



# VALUATION: IT'S NOT THAT COMPLICATED!

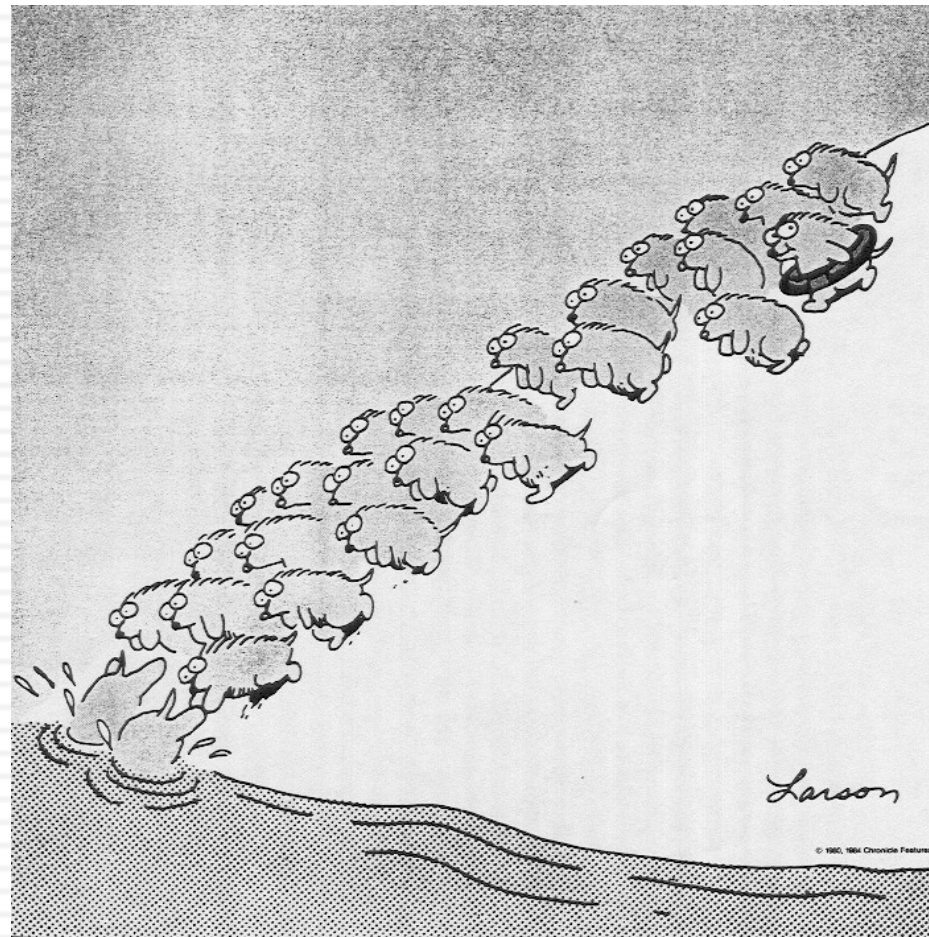
# The Big Picture

Just because you have a D and a CF does not mean you have a DCF!

# Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti



Aswath Damodaran

# Theme 1: Characterizing Valuation as a discipline

- In a science, if you get the inputs right, you should get the output right. The laws of physics and mathematics are universal and there are no exceptions. **Valuation is not a science.**
- In an art, there are elements that can be taught but there is also a magic that you either have or you do not. The essence of an art is that you are either a great artist or you are not. **Valuation is not an art.**
- A craft is a skill that you learn by doing. The more you do it, the better you get at it. **Valuation is a craft.**



# Theme 2: Valuing an asset is not the same as pricing that asset

Drivers of intrinsic value

- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of price

- Market moods & momentum
- Surface stories about fundamentals

Accounting Estimates

Valuation Estimates

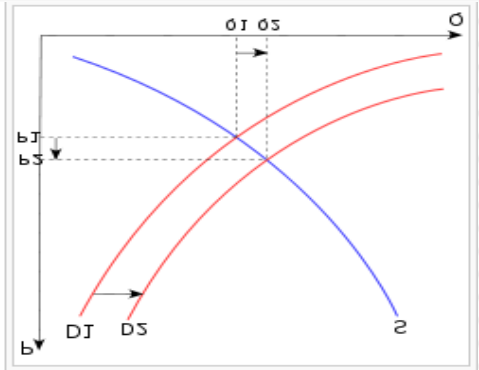
INTRINSIC VALUE

Value

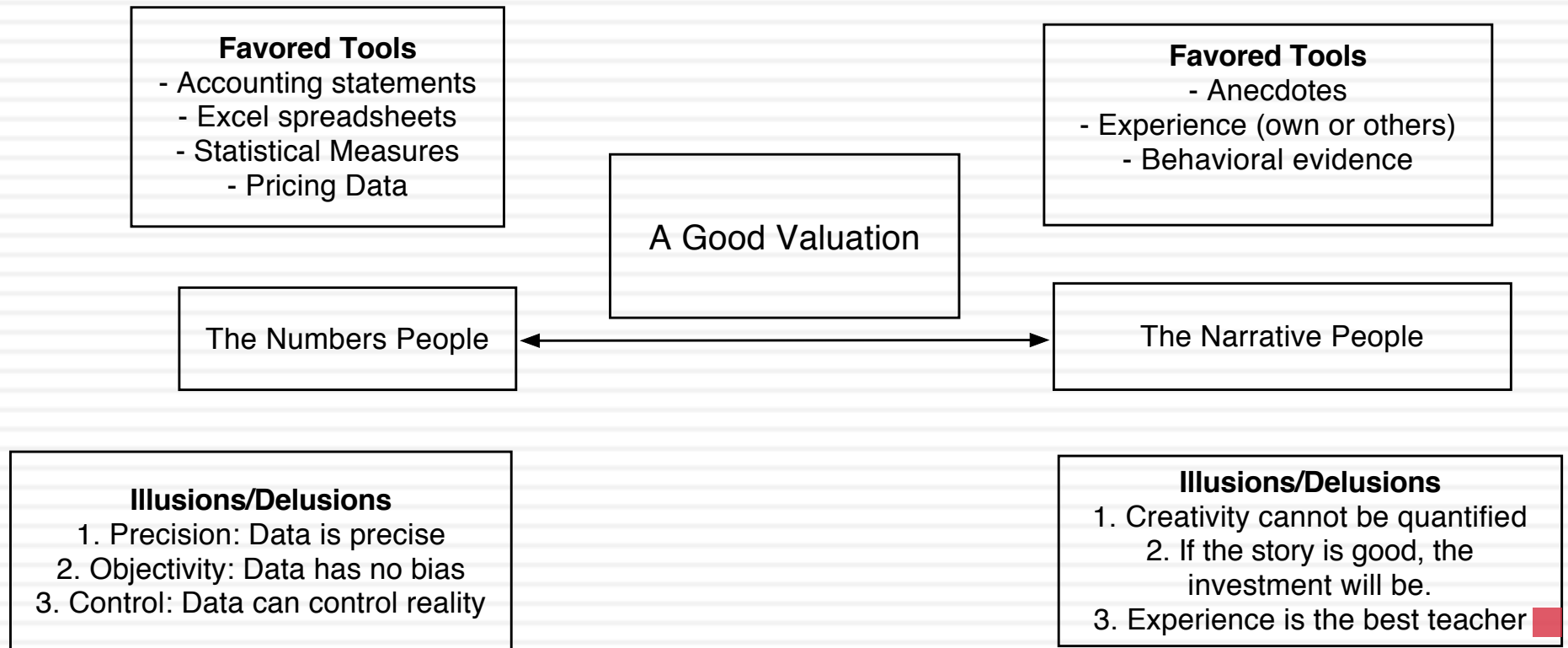
THE GAP  
Is there one?  
If so, will it close?  
If it will close, what will cause it to close?

Price

PRICE



# Theme 3: Good valuation = Story + Numbers



## Theme 4: If you value something, you should be willing to act on it..

- What theory? There is very little theory in valuation and I am not sure what an academic valuation would like like and am not sure that I want to find out.
- Pragmatism, not purity: The end game is to estimate a value for an asset. I plan to get there, even if it means taking short cuts and making assumptions that would make purists blanch.
- Do you have faith? To act on your valuations, you have to have faith in
  - ▣ In your own valuation judgments.
  - ▣ In markets: that prices will move towards your value estimates. That faith will have to be earned.

# 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

- **Intrinsic valuation**, relates the value of an asset to the present value of expected future cashflows on that asset. In its most common form, this takes the form of a discounted cash flow valuation.
- **Relative valuation or Pricing**, estimates the value of an asset by looking at the pricing of 'comparable' assets relative to a common variable like earnings, cash flows, 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.

# Risk Adjusted Value: Three Basic Propositions

- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

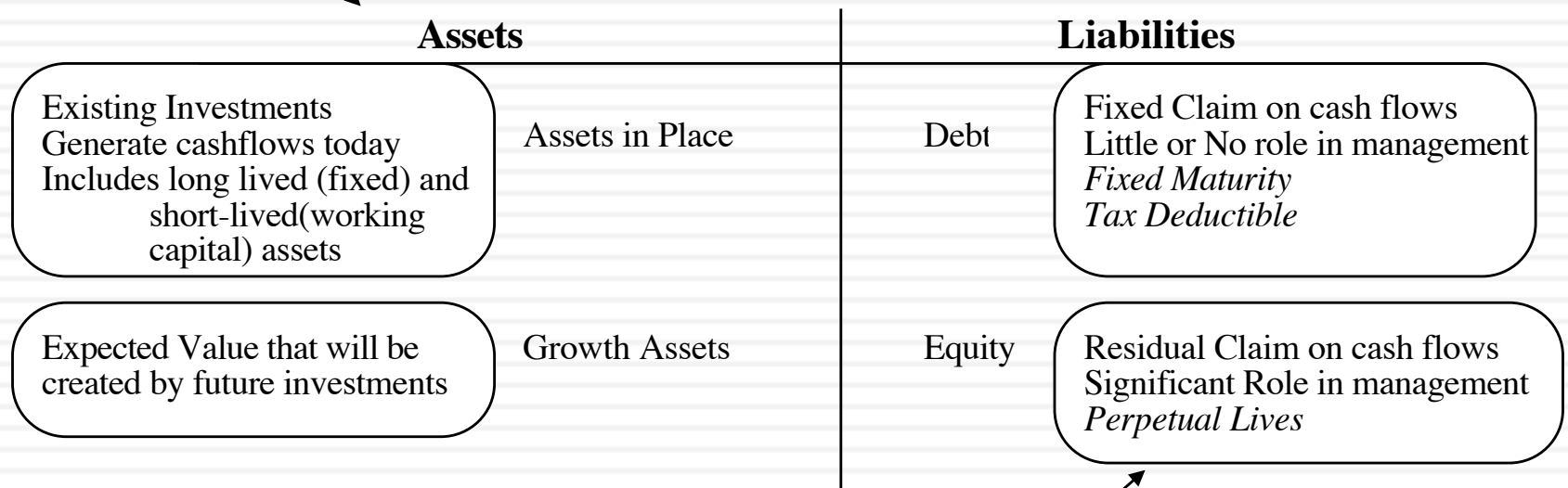
$$\text{Value of asset} = \frac{E(\text{CF}_1)}{(1+r)} + \frac{E(\text{CF}_2)}{(1+r)^2} + \frac{E(\text{CF}_3)}{(1+r)^3} \dots + \frac{E(\text{CF}_n)}{(1+r)^n}$$

1. *The IT Proposition:* If “it” does not affect the cash flows or alter risk (thus changing discount rates), “it” cannot affect value.
2. *The DUH Proposition:* For an asset to have value, the expected cash flows have to be positive some time over the life of the asset.
3. *The DON'T FREAK OUT Proposition:* Assets that generate cash flows early in their life will be worth more than assets that generate cash flows later; the latter may however have greater growth and higher cash flows to compensate.



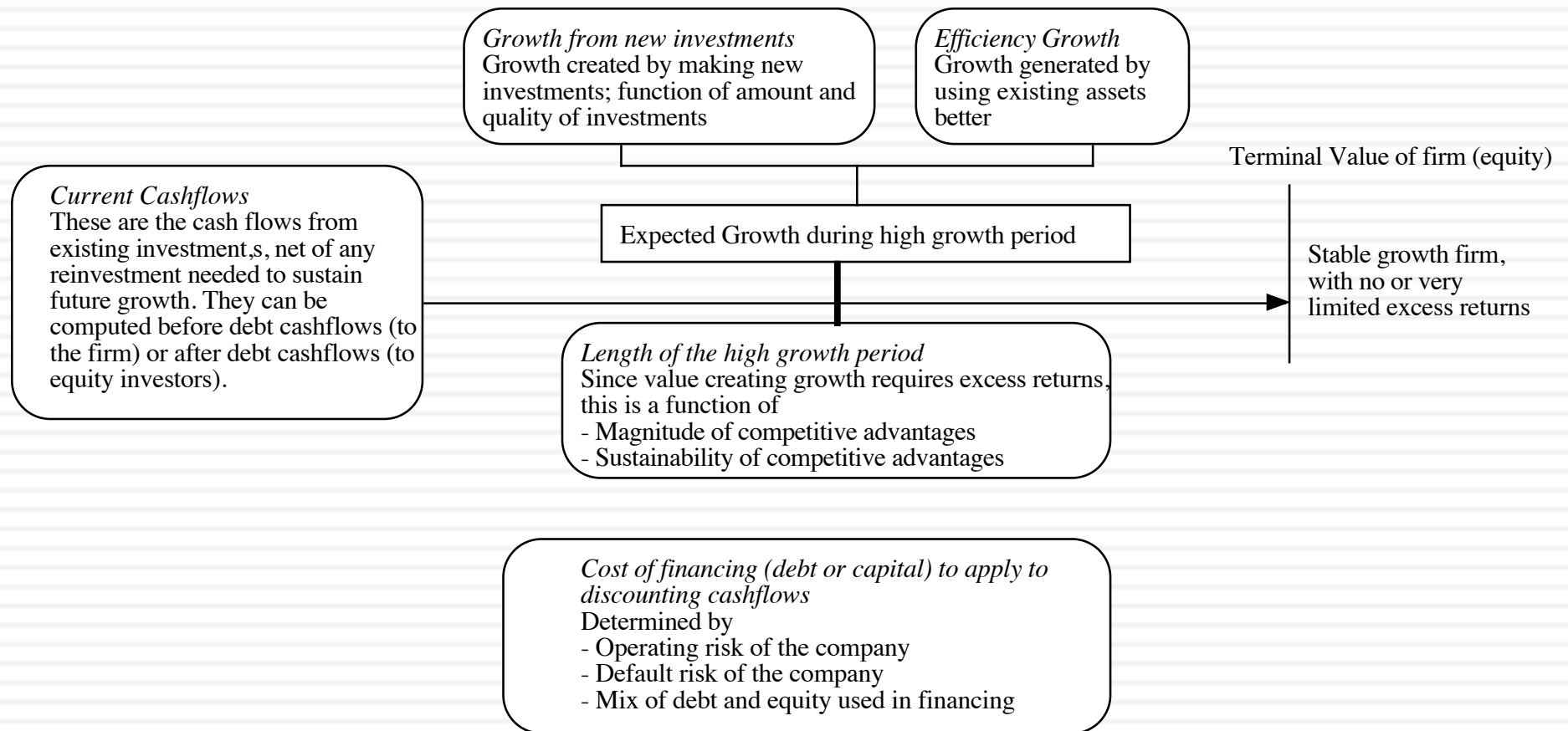
# DCF Choices: Equity Valuation versus Firm Valuation

**Firm Valuation:** Value the entire business



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

# The Drivers of Value...



*Start with the past*

**Cash flow to Firm**

Revenues \* Operating Margin  
= Operating Income

\* (1- tax rate) Tax Effect

- (Cap Ex - Depreciation) Reinvestment  
- Change in non-cash WC

= Free Cash flow to Firm

- \* How quickly is the firm growing?
- \* How efficiently is it growing?
- \* How profitable is the firm?

*Forecast future cashflows*

*If margins & returns are stable*

Expected growth in operating income = Reinvestment Rate \* Return on Invested Capital  
FCFF = After-tax Oper. Income (1 - Reinvestment Rate)

*If margins & returns are changing*

1. Estimate revenue growth & future revenues  
2. Estimate operating margins over time  
3. Estimate reinvestment based on revenues  
FCFF = After tax Operating Income - Reinvestment

*Apply Closure*

**Firm is mature**

Cashflow/Earnings grow at constant rate forever ( $g_n$ )

Terminal Value =  $FCFF_{n+1} / (r - g_n)$

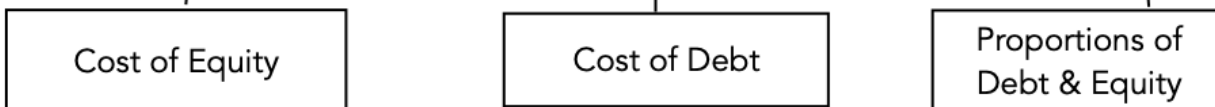
Value of Operating Assets + Cash  
+ Non-operating Assets  
- Debt  
= Value of Equity

**Adjust for risk of failure**

= Probability of failure \* Value of Equity in failure



Discount back at Cost of Capital, which can change over time..



**Long term rate at which you can borrow money, today**  
(Riskfree Rate + Default Spread) (1- tax rate)

**Return required by "marginal" investors, given perceived risk in equity investment**

**Riskfree Rate**

- Default free & long term  
- In same currency and in same terms as cash flows

+

**Relative Risk Measure (Beta)**

Business Mix

Financial Leverage

X

**Equity Risk Premium**

Operating Locations

*Adjust for operating risk in cashflows*

# Amgen: Status Quo

Cap Ex = Acc net Cap Ex(255) + Acquisitions (3975) + R&D (2216)

**Current Cashflow to Firm**  
 EBIT(1-t) =  $.7336(1-.28) = 6058$   
 - Nt CpX = 6443  
 - Chg WC 37  
 = FCFF - 423  
 Reinvestment Rate =  $6480/6058 = 106.98\%$   
 Return on capital = 16.71%

Reinvestment Rate 60%

**Expected Growth in EBIT (1-t)**  
 $.60 * .16 = .096$   
**9.6%**

Return on Capital 16%

**Stable Growth**  
 g = 4%; Beta = 1.10;  
 Debt Ratio = 20%; Tax rate = 35%  
 Cost of capital = 8.08%  
 ROC = 10.00%;  
 Reinvestment Rate =  $4/10 = 40\%$

Terminal Value<sub>10</sub> =  $7300 / (.0808 - .04) = 179,099$

First 5 years

Growth decreases gradually to 4%

| Year           | 1       | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       |
|----------------|---------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| EBIT           | \$9,221 | \$10,106 | \$11,076 | \$12,140 | \$13,305 | \$14,433 | \$15,496 | \$16,463 | \$17,306 | \$17,998 |
| EBIT (1-t)     | \$6,639 | \$7,276  | \$7,975  | \$8,741  | \$9,580  | \$10,392 | \$11,157 | \$11,853 | \$12,460 | \$12,958 |
| - Reinvestment | \$3,983 | \$4,366  | \$4,785  | \$5,244  | \$5,748  | \$5,820  | \$5,802  | \$5,690  | \$5,482  | \$5,183  |
| = FCFF         | \$2,656 | \$2,911  | \$3,190  | \$3,496  | \$3,832  | \$4,573  | \$5,355  | \$6,164  | \$6,978  | \$7,775  |

**Term Yr**  
 18718  
 12167  
 4867  
 7300

Op. Assets 94214  
 + Cash: 1283  
 - Debt 8272  
 = Equity 87226  
 - Options 479  
 Value/Share \$ 74.33

Cost of Capital (WACC) =  $11.7\% (0.90) + 3.66\% (0.10) = 10.90\%$

Debt ratio increases to 20%  
 Beta decreases to 1.10

On May 1, 2007, Amgen was trading at \$ 55/share

**Cost of Equity 11.70%**

**Cost of Debt**  
 $(4.78\% + .85\%)(1 - .35) = 3.66\%$

**Weights**  
 E = 90% D = 10%

**Riskfree Rate:**  
 Riskfree rate = 4.78%

+

**Beta 1.73** x **Risk Premium 4%**

Unlevered Beta for Sectors: 1.59      D/E = 11.06%

# 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 =  $.70 \times .1716 = 0.1201$

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

Rs Cashflows

Terminal Value =  $23493 / (.1039 - .05) = \text{Rs } 435,686$

| Year           | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       |
|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| EBIT (1-t)     | ₹ 22,533 | ₹ 25,240 | ₹ 28,272 | ₹ 31,668 | ₹ 35,472 | ₹ 39,236 | ₹ 42,848 | ₹ 46,192 | ₹ 49,150 | ₹ 51,607 |
| - Reinvestment | ₹ 15,773 | ₹ 17,668 | ₹ 19,790 | ₹ 22,168 | ₹ 24,830 | ₹ 25,242 | ₹ 25,138 | ₹ 24,482 | ₹ 23,264 | ₹ 21,503 |
| FCFF           | ₹ 6,760  | ₹ 7,572  | ₹ 8,482  | ₹ 9,500  | ₹ 10,642 | ₹ 13,994 | ₹ 17,711 | ₹ 21,710 | ₹ 25,886 | ₹ 30,104 |

45278  
21785  
23493

Move to effective tax rate causes EBIT (1-t) to drop in terminal year

Op. Assets 210,813  
 + Cash: 11418  
 + Crosshold 140576  
 - Debt 109198  
 =Equity 253,628  
**Value/Share Rs 614**

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

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

On April 1, 2010  
 Tata Motors price = Rs 781

Cost of Equity 14.00%

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

Weights  
 E = 74.7% D = 25.3%

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: 0.98 x Firm's D/E Ratio: 34%

Country Default Spread 3% x Rel Equity Mkt Vol 1.50

Fertiglobe comes into this valuation growing much faster than the typical fertilizer company and will much higher margins.

|                  | Fertiglobe | All Fertilizer | Fertilizer - Largest |
|------------------|------------|----------------|----------------------|
| Revenue growth   | 102.10%    | 16.00%         | 21.70%               |
| Operating margin | 46.14%     | 11.83%         | 22.42%               |
| Sales to Capital | 1.79       | 1.47           | 1.75                 |

Revenue growth of 50 next year, followed by 15% a year for next 4 years, tapering down to 4% forever.

### Fertiglobe: My valuation (October 2022)

Between 2018 and 2022 Fertiglobe has almost quadrupled revenue, and in the LTM, the company earned an operating margin of 46.14% and had a sales to capital ratio of 1.79

Pre-tax operating margin decreases to 40.00% over time.

Sales to capital ratio of 1.79, matching company's current

**Stable Growth**  
 g = 4%  
 Cost of capital = 10.10%  
 ROC = 15%;  
 Reinvestment Rate = 4%/15% = 26.67%

Terminal Value =  $4220 / (.101 - .04) = \$70,220$

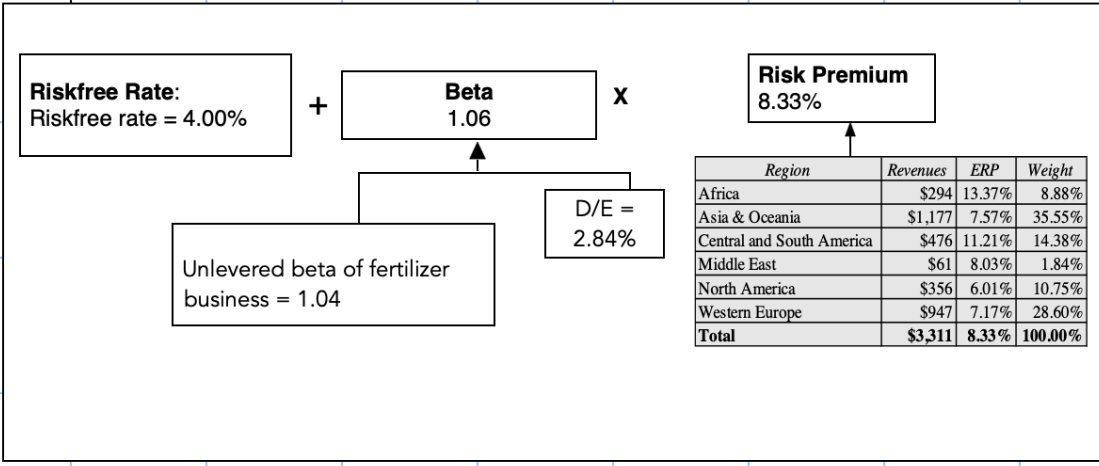
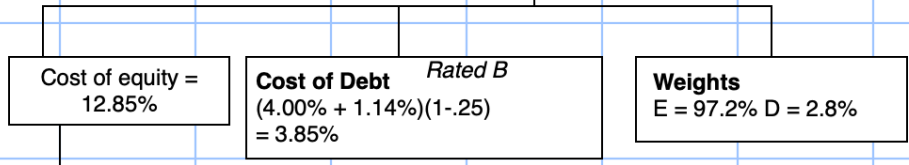
|                             |             |
|-----------------------------|-------------|
| PV(Terminal value)          | \$22,979.04 |
| PV (CF over next 10 years)  | \$17,918.97 |
| Value of operating assets = | \$40,898.02 |
| - Debt                      | \$1,237.00  |
| - Minority interests        | \$685.00    |
| + Cash                      | \$1,589.00  |
| Value of equity             | \$40,565.02 |
| Number of shares            | 8,301.30    |
| Estimated value /share      | \$4.89      |
| Price                       | \$5.32      |

|                     | Base year | 1       | 2       | 3       | 4        | 5        | 6        | 7        | 8        | 9        | 10       | Terminal year |
|---------------------|-----------|---------|---------|---------|----------|----------|----------|----------|----------|----------|----------|---------------|
| Revenue growth rate | 50.00%    | 15.00%  | 15.00%  | 15.00%  | 15.00%   | 15.00%   | 12.80%   | 10.60%   | 8.40%    | 6.20%    | 4.00%    | 4.00%         |
| Revenues            | \$4,707   | \$7,061 | \$8,120 | \$9,338 | \$10,738 | \$12,349 | \$13,930 | \$15,406 | \$16,700 | \$17,736 | \$18,445 | \$19,183      |
| Operating Margin    | 46.14%    | 46.14%  | 44.92%  | 44.30%  | 43.69%   | 43.07%   | 42.46%   | 41.84%   | 41.23%   | 40.61%   | 40.00%   | 40.00%        |
| Operating Income    | \$2,172   | \$3,258 | \$3,647 | \$4,137 | \$4,691  | \$5,319  | \$5,914  | \$6,446  | \$6,885  | \$7,203  | \$7,378  | \$7,673       |
| Tax rate            | 18.00%    | 18.00%  | 18.00%  | 18.00%  | 18.00%   | 18.00%   | 19.40%   | 20.80%   | 22.20%   | 23.60%   | 25.00%   | 25.00%        |
| EBIT(1-t)           | \$1,781   | \$2,672 | \$2,990 | \$3,392 | \$3,847  | \$4,362  | \$4,767  | \$5,106  | \$5,357  | \$5,503  | \$5,533  | \$5,755       |
| - Reinvestment      |           | \$1,315 | \$592   | \$680   | \$782    | \$900    | \$883    | \$825    | \$723    | \$578    | \$396    | \$1,535       |
| FCFF                |           | \$1,357 | \$2,399 | \$2,712 | \$3,064  | \$3,462  | \$3,884  | \$4,281  | \$4,634  | \$4,925  | \$5,137  | \$4,220       |

Cost of capital = 12.85% (.972) + 3.85% (.028) = 12.60%

Cost of capital decreases to 10.01% from years 6-10

On October 17, 2022, the shares were trading at \$5.32/share.

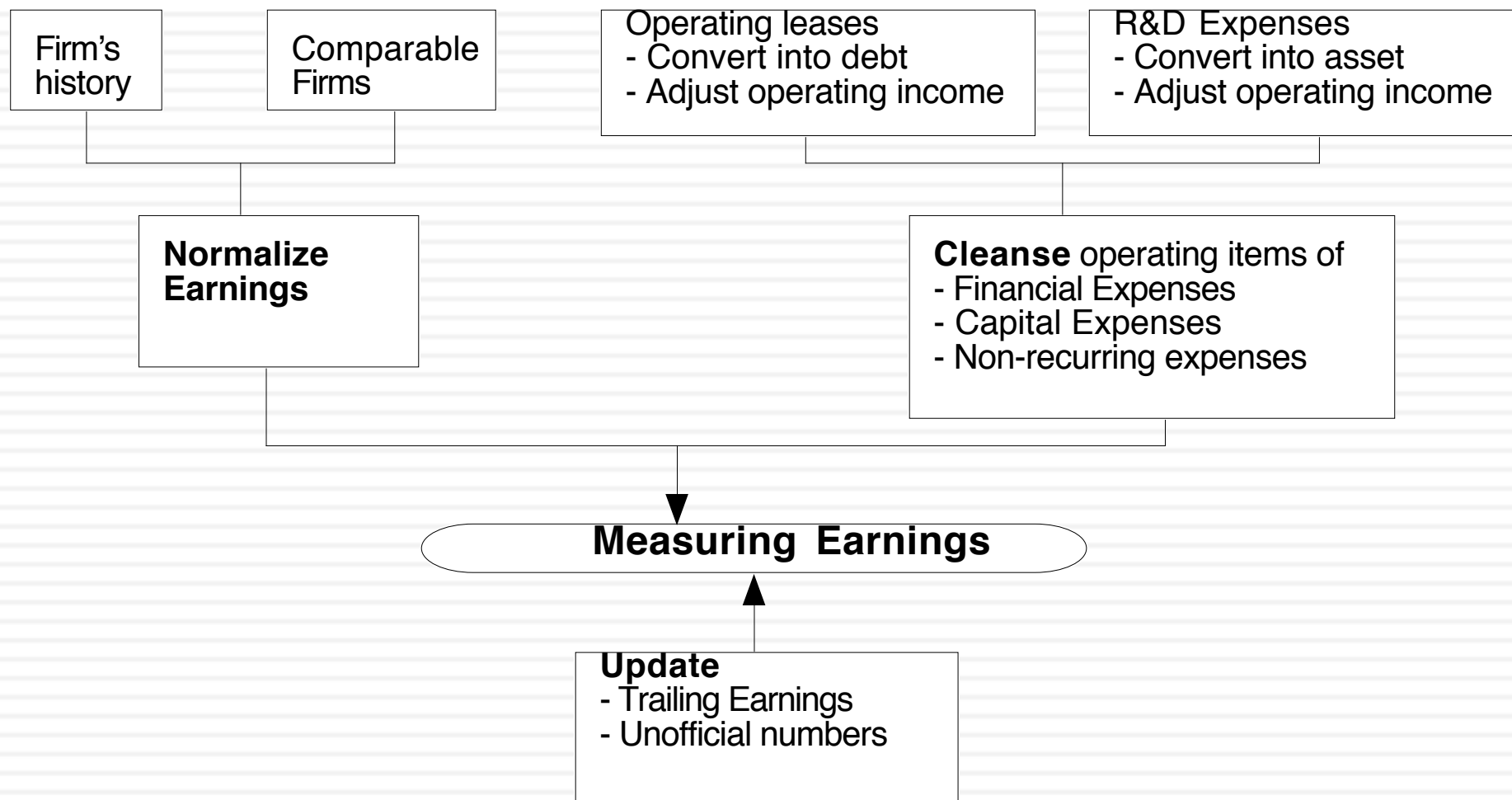


# I. The Nuts and Bolts of D & CF

The details matter, but never as much as you think they do...



# I. Measure earnings right..



# Operating Leases at Amgen in 2007

- Amgen has lease commitments and its cost of debt (based on its A rating) is 5.63%.

| Year | Commitment | Present Value                     |
|------|------------|-----------------------------------|
| 1    | \$96.00    | \$90.88                           |
| 2    | \$95.00    | \$85.14                           |
| 3    | \$102.00   | \$86.54                           |
| 4    | \$98.00    | \$78.72                           |
| 5    | \$87.00    | \$66.16                           |
| 6-12 | \$107.43   | \$462.10 (\$752 million prorated) |

- Debt Value of leases = \$869.55
- Debt outstanding at Amgen = \$7,402 + \$ 870 = \$8,272 million
- Adjusted Operating Income = Stated OI + Lease expense this year – Depreciation  
= 5,071 m + 69 m - 870/12 = \$5,068 million (12 year life for assets)
- Approximate Operating income= stated OI + PV of Lease commitment \* Pre-tax cost of debt  
= \$5,071 m + 870 m (.0563) = \$ 5,120 million

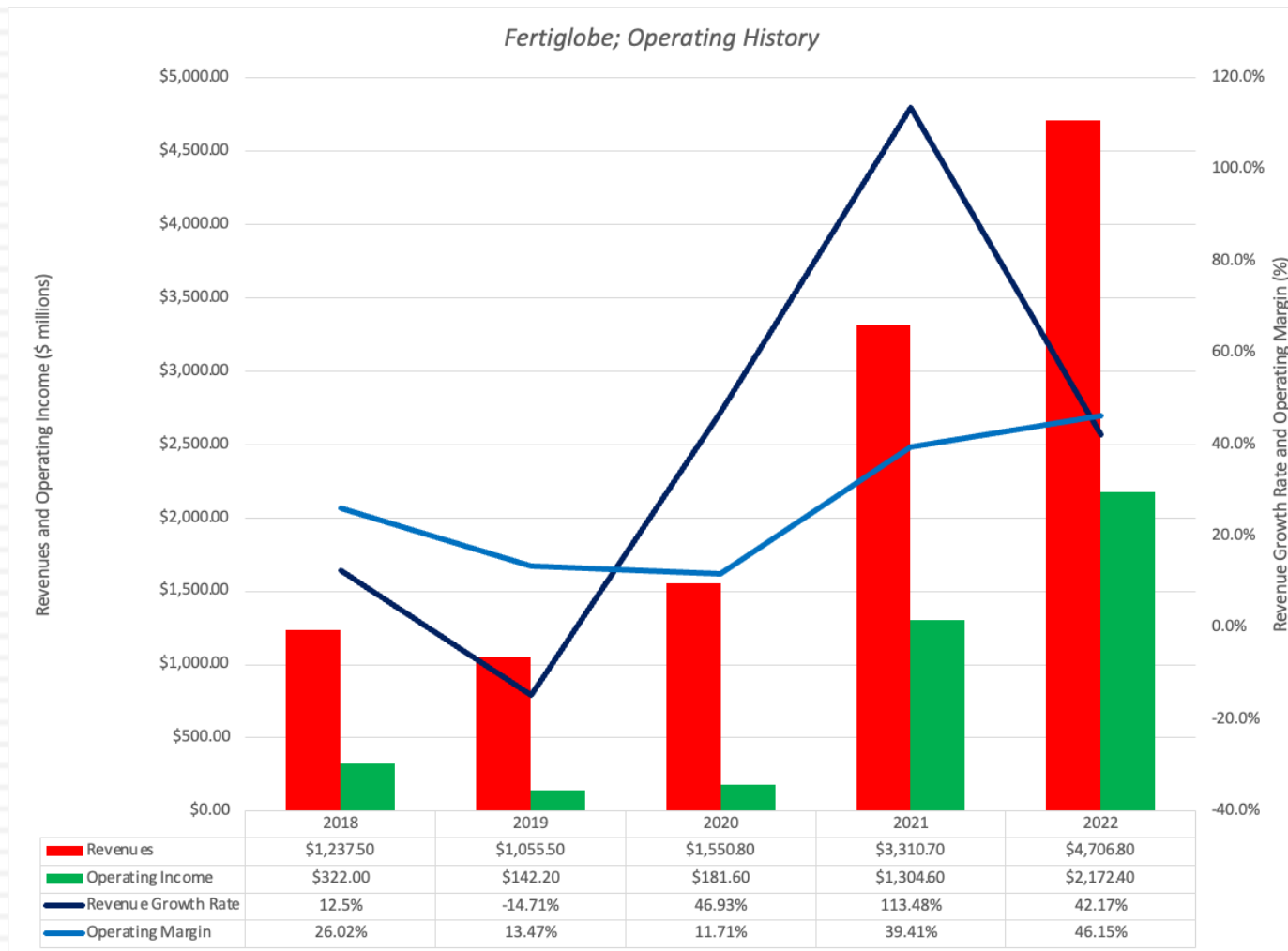
# Capitalizing R&D Expenses: Amgen

- R & D was assumed to have a 10-year life.

| Year                      | R&D Expense | Unamortized portion | Amortization this year |            |
|---------------------------|-------------|---------------------|------------------------|------------|
| Current                   | 3366.00     | 1.00                | 3366.00                |            |
| -1                        | 2314.00     | 0.90                | 2082.60                | \$231.40   |
| -2                        | 2028.00     | 0.80                | 1622.40                | \$202.80   |
| -3                        | 1655.00     | 0.70                | 1158.50                | \$165.50   |
| -4                        | 1117.00     | 0.60                | 670.20                 | \$111.70   |
| -5                        | 865.00      | 0.50                | 432.50                 | \$86.50    |
| -6                        | 845.00      | 0.40                | 338.00                 | \$84.50    |
| -7                        | 823.00      | 0.30                | 246.90                 | \$82.30    |
| -8                        | 663.00      | 0.20                | 132.60                 | \$66.30    |
| -9                        | 631.00      | 0.10                | 63.10                  | \$63.10    |
| -10                       | 558.00      | 0.00                |                        | \$55.80    |
| Value of Research Asset = |             |                     | \$10,112.80            | \$1,149.90 |

- Adjusted Operating Income = \$5,120 + 3,366 - 1,150 = \$7,336 million

# Fertiglobe: Operating History



## 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.

# Amgen's Net Capital Expenditures

- The accounting net cap ex at Amgen is small:
  - Accounting Capital Expenditures = \$1,218 million
  - - Accounting Depreciation = \$ 963 million
  - Accounting Net Cap Ex = \$ 255 million
- We define capital expenditures broadly to include R&D and acquisitions:
  - Accounting Net Cap Ex = \$ 255 million
  - Net R&D Cap Ex = (3366-1150) = \$2,216 million
  - Acquisitions in 2006 = \$3,975 million
  - Total Net Capital Expenditures = \$ 6,443 million
- Acquisitions have been a volatile item. Amgen was quiet on the acquisition front in 2004 and 2005 and had a significant acquisition in 2003.

# III. The government bond rate is not always the riskfree rate

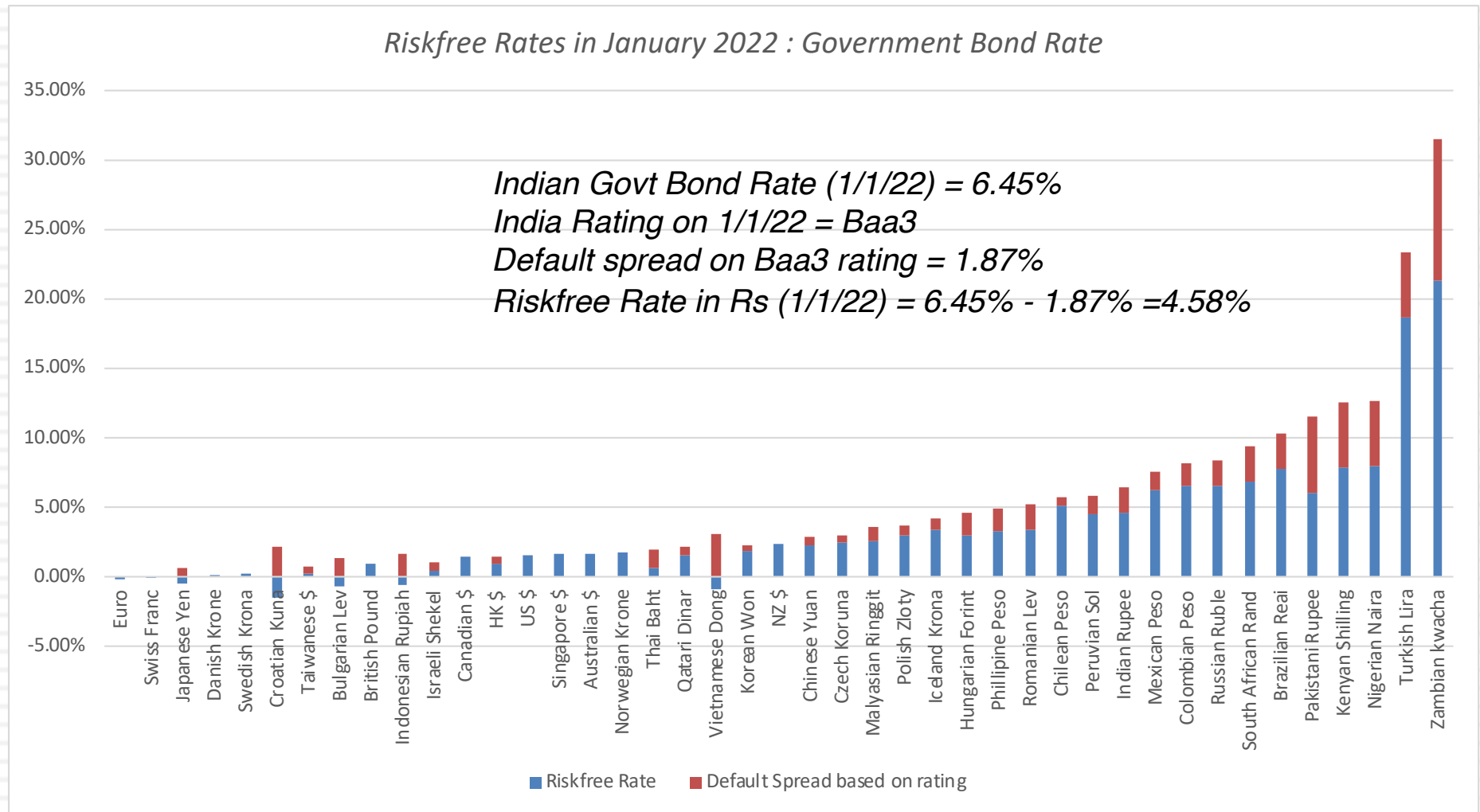
- When valuing Amgen in US dollars, the US\$ ten-year bond rate of 4.78% was used as the risk free rate. We assumed that the US treasury was default free.
- When valuing Tata Motors in Indian rupees in 2010, the Indian government bond rate of 8% was not default free. Using the Indian government's local currency rating of Ba2 yielded a default spread of 3% for India and a riskfree rate of 5% in Indian rupees.

Risk free rate in Indian Rupees = 8% - 3% = 5%

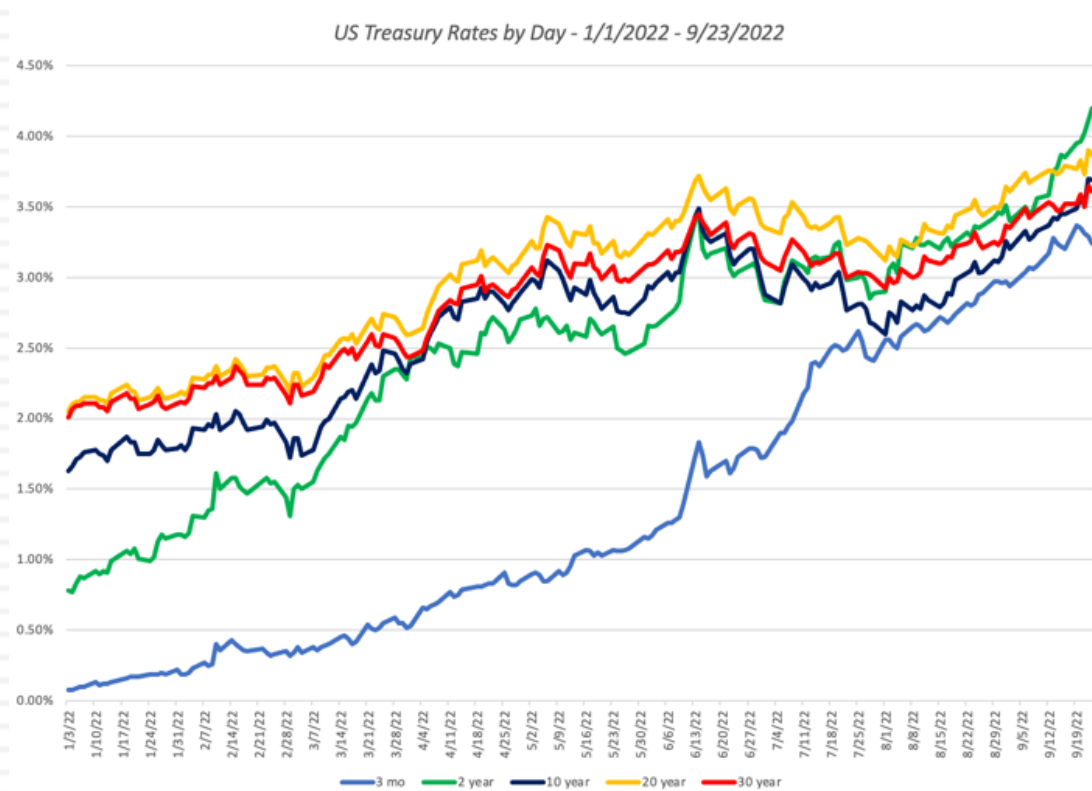
- To value Fertiglobe in March 2022, you need a risk free rate in UAE Dirham at the time. Assuming that the peg to the US dollar is sustainable, we switched and valued the company in US dollars. The risk free rate is the US treasury bond of 4%.



# Risk free rates will vary across currencies!



# And across time...



| Date             | 3 mo  | 2 year | 10 year | 20 year | 30 year |
|------------------|-------|--------|---------|---------|---------|
| 1/1/22           | 0.08% | 0.78%  | 1.63%   | 2.05%   | 2.01%   |
| 4/1/22           | 0.53% | 2.44%  | 2.39%   | 2.60%   | 2.44%   |
| 7/1/22           | 1.73% | 2.84%  | 2.88%   | 3.35%   | 3.11%   |
| 9/23/22          | 3.24% | 4.20%  | 3.69%   | 3.87%   | 3.61%   |
| Change: 1/1-9/23 | 3.16% | 3.42%  | 2.06%   | 1.82%   | 1.60%   |

# Risk free Rates in Currencies without a Government Bond Rate

- There are no traded long term Government bonds in some currencies. Hence, you have to improvise.
- One simple technique is to use differential inflation and the US dollar risk free rate. Using this technique on the Egyptian pound, here is what you get:
  - Risk free rate in US dollars on 12/31/15 = 2.27%
  - Expected inflation rate in the US = 1.50%
  - Expected inflation rate in Egypt = 9.70% (last year's estimate)
  - Risk free rate in EGP =  $(1.0227) * (1.097/1.015) - 1 = 10.53\%$
- This is also a good way to check government bond rates that you do not trust. For instance, the Venezuelan government bond rate of 19% on January 1, 2019, is pure fiction, since no rational person would have bought the bonds with the interest rate (given that inflation was in >5000%).

# But valuations should not! Infosys

## Valuation in 2018

|                      | In Rupees   | In Dollars   |
|----------------------|---|--|
| Risk free Rate       | 5.38%   | 2.85%  |
| Expected growth rate | 10.00% for next 5 years, scaling down to 5.38% in year 10 (and forever) | 7.37% for next 5 years, scaling down to 2.85% in year 10 (and forever) |
| Return on Capital    | Marginal ROIC of 39.70%, scaling down to 15% forever                    | Marginal ROIC of 37.68%, scaling down to 12.36% forever.               |
| Cost of capital      | 11.02% for next 5 years, scaling down to 9.88% in year 10 (and beyond)  | 8.36% for next 5 years, scaling down to 7.23% in year 10 (and beyond)  |
| Value per share      | Rs 1072.22 per share about 7% below stock price of Rs 1,150/share       | \$16.86 per share about 7% below stock price of \$18.02/share          |

# Heineken: September 2019 (in Euros)

## Cash flows from existing assets

|                        | LTM      | 2013-2018           |
|------------------------|----------|---------------------|
| Revenues               | € 23,119 | Growth rate = 3.22% |
| Operating Margin       | 14.86%   | 14.44%              |
| Sales/Invested Capital | 0.71     | 0.79                |
| ROIC                   | 7.46%    | 8.32%               |
| Effective Tax Rate     | 29.70%   | 27.00%              |

## The Payoff from growth

Revenues will grow 3.22% a year for next 5 years, tapering down to -0.5% growth in year 10

Operating margin (per-tax) will drop to 14.00%

Sales/Invested Capital will stay at five-year average of 0.79.

## Maturity and Closure

**Stable Growth**  
 $g = -0.5\%$ ;  
 Cost of capital = 5%  
 $ROC = 5\%$ ;  
 Reinvestment Rate =  $-0.5\%/5\% = -10\%$

## Euro Cashflows

Terminal Value =  $2972 / (0.05 - (-0.005)) = 54,034$

|                         | 1        | 2        | 3        | 4        | 5        | 6        | 7        | 8        | 9        | 10       | Terminal year |
|-------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---------------|
| Revenue growth rate     | 3.22%    | 3.22%    | 3.22%    | 3.22%    | 3.22%    | 2.48%    | 1.73%    | 0.99%    | 0.24%    | -0.50%   | -0.50%        |
| Revenues                | € 23,863 | € 24,632 | € 25,425 | € 26,244 | € 27,089 | € 27,759 | € 28,240 | € 28,519 | € 28,589 | € 28,446 | € 28,304      |
| EBIT (Operating) margin | 14.38%   | 14.34%   | 14.30%   | 14.26%   | 14.21%   | 14.17%   | 14.13%   | 14.09%   | 14.04%   | 14.00%   | 14.00%        |
| EBIT (Operating income) | € 3,432  | € 3,532  | € 3,635  | € 3,741  | € 3,850  | € 3,934  | € 3,990  | € 4,017  | € 4,015  | € 3,982  | \$ 3,963      |
| Tax rate                | 29.70%   | 29.70%   | 29.70%   | 29.70%   | 29.70%   | 28.76%   | 27.82%   | 26.88%   | 25.94%   | 25.00%   | 0             |
| EBIT(1-t)               | € 2,413  | € 2,483  | € 2,556  | € 2,630  | € 2,707  | € 2,802  | € 2,880  | € 2,937  | € 2,973  | € 2,987  | \$ 2,972      |
| - Reinvestment          | € 942    | € 973    | € 1,004  | € 1,036  | € 1,070  | € 849    | € 609    | € 353    | € 88     | € (181)  | \$ (297)      |
| FCFF                    | € 1,471  | € 1,511  | € 1,552  | € 1,594  | € 1,637  | € 1,953  | € 2,271  | € 2,584  | € 2,885  | € 3,168  | \$ 3,269      |

|                             |             |
|-----------------------------|-------------|
| PV(Terminal value)          | € 36,390.85 |
| PV (CF over next 10 years)  | € 15,300.34 |
| Value of operating assets = | € 51,691.19 |
| - Debt                      | € 19,709.52 |
| - Minority interests        | € 1,069.00  |
| + Cash                      | € 1,751.60  |
| + Non-operating assets      | € 1,401.00  |
| Value of equity             | € 34,065.26 |
| Number of shares            | 571.10      |
| Estimated value /share      | € 59.65     |
| Price                       | € 93.25     |
| Price as % of value         | 56.33%      |

Discount at Euro Cost of Capital (WACC) =  $7.66\% (.599) + 1.13\% (0.401) = 5.04\%$

## The Risk in the Cash flows

On September 1, 2019, Heineken was trading at 93.25 Euros/share

Cost of Equity  
7.66%

Cost of Debt  
 $(-0.5\% + 2\%)(1 - 0.25) = 1.13\%$

Weights  
E = 59.9% D = 40.1%

Riskfree Rate:  
Euro Risk free rate = -0.50%

+ Beta = 1.20 X

Unlevered beta of alcoholic beverage business = 0.80

Firm's D/E Ratio: 66.98%

ERP = 6.83%

| Region                    | Revenues     | Weight         | ERP          |
|---------------------------|--------------|----------------|--------------|
| Europe                    | 10348        | 50.24%         | 6.90%        |
| North America             | 5920         | 28.74%         | 5.75%        |
| Asia                      | 2919         | 14.17%         | 7.22%        |
| Latin America & Caribbean | 781          | 3.79%          | 10.53%       |
| Africa & Mid East         | 631          | 3.06%          | 9.30%        |
| <b>Total</b>              | <b>20599</b> | <b>100.00%</b> | <b>6.83%</b> |

Arcelik's revenue growth has been solid and its margins have been high, but return on capital has been less than the cost of capital

### Arcelik: My valuation (October 2019)

|                          | LTM    | 2014-2019 | Industry Average |
|--------------------------|--------|-----------|------------------|
| Revenue Growth           | 37.03% | 20.14%    | 7.83%            |
| Pre-tax Operating Margin | 7.82%  | 7.70%     | 7.93%            |
| ROIC                     | 11.70% | 12.74%    | 18.68%           |
| Sales/Capital            | 1.70   | 1.77      | 2.73             |

Between 2014 and 2019, Arcelik reported a growth rate of 20.14% in revenues, an average operating margin of 7.70% and an average sales to capital ratio of 1.77.

**Stable Growth**  
 $g = 10\%$   
 Cost of capital = 15%  
 ROC = 15%;  
 Reinvestment Rate =  $10\%/15\% = 66.67\%$

Revenue growth of 20% a year for 5 years, tapering down to 10% in year 10

Pre-tax operating margin increases to 8.00% over time.

Sales to capital ratio of 2.73, matching global average

Terminal Value =  $3,332 / (.15 - .10) = TL 66,633$

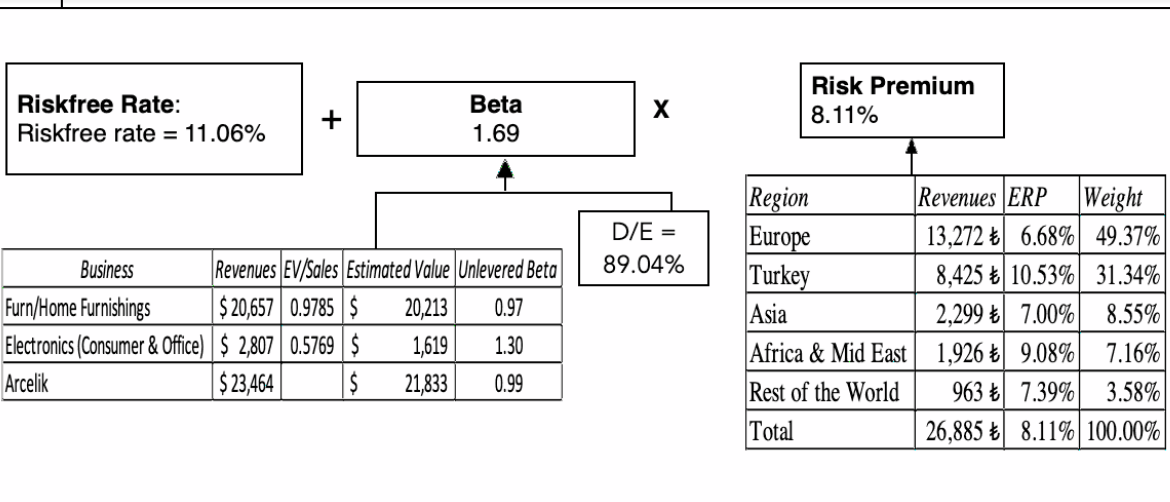
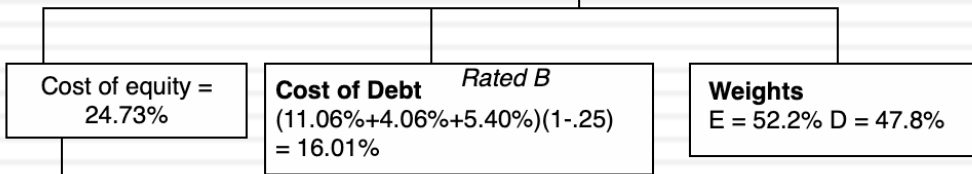
|                             |              |
|-----------------------------|--------------|
| PV(Terminal value)          | \$ 11,766.68 |
| PV (CF over next 10 years)  | \$ 3,603.22  |
| Value of operating assets = | \$ 15,369.90 |
| - Debt                      | \$ 14,305.92 |
| - Minority interests        | \$ 114.60    |
| + Cash                      | \$ 6,026.00  |
| + Non-operating assets      | \$ 481.10    |
| Value of equity             | \$ 7,456.48  |
| Number of shares            | 675.70       |
| Estimated value /share      | \$ 11.04     |

|                         | Base year | 1        | 2        | 3        | 4        | 5        | 6        | 7         | 8         | 9         | 10        | Terminal year |
|-------------------------|-----------|----------|----------|----------|----------|----------|----------|-----------|-----------|-----------|-----------|---------------|
| Revenue growth rate     |           | 20.00%   | 20.00%   | 20.00%   | 20.00%   | 20.00%   | 18.00%   | 16.00%    | 14.00%    | 12.00%    | 10.00%    | 10.00%        |
| Revenues                | 30,440 ₺  | 36,528 ₺ | 43,834 ₺ | 52,600 ₺ | 63,120 ₺ | 75,744 ₺ | 89,378 ₺ | 103,679 ₺ | 118,194 ₺ | 132,377 ₺ | 145,615 ₺ | 160,177 ₺     |
| EBIT (Operating) margin | 7.82%     | 7.84%    | 7.86%    | 7.88%    | 7.89%    | 7.91%    | 7.93%    | 7.95%     | 7.96%     | 7.98%     | 8.00%     | 8.00%         |
| EBIT (Operating income) | 2,381 ₺   | 2,864 ₺  | 3,444 ₺  | 4,143 ₺  | 4,982 ₺  | 5,992 ₺  | 7,087 ₺  | 8,239 ₺   | 9,413 ₺   | 10,567 ₺  | 11,649 ₺  | 12,814 ₺      |
| Tax rate                | 14.80%    | 14.80%   | 14.80%   | 14.80%   | 14.80%   | 14.80%   | 16.24%   | 17.68%    | 19.12%    | 20.56%    | 22.00%    | 22.00%        |
| EBIT(1-t)               | 2,029 ₺   | 2,440 ₺  | 2,935 ₺  | 3,529 ₺  | 4,245 ₺  | 5,105 ₺  | 5,936 ₺  | 6,782 ₺   | 7,614 ₺   | 8,394 ₺   | 9,086 ₺   | 9,995 ₺       |
| - Reinvestment          |           | 2,226 ₺  | 2,672 ₺  | 3,206 ₺  | 3,847 ₺  | 4,616 ₺  | 4,986 ₺  | 5,230 ₺   | 5,308 ₺   | 5,187 ₺   | 4,841 ₺   | 6,663 ₺       |
| FCFF                    |           | 214 ₺    | 263 ₺    | 324 ₺    | 398 ₺    | 489 ₺    | 950 ₺    | 1,553 ₺   | 2,306 ₺   | 3,208 ₺   | 4,246 ₺   | 3,332 ₺       |

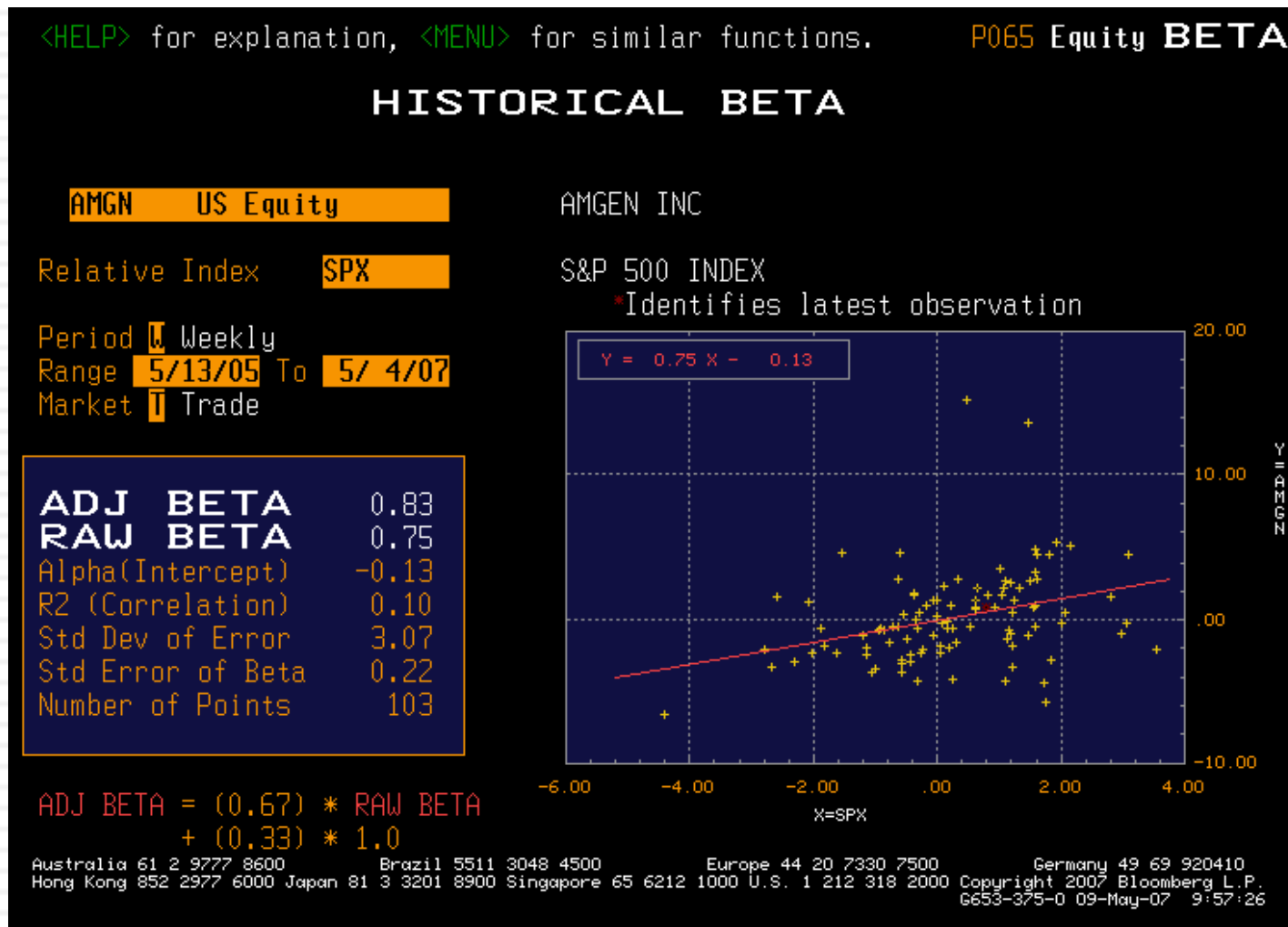
Cost of capital =  $24.73\% (.522) + 16.01\% (.478) = 20.64\%$

Cost of capital decreases to 15% from years 6-10

On October 14, 2019, the shares were trading at 18 TL/share.



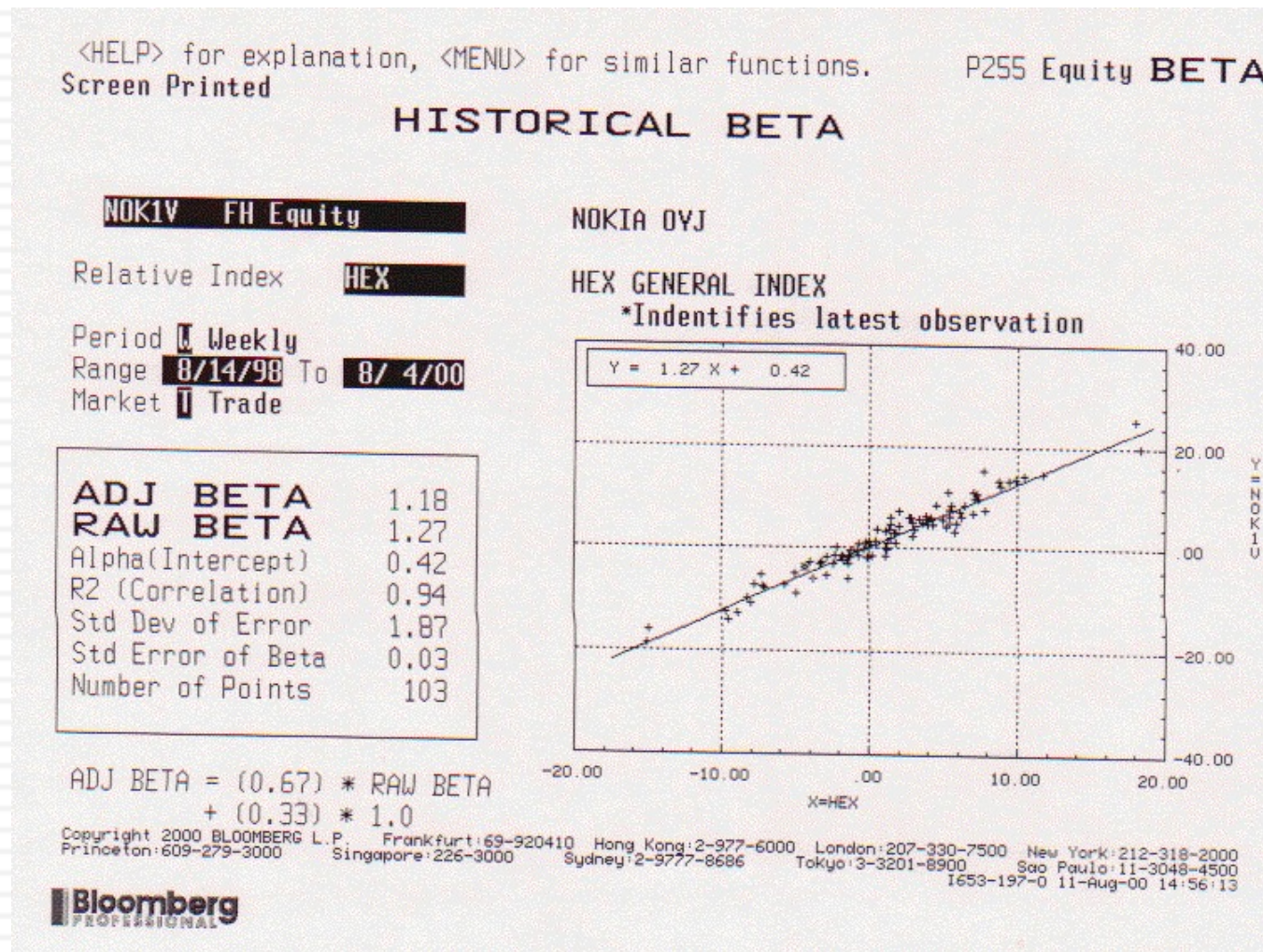
# IV. Betas do not come from regressions... and are noisy...





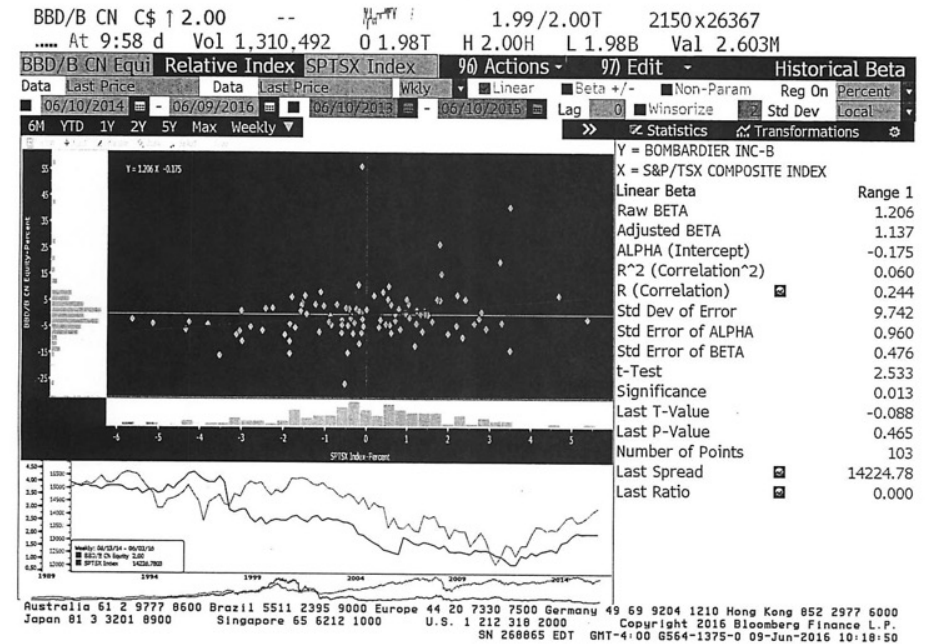
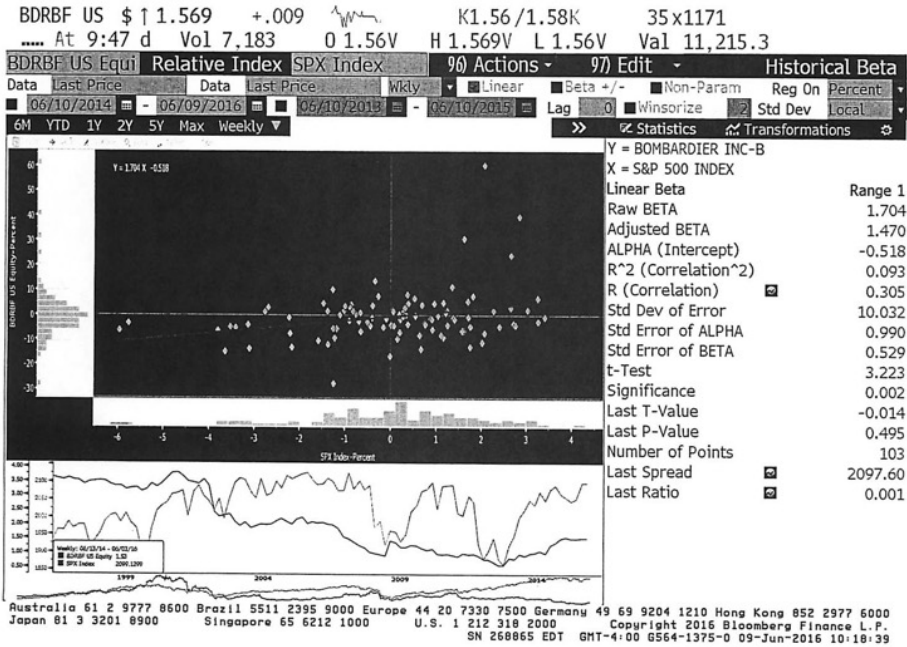
# But should not be trusted, even when they look great...

33

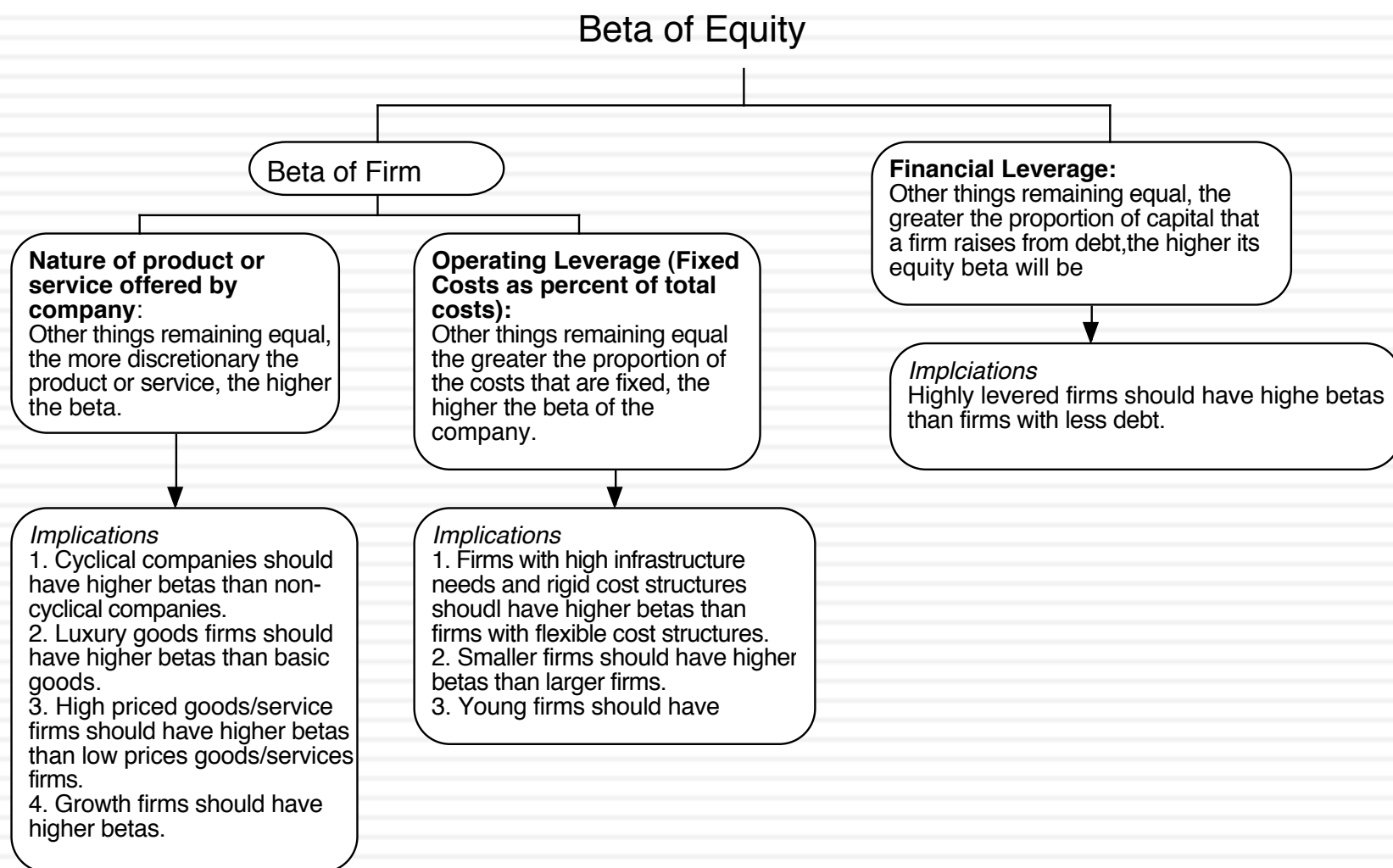


# And subject to game playing

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# Determinants of Betas





# Bottom-up Betas

Step 1: Find the business or businesses that your firm operates in.

Step 2: Find publicly traded firms in each of these businesses and obtain their regression betas. Compute the simple average across these regression betas to arrive at an average beta for these publicly traded firms. Unlever this average beta using the average debt to equity ratio across the publicly traded firms in the sample.  
Unlevered beta for business = Average beta across publicly traded firms /  $(1 + (1-t) (\text{Average D/E ratio across firms}))$

Step 3: Estimate how much value your firm derives from each of the different businesses it is in.

Step 4: Compute a weighted average of the unlevered betas of the different businesses (from step 2) using the weights from step 3.  
Bottom-up Unlevered beta for your firm = Weighted average of the unlevered betas of the individual business

Step 5: Compute a levered beta (equity beta) for your firm, using the market debt to equity ratio for your firm.  
Levered bottom-up beta = Unlevered beta  $(1 + (1-t) (\text{Debt/Equity}))$

## Possible Refinements

If you can, adjust this beta for differences between your firm and the comparable firms on operating leverage and product characteristics.

While revenues or operating income are often used as weights, it is better to try to estimate the value of each business.

If you expect the business mix of your firm to change over time, you can change the weights on a year-to-year basis.

If you expect your debt to equity ratio to change over time, the levered beta will change over time.

# Three examples...

## □ Amgen

- The unlevered beta for pharmaceutical firms is 1.59. Using Amgen's debt to equity ratio of 11%, the bottom up beta for Amgen is
- Bottom-up Beta =  $1.59 (1 + (1-.35)(.11)) = 1.73$

## □ Tata Motors

- The unlevered beta for automobile firms is 0.98. Using Tata Motor's debt to equity ratio of 33.87%, the bottom up beta for Tata Motors is
- Bottom-up Beta =  $0.98 (1 + (1-.3399)(.3387)) = 1.20$

## ■ Fertiglobe

- The unlevered beta of global fertilizer companies is 1.04. Using Fertiglobe's debt to equity ratio of 2.84% and a tax rate of 25%, the bottom up beta is
- Bottom up Beta =  $1.04 (1 + (1-.25) (.0284)) = 1.06$

## □ Almarai

| Business              | Revenue Weight | Unlevered Beta |
|-----------------------|----------------|----------------|
| Packaged Food         | 81%            | 0.82           |
| Agricultural Products | 19%            | 0.58           |
| Company               |                | 0.77           |

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

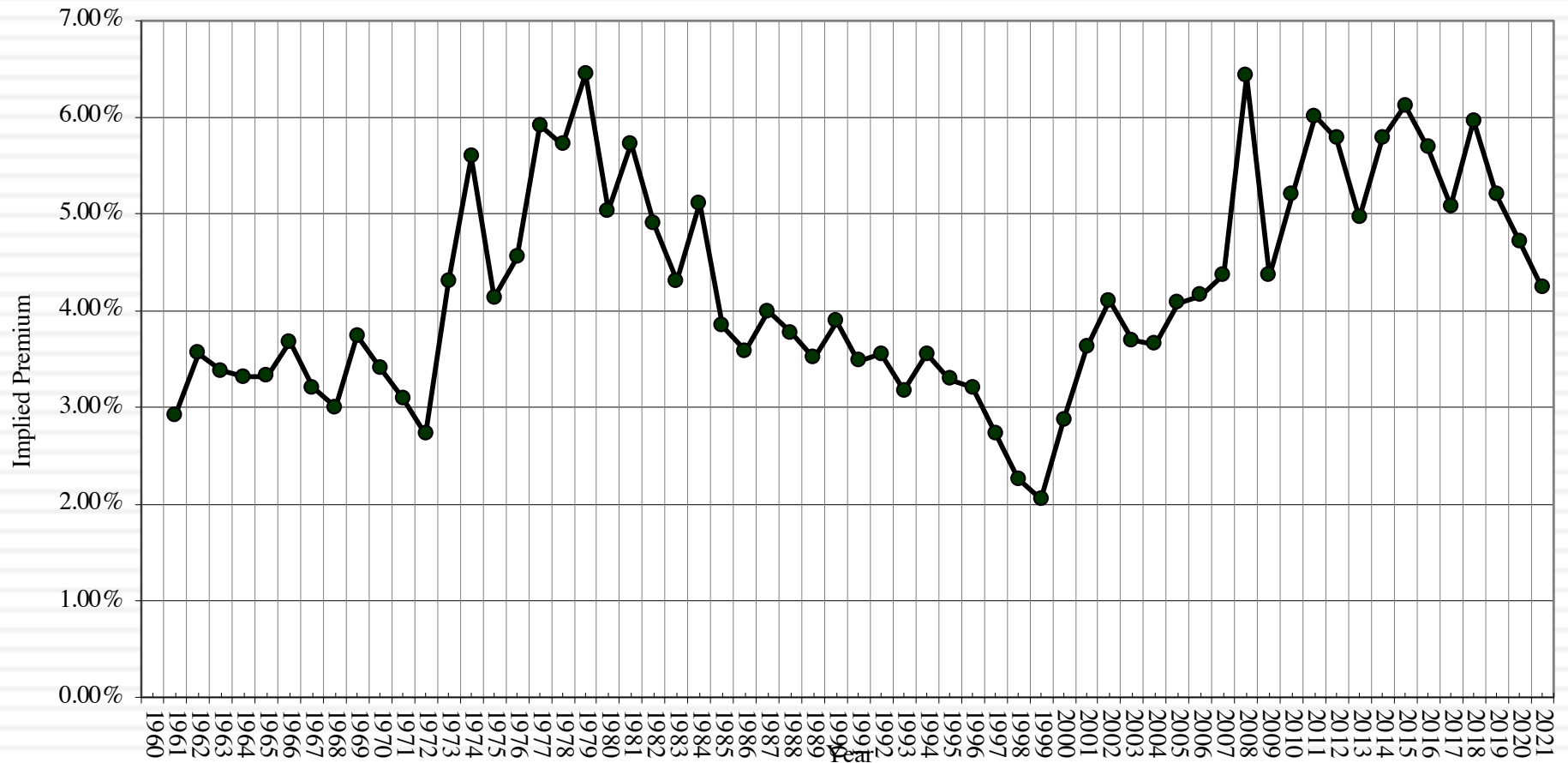
|           | Arithmetic Average |                   | Geometric Average |                   |
|-----------|--------------------|-------------------|-------------------|-------------------|
|           | Stocks - T. Bills  | Stocks - T. Bonds | Stocks - T. Bills | Stocks - T. Bonds |
| 1928-2021 | 8.49%              | 6.71%             | 6.69%             | 5.13%             |
| Std Error | 2.05%              | 2.17%             |                   |                   |
| 1972-2021 | 8.04%              | 5.47%             | 6.70%             | 4.47%             |
| Std Error | 2.44%              | 2.76%             |                   |                   |
| 2012-2021 | 16.47%             | 14.39%            | 15.89%            | 14.00%            |
| Std Error | 3.88%              | 4.59%             |                   |                   |

- If you are going to use a historical risk premium, make it
  - ▣ Long term (because of the standard error)
  - ▣ Consistent with your risk free rate
  - ▣ A “compounded” average
- No matter which estimate you use, recognize that it is backward looking, is noisy and may reflect selection bias



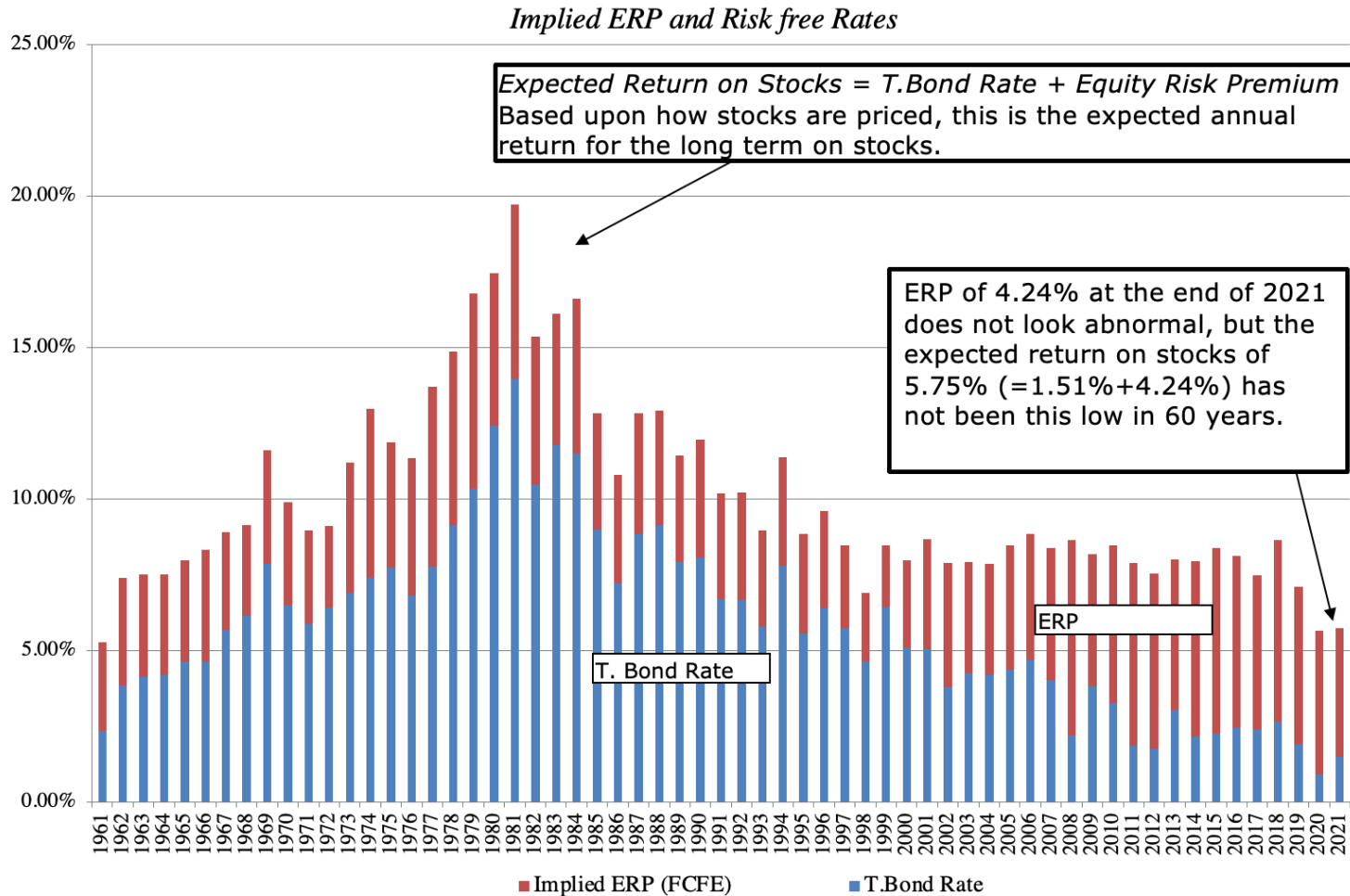
# Implied ERP for the S&P 500: History

*Implied Premium for US Equity Market: 1960-2021*

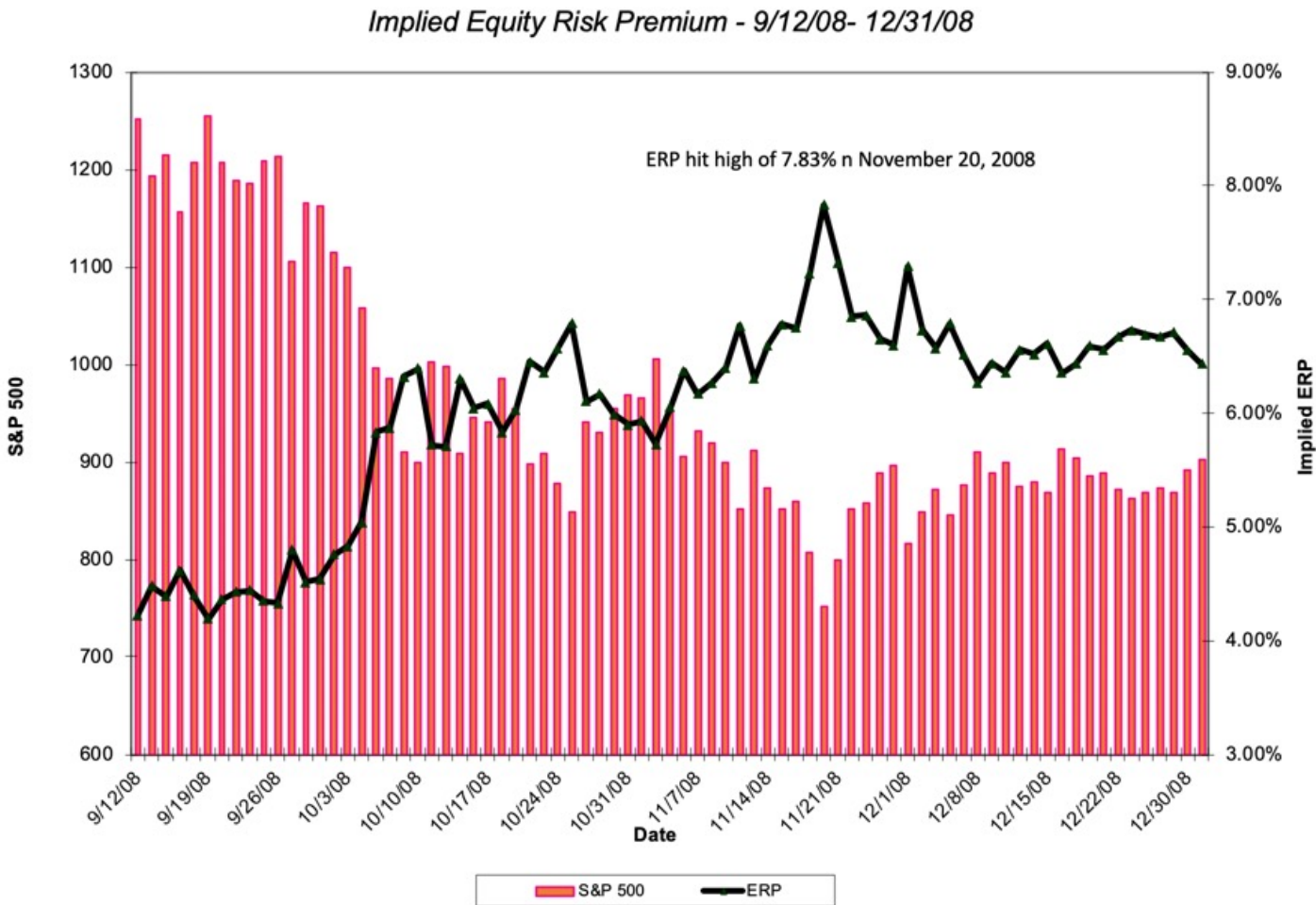




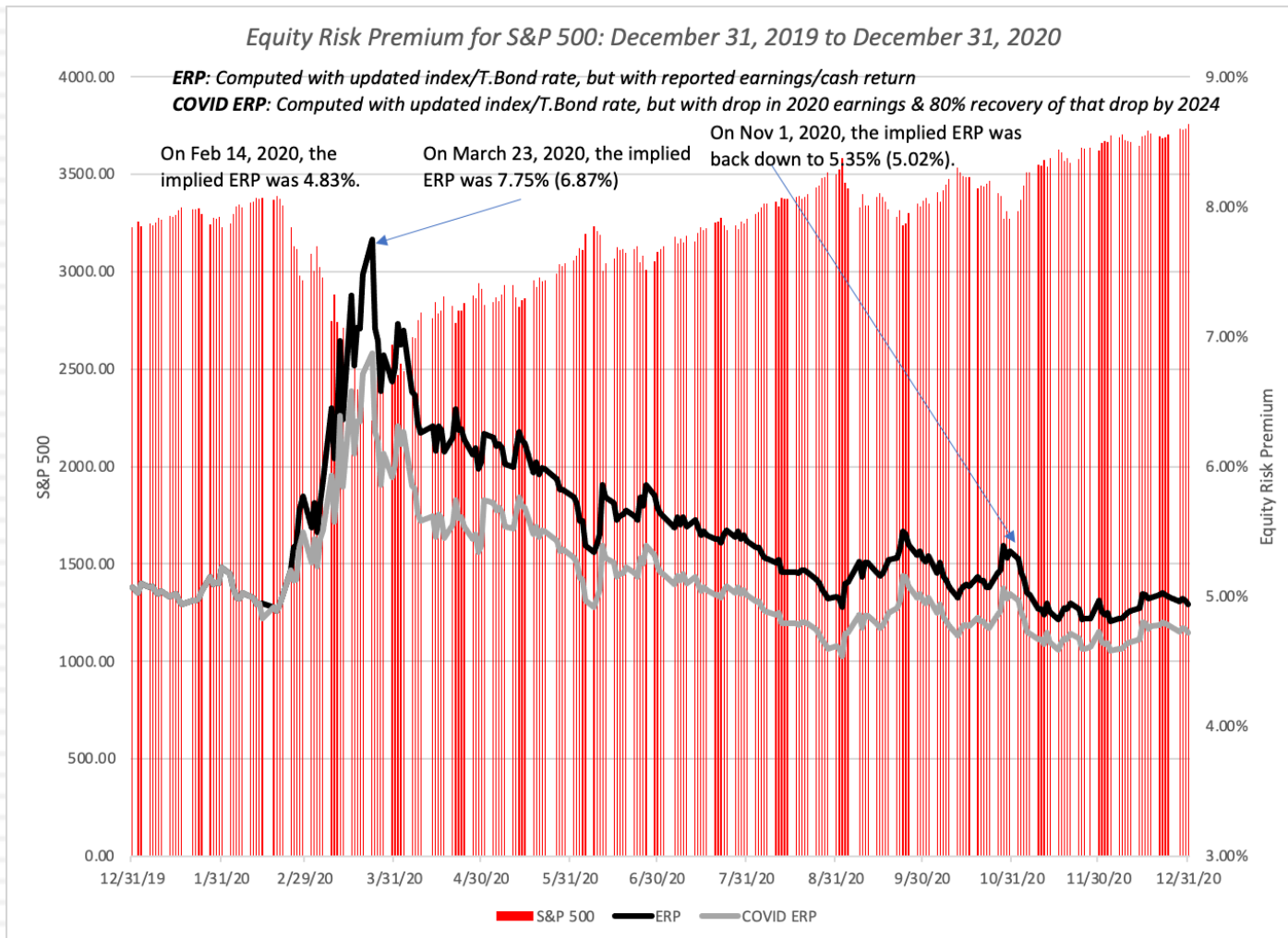
# Another Perspective on US stocks



# The Price of Risk: The 2008 Crisis



# The Price of Risk: The COVID crisis



# Implied Premium for India using the 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 =  $11.72\% - 5\% = 6.72\%$

# Global Equities?

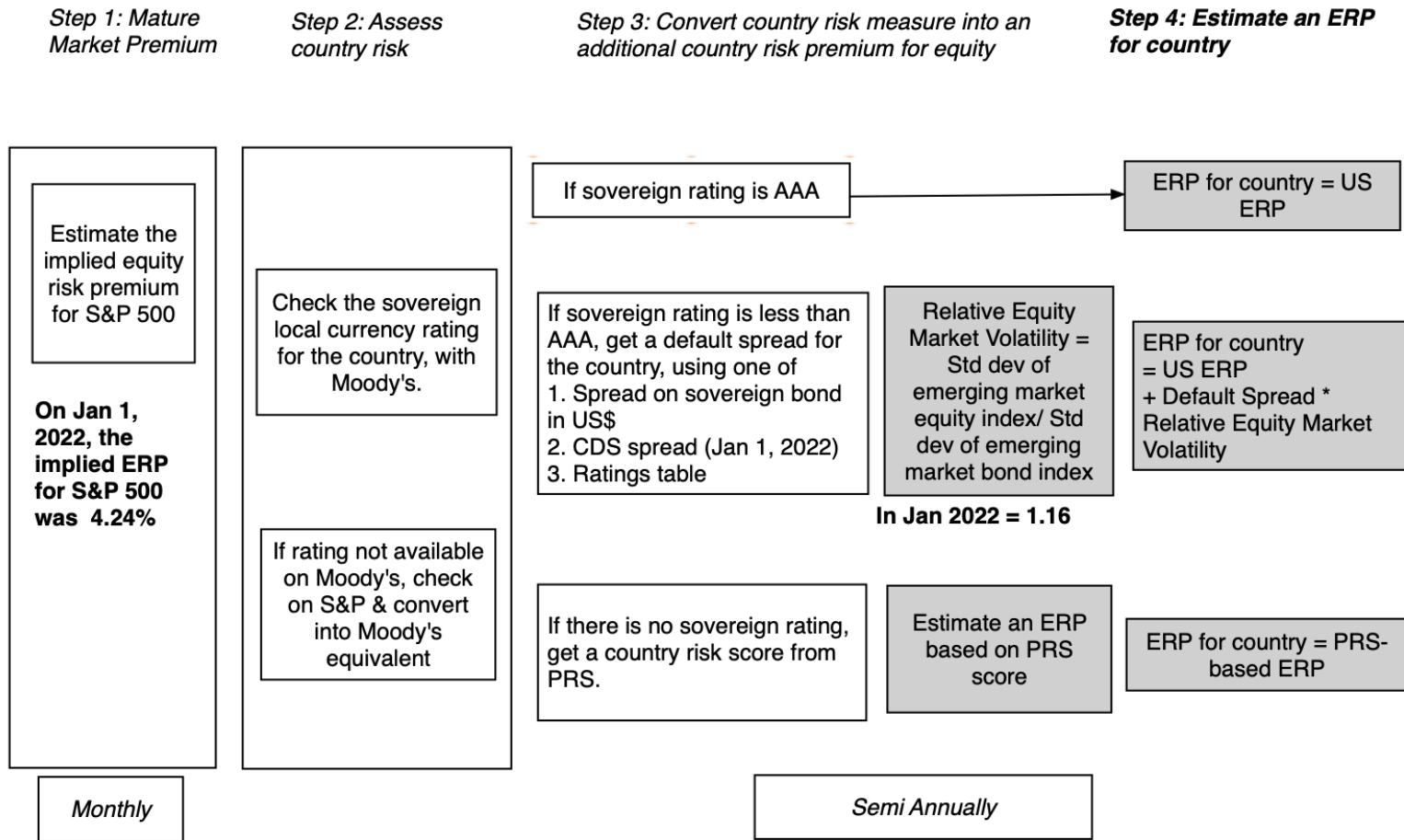
| <i>Start of year</i> | <i>PBV (Developed)</i> | <i>PBV (Emerging)</i> | <i>ROE (Developed)</i> | <i>ROE (Emerging)</i> | <i>US T.Bond Rate</i> | <i>Growth Rate (Developed)</i> | <i>Growth Rate (Emerging)</i> | <i>Cost of Equity (Developed)</i> | <i>Cost of Equity (Emerging)</i> | <i>Differential</i> |
|----------------------|------------------------|-----------------------|------------------------|-----------------------|-----------------------|--------------------------------|-------------------------------|-----------------------------------|----------------------------------|---------------------|
| 2004                 | 2.00                   | 1.19                  | 10.81%                 | 11.65%                | 4.25%                 | 3.75%                          | 4.75%                         | 7.28%                             | 10.55%                           | 3.27%               |
| 2005                 | 2.09                   | 1.27                  | 11.12%                 | 11.93%                | 4.22%                 | 3.72%                          | 4.72%                         | 7.26%                             | 10.40%                           | 3.14%               |
| 2006                 | 2.03                   | 1.44                  | 11.32%                 | 12.18%                | 4.39%                 | 3.89%                          | 4.89%                         | 7.55%                             | 9.95%                            | 2.40%               |
| 2007                 | 1.67                   | 1.67                  | 10.87%                 | 12.88%                | 4.70%                 | 4.20%                          | 5.20%                         | 8.19%                             | 9.80%                            | 1.60%               |
| 2008                 | 0.87                   | 0.83                  | 9.42%                  | 11.12%                | 4.02%                 | 3.52%                          | 4.52%                         | 10.30%                            | 12.47%                           | 2.17%               |
| 2009                 | 1.20                   | 1.34                  | 8.48%                  | 11.02%                | 2.21%                 | 1.71%                          | 2.71%                         | 7.35%                             | 8.91%                            | 1.56%               |
| 2010                 | 1.39                   | 1.43                  | 9.14%                  | 11.22%                | 3.84%                 | 3.34%                          | 4.34%                         | 7.51%                             | 9.15%                            | 1.64%               |
| 2011                 | 1.12                   | 1.08                  | 9.21%                  | 10.04%                | 3.29%                 | 2.79%                          | 3.79%                         | 8.52%                             | 9.58%                            | 1.05%               |
| 2012                 | 1.17                   | 1.18                  | 9.10%                  | 9.33%                 | 1.88%                 | 1.38%                          | 2.38%                         | 7.98%                             | 8.27%                            | 0.29%               |
| 2013                 | 1.56                   | 1.63                  | 8.67%                  | 10.48%                | 1.76%                 | 1.26%                          | 2.26%                         | 6.01%                             | 7.30%                            | 1.29%               |
| 2014                 | 1.95                   | 1.50                  | 9.27%                  | 9.64%                 | 3.04%                 | 2.54%                          | 3.54%                         | 5.99%                             | 7.61%                            | 1.62%               |
| 2015                 | 1.88                   | 1.56                  | 9.69%                  | 9.75%                 | 2.17%                 | 1.67%                          | 2.67%                         | 5.94%                             | 7.21%                            | 1.27%               |
| 2016                 | 1.99                   | 1.59                  | 9.24%                  | 10.16%                | 2.27%                 | 1.77%                          | 2.77%                         | 5.52%                             | 7.42%                            | 1.89%               |
| 2017                 | 1.76                   | 1.48                  | 8.71%                  | 9.53%                 | 2.68%                 | 2.18%                          | 3.18%                         | 5.89%                             | 7.47%                            | 1.58%               |
| 2018                 | 1.98                   | 1.66                  | 11.23%                 | 11.36%                | 2.68%                 | 2.18%                          | 3.18%                         | 6.75%                             | 8.11%                            | 1.36%               |
| 2019                 | 1.64                   | 1.31                  | 12.09%                 | 11.35%                | 2.68%                 | 2.18%                          | 3.18%                         | 8.22%                             | 9.42%                            | 1.19%               |

# VI. 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.
- Two ways of estimating the country risk premium:
  - Sovereign Default Spread: 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 mature market = 6.00%
    - Default Spread for India = 200% (based on rating)
    - Equity Risk Premium for India = 6.00% + 2.00% = 8.00%
  - Adjusted for equity risk: The country equity risk premium is based upon the volatility of the equity market relative to the government bond rate.
    - Country risk premium =  $\text{Default Spread} \times \frac{\text{Std Deviation}_{\text{Country Equity}}}{\text{Std Deviation}_{\text{Country Bond}}}$
    - Standard Deviation in Sensex = 21%
    - Standard Deviation in Indian government bond = 14%
    - Default spread on Indian Bond = 2%
    - Additional country risk premium for India =  $2\% \times (21/14) = 3.00\%$
    - Total equity risk premium = US equity risk premium + CRP for India  
= 6.00% + 3.00% = 9.00%

# A Template for Estimating the ERP

## ERP Estimation Procedure - January 1, 2022





# ERP : July 2022

|                           |      |       |        |                       |      |              |              |
|---------------------------|------|-------|--------|-----------------------|------|--------------|--------------|
| Andorra (Principality of) | Baa2 | 2.66% | 8.67%  | Italy                 | Baa3 | 3.07%        | 9.08%        |
| Austria                   | Aa1  | 0.56% | 6.57%  | Jersey (States of)    | Aaa  | 0.00%        | 6.01%        |
| Belgium                   | Aa3  | 0.84% | 6.85%  | Liechtenstein         | Aaa  | 0.00%        | 6.01%        |
| Cyprus                    | Ba1  | 3.50% | 9.51%  | Luxembourg            | Aaa  | 0.00%        | 6.01%        |
| Denmark                   | Aaa  | 0.00% | 6.01%  | Malta                 | A2   | 1.18%        | 7.19%        |
| Finland                   | Aa1  | 0.56% | 6.57%  | Netherlands           | Aaa  | 0.00%        | 6.01%        |
| France                    | Aa2  | 0.69% | 6.70%  | Norway                | Aaa  | 0.00%        | 6.01%        |
| Germany                   | Aaa  | 0.00% | 6.01%  | Portugal              | Baa2 | 2.66%        | 8.67%        |
| Greece                    | Ba3  | 5.03% | 11.04% | Spain                 | Baa1 | 2.23%        | 8.24%        |
| Guernsey (States of)      | Aaa  | 0.00% | 6.01%  | Sweden                | Aaa  | 0.00%        | 6.01%        |
| Iceland                   | A2   | 1.18% | 7.19%  | Switzerland           | Aaa  | 0.00%        | 6.01%        |
| Ireland                   | A1   | 0.99% | 7.00%  | Turkey                | B2   | 7.69%        | 13.70%       |
| Isle of Man               | Aa3  | 0.84% | 6.85%  | United Kingdom        | Aa3  | 0.84%        | 6.85%        |
|                           |      |       |        | <b>Western Europe</b> |      | <b>1.16%</b> | <b>7.17%</b> |

|                        |     |              |              |
|------------------------|-----|--------------|--------------|
| Canada                 | Aaa | 0.00%        | 6.01%        |
| United States          | Aaa | 0.00%        | 6.01%        |
| <b>US &amp; Canada</b> |     | <b>0.00%</b> | <b>6.01%</b> |

|                  |  |              |               |
|------------------|--|--------------|---------------|
| <b>Caribbean</b> |  | <b>9.06%</b> | <b>15.07%</b> |
|------------------|--|--------------|---------------|

|                      |      |              |               |
|----------------------|------|--------------|---------------|
| Argentina            | Ca   | 16.78%       | 22.79%        |
| Belize               | Caa3 | 13.98%       | 19.99%        |
| Bolivia              | B2   | 7.69%        | 13.70%        |
| Brazil               | Ba2  | 4.21%        | 10.22%        |
| Chile                | A1   | 0.99%        | 7.00%         |
| Colombia             | Baa2 | 2.66%        | 8.67%         |
| Costa Rica           | B2   | 7.69%        | 13.70%        |
| Ecuador              | Caa3 | 13.98%       | 19.99%        |
| El Salvador          | Caa3 | 13.98%       | 19.99%        |
| Guatemala            | Ba1  | 3.50%        | 9.51%         |
| Honduras             | B1   | 6.29%        | 12.30%        |
| Mexico               | Baa1 | 2.23%        | 8.24%         |
| Nicaragua            | B3   | 9.09%        | 15.10%        |
| Panama               | Baa2 | 2.66%        | 8.67%         |
| Paraguay             | Ba1  | 3.50%        | 9.51%         |
| Peru                 | Baa1 | 2.23%        | 8.24%         |
| Suriname             | Caa3 | 13.98%       | 19.99%        |
| Uruguay              | Baa2 | 2.66%        | 8.67%         |
| Venezuela            | C    | 20.40%       | 26.41%        |
| <b>Latin America</b> |      | <b>5.20%</b> | <b>11.21%</b> |

| Country                        | Rating | CRP          | ERP           |
|--------------------------------|--------|--------------|---------------|
| Angola                         | B3     | 9.09%        | 15.10%        |
| Benin                          | B1     | 6.29%        | 12.30%        |
| Botswana                       | A3     | 1.68%        | 7.69%         |
| Burkina Faso                   | Caa1   | 10.48%       | 16.49%        |
| Cameroon                       | B2     | 7.69%        | 13.70%        |
| Cape Verde                     | B3     | 9.09%        | 15.10%        |
| Congo (Democratic Republic of) | Caa1   | 10.48%       | 16.49%        |
| Congo (Republic of)            | Caa2   | 12.59%       | 18.60%        |
| Côte d'Ivoire                  | Ba3    | 5.03%        | 11.04%        |
| Egypt                          | B2     | 7.69%        | 13.70%        |
| Ethiopia                       | Caa2   | 12.59%       | 18.60%        |
| Gabon                          | Caa1   | 10.48%       | 16.49%        |
| Ghana                          | Caa1   | 10.48%       | 16.49%        |
| Kenya                          | B2     | 7.69%        | 13.70%        |
| Mali                           | Caa2   | 12.59%       | 18.60%        |
| Mauritius                      | Baa2   | 2.66%        | 8.67%         |
| Morocco                        | Ba1    | 3.50%        | 9.51%         |
| Mozambique                     | Caa2   | 12.59%       | 18.60%        |
| Namibia                        | B1     | 6.29%        | 12.30%        |
| Niger                          | B3     | 9.09%        | 15.10%        |
| Nigeria                        | B2     | 7.69%        | 13.70%        |
| Rwanda                         | B2     | 7.69%        | 13.70%        |
| Senegal                        | Ba3    | 5.03%        | 11.04%        |
| South Africa                   | Ba2    | 4.21%        | 10.22%        |
| Swaziland                      | B3     | 9.09%        | 15.10%        |
| Tanzania                       | B2     | 7.69%        | 13.70%        |
| Togo                           | B3     | 9.09%        | 15.10%        |
| Tunisia                        | Caa1   | 10.48%       | 16.49%        |
| Uganda                         | B2     | 7.69%        | 13.70%        |
| Zambia                         | Ca     | 16.78%       | 22.79%        |
| <b>Africa</b>                  |        | <b>7.36%</b> | <b>13.37%</b> |

|                               |      |              |               |
|-------------------------------|------|--------------|---------------|
| Albania                       | B1   | 6.29%        | 12.30%        |
| Armenia                       | Ba3  | 5.03%        | 11.04%        |
| Azerbaijan                    | Ba2  | 4.21%        | 10.22%        |
| Belarus                       | Ca   | 16.78%       | 22.79%        |
| Bosnia and Herz               | B3   | 9.09%        | 15.10%        |
| Bulgaria                      | Baa1 | 2.23%        | 8.24%         |
| Croatia                       | Ba1  | 3.50%        | 9.51%         |
| Czech Republic                | Aa3  | 0.84%        | 6.85%         |
| Estonia                       | A1   | 0.99%        | 7.00%         |
| Georgia                       | Ba2  | 4.21%        | 10.22%        |
| Hungary                       | Baa2 | 2.66%        | 8.67%         |
| Kazakhstan                    | Baa2 | 2.66%        | 8.67%         |
| Kyrgyzstan                    | B3   | 9.09%        | 15.10%        |
| Latvia                        | A3   | 1.68%        | 7.69%         |
| Lithuania                     | A2   | 1.18%        | 7.19%         |
| Macedonia                     | Ba3  | 5.03%        | 11.04%        |
| Moldova                       | B3   | 9.09%        | 15.10%        |
| Montenegro                    | B1   | 6.29%        | 12.30%        |
| Poland                        | A2   | 1.18%        | 7.19%         |
| Romania                       | Baa3 | 3.07%        | 9.08%         |
| Russia                        | Ca   | 16.78%       | 22.79%        |
| Serbia                        | Ba2  | 4.21%        | 10.22%        |
| Slovakia                      | A2   | 1.18%        | 7.19%         |
| Slovenia                      | A3   | 1.68%        | 7.69%         |
| Tajikistan                    | B3   | 9.09%        | 15.10%        |
| Ukraine                       | Caa3 | 13.98%       | 19.99%        |
| Uzbekistan                    | B1   | 6.29%        | 12.30%        |
| <b>E. Europe &amp; Russia</b> |      | <b>8.85%</b> | <b>14.86%</b> |

|                    |      |              |              |
|--------------------|------|--------------|--------------|
| Abu Dhabi          | Aa2  | 0.69%        | 6.70%        |
| Bahrain            | B2   | 7.69%        | 13.70%       |
| Iraq               | Caa1 | 10.48%       | 16.49%       |
| Israel             | A1   | 0.99%        | 7.00%        |
| Jordan             | B1   | 6.29%        | 12.30%       |
| Kuwait             | A1   | 0.99%        | 7.00%        |
| Lebanon            | C    | 20.40%       | 26.41%       |
| Oman               | Ba3  | 5.03%        | 11.04%       |
| Qatar              | Aa3  | 0.84%        | 6.85%        |
| Ras Al Khaimah     | A1   | 0.99%        | 7.00%        |
| Saudi Arabia       | A1   | 0.99%        | 7.00%        |
| Sharjah            | Baa3 | 3.07%        | 9.08%        |
| United Arab Em     | Aa2  | 0.69%        | 6.70%        |
| <b>Middle East</b> |      | <b>2.02%</b> | <b>8.03%</b> |

| Country         | PRS   | CRP    | ERP    |
|-----------------|-------|--------|--------|
| Algeria         | 66.75 | 6.29%  | 12.30% |
| Brunei          | 79.25 | 1.18%  | 7.19%  |
| Gambia          | 66.25 | 6.29%  | 12.30% |
| Guinea          | 58    | 12.59% | 18.60% |
| Guinea-Bissau   | 63.5  | 9.09%  | 15.10% |
| Guyana          | 75.75 | 2.23%  | 8.24%  |
| Haiti           | 56    | 13.98% | 19.99% |
| Iran            | 66.25 | 6.29%  | 12.30% |
| Korea, D.P.R.   | 51.25 | 16.78% | 22.79% |
| Liberia         | 58.25 | 12.59% | 18.60% |
| Libya           | 71    | 4.21%  | 10.22% |
| Madagascar      | 63.25 | 9.09%  | 15.10% |
| Malawi          | 56.75 | 13.98% | 19.99% |
| Myanmar         | 57.75 | 12.59% | 18.60% |
| Sierra Leone    | 54.75 | 16.78% | 22.79% |
| Somalia         | 52    | 16.78% | 22.79% |
| Sudan           | 47    | 20.40% | 26.41% |
| Syria           | 45.25 | 20.40% | 26.41% |
| Yemen, Republic | 48.25 | 20.40% | 26.41% |
| Zimbabwe        | 60.75 | 10.48% | 16.49% |

|                  |      |              |              |
|------------------|------|--------------|--------------|
| Bangladesh       | Ba3  | 5.03%        | 11.04%       |
| Cambodia         | B2   | 7.69%        | 13.70%       |
| China            | A1   | 0.99%        | 7.00%        |
| Fiji             | B1   | 6.29%        | 12.30%       |
| Hong Kong        | Aa3  | 0.84%        | 6.85%        |
| India            | Baa3 | 3.07%        | 9.08%        |
| Indonesia        | Baa2 | 2.66%        | 8.67%        |
| Japan            | A1   | 0.99%        | 7.00%        |
| Korea            | Aa2  | 0.69%        | 6.70%        |
| Laos             | Caa3 | 13.98%       | 19.99%       |
| Macao            | Aa3  | 0.84%        | 6.85%        |
| Malaysia         | A3   | 1.68%        | 7.69%        |
| Maldives         | Caa1 | 10.48%       | 16.49%       |
| Mongolia         | B3   | 9.09%        | 15.10%       |
| Pakistan         | B3   | 9.09%        | 15.10%       |
| Papua New Guinea | B2   | 7.69%        | 13.70%       |
| Philippines      | Baa2 | 2.66%        | 8.67%        |
| Singapore        | Aaa  | 0.00%        | 6.01%        |
| Solomon Islands  | Caa1 | 10.48%       | 16.49%       |
| Sri Lanka        | Ca   | 16.78%       | 22.79%       |
| Taiwan           | Aa3  | 0.84%        | 6.85%        |
| Thailand         | Baa1 | 2.23%        | 8.24%        |
| Vietnam          | Ba3  | 5.03%        | 11.04%       |
| <b>Asia</b>      |      | <b>1.56%</b> | <b>7.57%</b> |

|                           |      |              |              |
|---------------------------|------|--------------|--------------|
| Australia                 | Aaa  | 0.00%        | 6.01%        |
| Cook Islands              | Caa1 | 10.48%       | 16.49%       |
| New Zealand               | Aaa  | 0.00%        | 6.01%        |
| <b>Australia &amp; NZ</b> |      | <b>0.00%</b> | <b>6.01%</b> |

Aswath Damodaran

Blue: Moody's Rating  
Red: Added Country Risk  
Green #: Total ERP



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

- The “default” approach in valuation has been to assign country risk based upon your country of incorporation. Thus, if you are incorporated in a developed market, the assumption has been that you are not exposed to emerging market risks. If you are incorporated in an emerging market, you are saddled with the entire country risk.
- As companies globalize and look for revenues in foreign markets, this practice will under estimate the costs of equity of developed market companies with significant emerging market risk exposure and over estimate the costs of equity of emerging market companies with significant developed market risk exposure.

# Fertiglobe: Equity Risk Premium in 2022

| <i>Region</i>             | <i>Revenues</i> | <i>ERP</i>   | <i>Weight</i>  |
|---------------------------|-----------------|--------------|----------------|
| Africa                    | \$294           | 13.37%       | 8.88%          |
| Asia & Oceania            | \$1,177         | 7.57%        | 35.55%         |
| Central and South America | \$476           | 11.21%       | 14.38%         |
| Middle East               | \$61            | 8.03%        | 1.84%          |
| North America             | \$356           | 6.01%        | 10.75%         |
| Western Europe            | \$947           | 7.17%        | 28.60%         |
| <b>Total</b>              | <b>\$3,311</b>  | <b>8.33%</b> | <b>100.00%</b> |

# Natural Resource Twists? Royal Dutch

| <i>Country</i>               | <i>Oil &amp; Gas Production</i> | <i>% of Total</i> | <i>ERP</i>    |
|------------------------------|---------------------------------|-------------------|---------------|
| Denmark                      | 17396                           | 3.83%             | 6.20%         |
| Italy                        | 11179                           | 2.46%             | 9.14%         |
| Norway                       | 14337                           | 3.16%             | 6.20%         |
| UK                           | 20762                           | 4.57%             | 6.81%         |
| <i>Rest of Europe</i>        | <i>874</i>                      | <i>0.19%</i>      | <i>7.40%</i>  |
| Brunei                       | 823                             | 0.18%             | 9.04%         |
| Iraq                         | 20009                           | 4.40%             | 11.37%        |
| Malaysia                     | 22980                           | 5.06%             | 8.05%         |
| Oman                         | 78404                           | 17.26%            | 7.29%         |
| Russia                       | 22016                           | 4.85%             | 10.06%        |
| <i>Rest of Asia &amp; ME</i> | <i>24480</i>                    | <i>5.39%</i>      | <i>7.74%</i>  |
| <i>Oceania</i>               | <i>7858</i>                     | <i>1.73%</i>      | <i>6.20%</i>  |
| Gabon                        | 12472                           | 2.75%             | 11.76%        |
| Nigeria                      | 67832                           | 14.93%            | 11.76%        |
| Rest of Africa               | 6159                            | 1.36%             | 12.17%        |
| USA                          | 104263                          | 22.95%            | 6.20%         |
| Canada                       | 8599                            | 1.89%             | 6.20%         |
| Brazil                       | 13307                           | 2.93%             | 9.60%         |
| <i>Rest of Latin America</i> | <i>576</i>                      | <i>0.13%</i>      | <i>10.78%</i> |
| <b>Royal Dutch Shell</b>     | <b>454326</b>                   | <b>100.00%</b>    | <b>8.26%</b>  |

# An alternate way: Estimating a company's exposure to country risk (Lambda)

□ Just as beta measures exposure to macro economic risk, lambda measures exposure just to country risk. Like beta, it is scaled around one.

□ 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:

$$\text{Lambda} = \% \text{ of revenues domestically}_{\text{firm}} / \% \text{ of revenues domestically}_{\text{average firm}}$$

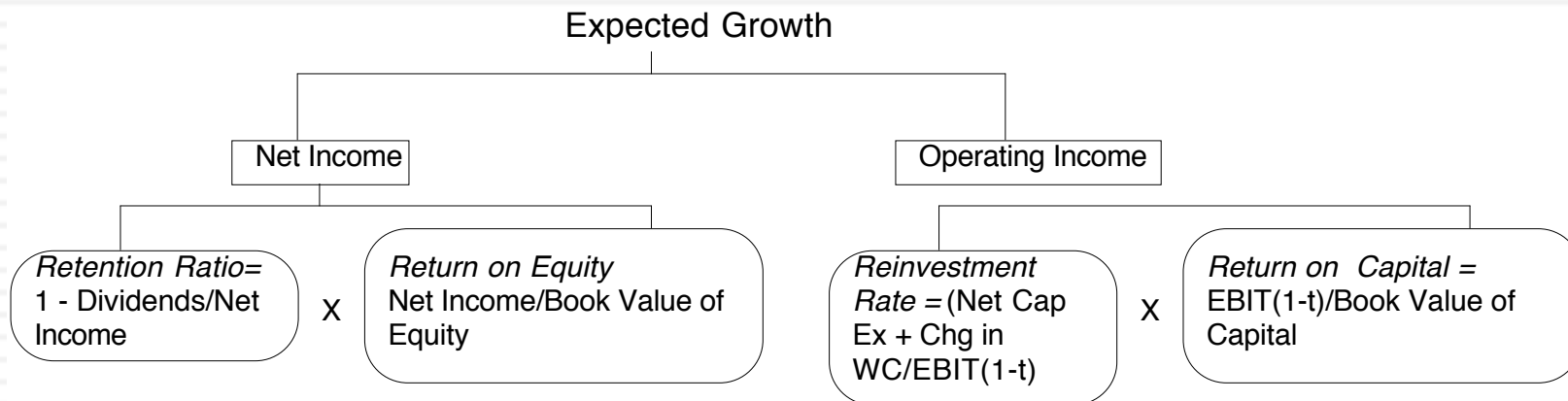
□ In 2008-09, Tata Motors got about 91.37% of its revenues in India and TCS got 7.62%. The average Indian firm gets about 80% of its revenues in India:

□  $\text{Lambda}_{\text{Tata Motors}} = 91\%/80\% = 1.14$

□ The danger of focusing just on revenues is that it misses other exposures to risk (production and operations).

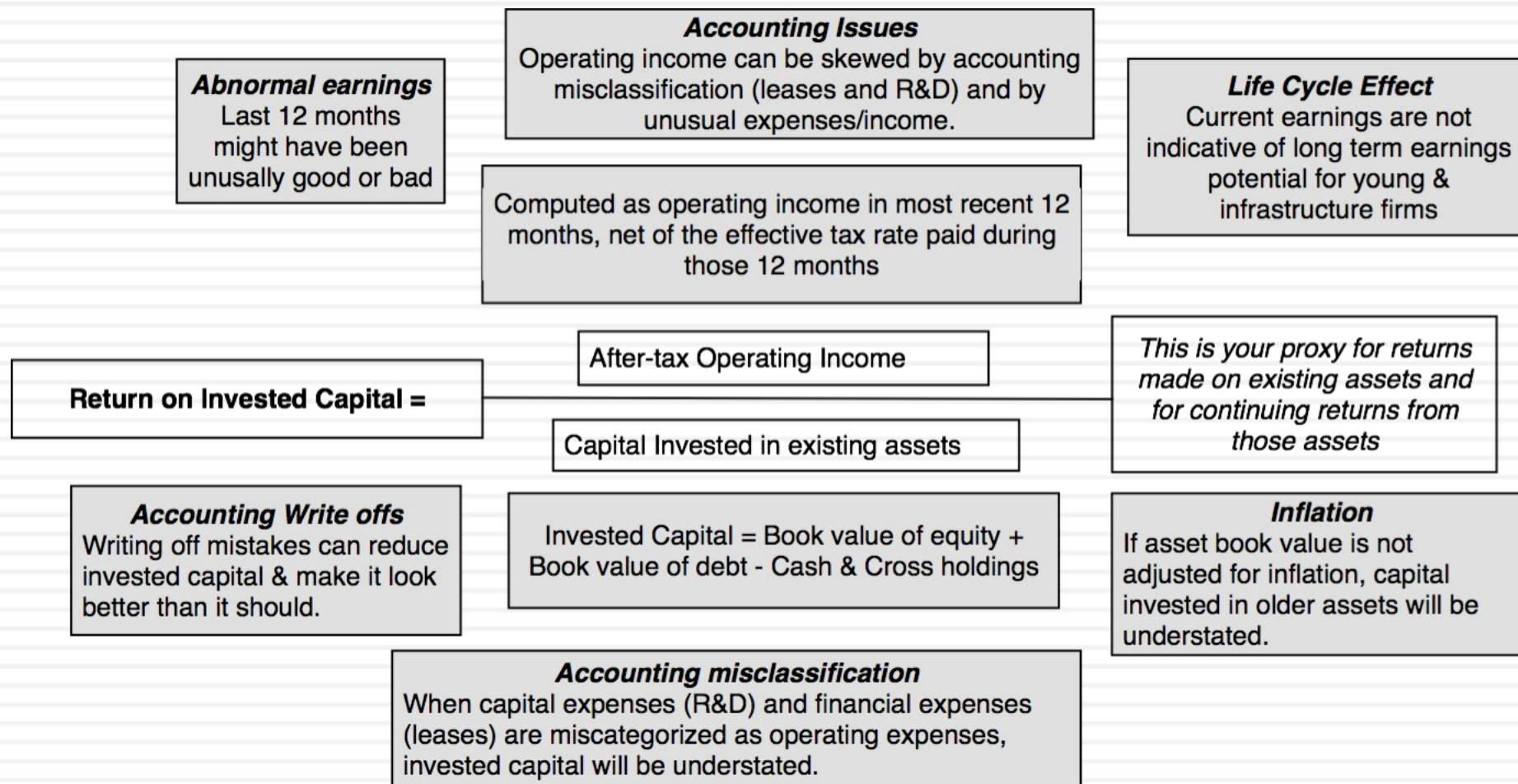
|                                     | <i>Tata Motors</i>                          | <i>TCS</i>                     |
|-------------------------------------|---|--------------------------------|
| % of production/operations in India | High  | High                           |
| % of revenues in India              | 91.37% (in 2009)<br>Estimated 70% (in 2010) | 7.62%                          |
| Lambda                              | 0.80  | 0.20                           |
| Flexibility in moving operations    | Low. Significant physical assets.           | High. Human capital is mobile. |

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

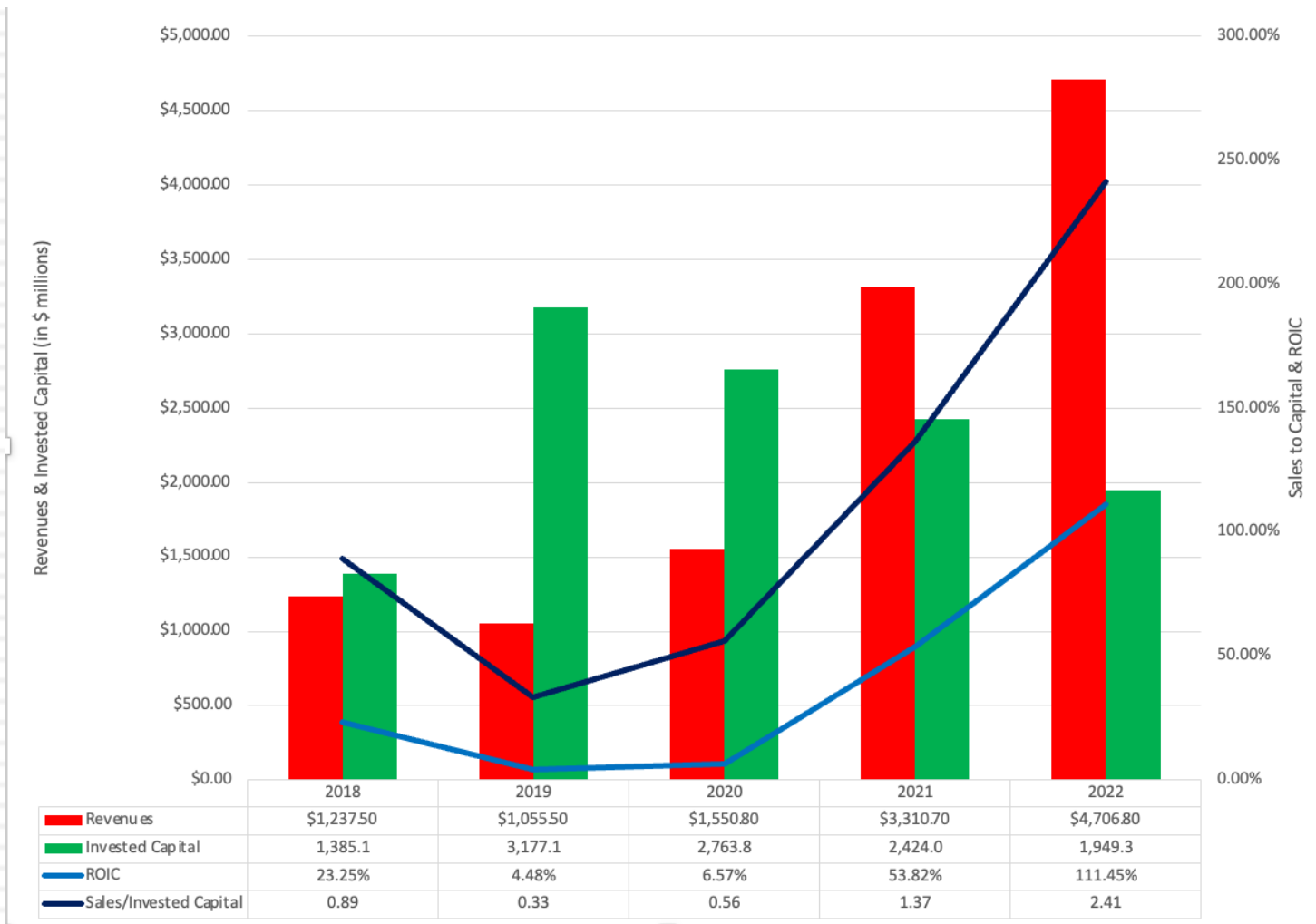


1. No free growth: In the long term, to grow, you have to reinvest.
2. Growth Quality: For a given reinvestment, the higher the return you generate on your reinvestment, the faster you can grow.
3. Scaling up is hard to do: As companies get larger, it gets more difficult to sustain value-adding growth.

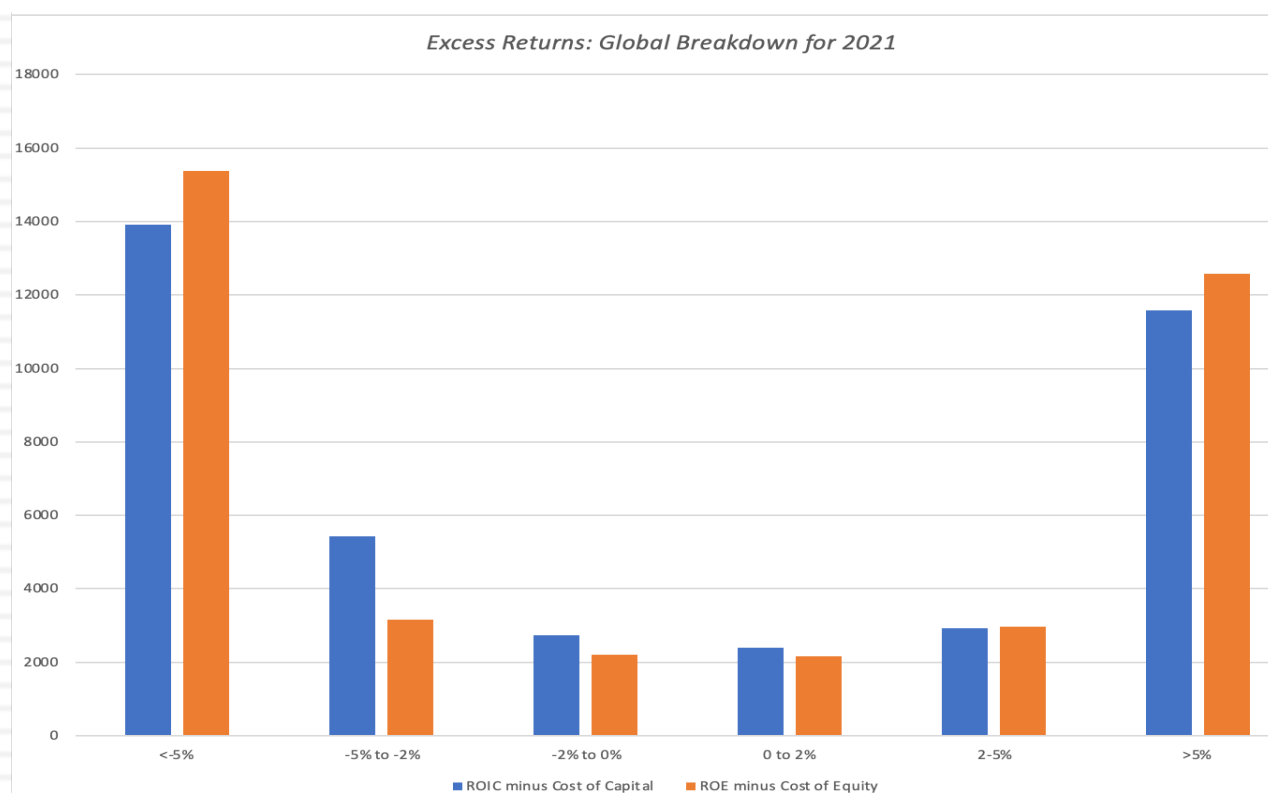
# Measuring Returns: The Quandary



# Reinvestment & Return on Capital – Fertiglobe History



# Earn at least your cost of capital! But companies seem to have trouble in practice



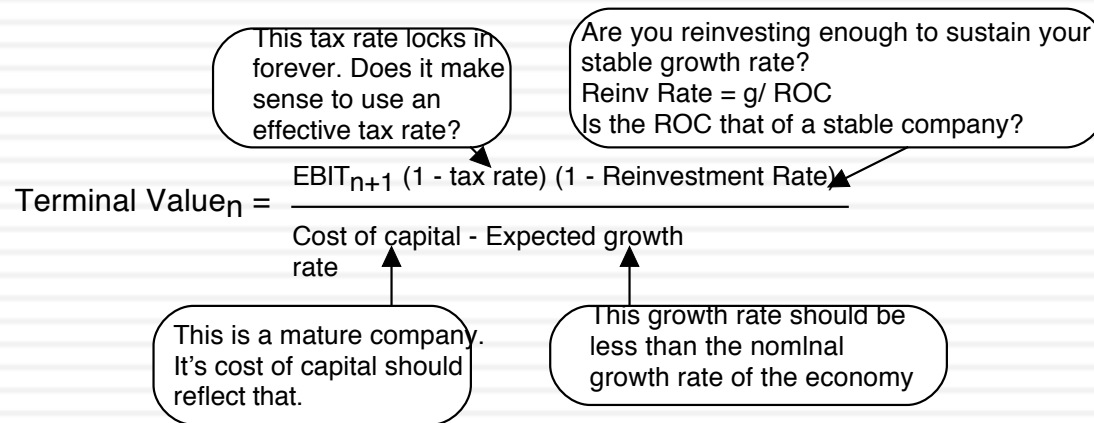
| Sub Group                 | Number of firms | Return on Capital - Cost of Capital |            |            |          |        | Positive | Negative |
|---------------------------|-----------------|-------------------------------------|------------|------------|----------|--------|----------|----------|
|                           |                 | <-5%                                | -5% to -2% | -2% to +2% | 2% to 5% | >5%    |          |          |
| Africa and Middle East    | 1,913           | 37.95%                              | 14.69%     | 14.22%     | 7.16%    | 25.98% | 39.52%   | 60.48%   |
| Australia & NZ            | 1,510           | 60.66%                              | 5.23%      | 7.48%      | 4.37%    | 22.25% | 30.66%   | 69.34%   |
| Canada                    | 2,071           | 72.33%                              | 4.01%      | 6.13%      | 2.95%    | 14.58% | 21.05%   | 78.95%   |
| China                     | 6,377           | 27.16%                              | 14.08%     | 13.88%     | 8.95%    | 35.93% | 51.73%   | 48.27%   |
| Eastern Europe & Russia   | 415             | 30.60%                              | 12.77%     | 16.14%     | 9.88%    | 30.60% | 47.95%   | 52.05%   |
| EU & Environs             | 4,698           | 34.36%                              | 11.56%     | 12.71%     | 6.85%    | 34.53% | 47.40%   | 52.60%   |
| India                     | 3,526           | 33.35%                              | 17.81%     | 12.62%     | 7.71%    | 28.50% | 41.97%   | 58.03%   |
| Japan                     | 3,665           | 17.49%                              | 16.13%     | 22.05%     | 10.89%   | 33.45% | 53.70%   | 46.30%   |
| Latin America & Caribbean | 847             | 31.17%                              | 13.70%     | 13.70%     | 8.50%    | 35.06% | 49.23%   | 50.77%   |
| Small Asia                | 8,346           | 35.85%                              | 15.96%     | 15.37%     | 8.24%    | 24.57% | 39.91%   | 60.09%   |
| UK                        | 1,037           | 37.51%                              | 9.35%      | 10.22%     | 5.01%    | 37.90% | 48.60%   | 51.40%   |
| United States             | 4,593           | 39.95%                              | 16.20%     | 6.88%      | 5.60%    | 31.37% | 40.15%   | 59.85%   |
| Global                    | 38,998          | 35.67%                              | 13.92%     | 13.17%     | 7.53%    | 29.71% | 43.40%   | 56.60%   |



# A More General Way to Estimate Growth: Top Down Growth

- All of the fundamental growth equations assume that the firm has a return on equity or return on capital it can sustain in the long term.
- When operating income is negative or margins are expected to change over time, we use a three step process to estimate growth:
  - ▣ Estimate growth rates in revenues over time
    - Determine the total market (given your business model) and estimate the market share that you think your company will earn.
    - Decrease the growth rate as the firm becomes larger
    - Keep track of absolute revenues to make sure that the growth is feasible
  - ▣ Estimate expected operating margins each year
    - Set a target margin that the firm will move towards
    - Adjust the current margin towards the target margin
  - ▣ Estimate the capital that needs to be invested to generate revenue growth and expected margins
    - Estimate a sales to capital ratio that you will use to generate reinvestment needs each year.

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



**Myth 5.1:** The only way to estimate terminal value is to use the perpetual growth model.

**Myth 5.2:** The perpetual growth model can give you an infinite value.

**Myth 5.3:** The growth rate is your biggest driver of terminal value.

**Myth 5.4:** Your growth rate cannot be negative in a perpetual growth model.

**Myth 5.5:** If your terminal value is a high proportion of your DCF value, it is flawed.

$$\text{Value of an asset with life } > n \text{ years} = \frac{E(CF_1)}{(1+r)^1} + \frac{E(CF_2)}{(1+r)^2} + \dots + \frac{E(CF_n)}{(1+r)^n} + \frac{\text{Terminal Value}_n}{(1+r)^n}$$

**Truth 5.1:** The terminal value can be based on annuities or a liquidation value.

**Truth 5.2:** Not if growth forever is capped at the growth rate of the economy.

**Truth 5.3:** Growth is not free & increasing growth can add or destroy value.

**Truth 5.4:** Growth can be negative forever & is often more reflective of reality.

**Truth 5.5:** The terminal value should be a high percent of value today.

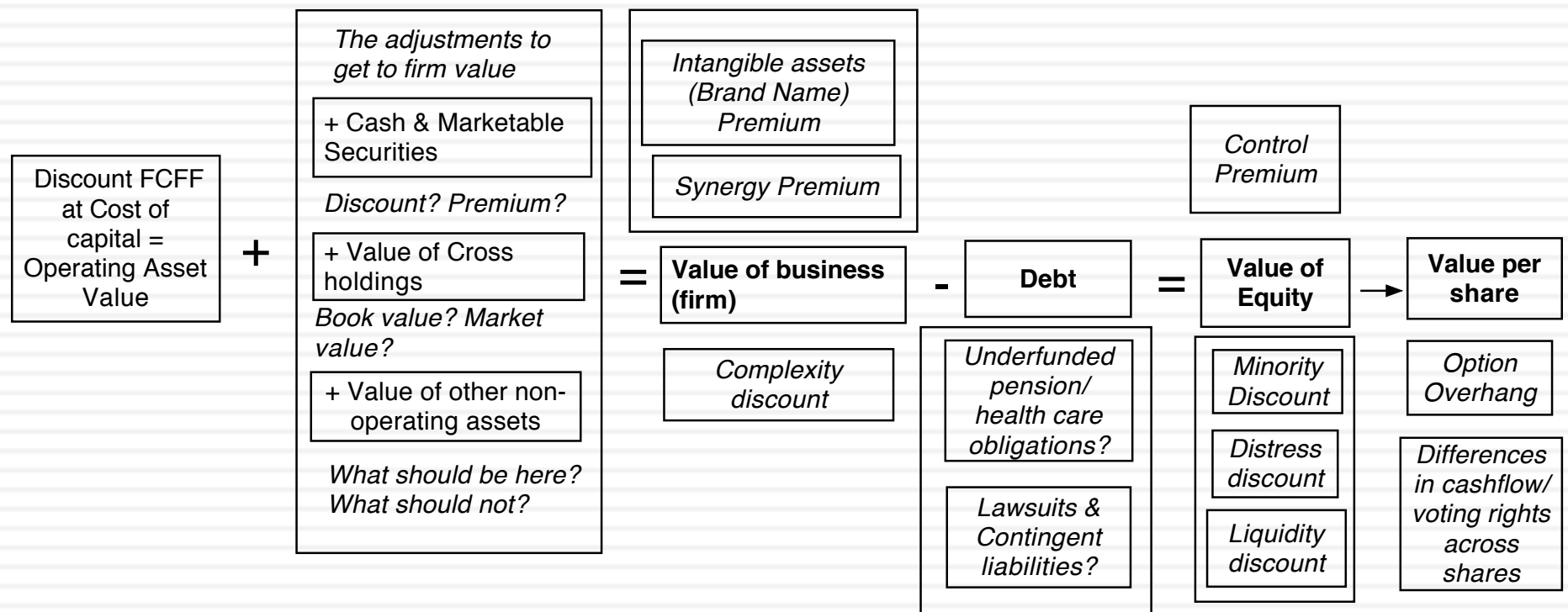
# Terminal Value and Growth

| <i>Stable Growth Rate</i> | <i>Amgen</i> | <i>Tata Motors</i> | <i>Fertiglobe</i> | <i>Heineken</i> |
|---------------------------|--------------|--------------------|-------------------|-----------------|
| 0%                        | \$150,652    | ₹ 435,686          | \$55,280          | €59,438         |
| 1%                        | \$154,479    | ₹ 435,686          | \$57,894          | €59,438         |
| 2%                        | \$160,194    | ₹ 435,686          | \$61,069          | €59,438         |
| 3%                        | \$167,784    | ₹ 435,686          | \$65,044          |                 |
| 4%                        | \$179,099    | ₹ 435,686          | \$70,220          |                 |
|                           |              |                    |                   |                 |
|                           |              |                    |                   |                 |
| Risk free Rate            | 4.78%        | 5.00%              | 4.00%             | -0.50%          |
| ROIC                      | 10.00%       | 10.39%             | 15.00%            | 5.00%           |
| Cost of capital           | 8.08%        | 10.39%             | 10.01%            | 5.00%           |

## II. The loose ends in valuation...

A premium here, a discount there, and soon you are where you wanted to be in the first place..

# Getting from DCF to value per share: The Loose Ends



# 1. The Value of Cash

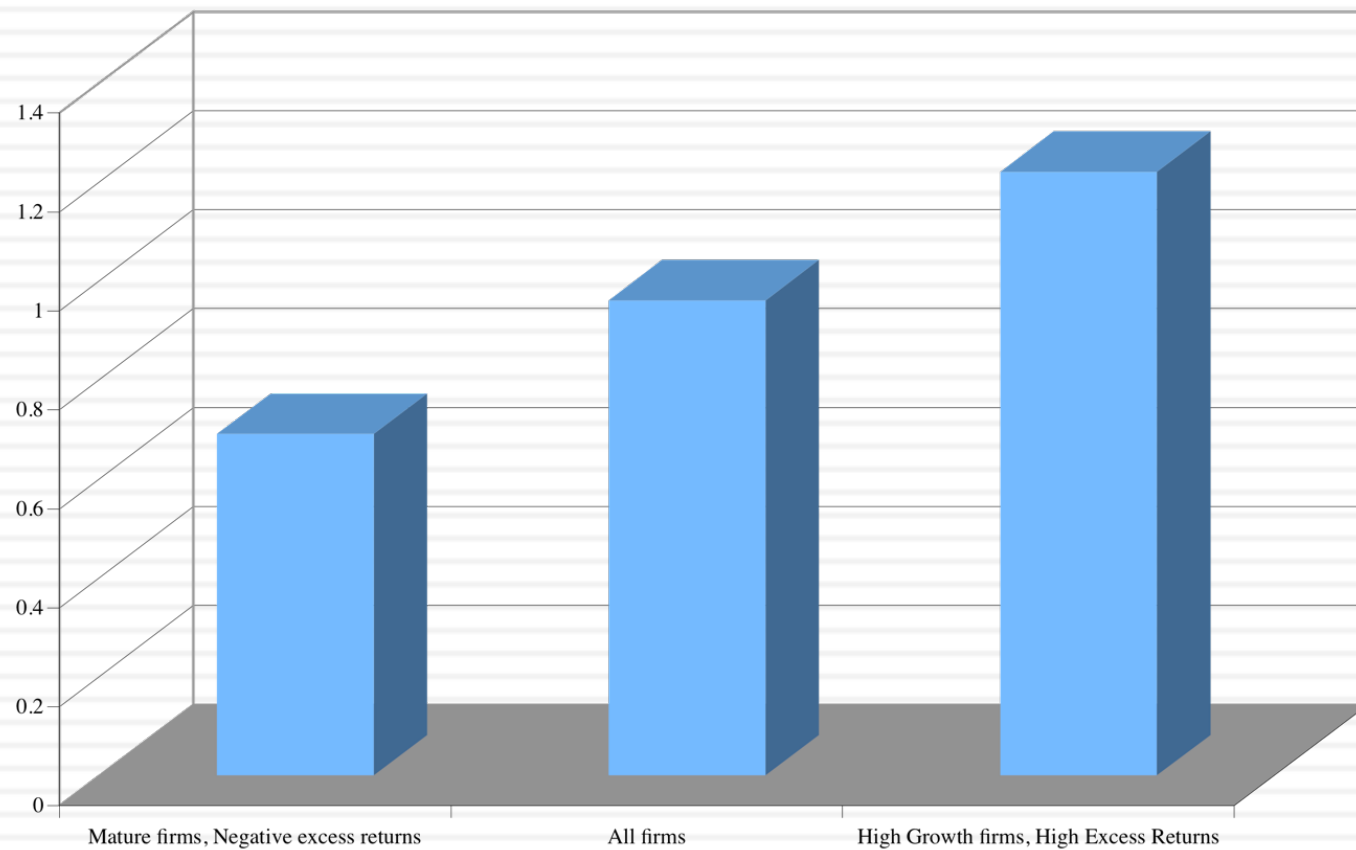
## An Exercise in Cash Valuation

|                   | Company A    | Company B    | Company C    |
|-------------------|--------------|--------------|--------------|
| Enterprise Value  | \$ 1 billion | \$ 1 billion | \$ 1 billion |
| Cash              | \$ 100 mil   | \$ 100 mil   | \$ 100 mil   |
| Return on Capital | 10%          | 5%           | 22%          |
| Cost of Capital   | 10%          | 10%          | 12%          |
| Trades in         | US           | US           | Argentina    |

- In which of these companies is cash most likely to trade at face value, at a discount and at a premium?

# Cash: Discount or Premium?

*Market Value of \$ 1 in cash:  
Estimates obtained by regressing Enterprise Value against Cash Balances*



## 2. 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.
- We tend to be sloppy in practice in dealing with cross holdings. After valuing the operating assets of a firm, using consolidated statements, it is common to add on the balance sheet value of minority holdings (which are in book value terms) and subtract out the minority interests (again in book value terms), representing the portion of the consolidated company that does not belong to the parent company.



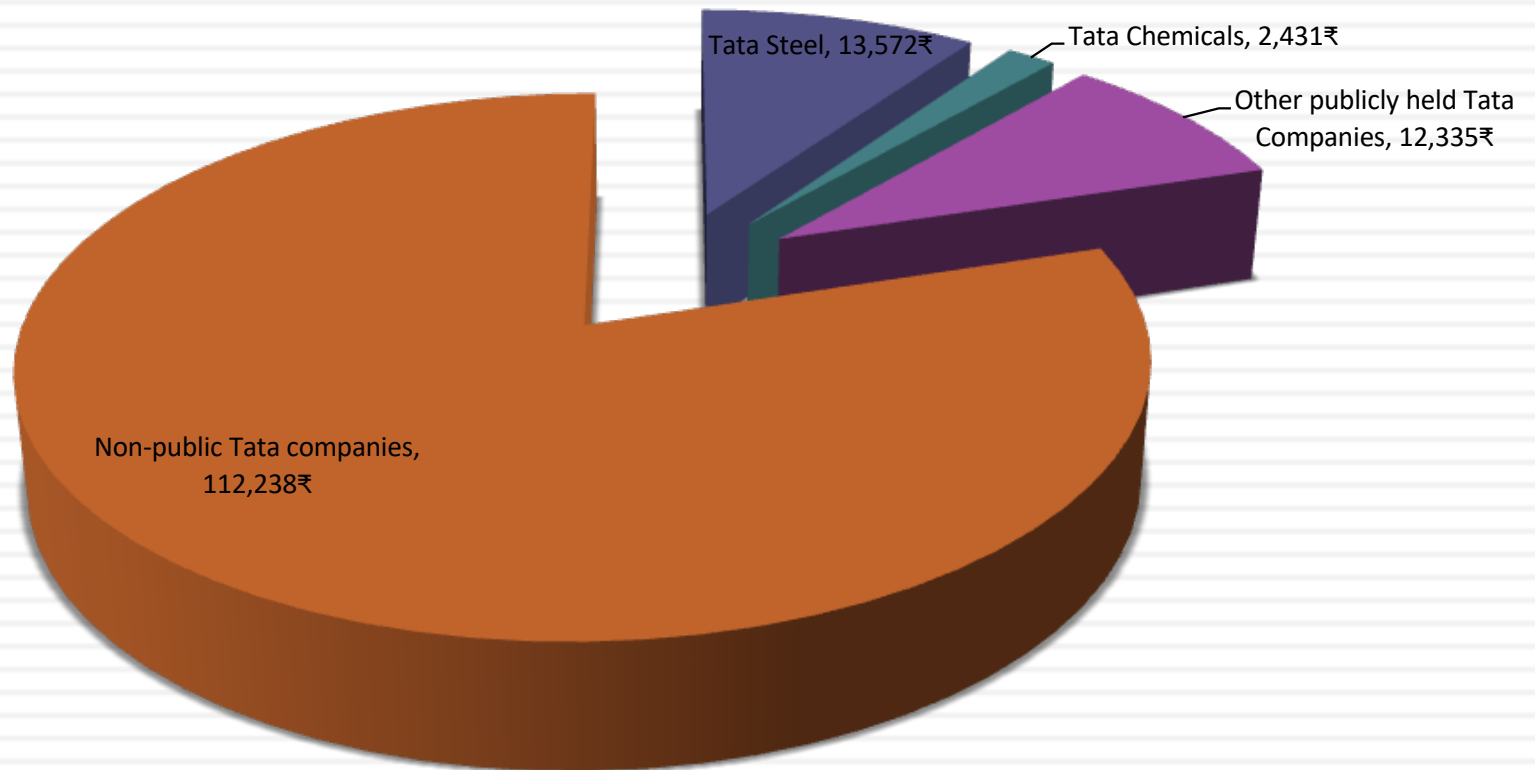
## How to value holdings in other firms.. In a perfect world..

- 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 estimate 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.

# Tata Motor's Cross Holdings



### 3. 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 cash flows, you cannot count the market value of the asset in your value.

# An Uncounted Asset?

69

*Price tag: \$200 million*



The longtime home of Playboy magazine founder Hugh Hefner is to be sold to Daren Metropoulos, a principal at private-equity firm Metropoulos & Co. PHOTO: GETTY IMAGES

# The “real estate” play

- Assume that Accor Hotels, a hotel company, has real estate investments underlying its operations. Assume that you estimate a real estate value of \$1.5 billion for the real estate. Can you add this value on to your DCF value that you get for the hotel business?
  - a. Yes.
  - b. No.
  - c. Depends
- What would you do if the value of the land exceeds the present value that you have estimated for them as operating assets?
  - a. Nothing
  - b. Use the higher of the two values
  - c. Use the lower of the two values
  - d. Use a weighted average of the two values

## 4. A Discount for Complexity: An Experiment

|                  | Company A    | Company B           |
|------------------|--------------|---------------------|
| 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       | Multiple Businesses |
| Holdings         | Simple       | Complex             |
| Accounting       | Transparent  | Opaque              |

□ Which firm would you value more highly?

# 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

| Item                 | Factors  | Follow-up Question                                      | Answer | Weighting factor | Gerdau Score | GE Score |
|----------------------|--|---|--------|------------------|--------------|----------|
| Operating Income     | 1. Multiple Businesses   | Number of businesses (with more than 10% of revenues) = | 1      | 2.00             | 2            | 30       |
|                      | 2. One-time income and expenses  | Percent of operating income =                           | 10%    | 10.00            | 1            | 0.8      |
|                      | 3. Income from unspecified sources                                     | Percent of operating income =                           | 0%     | 10.00            | 0            | 1.2      |
|                      | 4. Items in income statement that are volatile                         | Percent of operating income =                           | 15%    | 5.00             | 0.75         | 1        |
| Tax Rate             | 1. Income from multiple locales  | Percent of revenues from non-domestic locales =         | 70%    | 3.00             | 2.1          | 1.8      |
|                      | 2. Different tax and reporting books                                   | Yes or No   | No     | Yes=3            | 0            | 3        |
|                      | 3. Headquarters in tax havens  | Yes or No   | No     | Yes=3            | 0            | 0        |
|                      | 4. Volatile effective tax rate   | Yes or No   | Yes    | Yes=2            | 2            | 0        |
| Capital Expenditures | 1. Volatile capital expenditures                                       | Yes or No   | Yes    | Yes=2            | 2            | 2        |
|                      | 2. Frequent and large acquisitions                                     | Yes or No   | Yes    | Yes=4            | 4            | 4        |
|                      | 3. Stock payment for acquisitions and investments                      | Yes or No   | No     | Yes=4            | 0            | 4        |
| Working capital      | 1. Unspecified current assets and current liabilities                  | Yes or No   | No     | Yes=3            | 0            | 0        |
|                      | 2. Volatile working capital items                                      | Yes or No   | Yes    | Yes=2            | 2            | 2        |
| Expected Growth rate | 1. Off-balance sheet assets and liabilities (operating leases and R&D) | Yes or No   | No     | Yes=3            | 0            | 3        |
|                      | 2. Substantial stock buybacks  | Yes or No   | No     | Yes=3            | 0            | 3        |
|                      | 3. Changing return on capital over time                                | Is your return on capital volatile?                     | Yes    | Yes=5            | 5            | 5        |
|                      | 4. Unsustainably high return   | Is your firm's ROC much higher than industry average?   | No     | Yes=5            | 0            | 0        |
| Cost of capital      | 1. Multiple businesses   | Number of businesses (more than 10% of revenues) =      | 1      | 1.00             | 1            | 20       |
|                      | 2. Operations in emerging markets                                      | Percent of revenues=                                    | 50%    | 5.00             | 2.5          | 2.5      |
|                      | 3. Is the debt market traded?  | Yes or No   | No     | No=2             | 2            | 0        |
|                      | 4. Does the company have a rating?                                     | Yes or No   | Yes    | No=2             | 0            | 0        |
|                      | 5. Does the company have off-balance sheet debt?                       | Yes or No   | No     | Yes=5            | 0            | 5        |
| No-operating assets  | Minority holdings as percent of book assets                            | Minority holdings as percent of book assets             | 0%     | 20.00            | 0            | 0.8      |
| Firm to Equity value | Consolidation of subsidiaries  | Minority interest as percent of book value of equity    | 63%    | 20.00            | 12.6         | 1.2      |
| Per share value      | Shares with different voting rights                                    | Does the firm have shares with different voting rights? | Yes    | Yes = 10         | 10           | 0        |
|                      | Equity options outstanding   | Options outstanding as percent of shares                | 0%     | 10.00            | 0            | 0.23     |
| Complexity Score =   |  |   |        |                  | 48.95        | 90.55    |

# Dealing with Complexity

## □ In Discounted Cashflow Valuation

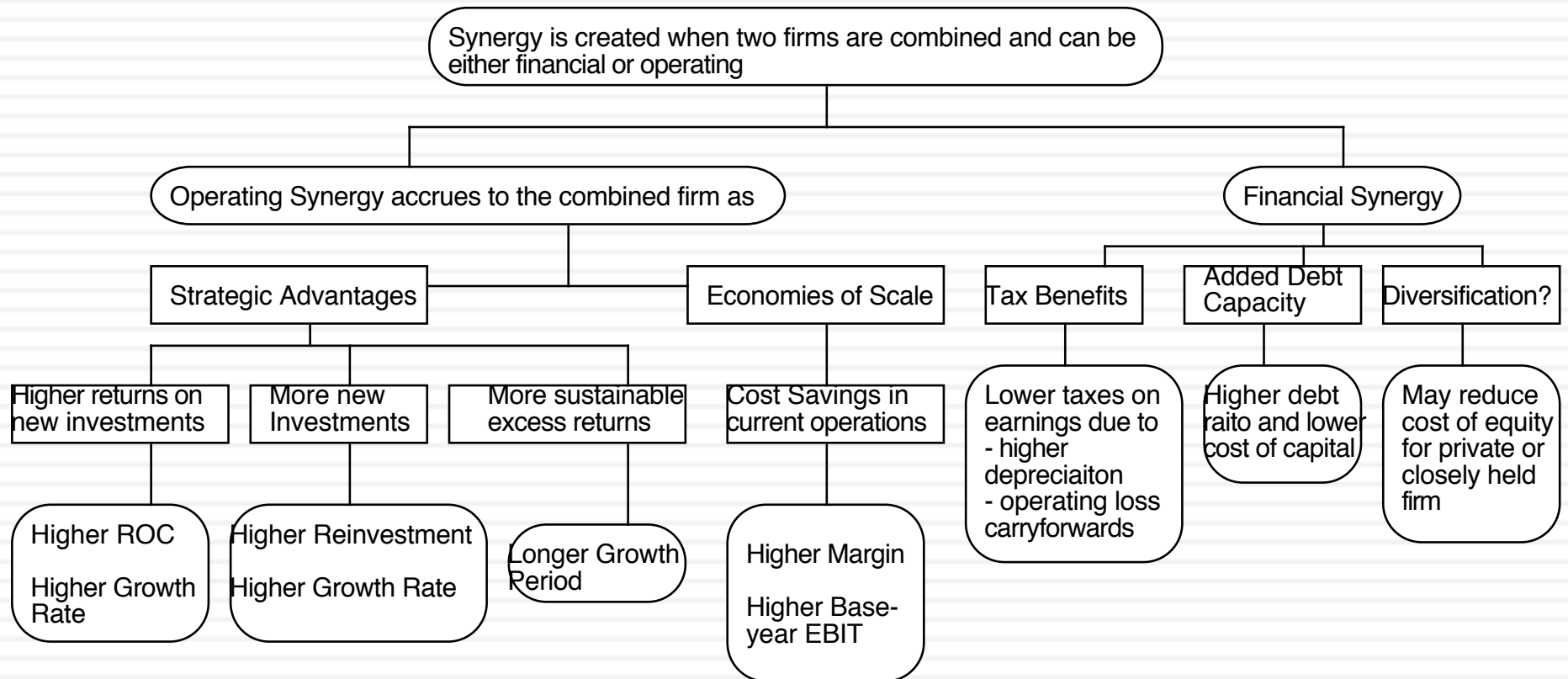
- The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
- The Conservative Analyst: Don't value what you cannot see.
- The Compromise: Adjust the value for complexity
  - Adjust cash flows for complexity
  - Adjust the discount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

## □ In relative valuation

- In a relative valuation, you may be able to assess the price that the market is charging for complexity:
- With the hundred largest market cap firms, for instance:

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

# 5. The Value of Synergy



# 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

# Inbev + SAB Miller: Where's the synergy?

|                             | <i>Inbev</i> | <i>SABMiller</i> | <i>Combined firm (status quo)</i> | <i>Combined firm (synergy)</i> |
|-----------------------------|--------------|------------------|-----------------------------------|--------------------------------|
| Levered Beta                | 0.85         | 0.8289           | 0.84641                           | 0.84641                        |
| Pre-tax cost of debt        | 3.0000%      | 3.2000%          | 3.00%                             | 3.00%                          |
| Effective tax rate          | 18.00%       | 26.36%           | 19.92%                            | 19.92%                         |
| Debt to Equity Ratio        | 30.51%       | 23.18%           | 29.71%                            | 29.71%                         |
|                             |              |                  |                                   |                                |
| Revenues                    | \$45,762.00  | \$22,130.00      | \$67,892.00                       | \$67,892.00                    |
|                             |              |                  |                                   |                                |
| Operating Margin            | 32.28%       | 19.97%           | 28.27%                            | 30.00%                         |
| Operating Income (EBIT)     | \$14,771.97  | \$4,419.36       | \$19,191.33                       | \$20.368                       |
|                             |              |                  |                                   |                                |
| After-tax return on capital | 12.10%       | 12.64%           | 11.68%                            | 12.00%                         |
| Reinvestment Rate =         | 50.99%       | 33.29%           | 43.58%                            | 50.00%                         |
| Expected Growth Rate        | 6.17%        | 4.21%            | 5.09%                             | 6.00%                          |

# The value of synergy

|                               | <i>Inbev</i> | <i>SABMiller</i> | <i>Combined firm<br/>(status quo)</i> | <i>Combined firm<br/>(synergy)</i> |
|-------------------------------|--------------|------------------|---------------------------------------|------------------------------------|
| Cost of Equity =              | 8.93%        | 9.37%            | 9.12%                                 | 9.12%                              |
| After-tax cost of debt =      | 2.10%        | 2.24%            | 2.10%                                 | 2.10%                              |
| Cost of capital =             | 7.33%        | 8.03%            | 7.51%                                 | 7.51%                              |
|                               |              |                  |                                       |                                    |
| After-tax return on capital = | 12.10%       | 12.64%           | 11.68%                                | 12.00%                             |
| Reinvestment Rate =           | 50.99%       | 33.29%           | 43.58%                                | 50.00%                             |
| Expected growth rate=         | 6.17%        | 4.21%            | 5.09%                                 | 6.00%                              |
|                               |              |                  |                                       |                                    |
| <i>Value of firm</i>          |              |                  |                                       |                                    |
| PV of FCFF in high growth =   | \$28,733     | \$9,806          | \$38,539                              | \$39,151                           |
| Terminal value =              | \$260,982    | \$58,736         | \$319,717                             | \$340,175                          |
| Value of operating assets =   | \$211,953    | \$50,065         | \$262,018                             | \$276,610                          |

***Value of synergy = 276,610 – 262,018 = 14,592 million*** 78

## 6. Brand name, great management, superb product ...Are we short changing intangibles?

- There is often a temptation to add on premiums for intangibles. Here are a few examples.
  - ▣ 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.

# Valuing Brand Name

|                                 | <b>Coca Cola</b> | <b>With Cott Margins</b> |
|---------------------------------|------------------|--------------------------|
| 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              |



# Valuing a Franchise: Star Wars

## Star Wars Franchise Valuation: December 2015

|                    | Add-on \$ per Box Office \$ |
|--------------------|-----------------------------|
| Streaming/Video    | \$1.20                      |
| Toys & Merchandise | \$2.00                      |
| Books/eBooks       | \$0.20                      |
| Gaming             | \$0.50                      |
| Other              | \$0.50                      |

*Main Movies*  
World Box office of \$1.5 billion,  
adjusted for 2% inflation.

*Spin Off Movies*  
World Box office is 50% of  
main movies.

| Add on \$<br>per box<br>office \$  | Main Star Wars Movies                   |                 |                 | Star Wars Spin offs |                |                |        |
|--|---|-----------------|-----------------|---------------------|----------------|----------------|--------|
|  | Star Wars VII                           | Star Wars VIII  | Star Wars IX    | Rogue One           | Hans Solo?     | Boba Fett?     |        |
| Years from now   | 0.0                                     | 2.0             | 4.0             | 1.0                 | 3.0            | 5.0            |        |
| Movies - Revenues  | \$2,000                                 | \$2,081         | \$2,165         | \$1,020             | \$1,061        | \$1,104        |        |
| Streaming/Video - Revenues   | \$2,400                                 | \$2,497         | \$2,598         | \$1,224             | \$1,273        | \$1,325        |        |
| Toys & Merchandise - Revenues  | \$4,000                                 | \$4,162         | \$4,330         | \$2,040             | \$2,122        | \$2,208        |        |
| Books/eBooks - Revenues  | \$400                                   | \$416           | \$433           | \$204               | \$212          | \$221          |        |
| Gaming - Revenues  | \$1,000                                 | \$1,040         | \$1,082         | \$510               | \$531          | \$552          |        |
| Other - Revenues   | \$1,000                                 | \$1,040         | \$1,082         | \$510               | \$531          | \$552          |        |
| <b>Total - Revenues</b>  | <b>\$10,800</b>                         | <b>\$11,236</b> | <b>\$11,690</b> | <b>\$5,508</b>      | <b>\$5,731</b> | <b>\$5,962</b> |        |
| Operating Margin<br>20.14% for movies<br>15% for non-movies<br>30% tax rate    | After-tax Operating Income (movies)     | \$ 282          | \$ 293          | \$ 305              | \$ 144         | \$ 150         | \$ 156 |
|  | After-tax Operating Income (non-movies) | \$ 924          | \$ 961          | \$ 1,000            | \$ 471         | \$ 490         | \$ 510 |
|  | Present Value                           | \$ 1,206        | \$ 1,083        | \$ 973              | \$ 572         | \$ 514         | \$ 461 |
| Discounted back<br>@ 7.61% cost of<br>capital of<br>entertainment<br>companies | Value of new Star Wars movies =         | \$4,809         |                 |                     |                |                |        |
|  | Value of continuing income =            | \$5,163         |                 |                     |                |                |        |
|  | Value of Star Wars =                    | \$9,972         |                 |                     |                |                |        |

Assumes that revenues from add ons  
continue after 2020, growing at 2% a year,  
with 15% operating margin

## 7. Be circumspect about defining debt for cost of capital purposes...

- 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

## But should consider other potential liabilities when getting to equity value...

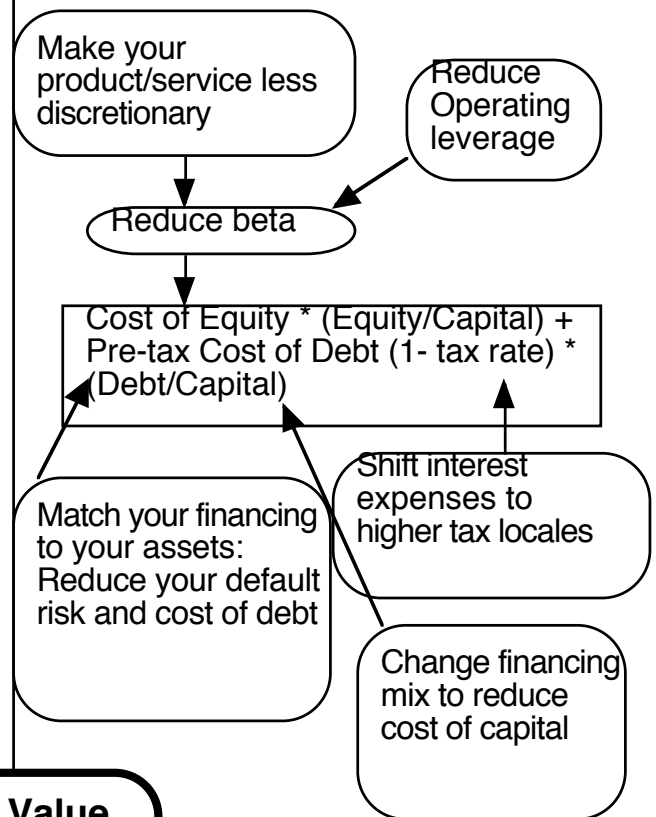
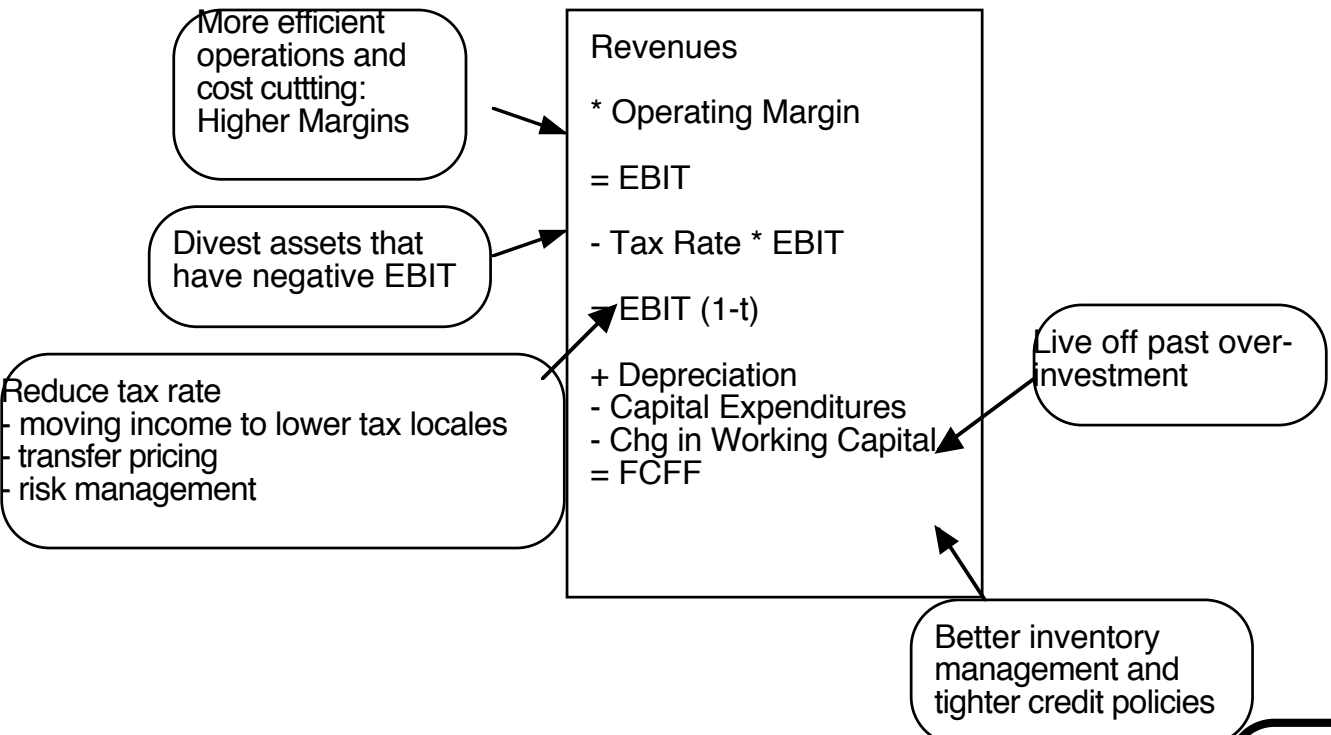
- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
  - If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
  - 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

# 8. 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

*Increase Cash Flows*

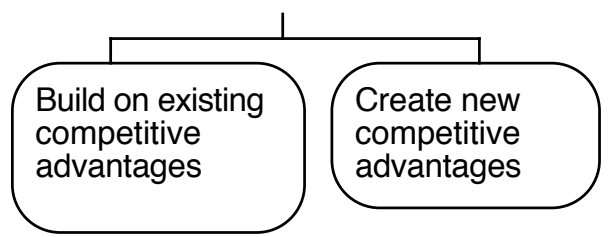
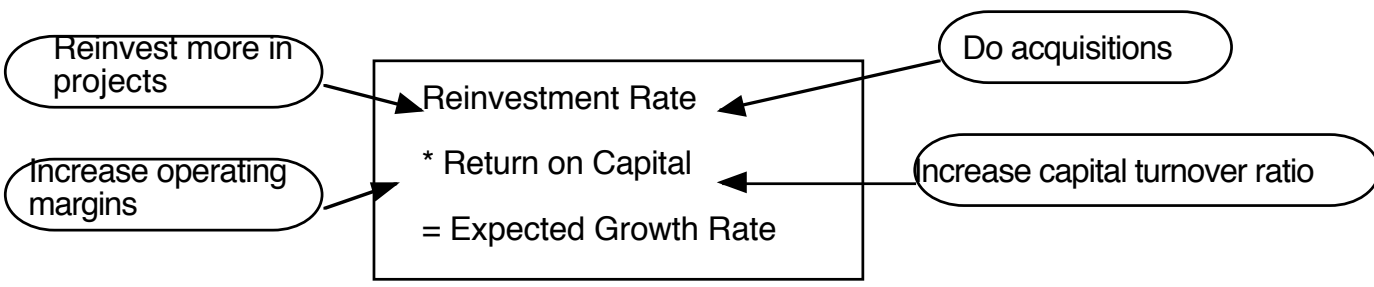
*Reduce the cost of capital*



**Firm Value**

*Increase Expected Growth*

*Increase length of growth period*





### Adris Grupa: 4/2010 (Restructured)

Current Cashflow to Firm  
 EBIT(1-t) : 436 HRK  
 - Nt CpX 3 HRK  
 - Chg WC -118 HRK  
 = FCFF 551 HRK  
 Reinv Rate= (3-118)/436=-26.35%;  
 Tax rate = 17.35%  
 Return on capital = 8.72%

Increased ROIC to cost of capital

Reinvestment Rate  
70.83%

Expected Growth from new inv.  
 $.7083 \times .01054 = 0.0747$   
 or 7.47%

Return on Capital  
10.54%

Stable Growth  
 g = 4%; Beta = 0.80  
 Country Premium= 2%  
 Cost of capital = 9.65%  
 Tax rate = 20.00%  
 ROC=9.65%;  
 Reinvestment Rate=g/ROC  
 =4/9.65%= 41.47%

Op. Assets 4545  
 + Cash: 1787  
 - Debt 141  
 - Minority int 465  
 =Equity 5,735  
 Value/non-voting 334  
 Value/voting 362

| Year           | 1       | 2       | 3       | 4       | 5       | Terminal Value |
|----------------|---------|---------|---------|---------|---------|----------------|
| EBIT (1-t)     | HRK 469 | HRK 503 | HRK 541 | HRK 581 | HRK 623 | 628            |
| - Reinvestment | HRK 332 | HRK 356 | HRK 383 | HRK 411 | HRK 442 | 246            |
| FCFF           | HRK 137 | HRK 147 | HRK 158 | HRK 169 | HRK 182 | 367            |

Terminal Value<sub>5</sub> =  $367 / (.0965 - .04) = 6508$  HRK

Discount at \$ Cost of Capital (WACC) =  $11.12\% (.90) + 8.20\% (0.10) = 10.54\%$

Changed mix of debt and equity to optimal

Cost of Equity  
11.12%

Cost of Debt  
 $(4.25\% + 4\% + 2\%) (1 - .20)$   
 = 8.20%

Weights  
 E = 90 % D = 10 %

On May 1, 2010  
 AG Pfd price = 279 HRK  
 AG Common = 345 HRK

Riskfree Rate:  
 HRK Riskfree Rate= 4.25%

Beta 0.75 X Mature market premium 4.5%

Unlevered Beta for Sectors: 0.68

Firm's D/E Ratio: 11.1%

Lambda 0.68 X CRP for Croatia (3%)  
 + Lambda 0.42 X CRP for Central Europe (3%)

Country Default Spread 2%

Rel Equity Mkt Vol 1.50

# Value of Control and the Value of Voting Rights

- Adris Grupa has two classes of shares outstanding: 9.616 million voting shares and 6.748 million non-voting shares.
- To value a non-voting share, we assume that all non-voting shares essentially have to settle for status quo value. All shareholders, common and preferred, get an equal share of the status quo value.

Status Quo Value of Equity = 5,484 million HKR

Value for a non-voting share =  $5484 / (9.616 + 6.748) = 334$  HKR/share

- To value a voting share, we first value control in Adris Grup as the difference between the optimal and the status quo value:

Value of control at Adris Grupa =  $5,735 - 5484 = 251$  million HKR

Value per voting share =  $334$  HKR +  $251 / 9.616 = 362$  HKR



**Untapped Potential or Flawed Platform**

Twitter will continue its path of monetizing its users, but in fits and starts, as the qualities that make it an appealing platform (brevity, timeliness, impulsiveness) impede attempt to deliver operating success consistently. While user numbers will continue to grow slowly, the active user component will rise faster, and augmented by add ons (limited subscription memberships for prolific and commercial users), the margins will continue to improve.

**The Assumptions**

|                      | Base year  | Next year       | Years 2-5 | Years 6-10 | After year 10 | Link to story   |
|----------------------|------------|-----------------|-----------|------------|---------------|---|
| Revenues (a)         | \$5,078.00 | 12.0%           | 12.00%    | 3.50%      | 3.50%         | Revenue growth will run ahead of user growth, as more of these users become active      |
| Operating margin (b) | 19.02%     | 20.0%           | 20.00%    | 25.00%     | 25.00%        | Limited subscription revenues will augment more creative ad strategy to deliver profits |
| Tax rate             | 25.00%     |                 | 25.00%    | 25.00%     | 25.00%        | Global/US marginal tax rate over time   |
| Reinvestment (c)     |            | 2.80            | 2.80      | 2.80       | 38.89%        | Investment in platform augmentations  |
| Return on capital    | 8.14%      | Marginal ROIC = | 81.36%    |            | 9.00%         | Unique platform and sticky users  |
| Cost of capital (d)  |            |                 | 8.34%     | 6.11%      | 6.11%         | Cost of capital close to median company   |

**The Cash Flows**

|               | Revenues    | Operating Margin | EBIT       | EBIT (1-t) | Reinvestment | FCFF       |
|---------------|-------------|------------------|------------|------------|--------------|------------|
| 1             | \$5,687.36  | 20.00%           | \$1,137.47 | \$1,137.47 | \$217.99     | \$919.48   |
| 2             | \$6,369.84  | 21.00%           | \$1,337.67 | \$1,316.38 | \$244.15     | \$1,072.23 |
| 3             | \$7,134.22  | 21.50%           | \$1,533.86 | \$1,150.39 | \$273.45     | \$876.94   |
| 4             | \$7,990.33  | 22.00%           | \$1,757.87 | \$1,318.40 | \$306.27     | \$1,012.14 |
| 5             | \$8,949.17  | 22.50%           | \$2,013.56 | \$1,510.17 | \$343.02     | \$1,167.15 |
| 6             | \$9,870.94  | 22.61%           | \$2,231.54 | \$1,673.66 | \$329.75     | \$1,343.90 |
| 7             | \$10,719.84 | 23.21%           | \$2,487.58 | \$1,865.69 | \$303.69     | \$1,562.00 |
| 8             | \$11,459.50 | 23.80%           | \$2,727.77 | \$2,045.83 | \$264.61     | \$1,781.22 |
| 9             | \$12,055.40 | 24.40%           | \$2,941.73 | \$2,206.30 | \$213.18     | \$1,993.12 |
| 10            | \$12,477.34 | 25.00%           | \$3,119.33 | \$2,339.50 | \$150.95     | \$2,188.56 |
| Terminal year | \$12,914.04 | 25.00%           | \$3,228.51 | \$2,421.38 | \$941.65     | \$1,479.73 |

**The Value**

|                                     |             |  |                          |         |
|-------------------------------------|-------------|--|--------------------------|---------|
| Terminal value                      | \$56,694.80 |  |                          |         |
| PV(Terminal value)                  | \$27,083.90 |  |                          |         |
| PV (CF over next 10 years)          | \$8,723.78  |  |                          |         |
| Value of operating assets =         | \$35,807.68 |  |                          |         |
| Adjustment for distress             | \$0.00      |  | Probability of failure = | 0.00%   |
| - Debt & Minority Interests         | \$5,546.60  |  |                          |         |
| + Cash & Other Non-operating assets | \$6,393.70  |  |                          |         |
| Value of equity                     | \$36,654.78 |  |                          |         |
| - Value of equity options           | \$17.91     |  |                          |         |
| Number of shares                    | 797.60      |  |                          |         |
| Value per share                     | \$45.93     |  | Stock was trading at =   | \$42.00 |

# Value Enhancement at Twitter

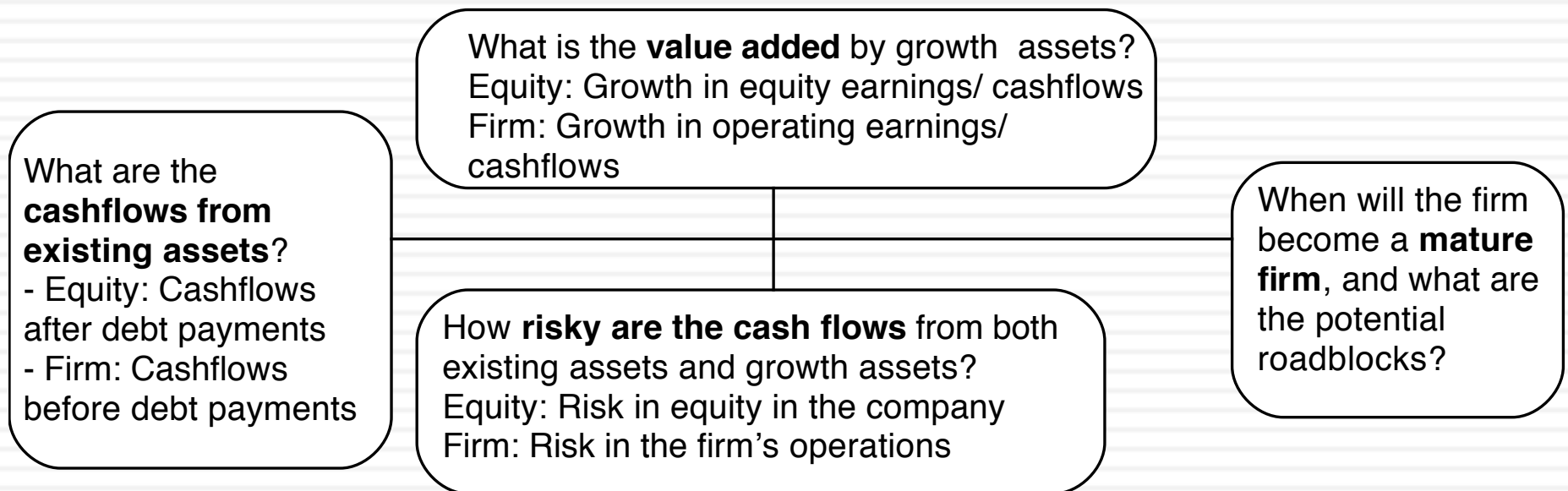
- When Musk announced his acquisition bid for Twitter at \$54.20/share, he contended that the company could be worth more, and that the changes that needed to be made could be done more easily if Twitter was a private business.
- One of the ideas floating around is that Twitter could adopt a subscription model.
  - ▣ How would adopting that model play out in Twitter's valuation?
  - ▣ What argument (if any) is there for going private?



# III. The Dark Side of Valuation

Valuing difficult-to-value companies!

# The fundamental determinants of value...



# The Dark Side of Valuation...

- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value “difficult” companies. In particular, the challenges are greatest when valuing:
  - ▣ Young companies, early in the life cycle, in young businesses
  - ▣ Companies that don’t fit the accounting mold
  - ▣ Companies that face substantial truncation risk (default or nationalization risk)

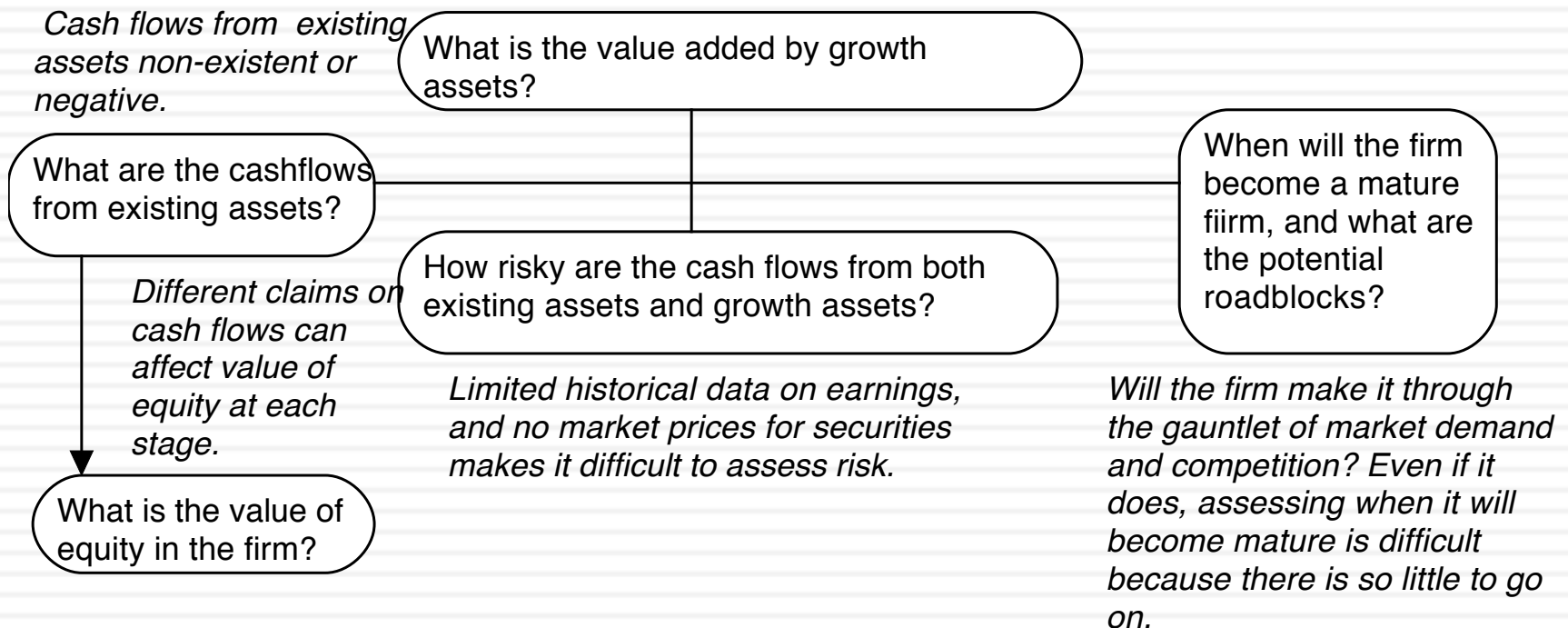
# Difficult to value companies...

- Across the life cycle:
  - ▣ Young, growth firms: Limited history, small revenues in conjunction with big operating losses and a propensity for failure make these companies tough to value.
  - ▣ Mature companies in transition: When mature companies change or are forced to change, history may have to be abandoned and parameters have to be reestimated.
  - ▣ Declining and Distressed firms: A long but irrelevant history, declining markets, high debt loads and the likelihood of distress make them troublesome.
- Across sectors
  - ▣ Financial service firms: Opacity of financial statements and difficulties in estimating basic inputs leave us trusting managers to tell us what's going on.
  - ▣ Commodity and cyclical firms: Dependence of the underlying commodity prices or overall economic growth make these valuations susceptible to macro factors.
  - ▣ Firms with intangible assets: Accounting principles are left to the wayside on these firms.
- Across the ownership cycle
  - ▣ Privately owned businesses: Exposure to firm specific risk and illiquidity bedevil valuations.
  - ▣ Venture Capital (VC) and private equity: Different equity investors, with different perceptions of risk.
  - ▣ Closely held public firms: Part private and part public, sharing the troubles of both.

# I. The challenge with young companies...

Figure 5.2: Estimation Issues - Young and Start-up Companies

*Making judgments on revenues/ profits difficult because you cannot draw on history. If you have no product/ service, it is difficult to gauge market potential or profitability. The company's entire value lies in future growth but you have little to base your estimate on.*



# Upping the ante.. Young companies in young businesses...

- When valuing a business, we generally draw on three sources of information
  - The firm's current financial statement
    - How much did the firm sell?
    - How much did it earn?
  - The firm's financial history, usually summarized in its financial statements.
    - How fast have the firm's revenues and earnings grown over time?
    - What can we learn about cost structure and profitability from these trends?
    - Susceptibility to macro-economic factors (recessions and cyclical firms)
  - The industry and comparable firm data
    - What happens to firms as they mature? (Margins.. Revenue growth... Reinvestment needs... Risk)
- It is when valuing these companies that you find yourself tempted by the dark side, where
  - "Paradigm shifts" happen...
  - New metrics are invented ...
  - The story dominates and the numbers lag...



# Amazon in January 2000

## Drivers of Cash Flow (Business Model)

### Stable Growth

- Revenue Growth: 6%
- Operating Margin: 10.00%
- ROC=20% Reinvest 30% of EBIT(1-t)

Current Revenue \$ 1,117

Current Margin: -36.71%

From previous year

NOL: 500 m

EBIT -410m

Growth potential: Revenue Growth: 42%

Profit potential: Expected Margin: -> 10.00%

Investment efficiency: Sales to Capital : 3.00

Terminal Value=  $1881 / (.0961 - .06)$   
=52,148

Value of Op Assets \$ 15,170

+ Cash \$ 26

= Value of Firm \$15,196

- Value of Debt \$ 349

= Value of Equity \$14,847

- Equity Options \$ 2,892

**Value per share \$ 35.08**

|                     | Base    | 1        | 2        | 3       | 4        | 5        | 6        | 7        | 8        | 9        | 10       | Terminal Year |
|---------------------|---------|----------|----------|---------|----------|----------|----------|----------|----------|----------|----------|---------------|
| Revenue Growth Rate |         | 150.00%  | 100.00%  | 75.00%  | 50.00%   | 30.00%   | 25.20%   | 20.40%   | 15.60%   | 10.80%   | 6.00%    | 6%            |
| Revenues            | \$1,117 | \$ 2,793 | \$ 5,585 | \$9,774 | \$14,661 | \$19,059 | \$23,862 | \$28,729 | \$33,211 | \$36,798 | \$39,006 | \$ 41,346     |
| Operating Margin    | -36.71% | -13.35%  | -1.68%   | 4.16%   | 7.08%    | 8.54%    | 9.27%    | 9.64%    | 9.82%    | 9.91%    | 9.95%    | 10.00%        |
| EBIT                | -\$410  | -\$373   | -\$94    | \$407   | \$1,038  | \$1,628  | \$2,212  | \$2,768  | \$3,261  | \$3,646  | \$3,883  | \$4,135       |
| Taxes               | \$0     | \$0      | \$0      | \$0     | \$167    | \$570    | \$774    | \$969    | \$1,141  | \$1,276  | \$1,359  | \$1,447       |
| EBIT(1-t)           | -\$410  | -\$373   | -\$94    | \$407   | \$871    | \$1,058  | \$1,438  | \$1,799  | \$2,119  | \$2,370  | \$2,524  | \$2,688       |
| - Reinvestment      | \$133   | \$559    | \$931    | \$1,396 | \$1,629  | \$1,466  | \$1,601  | \$1,623  | \$1,494  | \$1,196  | \$736    | \$806         |
| FCFF                | -\$543  | -\$931   | -\$1,024 | -\$989  | -\$758   | -\$408   | -\$163   | \$177    | \$625    | \$1,174  | \$1,788  | \$1,881       |

|                        | 1      | 2      | 3      | 4      | 5      | 6      | 7      | 8      | 9      | 10     | Forever |
|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|---------|
| Cost of Equity         | 12.90% | 12.90% | 12.90% | 12.90% | 12.90% | 12.42% | 11.94% | 11.46% | 10.98% | 10.50% |         |
| Cost of Debt           | 8.00%  | 8.00%  | 8.00%  | 8.00%  | 8.00%  | 7.80%  | 7.75%  | 7.67%  | 7.50%  | 7.00%  |         |
| After-tax cost of debt | 8.00%  | 8.00%  | 8.00%  | 6.71%  | 5.20%  | 5.07%  | 5.04%  | 4.98%  | 4.88%  | 4.55%  |         |
| Cost of Capital        | 12.84% | 12.84% | 12.84% | 12.83% | 12.81% | 12.13% | 11.62% | 11.08% | 10.49% | 9.61%  |         |

All existing options valued as options, using current stock price of \$84.

Amazon was trading at \$84 in January 2000.

Cost of Equity 12.90%

Used average interest coverage ratio over next 5 years to get BBB rating.

Cost of Debt 6.5%+1.5%=8.0% Tax rate = 0% -> 35%

Weights Debt= 1.2% -> 15%

Pushed debt ratio to retail industry average of 15%.

Riskfree Rate: T. Bond rate = 6.5%

+ Beta 1.60 -> 1.00 X Risk Premium 4%

Internet/Retail Operating Leverage Current D/E: 1.21% Base Equity Premium Country Risk Premium

Dot.com retailers for first 5 years Conventional retailers after year 5

# Lesson 1: Don't trust regression betas....

<HELP> for explanation, <MENU> for similar functions.

DG26 Equity BETA

## HISTORICAL BETA

AMZN

US

AMAZON.COM INC

Relative Index

SPX

S&P 500 INDEX

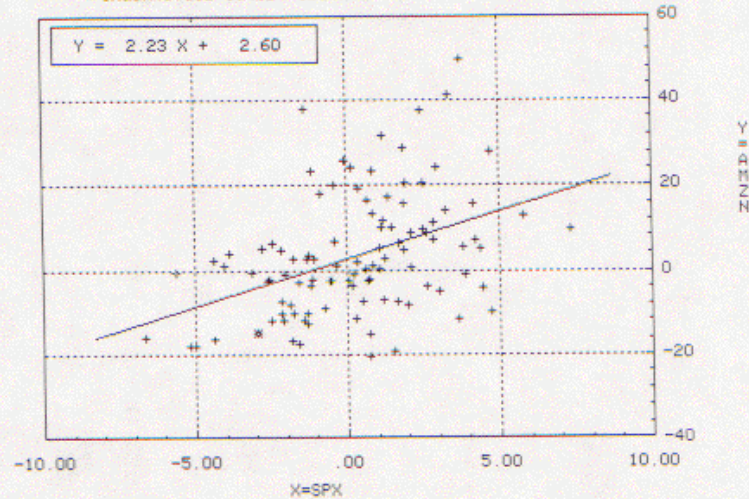
\* Identifies latest observation

Period  Weekly

Range  2/27/98 To  2/18/00

Market  Trade

|                   |       |
|-------------------|-------|
| ADJ BETA          | 1.82  |
| RAW BETA          | 2.23  |
| Alpha (Intercept) | 2.60  |
| R2 (Correlation)  | .17   |
| Std Dev of Error  | 13.20 |
| Std Error of Beta | .50   |
| Number of Points  | 103   |



Adj beta = (0.67) \* Raw Beta  
+ (0.33) \* 1.0

Copyright 2000 BLOOMBERG L.P. Frankfurt:69-920410 Hong Kong:2-977-6000 London:171-330-7500 New York:212-318-2000  
Princeton:609-279-3000 Singapore:226-3000 Sydney:2-9777-8686 Tokyo:3-3201-8900 Sao Paulo:11-3048-4500  
1257-602-0 22-Feb-00 16:21:23

**Bloomberg**  
PROFESSIONAL

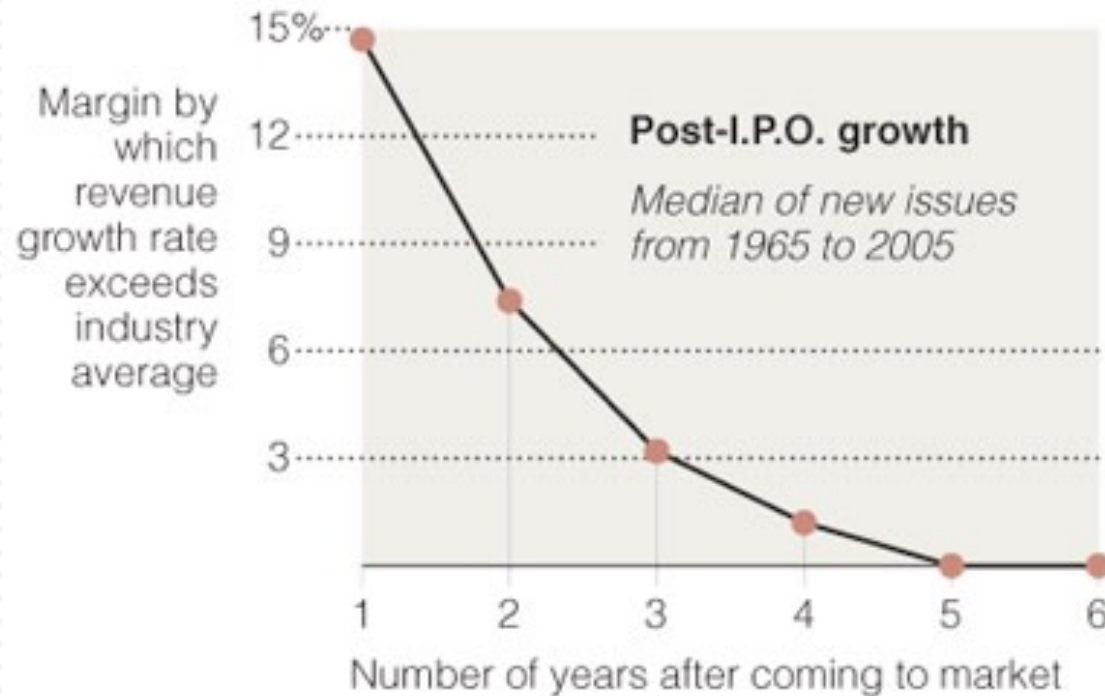
## Lesson 2: Work backwards and keep it simple...

| Year       | Revenue Growth | Sales    | Operating Margin | EBIT    | EBIT (1-t) |
|------------|----------------|----------|------------------|---------|------------|
| Tr 12 mths |                | \$1,117  | -36.71%          | -\$410  | -\$410     |
| 1          | 150.00%        | \$2,793  | -13.35%          | -\$373  | -\$373     |
| 2          | 100.00%        | \$5,585  | -1.68%           | -\$94   | -\$94      |
| 3          | 75.00%         | \$9,774  | 4.16%            | \$407   | \$407      |
| 4          | 50.00%         | \$14,661 | 7.08%            | \$1,038 | \$871      |
| 5          | 30.00%         | \$19,059 | 8.54%            | \$1,628 | \$1,058    |
| 6          | 25.20%         | \$23,862 | 9.27%            | \$2,212 | \$1,438    |
| 7          | 20.40%         | \$28,729 | 9.64%            | \$2,768 | \$1,799    |
| 8          | 15.60%         | \$33,211 | 9.82%            | \$3,261 | \$2,119    |
| 9          | 10.80%         | \$36,798 | 9.91%            | \$3,646 | \$2,370    |
| 10         | 6.00%          | \$39,006 | 9.95%            | \$3,883 | \$2,524    |
| TY         | 6.00%          | \$41,346 | 10.00%           | \$4,135 | \$2,688    |



# Lesson 3: Scaling up is hard to do...

Typically, the revenue growth rate of a newly public company outpaces its industry average for only about five years.



Source: Andrew Metrick

The New York Times

# Lesson 4: Don't forget to pay for growth...

Invested Capital in year t = Invested Capital in year t-1 +  
Reinvestment in year t-1

| Year       | Revenues | Δ Revenue | Sales/Cap | Δ Investment | Invested Capital | EBIT (1-t) | Imputed ROC |
|------------|----------|-----------|-----------|--------------|------------------|------------|-------------|
| Tr 12 mths | \$1,117  |           |           |              | \$ 487           | -\$410     |             |
| 1          | \$2,793  | \$1,676   | 3.00      | \$559        | \$ 1,045         | -\$373     | -76.62%     |
| 2          | \$5,585  | \$2,793   | 3.00      | \$931        | \$ 1,976         | -\$94      | -8.96%      |
| 3          | \$9,774  | \$4,189   | 3.00      | \$1,396      | \$ 3,372         | \$407      | 20.59%      |
| 4          | \$14,661 | \$4,887   | 3.00      | \$1,629      | \$ 5,001         | \$871      | 25.82%      |
| 5          | \$19,059 | \$4,398   | 3.00      | \$1,466      | \$ 6,467         | \$1,058    | 21.16%      |
| 6          | \$23,862 | \$4,803   | 3.00      | \$1,601      | \$ 8,068         | \$1,438    | 22.23%      |
| 7          | \$28,729 | \$4,868   | 3.00      | \$1,623      | \$ 9,691         | \$1,799    | 22.30%      |
| 8          | \$33,211 | \$4,482   | 3.00      | \$1,494      | \$ 11,185        | \$2,119    | 21.87%      |
| 9          | \$36,798 | \$3,587   | 3.00      | \$1,196      | \$ 12,380        | \$2,370    | 21.19%      |
| 10         | \$39,006 | \$2,208   | 3.00      | \$736        | \$ 13,116        | \$2,524    | 20.39%      |
| TY         | \$41,346 | \$2,340   | NA        |              | Assumed to be =  |            | 20.00%      |

Return on Capital in year t = EBIT (1-t) in year t / Invested Capital  
in year t-1

# Lesson 5: There are always scenarios where the market price can be justified...

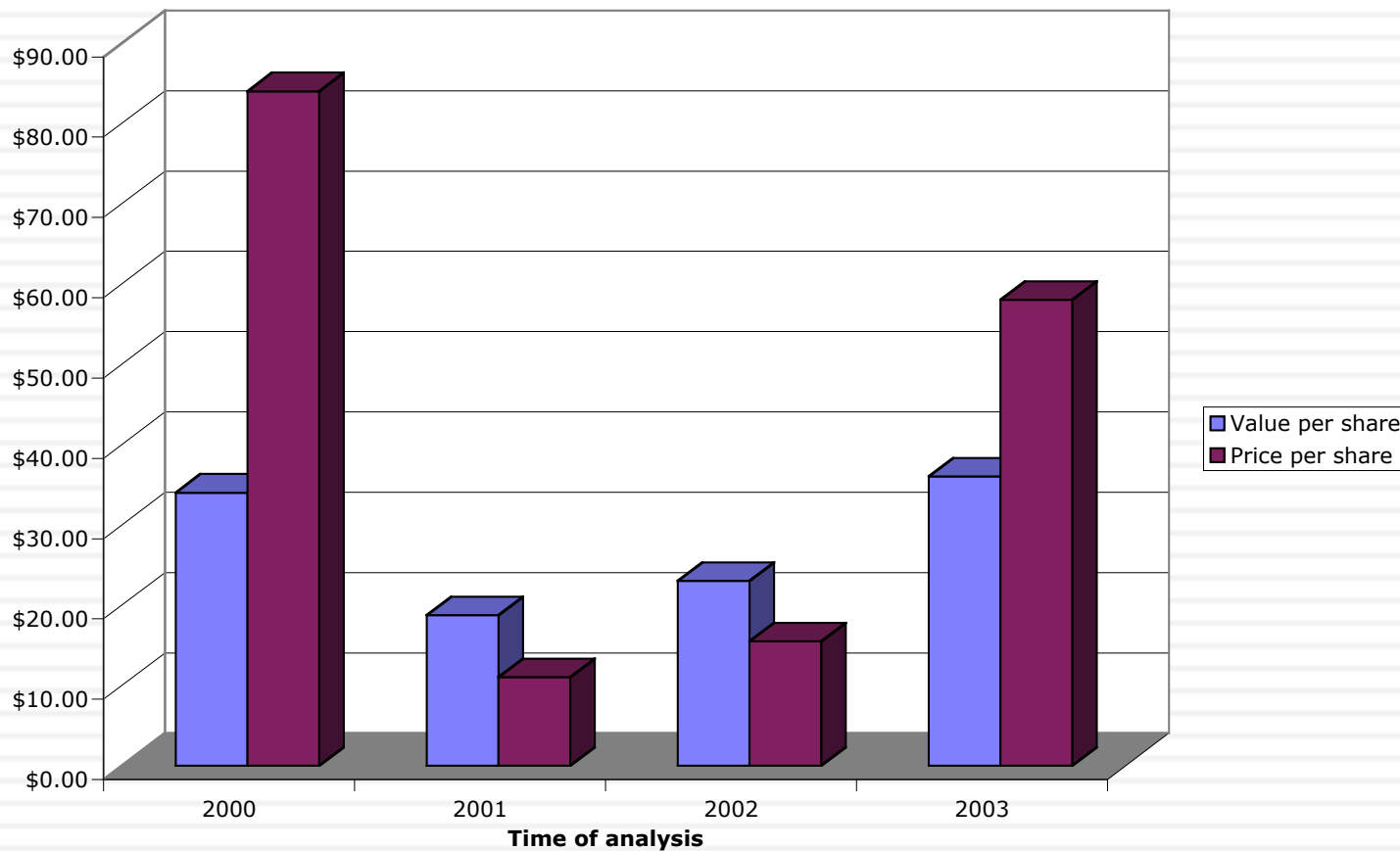
|  |     | Target pre-tax Operating Margin |          |           |           |           |
|--|-----|---------------------------------|----------|-----------|-----------|-----------|
|  |     | 6%                              | 8%       | 10%       | 12%       | 14%       |
| Compounded annual<br>Revenue Growth rate | 30% | \$ (1.94)                       | \$ 2.95  | \$ 7.84   | \$ 12.71  | \$ 17.57  |
|  | 35% | \$ 1.41                         | \$ 8.37  | \$ 15.33  | \$ 22.27  | \$ 29.21  |
|  | 40% | \$ 6.10                         | \$ 15.93 | \$ 25.74  | \$ 35.54  | \$ 45.34  |
|  | 45% | \$ 12.59                        | \$ 26.34 | \$ 40.05  | \$ 53.77  | \$ 67.48  |
|  | 50% | \$ 21.47                        | \$ 40.50 | \$ 59.52  | \$ 78.53  | \$ 97.54  |
|  | 55% | \$ 33.47                        | \$ 59.60 | \$ 85.72  | \$ 111.84 | \$ 137.95 |
|  | 60% | \$ 49.53                        | \$ 85.10 | \$ 120.66 | \$ 156.22 | \$ 191.77 |

## Lesson 6: You will be wrong 100% of the time... and it really is not (always) your fault...

- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.
- 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).

# And the market is often “more wrong” ....

**Amazon: Value and Price**





# Valuing an IPO

## □ Valuation issues:

- *Use of the proceeds from the offering:* The proceeds from the offering can be held as cash by the firm to cover future investment needs, paid to existing equity investors who want to cash out or used to pay down debt.
- *Warrants/ Special deals with prior equity investors:* If venture capitalists and other equity investors from earlier iterations of fund raising have rights to buy or sell their equity at pre-specified prices, it can affect the value per share offered to the public.

## □ Pricing issues:

- *Institutional set-up:* Most IPOs are backed by investment banking guarantees on the price, which can affect how they are priced.
- *Follow-up offerings:* The proportion of equity being offered at initial offering and subsequent offering plans can affect pricing.

**The Story**

Paytm will continue its dominance of the Indian mobile payment market, while that market continues to grow. Along the way, its management will focus more on converting transactions on its platform into revenues, and revenues into operating income.

**The Assumptions**

|                      | Base year   | Next year       | Years 2-5 | Years 6-10 | After year 10 | Link to story  |
|----------------------|-------------|-----------------|-----------|------------|---------------|--|
| GMV                  | ₹ 4,033,000 | 40.00%          | 40.00%    | 4.19%      | 4.19%         | Growing mobile payment market                                  |
| Revenue as % of GMV  | 0.79%       | 0.83%           | 1.00%     | 2.00%      | 2.00%         | Take rate improves, as company matures                         |
| Operating margin (b) | -49.00%     | -20.0%          | 5.00%     | 30.00%     | 30.00%        | High-margin intermediary business                              |
| Tax rate             | 25.00%      |                 | 25.00%    | 25.00%     | 25.00%        | Converge on statutory tax rate                                 |
| Reinvestment (c)     |             | 3.00            | 2.45      | 2.45       | 27.93%        | Industry average reinvestment, for capital intensive business. |
| Return on capital    | -21.78%     | Marginal ROIC = | 80.13%    |            | 15.00%        | Competitive advantages fade over time.                         |
| Cost of capital (d)  |             |                 | 10.44%    | 8.91%      | 8.91%         | Cost of capital relatively stable.                             |

**The Cash Flows**

|               | GMV          | Revenues       | Operating Margin | EBIT (1-t)   | Reinvestment | FCFF         |
|---------------|--------------|----------------|------------------|--------------|--------------|--------------|
| 1             | ₹ 5,646,200  | ₹ 46,984.56    | -20.00%          | ₹ -9,396.91  | ₹ 5,038.85   | ₹ -14,435.77 |
| 2             | ₹ 7,904,680  | ₹ 69,095.49    | -10.00%          | ₹ -6,909.55  | ₹ 9,024.87   | ₹ -15,934.42 |
| 3             | ₹ 11,066,552 | ₹ 101,377.63   | -5.00%           | ₹ -5,068.88  | ₹ 13,176.38  | ₹ -18,245.27 |
| 4             | ₹ 15,493,173 | ₹ 148,430.20   | 0.00%            | ₹ -0.00      | ₹ 19,205.13  | ₹ -19,205.13 |
| 5             | ₹ 21,690,442 | ₹ 216,904.42   | 5.00%            | ₹ 10,845.22  | ₹ 27,948.66  | ₹ -17,103.44 |
| 6             | ₹ 28,813,149 | ₹ 345,757.79   | 10.00%           | ₹ 28,564.36  | ₹ 52,593.21  | ₹ -24,028.85 |
| 7             | ₹ 36,211,213 | ₹ 506,956.99   | 15.00%           | ₹ 57,032.66  | ₹ 65,795.59  | ₹ -8,762.93  |
| 8             | ₹ 42,915,357 | ₹ 686,645.72   | 20.00%           | ₹ 102,996.86 | ₹ 73,342.34  | ₹ 29,654.52  |
| 9             | ₹ 47,787,109 | ₹ 860,167.96   | 25.00%           | ₹ 161,281.49 | ₹ 70,825.40  | ₹ 90,456.09  |
| 10            | ₹ 49,789,389 | ₹ 995,787.77   | 30.00%           | ₹ 224,052.25 | ₹ 55,355.03  | ₹ 168,697.22 |
| Terminal year | ₹ 51,875,564 | ₹ 1,037,511.28 | 30.00%           | ₹ 233,440.04 | ₹ 65,207.58  | ₹ 168,232.45 |

**The Value**

|                                     |                |  |            |
|-------------------------------------|----------------|--|------------|
| Terminal value                      | ₹ 3,564,246.92 |  |            |
| PV(Terminal value)                  | ₹ 1,377,090.74 |  |            |
| PV (CF over next 10 years)          | ₹ 36,169.53    |  |            |
| Value of operating assets =         | ₹ 1,413,260.27 |  |            |
| Adjustment for distress             | ₹ 35,331.51    | Probability of failure =   | 5.00%      |
| - Debt & Minority Interests         | ₹ 12,006.00    |  |            |
| + Cash & Other Non-operating assets | ₹ 7,785.00     |  |            |
| +HPO Proceeds                       | ₹ 83,000.00    | Total proceeds expected to be 166,000, but half will be cashing out existing stockholders. |            |
| Value of equity                     | ₹ 1,456,707.76 |  |            |
| - Value of equity options           | ₹ 45,696.90    |  |            |
| Number of shares                    | 644.23         |  |            |
| Value per share                     | ₹ 2,190.24     | Stock was trading at =   | ₹ 2,950.00 |

## II. Dealing with decline and distress...

*Historical data often reflects flat or declining revenues and falling margins. Investments often earn less than the cost of capital.*

*Growth can be negative, as firm sheds assets and shrinks. As less profitable assets are shed, the firm's remaining assets may improve in quality.*

What is the value added by growth assets?

What are the cashflows from existing assets?

*Underfunded pension obligations and litigation claims can lower value of equity. Liquidation preferences can affect value of equity*

What is the value of equity in the firm?

How risky are the cash flows from both existing assets and growth assets?

*Depending upon the risk of the assets being divested and the use of the proceeds from the divestiture (to pay dividends or retire debt), the risk in both the firm and its equity can change.*

When will the firm become a mature firm, and what are the potential roadblocks?

*There is a real chance, especially with high financial leverage, that the firm will not make it. If it is expected to survive as a going concern, it will be as a much smaller entity.*

# Dealing with the “downside” of Distress

- A DCF valuation values a firm as a going concern. If there is a significant likelihood of the firm failing before it reaches stable growth and if the assets will then be sold for a value less than the present value of the expected cash flows (a distress sale value), DCF valuations will understate the value of the firm.
- Value of Equity= DCF value of equity (1 - Probability of distress) + Distress sale value of equity (Probability of distress)
- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds..
- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).

Current Revenue  
\$ 4,390

Current Margin:  
4.76%

Reinvestment:  
Capital expenditures include cost of new casinos and working capital

**Stable Growth**  
Stable Revenue Growth: 3%  
Stable Operating Margin: 17%  
Stable ROC=10% Reinvest 30% of EBIT(1-t)

EBIT  
\$ 209m

Extended reinvestment break, due ot investment in past

Industry average

Expected Margin:  
-> 17%

Terminal Value=  $758(.0743-.03)$   
=\$ 17,129

Value of Op Assets \$ 9,793  
+ Cash & Non-op \$ 3,040  
= Value of Firm \$12,833  
- Value of Debt \$ 7,565  
= Value of Equity \$ 5,268  
  
Value per share \$ 8.12

|                 |         |         |         |         |         |         |         |         |         |         |                        |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|------------------------|
| Revenues        | \$4,434 | \$4,523 | \$5,427 | \$6,513 | \$7,815 | \$8,206 | \$8,616 | \$9,047 | \$9,499 | \$9,974 | Term. Year<br>\$10,273 |
| Oper margin     | 5.81%   | 6.86%   | 7.90%   | 8.95%   | 10%     | 11.40%  | 12.80%  | 14.20%  | 15.60%  | 17%     | 17%                    |
| EBIT            | \$258   | \$310   | \$429   | \$583   | \$782   | \$935   | \$1,103 | \$1,285 | \$1,482 | \$1,696 | \$ 1,746               |
| Tax rate        | 26.0%   | 26.0%   | 26.0%   | 26.0%   | 26.0%   | 28.4%   | 30.8%   | 33.2%   | 35.6%   | 38.00%  | 38%                    |
| EBIT * (1 - t)  | \$191   | \$229   | \$317   | \$431   | \$578   | \$670   | \$763   | \$858   | \$954   | \$1,051 | \$1,083                |
| - Reinvestment  | -\$19   | -\$11   | \$0     | \$22    | \$58    | \$67    | \$153   | \$215   | \$286   | \$350   | \$ 325                 |
| FCFF            | \$210   | \$241   | \$317   | \$410   | \$520   | \$603   | \$611   | \$644   | \$668   | \$701   | \$758                  |
|                 |         | 1       | 2       | 3       | 4       | 5       | 6       | 7       | 8       | 9       | 10                     |
| Beta            | 3.14    | 3.14    | 3.14    | 3.14    | 3.14    | 2.75    | 2.36    | 1.97    | 1.59    | 1.20    | Forever                |
| Cost of equity  | 21.82%  | 21.82%  | 21.82%  | 21.82%  | 21.82%  | 19.50%  | 17.17%  | 14.85%  | 12.52%  | 10.20%  |                        |
| Cost of debt    | 9%      | 9%      | 9%      | 9%      | 9%      | 8.70%   | 8.40%   | 8.10%   | 7.80%   | 7.50%   |                        |
| Debt/ratio      | 73.50%  | 73.50%  | 73.50%  | 73.50%  | 73.50%  | 68.80%  | 64.10%  | 59.40%  | 54.70%  | 50.00%  |                        |
| Cost of capital | 9.88%   | 9.88%   | 9.88%   | 9.88%   | 9.88%   | 9.79%   | 9.50%   | 9.01%   | 8.32%   | 7.43%   |                        |

**Cost of Equity**  
21.82%

**Cost of Debt**  
 $3%+6%= 9%$   
 $9% (1-.38)=5.58%$

**Weights**  
Debt= 73.5% ->50%

**Riskfree Rate:**  
T. Bond rate = 3%

*Aswath Damodaran*

+ **Beta**  
3.14-> 1.20

**Risk Premium**  
6%

Casino  
1.15

Current  
D/E: 277%

Base Equity  
Premium

Country Risk  
Premium

**Las Vegas Sands**  
**Feburary 2009**  
**Trading @ \$4.25**

# Adjusting the value of LVS for distress..

- Ratings based approach: In February 2009, Las Vegas Sands was rated B+, and based upon history (previous ten years), the likelihood of default is 28.25%.
- Bond Price based: In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at \$529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

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

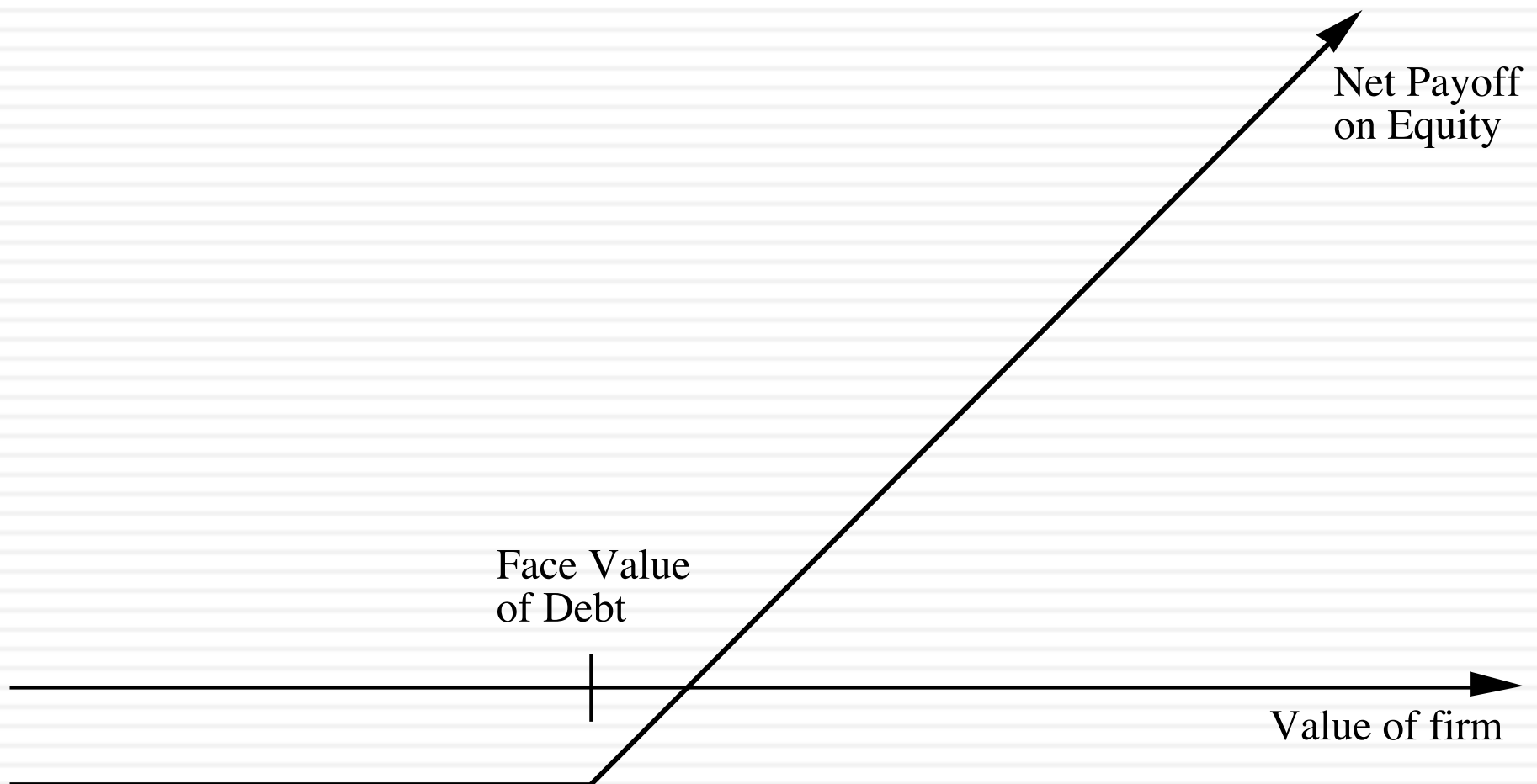
$\pi_{\text{Distress}}$  = Annual probability of default = 13.54%

Cumulative probability of surviving 10 years =  $(1 - .1354)^{10} = 23.34\%$

Cumulative probability of distress over 10 years =  $1 - .2334 = .7666$  or 76.66%

- If LVS is becomes distressed:
  - Expected distress sale proceeds = \$2,769 million < Face value of debt
  - Expected equity value/share = \$0.00
- Expected value per share
  - With ratings-based approach:  $\$8.12 (.7175) + \$ 0 (.2825) = \$5.83$
  - With bond-based approach:  $\$8.12 (1 - .7666) + \$0.00 (.7666) = \$1.92$

# The “sunny” side of distress: Equity as a call option to liquidate the firm



# Application to valuation: A simple example

- Assume that you have a firm whose assets are currently valued at \$100 million and that the standard deviation in this asset value is 40%.
- Further, assume that the face value of debt is \$80 million (It is zero coupon debt with 10 years left to maturity).
- If the ten-year treasury bond rate is 10%,
  - ▣ how much is the equity worth?
  - ▣ What should the interest rate on debt be?

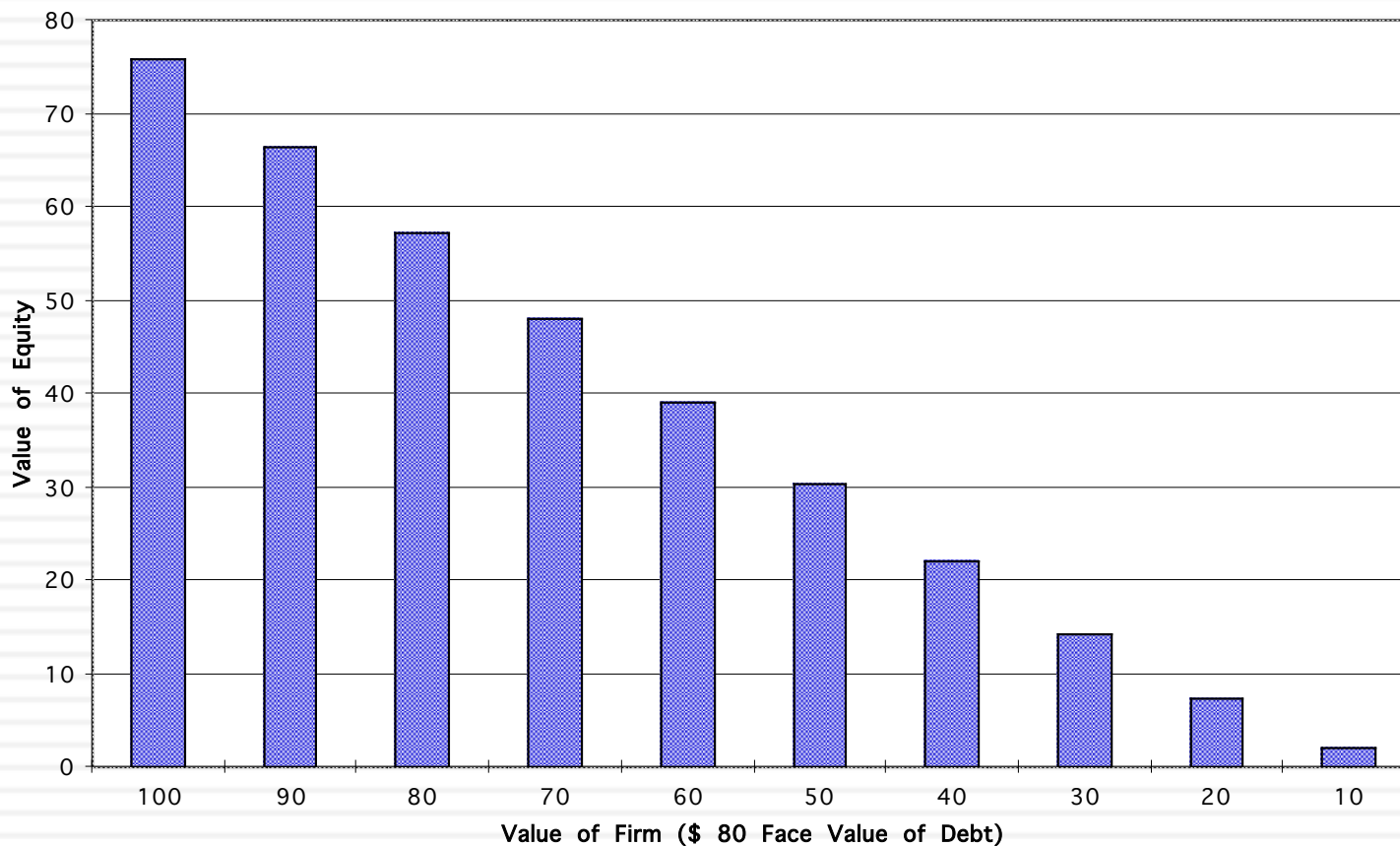






# Equity value persists .. As firm value declines..

Value of Equity as Firm Value Changes



# Air India: Give Away or Option Value?

- In October 2021, the equity in Air India was sold to the Tatas for \$2.4 billion.
- At the time of the sale, Air India owed \$3.1 billion, negative shareholder's equity and had racked up losses of close to \$10 billion in the years leading up to the sale.
- While some viewed the sale as a “give away”, there are two questions:
  - ▣ What was Air India's value as a going concern?
  - ▣ How much of the price was for its optionality?
  - ▣ How much did sentiment play a role in the pricing?

# III. Valuing Financial Service Companies

*Existing assets are usually financial assets or loans, often marked to market. Earnings do not provide much information on underlying risk.*

*Defining capital expenditures and working capital is a challenge. Growth can be strongly influenced by regulatory limits and constraints. Both the amount of new investments and the returns on these investments can change with regulatory changes.*

What is the value added by growth assets?

What are the cashflows from existing assets?

When will the firm become a mature firm, and what are the potential roadblocks?

*Preferred stock is a significant source of capital.*

How risky are the cash flows from both existing assets and growth assets?

What is the value of equity in the firm?

*For financial service firms, debt is raw material rather than a source of capital. It is not only tough to define but if defined broadly can result in high financial leverage, magnifying the impact of small operating risk changes on equity risk.*

*In addition to all the normal constraints, financial service firms also have to worry about maintaining capital ratios that are acceptable to regulators. If they do not, they can be taken over and shut down.*

# Lesson 1: Debt to a bank is raw material, not a source of capital

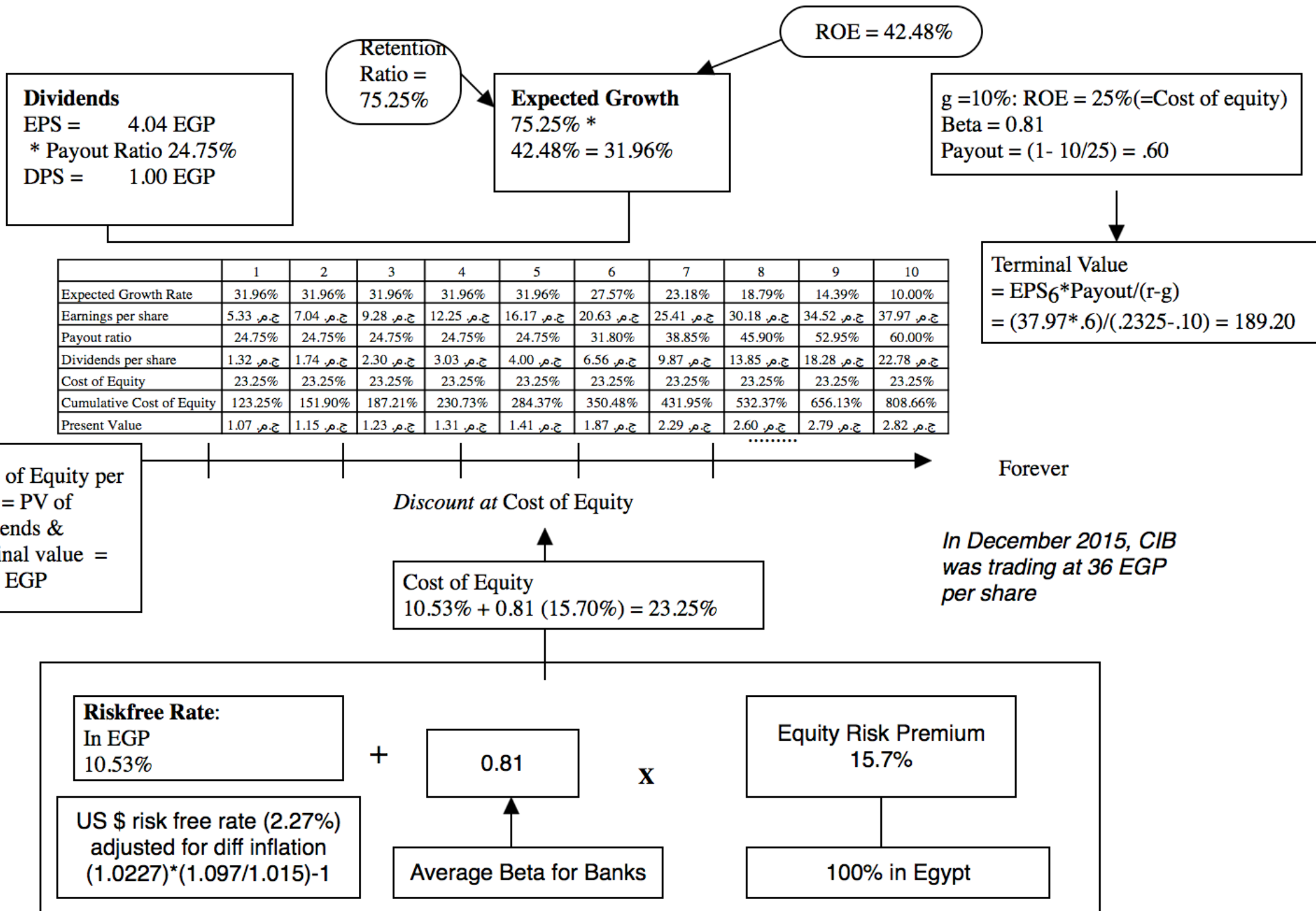
- With conventional firms, you often face a choice of either valuing the entire business (using cash flows to the firm and a cost of capital) or valuing equity. Often, valuing the firm is both easier and more robust, and you subtract out debt to get to value of equity.
- With financial service firms, valuing the firm is often a non-starter, since debt to a bank is not a source of capital but raw material.
- **Status Quo 1: When you value a bank, it is almost always on an equity basis.**

# Lesson 2: Estimating cash flows for a bank is difficult to do..

- Assuming that you want to go down the road of valuing equity using a DCF, the standard definition of cash flows is
  - ▣  $FCFE = \text{Net Income} + \text{Depreciation} - \text{Cap Ex} - \text{Change in Non-cash Working Capital}$
- Defining cap ex and working capital for a bank is close to impossible. Consequently, most analysts give up and make one of the two following choices:
  - ▣ The indefensible: Discount earnings at the cost of equity, which gives you basically nothing.
  - ▣ The defensible: Discount dividends at the cost of equity
- **Status Quo 2: The dividend discount model's last stand was with financial service companies.**

# CIB Egypt in December 2015

## Valuation in Egyptian Pounds





## Lesson 3: For financial service companies, book value matters...

- The book value of assets and equity is mostly irrelevant when valuing non-financial service companies. After all, the book value of equity is a historical figure and can be nonsensical. (The book value of equity can be negative and is so for more than a 1000 publicly traded US companies)
- With financial service firms, book value of equity is relevant for two reasons:
  - Since financial service firms mark to market, the book value is more likely to reflect what the firms own right now (rather than a historical value)
  - The regulatory capital ratios are based on book equity. Thus, a bank with negative or even low book equity will be shut down by the regulators.
- From a valuation perspective, it therefore makes sense to pay heed to book value. In fact, you can argue that reinvestment for a bank is the amount that it needs to add to book equity to sustain its growth ambitions and safety requirements:
  - $FCFE = \text{Net Income} - \text{Reinvestment in regulatory capital (book equity)}$

## Deutsche Bank: A Crisis Valuation (October 2016)

Risk adjusted assets grows at inflation rate of 1% a year forever.

Tier 1 capital ratio increases to 15.67%, the 75th percentile for all banks

Expected DOJ fine of \$10 billions lower Tier 1 capital today

Common Equity increases in tandem with Tier 1 capital

Cost of equity starts at 10.2% (75th percentile of banks) & decreases after year 5 to 9.44% (median across banks).

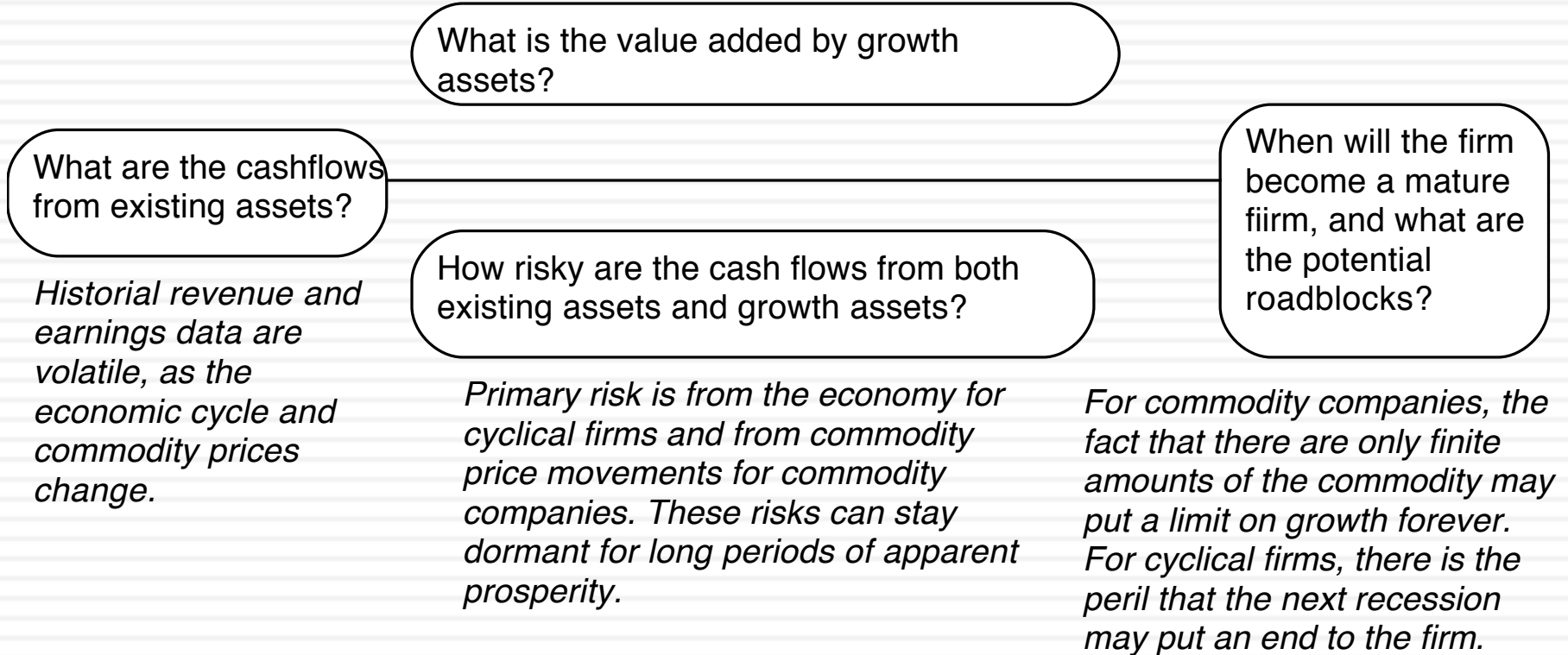
|  | Current     | 1           | 2          | 3          | 4          | 5          | 6          | 7          | 8          | 9          | 10         |
|--|-------------|-------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| Risk Adjusted Assets   | \$ 445,570  | \$ 450,026  | \$ 454,526 | \$ 459,071 | \$ 463,662 | \$ 468,299 | \$ 472,982 | \$ 477,711 | \$ 482,488 | \$ 487,313 | \$ 492,186 |
| Tier 1 Capital Ratio   | 12.41%      | 13.74%      | 13.95%     | 14.17%     | 14.38%     | 14.60%     | 14.81%     | 15.03%     | 15.24%     | 15.46%     | 15.67%     |
| Tier 1 Capital (Risk Adjusted Assets * Tier 1 Capital Ratio) | \$55,282    | \$61,834    | \$63,427   | \$65,045   | \$66,690   | \$68,361   | \$70,059   | \$71,784   | \$73,537   | \$75,317   | \$77,126   |
| Change in regulatory capital (Tier 1)                        |             | \$6,552     | \$1,593    | \$1,619    | \$1,645    | \$1,671    | \$1,698    | \$1,725    | \$1,753    | \$1,780    | \$1,809    |
| Book Equity  | \$64,609    | \$71,161    | \$72,754   | \$74,372   | \$76,017   | \$77,688   | \$79,386   | \$81,111   | \$82,864   | \$84,644   | \$86,453   |
| Expected ROE   | -13.70%     | -7.18%      | -2.84%     | 0.06%      | 1.99%      | 5.85%      | 6.568%     | 7.286%     | 8.004%     | 8.722%     | 9.440%     |
| Net Income (Book Equity * ROE)                               | \$ (8,851)  | \$ (5,111)  | \$ (2,065) | \$ 43      | \$ 1,512   | \$ 4,545   | \$ 5,214   | \$ 5,910   | \$ 6,632   | \$ 7,383   | \$ 8,161   |
| - Investment in Regulatory Capital                           |             | \$ 6,552    | \$ 1,593   | \$ 1,619   | \$ 1,645   | \$ 1,671   | \$ 1,698   | \$ 1,725   | \$ 1,753   | \$ 1,780   | \$ 1,809   |
| FCFE   |             | \$ (11,663) | \$ (3,658) | \$ (1,576) | \$ (133)   | \$ 2,874   | \$ 3,516   | \$ 4,185   | \$ 4,880   | \$ 5,602   | \$ 6,352   |
| Terminal value of equity                                     |             |             |            |            |            |            |            |            |            |            | \$87,317   |
| Present value  |             | \$ (10,583) | \$ (3,012) | \$ (1,178) | \$ (90)    | \$ 1,768   | \$ 1,966   | \$ 2,129   | \$ 2,262   | \$ 2,370   | \$ 36,207  |
| Cost of equity   | 10.20%      | 10.20%      | 10.20%     | 10.20%     | 10.20%     | 10.20%     | 10.048%    | 9.896%     | 9.744%     | 9.592%     | 9.440%     |
| Cumulative Cost of equity                                    |             | 1.1020      | 1.2144     | 1.3383     | 1.4748     | 1.6252     | 1.7885     | 1.9655     | 2.1570     | 2.3639     | 2.5871     |
| Value of equity today =                                      | \$31,838.74 |             |            |            |            |            |            |            |            |            |            |
| Number of shares outstanding =                               | 1386.00     |             |            |            |            |            |            |            |            |            |            |
| DCF Value per share =  | \$ 22.97    |             |            |            |            |            |            |            |            |            |            |
| Probability of equity wipeout                                | 10.00%      |             |            |            |            |            |            |            |            |            |            |
| Adjusted value per share =                                   | \$ 20.67    |             |            |            |            |            |            |            |            |            |            |
| Stock price on October 3, 2016 =                             | \$ 13.33    |             |            |            |            |            |            |            |            |            |            |

Value per share adjusted for probability of catastrophic failure (bailout) resulting in complete loss of equity.

Return on equity increases to 5.85% (25th percentile of banks) in year 5 and 9.44% (cost of equity) in year 10

# IV. Valuing cyclical and commodity companies

*Company growth often comes from movements in the economic cycle, for cyclical firms, or commodity prices, for commodity companies.*

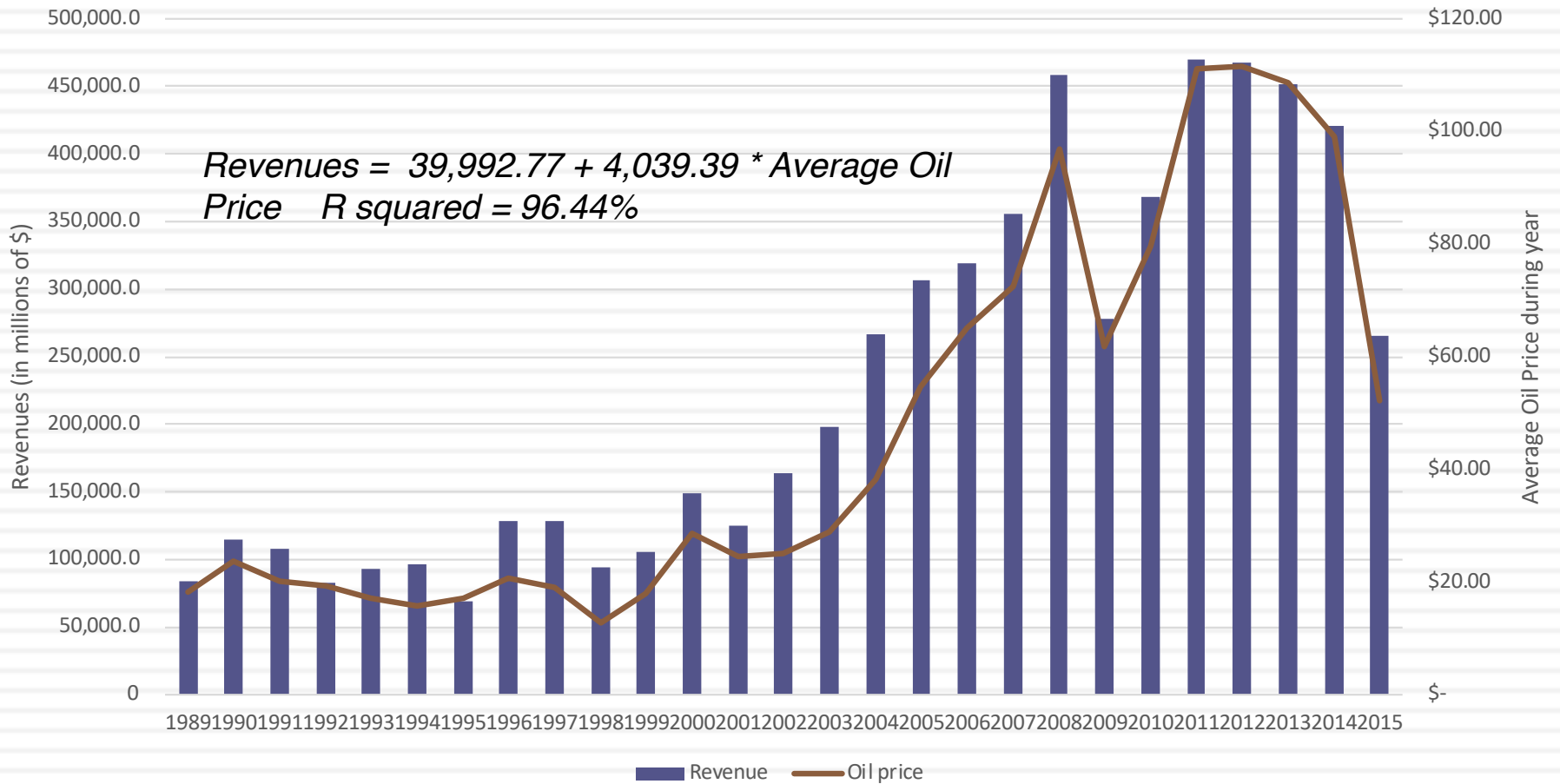


# Lesson 1: With “macro” companies, it is easy to get lost in “macro” assumptions...

- With cyclical and commodity companies, it is undeniable that the value you arrive at will be affected by your views on the economy or the price of the commodity.
- Consequently, you will feel the urge to take a stand on these macro variables and build them into your valuation. Doing so, though, will create valuations that are jointly impacted by your views on macro variables and your views on the company, and it is difficult to separate the two.
- The best (though not easiest) thing to do is to separate your macro views from your micro views. Use current market based numbers for your valuation, but then provide a separate assessment of what you think about those market numbers.

# Shell's Revenues & Oil Prices

Shell: Revenues vs Oil Price





## Shell: A "Oil Price" Neutral Valuation: March 2016

Revenue calculated from prevailing oil price of \$40/barrel in March 2016  
 Revenue =  $39992.77 + 4039.40 * \$40$   
 = \$201,569

Compounded revenue growth of 3.91% a year, based on Shell's historical revenue growth rate from 2000 to 2015

|                           | Base Year     | 1            | 2            | 3            | 4            | 5             | Terminal Year |
|---------------------------|---------------|--------------|--------------|--------------|--------------|---------------|---------------|
| Revenues                  | \$ 201,569    | \$ 209,450   | \$ 217,639   | \$ 226,149   | \$ 234,991   | \$ 244,180    | \$ 249,063    |
| Operating Margin          | 3.01%         | 6.18%        | 7.76%        | 8.56%        | 8.95%        | 9.35%         | 9.35%         |
| Operating Income          | \$ 6,065.00   | \$ 12,942.85 | \$ 16,899.10 | \$ 19,352.39 | \$ 21,040.39 | \$ 22,830.80  | \$ 23,287.41  |
| Effective tax rate        | 30.00%        | 30.00%       | 30.00%       | 30.00%       | 30.00%       | 30.00%        | 30.00%        |
| AT Operating Income       | \$ 4,245.50   | \$ 9,060.00  | \$ 11,829.37 | \$ 13,546.68 | \$ 14,728.27 | \$ 15,981.56  | \$ 16,301.19  |
| + Depreciation            | \$ 26,714.00  | \$ 27,759    | \$ 28,844    | \$ 29,972    | \$ 31,144    | \$ 32,361     |               |
| - Cap Ex                  | \$ 31,854.00  | \$ 33,099    | \$ 34,394    | \$ 35,738    | \$ 37,136    | \$ 38,588     |               |
| - Chg in WC               |               | \$ 472.88    | \$ 491.37    | \$ 510.58    | \$ 530.55    | \$ 551.29     |               |
| FCFF                      |               | \$ 3,246.14  | \$ 5,788.19  | \$ 7,269.29  | \$ 8,205.44  | \$ 9,203.68   | \$ 13,011.34  |
| Terminal Value            |               |              |              |              |              | \$ 216,855.71 |               |
| Return on capital         |               |              |              |              |              |               | 12.37%        |
| Cost of Capital           |               | 9.91%        | 9.91%        | 9.91%        | 9.91%        | 9.91%         | 8.00%         |
| Cumulated Discount Factor |               | 1.0991       | 1.2080       | 1.3277       | 1.4593       | 1.6039        |               |
| Present Value             |               | \$ 2,953.45  | \$ 4,791.47  | \$ 5,474.95  | \$ 5,622.81  | \$ 140,940.73 |               |
| Value of Operating Assets | \$ 159,783.41 |              |              |              |              |               |               |
| + Cash                    | \$ 31,752.00  |              |              |              |              |               |               |
| + Cross Holdings          | \$ 33,566.00  |              |              |              |              |               |               |
| - Debt                    | \$ 58,379.00  |              |              |              |              |               |               |
| - Minority Interests      | \$ 1,245.00   |              |              |              |              |               |               |
| Value of Equity           | \$ 165,477.41 |              |              |              |              |               |               |
| Number of shares          | 4209.7        |              |              |              |              |               |               |
| Value per share           | \$ 39.31      |              |              |              |              |               |               |

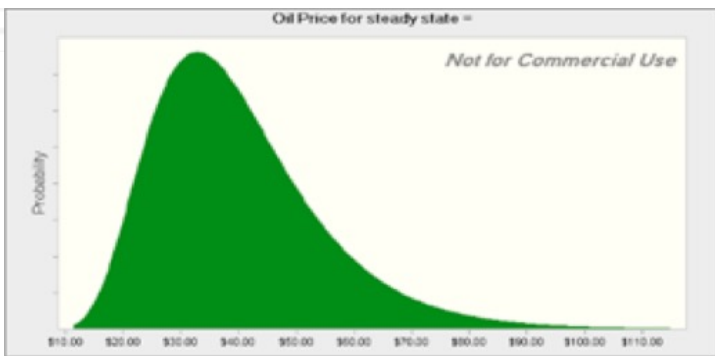
Operating margin converges on Shell's historical average margin of 9.35% from 200-2015

Return on capital reverts and stays at Shell's historic average of 12.37% from 200-2015

Added long term investments in joint ventures and subtracted out minority interest in consolidated holdings.

## Lesson 2: Use probabilistic tools to assess value as a function of macro variables...

- If there is a key macro variable affecting the value of your company that you are uncertain about (and who is not), why not quantify the uncertainty in a distribution (rather than a single price) and use that distribution in your valuation.
- That is exactly what you do in a Monte Carlo simulation, where you allow one or more variables to be distributions and compute a distribution of values for the company.
- With a simulation, you get not only everything you would get in a standard valuation (an estimated value for your company) but you will get additional output (on the variation in that value and the likelihood that your firm is under or over valued)



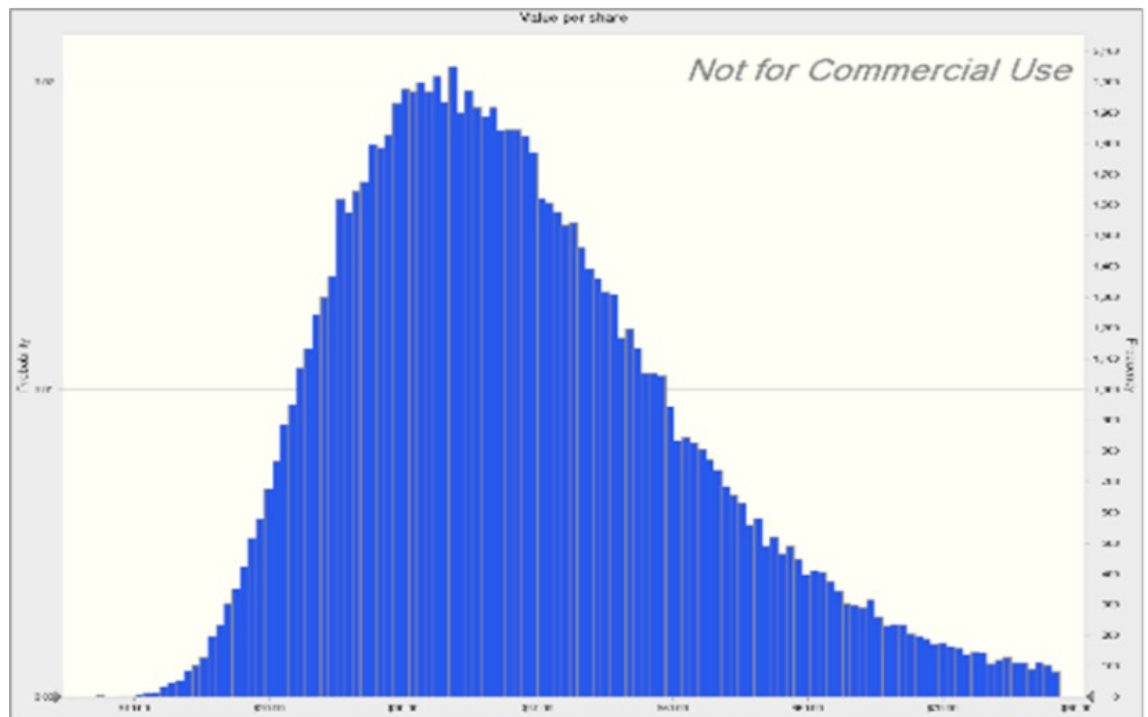
**Revenue calculated from the oil price drawn from distribution**  
 $Revenue = 39992.77 + 4039.40 * \text{Oil Price/Barrel}$

**Pre-tax Operating Income based on revenue & selected margin**  
 $Pre\text{-tax Operating Income} = Revenues * Operating\ Margin$



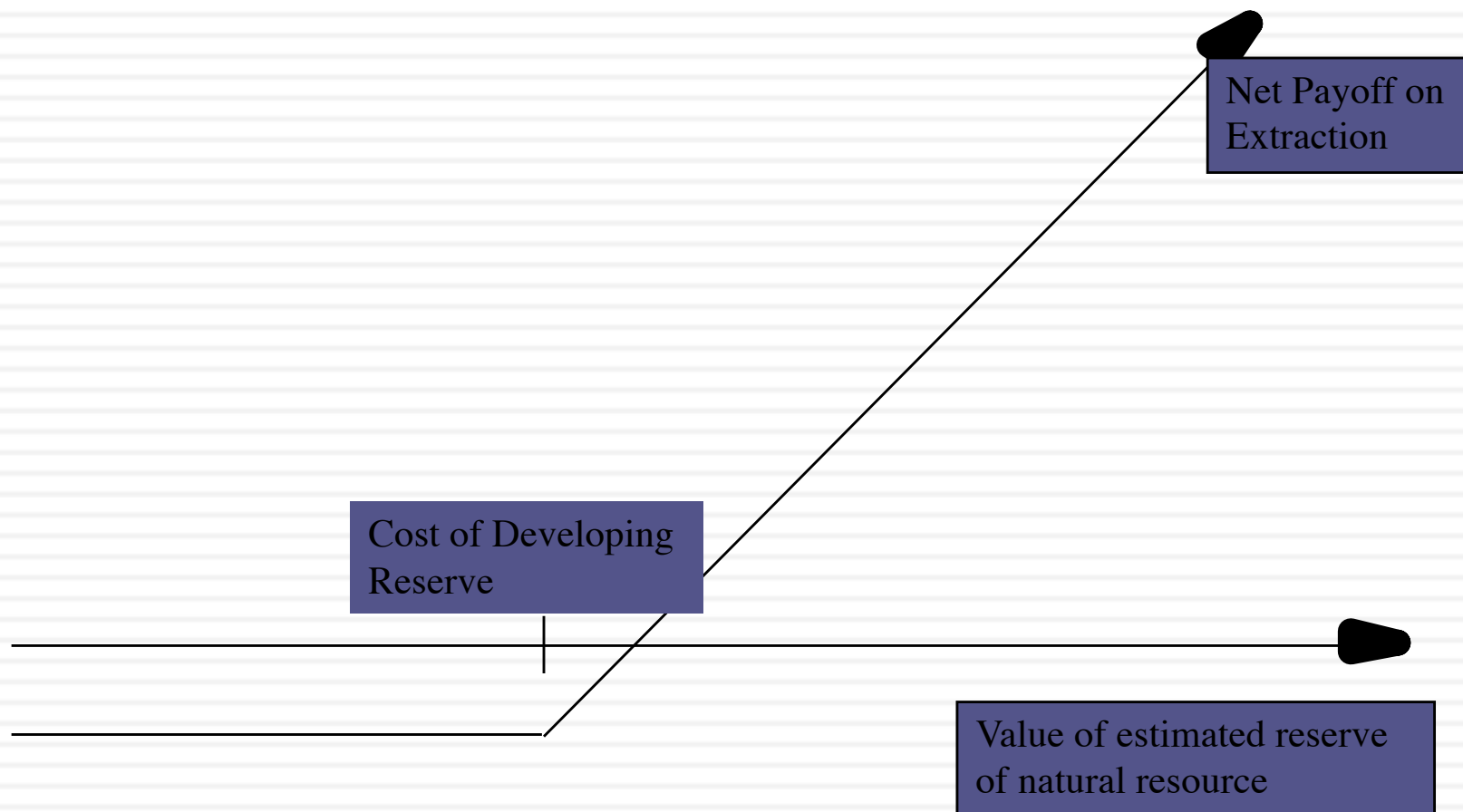
**Value Shell based on operating income, assuming other assumptions (tax rate, revenue growth, cost of capital)**

| Percentiles: | Forecast values |
|--------------|-----------------|
| 0%           | \$6.55          |
| 10%          | \$23.90         |
| 20%          | \$27.73         |
| 30%          | \$30.89         |
| 40%          | \$33.88         |
| 50%          | \$36.99         |
| 60%          | \$40.28         |
| 70%          | \$44.22         |
| 80%          | \$49.24         |
| 90%          | \$57.49         |
| 100%         | \$197.11        |





# The optionality in commodities: Undeveloped reserves as an option



# Implications

- Optionality Premium: Undeveloped reserves have option value that will give them a premium over their DCF value. Put simply, even non-viable reserves have value, because commodity prices can bounce back.
  - The option premium will be greater when commodity prices are low, rather than when oil prices are high.
  - The option premium will increase if commodity prices are expected to become more volatile.
- Level + Variance: The value of a commodity company is affected by both the level of oil prices, as well as the volatility in that level. The former affects your DCF and the latter the optionality.

# V. Valuing Companies across the ownership cycle

*Reported income and balance sheet are heavily affected by tax considerations rather than information disclosure requirements. The line between the personal and business expenses is a fine one.*

What are the **cashflows from existing assets**?  
- Equity: Cashflows after debt payments  
- Firm: Cashflows before debt payments

*Reversing investment mistakes is difficult to do. The need for and the cost of illiquidity has to be incorporated into current*

What is the **value added** by growth assets?  
Equity: Growth in equity earnings/ cashflows  
Firm: Growth in operating earnings/ cashflows

How **risky are the cash flows** from both existing assets and growth assets?  
Equity: Risk in equity in the company  
Firm: Risk in the firm's operations

*Different buyers can perceive risk differently in the same private business, largely because what they see as risk will be a function of how diversified they are. The fall back positions of using market prices to extract risk measures does not*

When will the firm become a **mature firm**, and what are the potential roadblocks?

*Many private businesses are finite life enterprises, not expected to last into perpetuity*

# Kristin's Kandy: Valuation in March 2006

**Current Cashflow to Firm**  
 EBIT(1-t) : 300  
 - Nt CpX 100  
 - Chg WC 40  
 = FCFF 160  
 Reinvestment Rate = 46.67%

Reinvestment Rate  
 46.67%

**Expected Growth in EBIT (1-t)**  
 $.4667 \times .1364 = .0636$   
**6.36%**

Return on Capital  
 13.64%

Stable Growth  
 $g = 4\%$ ; Beta = 3.00;  
 ROC = 12.54%  
 Reinvestment Rate = 31.90%

Terminal Value<sub>5</sub> =  $289 / (.1254 - .04) = 3,403$

Firm Value: 2,571  
 + Cash 125  
 - Debt: 900  
 = Equity 1,796  
 - Illiq Discount 12.5%  
 Adj Value 1,571

| Year           | 1     | 2     | 3     | 4     | 5     | Term Yr |
|----------------|-------|-------|-------|-------|-------|---------|
| EBIT (1-t)     | \$319 | \$339 | \$361 | \$384 | \$408 | 425     |
| - Reinvestment | \$149 | \$158 | \$168 | \$179 | \$191 | 136     |
| =FCFF          | \$170 | \$181 | \$193 | \$205 | \$218 | 289     |

Discount at Cost of Capital (WACC) =  $16.26\% (.70) + 3.30\% (.30) = 12.37\%$

**Cost of Equity**  
 16.26%

**Cost of Debt**  
 $(4.5\% + 1.00)(1 - .40) = 3.30\%$   
 Synthetic rating = A-

**Weights**  
 E = 70% D = 30%

**Riskfree Rate:**  
 Riskfree rate = 4.50%  
 (10-year T.Bond rate)

**Total Beta**  
 2.94

**Risk Premium**  
 4.00%

1/3 of risk is market risk

Adjusted for ownr non-diversification

Market Beta: 0.98

Mature risk premium  
 4%

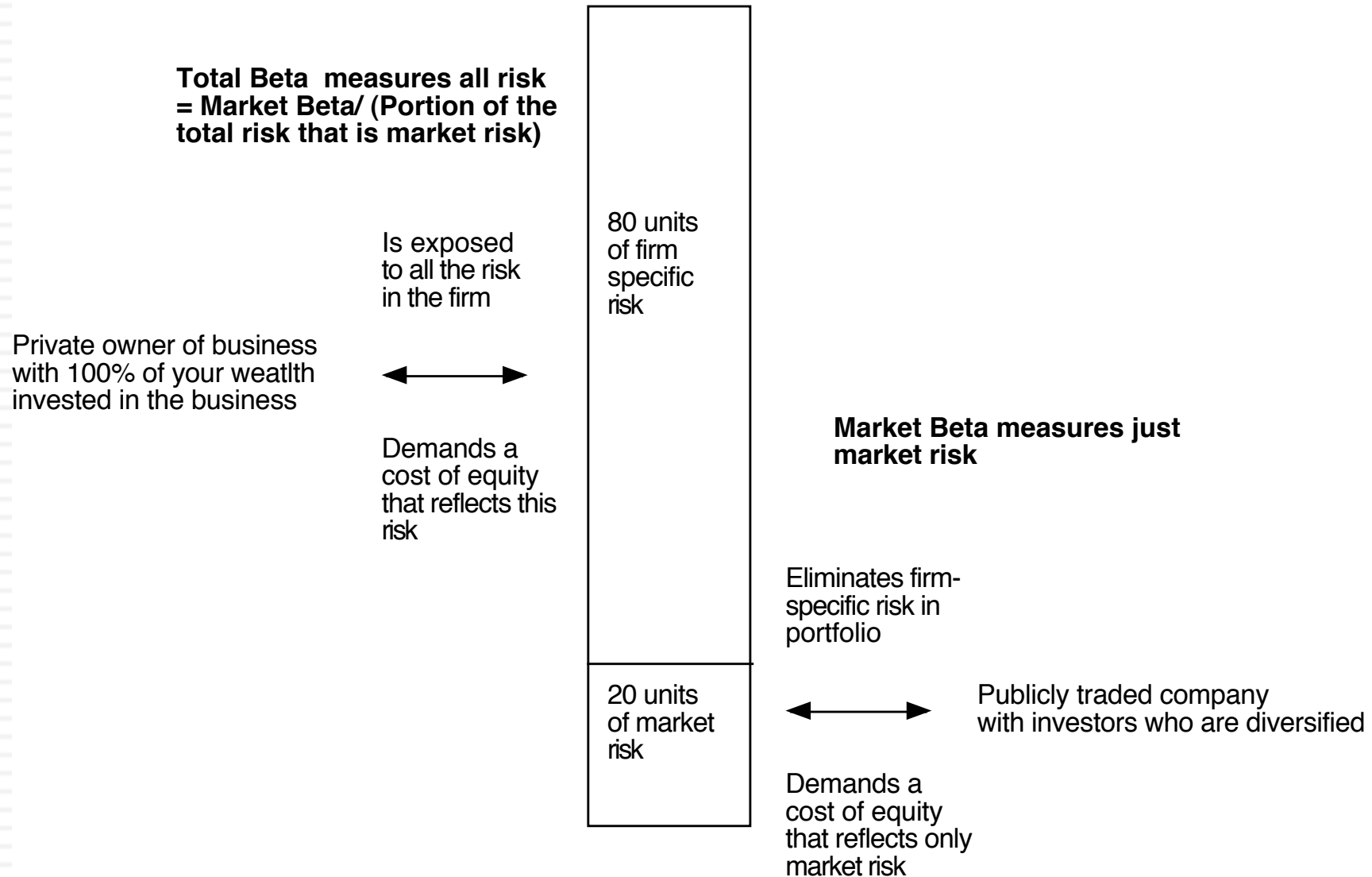
Country Risk Premium  
 0%

Aswath Damodaran

Unlevered Beta for Sectors: 0.78

Firm's D/E Ratio: 30/70

# Private Owner versus Publicly Traded Company Perceptions of Risk in an Investment



# Total Risk versus Market Risk

- Adjust the beta to reflect total risk rather than market risk. This adjustment is a relatively simple one, since the R squared of the regression measures the proportion of the risk that is market risk.
  - Total Beta = Market Beta / Correlation of the sector with the market
- To estimate the beta for Kristin Kandy, we begin with the bottom-up unlevered beta of food processing companies:
  - Unlevered beta for publicly traded food processing companies = 0.78
  - Average correlation of food processing companies with market = 0.333
  - Unlevered total beta for Kristin Kandy =  $0.78/0.333 = 2.34$
  - Debt to equity ratio for Kristin Kandy =  $0.3/0.7$  (assumed industry average)
  - Total Beta =  $2.34 ( 1 - (1-.40)(30/70)) = 2.94$
  - Total Cost of Equity =  $4.50\% + 2.94 (4\%) = 16.26\%$

## Lesson 2: With financials, trust but verify..

- Different Accounting Standards: The accounting statements for private firms are often based upon different accounting standards than public firms, which operate under much tighter constraints on what to report and when to report.
- Intermingling of personal and business expenses: In the case of private firms, some personal expenses may be reported as business expenses.
- Separating “Salaries” from “Dividends”: It is difficult to tell where salaries end and dividends begin in a private firm, since they both end up with the owner.
- The Key person issue: In some private businesses, with a personal component, the cashflows may be intertwined with the owner being part of the business.

## Lesson 3: Illiquidity is a clear and present danger..

- In private company valuation, illiquidity is a constant theme. All the talk, though, seems to lead to a rule of thumb. The illiquidity discount for a private firm is between 20-30% and does not vary across private firms.
- But illiquidity should vary across:
  - Companies: Healthier and larger companies, with more liquid assets, should have smaller discounts than money-losing smaller businesses with more illiquid assets.
  - Time: Liquidity is worth more when the economy is doing badly and credit is tough to come by than when markets are booming.
  - Buyers: Liquidity is worth more to buyers who have shorter time horizons and greater cash needs than for longer term investors who don't need the cash and are willing to hold the investment.



# Estimating an Illiquidity Discount

1. The Bludgeon Approach: Many practitioners use a fixed illiquidity discount, often around 25%, to reduce the values of all private business, no matter who the buyer, what the firm looks like or market conditions.
2. The Refined Bludgeon Approach: Start with a fixed discount, but alter it (subjectively or numerically) to reflect business, buyer and market conditions.
3. Illiquidity as an option: In a sense, liquidity provides the option to an asset's holder to sell at the prevailing market price, and not having it therefore can be viewed as the loss of this put option.
4. The Bid Ask Spread Variant: All investments, including the most liquid publicly traded stock, are illiquid, with the bid ask spread (as percent of the price) representing the magnitude of the illiquidity.

# And it is not just in private businesses..

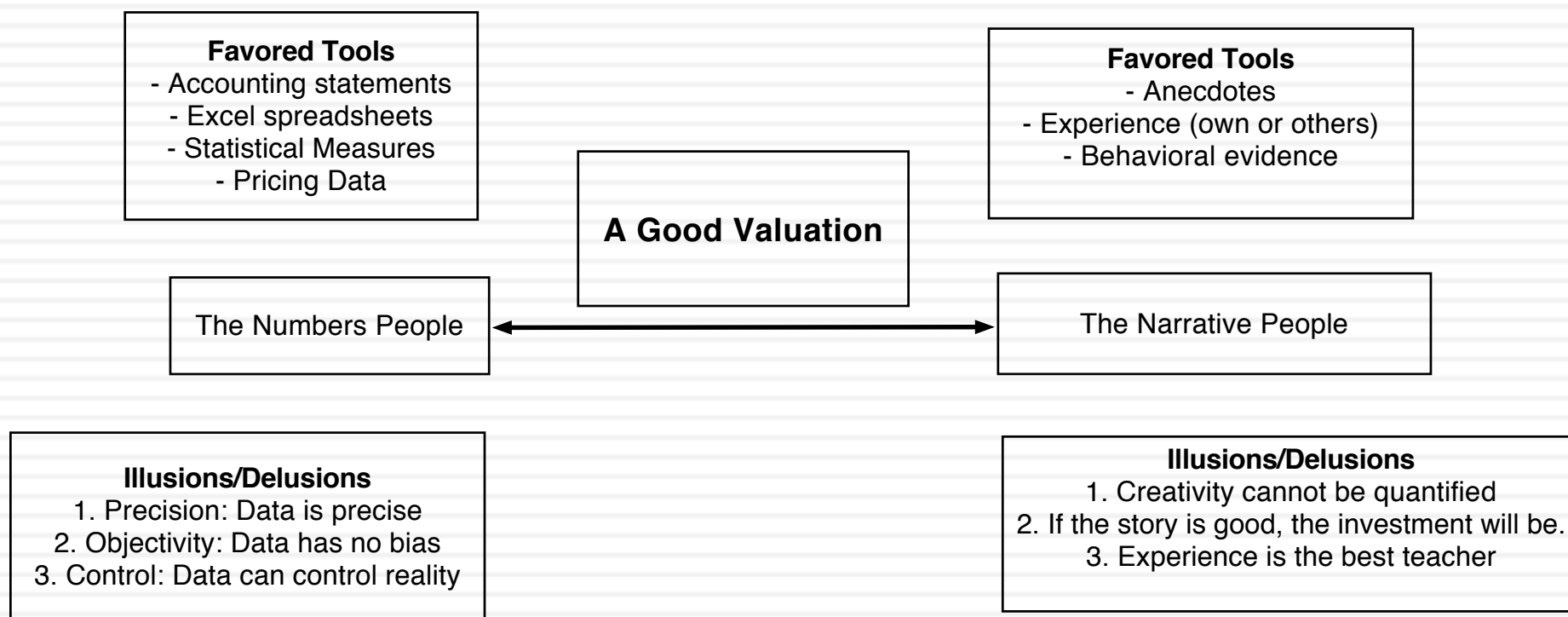
- Assume that you are valuing a closely held company in a lightly traded market. Will the possibility of illiquidity affect your valuation of the company?
  - a. Yes
  - b. No
- If it will affect your valuation, how will it show up?
- If it will not affect your valuation, how would it show up in your investment process?



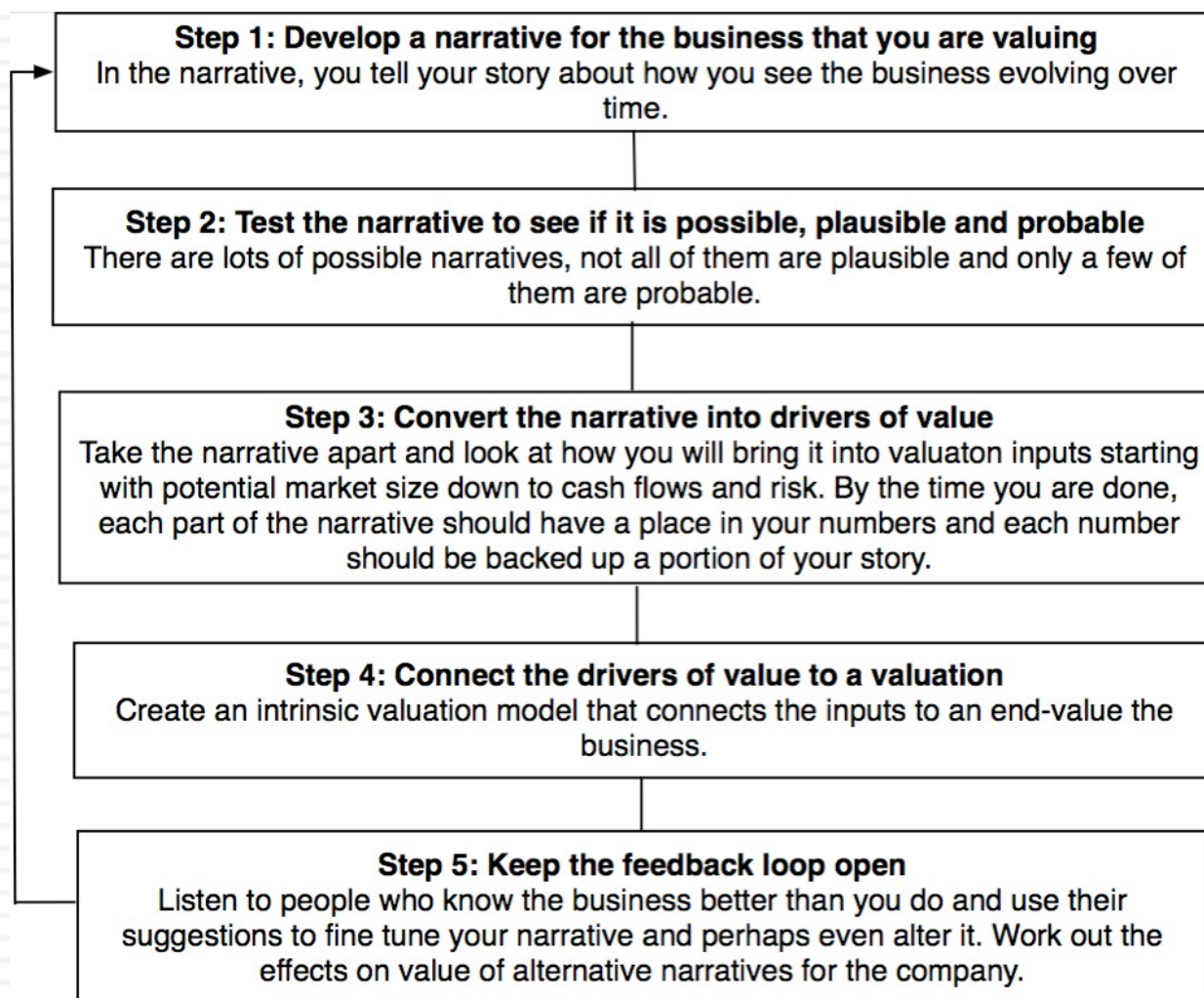
# NARRATIVE AND NUMBERS: VALUATION AS A BRIDGE

Work on your weak side...

# Valuation = Stories + Numbers



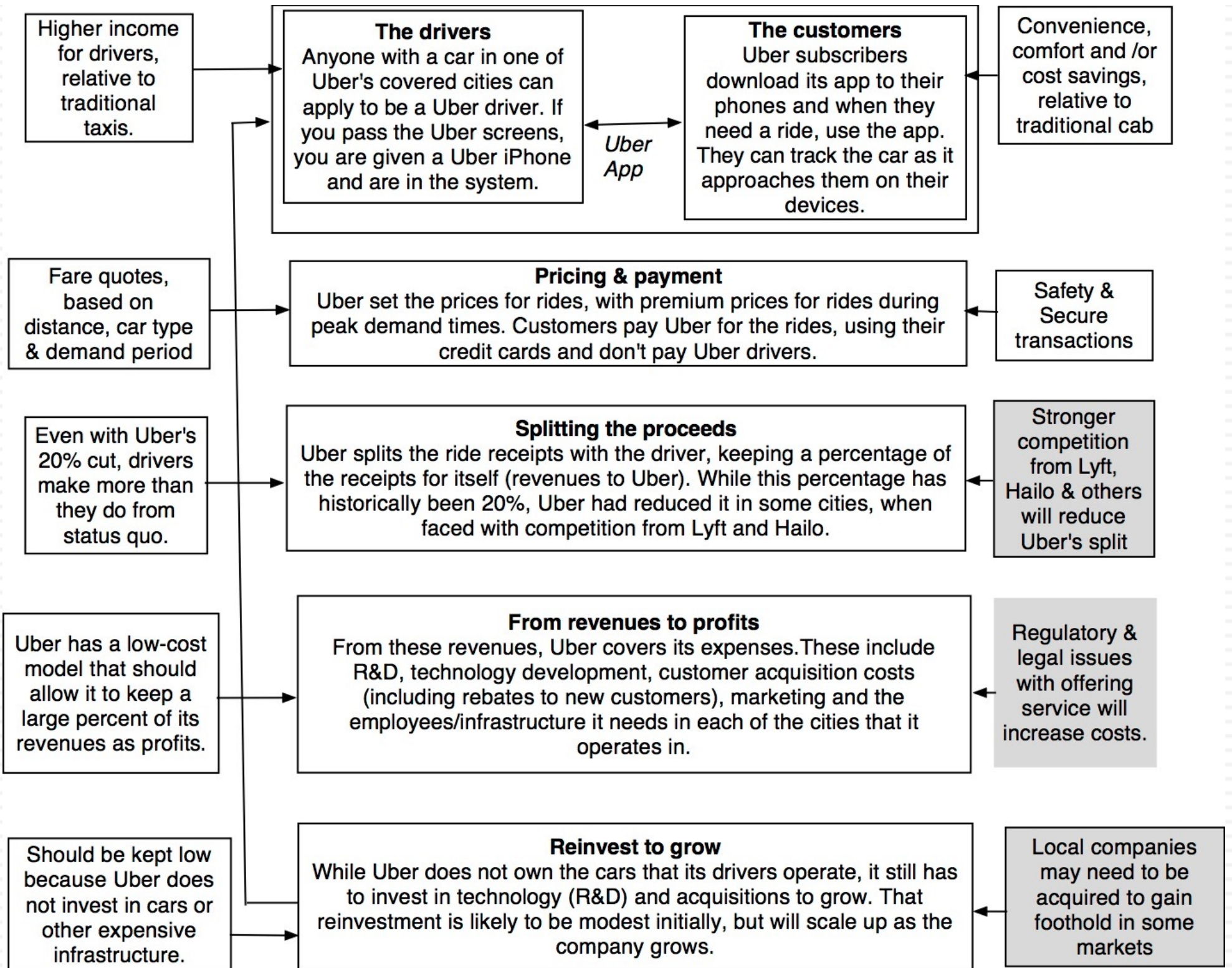
# From Story to Numbers: The Steps



# Step 1a: Survey the landscape

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of
  - ▣ Your company (its products, its management and its history).
  - ▣ The market or markets that you see it growing in.
  - ▣ The competition it faces and will face.
  - ▣ The macro environment in which it operates.





# Zomato: The Indian Online Food Delivery Business

- Transaction Fees: The bulk of Zomato's revenues come from the transactions on its platform, from food ordering and delivery, as the company keeps a percentage of the total order value for itself. While Zomato's revenue slice varies across restaurants, decreasing with restaurant profile and reach, it remains about 20-25% of gross order value.
- Advertising: Restaurants that list on Zomato have to pay a fixed fee to get listed, but they can also spend more on advertising, based upon customer visits and resetting revenues, to get additional visibility.
- Subscriptions to Zomato Gold (Pro): Zomato also offers a subscription service, and subscribers to Zomato Gold ([now Zomato Pro](#)) get discounts on food and faster deliveries. The service was initiated in 2017 and it had 1.5 million plus members in 2021, delivering subscription revenues of 600 million rupees (a little less than \$ 10 million, and less than 5% of overall revenues) in 2021.
- Restaurant Raw Material: In 2018, Zomato introduced HyperPure, a service directed at restaurants, offering groceries and meats that are source-checked for quality.



# The Indian Food Delivery Market

|  | <i>India</i> | <i>China</i> | <i>United States</i> | <i>EU</i> |
|--|--------------|--------------|----------------------|-----------|
| <i>General</i>                                   |              |              |                      |           |
| GDP in 2020 (in trillions of US \$)              | \$ 2.71      | \$ 14.70     | \$ 20.93             | \$ 15.17  |
| Population (millions)                            | 1360         | 1430         | 330                  | 445       |
| Per Capital GDP                                  | \$ 1,993     | \$ 10,280    | \$ 63,424            | \$ 34,090 |
| Number of restaurants (in 000s)                  | 1000         | 9000         | 660                  | 890       |
| <i>Food Delivery</i>                             |              |              |                      |           |
| Online Access (percent)                          | 43%          | 63%          | 88%                  | 90%       |
| Online Food Delivery Users (millions)            | 50.00        | 450.00       | 105.00               | 150.00    |
| Online Food Delivery Market (\$ million) in 2019 | \$ 4,200     | \$ 90,000    | \$ 21,000            | \$ 15,000 |
| Online Food Delivery Market (\$ million) in 2020 | \$ 2,900     | \$ 110,000   | \$ 49,000            | \$ 13,800 |

# Indian Market Size, adjusted for income and digital reach...

*Lower per-capita income: Eating out and prosperity don't always go hand in hand, but you are more likely to eat out, as your discretionary income rises..*

*Less digital reach: To use online restaurant services, you first need to be online, and digital reach in India, in spite of advances in recent years, lags digital reach in China, and is about half the reach in the US and the EU.*

*Eating habits: Looking across the regions, it seems clear that there is a third factor at play, a pre-disposition to eat out in the populace.*

|                             | Indian Per Capita GDP as % of China Per Capita GDP |          |          |          |
|-----------------------------|--|----------|----------|----------|
|                             | 25%  | 50%      | 75%      | 100%     |
| Current Internet access     | \$5,417  | \$10,834 | \$16,250 | \$21,667 |
| China-level Internet access | \$7,936  | \$15,872 | \$23,809 | \$31,745 |
| US-level Internet access    | \$11,085   | \$22,171 | \$33,256 | \$44,342 |

# Step 1b: Create a narrative for the future

- Every valuation starts with a narrative, a story that you see unfolding for your company in the future.
- In developing this narrative, you will be making assessments of your company (its products, its management), the market or markets that you see it growing in, the competition it faces and will face and the macro environment in which it operates.
  - ▣ Rule 1: Keep it simple.
  - ▣ Rule 2: Keep it focused.

# The Uber Narrative

In June 2014, my initial narrative for Uber was that it would be

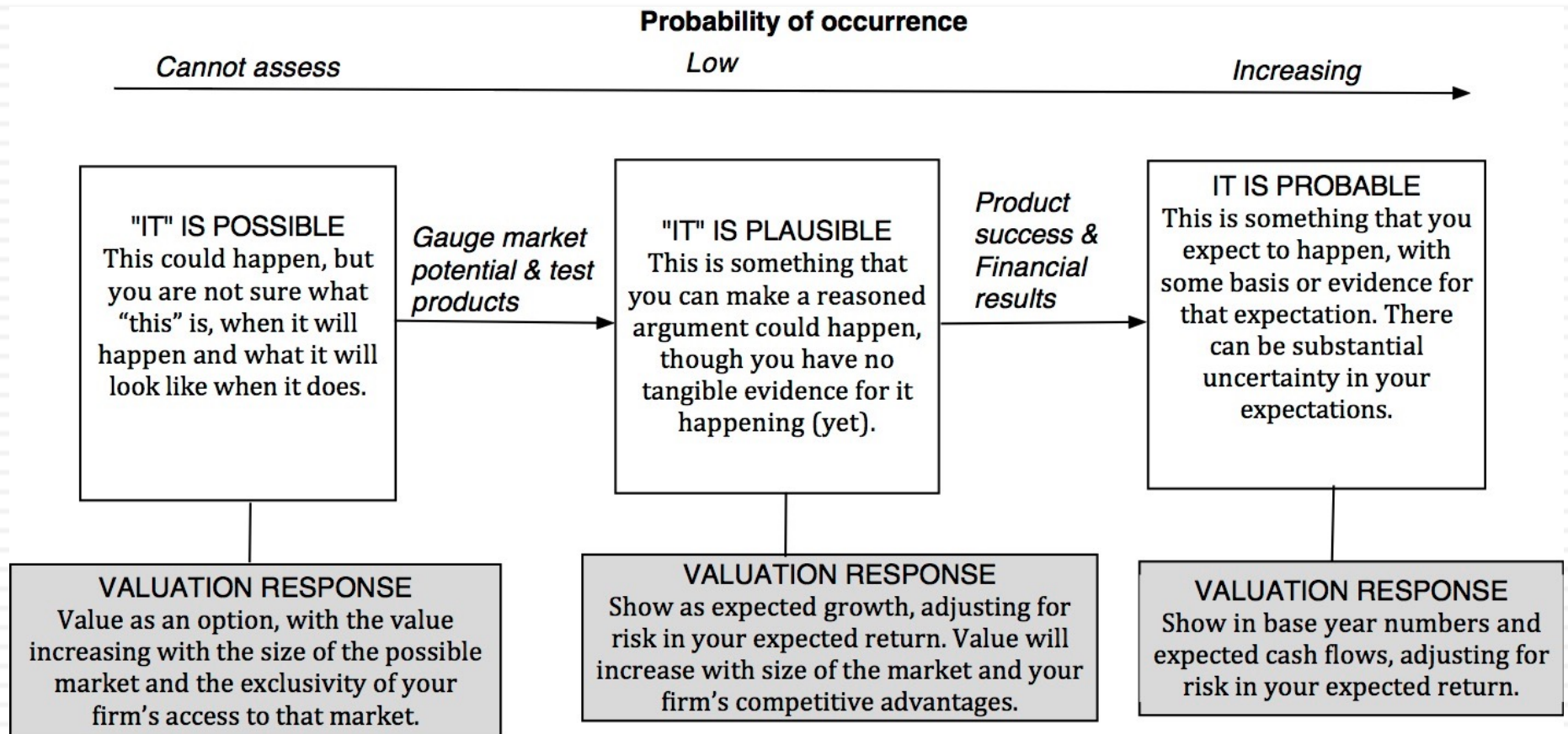
1. An urban car service business: I saw Uber primarily as a force in urban areas and only in the car service business.
2. Which would expand the business moderately (about 40% over ten years) by bringing in new users.
3. With local networking benefits: If Uber becomes large enough in any city, it will quickly become larger, but that will be of little help when it enters a new city.
4. Maintain its revenue sharing (20%) system due to strong competitive advantages (from being a first mover).
5. And its existing low-capital business model, with drivers as contractors and very little investment in infrastructure.

# The Zomato Narrative

- Zomato will continue to maintain a dominant market share of the Indian food delivery market, as that market increases in size almost ten-fold over the next decade. Zomato's forays in foreign markets in the food delivery business will provide only supplemental revenues and will be less profitable than their Indian food delivery business.
- Zomato may be able to expand into the grocery delivery market, but the revenue take rate in that market will be significantly lower than in food delivery.
- As Zomato scales up, economies of scale will allow the company's margins to converge on the high levels earned by intermediary businesses.

# Step 2: Check the narrative against history, economic first principles & common sense

150



# The Impossible, The Implausible and the Improbable

151

## The Impossible

### Bigger than the economy

Assuming Growth rate for company in perpetuity > Growth rate for economy

### Bigger than the total market

Allowing a company's revenues to grow so much that it has more than a 100% market share of whatever business it is in.

### Profit margin > 100%

Assuming earnings growth will exceed revenue growth for a long enough period, and pushing margins above 100%

### Depreciation without cap ex

Assuming that depreciation will exceed cap ex in perpetuity.

## The Implausible

### Growth without reinvestment

Assuming growth forever without reinvestment.

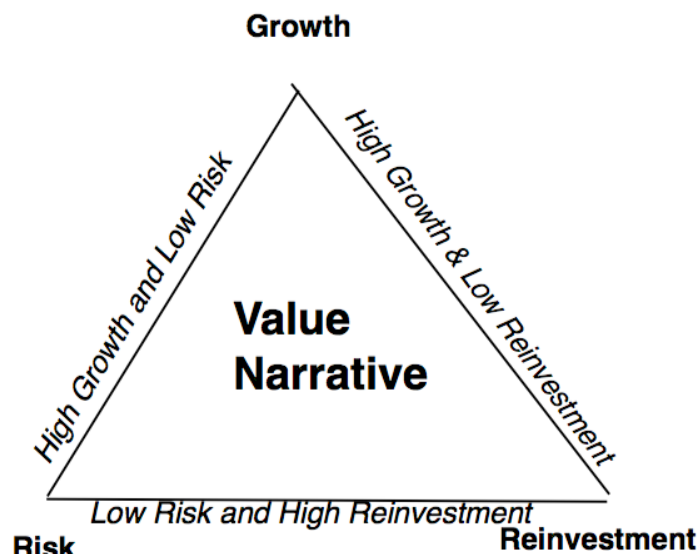
### Profits without competition

Assuming that your company will grow and earn higher profits, with no competition.

### Returns without risk

Assuming that you can generate high returns in a business with no risk.

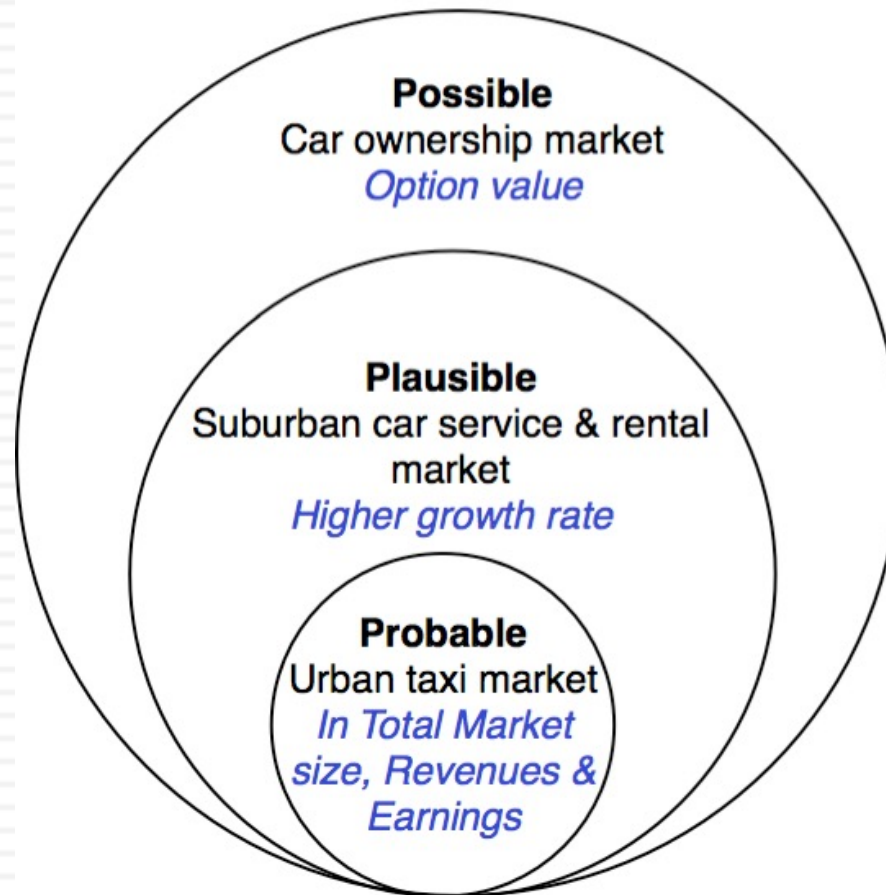
## The Improbable





# Uber: Possible, Plausible and Probable

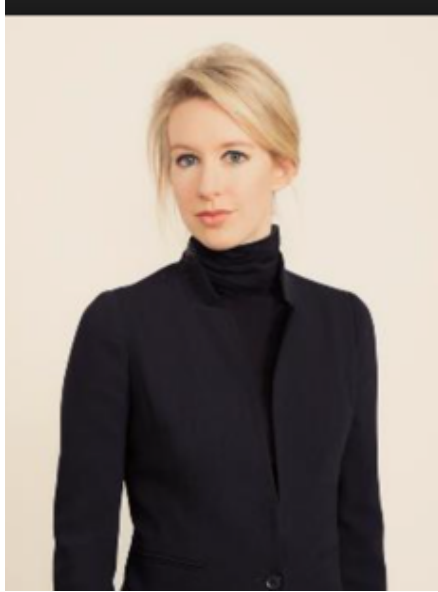
## Uber (My narrative))





# The Impossible: The Runaway Story

## The Story



+

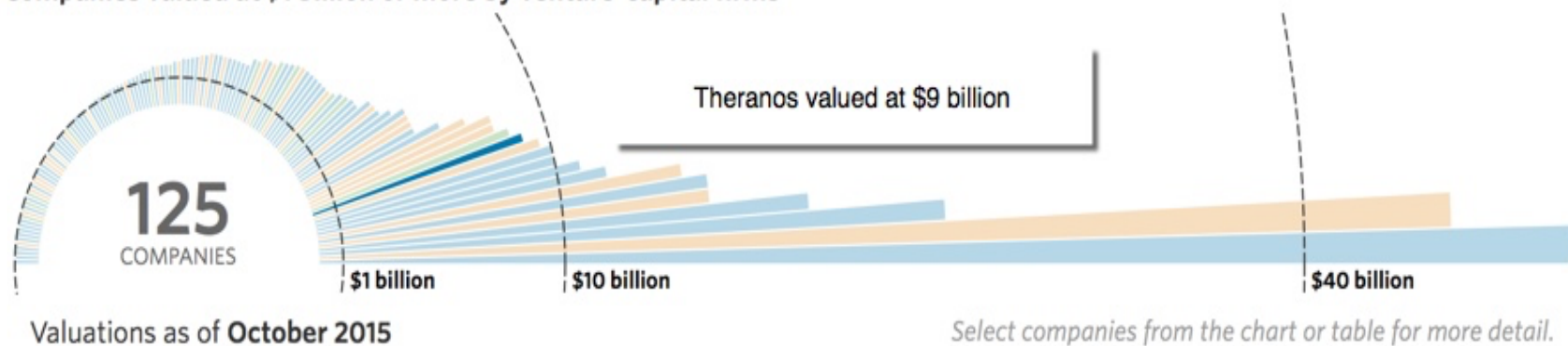
## The Checks (?)

| Board Member     | Designation                   | Age |
|------------------|-------------------------------|-----|
| Henry Kissinger  | Former Secretary of State     | 92  |
| Bill Perry       | Former Secretary of Defense   | 88  |
| George Schultz   | Former Secretary of State     | 94  |
| Bill Frist       | Former Senate Majority Leader | 63  |
| Sam Nunn         | Former Senator                | 77  |
| Gary Roughead    | Former Navy Admiral           | 64  |
| James Mattis     | Former Marine Corps General   | 65  |
| Dick Kovocovich  | Former CEO of Wells Fargo     | 72  |
| Riley Bechtel    | Former CEO of Bechtel         | 63  |
| William Foege    | Epidemiologist                | 79  |
| Elizabeth Holmes | Founder & CEO, Theranos       | 31  |
| Sunny Balwani    | President & COO, Theranos     | NA  |

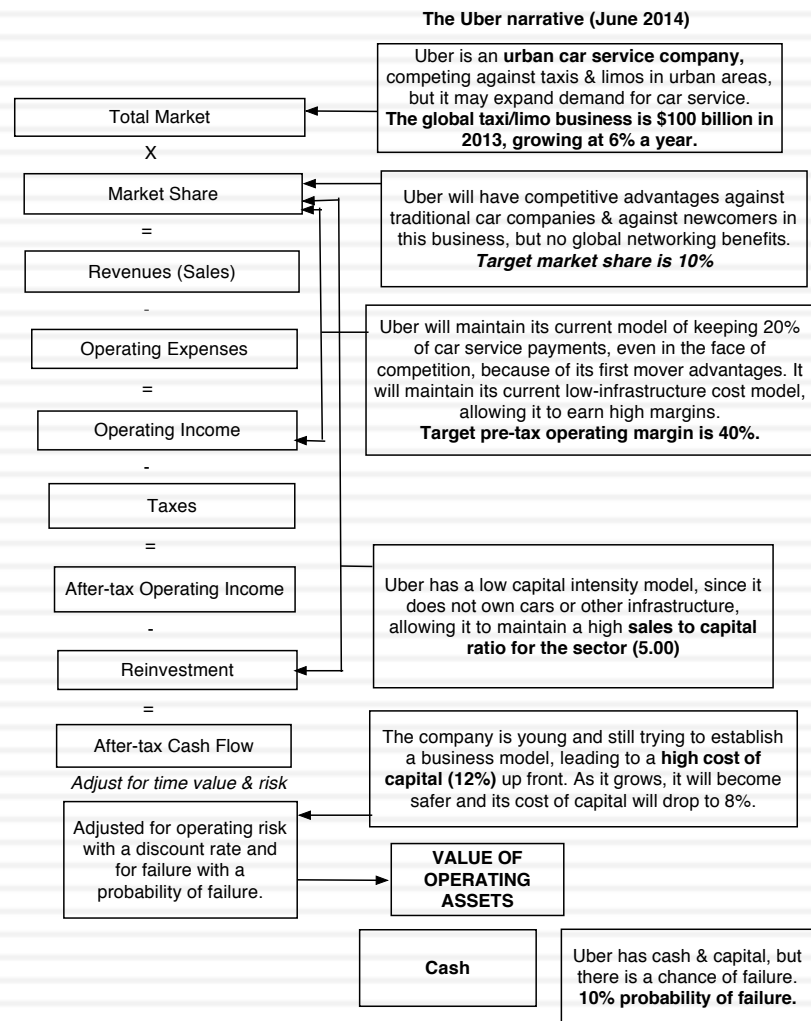
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Money

## Companies valued at \$1 billion or more by venture-capital firms



# Step 3: Connect your narrative to key drivers of value

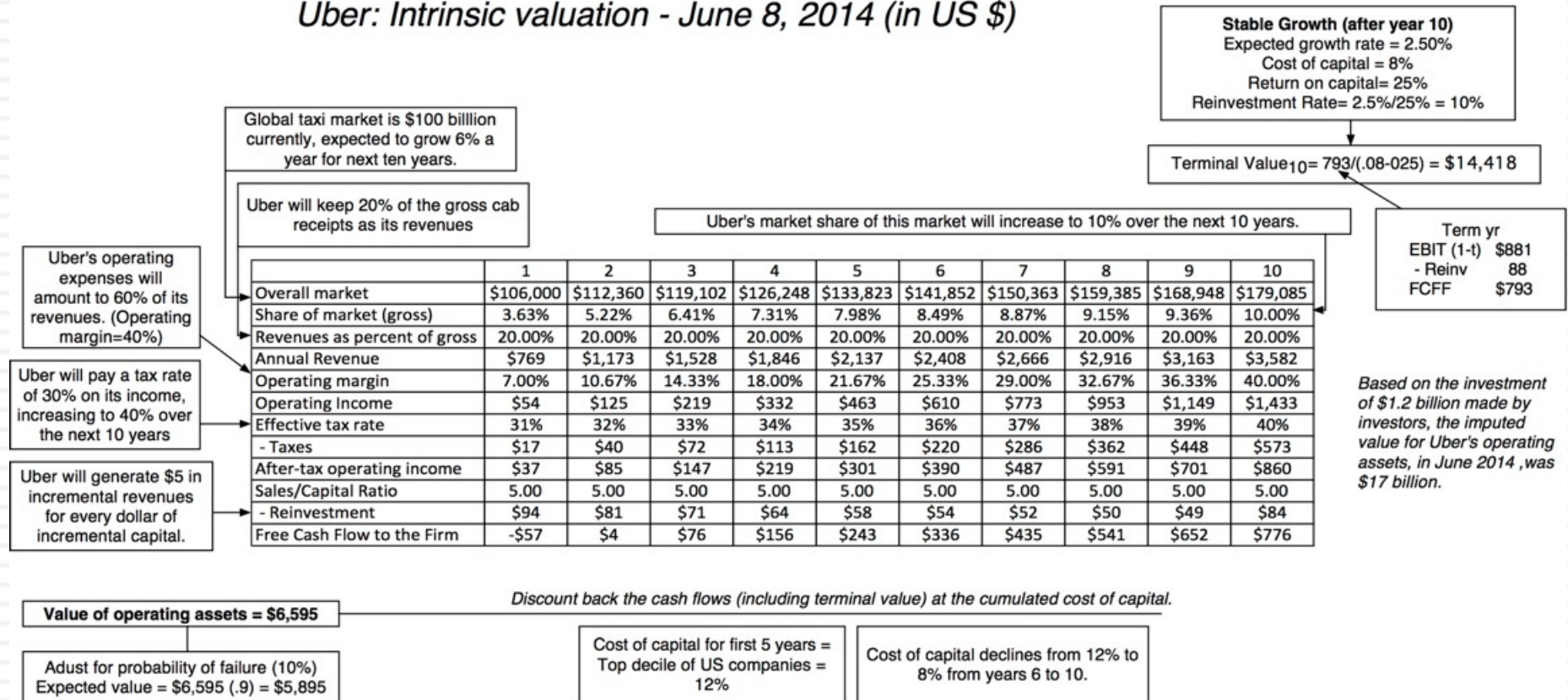


# Zomato: Narrative to Numbers

- Total Market: I find it hard to see the *total market exceeding \$40 billion, with US \$20-\$30 billion, in ten years*, being a more likely outcome. (In rupee terms, this will translate into a market that is roughly 1800-2000 billion INR.)
- Market Share: Expecting any company to have a *market share that exceeds 40%* of this market is a reach, and I will assume that Zomato will be one of the winners/survivors
- Revenue Share: That number was 23.13% in FY 2020, but dropped to 21.03% in FY 2021, as shut downs put a crimp on business. I will assume a *partial bounce back to 22% of GOV*, starting in 2022, but the presence of Amazon Food will prevent a return to higher values in the future.
- Profitability: I will assume that *pre-tax operating margins will trend towards 30%*, largely because I believe that the market will be dominated by a few big players, but with the very real possibility that one rogue player that is unwilling to play the game can upend profitability.
- Reinvestment: One of the advantages of being an intermediary business is that you can grow with relatively little capital investment, defined in conventional form (as plant, equipment or manufacturing facilities). That said, reinvestment takes a different form for online intermediaries, like Zomato, with investments in technology and in acquisitions, driving future growth.
- Risk: In terms of operating risk, the company, in spite of its global ambitions, is still primarily an Indian company, dependent on Indian macroeconomic growth to succeed, and my rupee cost of capital will incorporate the country risk. Zomato is a money losing company, but it is no start-up, facing imminent failure. Overall, I will attach a likelihood of failure of 10%, reflecting this balance.

# Step 4: Value the company (Uber)

## Uber: Intrinsic valuation - June 8, 2014 (in US \$)





**The Story**

Zomato will benefit as the Indian food delivery market grows, driven by overall economic growth and more digital access, and it will be one of a few (two or three) players who will dominate the market; there will be a near term COVID bounceback effect. While Amazon Food remains the wild card, economies of scales will allow the company to generate high operating margins, and the company will continue to reinvest (acquisitions and technology) as it grows. The risk of failure is low, given the company's post-IPO cash balance and access to capital and its operating risk reflects its exposure to Indian country risk.

**The Assumptions**

|                      | Base year   | Next year       | Years 2-5   | Years 6-10 | After year 10 | Link to story  |
|----------------------|-------------|-----------------|---|------------|---------------|--|
| Indian Food Delivery | ₹ 225,000   | ₹ 337,500       | 30.00%  | 15.27%     | ₹ 1,961,979   | Indian food market rebounds in 2021 and grows to about \$25 billion in year 10 |
| Market Share         | 42.15%      | 41.72%          | →   | 40.00%     | 40.00%        | Zomato is one of two or three lead players in Indian food delivery market      |
| Revenues as % of GOV | 21.03%      | 22.00%          |   |            | 22.00%        |  |
| Revenues (a)         | ₹ 19,937.89 | ₹ 30,975        | Total Market * Market Share * Revenue as % of GOV |            | ₹ 172,654     | COVID rebound in 2021 + Growth in food delivery market in India long term      |
| Operating margin (b) | -24.10%     | -10.0%          | -10.00%   | → 35.00%   | 35.00%        | Margins improve as growth wanes  |
| Tax rate             | 30.00%      |                 | 30.00%  | → 30.00%   | 30.00%        | Indian corporate tax rate over time  |
| Reinvestment (c)     |             | 5.00            | 2.50  | 3.00       | 35.42%        | Acquisitions & technology investments needed to sustain growth                 |
| Return on capital    | -7.15%      | Marginal ROIC = | 127.01%   |            | 12.00%        | New working benefits allow for high ROIC, near and long term.                  |
| Cost of capital (d)  |             |                 | 10.25%  | → 8.97%    | 8.97%         | Cost of capital reflects Indian country risk                                   |

**The Cash Flows**

|               | Total Market | Market Share | Revenues     | EBIT (1-t)  | Reinvestment | FCFF        |
|---------------|--------------|--------------|--------------|-------------|--------------|-------------|
| 1             | ₹ 337,500    | 41.72%       | ₹ 30,974.78  | -₹ 3,097.48 | ₹ 2,207.38   | -₹ 5,304.86 |
| 2             | ₹ 438,750    | 41.29%       | ₹ 39,852.91  | ₹ 498.16    | ₹ 3,551.25   | -₹ 3,053.09 |
| 3             | ₹ 570,375    | 40.86%       | ₹ 51,270.19  | ₹ 3,247.17  | ₹ 4,566.91   | -₹ 1,319.74 |
| 4             | ₹ 741,488    | 40.43%       | ₹ 65,951.07  | ₹ 5,770.72  | ₹ 5,872.35   | -₹ 101.64   |
| 5             | ₹ 963,934    | 40.00%       | ₹ 84,826.17  | ₹ 10,762.32 | ₹ 6,291.70   | ₹ 4,470.62  |
| 6             | ₹ 1,203,471  | 40.00%       | ₹ 105,905.47 | ₹ 14,994.01 | ₹ 7,026.43   | ₹ 7,967.57  |
| 7             | ₹ 1,440,555  | 40.00%       | ₹ 126,768.85 | ₹ 24,503.10 | ₹ 6,954.46   | ₹ 17,548.64 |
| 8             | ₹ 1,650,156  | 40.00%       | ₹ 145,213.72 | ₹ 35,577.36 | ₹ 6,148.29   | ₹ 29,429.07 |
| 9             | ₹ 1,805,271  | 40.00%       | ₹ 158,863.81 | ₹ 38,921.63 | ₹ 4,550.03   | ₹ 34,371.60 |
| 10            | ₹ 1,881,995  | 40.00%       | ₹ 165,615.52 | ₹ 40,575.80 | ₹ 2,250.57   | ₹ 38,325.23 |
| Terminal year | ₹ 1,961,979  | 40.00%       | ₹ 172,654.18 | ₹ 42,300.27 | ₹ 14,981.35  | ₹ 27,318.93 |

**The Value**

|                                     |              |                                    |          |
|-------------------------------------|--------------|------------------------------------|----------|
| Terminal value                      | ₹ 578,790.83 |                                    |          |
| PV(Terminal value)                  | ₹ 225,869.40 |                                    |          |
| PV (CF over next 10 years)          | ₹ 50,979.90  |                                    |          |
| Value of operating assets =         | ₹ 276,849.30 |                                    |          |
| Adjustment for distress             | ₹ 13,842.46  | Probability of failure =           | 10.00%   |
| - Debt & Minority Interests         | ₹ 1,591.72   |                                    |          |
| + Cash & Other Non-operating assets | ₹ 135,959.70 | Includes cash proceeds from IPO of | ₹ 90,000 |
| Value of equity                     | ₹ 397,374.81 |                                    |          |
| - Value of equity options           | ₹ 73,244.53  |                                    |          |
| Number of shares                    | 7,946.68     |                                    |          |
| Value per share                     | ₹ 40.79      | Stock was offered at =             | ₹ 70.00  |

# Step 5: Keep the feedback loop open

- When you tell a story about a company (either explicitly or implicitly), it is natural to feel attached to that story and to defend it against all attacks. Nothing can destroy an investor more than hubris.
- Being open to other views about a company is not easy, but here are some suggestions that may help:
  - ▣ Talk to a diverse audience: We have created workplaces, where these single-subject specialists often interact entirely with each other, making their isolation almost complete.
  - ▣ Transparency over opacity: I would rather be transparently wrong than opaquely right. When I value companies, I try to be open about process, data and mechanics, so that anyone can not just replicate what I did and find their own points of disagreement and reflect those changes in value.
  - ▣ Listen to those who disagree with you: There are people out there who know more than I do about some aspect of the company, and I can learn from them.
  - ▣ Be willing to change: The three most freeing words in investing and valuation are “I was wrong”, and they are not easy to say.

# The Uber Feedback Loop: Bill Gurley

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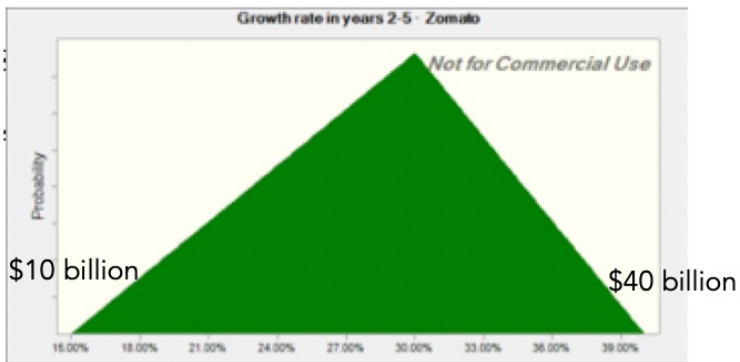
1. Not just car service company.: Uber is a car company, not just a car service company, and there may be a day when consumers will subscribe to a Uber service, rather than own their own cars. It could also expand into logistics, i.e., moving and transportation businesses.
2. Not just urban: Uber can create new demands for car service in parts of the country where taxis are not used (suburbia, small towns).
3. Global networking benefits: By linking with technology and credit card companies, Uber can have global networking benefits.

# Valuing Bill Gurley's Uber narrative

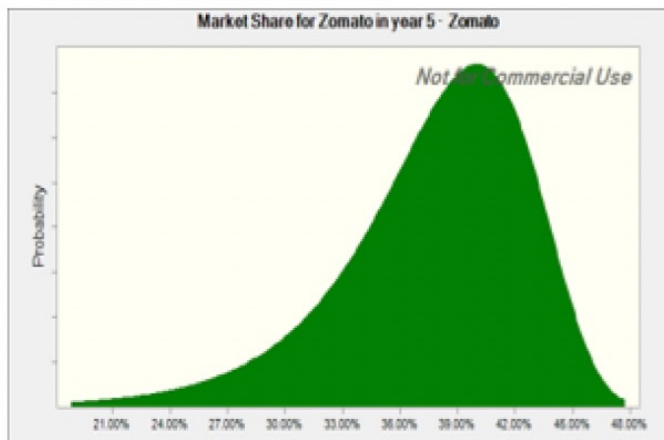
|                      | <i>Uber (Gurley)</i>   | <i>Uber (Gurley Mod)</i>  | <i>Uber (Damodaran)</i>   |
|----------------------|--|---|---|
| Narrative            | Uber will <u>expand the car service market substantially</u> , bringing in mass transit users & non-users from the suburbs into the market, and use its <u>networking advantage</u> to gain a <u>dominant market share</u> , while maintaining its revenue slice at 20%. | Uber will <u>expand the car service market substantially</u> , bringing in mass transit users & non-users from the suburbs into the market, and use its <u>networking advantage</u> to gain a <u>dominant market share</u> , while cutting prices and margins (to 10%). | Uber will expand the car service market moderately, primarily in urban environments, and use its <u>competitive advantages</u> to get a <u>significant but not dominant market share</u> and maintain its revenue slice at 20%. |
| Total Market         | \$300 billion, growing at 3% a year  | \$300 billion, growing at 3% a year   | \$100 billion, growing at 6% a year   |
| Market Share         | 40%  | 40%   | 10%   |
| Uber's revenue slice | 20%  | 10%   | 20%   |
| Value for Uber       | \$53.4 billion + Option value of entering car ownership market (\$10 billion+)   | \$28.7 billion + Option value of entering car ownership market (\$6 billion+)   | \$5.9 billion + Option value of entering car ownership market (\$2-3 billion)   |



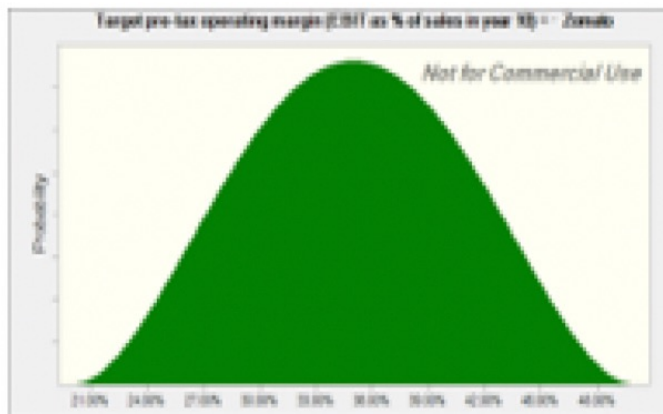
## Growth in Indian Food Delivery Market



## Zomato's Market Share

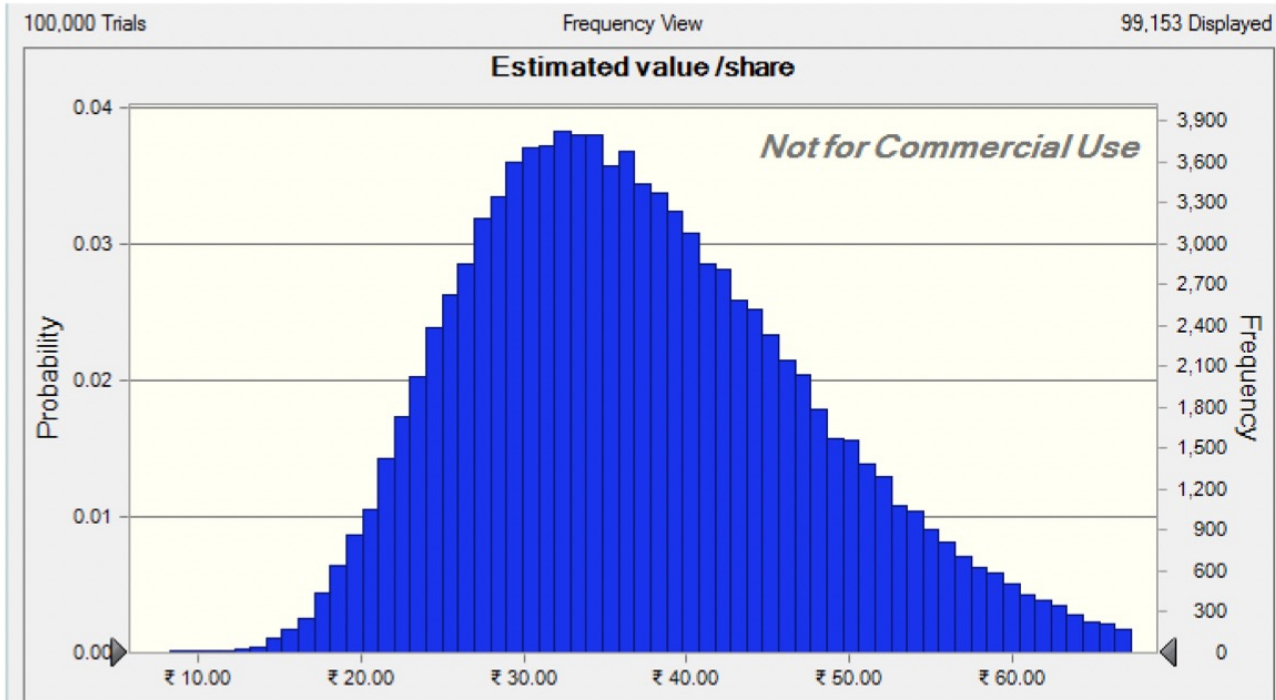


## Zomato's Operating Margin (Pre-tax)



Correlation = 0.50

## Zomato: Monte Carlo Simulation of Value/Share



| Percentile | Value per share |
|------------|-----------------|
| 0%         | -₹ 0.22         |
| 10%        | ₹ 24.49         |
| 20%        | ₹ 27.96         |
| 30%        | ₹ 30.74         |
| 40%        | ₹ 33.35         |
| 50%        | ₹ 36.02         |
| 60%        | ₹ 28.86         |
| 70%        | ₹ 42.11         |
| 80%        | ₹ 46.07         |
| 90%        | ₹ 51.92         |
| 100%       | ₹ 91.69         |

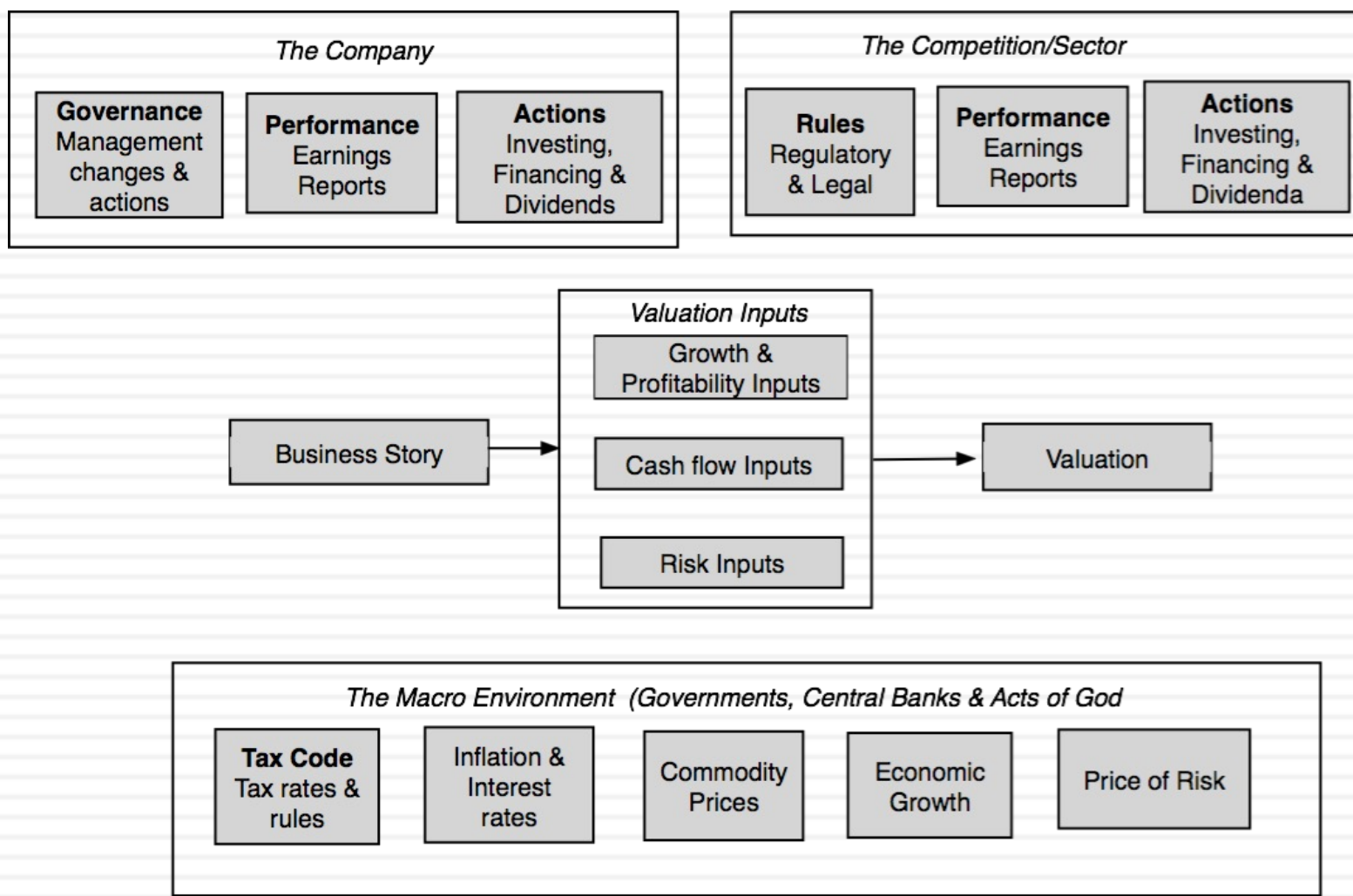
# Feedback on Zomato

- Indian food delivery: I have learned more about online food delivery and restaurants in India in the two weeks since I posted my Zomato valuation. I have learned why Zomato Pro has not caught on as quickly as the company thought it would, why some of you prefer Swiggy and even what you like to order from restaurants.
- Tax rate: Some of you noted that the corporate tax rate in India is 25%, not 30%, and while the Indian tax code with its predilection to add in surcharges that seem to last forever, and exceptions, does still leave me confused, I will concede on this point (pushing up my value per share marginally from 41 INR/share to about 43 INR/share).
- Market size: I have had pushback on my story's focus on Indian food delivery, with some pointing to the potential for Zomato to expand its market globally and others to the expansion possibilities in Indian grocery deliveries and from cloud kitchens. While I believe that the networking advantage that works to Zomato's benefits will stymie them if they try to expand to large foreign markets and that the grocery delivery market, at least for the moment, offers too small a slice of revenues to be a game changer for the company, those are legitimate points.

# Plausible Stories

| Story   | TAM (in ₹ millions) | Market Share | Revenue Slice | Target Margin | Cost of Capital | Value/share |           |
|---|---------------------|--------------|---------------|---------------|-----------------|-------------|-----------|
| Delivery Juggernaut                                   | ₹ 5,000,000.00      | 40%          | 25%           | 45%           | 9.50%           | ₹ 150.02    | Plausible |
| Delivery Star   | ₹ 5,000,000.00      | 40%          | 22%           | 35%           | 9.50%           | ₹ 93.00     |           |
| Delivery Leader + Competition                         | ₹ 5,000,000.00      | 40%          | 15%           | 35%           | 10.99%          | ₹ 61.55     |           |
| Restaurant Delivery Juggernaut + High Growth India    | ₹ 3,000,000.00      | 40%          | 25%           | 45%           | 9.50%           | ₹ 94.31     | Probable  |
| Restaurant Delivery Star + High Growth India          | ₹ 3,000,000.00      | 40%          | 22%           | 35%           | 9.50%           | ₹ 59.02     |           |
| Restaurant Delivery + Competition + High Growth India | ₹ 3,000,000.00      | 40%          | 20%           | 25%           | 10.99%          | ₹ 35.52     |           |
| Base Case, Positive                                   | ₹ 2,000,000.00      | 40%          | 25%           | 45%           | 10.25%          | ₹ 56.66     |           |
| Base Case   | ₹ 2,000,000.00      | 40%          | 22%           | 35%           | 10.25%          | ₹ 39.48     |           |
| Base Case, Negative                                   | ₹ 2,000,000.00      | 40%          | 20%           | 25%           | 10.25%          | ₹ 26.16     | Plausible |
| Restaurant Delivery Juggernaut + Low Growth India     | ₹ 1,125,000.00      | 40%          | 25%           | 45%           | 9.50%           | ₹ 36.48     |           |
| Restaurant Delivery Star + Low Growth India           | ₹ 1,125,000.00      | 40%          | 22%           | 35%           | 9.50%           | ₹ 24.02     |           |
| Restaurant Delivery + Competition + low Growth India  | ₹ 1,125,000.00      | 40%          | 20%           | 25%           | 10.99%          | ₹ 16.58     |           |

# Why narratives change: Because the world changes around you...



# How narratives change

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| Narrative Break/End   | Narrative Shift  | Narrative Change<br>(Expansion or Contraction)   |
|---|--|--|
| Events, external (legal, political or economic) or internal (management, competitive, default), that can cause the narrative to break or end. | Improvement or deterioration in initial business model, changing market size, market share and/or profitability. | Unexpected entry/success in a new market or unexpected exit/failure in an existing market.   |
| Your valuation estimates (cash flows, risk, growth & value) are no longer operative   | Your valuation estimates will have to be modified to reflect the new data about the company.                     | Valuation estimates have to be redone with new overall market potential and characteristics. |
| Estimate a probability that it will occur & consequences  | Monte Carlo simulations or scenario analysis   | Real Options   |

# Step 6: Be ready to modify narrative as events unfold

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| Narrative Break/End   | Narrative Shift  | Narrative Change (Expansion or Contraction)  |
|---|--|--|
| Events, external (legal, political or economic) or internal (management, competitive, default), that can cause the narrative to break or end. | Improvement or deterioration in initial business model, changing market size, market share and/or profitability. | Unexpected entry/success in a new market or unexpected exit/failure in an existing market.   |
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| Estimate a probability that it will occur & consequences  | Monte Carlo simulations or scenario analysis   | Real Options   |



# Valuation as a Craft

You can never master a craft... just keep working on it..

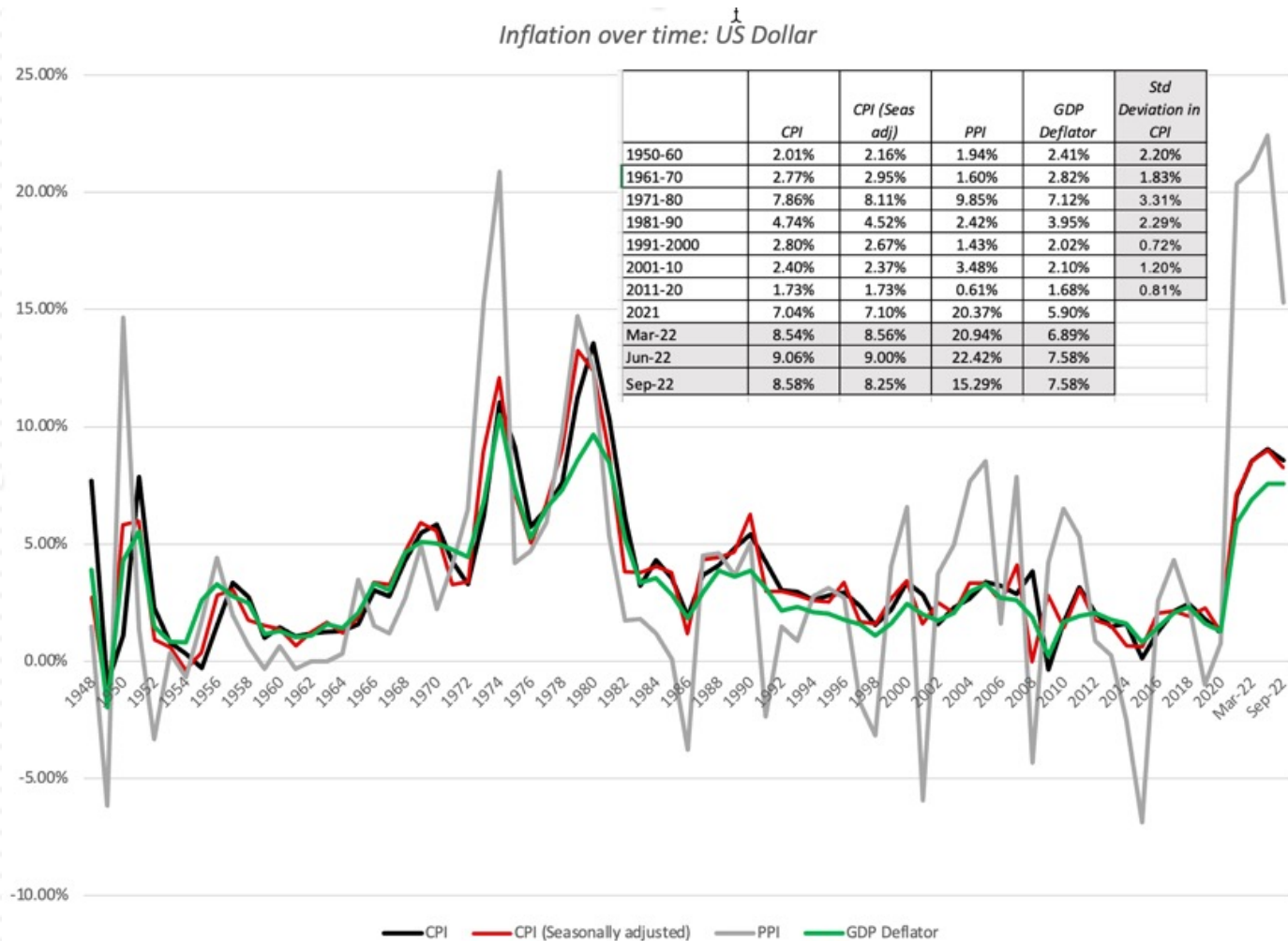


# Repeat and Retrace: The Return of Inflation

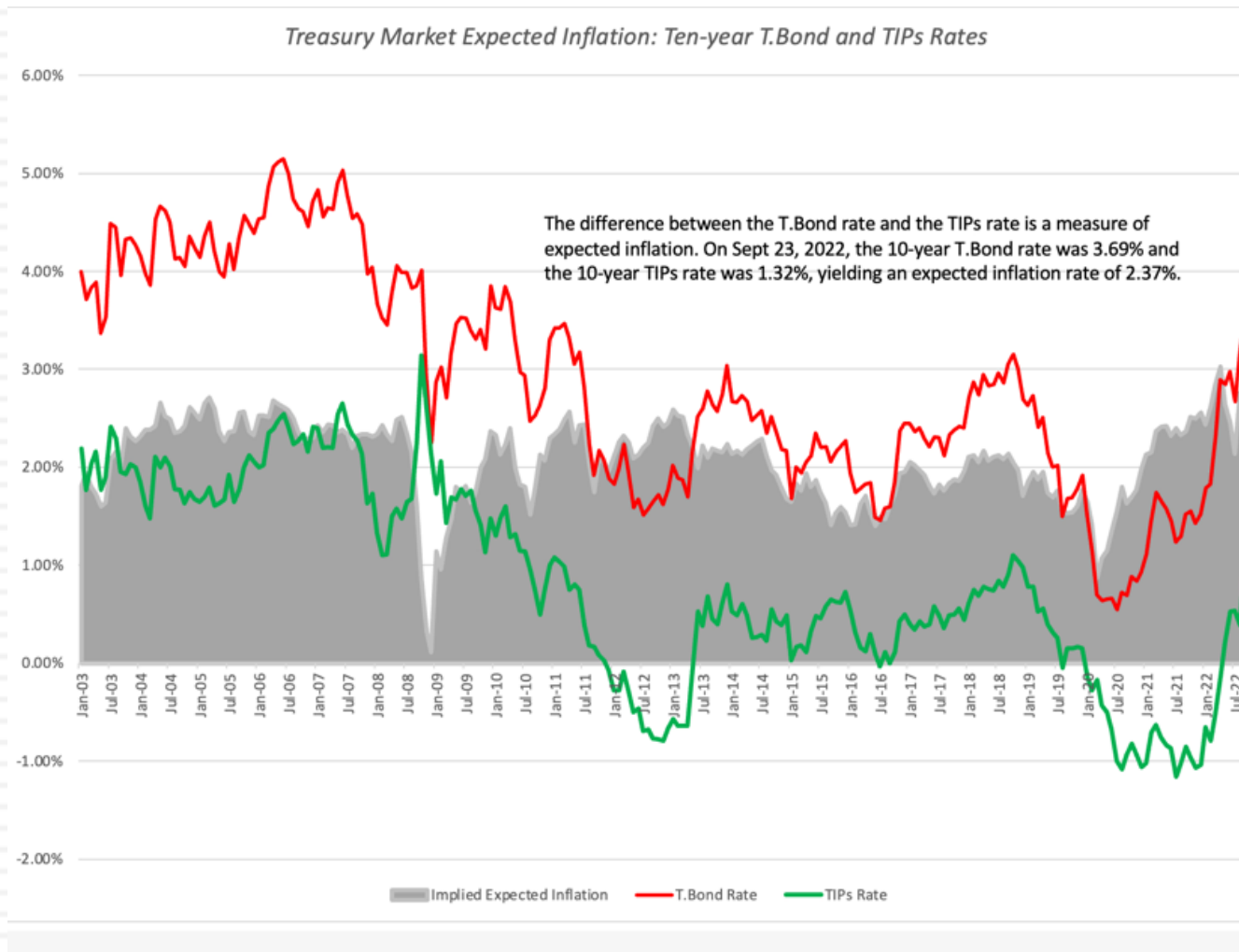
- ❑ In my early 2021 posts on inflation, I argued that while the higher inflation that we were just starting to see could be explained away as transitory, prudence required that policy makers treat it as a long term threat and deal with it quickly. Not only did they not do so, but the fiscal and monetary actions they took in 2021 exacerbated inflationary pressures.
- ❑ By the start of 2022, the window for early action had closed and for much of this year, inflation has been the elephant in the room, the force driving markets, forcing central banks to be reactive, and its presence has induced me to write three posts on its impact.
  - ❑ In [my first post on May 6, 2022](#), I put the surge in inflation, in 2022, in historical context and argued that it is unexpected inflation that shakes up the economy and caused damage to financial assets, and that until we reached a steady state, where expectations and actual inflation converge, markets would continue to be unsettled.
  - ❑ In a [follow-up post on May 20](#), I looked at the disparate effects of inflation on individual companies, positing that safer companies with pricing power are more protected against inflation than riskier companies in competitive businesses.
  - ❑ In [a third post on July 1, 2022](#), I pointed to inflation as a key culprit in the retreat of risk capital, i.e., capital invested in the riskiest segments of every market, and presented evidence of the impact on risk premiums (bond default spreads and equity risk premiums) in markets. In terms of content, I am afraid this post will contain nothing new, but the fresh uncertainties about inflation, and its impact, that have opened up this summer require at least an updating of the numbers.



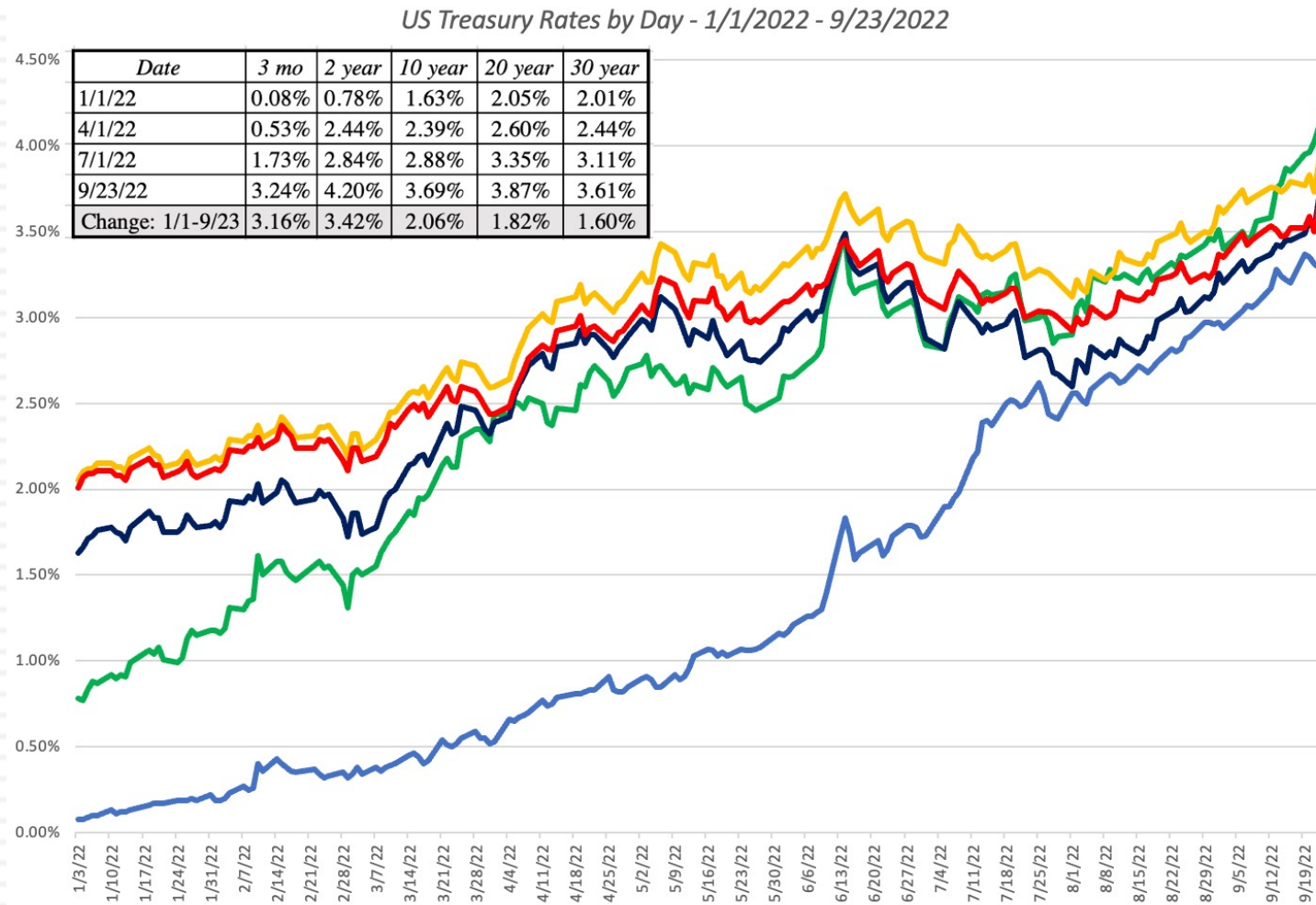
# Inflation: Historical Perspective



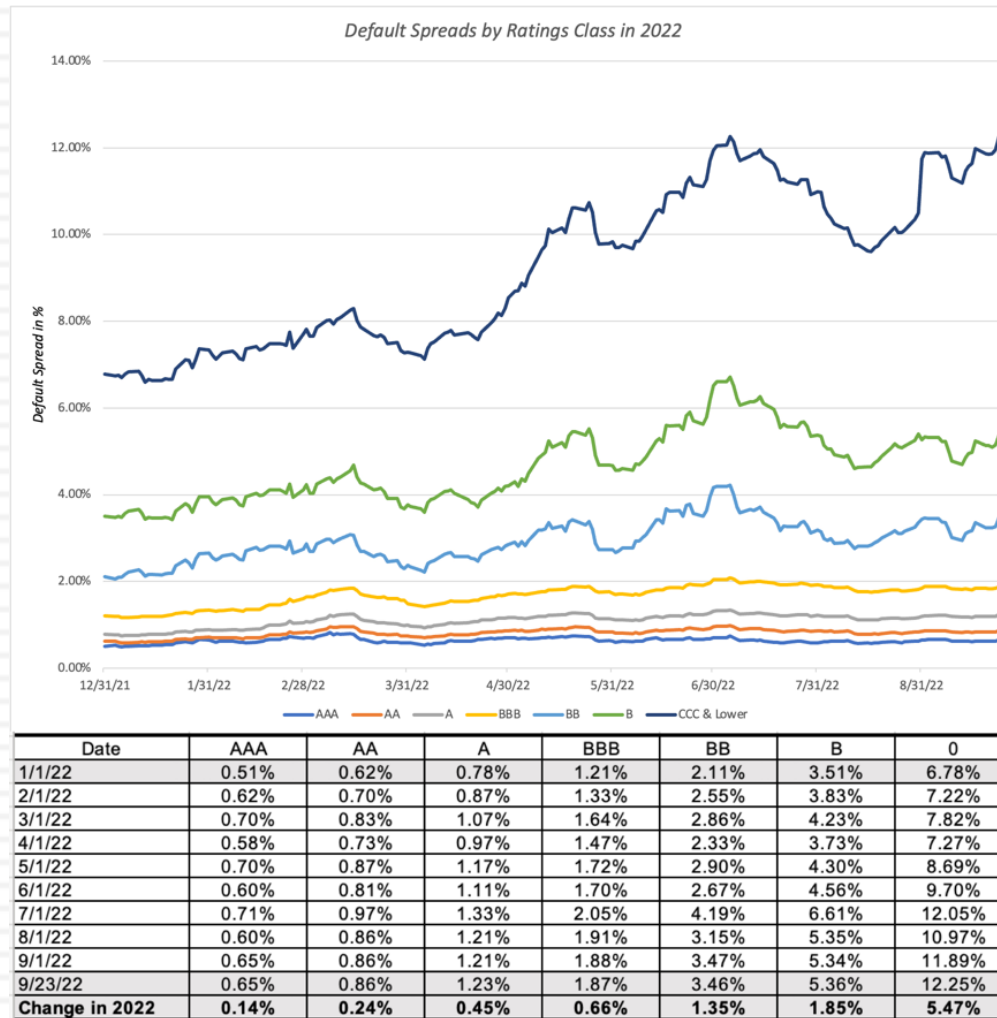
# A Market-implied Expected Inflation



# Interest Rates in 2022

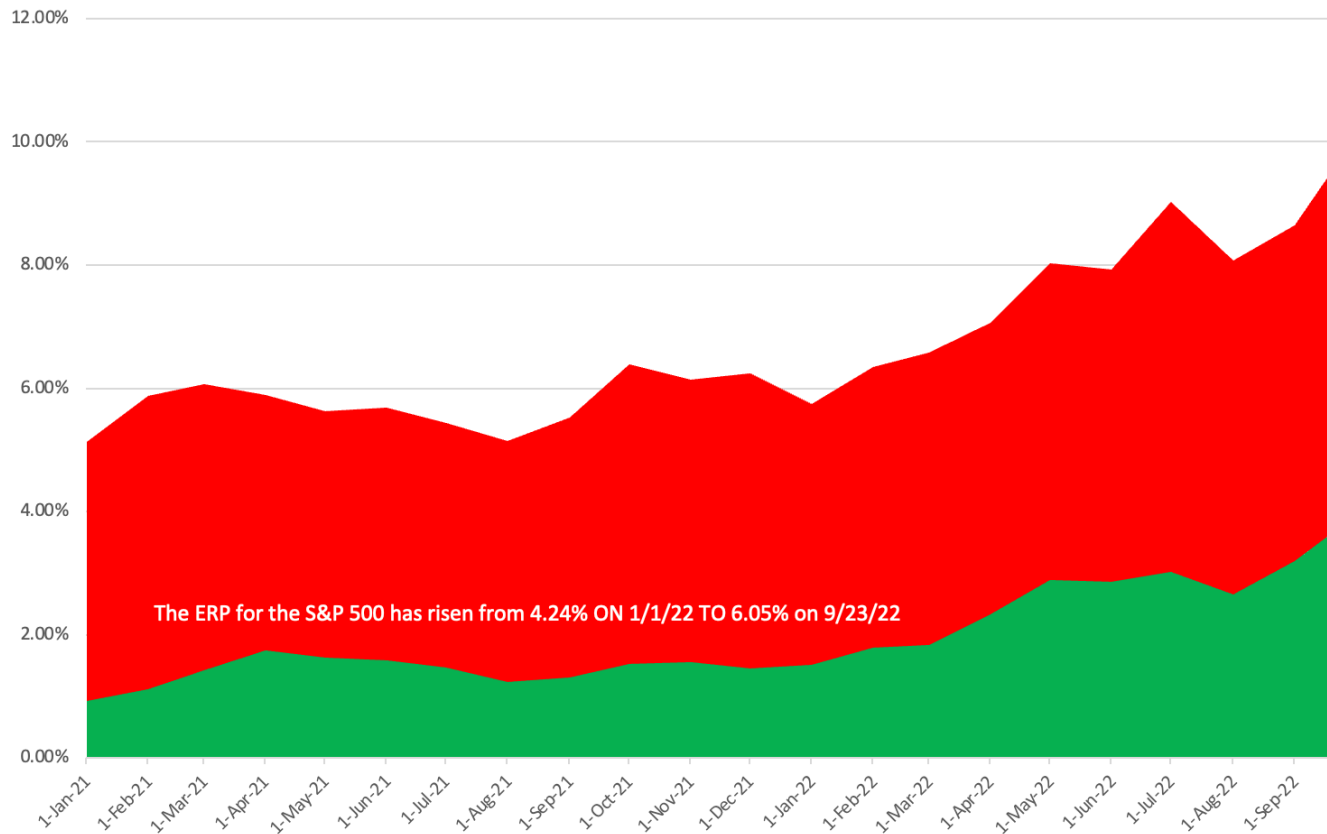


# Risk Premiums: Default Spreads



# Equity Risk Premiums

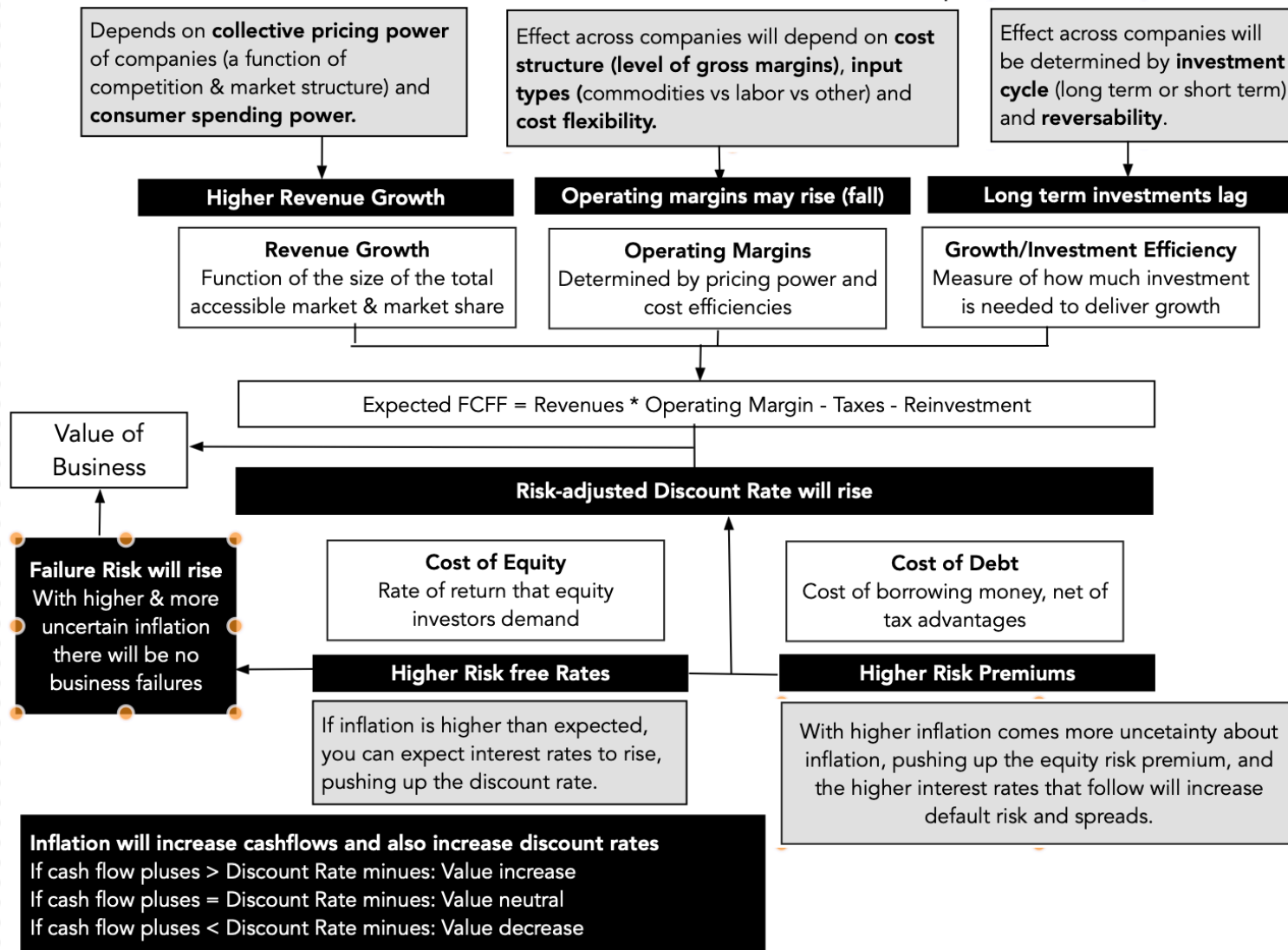
T.Bond Rate, Equity Risk Premium & Expected Return in 2021-2022



|                | 1-Jan-21 | 1-Feb-21 | 1-Mar-21 | 1-Apr-21 | 1-May-21 | 1-Jun-21 | 1-Jul-21 | 1-Aug-21 | 1-Sep-21 | 1-Oct-21 | 1-Nov-21 | 1-Dec-21 | 1-Jan-22 | 1-Feb-22 | 1-Mar-22 | 1-Apr-22 | 1-May-22 | 1-Jun-22 | 1-Jul-22 | 1-Aug-22 | 1-Sep-22 | 23-Sep-22 |
|----------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| ■ ERP          | 4.20%    | 4.76%    | 4.63%    | 4.14%    | 3.99%    | 4.10%    | 3.96%    | 3.91%    | 4.21%    | 4.87%    | 4.58%    | 4.79%    | 4.24%    | 4.56%    | 4.75%    | 4.73%    | 5.14%    | 5.07%    | 6.01%    | 5.42%    | 5.45%    | 5.95%     |
| ■ T. Bond Rate | 0.93%    | 1.11%    | 1.43%    | 1.75%    | 1.63%    | 1.58%    | 1.47%    | 1.23%    | 1.31%    | 1.52%    | 1.56%    | 1.45%    | 1.51%    | 1.79%    | 1.83%    | 2.33%    | 2.89%    | 2.86%    | 3.02%    | 2.65%    | 3.19%    | 3.72%     |

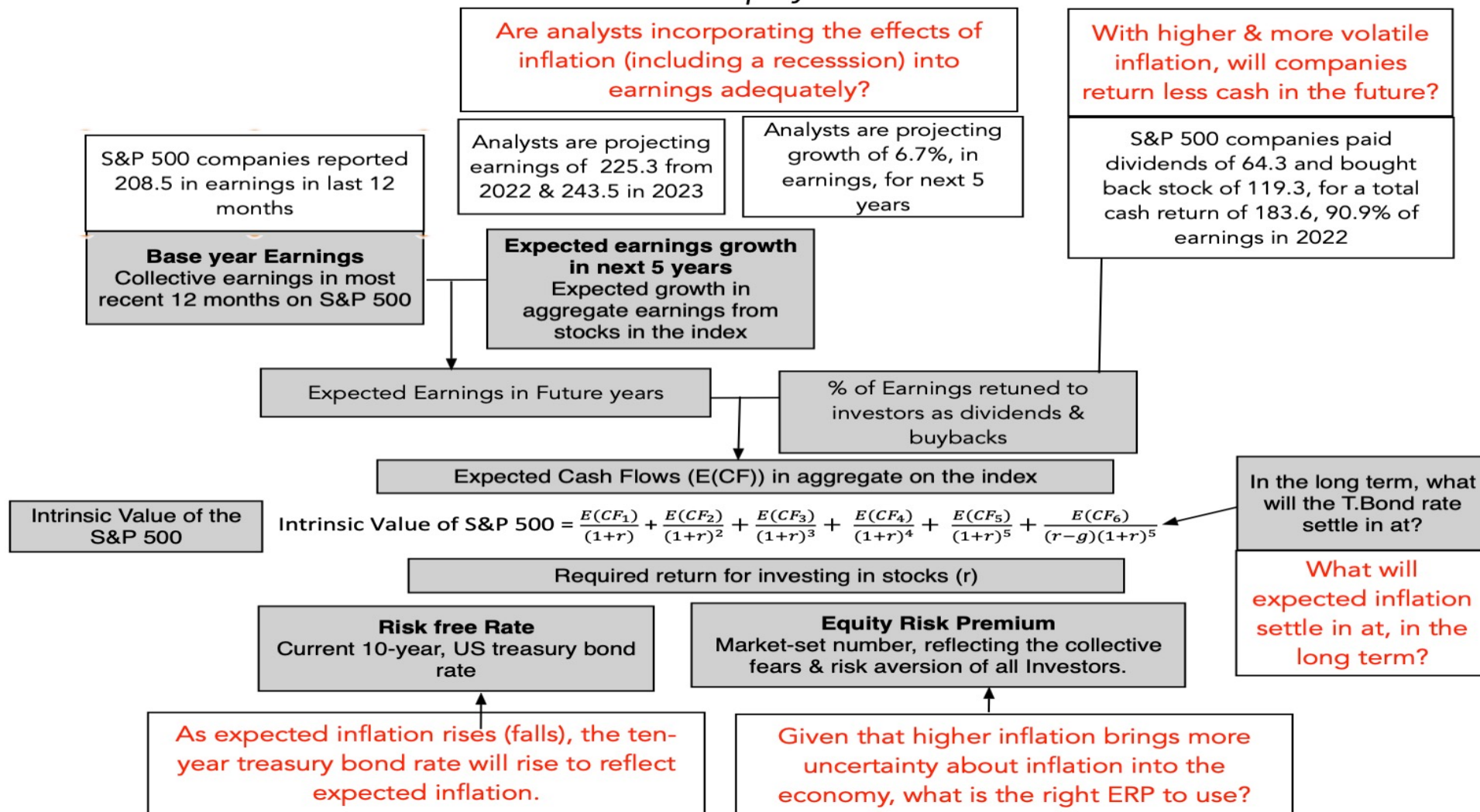
# Inflation and Overall Equity Value

## Effects of Increasing Inflation on Overall Equity Value



# Determinants of Value

## Inflation and Equity Value: The Drivers





# A Double Whammy?

- There are two things that stand out about equity markets in 2022.
  - The first is the surge in the equity risk premium from from 4.24% on January 1, 2022, to 6.05%, on September 23, 2022, an increase on par with what we have seen during market crises (2001, 2008 and 2020) in the past.
  - The second is that as equity risk premiums have jumped, the treasury bond rate has more than doubled, from 1.51% on January 1, 2022, to 3.69% on September 23, 2022.
- In contrast to the afore-mentioned crises, where the treasury bond rate dropped, offsetting some of the impact of the rise in equity risk premiums, this inflation-induced market reaction has caused the expected return on stocks to rise from 5.75% on January 1, 2022, to 9.75%, on September 23, 2022; that increase of 4% dwarfs the increases in expected returns that we witnessed in the last quarter of 2008 or the first quarter of 2020.



# Buzz Words and Magic Bullets!

- In my four decades in corporate finance and valuation, I have seen many "new and revolutionary" ideas emerge, marketed as the solution to all of the problems in business decision making.
- Most of the time, these ideas represent either a repackaging of existing concepts, with a healthy dose of marketing and selling, usually by consultants and bankers, and their magic fades quickly once their limitations come to the surface, as they inevitably do.
- The latest entrant in this game is ESG (Environmental, Social and Governance), and the sales pitch is wider and deeper. Companies that improve their social goodness standing will not only become more profitable and valuable over time, we are told, but they will also advance society's best interests, thus resolving one of the fundamental conflicts of private enterprise, while also enriching investors.

# My S&P 500 Story

## An Intrinsic (and Personal) Valuation of the S&P 500 on September 23, 2022

### My Earnings Estimates

Analysts are underestimating the effect of a recession on future earnings, and I am reducing their 2023 estimates by 15%, with ripple effects on earnings beyond. (I am leaving 2022 estimates untouched, because the bulk of the year is behind us.

### Cash Return

While companies have collectively returned 90.5% of earnings as dividends and buybacks in the most recent 12 months, recession fears and uncertainty will lead them to reduce this cash returns to 80% of earnings (consistent with growth in long term), over time.

| Intrinsic Value Estimate (based on your choice of ERP) |                |          |          |          |          |             |               |
|--|----------------|----------|----------|----------|----------|-------------|---------------|
|  | 2021           | 2022     | 2023     | 2024     | 2025     | 2026        | Terminal Year |
| Analyst Estimate of Earnings                           | 208.53         | 225.34   | 243.46   | 259.79   | 273.70   | 284.65      | 296.03        |
| My Estimate of Earnings                                | \$208.53       | 225.34   | 206.94   | 225.03   | 243.13   | 252.85      | 262.97        |
| Expected Earnings Growth Rate                          |                | 8.06%    | -8.16%   | 6.71%    | 5.35%    | 4.00%       | 4.00%         |
| Expected cash payout as % of earnings                  | 90.50%         | 90.50%   | 87.88%   | 85.25%   | 82.63%   | 80.00%      | 80.00%        |
| Expected Dividends + Buybacks =                        | \$188.72       | \$203.93 | \$181.85 | \$191.84 | \$200.89 | \$202.28    | 210.37        |
| Expected Terminal Value =                              |                |          |          |          |          | \$ 4,207.49 |               |
| Riskfree Rate  | 3.69%          | 3.75%    | 3.81%    | 3.88%    | 3.94%    | 4.00%       | 4.00%         |
| Required Return on Stocks                              | 8.69%          | 8.75%    | 8.81%    | 8.88%    | 8.94%    | 9.00%       | 9.00%         |
| Present Value =  |                | \$187.52 | \$153.67 | \$148.90 | \$143.12 | \$2,882.41  |               |
| <b>Intrinsic Value of Index =</b>                      | <b>3515.63</b> |          |          |          |          |             |               |
| <b>Actual Index level =</b>                            | <b>3693.23</b> |          |          |          |          |             |               |
| <b>% Under or Over Valuation =</b>                     | <b>-4.81%</b>  |          |          |          |          |             |               |

### Ten-year Treasury Bond Rate

I will assume that the bulk of the rise in rates has already occurred, and that the T.Bond rate will converge to 4%, over the next five years.

### Equity Risk Premium

The equity risk premium is 5%, close to both the historical average risk premium earned on stocks from 1928 - 2022 and the average implied equity risk premium over the last decade. Adding it to the ten-year bond rate yields the required return on stocks.

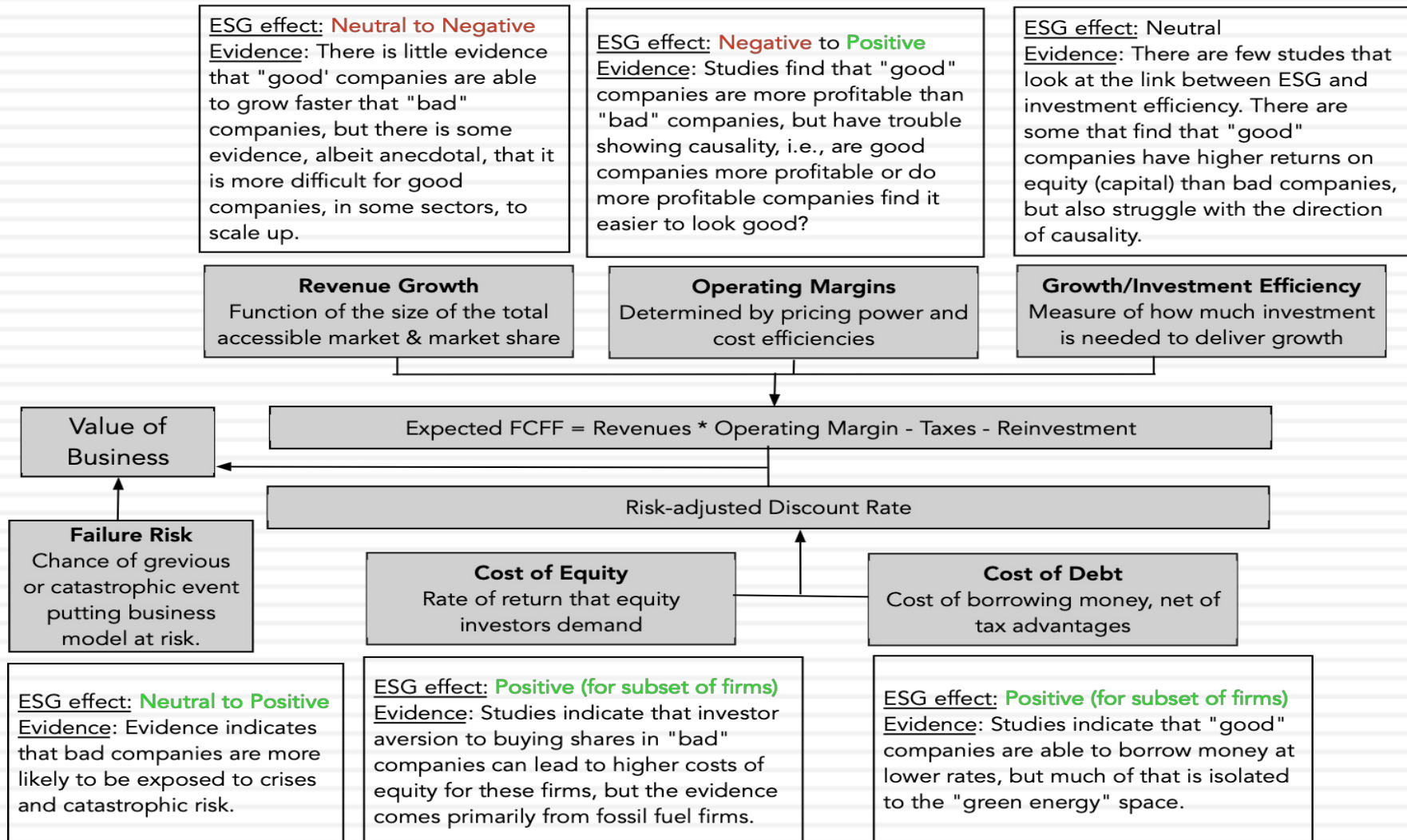
*In my overarching story for equities, I am building in the assumption that there will be a recession that creates both short term & long term damage to corporate earnings, but helps in restraining inflation, bringing it down from 2022 levels to about 3% in the long term (above the 2011-2021 average of 1.73%).*

# What if?

| Valuing the S&P 500 on Sept 23, 2022   |                                       |                |                |                                       |                |                |                             |                |                |
|--|---------------------------------------|----------------|----------------|---------------------------------------|----------------|----------------|-----------------------------|----------------|----------------|
|  | <i>Earnings = 30% below Estimates</i> |                |                | <i>Earnings = 15% below Estimates</i> |                |                | <i>Earnings = Estimates</i> |                |                |
| <b>Riskfree Rate</b>   | <i>ERP =4%</i>                        | <i>ERP =5%</i> | <i>ERP =6%</i> | <i>ERP =4%</i>                        | <i>ERP =5%</i> | <i>ERP =6%</i> | <i>ERP =4%</i>              | <i>ERP =5%</i> | <i>ERP =6%</i> |
| <b>2%</b>  | 4276                                  | 3416           | 2842           | 4677                                  | 3737           | 3110           | 5449                        | 4348           | 3615           |
| <b>3%</b>  | 4132                                  | 3303           | 2750           | 4519                                  | 3613           | 3009           | 5169                        | 4129           | 3436           |
| <b>4%</b>  | 3979                                  | 3183           | 2653           | 4352                                  | 3482           | 2903           | 4889                        | 3910           | 3257           |
| <b>5%</b>  | 3819                                  | 3058           | 2551           | 4176                                  | 3345           | 2790           | 4609                        | 3690           | 3078           |
| <b>6%</b>  | 3650                                  | 2926           | 2443           | 3991                                  | 3200           | 2672           | 4328                        | 3471           | 2899           |
| <i>Index was trading at 3693 on 9/23/22. Shaded cells are higher than 3693</i> |                                       |                |                |                                       |                |                |                             |                |                |

# ESG and Value

## ESG and Value: Just the facts!



*Aswath Damodaran*



# RELATIVE VALUATION (PRICING)

Aswath Damodaran

# Relative valuation is pervasive...

- Most asset valuations are relative.
- Most equity valuations on Wall Street are relative valuations.
  - Almost 85% of equity research reports are based upon a multiple and comparables.
  - More than 50% of all acquisition valuations are based upon multiples
  - Rules of thumb based on multiples are not only common but are often the basis for final valuation judgments.
- While there are more discounted cashflow valuations in consulting and corporate finance, they are often relative valuations masquerading as discounted cash flow valuations.
  - The objective in many discounted cashflow valuations is to back into a number that has been obtained by using a multiple.
  - The terminal value in a significant number of discounted cashflow valuations is estimated using a multiple.

# Why relative valuation?

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“If you think I’ m crazy, you should see the gu  
lives across the hall”

Jerry Seinfeld talking about Kramer in a Seinfeld episode



*“A little inaccuracy sometimes saves tons of explanation”*

*H.H. Munro*

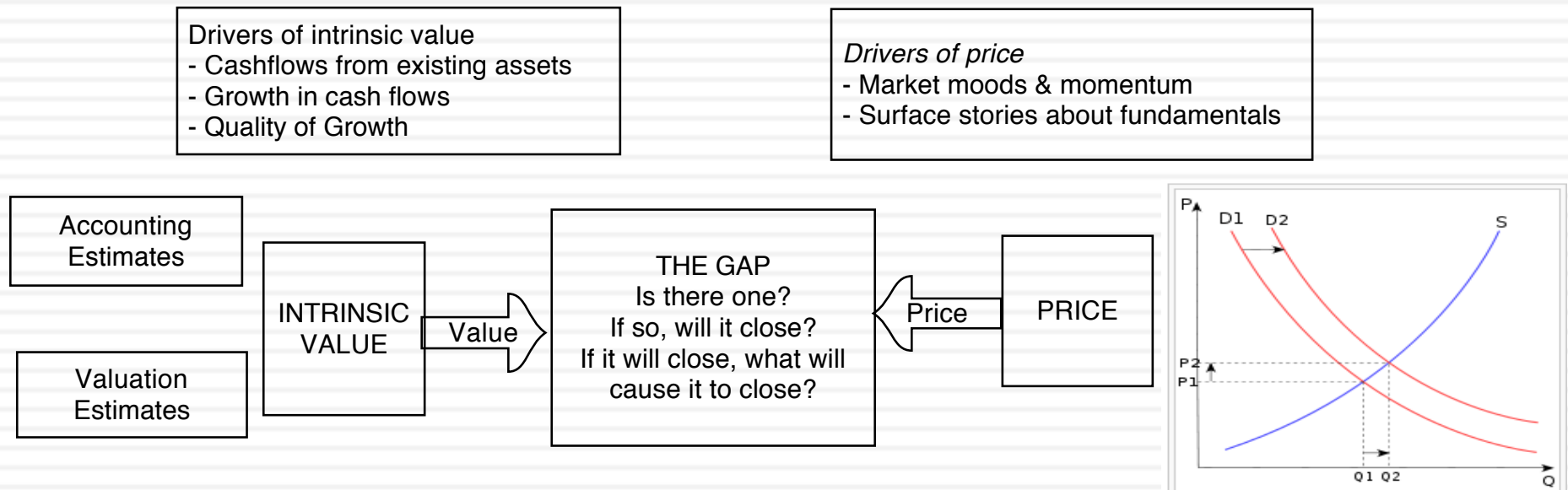
*“If you are going to screw up, make sure that you have  
lots of company”*

*Ex-portfolio manager*




# Pricing versus Valuation

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# Test 1: Are you pricing or valuing?

185

 **5369 La Jolla Mesa Dr**  
La Jolla, CA 92037  
Status: Active





**\$995,000**  
Price

**3**  
Beds

**2.5**  
Baths


**1,440** Sq. Ft.  
\$691 / Sq. Ft.

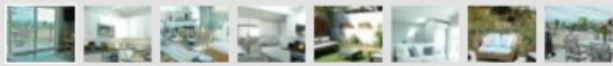
Built: 1955   Lot Size: 3,000 Sq. Ft.   On Redfin: 12 days

Favorite   X-Out   Share...   Tour Home

Overview   Property Details   Tour Insights   Property History   Public Records   Activity   Schools   Neighborhood & Offer Insights   Similar Homes




1 of 25  [Play Video](#)

**Lisa Padilla**  
REDFIN Real Estate Agent

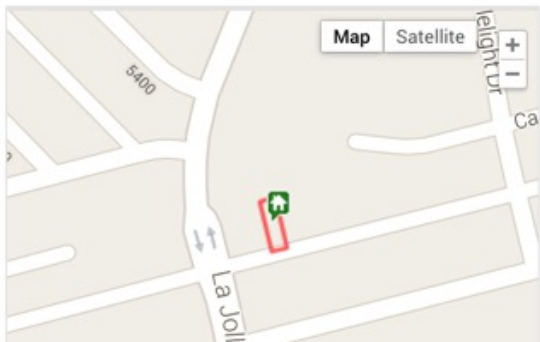
★★★★★  
47 client reviews

\$8,726 commission refund

 [Go Tour This Home](#)

[Ask Lisa a Question](#) or [Start an Offer](#)

1 of 4 Redfin Agents in this area



# Test 2: Are you pricing or valuing?

186

Europe  
Switzerland  
  
Biotechnology  
Biotechnology

Reuters  
BION.S

Bloomberg  
BION SW

Exchange  
SWX  
Ticker  
BION

|                            |                |
|----------------------------|----------------|
| Price at 12 Aug 2013 (CHF) | 124.00         |
| Price Target (CHF)         | 164.50         |
| 52-week range (CHF)        | 128.40 - 84.90 |

## Strong sector and stock-picking continue

### Impressive performance

Over the past two years, BB Biotech shares have roughly tripled, which could tempt investors to take profits. However, this performance has been well backed by a deserved revival of the biotech industry, encouraging fundamental news, M&A, and increased money flow into health care stocks. In addition, BBB returned to index outperformance by modifying its stock-picking approach. Hence, despite excellent performance, the shares still trade at a 23% discount to the net asset value of the portfolio. Hence, the shares are an attractive value vehicle to capture growth opportunities in an attractive sector.

### Biotech industry remains attractive

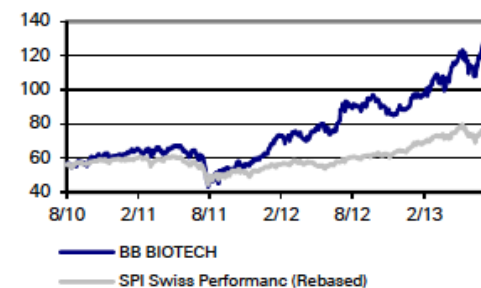
With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money and high liquidity. BB Biotech remains an attractive vehicle to capture the future potential of the biotech sector. In addition, investors benefit from a 23% discount to NAV and attractive cash distribution policy of 5% yield p.a. Hence, we reiterate our Buy on BB Biotech shares.

### Key changes

Target Price 106.50 to 164.50 ↑ 54.5%

Source: Deutsche Bank

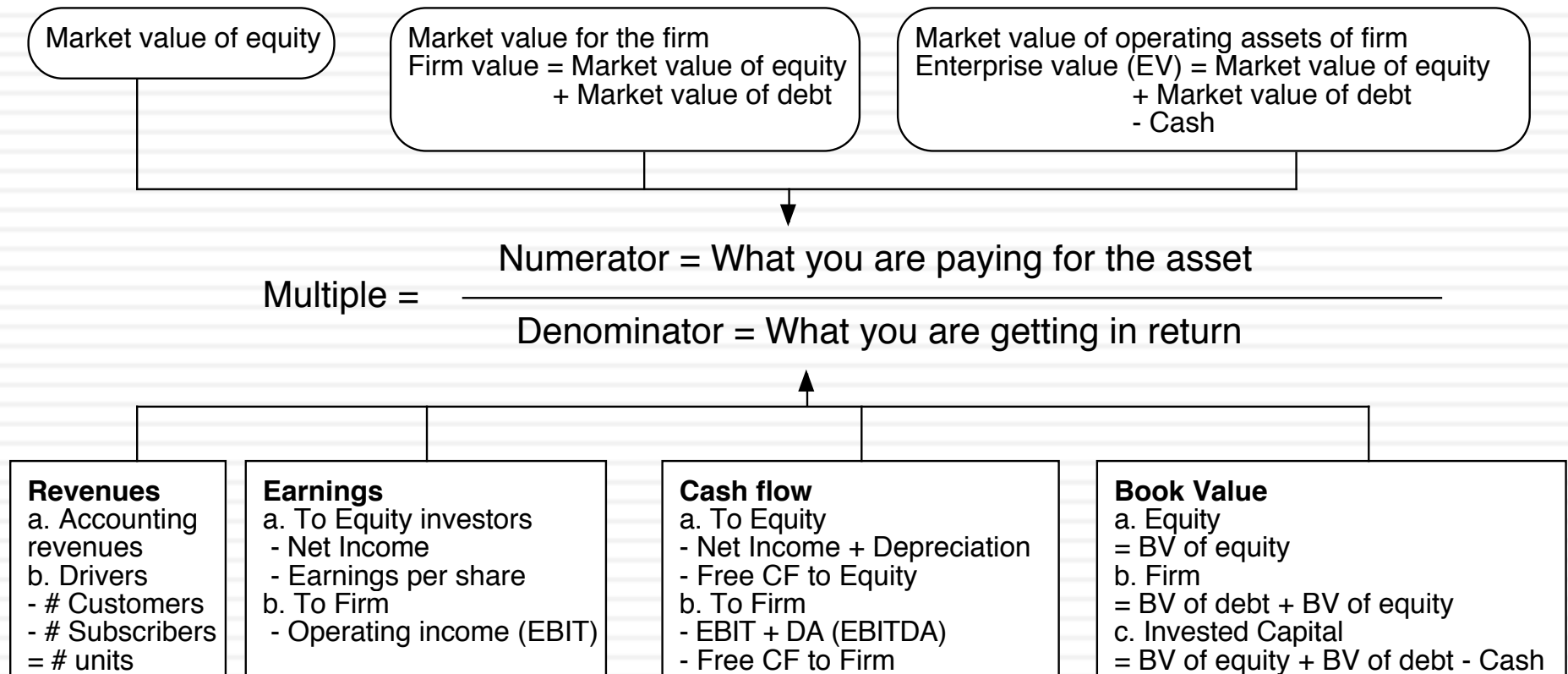
### Price/price relative



| Performance (%) | 1m   | 3m  | 12m  |
|-----------------|------|-----|------|
| Absolute        | -1.4 | 5.4 | 37.4 |

# The tool for pricing: A multiple

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# 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: EPS in most recent financial year

EPS in trailing 12 months (Trailing PE)

Forecasted EPS for next year (Forward PE)

Forecasted EPS 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.

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

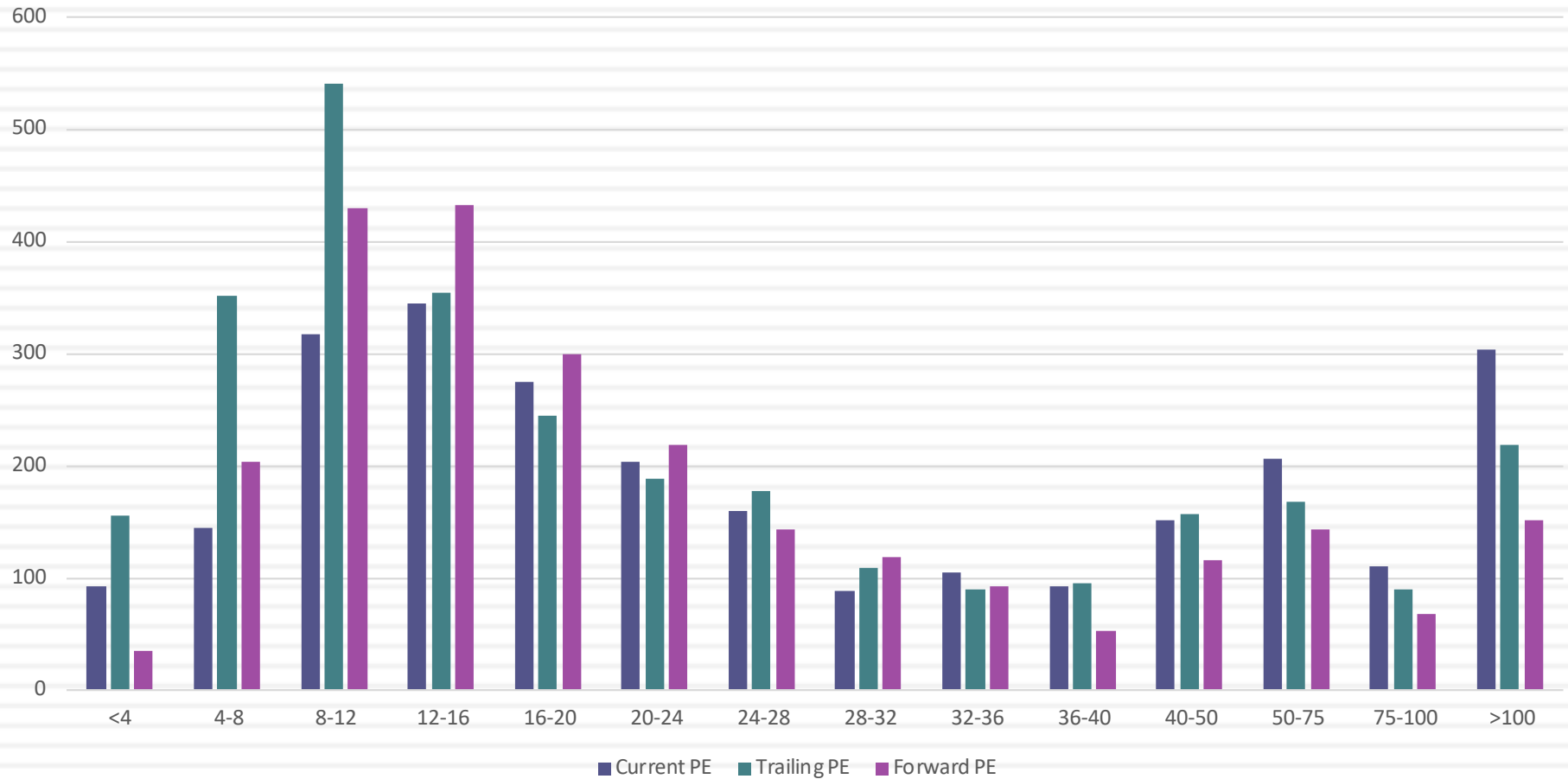
- Why do we net out cash from firm value?
- What happens if a firm has cross holdings which are categorized as:
  - ▣ Minority interests?
  - ▣ Majority active interests?

# 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?

# 1. Multiples have skewed distributions...

PE ratios for US Companies in January 2022



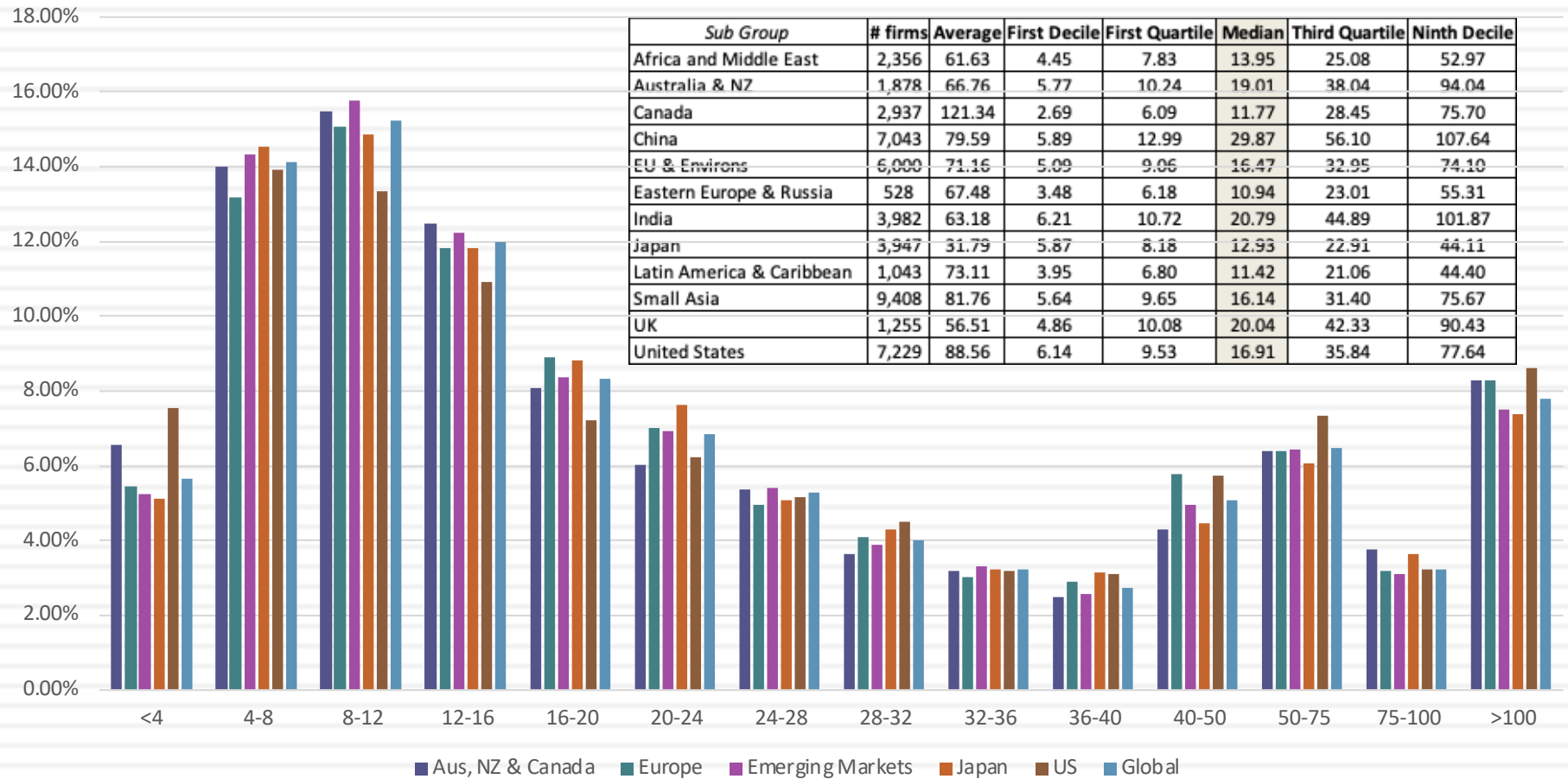
## 2. Making statistics “dicey”

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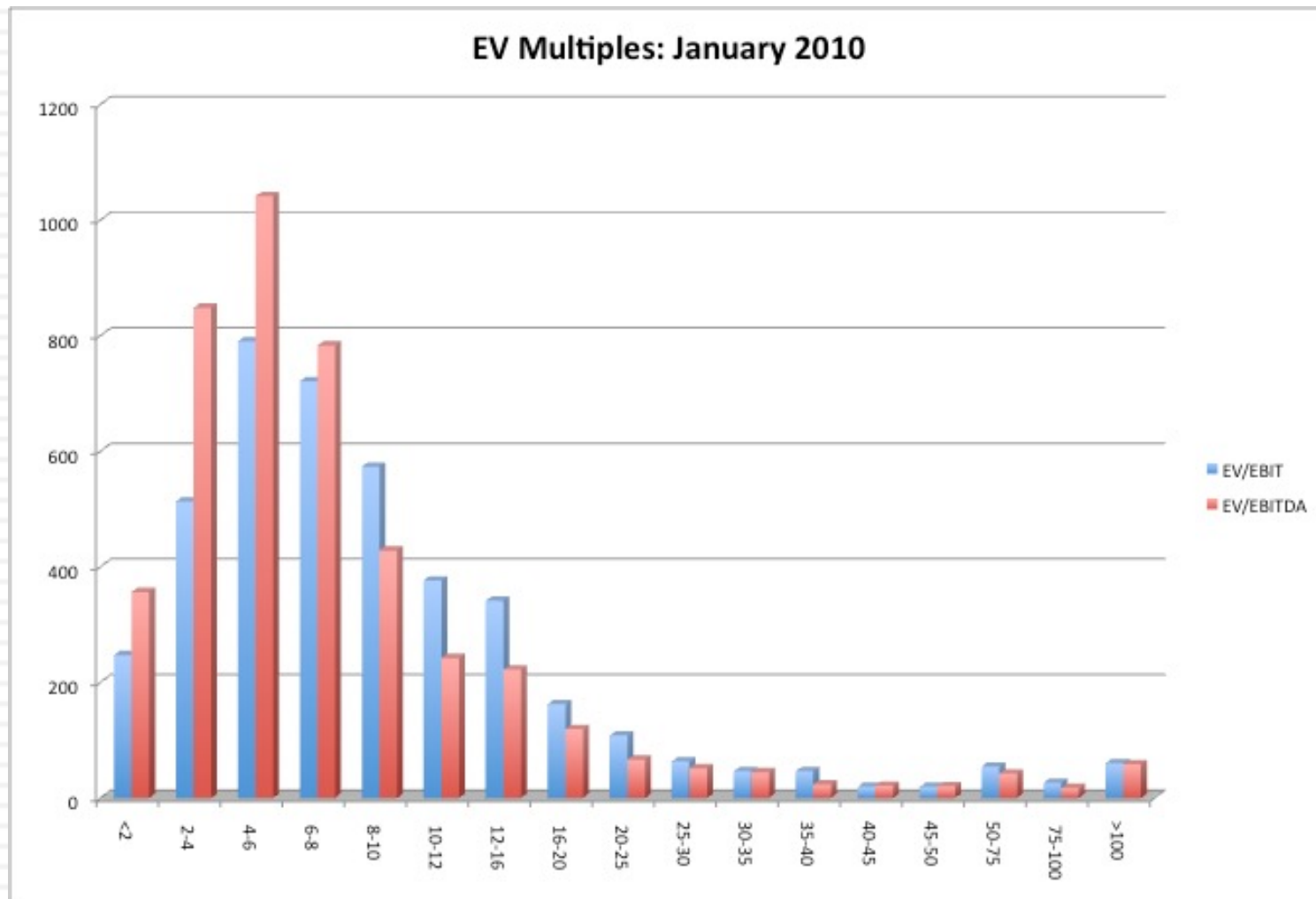
|                       | Current PE   | Trailing PE  | Forward PE   |
|-----------------------|--------------|--------------|--------------|
| Total Number of firms | 7082         | 7082         | 7082         |
| Firms with PE         | 2948         | 2838         | 2387         |
| <b>Average</b>        | <b>60.52</b> | <b>70.85</b> | <b>35.79</b> |
| <b>Median</b>         | <b>18.49</b> | <b>18.28</b> | <b>17.56</b> |
| 10th Percentile       | 7.09         | 8.23         | 9.27         |
| First Quartile        | 11.98        | 11.95        | 12.22        |
| Third Quartile        | 33.08        | 32.35        | 27.74        |
| 90th Percentile       | 67.99        | 68.4         | 50           |
| Maximum               | 9180.91      | 41200        | 8643.33      |

# 3. Markets have a lot in common : Comparing Global PEs

PE Ratios, by Geography, in January 2022

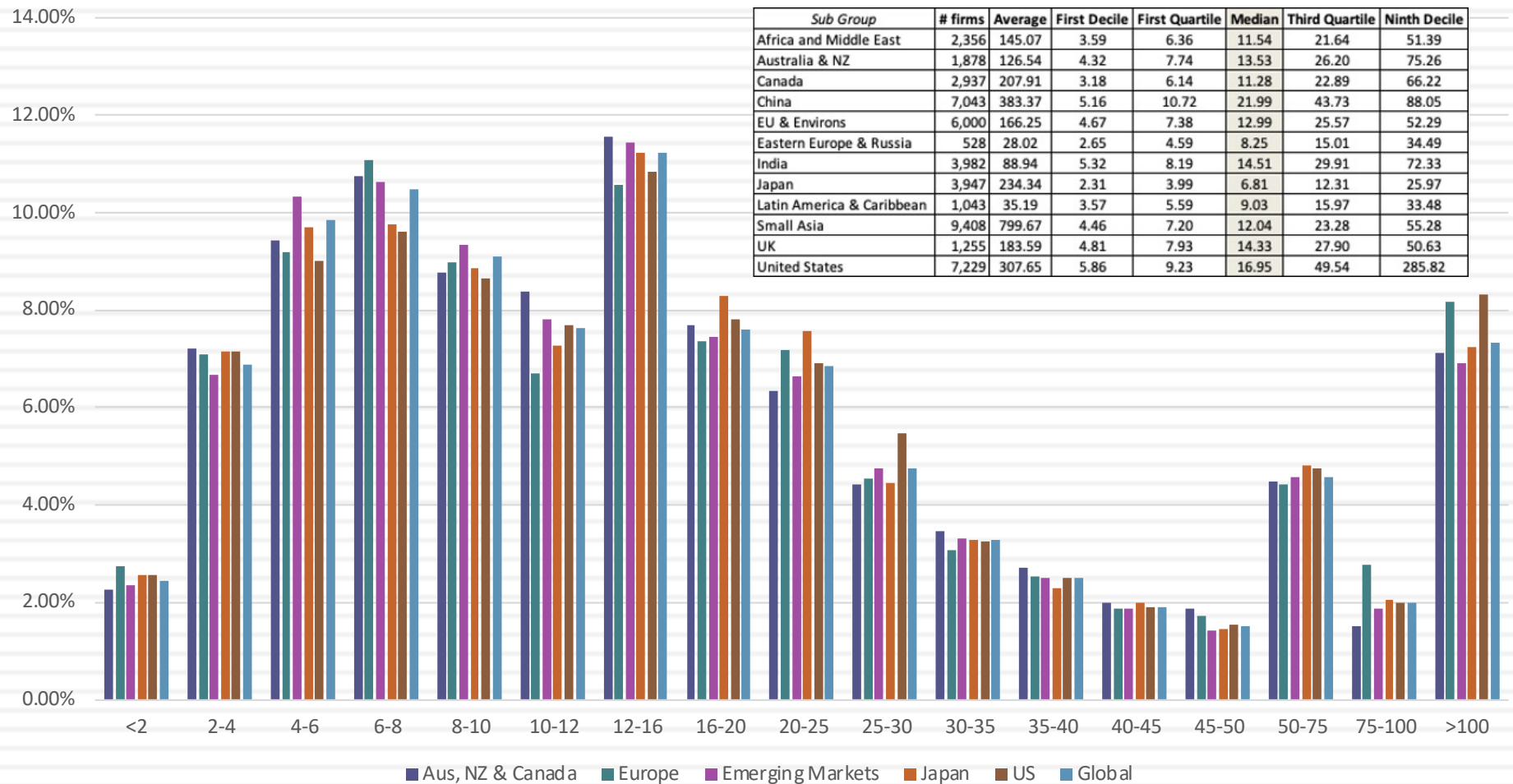


# 4. Simplistic rules almost always break down...6 times EBITDA was not cheap in the US in 2010



# But it may be in 2022, unless you in Japan or Russia...

EV to EBITDA by sub-group, by region, in January 2022





# Fertiglobe: A Relative Valuation in November 2022

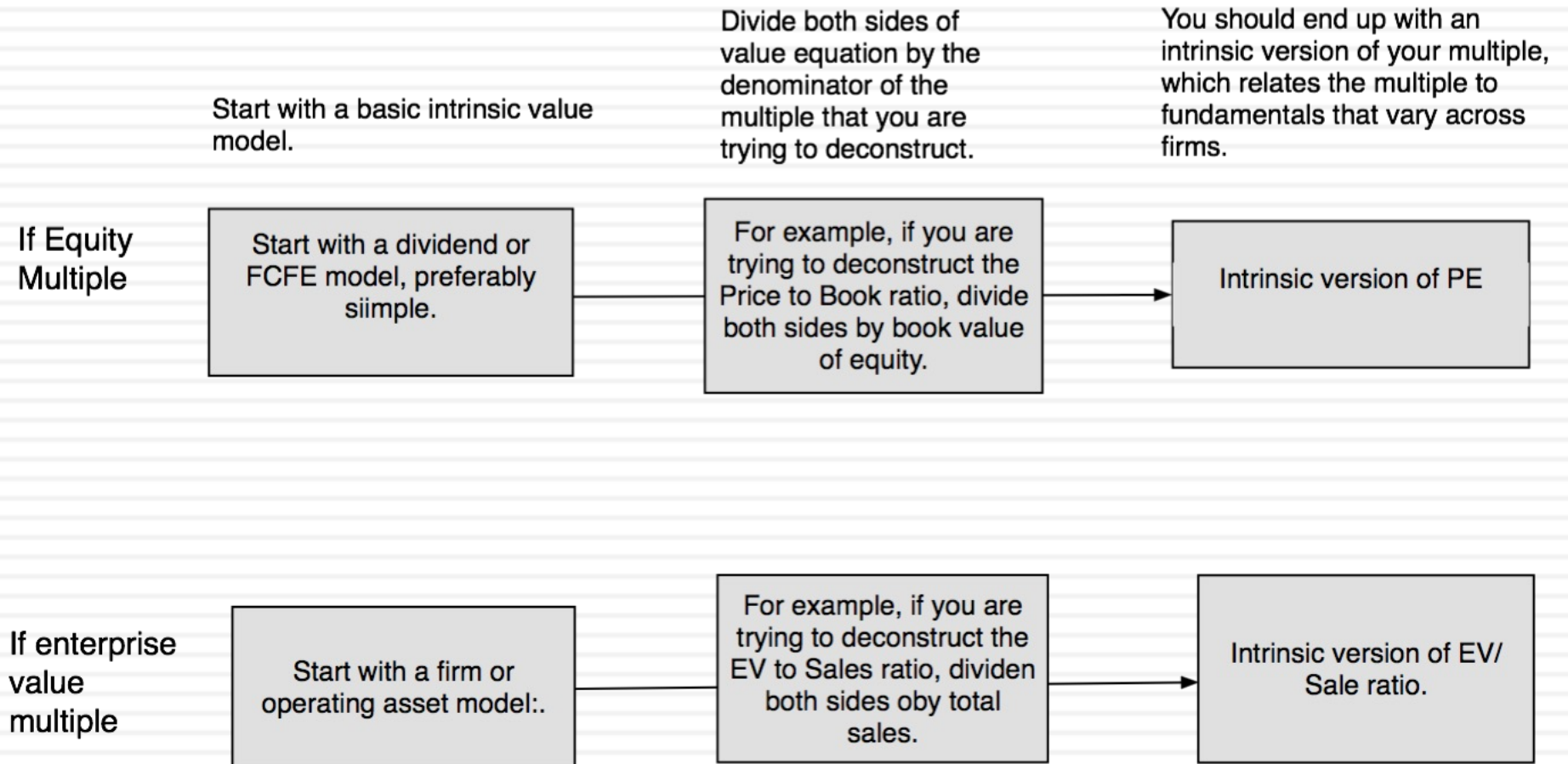
| Company Name  | EV/Sales    | Operating Margin | PBV         | ROE           | PE           |
|---|-------------|------------------|-------------|---------------|--------------|
| Nutrien Ltd. (TSX:NTR)                                    | 1.53        | 27.01%           | 1.58        | 25.93%        | 6.10         |
| Yara International ASA (OB:YAR)                           | 0.61        | 14.71%           | 1.28        | 19.58%        | 6.56         |
| Corteva, Inc. (NYSE:CTVA)                                 | 2.49        | 15.30%           | 1.63        | 6.67%         | 24.51        |
| The Mosaic Company (NYSE:MOS)                             | 1.18        | 28.17%           | 1.38        | 27.70%        | 4.97         |
| CF Industries Holdings, Inc. (NYSE:CF)                    | 2.00        | 50.35%           | 4.26        | 55.96%        | 7.61         |
| Yunnan Yuntianhua Co., Ltd. (SHSE:600096)                 | 0.86        | 12.37%           | 3.07        | 42.86%        | 7.15         |
| ICL Group Ltd (TASE:ICL)                                  | 1.43        | 30.15%           | 2.13        | 33.05%        | 6.44         |
| Israel Corporation Ltd (TASE:ILCO)                        | 0.65        | 30.17%           | 1.50        | 23.43%        | 6.40         |
| OCI N.V. (ENXTAM:OCI)                                     | 1.05        | 34.64%           | 3.06        | 43.98%        | 6.95         |
| Sociedad Química y Minera de Chile S.A.                   | 3.72        | 48.44%           | 6.68        | 58.93%        | 11.33        |
| UPL Limited (BSE:512070)                                  | 1.42        | 17.01%           | 1.99        | 15.51%        | 12.80        |
| FMC Corporation (NYSE:FMC)                                | 3.21        | 22.42%           | 4.49        | 22.28%        | 20.16        |
| ADAMA Ltd. (SZSE:000553)                                  | 0.94        | 7.38%            | 0.90        | 2.32%         | 38.73        |
| Grupa Azoty S.A. (WSE:ATT)                                | 0.33        | 13.24%           | 0.28        | 19.64%        | 1.43         |
| K+S Aktiengesellschaft (XTRA:SDF)                         | 0.91        | 27.50%           | 0.59        | 39.75%        | 1.47         |
| <b>Fertiglobe plc (ADX:FERTIGLB)</b>                      | <b>2.49</b> | <b>46.15%</b>    | <b>5.24</b> | <b>56.05%</b> | <b>9.35</b>  |
| Shandong Hualu-Hengsheng Chemical Co., Ltd. (SHSE:600426) | 1.79        | 30.06%           | 2.26        | 31.73%        | 7.13         |
| SABIC Agri-Nutrients Company                              | 4.33        | 61.18%           | 4.59        | 53.52%        | 8.59         |
| KG Chemical Corporation (KOSE:A001390)                    | 0.22        | 9.87%            | 0.41        | 26.75%        | 1.54         |
| The Scotts Miracle-Gro Company                            | 1.47        | 11.07%           | 5.73        | -63.48%       | NA           |
| <b>First Quartile</b>                                     | <b>0.90</b> | <b>14.34%</b>    | <b>1.35</b> | <b>19.63%</b> | <b>6.25</b>  |
| <b>Median</b>   | <b>1.42</b> | <b>27.25%</b>    | <b>2.06</b> | <b>27.22%</b> | <b>7.13</b>  |
| <b>Third Quartile</b>                                     | <b>2.13</b> | <b>31.29%</b>    | <b>4.32</b> | <b>43.14%</b> | <b>10.34</b> |

# 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.

# A Simple Analytical device

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# 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,

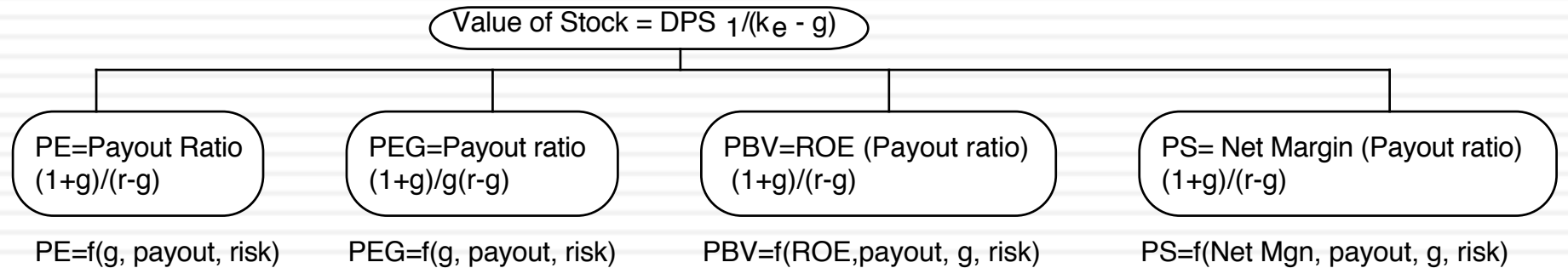
$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- If this had been a FCFE Model,

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

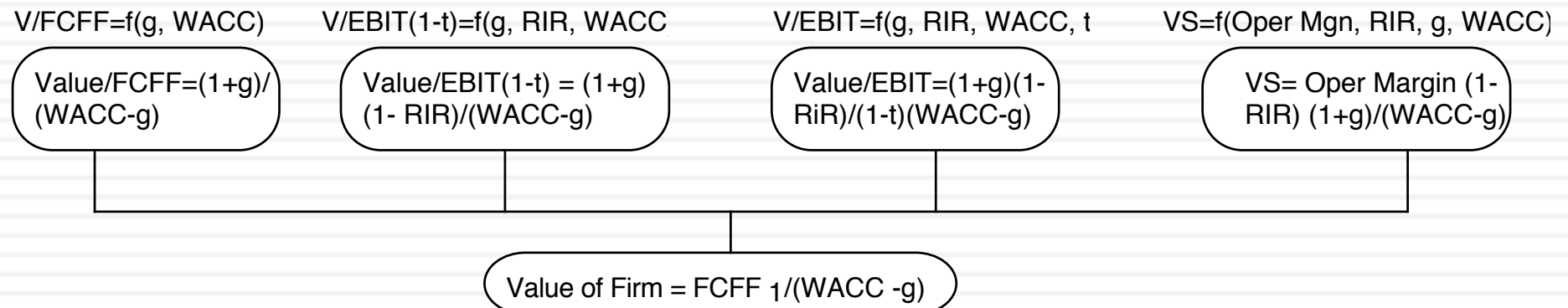
$$\frac{P_0}{EPS_0} = PE = \frac{(FCFE/\text{Earnings}) * (1 + g_n)}{r - g_n}$$

# The Determinants of Multiples...



## Equity Multiples

## Firm 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: Comparing PE Ratios across a Sector: PE

| <i>Company Name</i>                                     | <i>PE</i>   | <i>Growth</i> |
|---|-------------|---------------|
| <i>PT Indosat ADR</i>                                   | <i>7.8</i>  | <i>0.06</i>   |
| <i>Telebras ADR</i>                                     | <i>8.9</i>  | <i>0.075</i>  |
| <i>Telecom Corporation of New Zealand ADR</i>           | <i>11.2</i> | <i>0.11</i>   |
| <i>Telecom Argentina Stet - France Telecom SA ADR B</i> | <i>12.5</i> | <i>0.08</i>   |
| <i>Hellenic Telecommunication Organization SA ADR</i>   | <i>12.8</i> | <i>0.12</i>   |
| <i>Telecomunicaciones de Chile ADR</i>                  | <i>16.6</i> | <i>0.08</i>   |
| <i>Swisscom AG ADR</i>                                  | <i>18.3</i> | <i>0.11</i>   |
| <i>Asia Satellite Telecom Holdings ADR</i>              | <i>19.6</i> | <i>0.16</i>   |
| <i>Portugal Telecom SA ADR</i>                          | <i>20.8</i> | <i>0.13</i>   |
| <i>Telefonos de Mexico ADR L</i>                        | <i>21.1</i> | <i>0.14</i>   |
| <i>Matav RT ADR</i>                                     | <i>21.5</i> | <i>0.22</i>   |
| <i>Telstra ADR</i>                                      | <i>21.7</i> | <i>0.12</i>   |
| <i>Gilat Communications</i>                             | <i>22.7</i> | <i>0.31</i>   |
| <i>Deutsche Telekom AG ADR</i>                          | <i>24.6</i> | <i>0.11</i>   |
| <i>British Telecommunications PLC ADR</i>               | <i>25.7</i> | <i>0.07</i>   |
| <i>Tele Danmark AS ADR</i>                              | <i>27</i>   | <i>0.09</i>   |
| <i>Telekomunikasi Indonesia ADR</i>                     | <i>28.4</i> | <i>0.32</i>   |
| <i>Cable &amp; Wireless PLC ADR</i>                     | <i>29.8</i> | <i>0.14</i>   |
| <i>APT Satellite Holdings ADR</i>                       | <i>31</i>   | <i>0.33</i>   |
| <i>Telefonica SA ADR</i>                                | <i>32.5</i> | <i>0.18</i>   |
| <i>Royal KPN NV ADR</i>                                 | <i>35.7</i> | <i>0.13</i>   |
| <i>Telecom Italia SPA ADR</i>                           | <i>42.2</i> | <i>0.14</i>   |
| <i>Nippon Telegraph &amp; Telephone ADR</i>             | <i>44.3</i> | <i>0.2</i>    |
| <i>France Telecom SA ADR</i>                            | <i>45.2</i> | <i>0.19</i>   |
| <i>Korea Telecom ADR</i>                                | <i>71.3</i> | <i>0.44</i>   |

# PE, Growth and Risk

□ Dependent variable is: PE

□ R squared = 66.2%    R squared (adjusted) = 63.1%

| <i>Variable</i>             |         | <i>Coefficient</i> | <i>SE</i> | <i>t-ratio</i>                   | <i>Probability</i> |
|-----------------------------|---------|--------------------|-----------|----------------------------------|--------------------|
| Constant                    | 13.1151 | 3.471              | 3.78      | 0.0010                           |                    |
| Growth rate                 |         | 121.223            | 19.27     | 6.29                             | ≤ 0.0001           |
| Emerging Market             | -13.853 | 1                  | 3.606     | -3.84                            | 0.0009             |
| Emerging Market is a dummy: |         |                    |           | 1 if emerging market<br>0 if not |                    |

□ Is Indosat cheap?

$$PE = 13.13 + 121.22 (.06) - 13.85 (1) = 6.55$$

At 7.8 times earnings, Indosat is over valued.



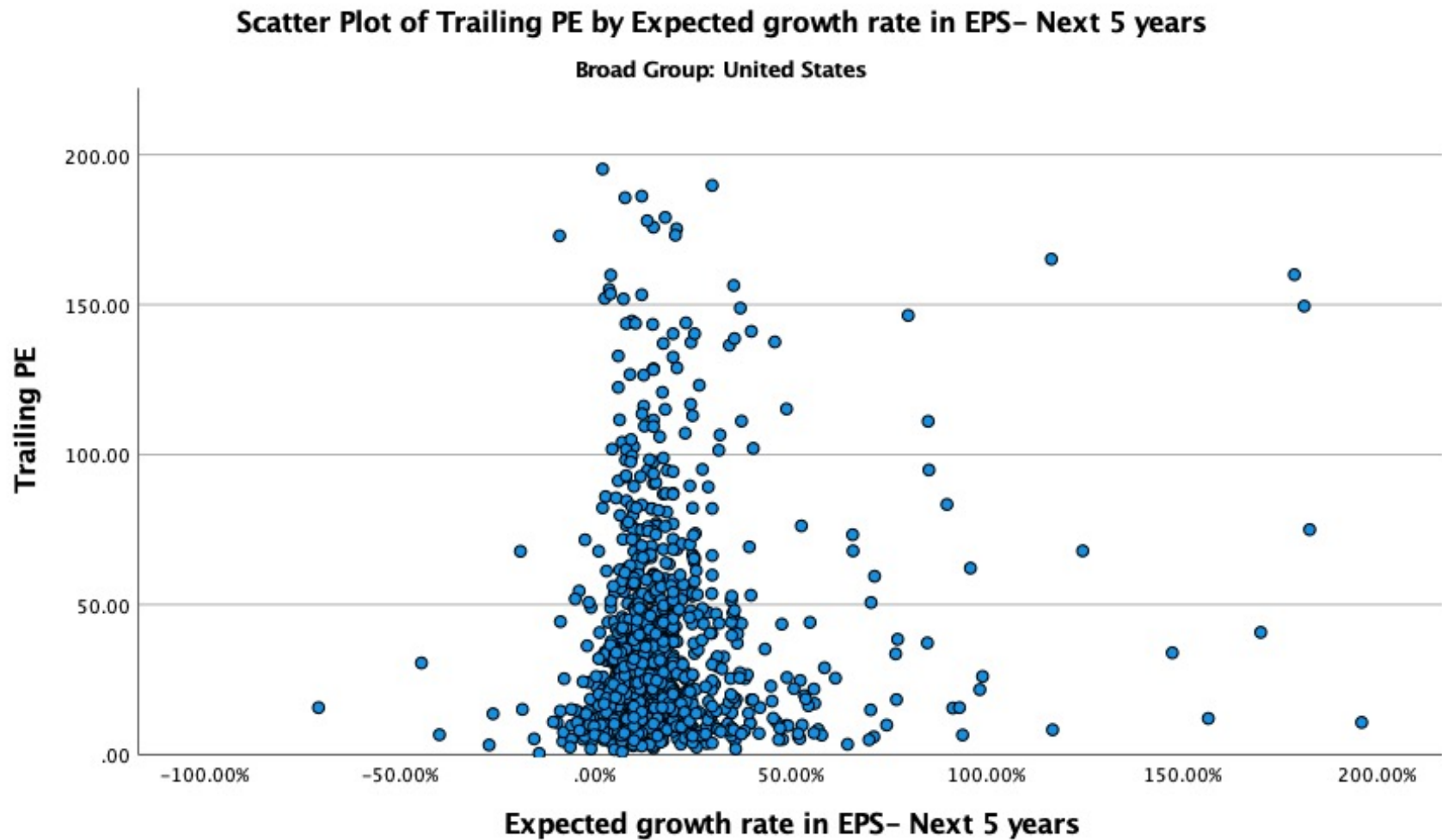
# Comparisons to the entire market: Why not?

- In contrast to the 'comparable firm' approach, the information in the entire cross-section of firms can be used to predict PE ratios.
- The simplest way of summarizing this information is with a multiple regression, with the PE ratio as the dependent variable, and proxies for risk, growth and payout forming the independent variables.

# I. PE Ratio versus the market

## PE versus Expected EPS Growth: January 2022

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# PE Ratio: Standard Regression for US stocks - January 2022

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## Model Summary<sup>a</sup>

| Model | R                 | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1     | .231 <sup>b</sup> | .053     | .051              | 4834.03933                 |

a. Broad Group = United States

b. Predictors: (Constant), Expected growth rate in EPS- Next 5 years, Payout ratio, Beta

*The regression is run with growth and payout entered as absolute, i.e., 25% is entered as 25)*

## Coefficients<sup>a,b,c</sup>

| Model |   | Unstandardized Coefficients |            | Standardized Coefficients | t      | Sig.  |
|-------|---|-----------------------------|------------|---------------------------|--------|-------|
|       |   | B                           | Std. Error | Beta                      |        |       |
| 1     | (Constant)                                | 33.327                      | 2.694      |                           | 12.369 | <.001 |
|       | Beta                                      | -7.107                      | 2.474      | -.086                     | -2.873 | .004  |
|       | Payout ratio                              | .075                        | .021       | .105                      | 3.537  | <.001 |
|       | Expected growth rate in EPS- Next 5 years | .494                        | .063       | .243                      | 7.897  | <.001 |

a. Broad Group = United States

b. Dependent Variable: Trailing PE

c. Weighted Least Squares Regression – Weighted by Market Cap (in US \$)

Aswari

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# PE ratio regressions across markets

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| Region                | Regression – January 2022   | R <sup>2</sup> |
|-----------------------|---|----------------|
| US                    | PE = 33.33 – 7.11 Beta + 7.50 Payout + 49.4 g <sub>EPS</sub>        | 5.1%           |
| Europe                | PE = 30.23 -9.06Beta + 12.60 Payout + 27.40 g <sub>EPS</sub>        | 9.4%           |
| Japan                 | PE = 18.17– 3.40 Beta + 7.40 Payout + 59.70 g <sub>EPS</sub>        | 12.5%          |
| Emerging Markets      | PE = 15.08 + 0.40 Beta + 2.60 Payout + 66.90 g <sub>EPS</sub>       | 16.7%          |
| Australia, NZ, Canada | PE = 16.65 -5.88 Beta + 10.20 Payout + 100.20 g <sub>EPS</sub>      | 29.4%          |
| <b>Global</b>         | <b>PE = 28.52 – 5.89 Beta + 6.20 Payout + 51.30 g<sub>EPS</sub></b> | <b>7.6%</b>    |

*g<sub>EPS</sub>* = Expected Growth: Expected growth in EPS or Net Income: Next 5 years (decimals)

*Beta*: Regression or Bottom up Beta

*Payout ratio*: Dividends/ Net income from most recent year. Set to zero, if net income < 0

# Choosing Between the Multiples

- As presented in this section, there are dozens of multiples that can be potentially used to value an individual firm.
- In addition, relative valuation can be relative to a sector (or comparable firms) or to the entire market (using the regressions, for instance)
- Since there can be only one final estimate of value, there are three choices at this stage:
  - Use a simple average of the valuations obtained using a number of different multiples
  - Use a weighted average of the valuations obtained using a number of different multiples
  - Choose one of the multiples and base your valuation on that multiple

# Picking one Multiple

- This is usually the best way to approach this issue. While a range of values can be obtained from a number of multiples, the “best estimate” value is obtained using one multiple.
- The multiple that is used can be chosen in one of two ways:
  - Use the multiple that best fits your objective. Thus, if you want the company to be undervalued, you pick the multiple that yields the highest value.
  - Use the multiple that has the highest R-squared in the sector when regressed against fundamentals. Thus, if you have tried PE, PBV, PS, etc. and run regressions of these multiples against fundamentals, use the multiple that works best at explaining differences across firms in that sector.
  - Use the multiple that seems to make the most sense for that sector, given how value is measured and created.

# Conventional usage...

| Sector                       | Multiple Used                                 | Rationale                               |
|------------------------------|---|---|
| Cyclical Manufacturing       | PE, Relative PE                               | Often with normalized earnings          |
| Growth firms                 | PEG ratio                                     | Big differences in growth rates         |
| Young growth firms w/ losses | Revenue Multiples                             | What choice do you have?                |
| Infrastructure               | EV/EBITDA                                     | Early losses, big DA                    |
| REIT                         | P/CFE (where CFE = Net income + Depreciation) | Big depreciation charges on real estate |
| Financial Services           | Price/ Book equity                            | Marked to market?                       |
| Retailing                    | Revenue multiples                             | Margins equalize sooner or later        |



# A closing thought...

