# Living with Noise
## Valuation in the face of uncertainty

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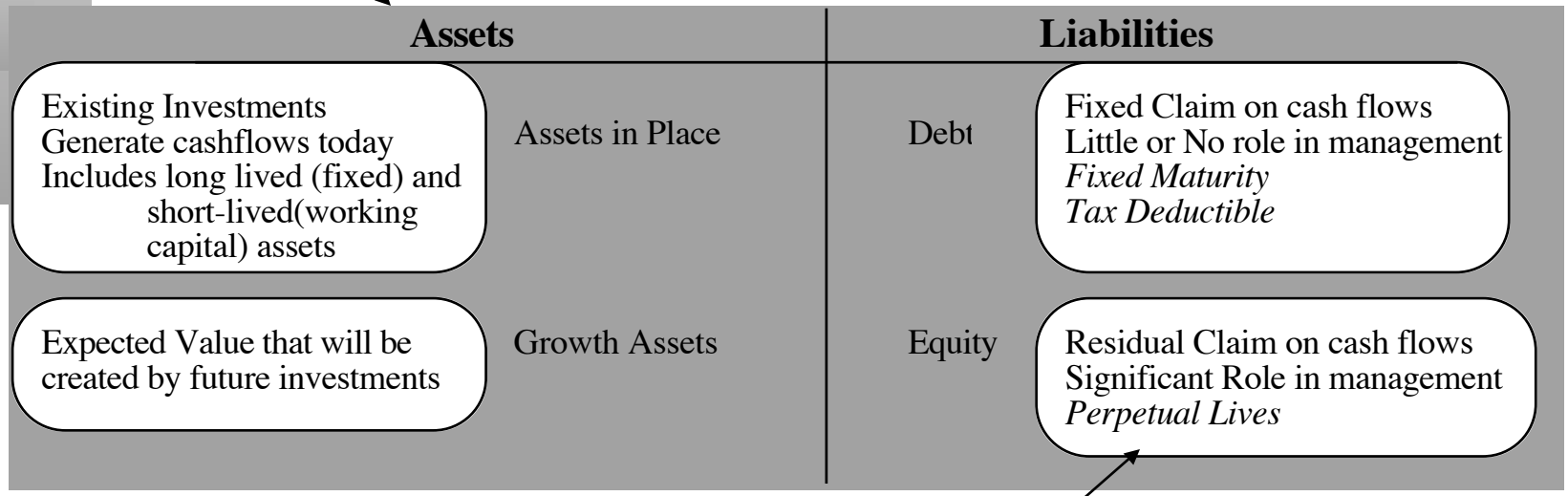
**Wells Fargo**

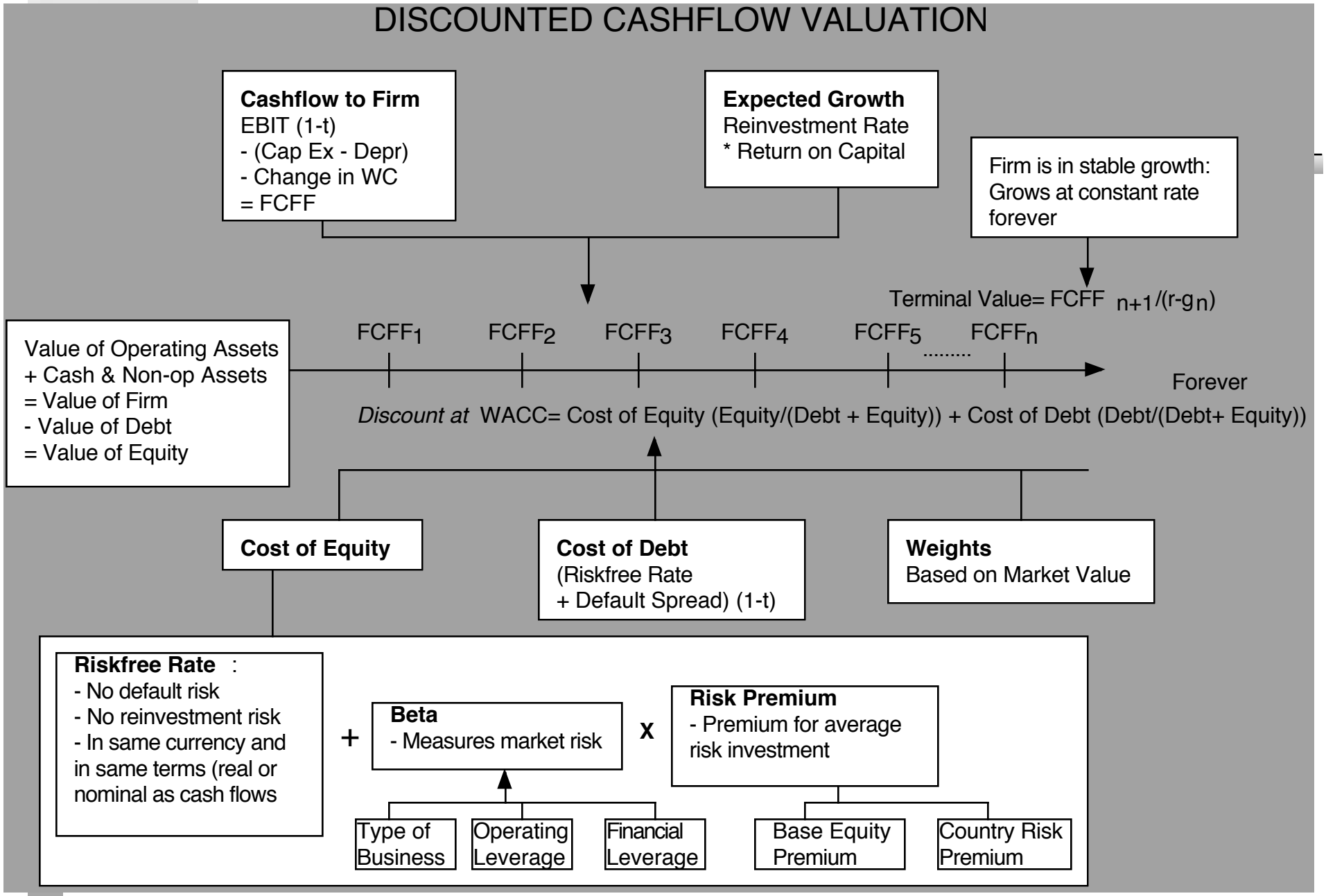
# DCF Choices: Equity Valuation versus Firm Valuation

**Firm Valuation**: Value the entire business




**Equity valuation**: Value just the equity claim in the business

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

Terminal Value5= 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)**

# Estimating the Riskfree Rate in Rupees… and US dollars.. Or Euros

- 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 (over a default free rate) 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%)

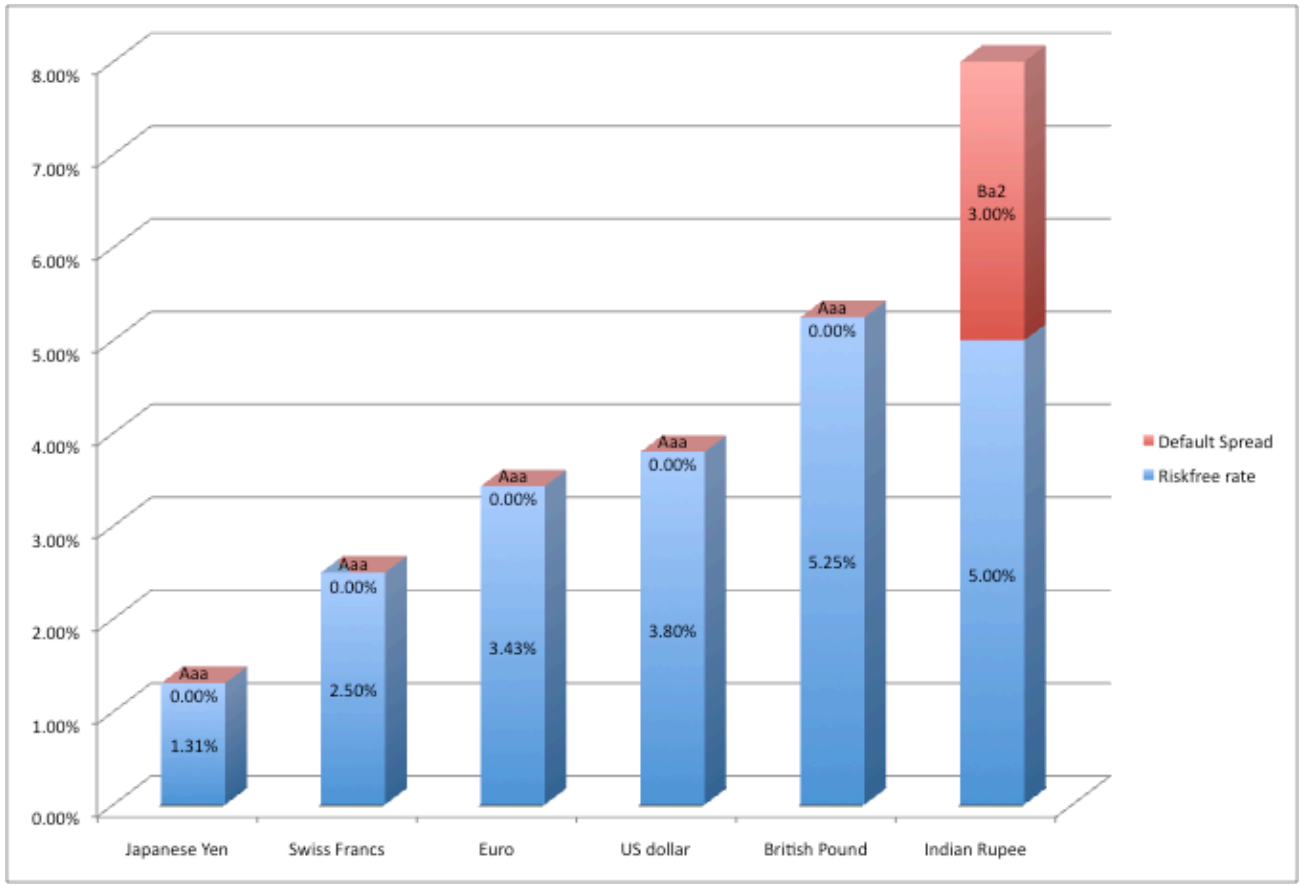
b) The yield to maturity on the 10-year bond + Default spread (8%+3% =11%)

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

d) None of the above

- If you wanted to do you entire valuation in US dollars, what would you use as your riskfree rate?
- How would your answer change if you were doing the analysis in Euros?

# Why do riskfree rates vary?



# If you had to do it….Converting a Dollar Cost of Equity to a Nominal Rupee Cost of Equity

- One of the perils of working with domestic currency riskfree rates is that much of the information on risk premiums (equity and debt) come from developed markets and are often computed in US dollar or Euro terms. If the inflation rates are very different, it may be inappropriate to use these risk premiums with domestic riskfree rates.
- Here is the alternative.
- Step 1: Estimate the cost of equity and capital in US dollars.
- Step 2: Use the differential inflation rate to estimate the cost of capital

$$\text{Cost of capital}_{\text{Domestic currency}} = (1+\text{Cost of Capital}_{\$})\left[\frac{1+\text{Inflation}_{BR}}{1+\text{Inflation}_{\$}}\right]$$

(Thus, if the US dollar cost of equity is 8% and the inflation rates for India and the US are 4% and 2% respectively, the cost of equity in rupee terms is as follows:

(1.08) (1.04/1.02) – 1= 10.12%)

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

| | 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

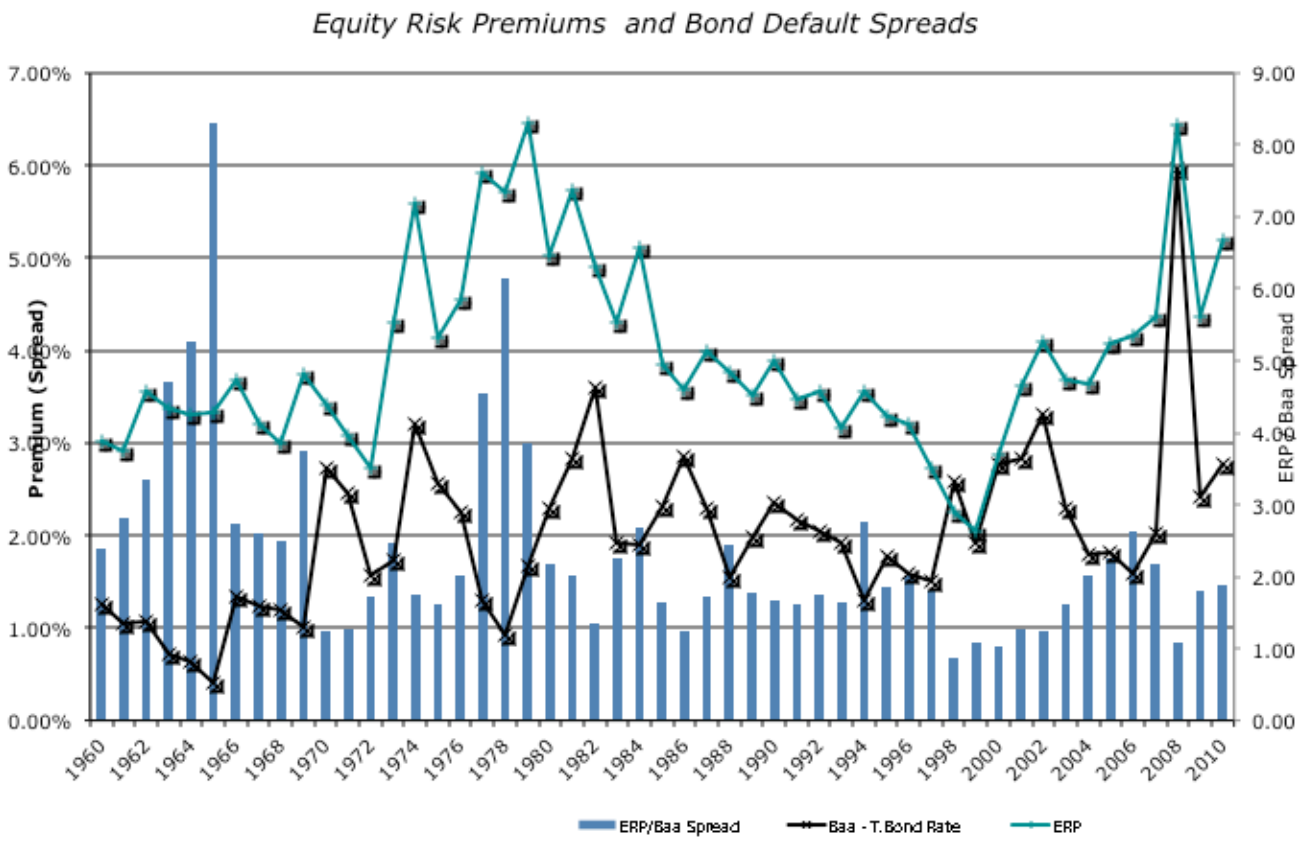
$$1257.64=\frac{57.72}{(1+r)}+\frac{61.73}{(1+r)^2}+\frac{66.02}{(1+r)^3}+\frac{70.60}{(1+r)^4}+\frac{75.51}{(1+r)^5}+\frac{75.51(1.0329)}{(r-.0329)(1+r)^5}$$

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

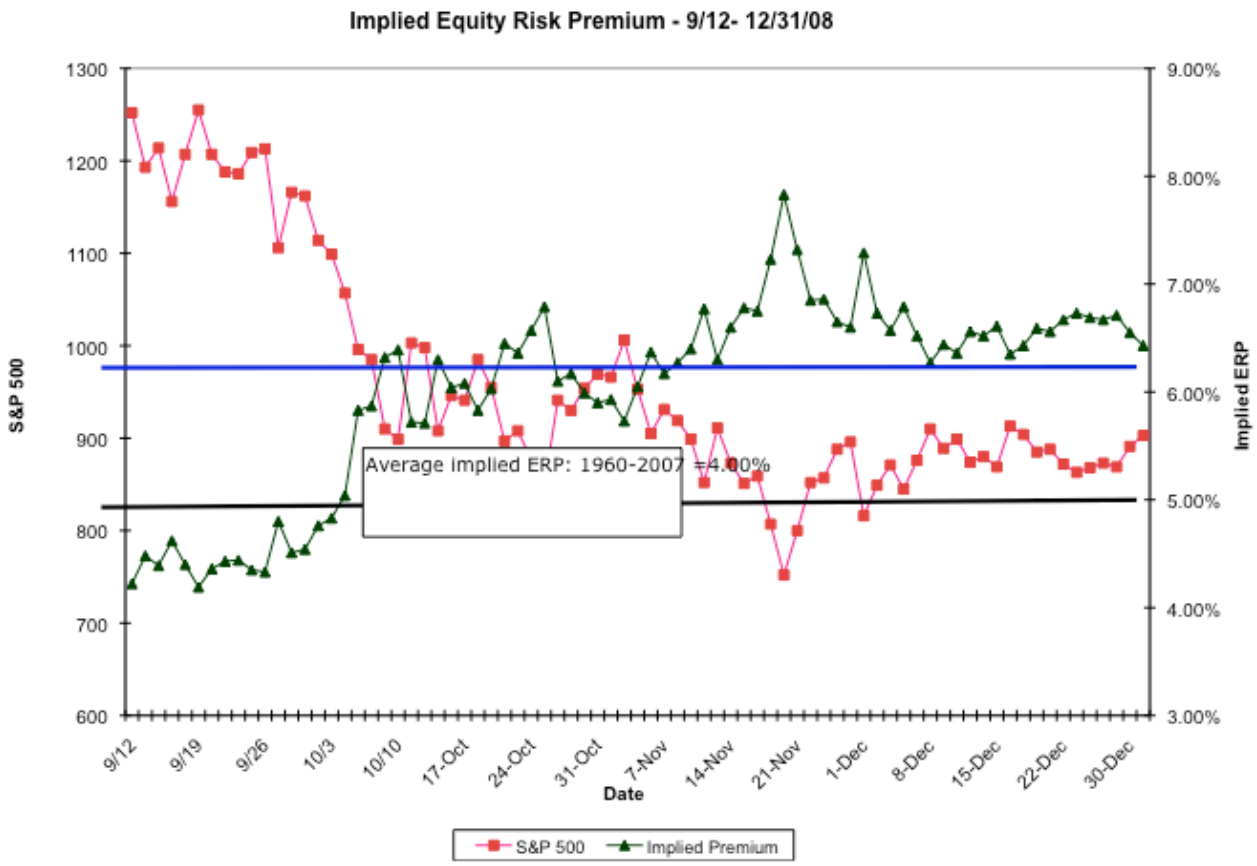
Expected Return on Stocks (1/1/11) = 8.49%
T.Bond rate on 1/1/11 = 3.29%
Equity Risk Premium = 8.03% - 3.29% = 5.20%

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

# Implied ERP for US: A Mature Market..



# Or is the US an Emerging Market?



# 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%

# 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 4.5%. 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 = 4.5% + 3% = 7.5%
  - *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= 3%
    - Total equity risk premium for India = 4.5% + 3% (30/20) = 9%

# *Country Risk Premiums July 2011*

| | |
|---|---|
| Canada | 5.00% |
| United States | 5.00% |

| | |
|---|---|
| Argentina | 14.00% |
| Belize | 14.00% |
| Bolivia | 11.00% |
| Brazil | 7.63% |
| Chile | 6.05% |
| Colombia | 8.00% |
| Costa Rica | 8.00% |
| Ecuador | 17.75% |
| El Salvador | 9.13% |
| Guatemala | 8.60% |
| Honduras | 12.50% |
| Mexico | 7.25% |
| Nicaragua | 14.00% |
| Panama | 8.00% |
| Paraguay | 11.00% |
| Peru | 8.00% |
| Uruguay | 8.60% |
| Venezuela | 11.00% |

| | |
|---|---|
| Austria [1] | 5.00% |
| Belgium [1] | 5.38% |
| Cyprus [1] | 6.50% |
| Denmark | 5.00% |
| Finland [1] | 5.00% |
| France [1] | 5.00% |
| Germany [1] | 5.00% |
| Greece [1] | 15.50% |
| Iceland | 8.00% |
| Ireland [1] | 8.60% |
| Italy [1] | 5.75% |
| Malta [1] | 6.28% |
| Netherlands [1] | 5.00% |
| Norway | 5.00% |
| Portugal [1] | 9.13% |
| Spain [1] | 5.75% |
| Sweden | 5.00% |
| Switzerland | 5.00% |
| United Kingdom | 5.00% |

| | |
|---|---|
| Angola | 9.88% |
| Botswana | 6.50% |
| Egypt | 9.88% |
| Mauritius | 7.63% |
| Morocco | 8.60% |
| South Africa | 6.73% |
| Tunisia | 8.00% |

| | |
|---|---|
| Albania | 11.00% |
| Armenia | 9.13% |
| Azerbaijan | 8.60% |
| Belarus | 12.50% |
| Bosnia and Herzegovina | 12.50% |
| Bulgaria | 8.00% |
| Croatia | 8.00% |
| Czech Republic | 6.28% |
| Estonia | 6.28% |
| Georgia | 9.88% |
| 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 | 7.25% |
| Israel | 6.28% |
| Jordan | 9.13% |
| Kuwait | 5.75% |
| Lebanon | 11.00% |
| Oman | 6.28% |
| Qatar | 5.75% |
| Saudi Arabia | 6.05% |
| Senegal | 11.00% |
| 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 | 8.60% |
| Japan | 5.75% |
| Korea | 6.28% |
| Macao | 6.05% |
| Mongolia | 11.00% |
| Pakistan | 14.00% |
| New Guinea | 11.00% |
| Philippines | 9.13% |
| Singapore | 5.00% |
| Sri Lanka | 11.00% |
| Taiwan | 6.05% |
| Thailand | 7.25% |
| Turkey | 9.13% |
| Vietnam | 11.00% |

| | |
|---|---|
| Australia | 5.00% |
| New Zealand | 5.00% |

# 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+ $\beta$ (US premium) + $\lambda$ (Country ERP)

  Country ERP: Additional country equity risk premium

# Estimating Company Exposure to Country Risk

- Different companies should be exposed to different degrees to country risk. For instance, a Korean firm that generates the bulk of its revenues in Western Europe and the US should be less exposed to country risk than one that generates all its business within Korea.
- The factor "λ" measures the relative exposure of a firm to country risk. One simplistic solution would be to do the following:

  $\lambda$ = % of revenues domestically$_{firm}$/ % of revenues domestically$_{avg\ firm}$

  Consider two firms – Tata Motors and Tata Consulting Services, both Indian companies. In 2008-09, Tata Motors got about 91.37% of its revenues in India and TCS got 7.62%. The average Indian firm gets about 80% of its revenues in India:

  $\lambda_{Tata\ Motors}$ = 91%/80% = 1.14

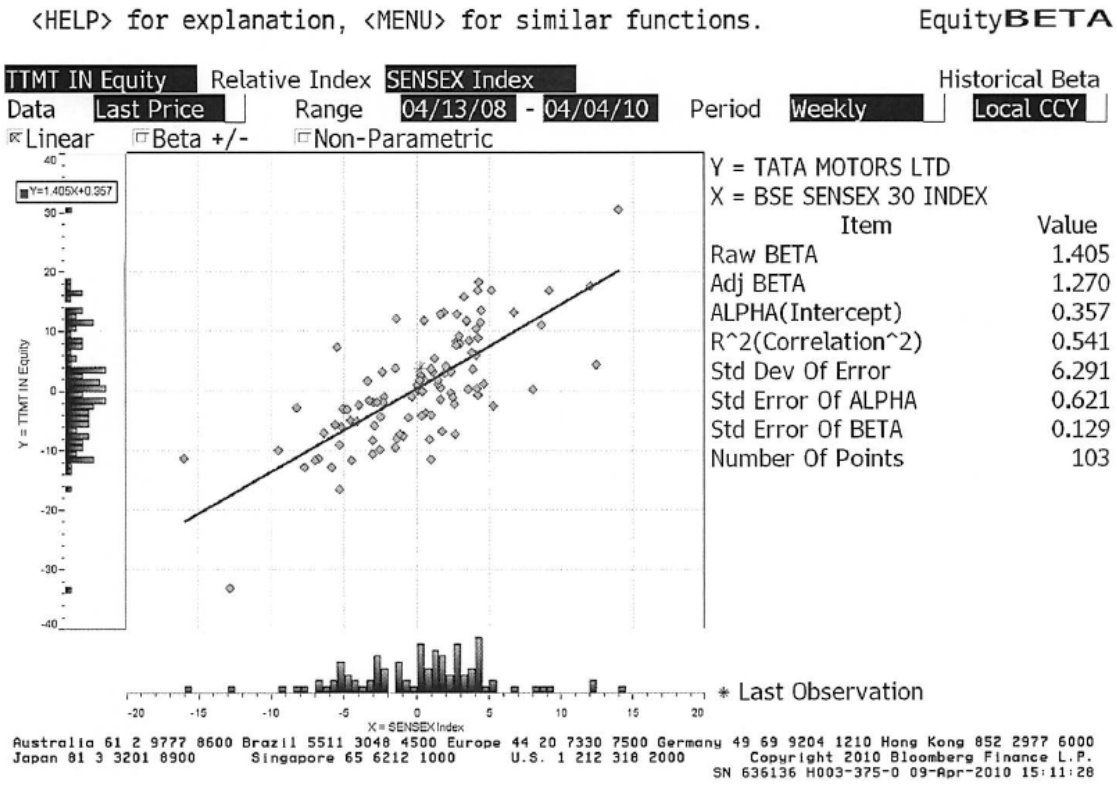
  $\lambda_{TCS}$ = 7.62%/80% = 0.09

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

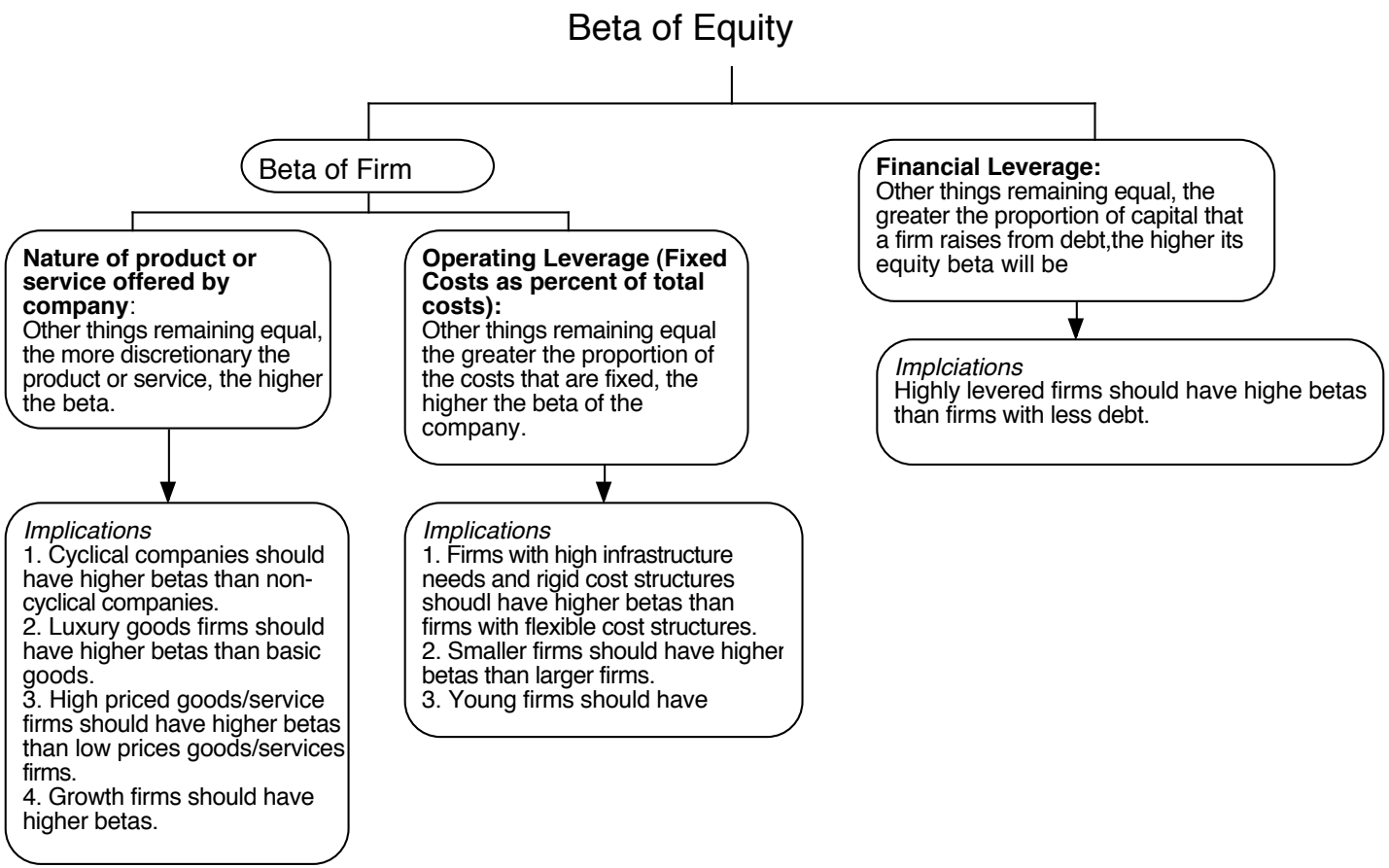
# Estimating lambdas: Tata Group

| | *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 |

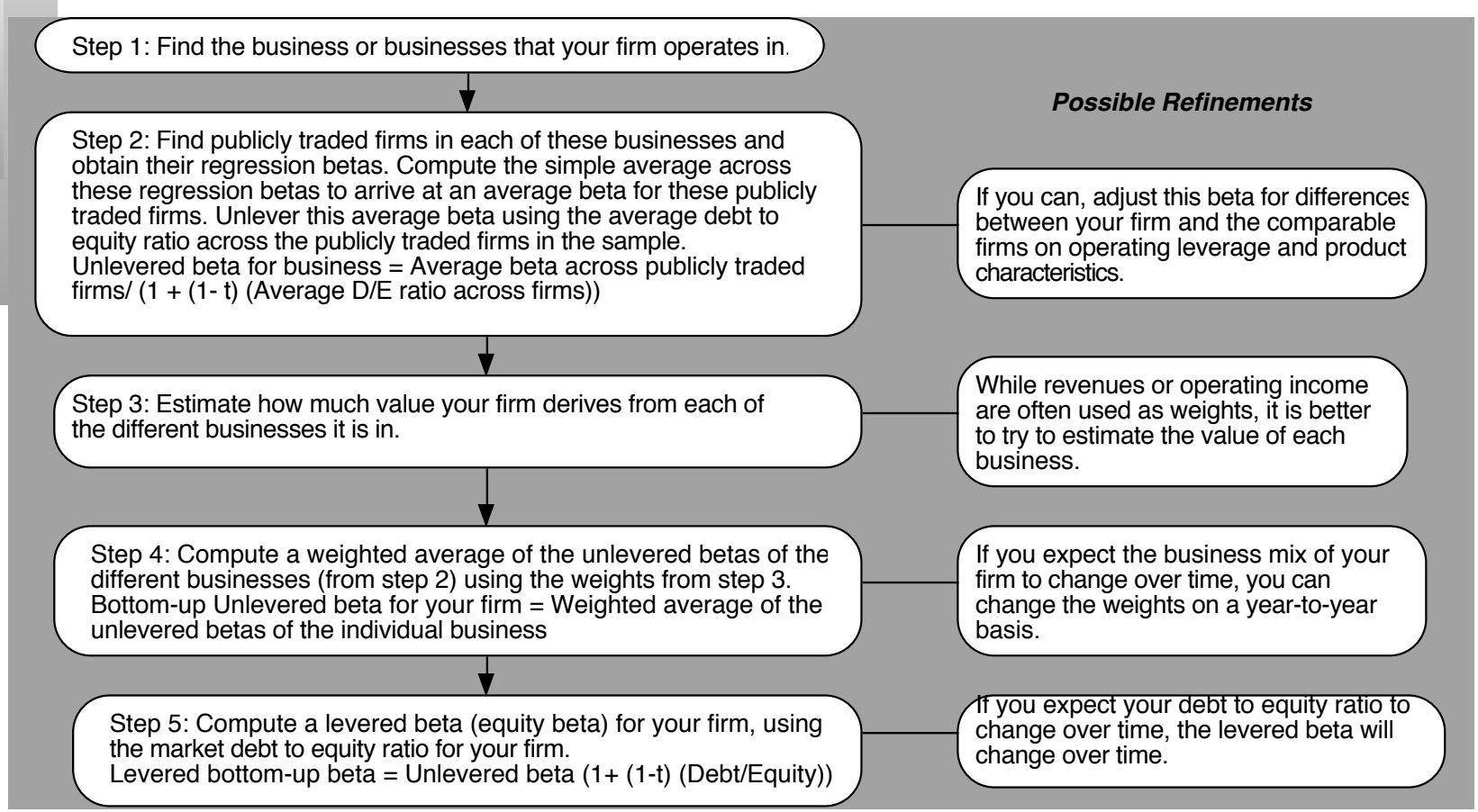
# Lesson 4: Beta is not just a statistical artifact…



# And has roots in fundamentals…



# Bottom-up 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 |

# TCS: Geographical breakdown

| | Beta | Equity Risk Premium | Rs Cost of equity |
|---|---|---|---|
| US & Canada | 1.05 | 4.50% | 9.73% |
| UK | 1.05 | 4.50% | 9.73% |
| Europe | 1.05 | 4.50% | 9.73% |
| India | 1.05 | 9% | 14.45% |
| AsiaPacific | 1.05 | 7% | 12.35% |
| Latin America | 1.05 | 10% | 15.50% |
| Middle East & Africa | 1.05 | 12% | 17.60% |

# 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. In its simplest form, the rating can be estimated from the interest coverage ratio

  Interest Coverage Ratio = EBIT / Interest Expenses

- The interest coverage ratio can be linked to a debt rating, which in turn 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 themselves 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

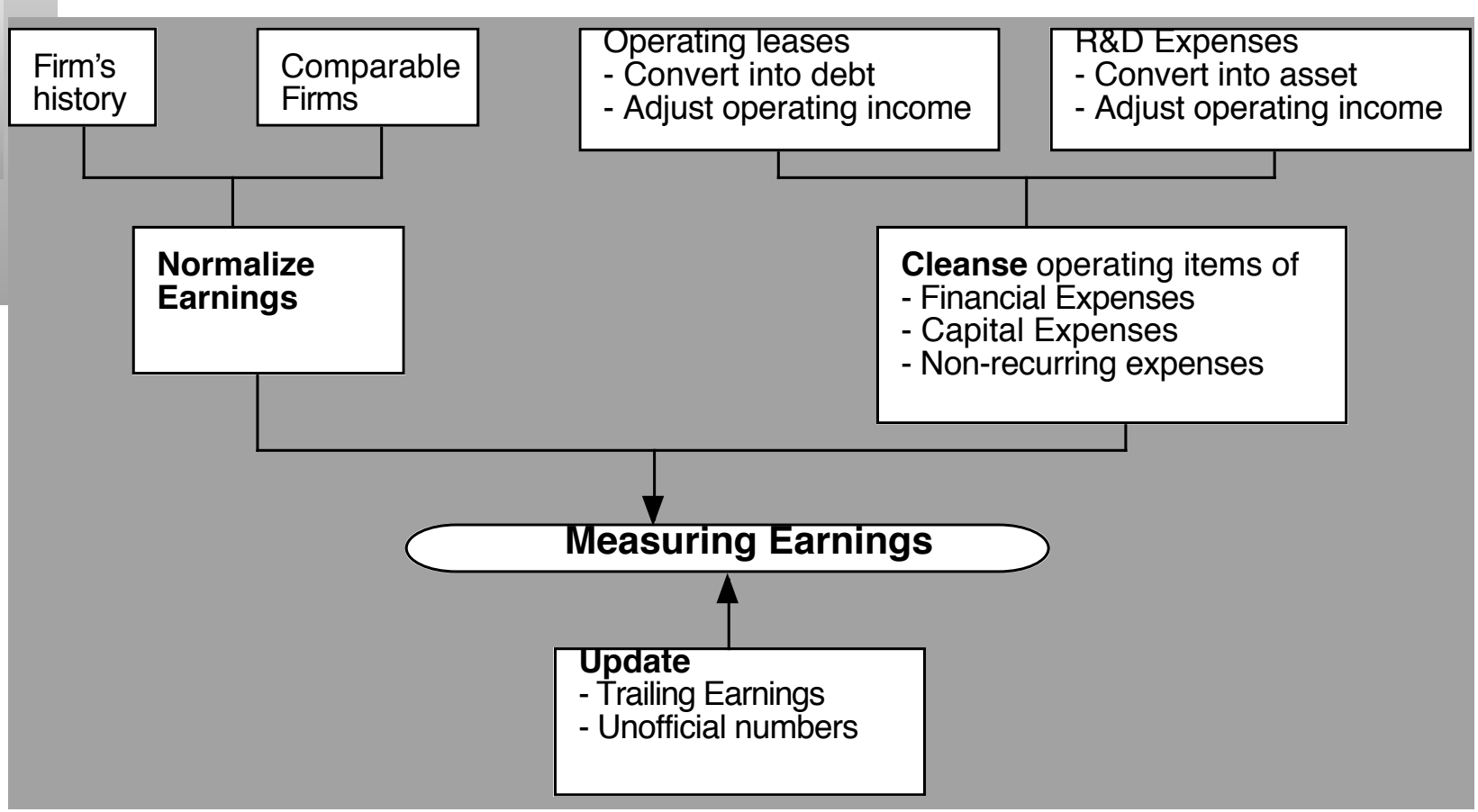
# Interest Coverage Ratios, Ratings and Default Spreads

| If interest coverage ratio is | | | |
|---|---|---|---|
| greater than | ≤ to | Rating is | Spread is |
| -100000 | 0.499999 | D | 15.00% |
| 0.5 | 0.799999 | C | 12.00% |
| 0.8 | 1.249999 | CC | 10.00% |
| 1.25 | 1.499999 | CCC | 8.50% |
| 1.5 | 1.999999 | B- | 5.50% |
| 2 | 2.499999 | B | 5.25% |
| 2.5 | 2.999999 | B+ | 4.25% |
| 3 | 3.499999 | BB | 4.00% |
| 3.5 | 3.9999999 | BB+ | 3.50% |
| 4 | 4.499999 | BBB | 2.00% |
| 4.5 | 5.999999 | A- | 1.50% |
| 6 | 7.499999 | A | 1.25% |
| 7.5 | 9.499999 | A+ | 1.00% |
| 9.5 | 12.499999 | AA | 0.75% |
| 12.5 | 100000 | AAA | 0.50% |

# Estimating the cost of debt for Tata companies

| | Tata Chemicals | Tata Steel | Tata Motors | TCS |
|---|---|---|---|---|
| EBIT | INR 8,515 | INR 84,683 | INR 17,527 | INR 51,414 |
| Interest expense | INR 1,912 | INR 11,527 | INR 6,737 | INR 74 |
| Int coverage ratio | 4.45 | 7.35 | 2.60 | 694.78 |
| Synthetic rating | BBB | A | B+ | AAA |
| Default spread (for company) | 2% | 1.25% | 4.25% | 0.50% |
| Default spread (for country) | 3% | 3% | 3% | 3% |
| Riskfree Rate | 5% | 5% | 5% | 5% |
| Cost of debt | 10.00% | 9.25% | 12.25% | 8.50% |
| Marginal tax rate | 33.99% | 33.99% | 33.99% | 33.99% |
| After-tax cost of debt | 6.60% | 6.11% | 8.09% | 5.61% |

# Lesson 6: Work on your base year earnings…



# Normalizing Earnings: Tata Motors

| | Tata Chemicals | Tata Steel | Tata Motors (actual) | Tata Motors (normalized) | TCS |
|---|---|---|---|---|---|
| EBIT (1-t) | INR 5,833 | INR 60,213 | INR 13,846 | INR 20,117 | INR 43,420 |
| - Net Cap Ex | INR 5,832 | INR 61,620 | INR 31,590 | INR 31,590 | INR 5,611 |
| - Chg in WC | INR 4,229 | -INR 3,658 | INR 2,732 | INR 2,732 | INR 6,130 |
| FCFF | -INR 4,229 | INR 2,252 | -INR 20,476 | -INR 14,205 | INR 31,679 |

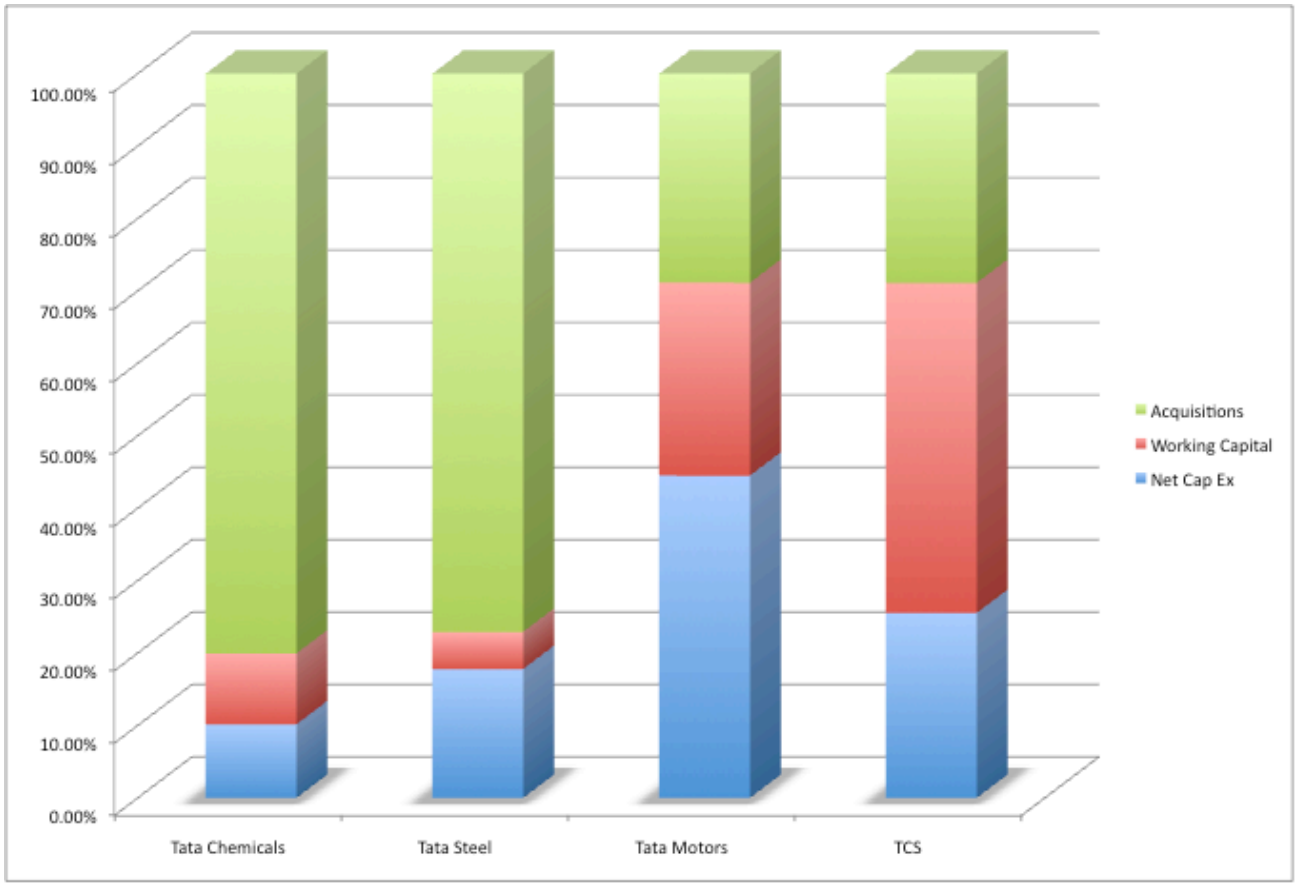
Tax rate =21%

Normalized EBIT = Normalized EBT + Interest Expense in 2009
= Rs 18,727 + Rs 6,737 m= Rs 25,464 m

Normalized EBT = Revenues in 2009 * Average Margin
= Rs 265,868 m* 7.04% = Rs 18,727 m

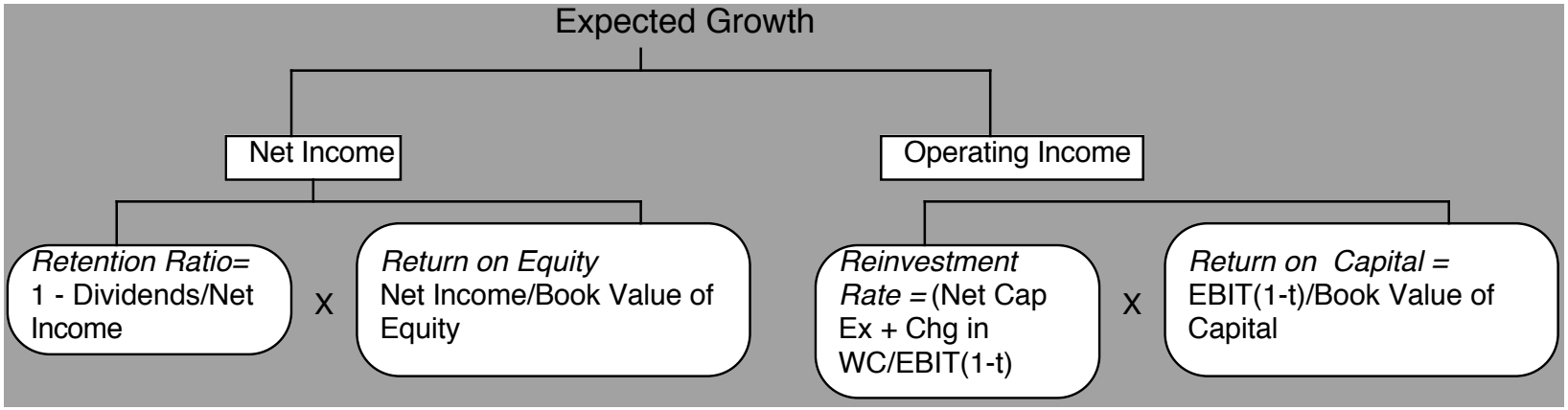
| | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|
| Revenues | INR 206,487 | INR 242,905 | INR 320,648 | INR 335,771 | INR 295,252 | INR 1,401,063 |
| EBT | INR 16,519 | INR 20,534 | INR 25,732 | INR 25,765 | INR 10,138 | INR 98,688 |
| EBT Margin | 8.00% | 8.45% | 8.02% | 7.67% | 3.43% | 7.04% |

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

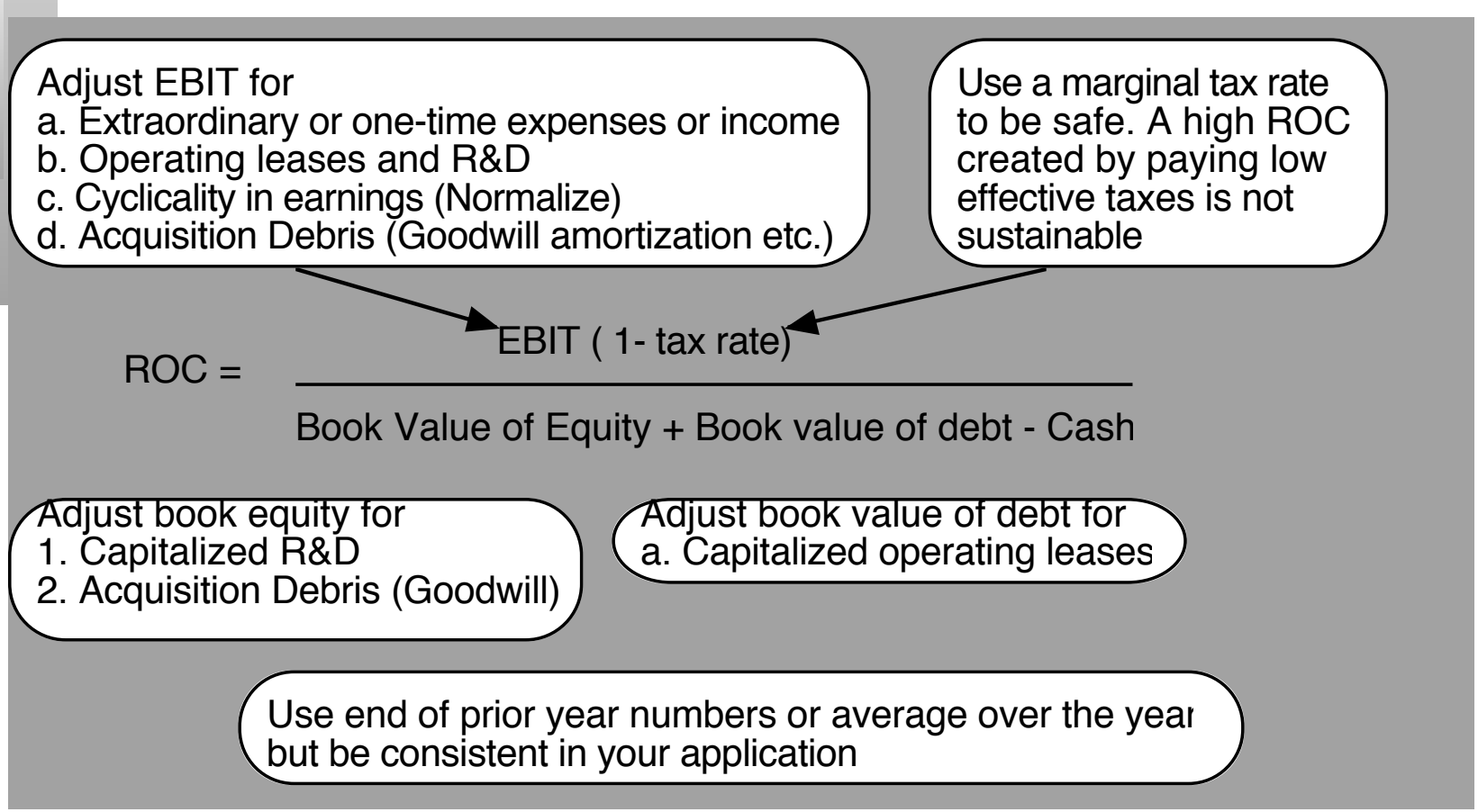


# Lesson 8: History provides little information on growth and managers are no help…

- 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:



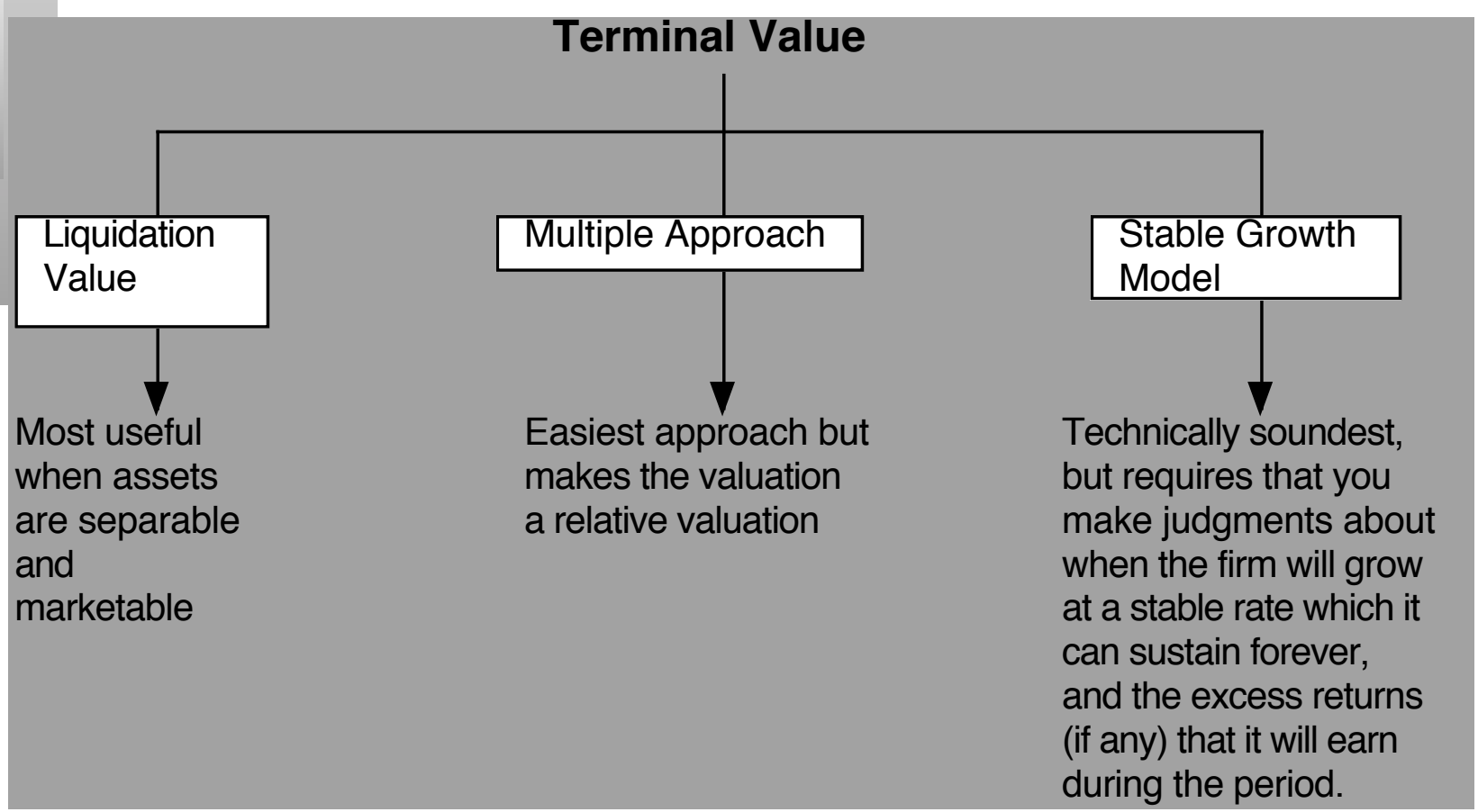
# The key number driving value: Return on Invested Capital



# Measuring Reinvestment Rate and Expected Growth at Tata Group

| | Tata Chemicals | Tata Steel | Tata Motors | TCS |
|---|---|---|---|---|
| ROC | 10.35% | 13.42% | 17.16% | 40.63% |
| | | | | |
| Reinvestment Rate (last year) | 172.50% | 96.26% | 170.61% | 27.04% |
| Reinvestment Rate (last 5 years) | 283.28% | 166.10% | 190.74% | 56.73% |
| Reinvestment Rate (last 5 years - w/o acquisitions) | 56.50% | 38.09% | 179.59% | 30.87% |
| | | | | |
| ROC used | 10.35% | 13.42% | 17.16% | 40.63% |
| Reinvestment rate | 56.50% | 38.09% | 70% | 56.73% |
| Sustainable growth | 5.85% | 5.11% | 12.01% | 23.05% |

# 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. In particular,
  - Betas should move towards one
  - Debt ratios should converge on long-term sustainable averages

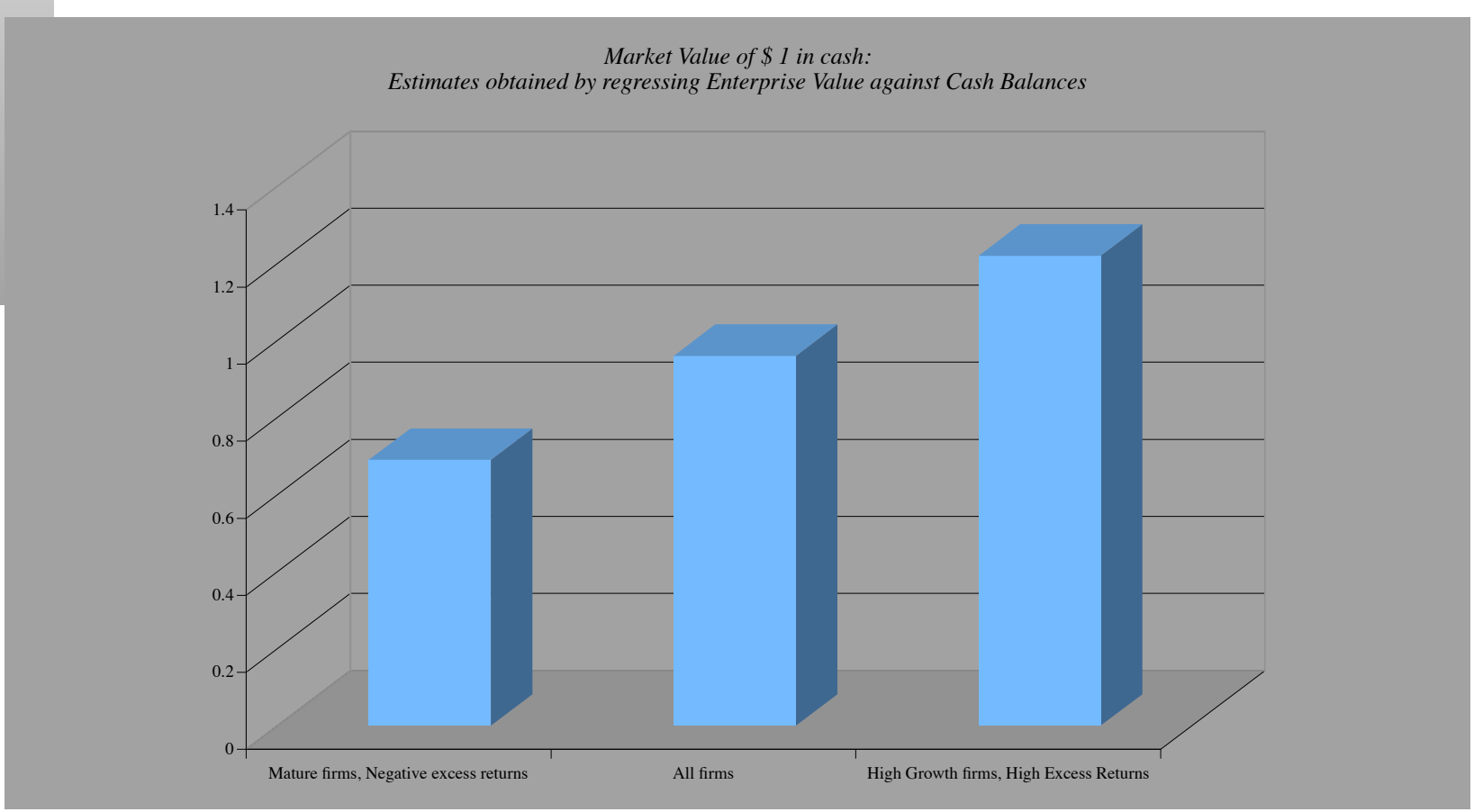
# Stable Growth Assumptions: Tata Group

| | | Tata Chemicals | Tata Steel | Tata Motors | TCS |
|---|---|---|---|---|---|
| Beta | High Growth | 1.21 | 1.57 | 1.20 | 1.05 |
| | Stable Growth | 1.00 | 1.20 | 1.00 | 1.00 |
| Lambda | High Growth | 0.75 | 1.10 | 0.80 | 0.20 |
| | Stable Growth | 0.75 | 1.10 | 0.80 | 0.20 |
| Country Risk Premium | High Growth | 4.50% | 4.50% | 4.50% | 4.50% |
| | Stable Growth | 3.00% | 3.00% | 3.00% | 3.00% |
| Cost of equity | High Growth | 13.82% | 17.02% | 14.00% | 10.63% |
| | Stable Growth | 11.75% | 13.70% | 11.90% | 10.10% |
| Debt Ratio | High Growth | 30.48% | 29.59% | 25.30% | 0.03% |
| | Stable Growth | 30.48% | 29.59% | 25.30% | 10% |
| Cost of debt | High Growth | 10.00% | 9.25% | 12.25% | 8.50% |
| | Stable Growth | 8.00% | 7.75% | 9.00% | 6.50% |
| Cost of capital | High Growth | 11.62% | 13.79% | 12.50% | 10.62% |
| | Stable Growth | 9.78% | 11.16% | 10.39% | 9.52% |
| Reurn on capital | High Growth | 13.42% | 11.81% | 17.16% | 40.63% |
| | Stable Growth | 9.78% | 11.16% | 12.00% | 15% |
| Reinvestment Rate | High Growth | 56.50% | 38.09% | 70.00% | 56.73% |
| | Stable Growth | 51.14% | 44.80% | 41.67% | 33.33% |
| Expected growth rate | High Growth | 5.85% | 5.11% | 12.01% | 23.05% |
| | Stable Growth | 5% | 5% | 5% | 5% |

# Terminal Value and Growth: Contrasts

| Stable growth rate | Tata Chemicals | Tata Steel | Tata Motors | TCS |
|---|---|---|---|---|
| 0% | INR 80,187 | INR 674,891 | INR 435,686 | INR 1,869,744 |
| 1% | INR 80,187 | INR 674,891 | INR 441,901 | INR 1,949,941 |
| 2% | INR 80,187 | INR 674,891 | INR 449,598 | INR 2,051,468 |
| 3% | INR 80,187 | INR 674,891 | INR 459,376 | INR 2,184,144 |
| 4% | INR 80,187 | INR 674,891 | INR 472,214 | INR 2,364,898 |
| 5% | INR 80,187 | INR 674,891 | INR 489,813 | INR 2,625,649 |
| | | | | |
| Return on capital | 9.78% | 11.16% | 12.00% | 15.00% |
| Cost of capital | 9.78% | 11.16% | 10.39% | 9.52% |

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



# Lesson 11: Watch out for cross holdings..

- Cross holdings in other firms can create problems because the accounting for these holdings can vary widely across countries, across companies and even within the same company, across different holdings. In particular,
  - How the income from these holdings is accounted for in the income statement
    - What is counted as income? (Operating income, Net income or just dividends)
    - Where is it shown? (Above or below the operating income line)
    - How much of the income is shown? (The share of the holding, 100%?)
  - How is the value of the asset recorded on the balance sheet?
    - Is it recorded at original cost, updated book value or market value?
    - Is just the net value of the holding shown or are all of the assets and liabilities recorded?
- 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

# Three compromise solutions…

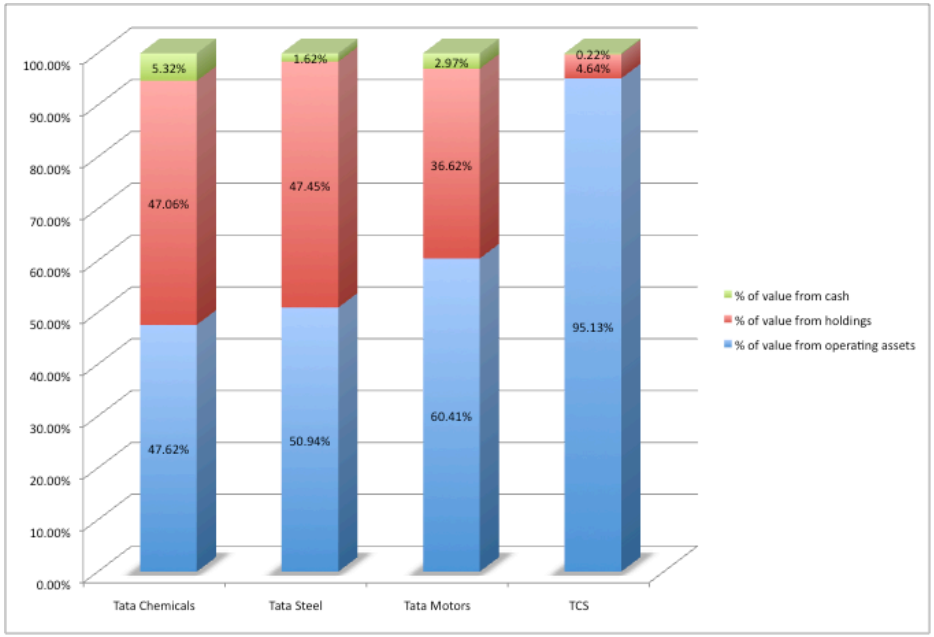
- The market value solution: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.
- The relative value solution: When 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.
- The "take what I can get" solution: Estimate the market value of those holdings that are publicly traded, the relative value of those holdings where there are publicly traded investments to obtain multiples from and book value for the rest.

# 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.

# Getting to per share 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 |



# The Four Steps to Deconstructing Multiples

- Define the multiple
  - In use, the same multiple can be defined in different ways by different users. When comparing and using multiples, estimated by someone else, it is critical that we understand how the multiples have been estimated
- Describe the multiple
  - Too many people who use a multiple have no idea what its cross sectional distribution is. If you do not know what the cross sectional distribution of a multiple is, it is difficult to look at a number and pass judgment on whether it is too high or low.
- Analyze the multiple
  - It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.
- Apply the multiple
  - Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.

# Definitional Tests

- Is the multiple consistently defined?
  - **Proposition 1: Both the value (the numerator) and the standardizing variable ( the denominator) should be to the same claimholders in the firm. In other words, the value of equity should be divided by equity earnings or equity book value, and firm value should be divided by firm earnings or book value.**
- Is the multiple uniformly estimated?
  - The variables used in defining the multiple should be estimated uniformly across assets in the "comparable firm" list.
  - If earnings-based multiples are used, the accounting rules to measure earnings should be applied consistently across assets. The same rule applies with book-value based multiples.

# Example 1: Price Earnings Ratio: Definition

**PE = Market Price per Share / Earnings per Share**

- There are a number of variants on the basic PE ratio in use. They are based upon how the price and the earnings are defined.
- Price: is usually the current price
  is sometimes the average price for the year
- EPS: earnings per share in most recent financial year
  earnings per share in trailing 12 months (Trailing PE)
  forecasted earnings per share next year (Forward PE)
  forecasted earnings per share in future year

# Example 2: Enterprise Value /EBITDA Multiple

- The enterprise value to EBITDA multiple is obtained by netting cash out against debt to arrive at enterprise value and dividing by EBITDA.

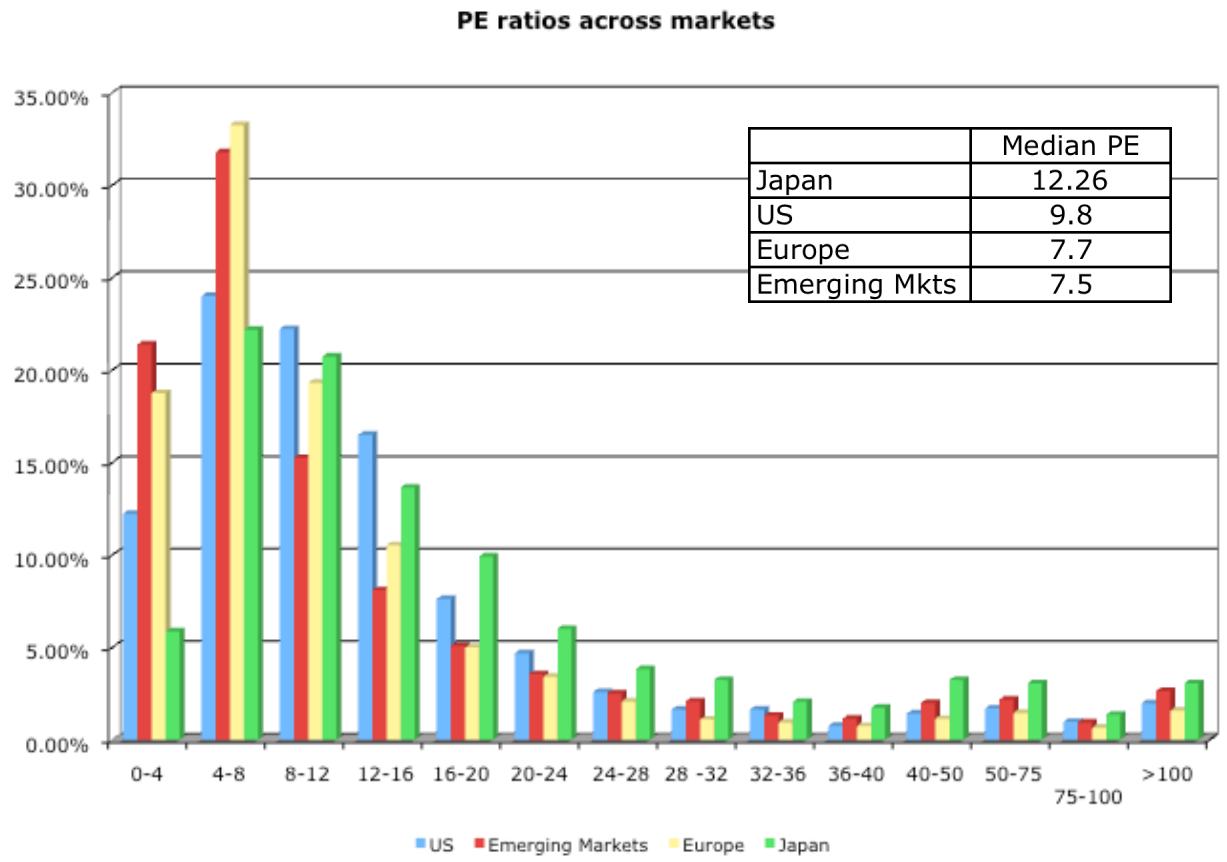
$$\frac{\text{Enterprise Value}}{\text{EBITDA}} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt} - \text{Cash}}{\text{Earnings before Interest, Taxes and Depreciation}}$$

- Why do we net out cash from firm value?
- What happens if a firm has cross holdings which are categorized as:
  - Minority interests?
  - Majority active interests?

# Descriptive Tests

- What is the average and standard deviation for this multiple, across the universe (market)?
- What is the median for this multiple?
  - The median for this multiple is often a more reliable comparison point.
- How large are the outliers to the distribution, and how do we deal with the outliers?
  - Throwing out the outliers may seem like an obvious solution, but if the outliers all lie on one side of the distribution (they usually are large positive numbers), this can lead to a biased estimate.
- Are there cases where the multiple cannot be estimated? Will ignoring these cases lead to a biased estimate of the multiple?
- How has this multiple changed over time?

# Comparing PE Ratios: US, Europe, Japan and Emerging Markets




| | Median PE |
|---|---|
| Japan | 12.26 |
| US | 9.8 |
| Europe | 7.7 |
| Emerging Mkts | 7.5 |

# Analytical Tests

- What are the fundamentals that determine and drive these multiples?
  - Proposition 2: Embedded in every multiple are all of the variables that drive every discounted cash flow valuation - growth, risk and cash flow patterns.
  - In fact, using a simple discounted cash flow model and basic algebra should yield the fundamentals that drive a multiple
- How do changes in these fundamentals change the multiple?
  - The relationship between a fundamental (like growth) and a multiple (such as PE) is seldom linear. For example, if firm A has twice the growth rate of firm B, it will generally not trade at twice its PE ratio
  - **Proposition 3: It is impossible to properly compare firms on a multiple, if we do not know the nature of the relationship between fundamentals and the multiple.**

# PE Ratio: Understanding the Fundamentals

- To understand the fundamentals, start with a basic equity discounted cash flow model.
- With the dividend discount model,

$$P_0 = \frac{DPS_1}{r - g_n}$$

- Dividing both sides by the current earnings per share,

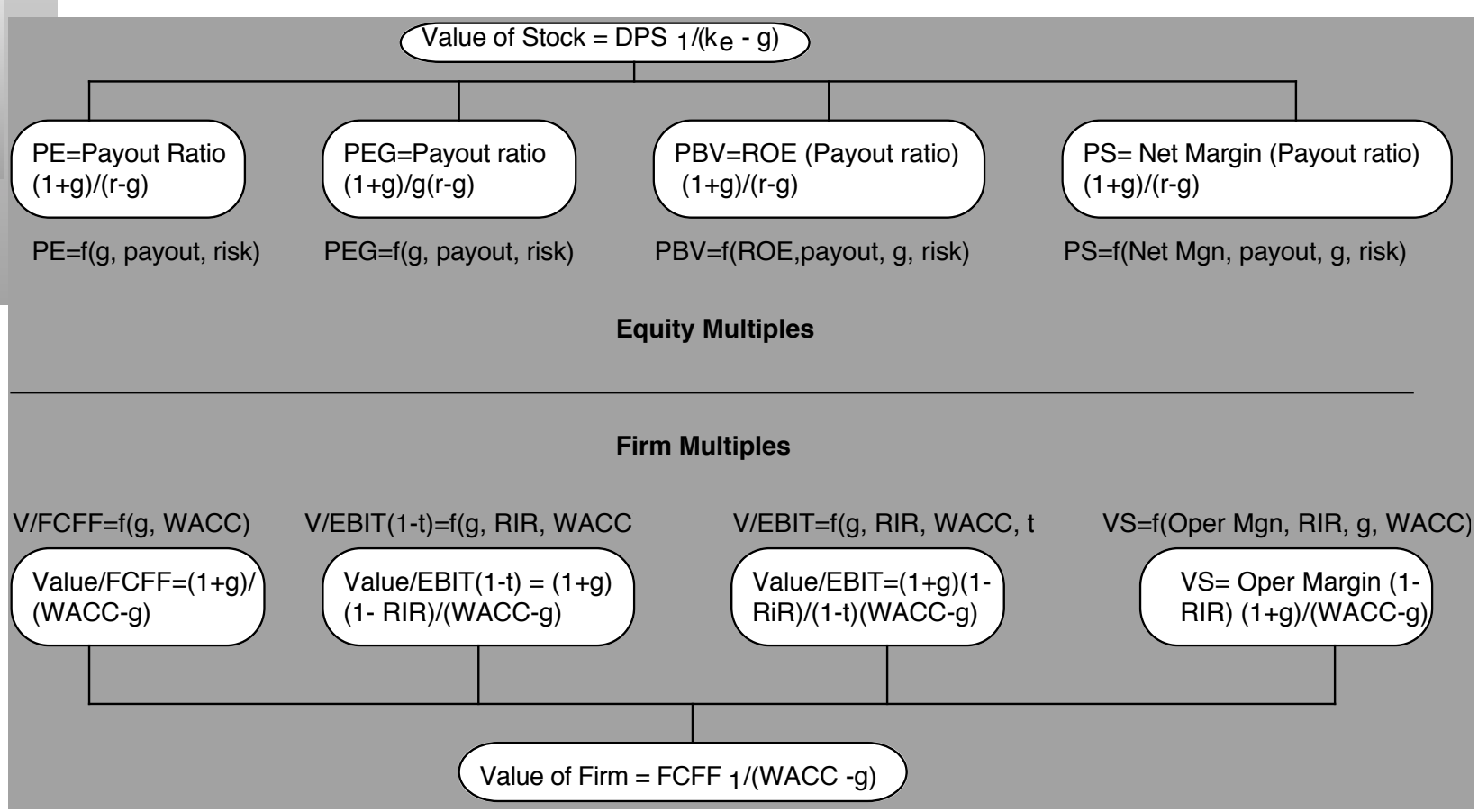
$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- If this had been a FCFE Model,

$$P_0 = \frac{FCFE_1}{r - g_n}$$

$$\frac{P_0}{EPS_0} = PE = \frac{(FCFE/Earnings) * (1 + g_n)}{r - g_n}$$

# The Determinants of Multiples…



# Application Tests

- Given the firm that we are valuing, what is a "comparable" firm?
  - While traditional analysis is built on the premise that firms in the same sector are comparable firms, valuation theory would suggest that a comparable firm is one which is similar to the one being analyzed in terms of fundamentals.
  - **Proposition 4: There is no reason why a firm cannot be compared with another firm in a very different business, if the two firms have the same risk, growth and cash flow characteristics.**
- Given the comparable firms, how do we adjust for differences across firms on the fundamentals?
  - **Proposition 5: It is impossible to find an exactly identical firm to the one you are valuing.**

# An Example: Indian Automobile firms…

| Company Name | Market Capitalization (Millions of Rs) | PE | Beta | Turnover Ratio |
|---|---|---|---|---|
| Atlas Honda Ltd. | RS 2,736 | 9.22 | 0.26 | 1.06% |
| Atul Auto Limited | RS 137 | 9.25 | 1.30 | 17.09% |
| Bajaj Auto Ltd. | RS 76,781 | 8.54 | 0.80 | 10.02% |
| Hero Honda Motors Ltd. | RS 189,072 | 16.25 | 0.44 | 9.26% |
| Hindustan Motors Ltd. | RS 1,800 | 3.94 | 1.22 | 47.30% |
| Indus Motor Co. Ltd. | RS 3,317 | 5.01 | 0.40 | 38.80% |
| Maharashtra Scooters Ltd. | RS 734 | 7.18 | 0.97 | 6.58% |
| Mahindra & Mahindra Ltd. | RS 91,954 | 4.88 | 0.79 | 11.94% |
| Majestic Auto Ltd. | RS 230 | 4.86 | 0.85 | 4.81% |
| Maruti Suzuki India Ltd | RS 195,230 | 9.09 | 0.56 | 19.73% |
| Pak Suzuki Motor Co. Ltd. | RS 2,539 | 2.65 | 0.59 | 21.26% |
| Tata Motors | RS 74,737 | 3.05 | 1.48 | 24.50% |

# Another example: Developed Market comparables…

| Company Name | EV/EBITDA | ROC | Tax Rate | Debt/Capital |
|---|---|---|---|---|
| AK Steel Holding | 0.83 | 69.33% | 34.43% | 40.91% |
| Schuff International Inc | 1.08 | 51.45% | 34.89% | 33.55% |
| Shiloh Inds. | 1.38 | 14.55% | 44.00% | 63.73% |
| Mueller (Paul) Co | 1.53 | 42.08% | 37.65% | 6.95% |
| Carpenter Technology | 1.80 | 31.66% | 32.56% | 26.87% |
| Unvl Stainless & Alloy Prods | 1.97 | 20.31% | 32.74% | 4.28% |
| Ampco-Pittsburgh | 2.19 | 33.30% | 32.78% | 5.86% |
| Castle (A.M.) & Co. | 2.28 | 14.78% | 40.23% | 26.85% |
| Schnitzer Steel Inds 'A' | 2.29 | 24.46% | 36.39% | 16.15% |
| ArcelorMittal | 2.37 | 19.20% | 20.41% | 48.23% |
| Posco ADR | 2.43 | 19.43% | 26.01% | 22.69% |
| Reliance Steel | 2.72 | 16.08% | 37.64% | 43.81% |
| U.S. Steel Corp. | 3.07 | 16.42% | 19.87% | 45.11% |
| Olympic Steel Inc. | 3.37 | 11.85% | 37.61% | 9.16% |
| Tenaris S.A. | 3.53 | 25.87% | 28.75% | 25.69% |
| Canam Group Inc | 3.54 | 13.71% | 39.26% | 17.85% |
| Commercial Metals | 3.65 | 13.26% | 30.96% | 50.53% |
| Samuel Manu-Tech Inc. | 3.85 | 9.83% | 25.47% | 41.25% |
| General Steel Holdings Inc | 3.85 | 29.79% | 12.32% | 50.13% |
| Steel Dynamics | 4.07 | 14.71% | 37.39% | 51.14% |
| Nucor Corp. | 4.29 | 33.23% | 34.68% | 14.22% |
| Moro Corp | 4.49 | 11.65% | 40.98% | 51.28% |
| Gerdau Ameristeel Corp | 4.60 | 10.87% | 30.54% | 51.60% |
| Worthington Inds. | 4.64 | 11.57% | 26.51% | 30.70% |
| Russel Metals Inc. | 4.72 | 14.63% | 35.42% | 14.49% |
| Cliffs Natural Res. | 5.14 | 22.93% | 22.09% | 17.70% |
| Gibraltar Inds. | 5.17 | 6.88% | 38.55% | 61.29% |
| Northwest Pipe Co | 7.92 | 7.99% | 36.33% | 25.20% |
| Great Northern Iron Ore | 8.40 | 245.00% | 0.00% | 0.00% |
| Omega Flex Inc | 13.52 | 57.23% | 37.94% | 0.00% |