Living with Noise
Valuation in the face of uncertainty

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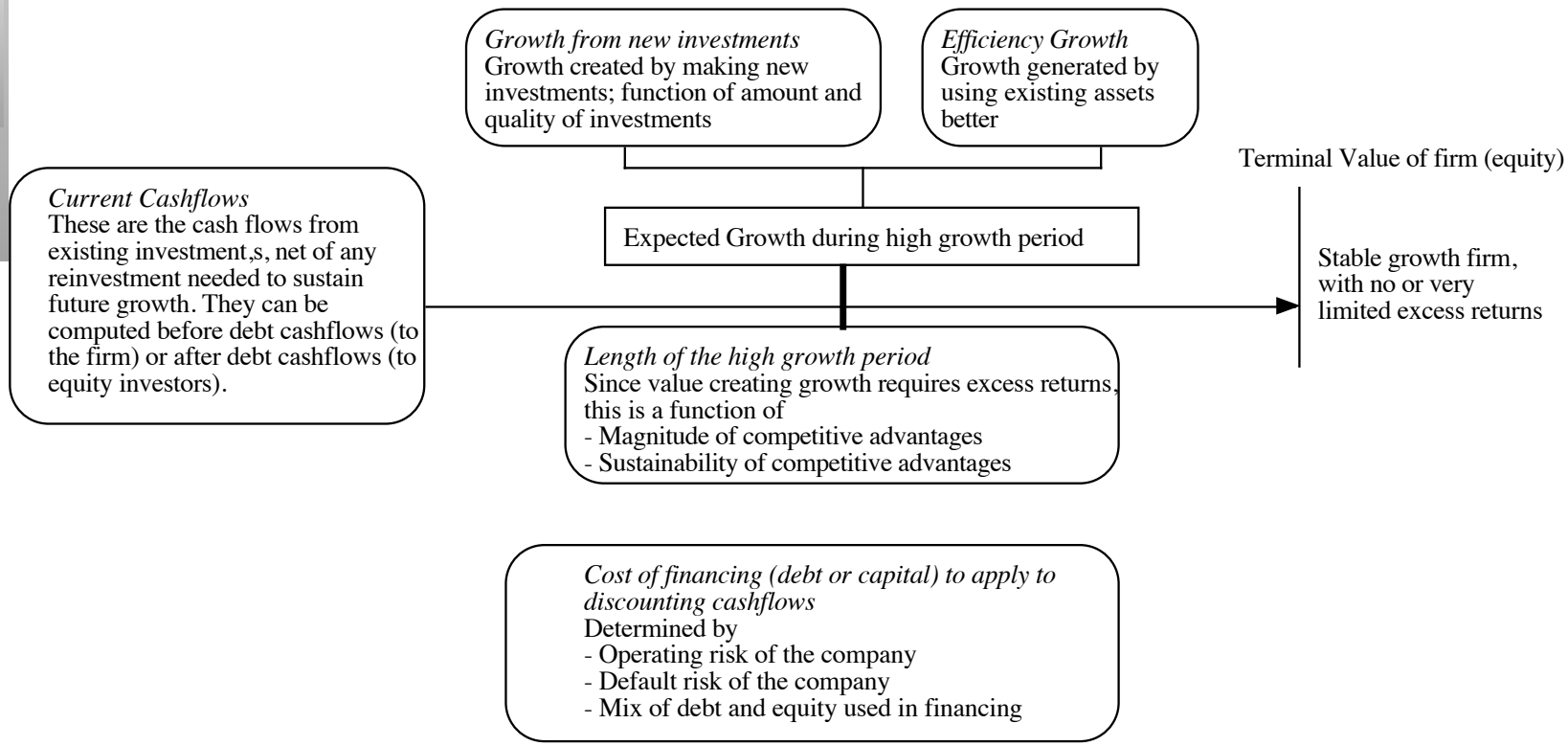
Misconceptions about Valuation

- 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.

The Drivers of Value…



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= 12%;
Reinvestment Rate=g/ROC =5/ 12= 41.67%

Terminal Value$_5$= 26412/(.1039-.05) = Rs 489,813

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
18866
26412

Op. Assets Rs231,914
+ Cash: 11418
+ Other NO 140576
- Debt 109198
=Equity 274,710

Value/Share Rs 665

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

Lesson 1: Be currency consistent

- **Currency consistency: If your cash flows are in a specific currency, your discount rate has to be in the same currency as well.**
- **Currency Invariance: You can value any company in any currency and if you do it correctly, your value should be invariant to the currency used.**
- Generally speaking, you can value a company in its domestic currency or in a foreign currency.
  - The advantage of using a domestic currency is that the most complete financial statements for the firm are usually in that currency and a significant portion of the operations are in that currency. The disadvantage is that many of the inputs that ou need to estimate discount rates (starting with the riskfree rate) may be difficult to get in that currency.
  - While estimating a discount rate for an emerging market may sometimes be easier to do in US dollars or Euros, the expected future cash flows will then have to be converted into US dollars or Euros, using expected exchange rates in the future.

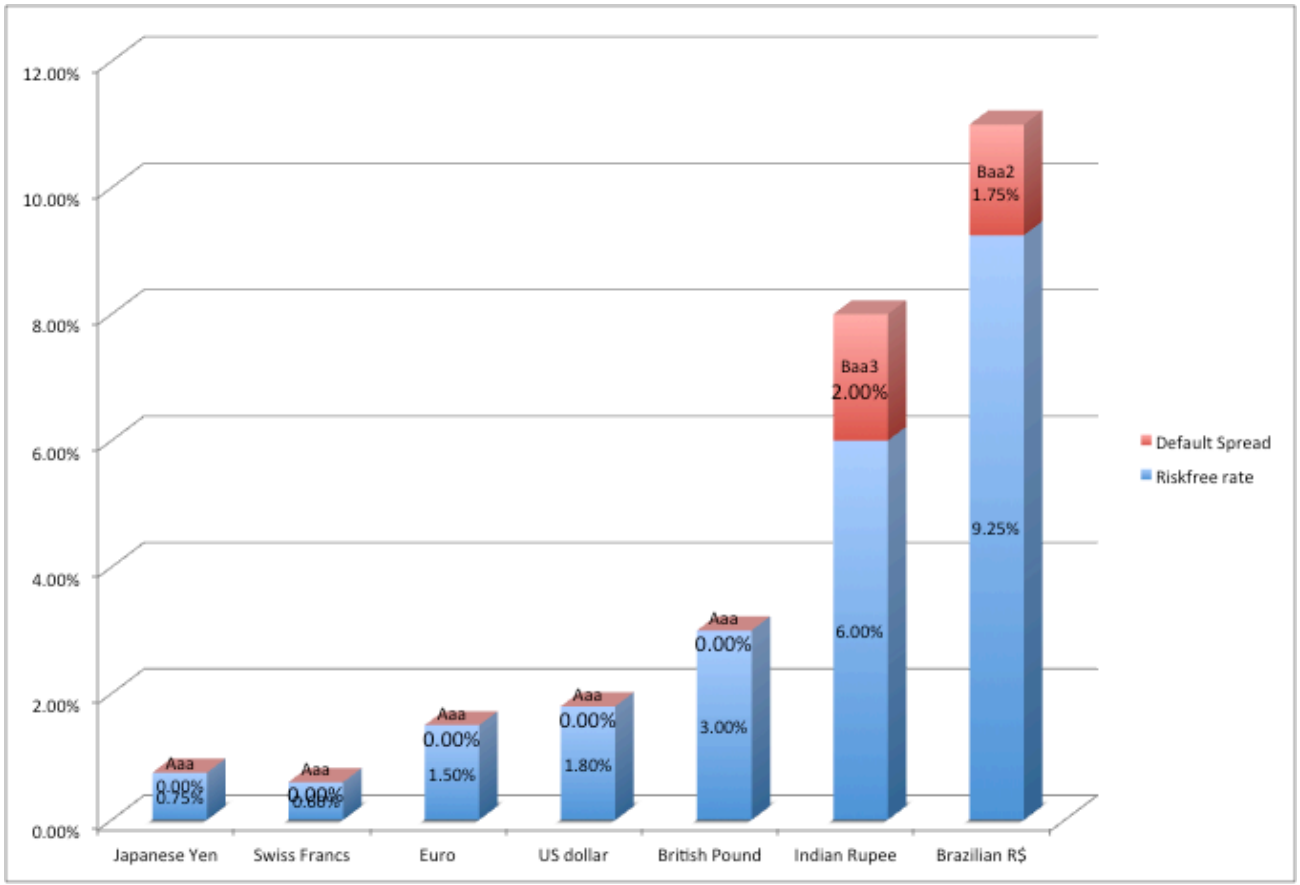
Estimating a riskfree rate

- On a riskfree asset, the actual return is equal to the expected return. Therefore, there is no variance around the expected return.
- For an investment to be riskfree, then, it has to have
  - No default risk
  - No reinvestment risk

1. Time horizon matters: Thus, the riskfree rates in valuation will depend upon when the cash flow is expected to occur and will vary across time.
2. Not all government securities are riskfree: Some governments face default risk and the rates on bonds issued by them will not be riskfree.

For a rate to be riskfree in valuation, it has to be long term, default free and currency matched (to the cash flows)

Why do riskfree rates vary?



Lesson 2: Don't look back to get Equity Risk Premiums… look forward..

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

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2011	7.55%	5.79%	5.62%	4.10%
	2.22%	2.36%		
1962-2011	5.38%	3.36%	4.02%	2.35%
	2.39%	2.68%		
2002-2011	3.12%	-1.92%	1.08%	-3.61%
	6.46%	8.94%		

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

In the trailing 12 months, the cash returned to stockholders was 74.17. Using the average cash yield of 4.71% for 2002-2011 the cash returned would have been 59.29.

Analysts expect earnings to grow 9.6% in 2012, 11.9% in 2013, 8.2% in 2014, 4.5% in 2015 and 2% therafter, resulting in a compounded annual growth rate of 7.18% over the next 5 years. We will assume that dividends & buybacks will grow 7.18% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 1.87%, the same rate as the entire economy (= riskfree rate).

63.54 68.11 73.00 78.24 83.86

$$1257.60 = \frac{63.54}{(1+r)} + \frac{68.11}{(1+r)^2} + \frac{73.00}{(1+r)^3} + \frac{78.24}{(1+r)^4} + \frac{83.86}{(1+r)^5} + \frac{83.86(1.0187)}{(r-.0187)(1+r)^5}$$

January 1, 2012
S&P 500 is at 1257.60
Adjusted Dividends & Buybacks for 2011 = 59.29

Expected Return on Stocks (1/1/12) = 7.91%
T.Bond rate on 1/1/12 = 1.87%
Equity Risk Premium = 8.03% - 3.29% = 6.04%

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

Implied Premium for Sensex: May 2012

In the trailing 12 months, the FCFE for the companies in the Sensex amounted to about 6% of the market cpaitalization of these stocks.

Analysts expect earnings to grow 14.03% in 2012, 13.84% in 2013, 7.5% in 2014 and at 6.5% therafter, resulting in a compounded annual growth rate of 9.62% over the next 5 years. We will assume that FCFE will grow 9.62% a year for the next 5 years.

After year 5, we will assume that earnings on the index will grow at 6.50%, the same rate as the entire economy (= riskfree rate).

976.60 1070.65 1173.63 1286.52 1410.26

May 15, 2012
The Sensex was trading at 16,200.

$$16200 = \frac{976.60}{(1+r)} + \frac{1070.65}{(1+r)^2} + \frac{1173.63}{(1+r)^3} + \frac{1286.52}{(1+r)^4} + \frac{1410.26}{(1+r)^5} + \frac{1410.26(1.065)}{(r-.065)(1+r)^5}$$

Expected Return on Stocks 5/15/12 = 13.27%
Indian Rs riskfree rate on 5/15/12 = 6.50%
Equity Risk Premium = 13.27% - 6.50% = 6.77%

A solution: Estimate a mature market premium with an added country risk premium

- Assume that the equity risk premium for the US and other mature equity markets is 6%. You could then add on an additional premium for investing in an emerging markets.
- Two ways of estimating the country risk premium:
  - *Default spread on Country Bond*: In this approach, the country equity risk premium is set equal to the default spread of the bond issued by the country.
    - Equity Risk Premium for India = 6% + 2% = 8%
  - *Adjusted for equity risk*: The country equity risk premium is based upon the volatility of the market in question relative to U.S market.

    Total equity risk premium = Risk Premium$_{US}$* $\sigma_{\text{Country Equity}}$ / $\sigma_{\text{Country Bond}}$
    - Standard Deviation in Sensex = 30%
    - Standard Deviation in Indian government bond= 20%
    - Default spread on Indian Bond= 2%
    - Total equity risk premium for India = 6% + 2% (30/20) = 9%

Country Risk Premiums June 2012

Canada	6.00%	0.00%
United States	6.00%	0.00%
NORTH AM	6.00%	0.00%

Argentina	15.00%	9.00%
Belize	9.00%	3.00%
Bolivia	10.88%	4.88%
Brazil	8.63%	2.63%
Chile	7.05%	1.05%
Colombia	9.00%	3.00%
Costa Rica	9.00%	3.00%
Ecuador	18.75%	12.75%
El Salvador	10.13%	4.13%
Guatemala	9.60%	3.60%
Honduras	13.50%	7.50%
Mexico	8.25%	2.25%
Nicaragua	15.00%	9.00%
Panama	9.00%	3.00%
Paraguay	12.00%	6.00%
Peru	9.00%	3.00%
Uruguay	9.60%	3.60%
Venezuela	12.00%	6.00%
LAT AM	9.42%	3.42%

Spain	9.00%	3.00%
Austria	6.00%	0.00%
Belgium	7.05%	1.05%
Cyprus	10.88%	4.88%
Denmark	6.00%	0.00%
Finland	6.00%	0.00%
France	6.00%	0.00%
Germany	6.00%	0.00%
Greece	16.50%	10.50%
Iceland	9.00%	3.00%
Ireland	9.60%	3.60%
Italy	7.73%	1.73%
Malta	7.73%	1.73%
Netherlands	6.00%	0.00%
Norway	6.00%	0.00%
Portugal	10.88%	4.88%
Sweden	6.00%	0.00%
Switzerland	6.00%	0.00%
Turkey	9.60%	3.60%
United Kingdom	6.00%	0.00%
W. EUROPE	6.80%	0.80%

Angola	10.88%	4.88%
Botswana	7.50%	1.50%
Egypt	13.50%	7.50%
Mauritius	8.25%	2.25%
Morocco	9.60%	3.60%
Namibia	9.00%	3.00%
South Africa	7.73%	1.73%
Tunisia	9.00%	3.00%
AFRICA	9.82%	3.82%

Albania	12.00%	6.00%
Armenia	10.13%	4.13%
Azerbaijan	9.00%	3.00%
Belarus	15.00%	9.00%
Bosnia	15.00%	9.00%
Bulgaria	8.63%	2.63%
Croatia	9.00%	3.00%
Czech Republic	7.28%	1.28%
Estonia	7.28%	1.28%
Georgia	10.88%	4.88%
Hungary	9.60%	3.60%
Kazakhstan	8.63%	2.63%
Latvia	9.00%	3.00%
Lithuania	8.25%	2.25%
Moldova	15.00%	9.00%
Montenegro	10.88%	4.88%
Poland	7.50%	1.50%
Romania	9.00%	3.00%
Russia	8.25%	2.25%
Slovakia	7.50%	1.50%
Slovenia [1]	7.50%	1.50%
Ukraine	13.50%	7.50%
E. EUROPE	8.60%	2.60%

Bahrain	8.25%	2.25%
Israel	7.28%	1.28%
Jordan	10.13%	4.13%
Kuwait	6.75%	0.75%
Lebanon	12.00%	6.00%
Oman	7.28%	1.28%
Qatar	6.75%	0.75%
Saudi Arabia	7.05%	1.05%
UAE	6.75%	0.75%
MIDDLE EAST	7.16%	1.16%

Bangladesh	10.88%	4.88%
Cambodia	13.50%	7.50%
China	7.05%	1.05%
Fiji Islands	12.00%	6.00%
Hong Kong	6.38%	0.38%
India	9.00%	3.00%
Indonesia	9.00%	3.00%
Japan	7.05%	1.05%
Korea	7.28%	1.28%
Macao	7.05%	1.05%
Malaysia	7.73%	1.73%
Mongolia	12.00%	6.00%
Pakistan	15.00%	9.00%
New Guinea	12.00%	6.00%
Philippines	10.13%	4.13%
Singapore	6.00%	0.00%
Sri Lanka	12.00%	6.00%
Taiwan	7.05%	1.05%
Thailand	8.25%	2.25%
Vietnam	12.00%	6.00%
ASIA	7.63%	1,63%
WO JAPAN	7.77%	1.77%

Australia	6.00%	0.00%
New Zealand	6.00%	0.00%
AUS & NZ	6.00%	0.00%

Black #: Total ERP
Red #: Country risk premium
AVG: GDP weighted average

Lesson 3: Emerging Market Risk Exposure can vary across companies…

- Approach 1: Assume that every company in the country is equally exposed to country risk. In this case,

  E(Return) = Riskfree Rate + Country ERP + Beta (US premium)

- Approach 2: Assume that a company's exposure to country risk is similar to its exposure to other market risk.

  E(Return) = Riskfree Rate + Beta (US premium + Country ERP)

- Approach 3: 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(Return)=Riskfree Rate+ β (US premium) + λ (Country ERP)

  Country ERP: Additional country equity risk premium

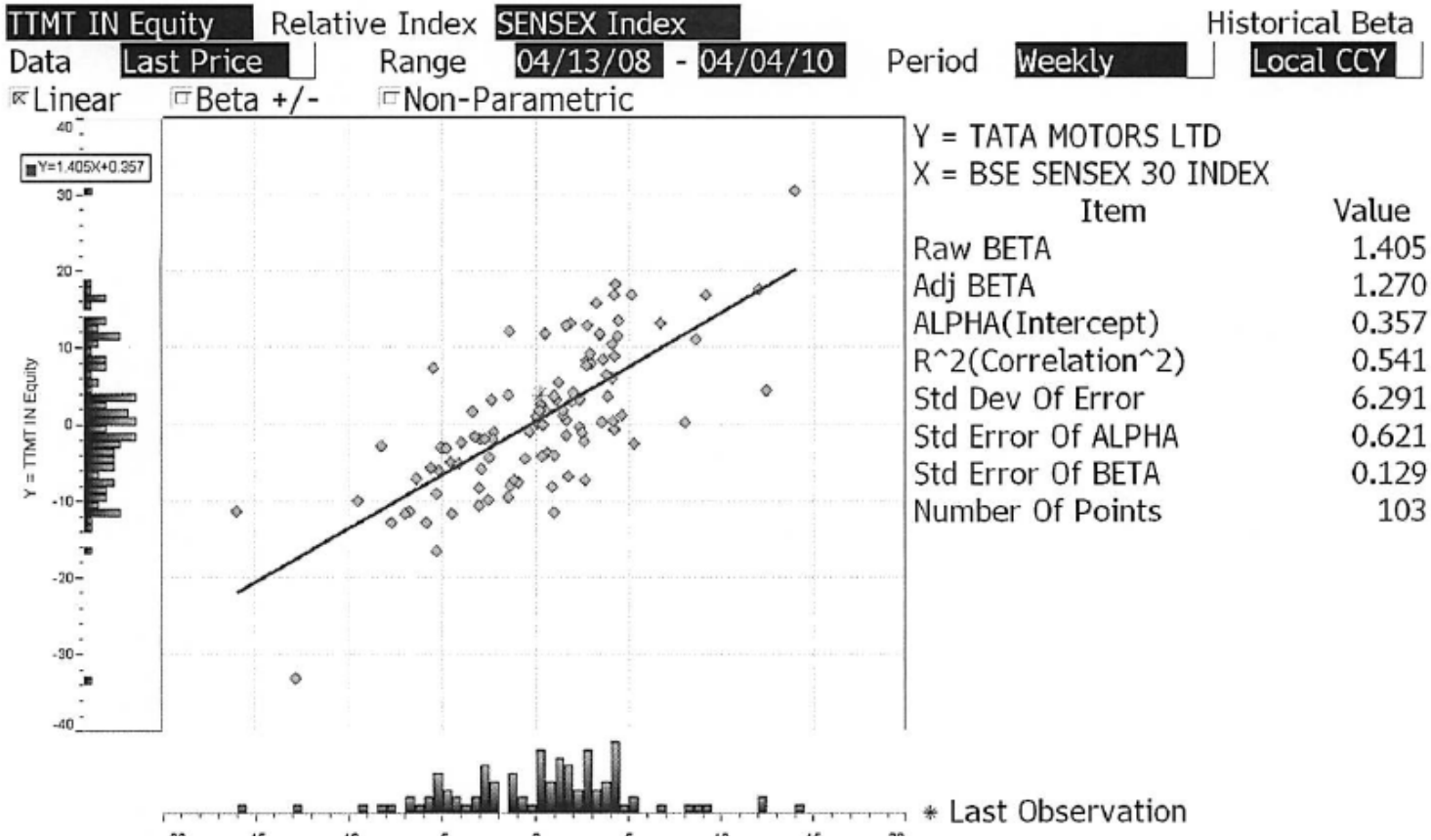
Estimating lambdas: Tata Motors, Dr. Reddy's Lab and TCS

	Tata Motors	*Dr. Reddy's*	*TCS*
% of production/ operations in India	High	High	High
% of revenues in India	91.37% (in 2009) Estimated 70% (in 2010)	Low (13%)	7.62%
Lambda	0.80	0.30	0.20
Flexibility in moving operations	Low. Significant physical assets.	High.	High. Human capital is mobile.

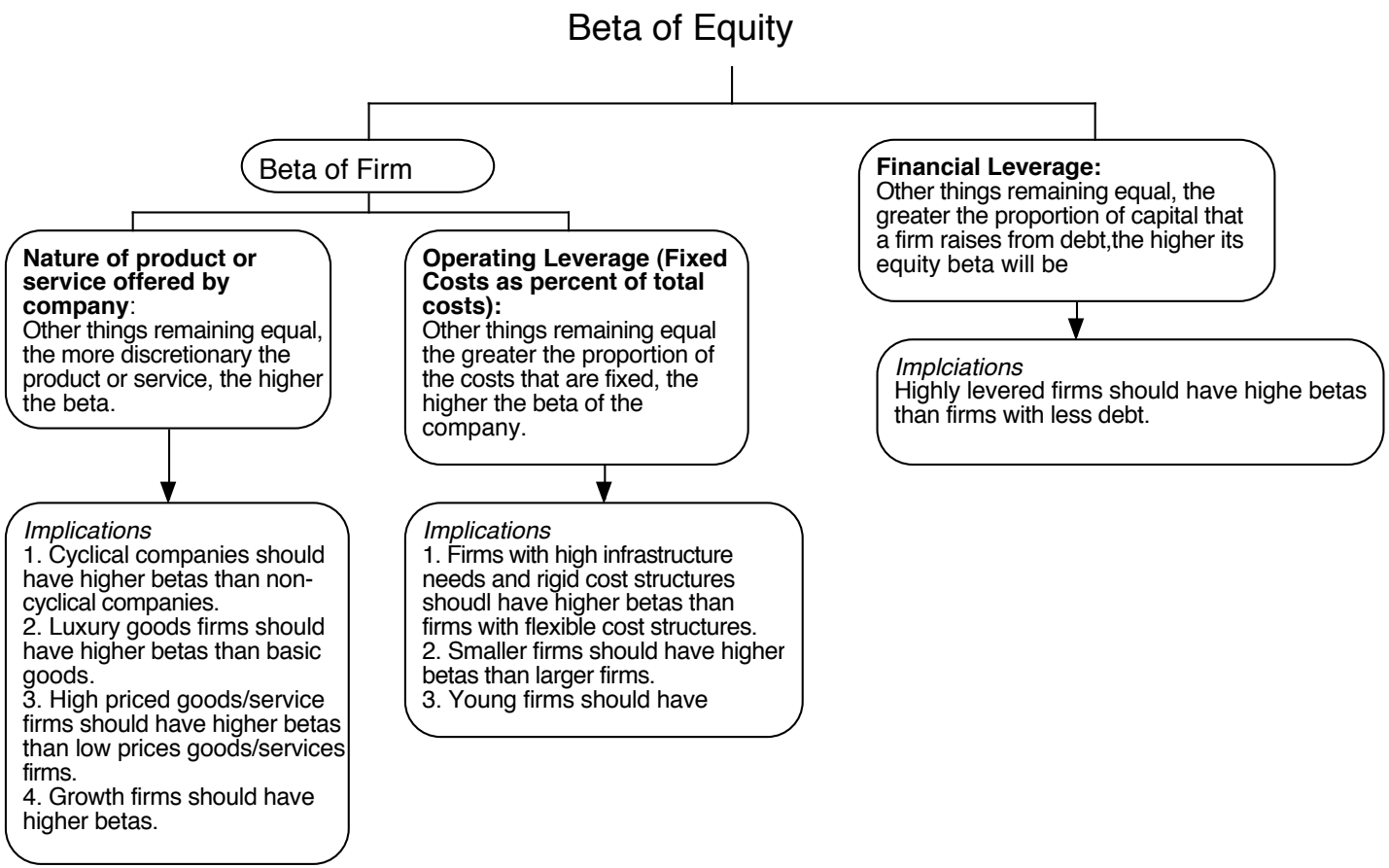
From the frying pan… into the fire…

Region	Revenues	% from Region	% of typical company	Lambda	CRP
North America	22.56	31.02%	75%	0.41	0.00%
Europe	15.77	21.68%	70%	0.31	0.50%
India	12.96	17.82%	80%	0.22	3.00%
Russia & Eastern Europe	10.86	14.93%	90%	0.17	4.00%
Others	10.58	14.55%	70%	0.21	3.00%
	72.73				2.11%

Lesson 4: Beta is not just a statistical artifact…



And has roots in fundamentals…



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

Lesson 5: Even non-traded debt has a "market" cost

- When a company has a bonds outstanding, you can use the market interest rate on the bond to get a cost of debt. Alternatively, you can use the bond rating for the company to estimate a default spread and a cost of debt. For companies with only bank debt, neither option works. For these firms, the rating can be estimated using the financial characteristics of the firm.

  Interest Coverage Ratio = EBIT / Interest Expenses

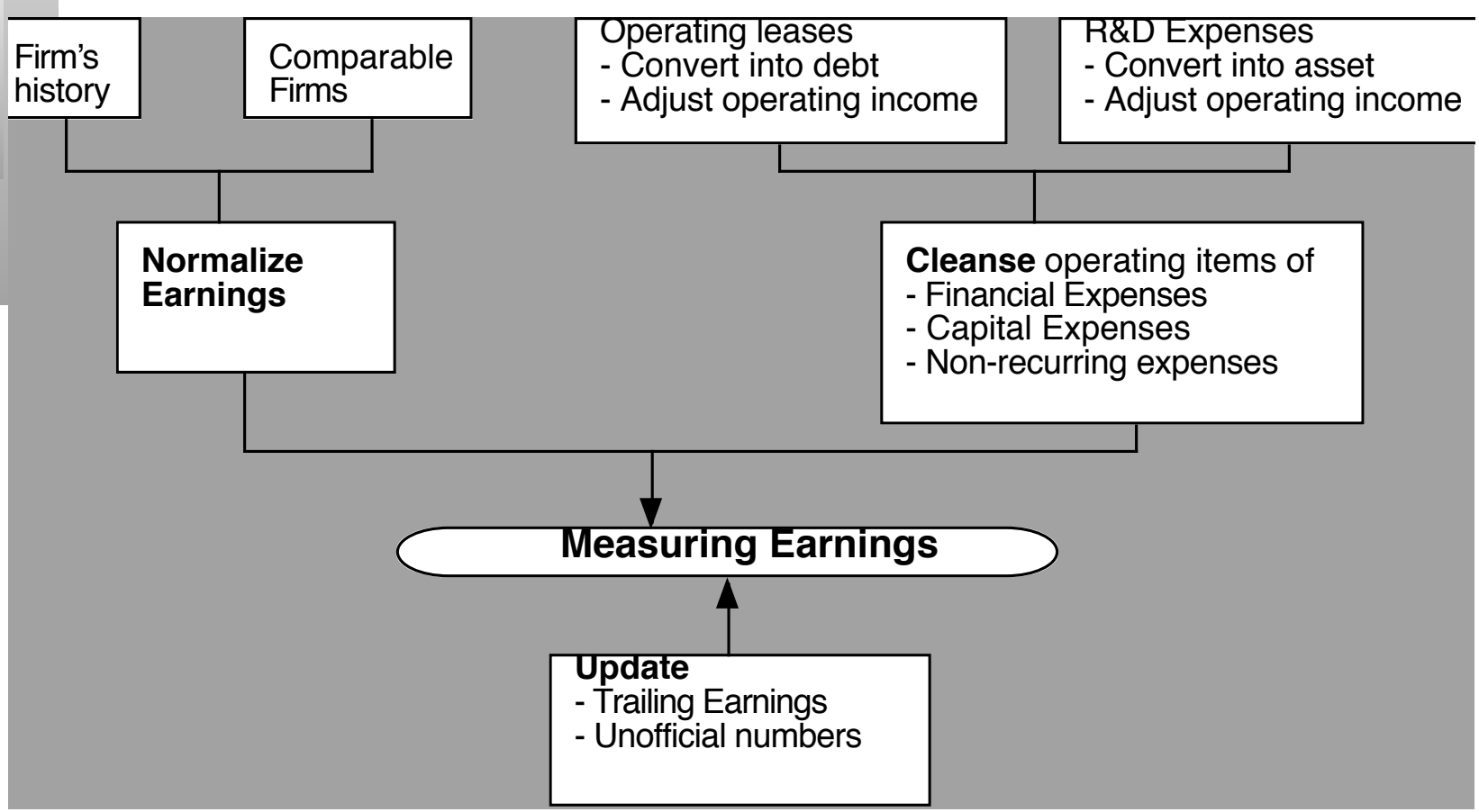
- The coverage ratio can be linked to a debt rating, which can provide an estimate of default spread and the cost of debt for a company.

  Cost of debt = Riskfree Rate + Default spread for the company

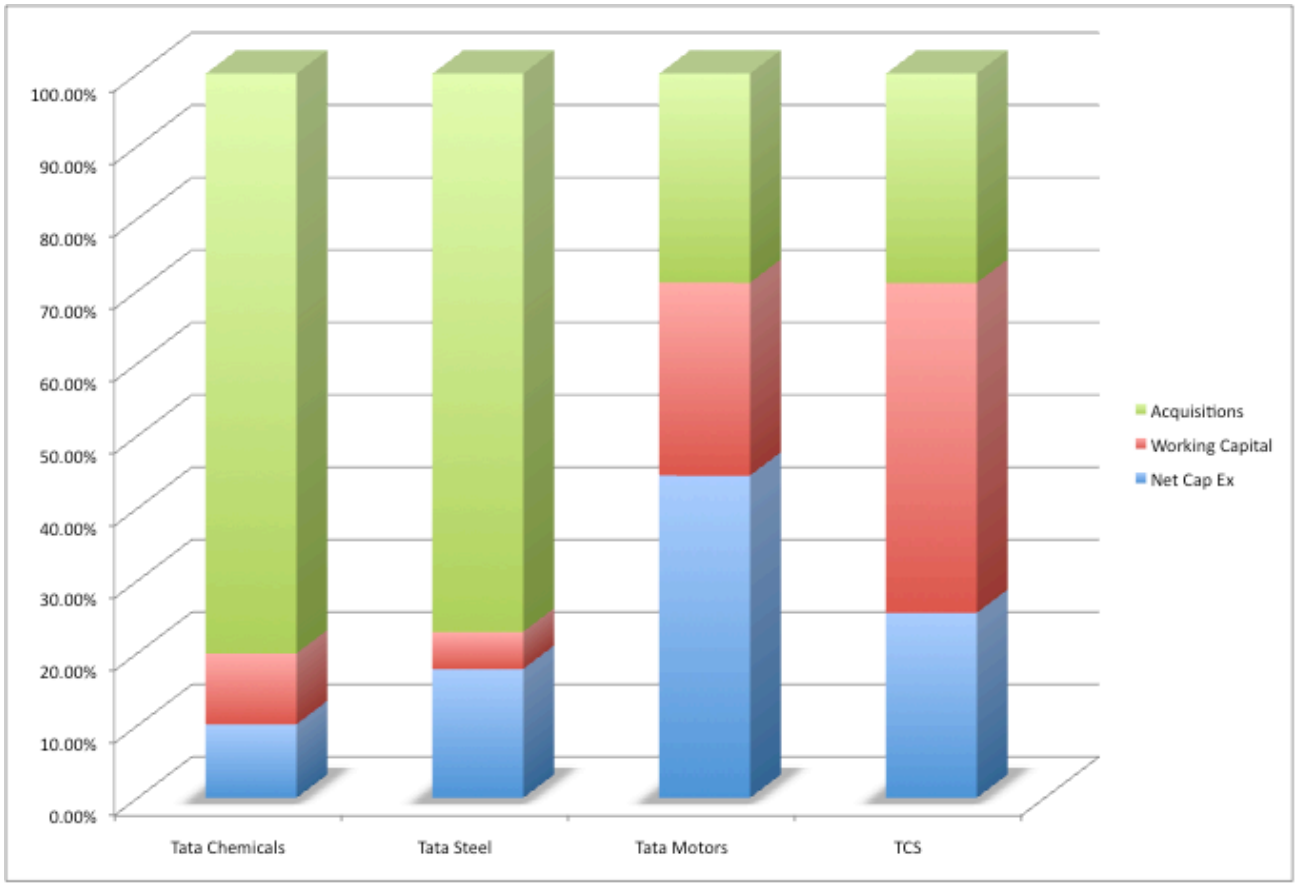
- In emerging markets, where governments have default risk, the cost of debt for a company will include some or all of the default spread for the country.

  Cost of debt = Riskfree Rate + Default spread for the country + Default spread for the company

Lesson 6: Work on your base year earnings…

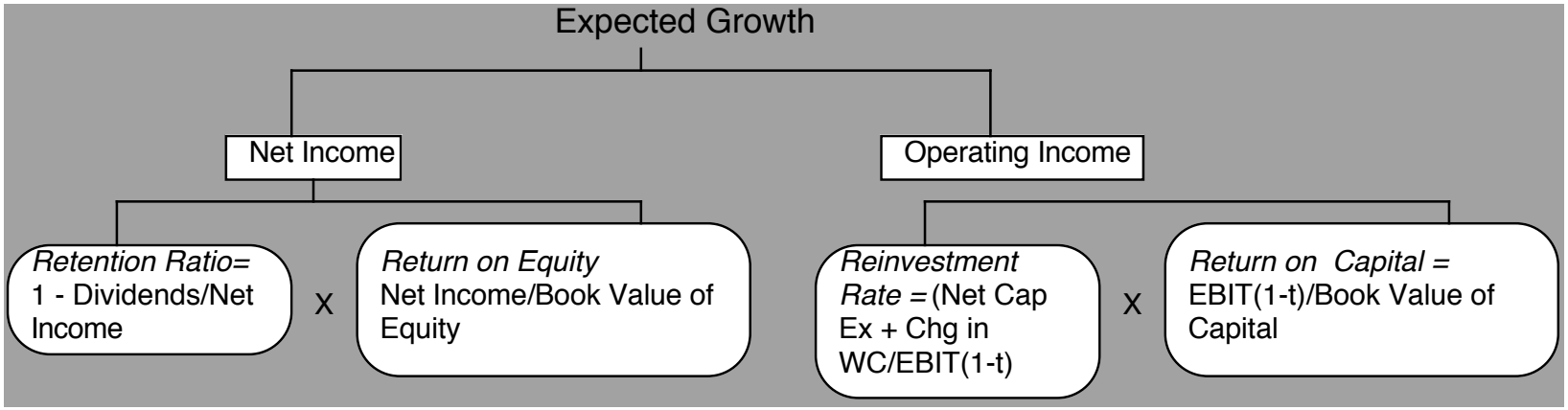


Lesson 7: For capital expenditures, look past narrow accounting categorizations…

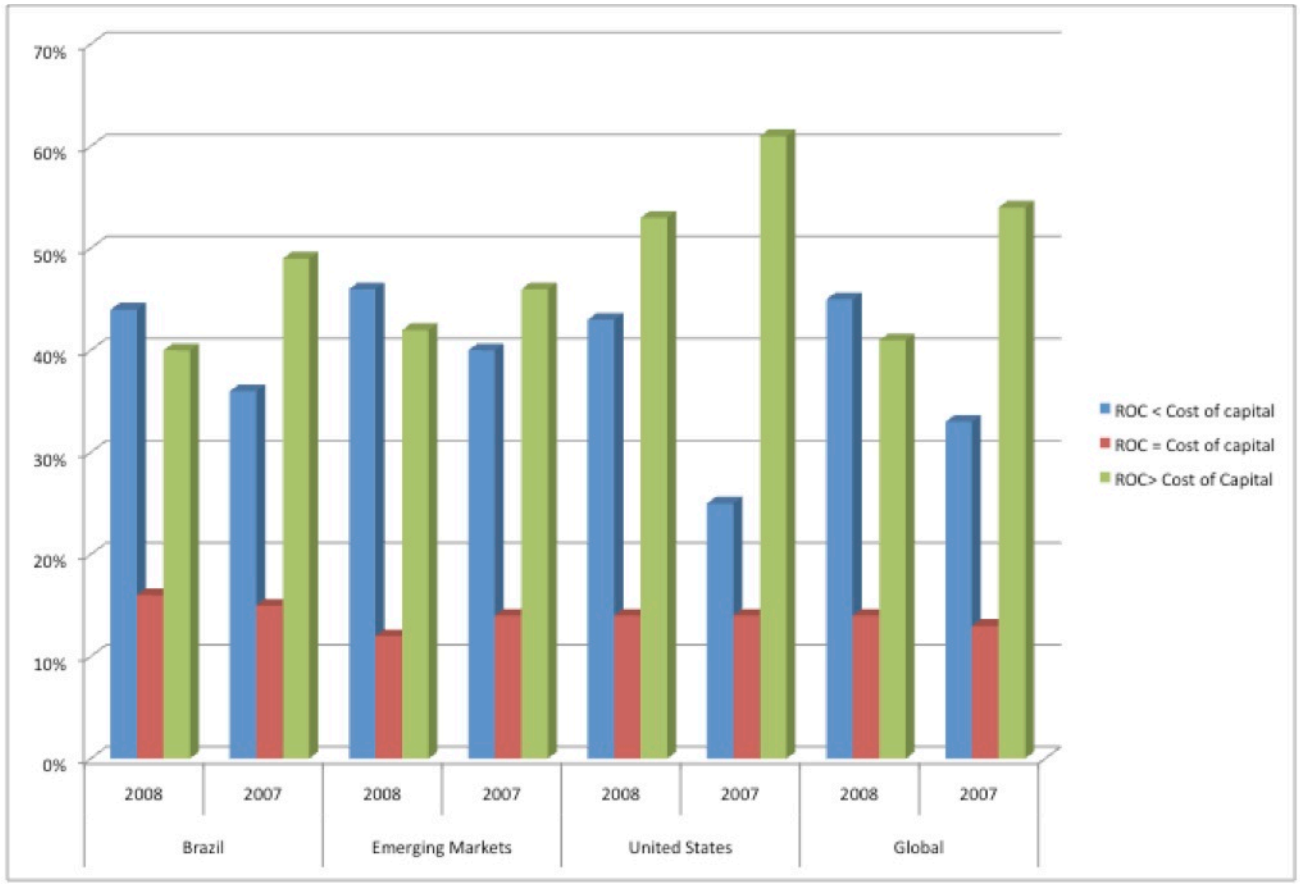


Lesson 8: History provides little information on growth and managers are no help…

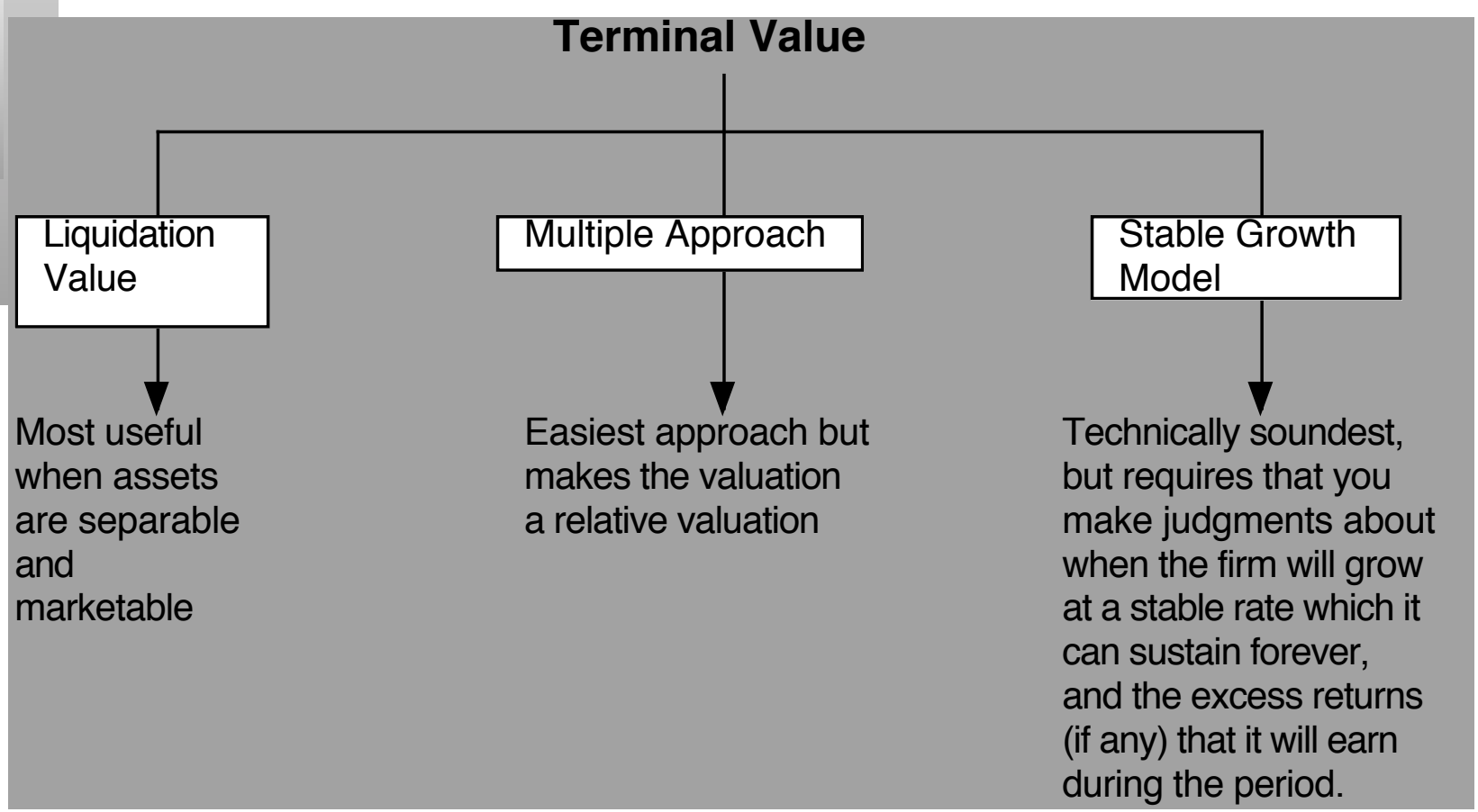
- Historical earnings growth has always been a poor measure of future growth and is even less reliable in markets that are changing and dynamic.
- Trusting other analysts or managers to estimate or provide growth rates for the the future is futile. Not only are they biased but they have little basis for their forecasts (other than hope and prayer).
- So, tie growth to fundamentals:



The key number driving value: Return on Invested Capital



Lesson 9: Don't make the terminal value an ATM

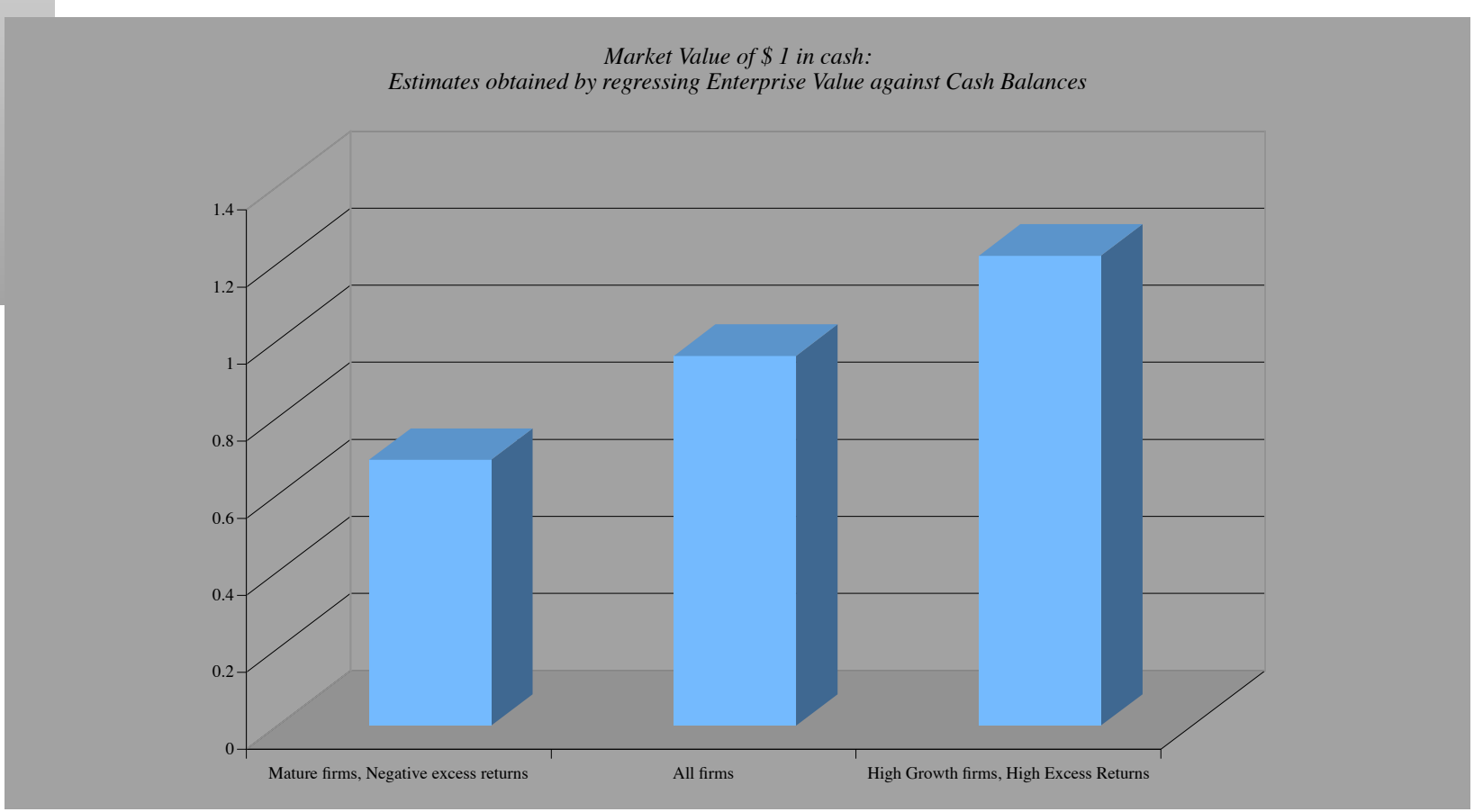


Four Rules for Terminal value

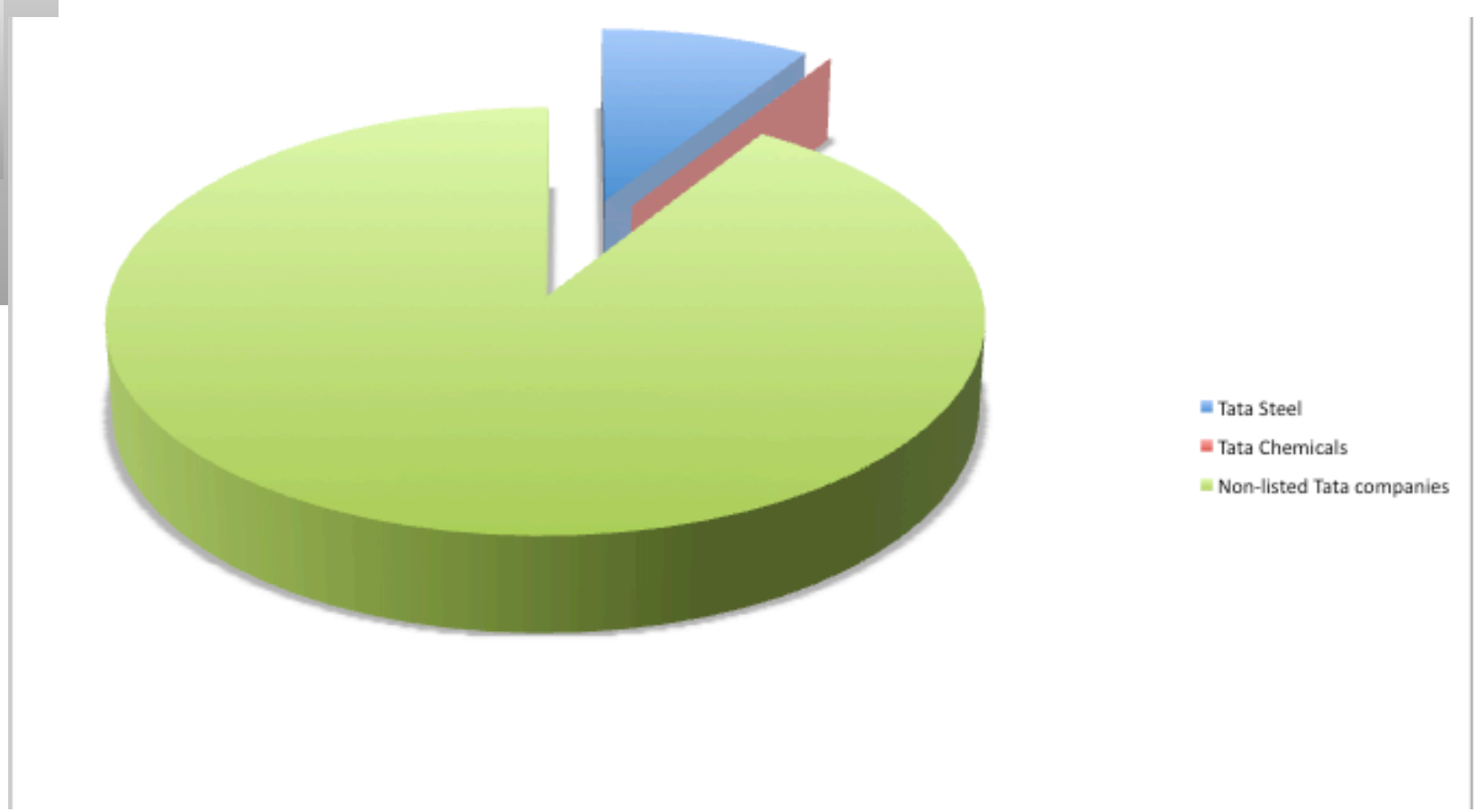
- Respect the cap: The stable growth rate cannot exceed the growth rate of the economy but it can be set lower. One simple proxy for the nominal growth rate of the economy is the riskfree rate.
  - Riskfree rate = Expected inflation + Expected Real Interest Rate
  - Nominal growth rate in economy = Expected Inflation + Expected Real Growth
- Stable period excess returns: Firms that generate returns on capital that vastly exceed their costs of capital should see these excess returns shrink in stable growth as competition enters and size works against them.
- Reinvest to grow: Growth is never free and this is especially true in stable growth. To grow at a perpetual rate, firms have to reinvest and how much they reinvest will be a function of the return on capital:

  Reinvestment Rate = Stable growth rate/ Stable ROC
- Adjust risk and cost of capital: The cost of equity and capital in stable growth should be reflective of a mature firm in stable growth.

Lesson 10: A dollar in cash is not always worth a dollar…



Lesson 11: Watch out for cross holdings..



Lesson 12: Value multiple claims on equity…

- Contingent versus Absolute claims: To the extent that there options outstanding on the equity (options granted to managers, conversion options in securities), you have an alternate claim on equity. The best way to deal with these claims is to value the options as options, net the value of the options out from the aggregate equity value and divide by the actual number of shares outstanding.
- Differences in voting rights: In some emerging markets, it is par for the course to have two classes of shares – voting shares held by insiders and non-voting shares held by other investors.

Lesson 13: Be ready to be wrong… 100% of the time…

- Valuation in the presence of noise or uncertainty is not for an exercise for those with big egos or tender sensibilities. You will be wrong on your forecasts every single time.
- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.
- *A test: If your valuations are unbiased, you should find yourself increasing estimated values as often as you are decreasing values. In other words, there should be equal doses of good and bad news affecting valuations (at least over time).*