

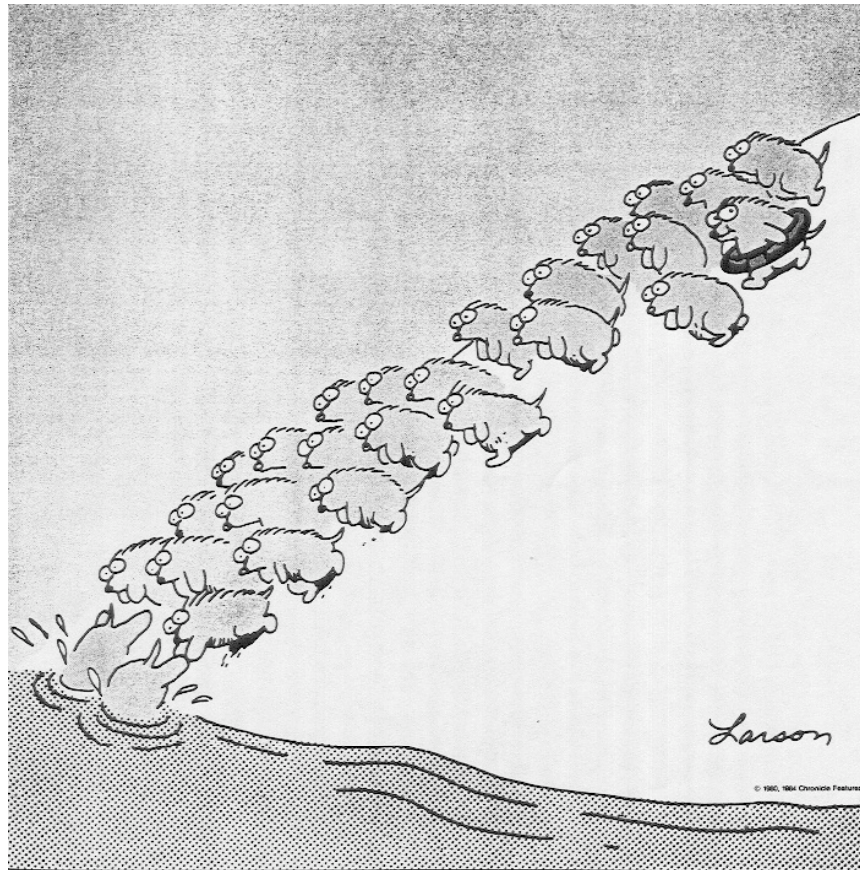
Valuation: Many a slip between the cup and the lip...

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Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti



Misconceptions about Valuation

- Myth 1: A valuation is an objective search for “true” value
 - Truth 1.1: All valuations are biased. The only questions are how much and in which direction.
 - Truth 1.2: The direction and magnitude of the bias in your valuation is directly proportional to who pays you and how much you are paid.
- Myth 2.: A good valuation provides a precise estimate of value
 - Truth 2.1: There are no precise valuations
 - Truth 2.2: The payoff to valuation is greatest when valuation is least precise.
- Myth 3: . The more quantitative a model, the better the valuation
 - Truth 3.1: One’s understanding of a valuation model is inversely proportional to the number of inputs required for the model.
 - Truth 3.2: Simpler valuation models do much better than complex ones.

Approaches to Valuation

- **Discounted cashflow valuation**, relates the value of an asset to the present value of expected future cashflows on that asset.
- **Relative valuation**, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cashflows, book value or sales.
- **Contingent claim valuation**, uses option pricing models to measure the value of assets that share option characteristics.

Discounted Cash Flow Valuation

- **What is it:** In discounted cash flow valuation, the value of an asset is the present value of the expected cash flows on the asset.
- **Philosophical Basis:** Every asset has an intrinsic value that can be estimated, based upon its characteristics in terms of cash flows, growth and risk.
- **Information Needed:** To use discounted cash flow valuation, you need
 - to estimate the life of the asset
 - to estimate the cash flows during the life of the asset
 - to estimate the discount rate to apply to these cash flows to get present value
- **Market Inefficiency:** Markets are assumed to make mistakes in pricing assets across time, and are assumed to correct themselves over time, as new information comes out about assets.

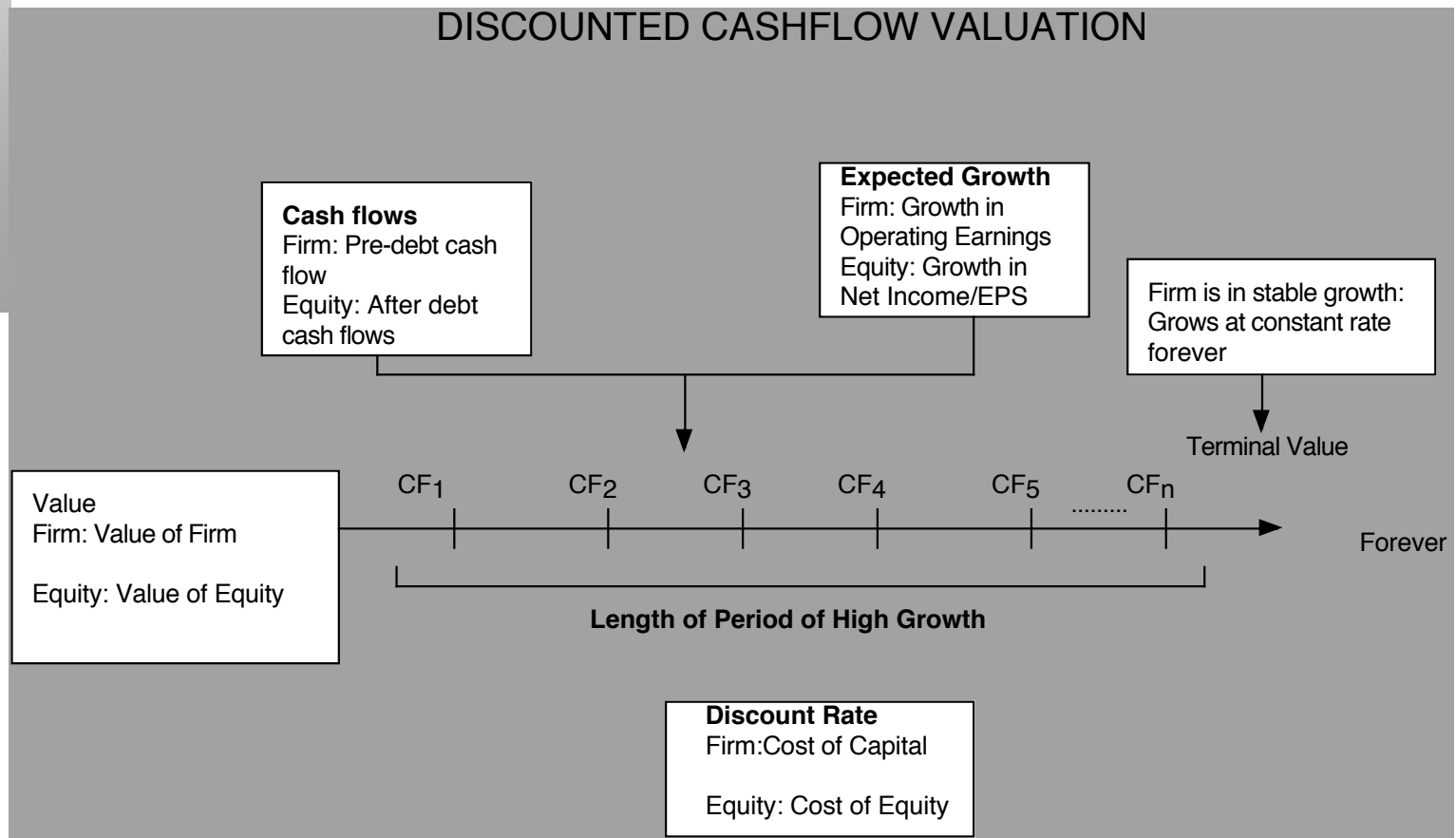
DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

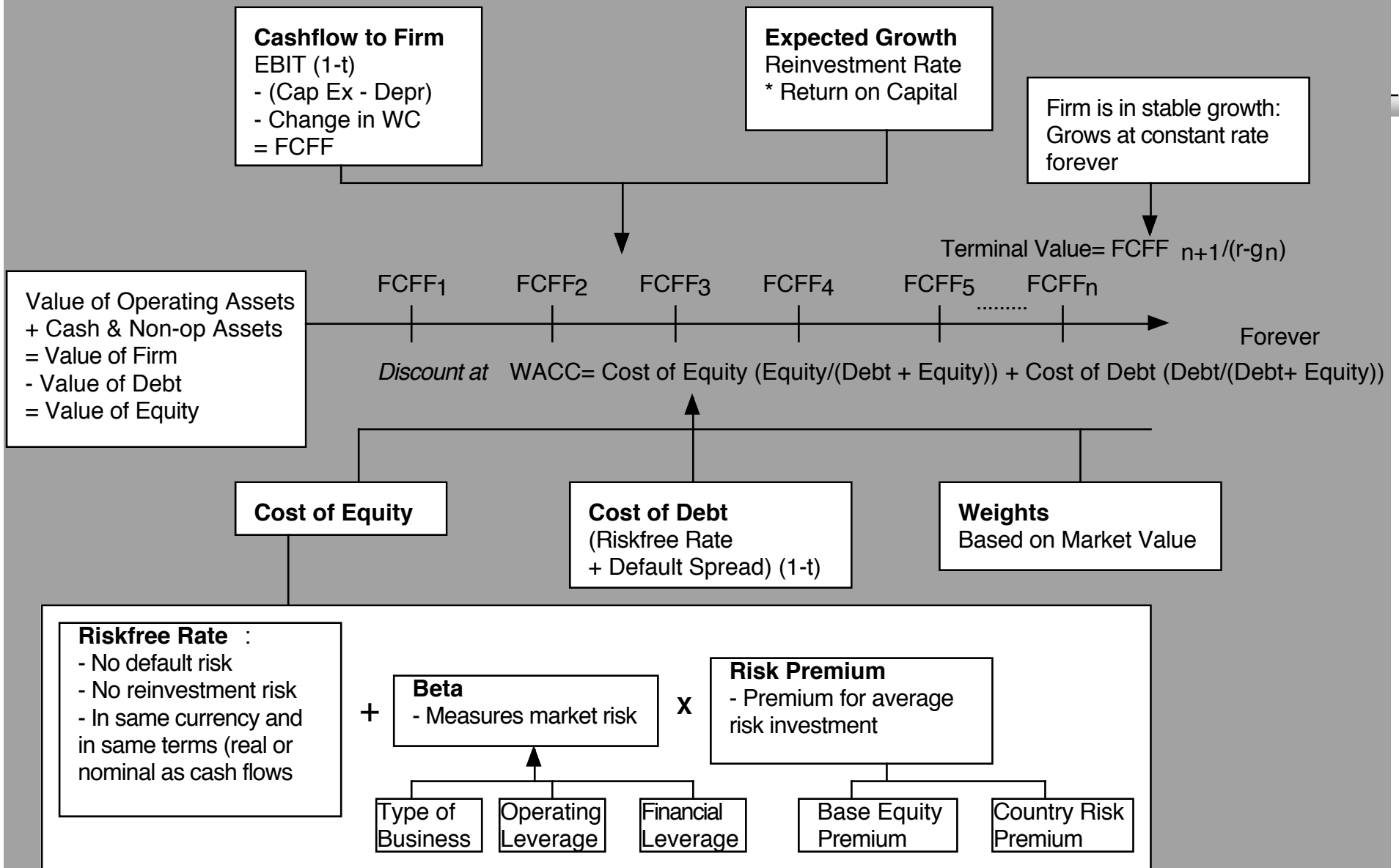
Assets		Liabilities	
Existing Investments Generate cashflows today Includes long lived (fixed) and short-lived (working capital) assets	Assets in Place	Debt	Fixed Claim on cash flows Little or No role in management <i>Fixed Maturity</i> <i>Tax Deductible</i>
Expected Value that will be created by future investments	Growth Assets	Equity	Residual Claim on cash flows Significant Role in management <i>Perpetual Lives</i>

Equity valuation: Value just the equity claim in the business

Valuation with Infinite Life



DISCOUNTED CASHFLOW VALUATION



Tata Chemicals: Status Quo

Average Reinvestment Rate (1999-2003) = 41%

Return on Capital 9.01%

Current Cashflow to Firm
 EBIT(1-t) : 2210
 - Nt CpX 366
 - Chg WC 155
 = FCFF 1689
 Reinvestment Rate = 521/1689 = 23.58%

Reinvestment Rate 41%

Expected Growth in EBIT (1-t)
 $.41 * .0901 = .0369$
3.69%

Stable Growth
 g = 3%; Beta = 0.9;
 Country Premium = 1.3%
 Debt Ratio = 23.7%
 Cost of capital = 9.19%
 ROC = 9.19%; Tax rate = 30%
 Reinvestment Rate = $g/ROC = 3/9.19 = 32.63%$

Terminal Value₅ = $1838 / (.0919 - .03) = 29,676$

Op. Assets 23,524
 + Cash: 2,904
 - Debt 7,660
 = Equity 18,768
 - Options 0
 Equity 18,768
 Value/Sh Rs 104/sh

Year	1	2	3	4	5
EBIT (1-t)	2291	2376	2464	2555	2649
- Reinvestment	939	974	1010	1047	1086
FCFF	1352	1402	1454	1507	1563

Term Yr
 2,728
 - 890
 = 1838

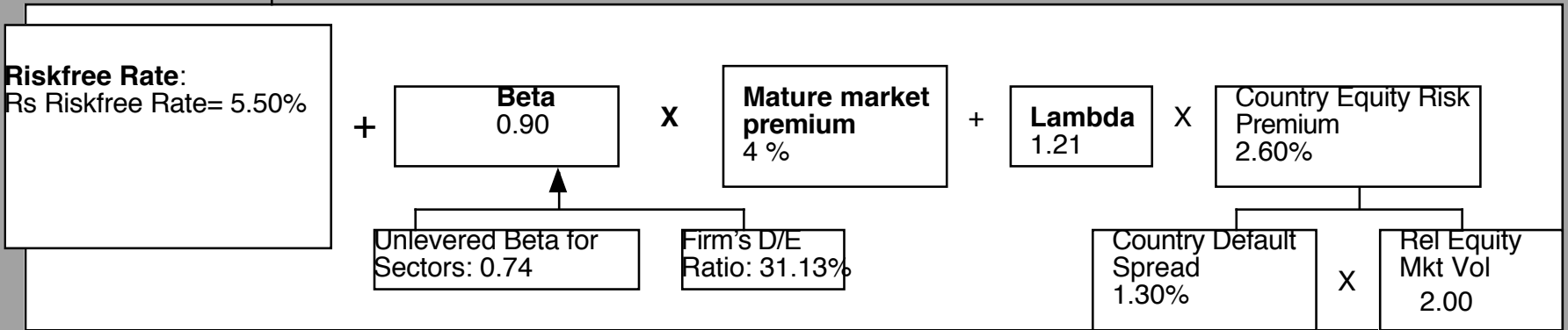
Discount at Cost of Capital (WACC) = 12.25% (.763) + 4.45% (0.237) = 10.39%

Cost of Equity 12.25%

Cost of Debt
 $(5.50\% + 0.85\%)(1 - .30) = 4.45\%$

Weights
 E = 76.3% D = 23.7%

On June 15, 2004
 Tata Chem = Rs 136.2



Average Reinvestment Rate (1999-2003) = 75.47%

Current Cashflow to Firm
 EBIT(1-t) : 9485
 - Nt CpX 2594
 - Chg WC 341
 = FCFF 6550
 Reinvestment Rate = 2935/9485 = 30.95%

Reinvestment Rate 75.47%

Expected Growth in EBIT (1-t)
 $.7547 * .2682 = .2024$
20.24%

Return on Capital 26.82%

Wipro: Status Quo

Stable Growth
 $g = 5\%$; Beta = 1.0;
 Country Premium = 1.3%
 Debt Ratio = 20%
 Cost of capital = 8.83%
 ROC = 8.83%; Tax rate = 25%
 Reinvestment Rate = $g/ROC = 5/8.83 = 56.60\%$

First 5 years

Terminal Value₅ = $16163 / (.0883 - .05) = 421,583$

Op. Assets 196,704
 + Cash: 28792
 - Debt 1054
 - Minority Int. 524
 = Equity 223,917
 - Options 1,971
 Equity 221,946
 Value/Sh Rs 960/sh

Year	1	2	3	4	5	6	7	8	9	10
EBIT	13418	16134	19400	23327	28048	32871	37521	41684	45039	47291
EBIT (1-t)	11405	13714	16490	19828	23841	27940	31893	35432	38283	40198
- Reinvestment	8608	10350	12445	14964	17993	20033	21663	22729	23114	22752
FCFF	2797	3364	4045	4863	5848	7908	10230	12703	15170	17446

Term Yr
 49656
 37242
 21079
 =16163

Adjust beta to 1, debt ratio to 20% in years 6-10

Discount at Cost of Capital (WACC) = 11.33% (.997) + 4.97% (0.003) = 11.31%

Cost of Equity 11.33%

Cost of Debt
 $(5.50\% + 0.35\%)(1 - .15) = 4.97\%$

Weights
 E = 99.7% D = 0.3%

On June 15, 2004
 Wipro price = Rs 1523

Riskfree Rate:
 Rs Riskfree Rate = 5.50%

+ **Beta 1.2480**

x **Mature market premium 4%**

+ **Lambda 0.32**

x **Country Equity Risk Premium 2.60%**

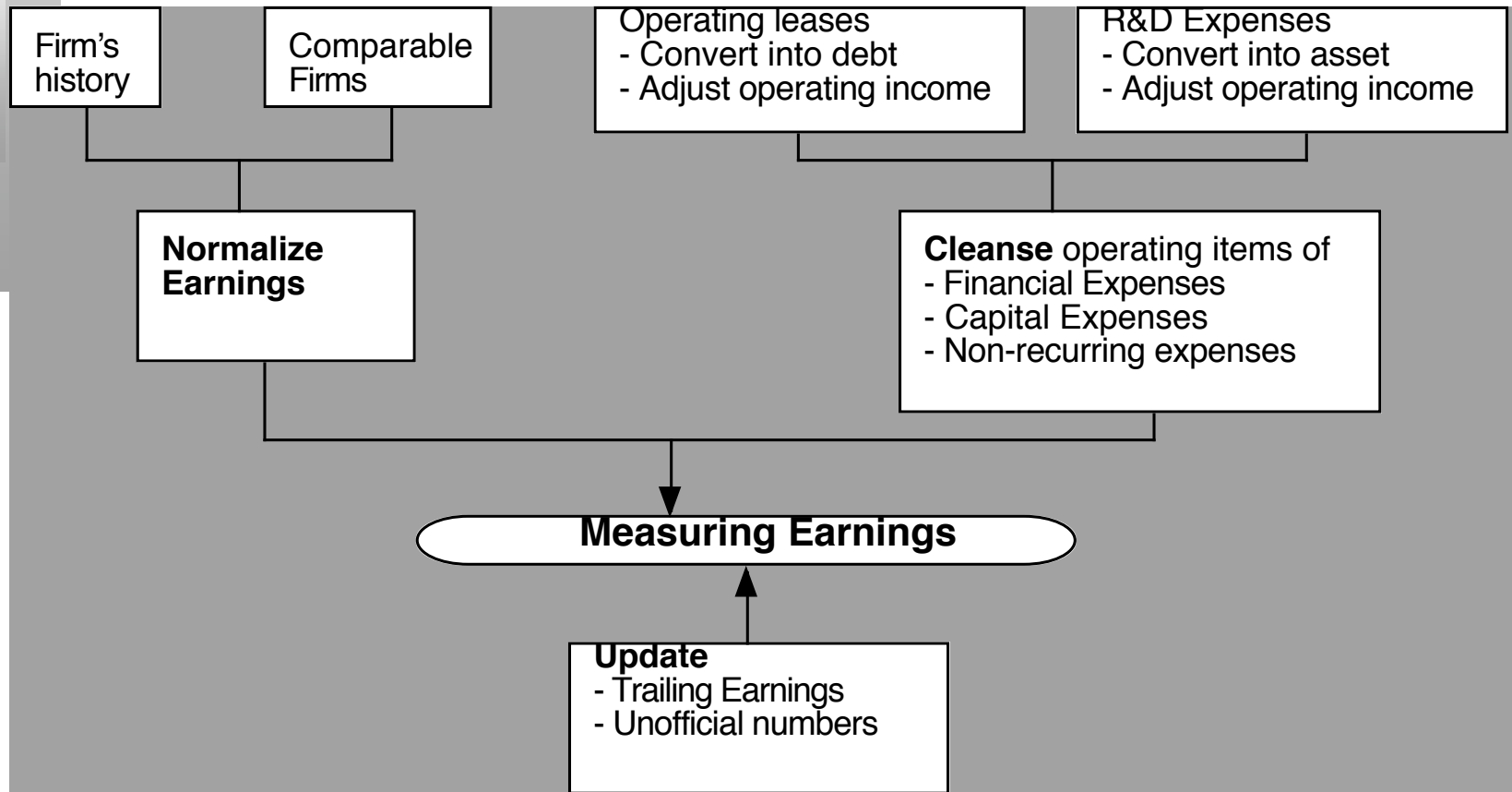
Unlevered Beta for Sectors: 1.2446

Firm's D/E Ratio: 0.30%

Country Default Spread 1.30%

x Rel Equity Mkt Vol 2.00

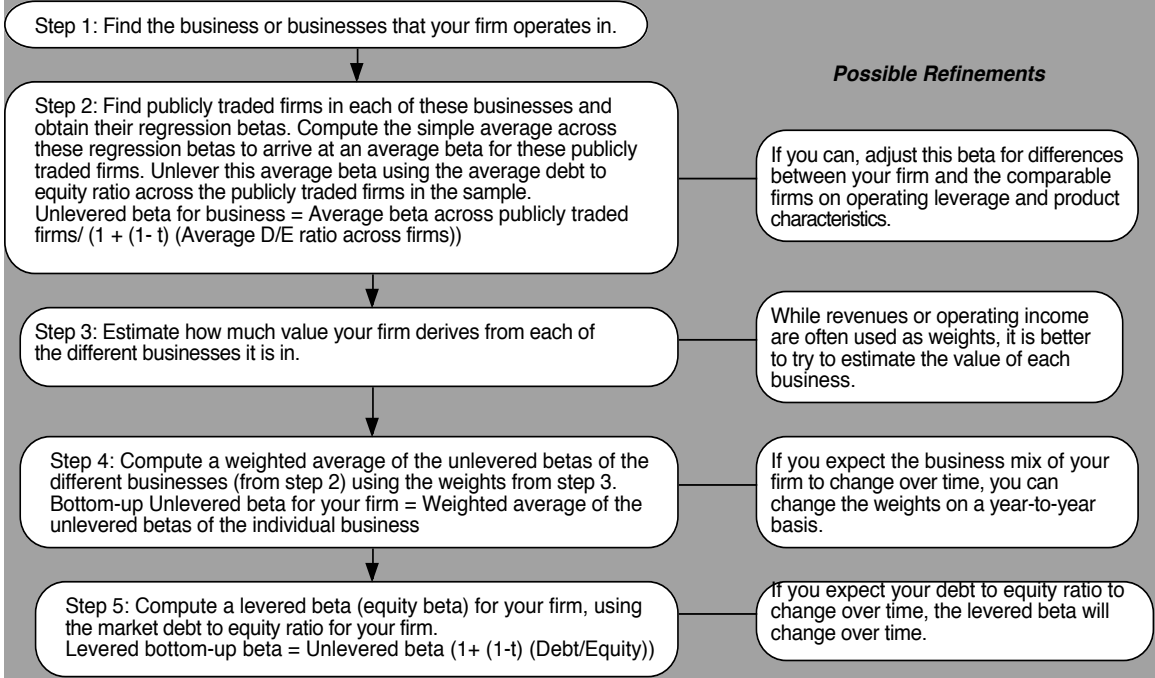
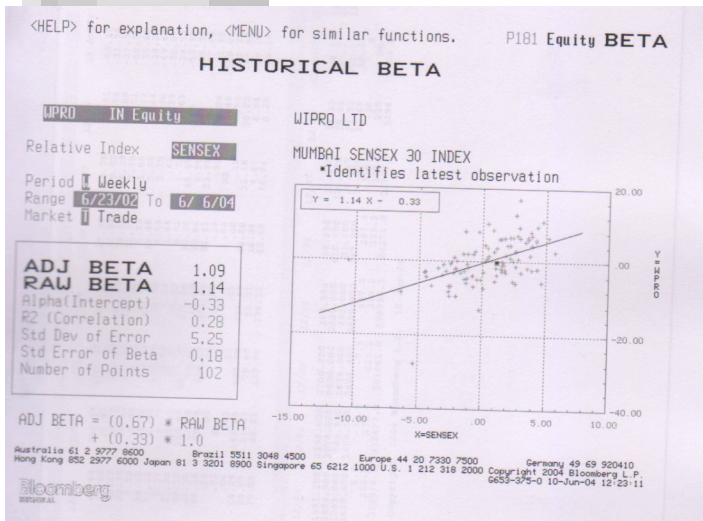
I. Measure earnings right..



II. Get the big picture (not the accounting one) when it comes to cap ex and working capital

- Capital expenditures should include
 - Research and development expenses, once they have been re-categorized as capital expenses.
 - Acquisitions of other firms, whether paid for with cash or stock.
- Working capital should be defined not as the difference between current assets and current liabilities but as the difference between non-cash current assets and non-debt current liabilities.
- On both items, start with what the company did in the most recent year but do look at the company's history and at industry averages.

III. Betas don't come from regressions or services



Business Mix	Revenues	Operating Income	Weights	Unlevered beta	Debt/Equity	Levered Beta
Consulting and Service	36803	7128	63.88%	0.98	0.30%	0.98
Software	16534	3203	28.70%	1.97	0.30%	1.98
Consumer products	5475	828	7.42%	0.72	0.30%	0.72
		11159		1.24	0.30%	1.25

IV. And the past is not always a good indicator of the future

- It is standard practice to use historical premiums as forward looking premiums. :

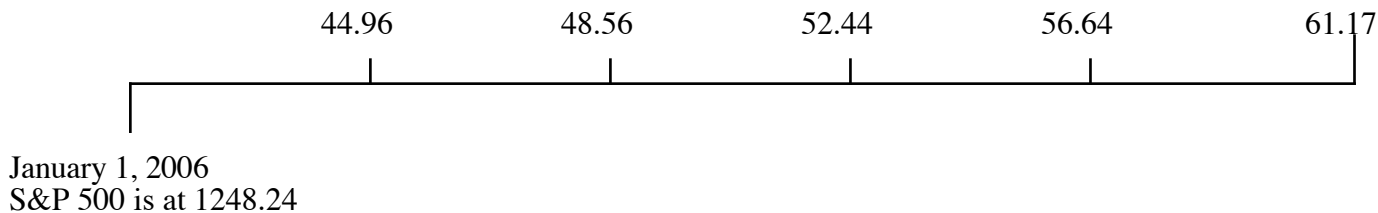
Historical Period	<i>Arithmetic average</i>		<i>Geometric Average</i>	
	Stocks - T.Bills	Stocks - T.Bonds	Stocks - T.Bills	Stocks - T.Bonds
1928-2005	7.83%	5.95%	6.47%	4.80%
1964-2005	5.52%	4.29%	4.08%	3.21%
1994-2005	8.80%	7.07%	5.15%	3.76%

- An alternative is to back out the premium from market prices:

In 2005, dividends & stock buybacks were 3.34% of the index, generating 41.63.in cashflows

Analyst estimate of growth in net income for S&P 500 over next 5 years = 8%

After year 5, we will assume that earnings on the index will grow at 4.39%, the same rate as the entire economy



- Implied Equity risk premium = Expected return on stocks - Treasury bond rate = 8.47%-4.39% = 4.08%

V. There is a downside to globalization...

- Emerging markets offer growth opportunities but they are also riskier. If we want to count the growth, we have to also consider the risk.
- Consider, for example, India as a country. In mid-2004, India was rated Baa2, with a default spread of 1.30%.
 - To estimate the country equity risk premium, we scaled up the default spread to reflect the additional risk in equities.
 - Standard Deviation in BSE = 32%
 - Standard Deviation in Indian Government Bond = 16%
 - Additional country risk premium = 1.30% $(32/16) = 2.60\%$

VI. And it is not just emerging market companies that are exposed to this risk..

- If we treat country risk as a separate risk factor and allow firms to have different exposures to country risk (perhaps based upon the proportion of their revenues come from non-domestic sales)

$$E(\text{Return}) = \text{Riskfree Rate} + \beta (\text{US premium}) + \lambda (\text{Country ERP})$$

- The easiest and most accessible data is on revenues. Most companies break their revenues down by region. One simplistic solution would be to do the following:
 $\lambda = \% \text{ of revenues domestically}_{\text{firm}} / \% \text{ of revenues domestically}_{\text{avg firm}}$

- Consider, for instance, Tata Chemicals and Wipro. Tata Chemicals gets 98% of its revenues in India whereas Wipro gets only 26% of its revenues in India. The average Indian company gets about 81% of its revenues in India:

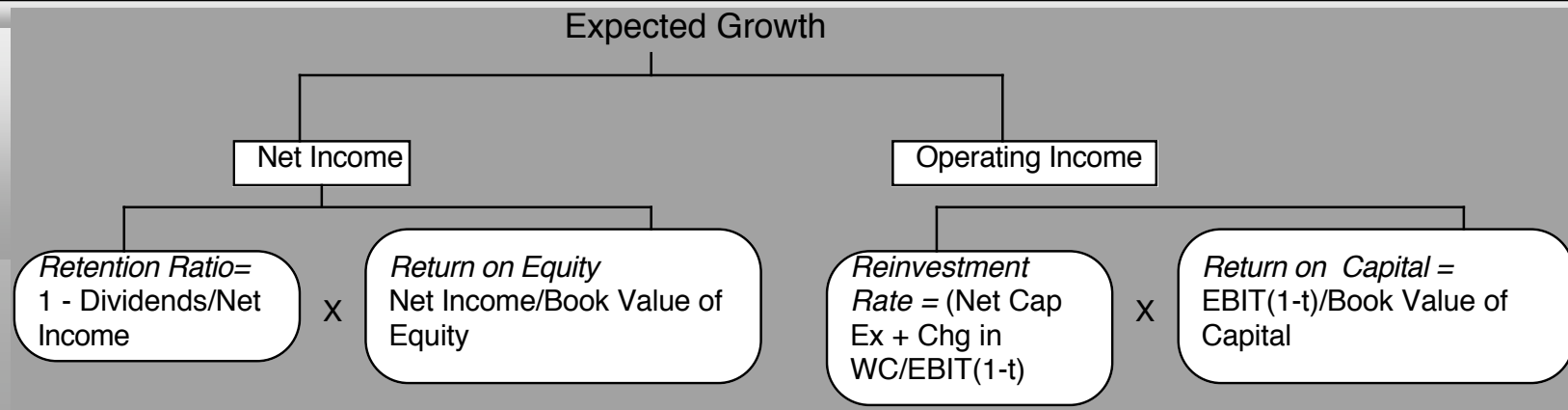
- $\text{Lambda}_{\text{Wipro}} = 26\% / 81\% = .32$
- $\text{Lambda}_{\text{Tata Chemicals}} = 98\% / 81\% = 1.21$

- There are two implications
 - A company's risk exposure is determined by where it does business and not by where it is located
 - Firms might be able to actively manage their country risk exposures

VII. Discount rates can (and often should) change over time...

- The inputs into the cost of capital - the cost of equity (beta), the cost of debt (default risk) and the debt ratio - can change over time. For younger firms, they should change over time.
- At the minimum, they should change when you get to your terminal year to inputs that better reflect a mature firm.

VIII. Growth has to be earned (not endowed or estimated)



Adjust EBIT for

- Extraordinary or one-time expenses or income
- Operating leases and R&D
- Cyclicality in earnings (Normalize)
- Acquisition Debris (Goodwill amortization etc.)

Use a marginal tax rate to be safe. A high ROC created by paying low effective taxes is not sustainable

$$\text{ROC} = \frac{\text{EBIT (1- tax rate)}}{\text{Book Value of Equity + Book value of debt - Cash}}$$

Adjust book equity for

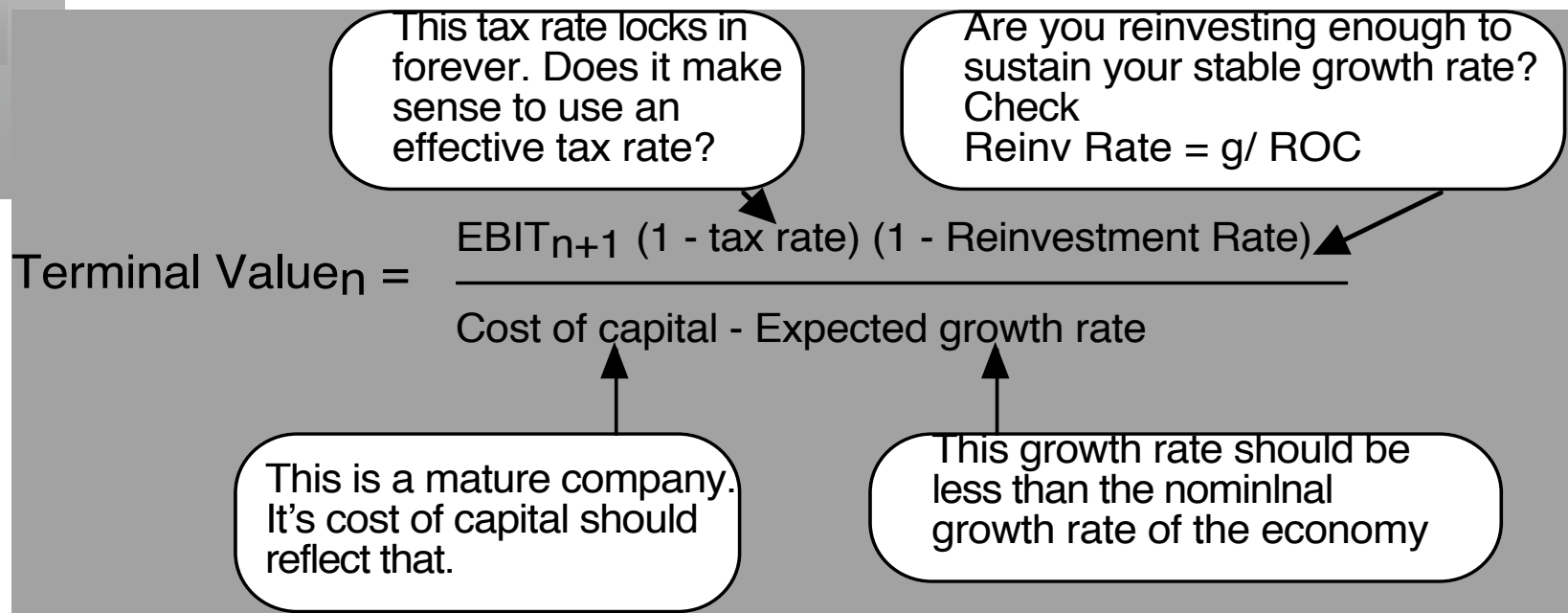
- Capitalized R&D
- Acquisition Debris (Goodwill)

Adjust book value of debt for

- Capitalized operating leases

Use end of prior year numbers or average over the year but be consistent in your application

IX. All good things come to an end..And the terminal value is not an ATM...



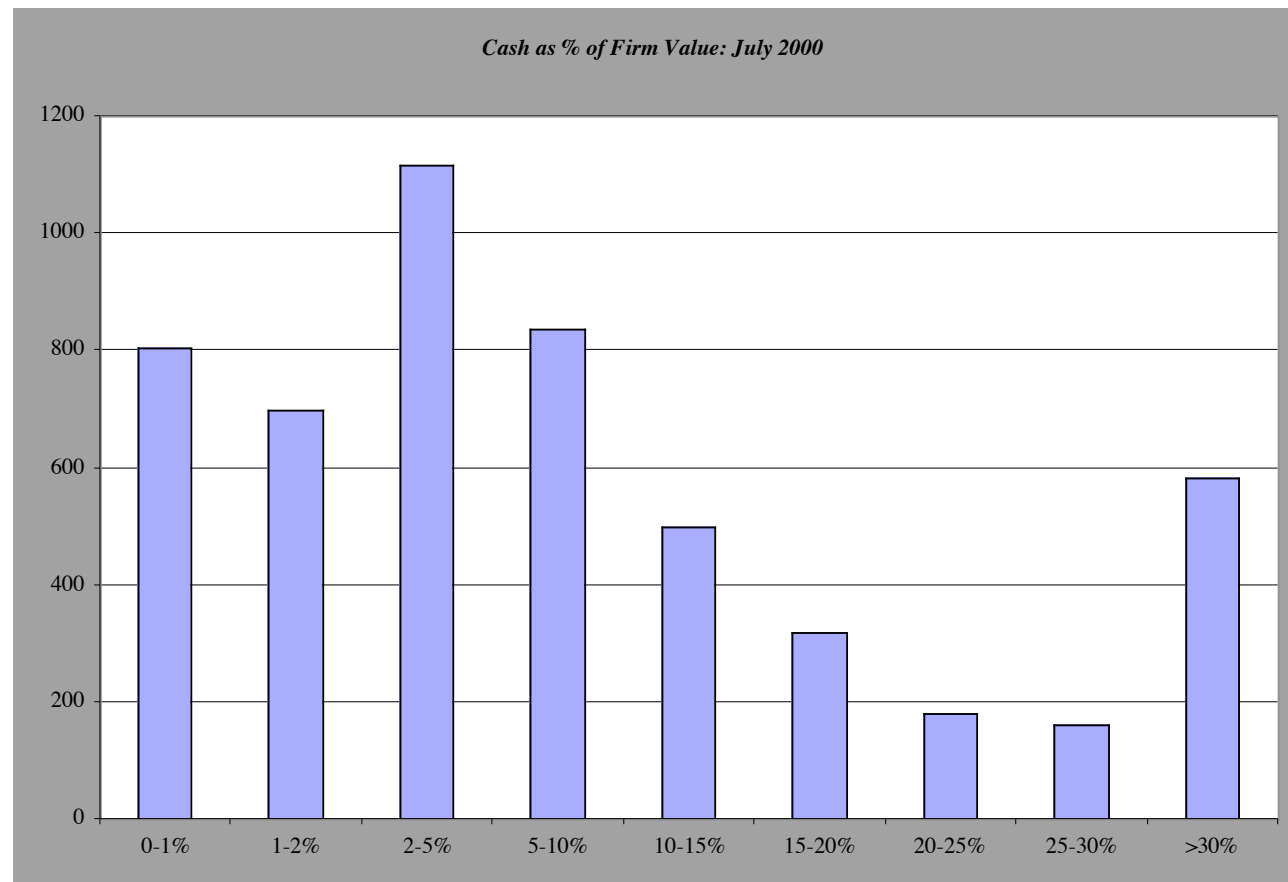
X. The loose ends matter...

Value of Operating Assets	Since this is a discounted cashflow valuation, should there be a real option premium?
+ Cash and Marketable Securities	Operating versus Non-operating cash Should cash be discounted for earning a low return?
+ Value of Cross Holdings	How do you value cross holdings in other companies? What if the cross holdings are in private businesses?
+ Value of Other Assets	What about other valuable assets? How do you consider under utilized assets?
Value of Firm	Should you discount this value for opacity or complexity? How about a premium for synergy? What about a premium for intangibles (brand name)?
- Value of Debt	What should be counted in debt? Should you subtract book or market value of debt? What about other obligations (pension fund and health care)? What about contingent liabilities? What about minority interests?
= Value of Equity	Should there be a premium/discount for control? Should there be a discount for distress
- Value of Equity Options	What equity options should be valued here (vested versus non-vested)? How do you value equity options?
= Value of Common Stock	Should you divide by primary or diluted shares?
/ Number of shares	
= Value per share	Should there be a discount for illiquidity/ marketability? Should there be a discount for minority interests?

1a. The Value of Cash

- The simplest and most direct way of dealing with cash and marketable securities is to keep it out of the valuation - the cash flows should be before interest income from cash and securities, and the discount rate should not be contaminated by the inclusion of cash. (Use betas of the operating assets alone to estimate the cost of equity).
- Once the operating assets have been valued, you should add back the value of cash and marketable securities.

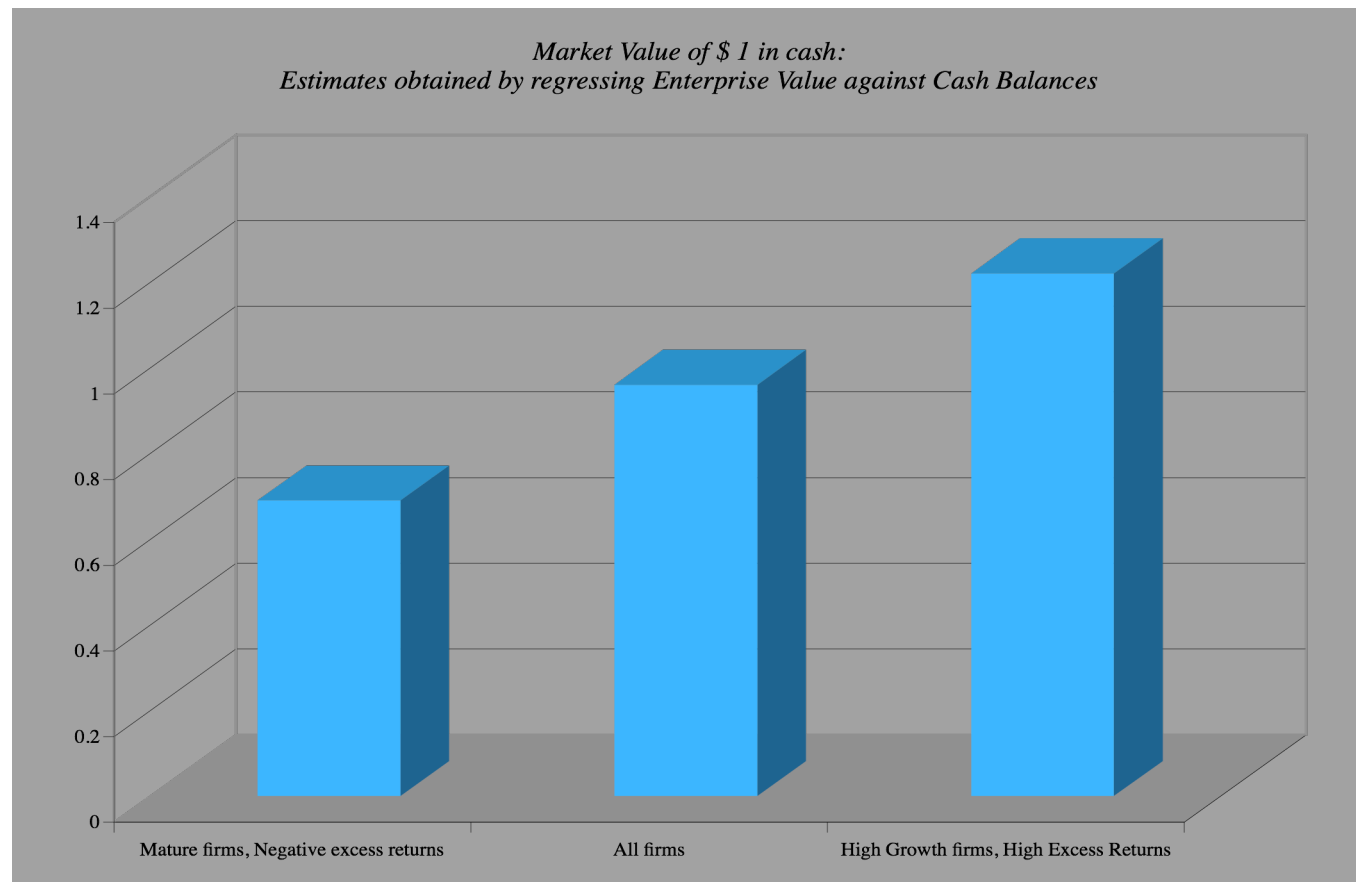
How much cash is too much cash?



Should you ever discount cash for its low returns?

- There are some analysts who argue that companies with a lot of cash on their balance sheets should be penalized by having the excess cash discounted to reflect the fact that it earns a low return.
 - Excess cash is usually defined as holding cash that is greater than what the firm needs for operations.
 - A low return is defined as a return lower than what the firm earns on its non-cash investments.
- This is the wrong reason for discounting cash. If the cash is invested in riskless securities, it should earn a low rate of return. As long as the return is high enough, given the riskless nature of the investment, cash does not destroy value.
- There is a right reason, though, that may apply to some companies...

Cash: Discount or Premium?



1b. Dealing with Holdings in Other firms

- Holdings in other firms can be categorized into
 - Minority passive holdings, in which case only the dividend from the holdings is shown in the balance sheet
 - Minority active holdings, in which case the share of equity income is shown in the income statements
 - Majority active holdings, in which case the financial statements are consolidated.

How to value holdings in other firms.. In a perfect world..

- 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 estimated cash flows and discount rates.

Two compromise solutions...

- 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.

2. Other Assets that have not been counted yet..

- **Unutilized assets:** If you have assets or property that are not being utilized (vacant land, for example), you have not valued it yet. You can assess a market value for these assets and add them on to the value of the firm.
- **Overfunded pension plans:** If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:
 - Collective bargaining agreements may prevent you from laying claim to these excess assets.
 - There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates.

Do not double count an asset. If you count the income from an asset in your cashflows, you cannot count the market value of the asset in your value.

3. A Discount for Complexity: An Experiment

	<i>Company A</i>	<i>Company B</i>
Operating Income	\$ 1 billion	\$ 1 billion
Tax rate	40%	40%
ROIC	10%	10%
Expected Growth	5%	5%
Cost of capital	8%	8%
Business Mix	Single Business	Multiple Businesses
Holdings	Simple	Complex
Accounting	Transparent	Opaque

- *Which firm would you value more highly?*

Sources of Complexity

- Accounting Standards
 - Inconsistency in applying accounting principles (Operating leases, R&D etc.)
 - Fuzzy Accounting Standards (One-time charges, hidden assets)
 - Unintended Consequences of Increased Disclosure
- Nature and mix of businesses
 - Multiple businesses (Eg. GE)
 - Multiple countries (Eg. Coca Cola)
- Structuring of businesses
 - Cross Holdings (The Japanese Curse)
 - Creative Holding Structures (Enronitis)
- Financing Choices
 - Growth of Hybrids
 - New Securities (Playing the Ratings Game)

Reasons for Complexity

- Control
 - Complex holding structures were designed to make it more difficult for outsiders (which includes investors) to know how much a firm is worth, how much it is making and what assets it holds.
 - Multiple classes of shares and financing choices also make it more likely that incumbents can retain control in the event of a challenge.
- Tax Benefits
 - Complex tax law begets complex business mixes and holding structures.
 - Different tax rates for different locales and different transactions
 - Tax credits
- Deceit

Measuring Complexity: Volume of Data in Financial Statements

<i>Company</i>	<i>Number of pages in last 10Q</i>	<i>Number of pages in last 10K</i>
General Electric	65	410
Microsoft	63	218
Wal-mart	38	244
Exxon Mobil	86	332
Pfizer	171	460
Citigroup	252	1026
Intel	69	215
AIG	164	720
Johnson & Johnson	63	218
IBM	85	353

Measuring Complexity: A Complexity Score

<i>Item</i>	<i>Factors</i>	<i>Follow-up Question</i>	<i>Answer</i>	<i>Complexity score</i>
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	2	4
	2. One-time income and expenses	Percent of operating income =	20%	1
	3. Income from unspecified sources	Percent of operating income =	15%	0.75
	4. Items in income statement that are volatile	Percent of operating income =	5%	0.25
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	100%	3
	2. Different tax and reporting books	Yes or No	Yes	3
	3. Headquarters in tax havens	Yes or No	Yes	3
	4. Volatile effective tax rate	Yes or No	Yes	2
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	2
	2. Frequent and large acquisitions	Yes or No	Yes	4
	3. Stock payment for acquisitions and investments	Yes or No	Yes	4
Working capital	1. Unspecified current assets and current liabilities	Yes or No	Yes	3
	2. Volatile working capital items	Yes or No	Yes	2
Expected Growth rate	1. Off-balance sheet assets and liabilities (operating leases and R&D)	Yes or No	Yes	3
	2. Substantial stock buybacks	Yes or No	Yes	3
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	Yes	5
Cost of capital	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	2	2
	2. Operations in emerging markets	Percent of revenues=	30%	1.5
	3. Is the debt market traded?	Yes or No	Yes	0
	4. Does the company have a rating?	Yes or No	Yes	0
	5. Does the company have off-balance sheet debt?	Yes or No	No	0
Complexity Score =				51.5

Dealing with Complexity

- The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
- The Conservative Analyst: Don't value what you cannot see.
- The Compromise: Adjust the value for complexity
 - Adjust cash flows for complexity
 - Adjust the discount rate for complexity
 - Adjust the expected growth rate/ length of growth period
 - Value the firm and then discount value for complexity

With the hundred largest market cap firms, for instance:

$PBV = 0.65 + 15.31 \text{ ROE} - 0.55 \text{ Beta} + 3.04 \text{ Expected growth rate} - 0.003 \text{ \# Pages in 10K}$

4. The Value of Synergy

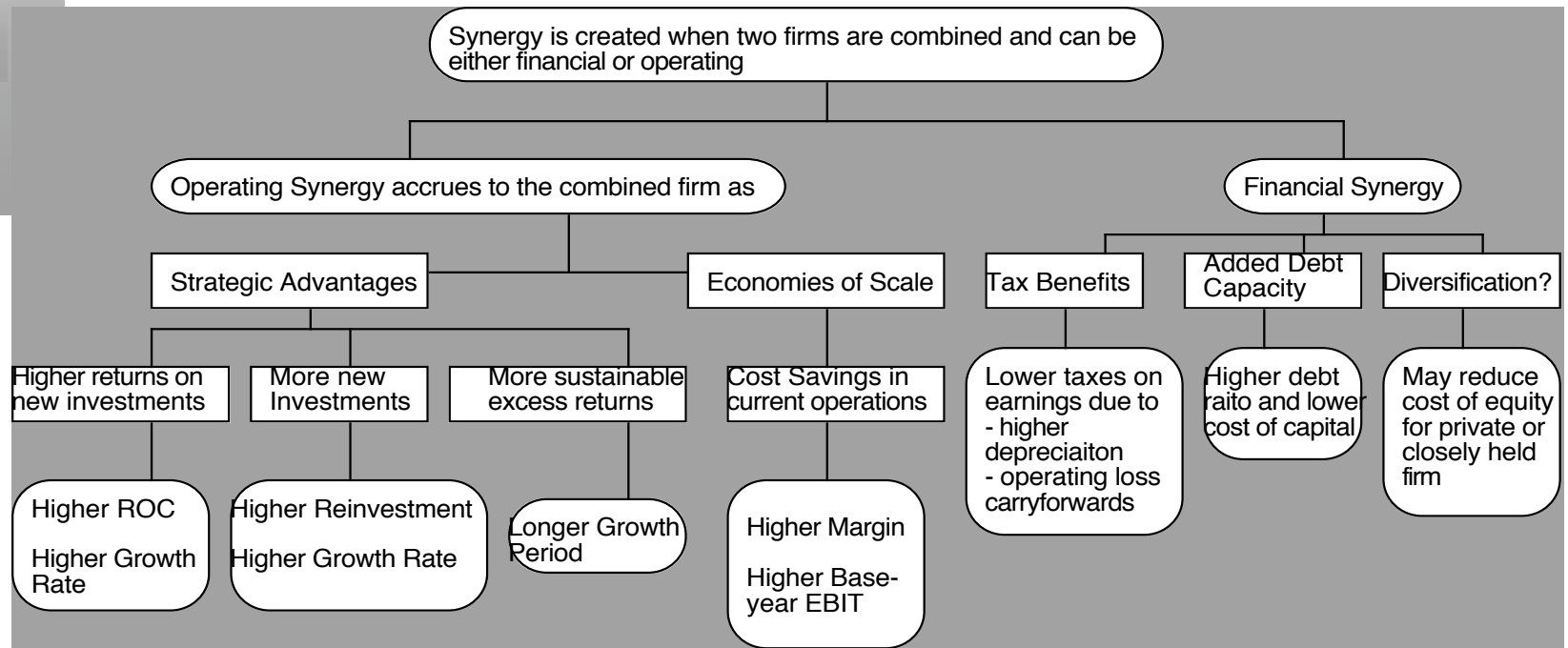
- Synergy can be valued. In fact, if you want to pay for it, it should be valued.
- To value synergy, you need to answer two questions:
 - (a) What **form** is the synergy expected to take? Will it **reduce costs** as a percentage of sales and increase profit margins (as is the case when there are economies of scale)? Will it **increase future growth** (as is the case when there is increased market power)?)
 - (b) **When can the synergy be reasonably expected to start** affecting cashflows? (Will the gains from synergy show up instantaneously after the takeover? If it will take time, when can the gains be expected to start showing up?)
- If you cannot answer these questions, you need to go back to the drawing board...

A procedure for valuing synergy

- (1) the firms involved in the merger are **valued independently**, by discounting expected cash flows to each firm at the weighted average cost of capital for that firm.
- (2) the **value of the combined firm, with no synergy**, is obtained by adding the values obtained for each firm in the first step.
- (3) The **effects of synergy are built into expected growth rates and cashflows**, and the combined firm is re-valued with synergy.

Value of Synergy = Value of the combined firm, with synergy - Value of the combined firm, without synergy

Sources of Synergy



Valuing Synergy: P&G + Gillette

	P&G	Gillette	Piglet: No Synergy	Piglet: Synergy	
Free Cashflow to Equity	\$5,864.74	\$1,547.50	\$7,412.24	\$7,569.73	Annual operating expenses reduced by \$250 million
Growth rate for first 5 years	12%	10%	11.58%	12.50%	Slightly higher growth rate
Growth rate after five years	4%	4%	4.00%	4.00%	
Beta	0.90	0.80	0.88	0.88	
Cost of Equity	7.90%	7.50%	7.81%	7.81%	Value of synergy
Value of Equity	\$221,292	\$59,878	\$281,170	\$298,355	\$17,185

5. Brand name, great management, superb product ...Are we short changing the intangibles?

- There is often a temptation to add on premiums for intangibles. Among them are
 - Brand name
 - Great management
 - Loyal workforce
 - Technological prowess
- There are two potential dangers:
 - For some assets, the value may already be in your value and adding a premium will be double counting.
 - For other assets, the value may be ignored but incorporating it will not be easy.

Categorizing Intangibles

	<i>Independent and Cash flow generating intangibles</i>	<i>Not independent and cash flow generating to the firm</i>	<i>No cash flows now but potential for cashflows in future</i>
Examples	Copyrights, trademarks, licenses, franchises, professional practices (medical, dental)	Brand names, Quality and Morale of work force, Technological expertise, Corporate reputation	Undeveloped patents, operating or financial flexibility (to expand into new products/markets or abandon existing ones)
Valuation approach	Estimate expected cashflows from the product or service and discount back at appropriate discount rate.	<ul style="list-style-type: none"> • Compare DCF value of firm with intangible with firm without (if you can find one) • Assume that all excess returns of firm are due to intangible. • Compare multiples at which firm trades to sector averages. 	Option valuation <ul style="list-style-type: none"> • Value the undeveloped patent as an option to develop the underlying product. • Value expansion options as call options • Value abandonment options as put options.
Challenges	<ul style="list-style-type: none"> • Life is usually finite and terminal value may be small. • Cashflows and value may be person dependent (for professional practices) 	With multiple intangibles (brand name and reputation for service), it becomes difficult to break down individual components.	<ul style="list-style-type: none"> • Need exclusivity. • Difficult to replicate and arbitrage (making option pricing models dicey)

Valuing Brand Name

	Coca Cola	With Cott Margins
Current Revenues =	\$21,962.00	\$21,962.00
Length of high-growth period	10	10
Reinvestment Rate =	50%	50%
Operating Margin (after-tax)	15.57%	5.28%
Sales/Capital (Turnover ratio)	1.34	1.34
Return on capital (after-tax)	20.84%	7.06%
Growth rate during period (g) =	10.42%	3.53%
Cost of Capital during period =	7.65%	7.65%
Stable Growth Period		
Growth rate in steady state =	4.00%	4.00%
Return on capital =	7.65%	7.65%
Reinvestment Rate =	52.28%	52.28%
Cost of Capital =	7.65%	7.65%
Value of Firm =	\$79,611.25	\$15,371.24

6. Defining Debt

- **General Rule:** Debt generally has the following characteristics:
 - Commitment to make fixed payments in the future
 - The fixed payments are tax deductible
 - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- **Defined as such, debt should include**
 - All interest bearing liabilities, short term as well as long term
 - All leases, operating as well as capital
- **Debt should not include**
 - Accounts payable or supplier credit

Book Value or Market Value

- For some firms that are in financial trouble, the book value of debt can be substantially higher than the market value of debt. Analysts worry that subtracting out the market value of debt in this case can yield too high a value for equity.
- A discounted cashflow valuation is designed to value a going concern. In a going concern, it is the market value of debt that should count, even if it is much lower than book value.
- In a liquidation valuation, you can subtract out the book value of debt from the liquidation value of the assets.

Converting book debt into market debt,.....

But you should consider other potential liabilities

- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
 - If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
 - You should not be counting these items as debt in your cost of capital calculations....
- If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities
 - Value of contingent liability = Probability that the liability will occur * Expected value of liability

7. The Value of Control

- The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -
 - **Probability that control of firm will change:** This refers to the probability that incumbent management will be replaced. this can be either through acquisition or through existing stockholders exercising their muscle.
 - **Value of Gaining Control of the Company:** The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control

Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control

Tata Chemicals: Optimal Debt Ratio

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.74	11.60%	AAA	6.00%	30.00%	4.20%	11.60%	\$26,591
10%	0.80	11.83%	AA	6.00%	30.00%	4.20%	11.07%	\$28,841
20%	0.87	12.12%	A+	6.20%	30.00%	4.34%	10.56%	\$31,333
30%	0.96	12.49%	A-	6.50%	30.00%	4.55%	10.11%	\$33,964
40%	1.08	12.98%	BB	8.00%	30.00%	5.60%	10.03%	\$34,459
50%	1.26	13.67%	B-	11.50%	30.00%	8.05%	10.86%	\$29,819
60%	1.51	14.71%	CC	15.50%	30.00%	10.85%	12.39%	\$23,810
70%	2.00	16.63%	CC	15.50%	27.05%	11.31%	12.90%	\$22,284
80%	3.08	20.95%	C	17.50%	20.96%	13.83%	15.25%	\$17,139
90%	6.54	34.80%	D	25.50%	12.79%	22.24%	23.50%	\$9,115

Tata Chemical's Existing Debt Ratio

Equity = 76.3% Debt = 23.7%

Cost of Capital = 10.39%

Tata Chemicals: Restructured

Current Cashflow to Firm

EBIT(1-t) :	2210
- Nt CpX	366
- Chg WC	155
= FCFF	1689
Reinvestment Rate = 521/1689=	23.58%

Reinvestment Rate
40%

**Expected Growth
in EBIT (1-t)**
.40*.12=.048
4.80%

Return on Capital
12%

Stable Growth
g = 3%; Beta = 1.0
Country Premium= 1.3%
Debt Ratio = 40%
Cost of capital = 8.30%
ROC= 8.30%; Tax rate=30%
Reinvestment Rate=g/ROC
=3/8.30 = 36.14%

Terminal Value₅= 1837/ (.083-.03) = 34,663

Op. Assets	27,620
+ Cash:	2,904
- Debt	7,660
=Equity	22,864
-Options	0
Equity	22,864
Value/Sh	Rs 127/sh

Year	1	2	3	4	5
EBIT (1-t)	2316	2427	2543	2665	2793
- Reinvestment	926	971	1017	1066	1117
FCFF	1389	1456	1526	1599	1676

Term Yr
2,877
1,040
=1837

Discount at Cost of Capital (WACC) = 12.42% (.763) + 5.60% (0.237) = 10.03%

Cost of Equity
12.42%

Cost of Debt
(5.50%+2.50%)(1-.30)
= 5.60%

Weights
E = 60% D = 40%

On June 15, 2004
Tata Chem= Rs 136.2

Riskfree Rate:
Rs Riskfree Rate= 5.50%

+ **Beta**
1.08

Unlevered Beta for Sectors: 0.74

x **Mature market premium**
4 %

Firm's D/E Ratio: 31.13%

+ **Lambda**
1.00

x **Country Equity Risk Premium**
2.60%

Country Default Spread
1.30%

x **Rel Equity Mkt Vol**
2.00

The Value of Control?

- If the value of a firm run optimally is significantly higher than the value of the firm with the status quo (or incumbent management), you can write the value that you should be willing to pay as:
 - Value of control = Value of firm optimally run - Value of firm with status quo
 - Value of control at Tata Chemicals = $127 - 104 = \text{Rs } 23$ per share or roughly 22%
- Implications:
 - The value of control is greatest at poorly run firms.
 - As the likelihood of changing management at badly run firms increases (hostile acquisitions, proxy fights etc.), the value per share will move towards the optimal value.
 - Voting shares in poorly run firms should trade at a premium on non-voting shares if the votes associated with the shares will give you a chance to have a say in a hostile acquisition.

Minority Discounts and Voting Shares

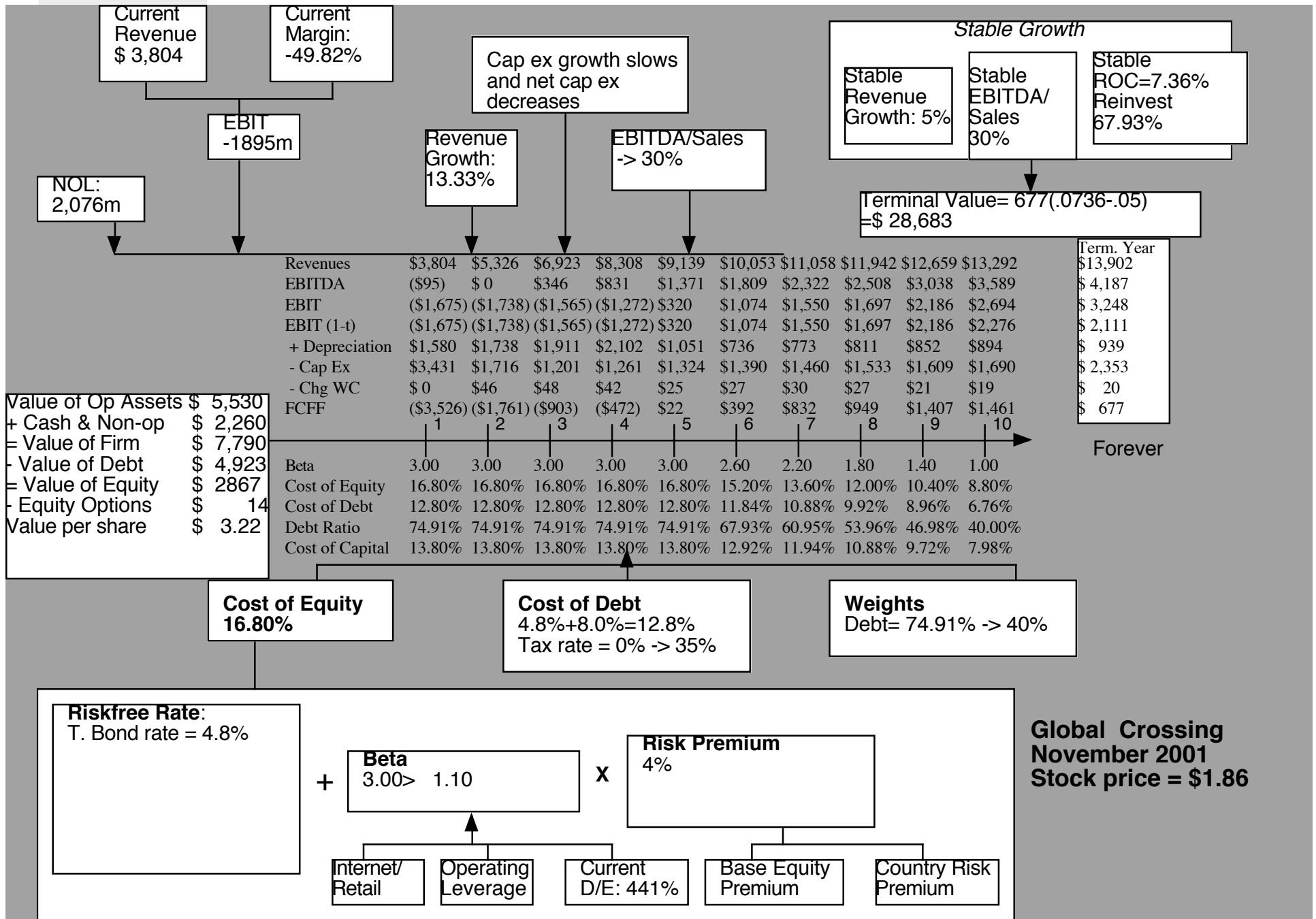
- Assume that a firm has a value of \$ 100 million run by incumbent managers and \$ 150 million run optimally.
- Proposition 1: The market price will reflect the expected value of control
 - The firm has 10 million voting shares outstanding.
 - Since the potential for changing management is created by this offering, the value per share will fall between \$10 and \$15, depending upon the probability that is attached to the management change. Thus, if the probability of the management change is 60%, the value per share will be \$13.00.

$$\text{Value/Share} = (150 \cdot .6 + 100 \cdot .4) / 10 = \$13$$

- Proposition 2: If you have shares with different voting rights, the voting shares will get a disproportionate share of the value of control...
- Proposition 3: The value of a minority interest (49%) of a private business will be significantly lower than the value of a majority stake in the same business if control has value.

8. Distress and the Going Concern Assumption

- 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.



Valuing Global Crossing with Distress

■ Probability of distress

- Price of Global Crossing = \$653

$$653 = \sum_{t=1}^{t=8} \frac{120(1 - \pi_{Distress})^t}{(1.05)^t} + \frac{1000(1 - \pi_{Distress})^8}{(1.05)^8}$$

- Probability of distress = 13.53% a year
- Cumulative probability of survival over 10 years = $(1 - .1353)^{10} = 23.37\%$

■ Distress sale value of equity

- Book value of capital = \$14,531 million
- Distress sale value = 15% of book value = $.15 * 14531 = \$2,180$ million
- Book value of debt = \$7,647 million
- Distress sale value of equity = \$0

■ Distress adjusted value of equity

- Value of Global Crossing = $\$3.22 (.2337) + \$0.00 (.7663) = \$0.75$

9. Equity to Employees: Effect on Value

- In recent years, firms have turned to giving employees (and especially top managers) equity option packages as part of compensation. These options are usually
 - Long term
 - At-the-money when issued
 - On volatile stocks
- Are they worth money? And if yes, who is paying for them?
- Two key issues with employee options:
 - How do options granted in the past affect equity value per share today?
 - How do expected future option grants affect equity value today?

Equity Options and Value

- Options outstanding
 - Step 1: List all options outstanding, with maturity, exercise price and vesting status.
 - Step 2: Value the options, taking into account dilution, vesting and early exercise considerations
 - Step 3: Subtract from the value of equity and divide by the actual number of shares outstanding (not diluted or partially diluted).
- Expected future option and restricted stock issues
 - Step 1: Forecast value of options that will be granted each year as percent of revenues that year. (As firm gets larger, this should decrease)
 - Step 2: Treat as operating expense and reduce operating income and cash flows
 - Step 3: Take present value of cashflows to value operations or equity.

10. Analyzing the Effect of Illiquidity on Value

- Investments which are less liquid should trade for less than otherwise similar investments which are more liquid.
- The size of the illiquidity discount should depend upon
 - *Type of Assets owned by the Firm*: The more liquid the assets owned by the firm, the lower should be the liquidity discount for the firm
 - *Size of the Firm*: The larger the firm, the smaller should be size of the liquidity discount.
 - *Health of the Firm*: Stock in healthier firms should sell for a smaller discount than stock in troubled firms.
 - *Cash Flow Generating Capacity*: Securities in firms which are generating large amounts of cash from operations should sell for a smaller discounts than securities in firms which do not generate large cash flows.
 - *Size of the Block*: The liquidity discount should increase with the size of the portion of the firm being sold.

Empirical Evidence on Illiquidity Discounts: Restricted Stock

- Restricted securities are securities issued by a company, but not registered with the SEC, that can be sold through private placements to investors, but cannot be resold in the open market for a two-year holding period, and limited amounts can be sold after that. Restricted securities trade at significant discounts on publicly traded shares in the same company.
 - Maher examined restricted stock purchases made by four mutual funds in the period 1969-73 and concluded that they traded an average discount of 35.43% on publicly traded stock in the same companies.
 - Moroney reported a mean discount of 35% for acquisitions of 146 restricted stock issues by 10 investment companies, using data from 1970.
 - In a recent study of this phenomenon, Silber finds that the median discount for restricted stock is 33.75%.

An Alternate Approach to the Illiquidity Discount: Bid Ask Spread

- The bid ask spread is the difference between the price at which you can buy a security and the price at which you can sell it, at the same point. In other words, it is the illiquidity discount on a publicly traded stock.
- Studies have tied the bid-ask spread to
 - the size of the firm
 - the trading volume on the stock
 - the degree
- Regressing the bid-ask spread against variables that can be measured for a private firm (such as revenues, cash flow generating capacity, type of assets, variance in operating income) and are also available for publicly traded firms offers promise.

A Bid-Ask Spread Regression

- Using data from the end of 2000, for instance, we regressed the bid-ask spread against annual revenues, a dummy variable for positive earnings (DERN: 0 if negative and 1 if positive), cash as a percent of firm value and trading volume.

$$\text{Spread} = 0.145 - 0.0022 \ln(\text{Annual Revenues}) - 0.015 (\text{DERN}) - 0.016 (\text{Cash/Firm Value}) - 0.11 (\text{\$ Monthly trading volume/ Firm Value})$$

- You could plug in the values for a private firm into this regression (with zero trading volume) and estimate the spread for the firm.
- To estimate the illiquidity discount for a private firm with \$209 million in revenues, 3% in cash as a percent of value and positive earnings.

$$\text{Spread} = 0.145 - 0.0022 \ln(\text{Annual Revenues}) - 0.015 (\text{DERN}) - 0.016 (\text{Cash/Firm Value}) - 0.11 (\text{\$ Monthly trading volume/ Firm Value})$$

$$= 0.145 - 0.0022 \ln(209) - 0.015 (1) - 0.016 (.03) - 0.11 (0) = .1178 \text{ or } 11.78\%$$

Back to Lemmings...

