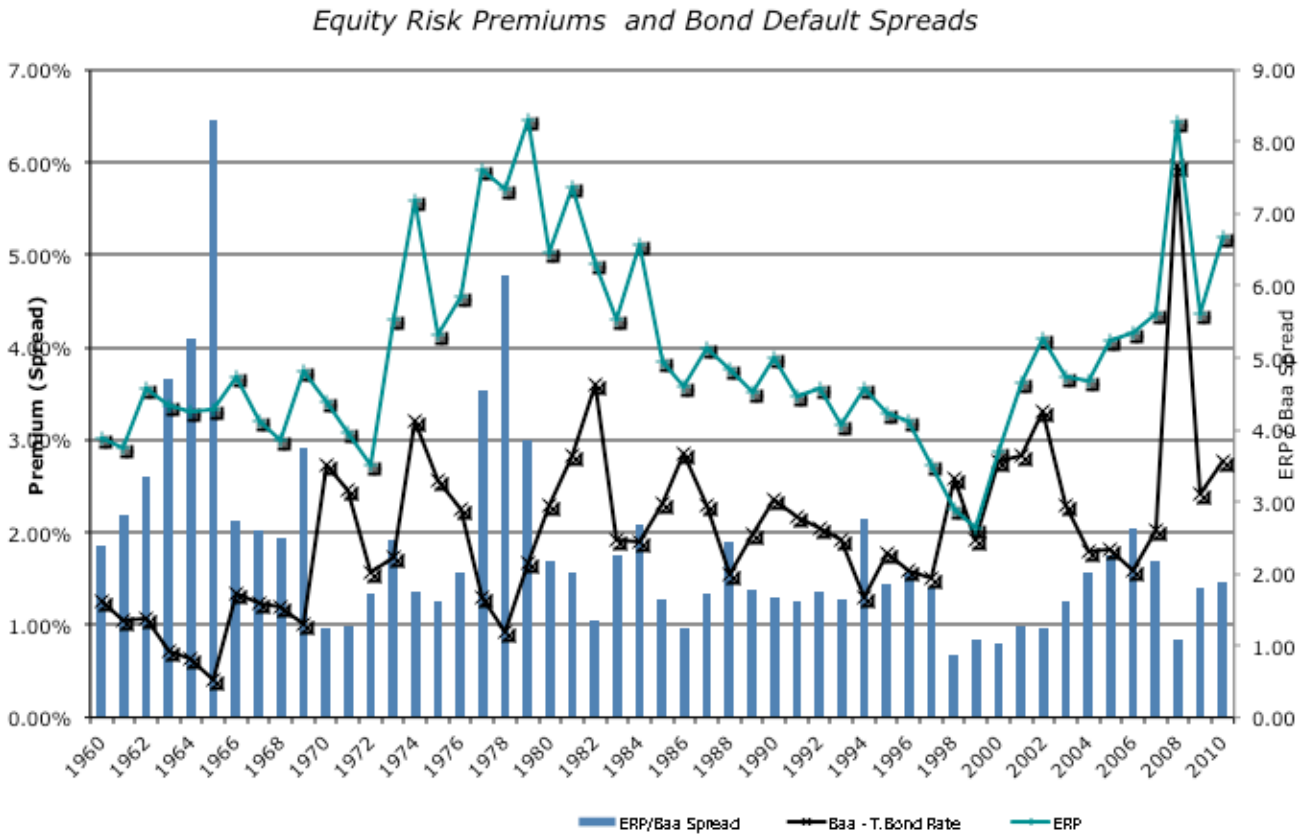
$$1257.64=\frac{57.72}{(1+r)}+\frac{61.73}{(1+r)^2}+\frac{66.02}{(1+r)^3}+\frac{70.60}{(1+r)^4}+\frac{75.51}{(1+r)^5}+\frac{75.51(1.0329)}{(r-.0329)(1+r)^5}$$

January 1, 2011
S&P 500 is at 1257.64
Adjusted Dividends & Buybacks for 2010 = 53.96

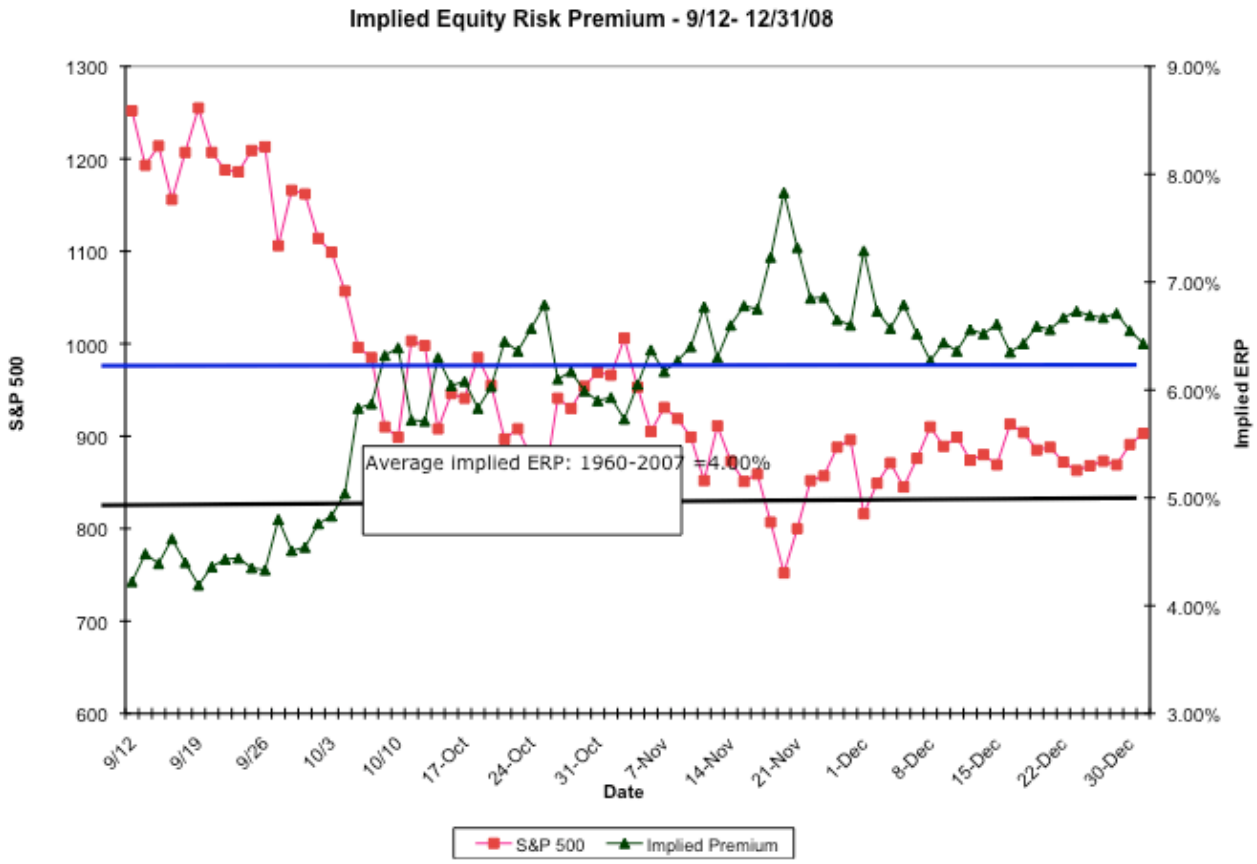
Expected Return on Stocks (1/1/11) = 8.49%
T.Bond rate on 1/1/11 = 3.29%
Equity Risk Premium = 8.03% - 3.29% = 5.20%

Data Sources:
Dividends and Buybacks last year: S&P
Expected growth rate: News stories, Yahoo! Finance, Zacks

Equity risk premiums change over long periods... And so do default spreads…



And sometimes over short time periods: 9/12/2008 – 12/31/2008



Implied Premium for Sensex: April 2010

- Level of the Index = 17559
- FCFE on the Index = 3.5% (Estimated FCFE for companies in index as % of market value of equity)
- Other parameters
  - Riskfree Rate = 5% (Rupee)
  - Expected Growth (in Rupee)
    - Next 5 years = 20% (Used expected growth rate in Earnings)
    - After year 5 = 5%
- Solving for the expected return:
  - Expected return on Equity = 11.72%
  - Implied Equity premium for India =11.72% - 5% = 6.72%

4.5: Small Cap and other premiums: The perils of the Build-up Approach

- While it has become conventional practice to estimate and use small cap, liquidity and other premiums, when computing cost of equity, it is a dangerous practice because:

1. These premiums are derived from historical data and come with very large standard errors. For instance, the standard error on the small cap premium estimated over the last 80 years is close to 2%...
2. If small firms are riskier than large firms, we should consider the source of that risk – niche products, high operating leverage… - and build it in, rather than accept a fixed premium for all small firms.
3. Small firms become larger as they grow over time.. Small cap premiums should be year-specific.
4. The danger of double counting risk grows as we add more premiums – small cap, private business and illiquidity are overlapping issues, not independent ones.

4.6: With globalization of revenues… globalization of risk

Proposition 1: There is more risk in operating in some countries than in others and the risk premium should reflect this additional risk. One approach to estimating this additional risk premium is to do the following:

- Start with the default spread for the country in question
- Scale up the default spread to reflect the additional risk of equity

  Country Risk Premium = Default Spread * ($\sigma_{Equity}/\sigma_{Government\ Bond}$)

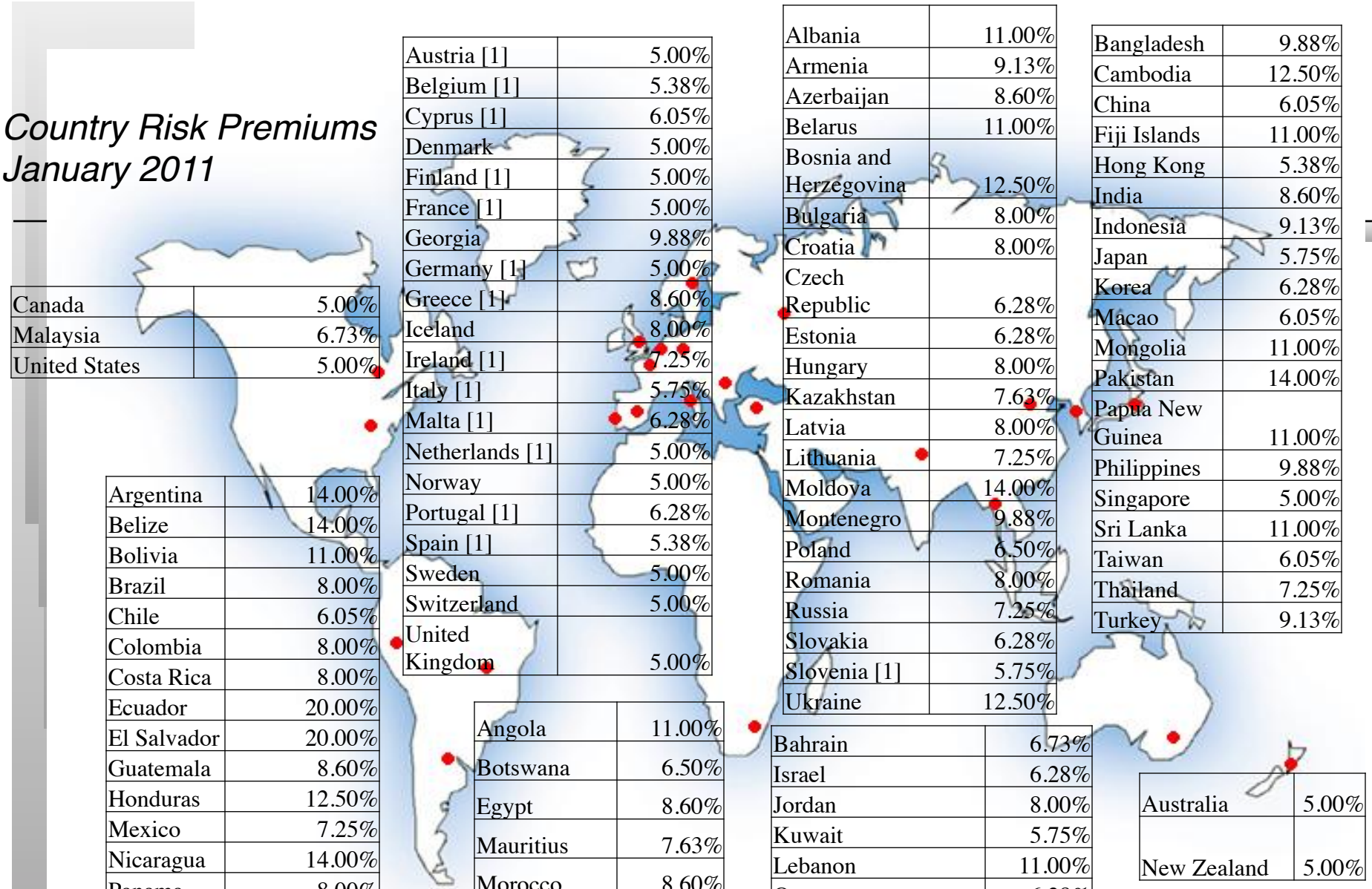
  Country Risk Premium$_{Brazil}$ = 2.00% (33%/22%) = 3.00%

Proposition 2: Risk comes from your operations and not your country of incorporation. Developed market companies can be heavily exposed to emerging market risk, just as emerging market companies can find ways to reduce their exposure to emerging market risk. One simple proxy is to look at the revenues generated in a country, relative to the average company in that market.

- Proportion of Chippewa's revenues from Brazil = 20%
- Average Brazilian company's revenues from Brazil = 77%

  Lambda$_{Chippewa}$ = 20%/ 77% = .26

Country Risk Premiums January 2011



Canada	5.00%
Malaysia	6.73%
United States	5.00%

Argentina	14.00%
Belize	14.00%
Bolivia	11.00%
Brazil	8.00%
Chile	6.05%
Colombia	8.00%
Costa Rica	8.00%
Ecuador	20.00%
El Salvador	20.00%
Guatemala	8.60%
Honduras	12.50%
Mexico	7.25%
Nicaragua	14.00%
Panama	8.00%
Paraguay	11.00%
Peru	8.00%

Austria [1]	5.00%
Belgium [1]	5.38%
Cyprus [1]	6.05%
Denmark	5.00%
Finland [1]	5.00%
France [1]	5.00%
Georgia	9.88%
Germany [1]	5.00%
Greece [1]	8.60%
Iceland	8.00%
Ireland [1]	7.25%
Italy [1]	5.75%
Malta [1]	6.28%
Netherlands [1]	5.00%
Norway	5.00%
Portugal [1]	6.28%
Spain [1]	5.38%
Sweden	5.00%
Switzerland	5.00%
United Kingdom	5.00%

Angola	11.00%
Botswana	6.50%
Egypt	8.60%
Mauritius	7.63%
Morocco	8.60%
South Africa	6.73%
Tunisia	7.63%

Albania	11.00%
Armenia	9.13%
Azerbaijan	8.60%
Belarus	11.00%
Bosnia and Herzegovina	12.50%
Bulgaria	8.00%
Croatia	8.00%
Czech Republic	6.28%
Estonia	6.28%
Hungary	8.00%
Kazakhstan	7.63%
Latvia	8.00%
Lithuania	7.25%
Moldova	14.00%
Montenegro	9.88%
Poland	6.50%
Romania	8.00%
Russia	7.25%
Slovakia	6.28%
Slovenia [1]	5.75%
Ukraine	12.50%

Bahrain	6.73%
Israel	6.28%
Jordan	8.00%
Kuwait	5.75%
Lebanon	11.00%
Oman	6.28%
Qatar	5.75%
Saudi Arabia	6.05%
United Arab Emirates	5.75%

Bangladesh	9.88%
Cambodia	12.50%
China	6.05%
Fiji Islands	11.00%
Hong Kong	5.38%
India	8.60%
Indonesia	9.13%
Japan	5.75%
Korea	6.28%
Macao	6.05%
Mongolia	11.00%
Pakistan	14.00%
Papua New Guinea	11.00%
Philippines	9.88%
Singapore	5.00%
Sri Lanka	11.00%
Taiwan	6.05%
Thailand	7.25%
Turkey	9.13%

Australia	5.00%
New Zealand	5.00%

Estimating lambdas: Tata Group

	Tata Chemicals	*Tata Steel*	*Tata Motors*	*TCS*
% of production/ operations in India	High	High	High	Low
% of revenues in India	75%	88.83%	91.37%	7.62%
Lambda	0.75	1.10	0.80	0.20
Other factors	Gets 77% of its raw material from non-domestic sources,		Recently acquired Jaguar/Land Rover, with significant non-domestic sales	While its operations are spread all over, it uses primarily Indian personnel

4.7: Debt and the Cost of debt

- As a general rule, it is better to use narrow definitions of debt, when it comes to the debt in the cost of capital computation. Including nebulous items in debt will just inflate the debt ratio, lower the cost of capital and make the firm look more valuable than it really is.
- The cost of debt is the rate at which the firm can borrow long term, today. The current book interest rate (interest expense/ book debt) is almost always useless for this purpose because it includes old debt, short term debt and items that should not be even be considered as debt.
- The cost of debt is best estimated by looking at the firm's current financial ratios and assessing how much a lender would charge to lend them money, long term:

  Cost of debt = Riskfree rate + Default spread on debt
- Since interest saves you taxes at the margin, the tax rate used should be the marginal tax rate and not the effective tax rate.

The Correct Cost of Capital for Chippewa

Input	*What was used…*	*What should have been used….*
Riskfree rate	Normalized riskfree rate = 5%	Actual riskfree rate = 3%
Beta	Bloomberg adjusted beta = 1.20	Sector average adjusted beta = 1.60
Equity Risk Premium	Ibbotson Historical premium = 5%	Current implied equity risk premium = 4.5%
Other adjustments to cost of equity	Small firm premium = 3%	No small firm premium Country risk premium = Lambda * Brazil Country Risk Premium = 0.26 * 3% = 0.78%
Cost of equity	5% + 1.20 (5%) + 3% = 14%	3% + 1.60 (4.5%) +0.78% = 10.98%
Cost of debt (pre-tax)	Book interest rate = 3%	Cost of debt based on synthetic rating = 3% + 3.5% = 6.5%
Tax rate	Effective tax rate = 30%	Marginal tax rate = 40%
Debt ratio	Book ratio: Liabilities = 50% and Equity = 50%	Market debt ratio Equity = 70% and Debt = 30%
Cost of capital	14% (.5) + 3% (1-.3) (.5) = 8.05%	10.98% (.7) + 6.5% (1-.4) (.3) = 8.72%

Estimating Cost of Capital: Tata Group

	Tata Chemicals	Tata Steel	Tata Motors	TCS
Beta	1.21	1.57	1.20	1.05
Lambda	0.75	1.10	0.80	0.20
Cost of equity	13.82%	17.02%	14.00%	10.63%
Synthetic rating	BBB	A	B+	AAA
Cost of debt	6.60%	6.11%	8.09%	5.61%
Debt Ratio	30.48%	29.59%	25.30%	0.03%
Cost of Capital	11.62%	13.79%	12.50%	10.62%

Tata Chemicals: Divisional Costs of Capital

	Beta	Cost of equity	Cost of debt	Debt Ratio	Cost of capital
Chemicals	1.35	14.47%	6.60%	30.48%	12.07%
Fertilizers	1.11	13.37%	6.60%	30.48%	11.30%

Illustration 5: The price of growth...

- You are looking at the projected cash flows provided by the management of the firm, for use in valuation

Year	Current	1	2	3	4
Growth rate		10%	10%	10%	10%
Revenues	$100.00	$110.00	$121.00	$133.10	$146.41
EBIT (1-t)	$30.00	$33.00	$36.30	$39.93	$43.92
+ Depreciation	$15.00	$16.50	$18.15	$19.97	$21.96
- Cap Ex	$18.00	$19.80	$21.78	$23.96	$26.35
- Chg in WC	$3.00	$3.30	$3.63	$3.99	$4.39
FCFF	$24.00	$26.40	$29.04	$31.94	$35.14

a. How do you check to see if top-line growth is feasible?

b. How do you ensure that the forecasts are internally consistent? (In other words, are all of the other forecasted numbers consistent with the growth forecast in revenues?)

You be the judge: Good Growth or Bad Growth

	Tata Chemicals	Tata Steel	Tata Motors	TCS
ROC	10.35%	13.42%	17.16%	40.63%
Cost of capital	11.62%	13.79%	12.50%	10.62%
Reinvestment rate	56.50%	38.09%	70%	56.73%
Sustainable growth	5.85%	5.11%	12.01%	23.05%

Illustration 6: The "fixed debt ratio" assumption

- You have been asked to value Hormel Foods, a firm which currently has the following cost of capital:

  Cost of capital = 7.31% (.9) + 2.36% (.1) = 6.8%

a. You believe that the target debt ratio for this firm should be 30%. What will the cost of capital be at the target debt ratio?

b. Which debt ratio (and cost of capital) should you use in valuing this company?

6.1: Cost of Capital and Debt Ratios
Hormel Foods in 2009

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.78	7.00%	AAA	3.60%	40.00%	2.16%	7.00%	$4,523
10%	0.83	7.31%	AAA	3.60%	40.00%	2.16%	6.80%	$4,665
20%	0.89	7.70%	AAA	3.60%	40.00%	2.16%	6.59%	$4,815
30%	0.97	8.20%	A+	4.60%	40.00%	2.76%	6.57%	$4,834
40%	1.09	8.86%	A-	5.35%	40.00%	3.21%	6.60%	$4,808
50%	1.24	9.79%	B+	8.35%	40.00%	5.01%	7.40%	$4,271
60%	1.47	11.19%	B-	10.85%	40.00%	6.51%	8.38%	$3,757
70%	1.86	13.52%	CCC	12.35%	40.00%	7.41%	9.24%	$3,398
80%	2.70	18.53%	CC	14.35%	38.07%	8.89%	10.81%	$2,892
90%	5.39	34.70%	CC	14.35%	33.84%	9.49%	12.01%	$2,597

As debt increases, your cost of equity should go up.
Levered Beta = Unlevered beta (1+(1-t) (D/E))

As debt increases, interest expenses will go up more than proportionately. Holding operating income constant, coverage ratios decrease and ratings fall.

6.2: Changing Debt Ratios and Costs of Capital over time – Las Vegas Sands

Year	Beta	Cost of equity	Pre-tax Cost of debt	Debt Ratio	Cost of capital
1	3.14	21.82%	9.00%	73.50%	9.88%
2	3.14	21.82%	9.00%	73.50%	9.88%
3	3.14	21.82%	9.00%	73.50%	9.88%
4	3.14	21.82%	9.00%	73.50%	9.88%
5	3.14	21.82%	9.00%	73.50%	9.88%
6	2.75	19.50%	8.70%	68.80%	9.79%
7	2.36	17.17%	8.40%	64.10%	9.50%
8	1.97	14.85%	8.10%	59.40%	9.01%
9	1.59	12.52%	7.80%	54.70%	8.32%
10	1.20	10.20%	7.50%	50.00%	7.43%

Illustration 7: The Terminal Value

- The best way to compute terminal value is to
- Use a stable growth model and assume cash flows grow at a fixed rate forever
- Use a multiple of EBITDA or revenues in the terminal year
- Use the estimated liquidation value of the assets

You have been asked to value a business. The business expects to earn $ 120 million in after-tax earnings (and cash flow) next year and to continue generating these earnings in perpetuity. The firm is all equity funded and the cost of equity is 10%; the riskfree rate is 3% and the ERP is 7%. What is the value of the business?

7.1: Limits to stable growth...

- Assume now that you were told that the firm can grow earnings at 2% a year forever. Estimate the value of the business.
- Now what if you were told that the firm can grow its earnings at 4% a year forever?
- What if the growth rate were 6% a year forever?

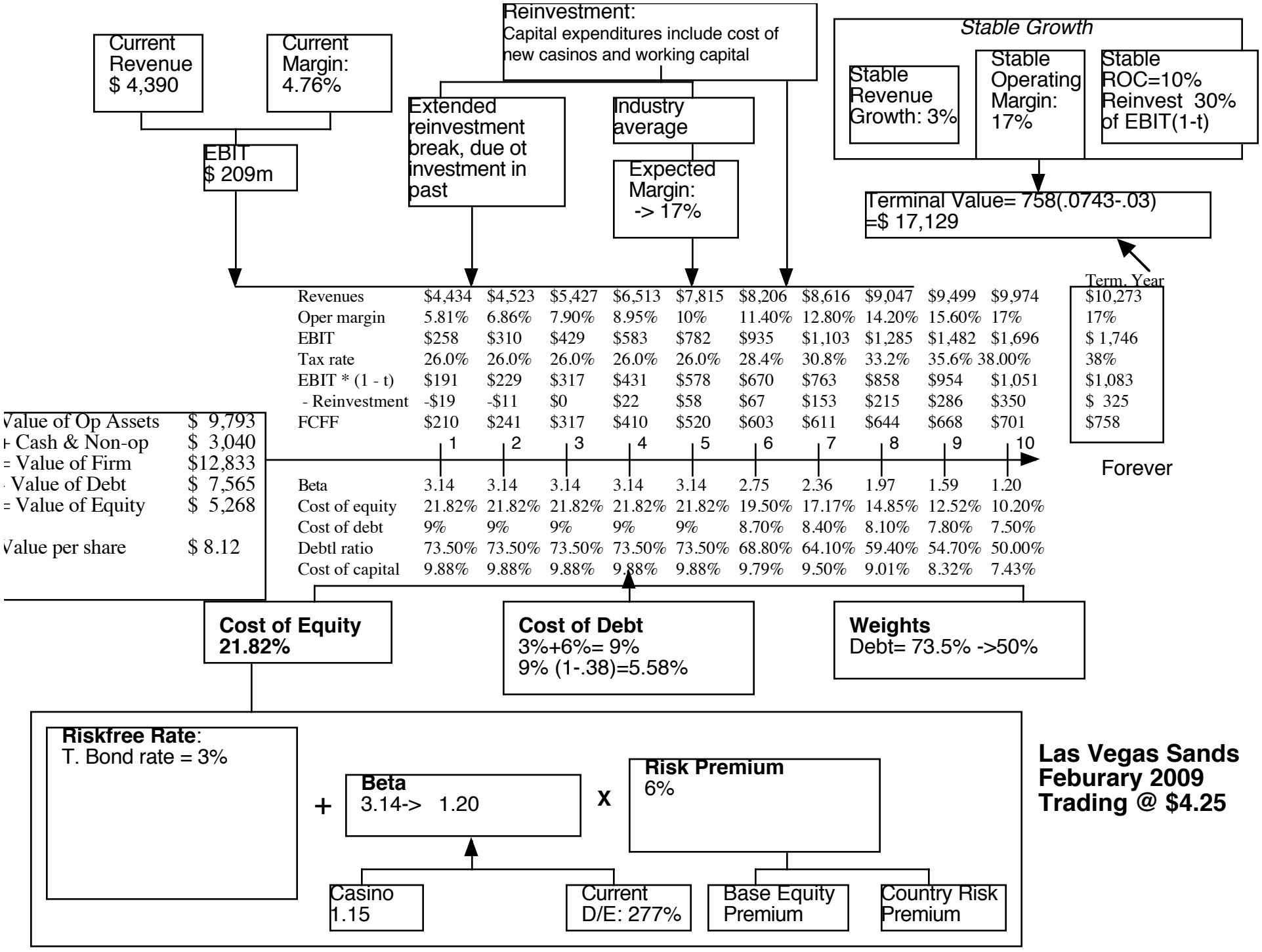
7.2: And reinvestment to go with growth…

- To grow, a company has to reinvest. How much it will have to reinvest depends in large part on how fast it wants to grow and what type of return it expects to earn on the reinvestment.
  - Reinvestment rate = Growth Rate/ Return on Capital
- Assume in the previous example that you were told that the return on capital was 10%. Estimate the reinvestment rate and the value of the business (with a 2% growth rate).

- What about with a 3% growth rate?

7.3: And you may not make it to Nirvana…

- Traditional valuation techniques are built on the assumption of a going concern, i.e., a firm that has continuing operations and there is no significant threat to these operations.
  - In discounted cashflow valuation, this going concern assumption finds its place most prominently in the terminal value calculation, which usually is based upon an infinite life and ever-growing cashflows.
  - In relative valuation, this going concern assumption often shows up implicitly because a firm is valued based upon how other firms - most of which are healthy - are priced by the market today.
- When there is a significant likelihood that a firm will not survive the immediate future (next few years), traditional valuation models may yield an over-optimistic estimate of value.


Current Revenue $ 4,390
Current Margin: 4.76%
EBIT $ 209m
Reinvestment: Capital expenditures include cost of new casinos and working capital
Extended reinvestment break, due ot investment in past
Industry average
Expected Margin: -> 17%
Stable Growth
Stable Revenue Growth: 3%
Stable Operating Margin: 17%
Stable ROC=10% Reinvest 30% of EBIT(1-t)
Terminal Value= 758(.0743-.03) =$ 17,129
Term. Year
Revenues $4,434 $4,523 $5,427 $6,513 $7,815 $8,206 $8,616 $9,047 $9,499 $9,974 $10,273
Oper margin 5.81% 6.86% 7.90% 8.95% 10% 11.40% 12.80% 14.20% 15.60% 17% 17%
EBIT $258 $310 $429 $583 $782 $935 $1,103 $1,285 $1,482 $1,696 $ 1,746
Tax rate 26.0% 26.0% 26.0% 26.0% 26.0% 28.4% 30.8% 33.2% 35.6% 38.00% 38%
EBIT * (1 - t) $191 $229 $317 $431 $578 $670 $763 $858 $954 $1,051 $1,083
- Reinvestment -$19 -$11 $0 $22 $58 $67 $153 $215 $286 $350 $ 325
FCFF $210 $241 $317 $410 $520 $603 $611 $644 $668 $701 $758
1 2 3 4 5 6 7 8 9 10
Forever
Value of Op Assets $ 9,793
+ Cash & Non-op $ 3,040
= Value of Firm $12,833
- Value of Debt $ 7,565
= Value of Equity $ 5,268
Value per share $ 8.12
Beta 3.14 3.14 3.14 3.14 3.14 2.75 2.36 1.97 1.59 1.20
Cost of equity 21.82% 21.82% 21.82% 21.82% 21.82% 19.50% 17.17% 14.85% 12.52% 10.20%
Cost of debt 9% 9% 9% 9% 9% 8.70% 8.40% 8.10% 7.80% 7.50%
Debtl ratio 73.50% 73.50% 73.50% 73.50% 73.50% 68.80% 64.10% 59.40% 54.70% 50.00%
Cost of capital 9.88% 9.88% 9.88% 9.88% 9.88% 9.79% 9.50% 9.01% 8.32% 7.43%
Cost of Equity 21.82%
Cost of Debt 3%+6%= 9% 9% (1-.38)=5.58%
Weights Debt= 73.5% ->50%
Riskfree Rate: T. Bond rate = 3%
+
Beta 3.14-> 1.20
X
Risk Premium 6%
Casino 1.15
Current D/E: 277%
Base Equity Premium
Country Risk Premium
Las Vegas Sands Feburary 2009 Trading @ $4.25

The Distress Factor

- In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at $529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

$$529 = \sum_{t=1}^{t=7} \frac{63.75(1-p_{Distress})^t}{(1.03)^t} + \frac{1000(1-p_{Distress})^7}{(1.03)^7}$$

- Solving for the probability of bankruptcy, we get:

$$\pi_{Distress} = \text{Annual probability of default} = 13.54\%$$

  - Cumulative probability of surviving 10 years = $(1 - .1354)^{10} = 23.34\%$
  - Cumulative probability of distress over 10 years = 1 - .2334 = .7666 or 76.66%
- If LVS is becomes distressed:
  - Expected distress sale proceeds = $2,769 million < Face value of debt
  - Expected equity value/share = $0.00
- Expected value per share = $8.12 (1 - .7666) + $0.00 (.2334) = $1.92

8. From firm value to equity value: Loose Ends…

- For a firm with consolidated financial statements, you have discounted free cashflows to the firm at the cost of capital to arrive at a firm value of $ 100 million. The firm has
  - A cash balance of $ 15 million
  - Debt outstanding of $ 20 million
  - A 5% holding in another company: the book value of this holding is $ 5 million. (Market value of equity in this company is $ 200 million)
  - Minority interests of $ 10 million on the balance sheet

a. What is the value of equity in this firm?

b. How would your answer change if you knew that the firm was the target of a lawsuit it is likely to win but where the potential payout could be $ 100 million if it loses?

c. Now assume that you are considering acquiring the firm and are told that it is "normal" to pay a 20% control premium. Would you go along? Why or why not?

8.1: A discount for cash…

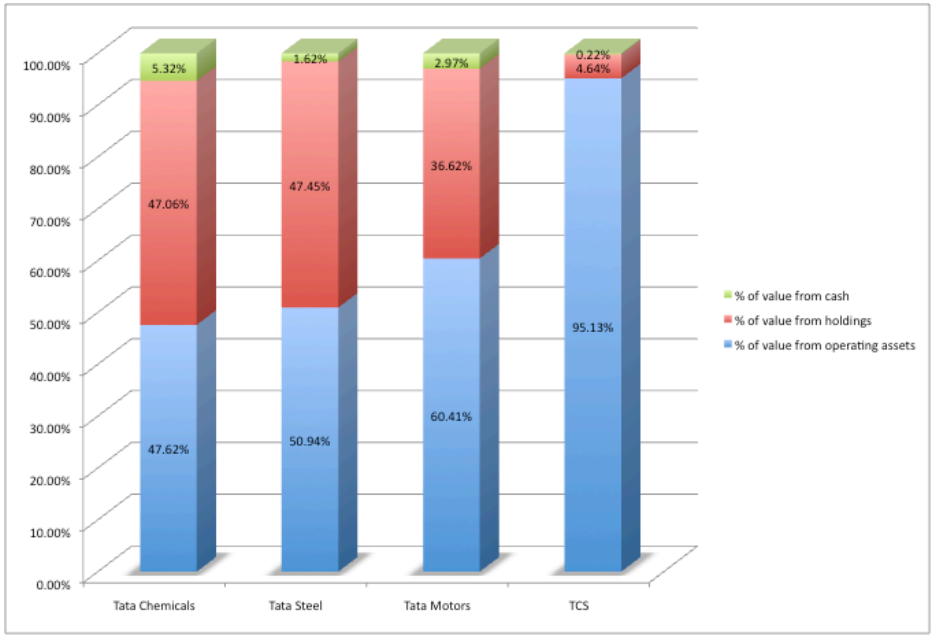
- The cash is invested in treasury bills, earning 3% a year. The cost of capital for the firm is 8% and its return on capital is 10%. An argument has been made that cash is a sub-optimal investment for the firm and should be discounted. Do you agree?
  - Yes
  - No
- If yes, what are the logical implications of firms paying dividends or buying back stock?
- If no, are there circumstances under which you would discount cash? How about attaching a premium?

8.2: Valuing Cross Holdings

- In a perfect world, we would strip the parent company from its subsidiaries and value each one separately. The value of the combined firm will be
  - Value of parent company + Proportion of value of each subsidiary
- To do this right, you will need to be provided detailed information on each subsidiary to estimate cash flows and discount rates.
- With limited or unreliable information, you can try one of these approximations:
  - The market value solution: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.
  - The relative value solution: When there are too many cross holdings to value separately or when there is insufficient information provided on cross holdings, you can convert the book values of holdings that you have on the balance sheet (for both minority holdings and minority interests in majority holdings) by using the average price to book value ratio of the sector in which the subsidiaries operate.

Getting to equity value: Tata Companies

	Tata Chemicals	Tata Steel	Tata Motors	TCS
Value of Operating Assets	INR 57,129	INR 501,661	INR 231,914	INR 1,355,361
+ Cash	INR 6,388	INR 15,906	INR 11,418	INR 3,188
+ Value of Holdings	INR 56,454	INR 467,315	INR 140,576	INR 66,141
Value of Firm	INR 119,971	INR 984,882	INR 383,908	INR 1,424,690
- Debt	INR 32,374	INR 235,697	INR 109,198	INR 505
- Options	INR 0	INR 0	INR 0	INR 0
Value of Equity	INR 87,597	INR 749,185	INR 274,710	INR 1,424,184
Value per share	INR 372.34	INR 844.43	INR 665.07	INR 727.66



8.3: No garnishing please… Control may have value… but is not always 20%

Exhibit 7.2: The value of control at Hormel Foods

Hormel Foods sells packaged meat and other food products and has been in existence as a publicly traded company for almost 80 years. In 2008, the firm reported after-tax operating income of $315 million, reflecting a compounded growth of 5% over the previous 5 years.

The Status Quo

Run by existing management, with conservative reinvestment policies (reinvestment rate = 14.34% and debt ratio = 10.4%.

Anemic growth rate and short growth period, due to reinvestment policy

Low debt ratio affects cost of capital

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	$315							
1	$324	2.75%	14.34%	19.14%	$62	$262	6.79%	$245
2	$333	2.75%	14.34%	19.14%	$64	$269	6.79%	$236
3	$342	2.75%	14.34%	19.14%	$65	$276	6.79%	$227
Beyond	$350	2.35%	7.23%	32.52%	$114	$4,840	7.23%	$3,974
Value of operating assets								$4,682
(Add) Cash								$155
(Subtract) Debt								$491
(Subtract) Management Options								$53
Value of equity in common stock								$4,293
Value per share								$31.91

New and better management

More aggressive reinvestment which increases the reinvestment rate (to 40%) and length of growth (to 5 years), and higher debt ratio (20%).

Operating Restructuring (1)
Expected growth rate = ROC * Reinvestment Rate
Expected growth rate (status quo) = 14.34% * 19.14% = 2.75%
Expected growth rate (optimal) = 14.00% * 40% = 5.60%
ROC drops, reinvestment rises and growth goes up.

Financial restructuring (2)
Cost of capital = Cost of equity (1-Debt ratio) + Cost of debt (Debt ratio)
Status quo = 7.33% (1-.104) + 3.60% (1-.40) (.104) = 6.79%
Optimal = 7.75% (1-.20) + 3.60% (1-.40) (.20) = 6.63%
Cost of equity rises but cost of capital drops.

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	$315							
1	$333	5.60%	14.00%	40.00%	$133	$200	6.63%	$187
2	$351	5.60%	14.00%	40.00%	$141	$211	6.63%	$185
3	$371	5.60%	14.00%	40.00%	$148	$223	6.63%	$184
4	$392	5.60%	14.00%	40.00%	$260	$235	6.63%	$182
5	$414	5.60%	14.00%	40.00%	$223	$248	6.63%	$180
Beyond	$423	2.35%	6.74%	34.87%	$148	$6,282	6.74%	$4,557
Value of operating assets								$5,475
(Add) Cash								$155
(Subtract) Debt								$491
(Subtract) Management Options								$53
Value of equity in common stock								$5,085
Value per share								$37.80

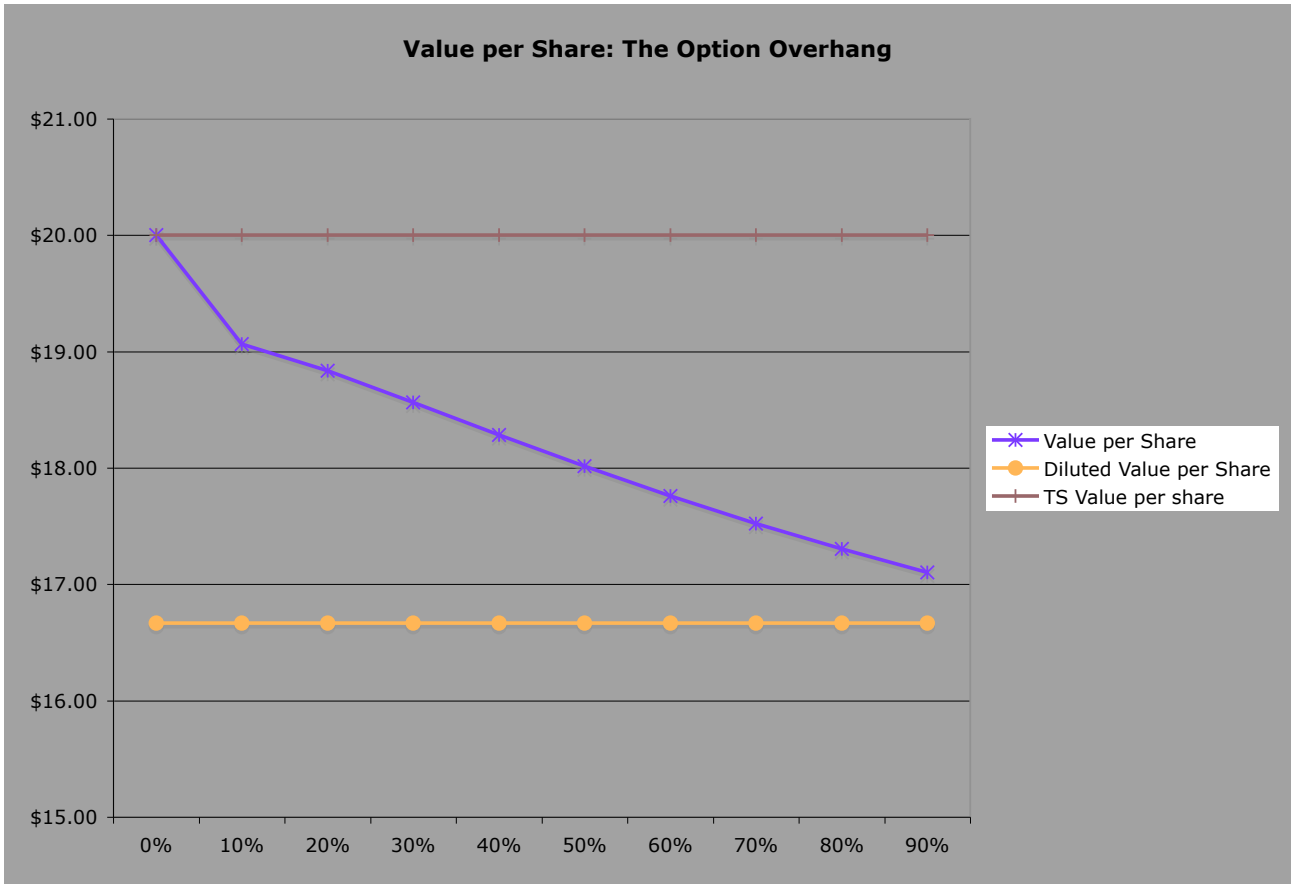
Probability of management change = 10% (3)
Expected value =$31.91 (.90) + $37.80 (.10) = $32.50 (4)

9. From equity value to equity value per share

- You have valued the equity in a firm at $ 200 million. Estimate the value of equity per share if there are 10 million shares outstanding.

- How would your answer change if you were told that there are 2 million employee options outstanding, with a strike price of $ 20 a share and 5 years left to expiration?

Value per share… as a function of stock price volatility and option maturity



10. The final circle of hell…

Exhibit 8

KENNECOTT COPPER CORPORATION

PROJECTED CARBORUNDUM COMPANY FINANCIAL DATA ADJUSTED TO REFLECT THE ACQUISITION OF CARBORUNDUM BY KENNNECOTT AT A PRICE OF $66 PER SHARE, 1977–1987

($ millions except for per share and ratio data)

	1977 Unadjusted	1977 Adjustments	1977 Adjusted	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Income statement													
Sales	$717.6			$790.1	$885.9	$1,005.2	$1,129.9	$1,265.5	$1,392.1	$1,531.3	$1,684.4	$1,852.8	$2,038.1
Net income (before adjustments)	38.4			43.1	50.7	60.1	70.6	84.7	93.2	102.5	112.7	124.0	136.4
Interest adjustment[2]	0			6.5	7.8	8.5	9.2	9.8	10.7	11.7	12.8	14.0	15.4
Goodwill adjustment[3]	0			2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Plant write-up adjustment[4]	0			2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Net income (after adjustments)	$38.4			$31.8	$38.1	$ 46.8	$ 56.6	$ 70.1	$ 77.7	$ 86.0	$ 95.1	$ 105.2	$ 116.2
Balance sheet													
Working capital	$198.8	+ 37.0 + 100.0 − 140.0	$195.8	$202.9	$223.0	$248.1	$274.2	$302.8	$329.3	$358.6	$390.7	$426.1	$465.0
Property, plant, and equipment	181.8	+ 124.0	305.8	334.2	367.4	384.6	400.1	411.6	437.5	466.6	499.1	535.6	576.1
Goodwill	0	+ 80.0	80.0	78.0	76.0	74.0	72.0	70.0	68.0	66.0	64.0	62.0	60.0
Total assets	584.3	+ 201.0	785.3	824.0	889.9	948.4	1,007.0	1,065.8	1,135.5	1,213.1	1,299.0	1,394.6	1,500.3
Long-term debt	86.2	+ 100.0	186.2	220.9	238.8	252.9	266.8	280.1	297.7	317.5	339.4	365.9	391.0
Shareholders' equity	309.0	+ 101.0	410.0	410.1	443.5	469.7	495.4	520.2	553.0	589.6	630.3	675.7	726.0
Total capital	395.2	+ 201.0	596.2	631.0	682.3	722.6	762.2	800.3	850.7	907.1	969.7	1,039.6	1,117.0
Capital sources													
Profit retentions				$ 0.1	$33.4	$26.2	$25.7	$24.8	$32.8	$36.6	$40.7	$45.4	$50.3
Capital contributed by Kennecott				—	—	—	—	—	—	—	—	—	—
Debt financing (net)				34.7	17.9	14.1	13.9	13.3	17.6	19.8	21.9	24.5	27.1
Total capital added				$34.8	$51.3	$40.3	$39.6	$38.1	$50.4	$56.4	$62.6	$69.9	$77.4
Key financial ratios													
Growth rate in sales (%)	16.9			10.1	12.1	13.5	12.4	12.0	10.0	10.0	10.0	10.0	10.0
Sales/assets	1.23			0.96	1.00	1.06	1.12	1.19	1.23	1.26	1.30	1.33	1.36
Profit/sales	.054			0.040	0.043	0.047	0.050	0.055	0.056	0.056	0.056	0.057	0.057
Assets/net worth	1.89			2.01	2.01	2.02	2.03	2.05	2.05	2.06	2.06	2.06	2.07
Profit/net worth	.124			0.078	0.086	0.100	0.114	0.135	0.141	0.146	0.151	0.156	0.160
Cash flow to Kennecott													
Acquisition of Carborundum			$(550.0)										
Dividends to Kennecott[5]			140.0	$31.7	$ 4.7	$20.6	$30.9	$45.3	$44.9	$49.4	$54.4	$59.8	$ 65.9
Utilization of Kennecott tax loss carryforwards[6]			—	20.0	20.0	—	—	—	—	—	—	—	—
Tax shelter from plant write-up adj.[4]				2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8
Terminal value at 10 times earnings[7]													1,044.9
Net cash flow			$(410.0)	$54.5	$27.5	$23.4	$33.7	$48.1	$47.7	$52.2	$57.2	$62.6	$1,113.6

Assumptions:

[1]Kennecott would pay $550 million to acquire Carborundum's equity which had a book value of $309 million. The $241 million in excess of purchase price over book value of assets acquired would be allocated as follows: (a) $57.0 million would be added to inventory to reflect the replacement cost of inventories; (b) $11.0 million would be added to land to reflect the market value of land; (c) $113 million would be added to net plant and equipment to reflect the depreciated replacement cost of plant and equipment; and (d) $80 million would be added to goodwill. Immediately following the acquisition of Carborundum, Carborundum borrows $100 million and then pays a $140 million dividend to Kennecott. This dividend is financed with the $100 million plus $40 million of Carborundum's excess cash.

[2]Interest at the rate of 10% (5% after taxes) is paid on the difference between the amount of Carborundum debt outstanding in Exhibit 8 and the amount of debt assumed to be outstanding in Exhibit 5. In Exhibit 8, it is assumed that Carborundum will have 35% debt in its total capital structure after 1977.

[3]The $80 million of goodwill created as a result of the acquisition is amortized over 40 years. This expense is not tax-deductible.

[4]The $113 million write-up of plant and equipment is depreciated over a 20-year life, providing a reduction in profit after taxes and an increase in cash flow equal to ($113/20) x .5. It is assumed that this added cash flow is paid to Kennecott as dividends.

[5]Dividends to Kennecott equal the difference between Carborundum's net profit (after adjustment) and the profit retention requirements needed to support Carborundum's growth.

[6]The utilization of $40 million of tax loss carry-forwards and investment tax credit carryforwards available to Kennecott are assumed to be utilized as a result of the Carborundum acquisition and that these would expire unutilized without the acquisition.

[7]Carborundum is assumed to be sold at the end of ten years at a price equal to ten times earnings. The proceeds from this sale, $1,162 million, are reduced by $117.1 million as a result of taxes on the capital gain of $1,162–$726. Carborundum's net worth at 12/31/87 is assumed to be $726 million.

Sources: Exhibit 5 and casewriter projections.

	Cost of Equity	Cost of Capital
Kennecott Corp (Acquirer)	13.0%	10.5%
Carborandum (Target)	16.5%	12.5%

Some closing thoughts on valuation…

- View "paradigm shifts" with skepticism.
- Focus on the big picture; don't let the details trip you up.
- Keep your perspective; it is only a valuation.
- If you have to choose between valuation skills and luck….