VALUATION: IT'S NOT THAT COMPLICATED!

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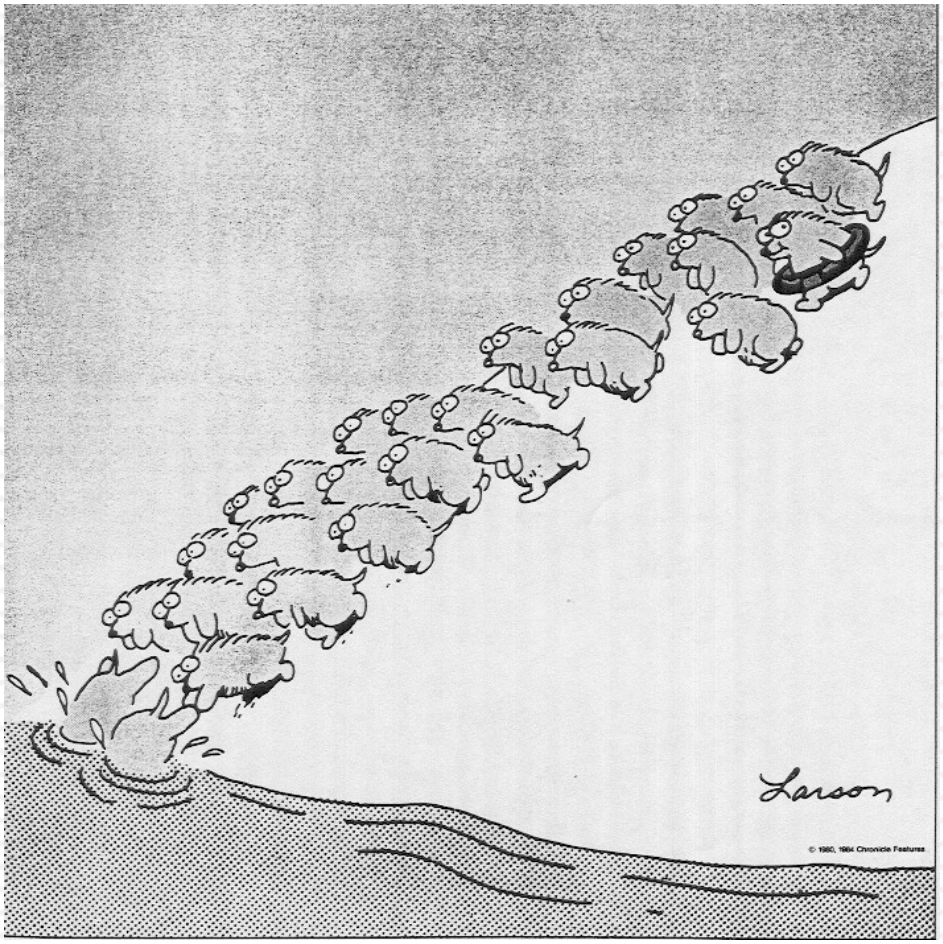
The Big Picture

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



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

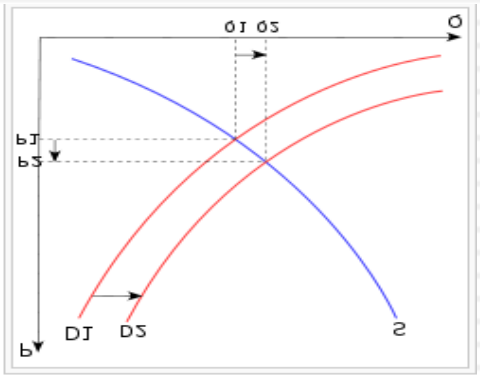
INTRINSIC VALUE

Value

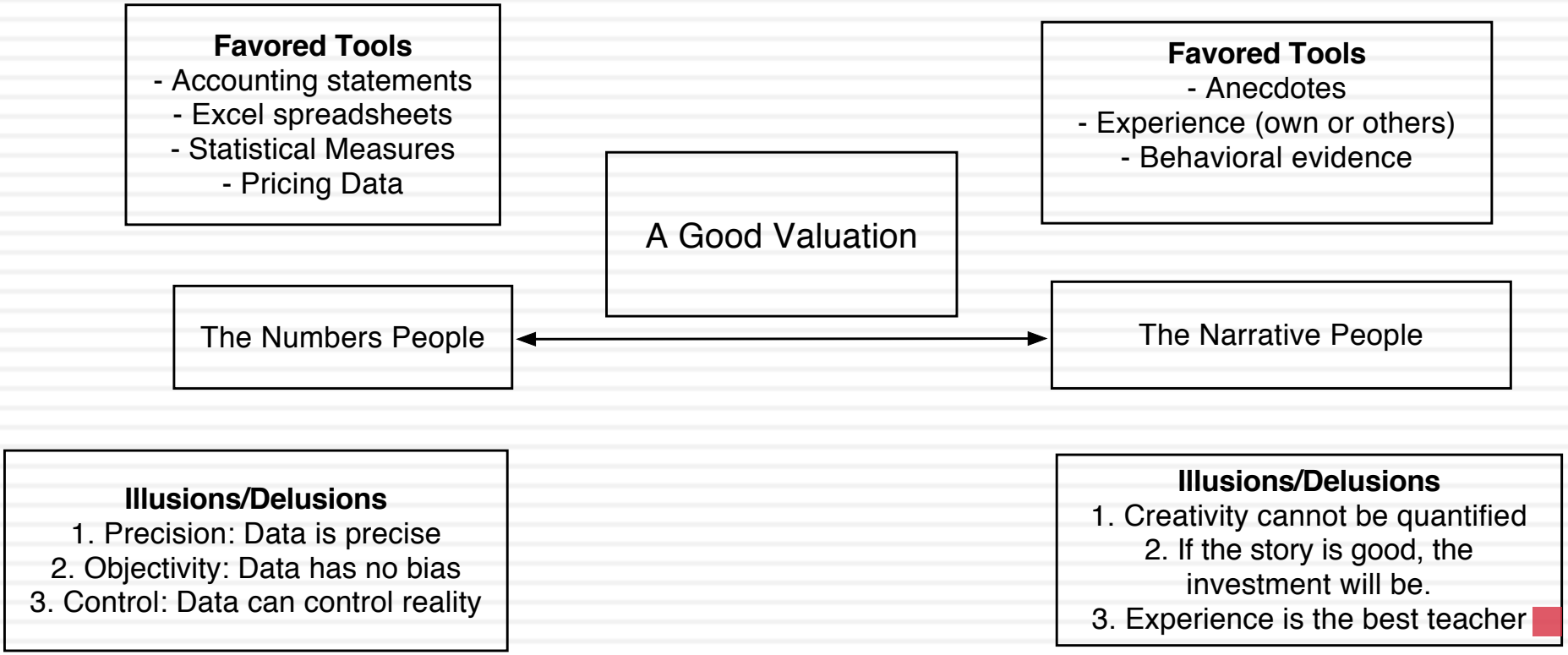
THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?

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

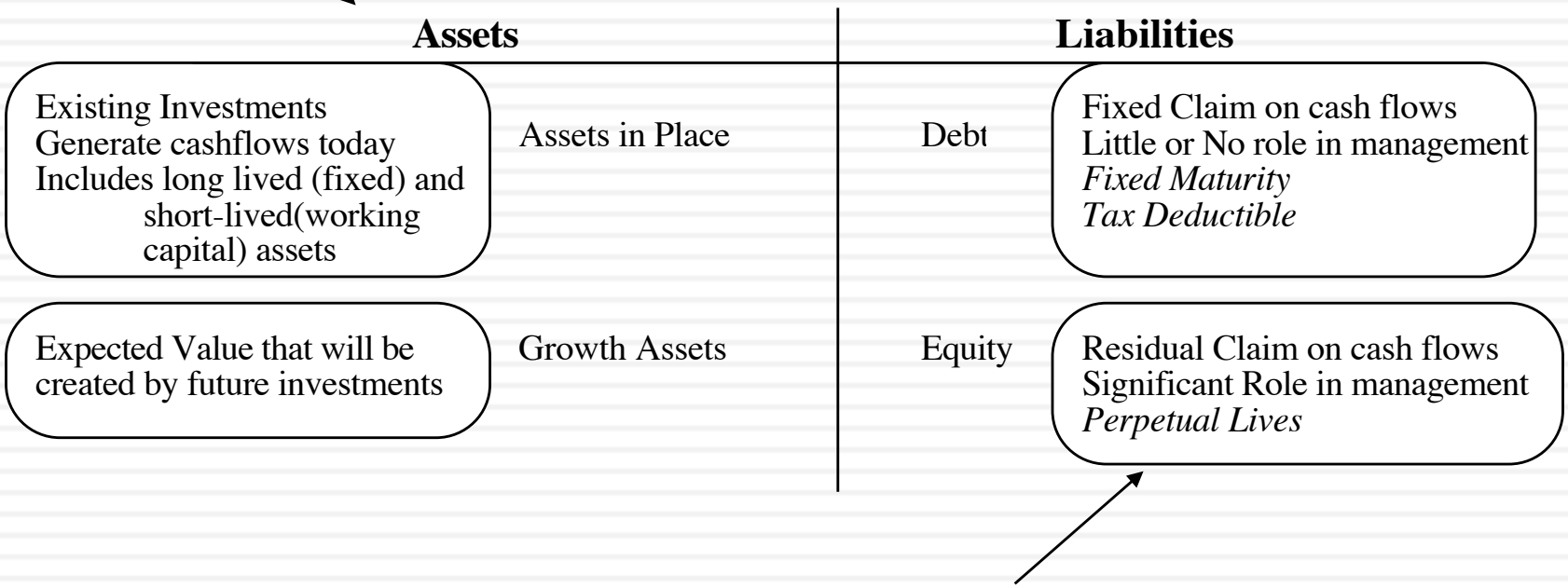
- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

$$\text{Value of asset} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \ldots\ldots + \frac{E(CF_n)}{(1+r)^n}$$

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.

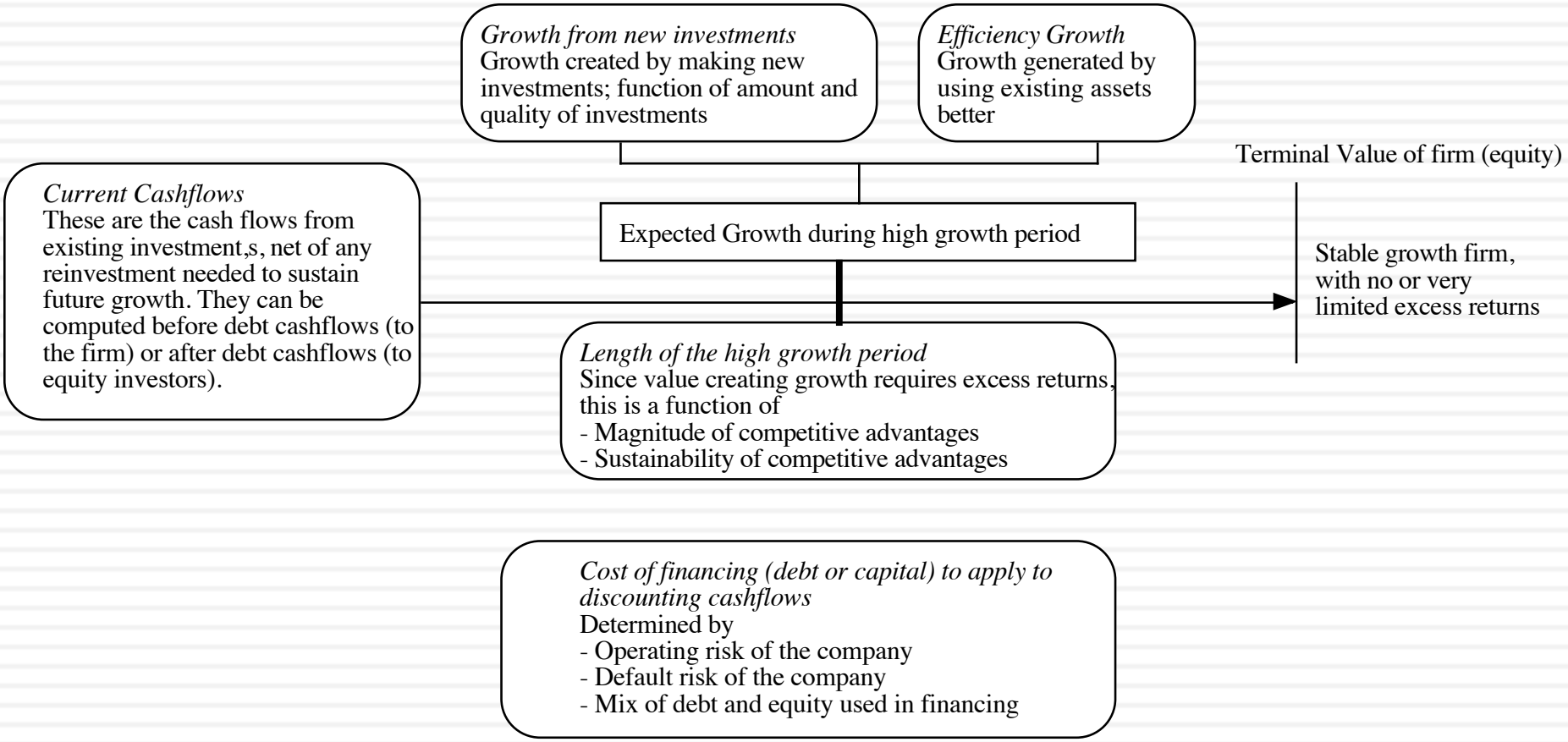
DCF Choices: Equity Valuation versus Firm Valuation

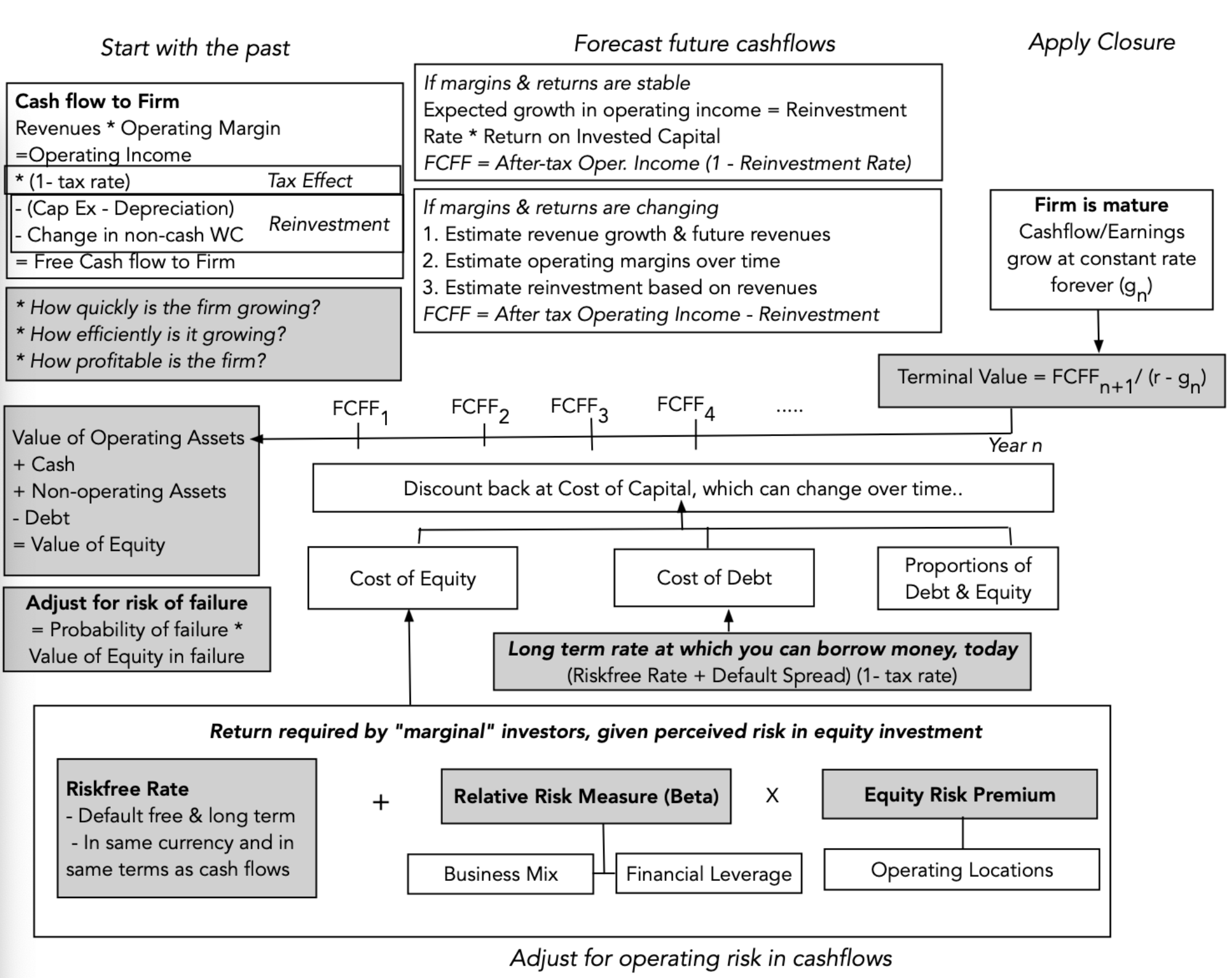
Firm Valuation: Value the entire business



Equity valuation: Value just the equity claim in the business

The Drivers of Value…




Start with the past
Forecast future cashflows
Apply Closure
Cash flow to Firm
Revenues * Operating Margin
=Operating Income
* (1- tax rate)
Tax Effect
- (Cap Ex - Depreciation)
- Change in non-cash WC
Reinvestment
= Free Cash flow to Firm
* How quickly is the firm growing?
* How efficiently is it growing?
* How profitable is the firm?
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
Firm is mature
Cashflow/Earnings grow at constant rate forever (g_n)
Terminal Value = FCFF_n+1 / (r - g_n)
FCFF1
FCFF2
FCFF3
FCFF4
.....
Year n
Value of Operating Assets
+ Cash
+ Non-operating Assets
- Debt
= Value of Equity
Discount back at Cost of Capital, which can change over time..
Cost of Equity
Cost of Debt
Proportions of Debt & Equity
Adjust for risk of failure
= Probability of failure * Value of Equity in failure
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)
X
Equity Risk Premium
Business Mix
Financial Leverage
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%

Return on Capital 16%

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

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$_{10}$= 7300/(.0808-.04) = 179,099

First 5 years

Growth decreases gradually to 4%

Year	1	2	3	4	5	6	7	8	9	10	Term Yr
EBIT	$9,221	$10,106	$11,076	$12,140	$13,305	$14,433	$15,496	$16,463	$17,306	$17,998	18718
EBIT (1-t)	$6,639	$7,276	$7,975	$8,741	$9,580	$10,392	$11,157	$11,853	$12,460	$12,958	12167
- Reinvestment	$3,983	$4,366	$4,785	$5,244	$5,748	$5,820	$5,802	$5,690	$5,482	$5,183	4867
= FCFF	$2,656	$2,911	$3,190	$3,496	$3,832	$4,573	$5,355	$6,164	$6,978	$7,775	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*.1716=0.1201

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

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

Rs Cashflows

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.

Cost of Equity
14.00%

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

Weights
E = 74.7% D = 25.3%

On April 1, 2010
Tata Motors price = Rs 781

Riskfree Rate:
Rs Riskfree Rate= 5%

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

Unlevered Beta for Sectors: 0.98

Firm's D/E Ratio: 34%

Country Default Spread 3% X Rel Equity Mkt Vol 1.50

Infosys: November 2022 (in Rupees)

Cash flows from existing assets

	2001-2010	2011-2020	LTM
Revenue Growth Rate	37.58%	16.13%	32.80%
Operating Margin	29.43%	25.35%	21.59%
Sales/Invested Capital	2.67	2.29	2.38

The Payoff from growth

Revenues will grow 15% a year for next 5 years, tapering down to 5.42% growth in year 10

Operatng margin (per-tax) will continue to decline from 21.55% to 20%

Sales/Invested Capital will stay at last year's level of 2.39

Maturty and Closure

Stable Growth
g = 4.77%;
Cost of capital = 9.28%
ROC= 20%;
Reinvestment Rate=g/ROC
= 4.77%/20.00= 23.85%

Terminal Value = 490,140/(.0928-..0477) = 10,873,670

Terminal cash flow	₹ 490,140
Terminal cost of capital	9.28%
Terminal value	₹ 10,873,670
PV(Terminal value)	₹ 4,477,805
PV (CF over next 10 years)	₹ 1,826,077
Proceeds if firm fails =	₹ 3,151,941
Value of operating assets =	₹ 6,303,882
- Debt	₹ 65,262
- Minority interests	₹ 3,987
+ Cash	₹ 266,583
+ Non-operating assets	₹ 126,700
Value of equity	₹ 6,627,916
Number of shares	₹ 4,195
Estimated value /share	₹ 1,579.99
Price	₹ 1,524.00

Rupee Cashflows

	Base year	1	2	3	4	5	6	7	8	9	10	Terminal year
Revenue growth rate		15.00%	15.00%	15.00%	15.00%	15.00%	12.95%	10.91%	8.86%	6.82%	4.77%	4.77%
Revenues	₹ 1,429,493	₹ 1,643,917	₹ 1,890,504	₹ 2,174,080	₹ 2,500,192	₹ 2,875,221	₹ 3,247,677	₹ 3,601,934	₹ 3,921,137	₹ 4,188,402	₹ 4,388,189	₹ 4,597,505
Operating Margin	21.55%	21.55%	20.93%	20.62%	20.31%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
Operating Income	₹ 308,002	₹ 354,202	₹ 395,640	₹ 448,263	₹ 507,770	₹ 575,044	₹ 649,535	₹ 720,387	₹ 784,227	₹ 837,680	₹ 877,638	₹ 919,501
Tax rate	27.10%	27.10%	27.10%	27.10%	27.10%	27.10%	27.68%	28.26%	28.84%	29.42%	30.00%	30.00%
EBIT(1-t)	₹ 224,533	₹ 258,213	₹ 288,422	₹ 326,783	₹ 370,165	₹ 419,207	₹ 469,744	₹ 516,805	₹ 558,056	₹ 591,235	₹ 614,346	₹ 643,651
- Reinvestment		₹ 89,764	₹ 103,229	₹ 118,713	₹ 136,520	₹ 156,998	₹ 155,921	₹ 148,302	₹ 133,628	₹ 111,885	₹ 83,637	₹ 153,511
FCFF		₹ 168,449	₹ 185,193	₹ 208,071	₹ 233,645	₹ 262,209	₹ 313,823	₹ 368,503	₹ 424,429	₹ 479,350	₹ 530,710	₹ 490,140
Cost of capital		9.28%	9.28%	9.28%	9.28%	9.28%	9.28%	9.28%	9.28%	9.28%	9.28%	
PV(FCFF)		₹ 154,148	₹ 155,082	₹ 159,447	₹ 163,844	₹ 168,265	₹ 184,289	₹ 198,027	₹ 208,716	₹ 215,711	₹ 218,548	

Discount at Rs Cost of Capital (WACC) = 9.31% (.991) + 8.07%(1-.3) (.009) = 9.28%

The Risk in the Cash flows

On October 28, 2022, Infosys was trading at Rs 1524/share

Cost of Equity
9.31%

Pre-tax Cost of Debt
= 4.77% + 2.64% + 0.66% =8.07%
After-tax = 8.07% (1-.3) - 5.65%

Weights
E = 99.1% D = 0.9%

Riskfree Rate:
Rupee Risk free Rate =
7.41% - 2.64% = 4.77%

+ Beta = 0.70 X

Firm's D/E Ratio: 0.9%

ERP = 6.41%

Region	Revenues	Weight	ERP
North America	₹ 10,066	61.71%	6.01%
Western Europe	₹ 4,039	24.76%	7.17%
Rest of the World	₹ 1,726	10.58%	6.18%
India	₹ 480	2.94%	9.08%
Infosys	₹ 16,311	100.00%	6.41%

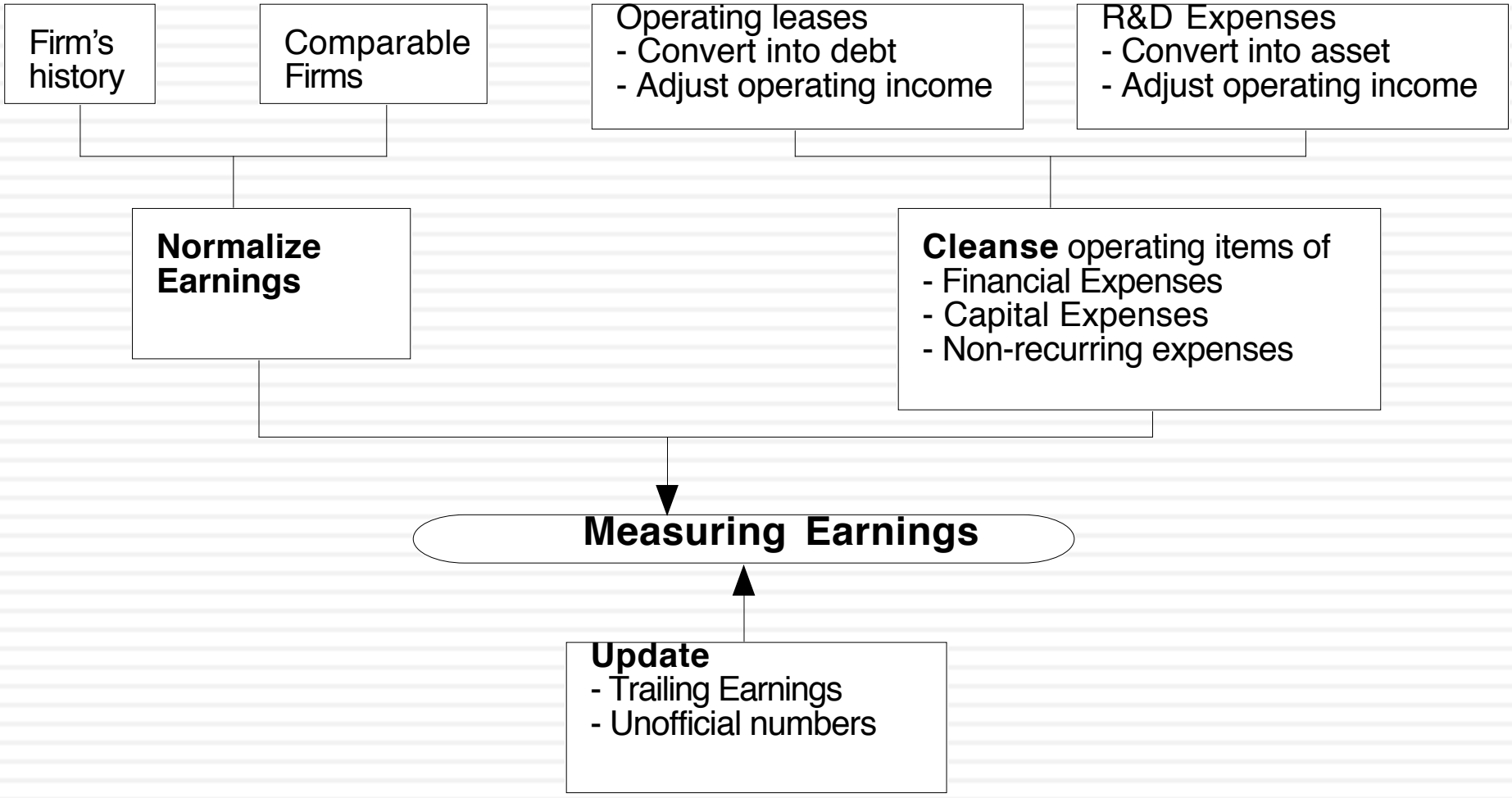
Client Business	Revenues	EV/Sales	Estimated Value	Weights	Unlevered Beta
Financial Services	₹ 5,218	6.3536	$ 33,153.32	57.61%	0.5906
Retail	₹ 2,379	0.9811	$ 2,334.03	4.06%	0.8681
Communications	₹ 2,035	2.1781	$ 4,432.34	7.70%	0.5764
Energy & Utilities	₹ 1,942	2.2634	$ 4,395.60	7.64%	0.5392
Manufacturing	₹ 1,787	2.3838	$ 4,259.80	7.40%	1.1250
Technology	₹ 1,346	1.6694	$ 2,246.95	3.90%	1.0873
Healthcare	₹ 1,142	5.8873	$ 6,723.33	11.68%	1.0052
Infosys	₹ 15,849		$ 57,545.35		0.7042

Aswath Damodaran

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 it's 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

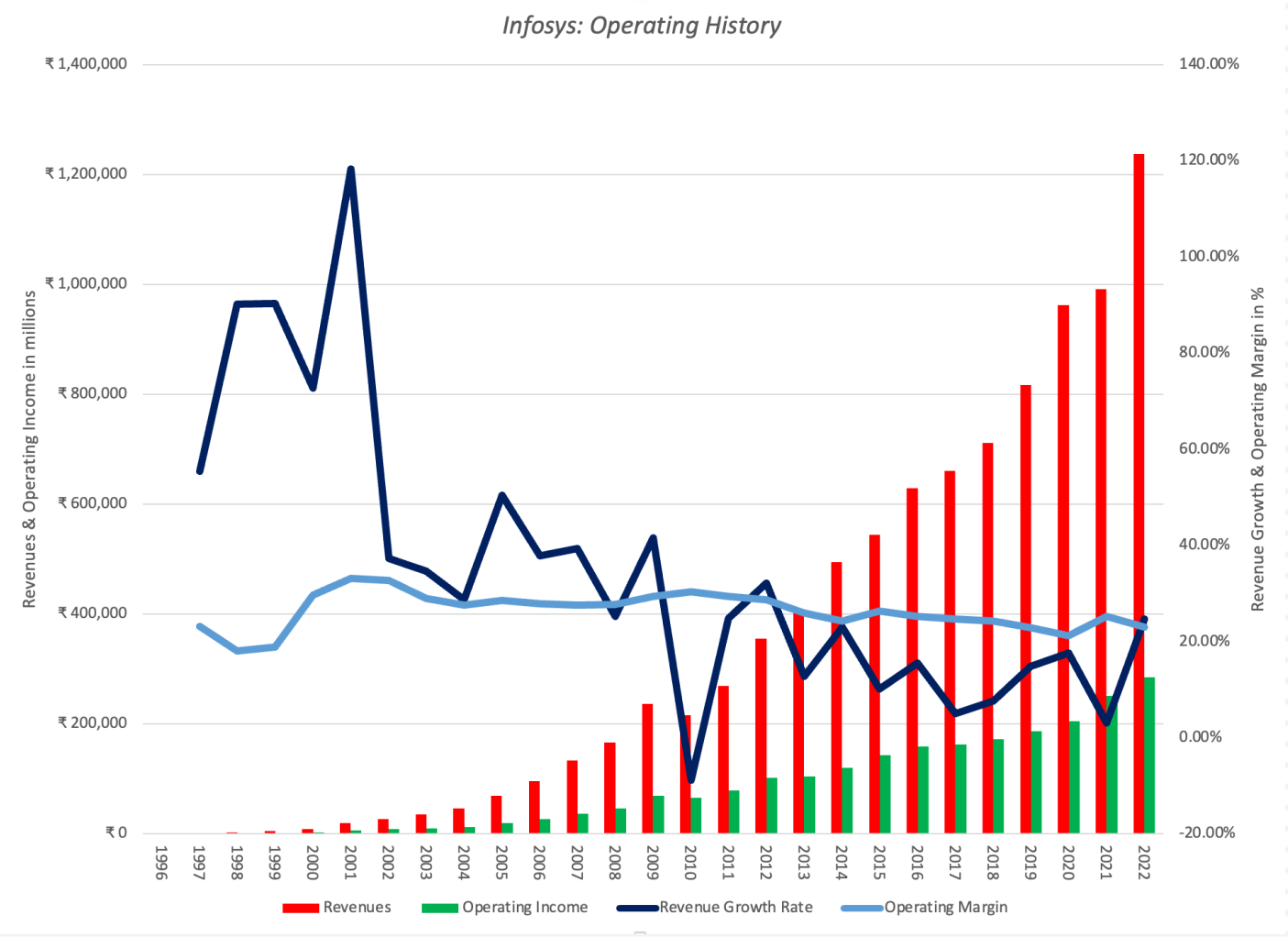
Capitalizing R&D Expenses: Amgen

- 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

Infosys: 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.

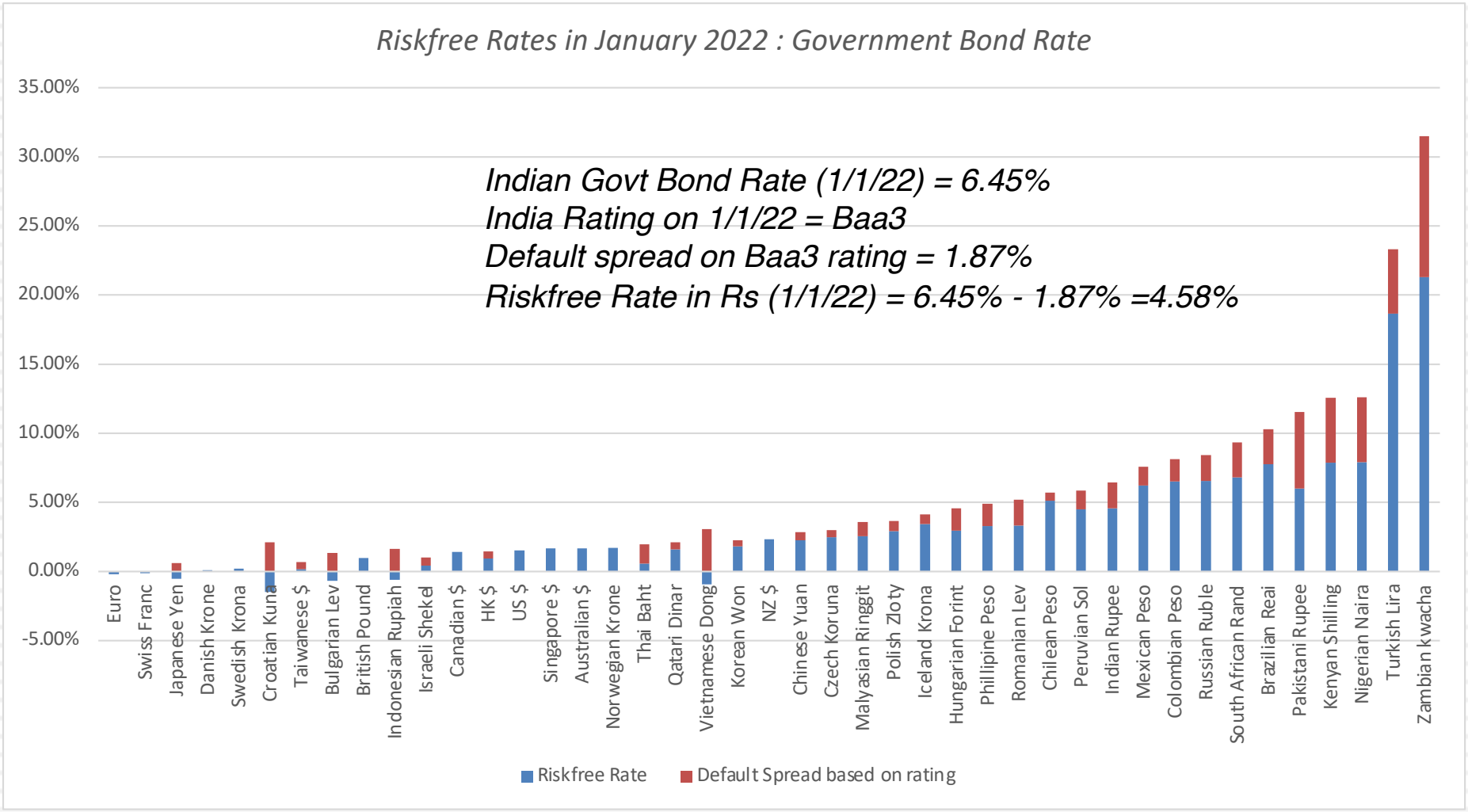
III. The government bond rate is not always the riskfree rate

- 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.

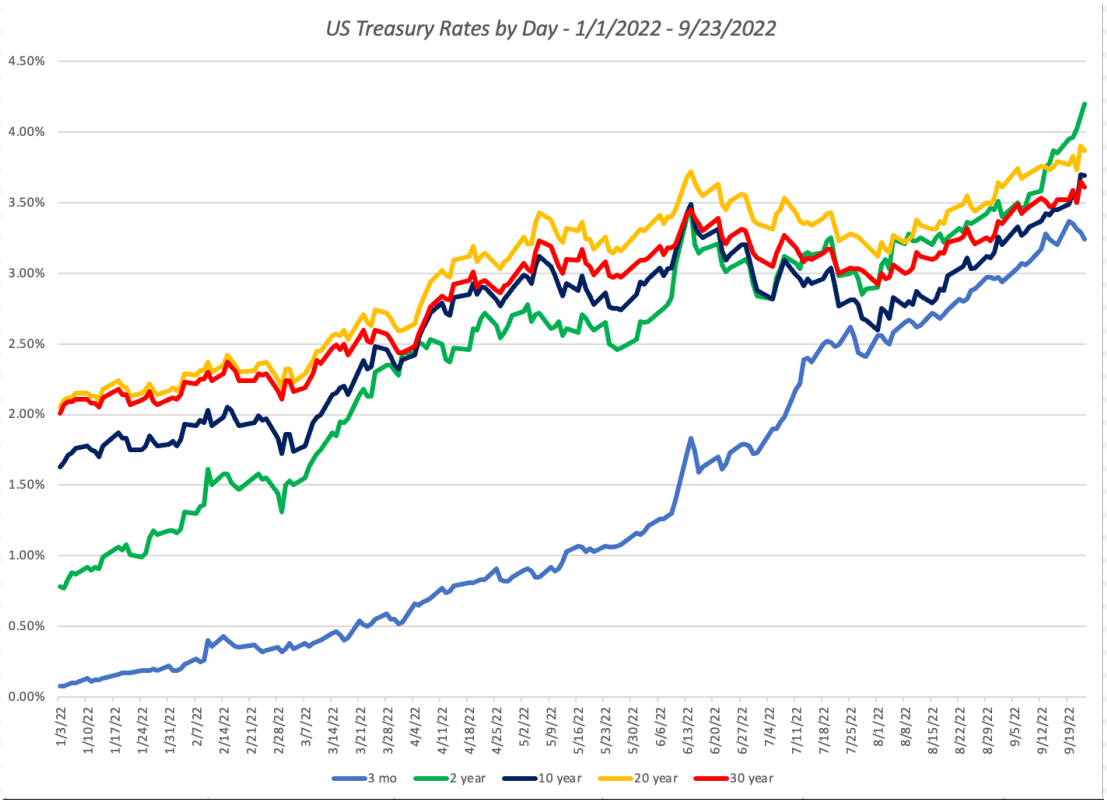
  Risk free rate in Indian Rupees = 8% - 3% = 5%

- To value Infosys in March 2022, you need a risk free rate in Rupees at the time. The Indian government bond rate on October 28, 2022, was 7.41%. The Indian government was rated Ba3 on that day with a default spread of 2.64% associated with it. The risk free rate in the Indian rupees on March 31, 2018:
  - Risk free Rate in Rupees = 7.41% - 2.64% = 4.77%

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

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

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

Maturty and Closure

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

Terminal Value = 2972/(.05-..-(.005)) = 54,034

Euro Cashflows

	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-.25) = 1.13%

Weights E = 59.9% D = 40.1%

Riskfree Rate: Euro Risk free rate = -0.50%

\+

Beta = 1.20

X

Firm's D/E Ratio: 66.98%

Unlevered beta of alcoholic beverage business = 0.80

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%
Total	**20599**	**100.00%**	**6.83%**

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

	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

Arcelik: My valuation (October 2019)

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.

Cost of equity = 24.73%

Cost of Debt *Rated B*
(11.06%+4.06%+5.40%)(1-.25) = 16.01%

Weights
E = 52.2% D = 47.8%

Riskfree Rate:
Riskfree rate = 11.06%

+

Beta
1.69

x

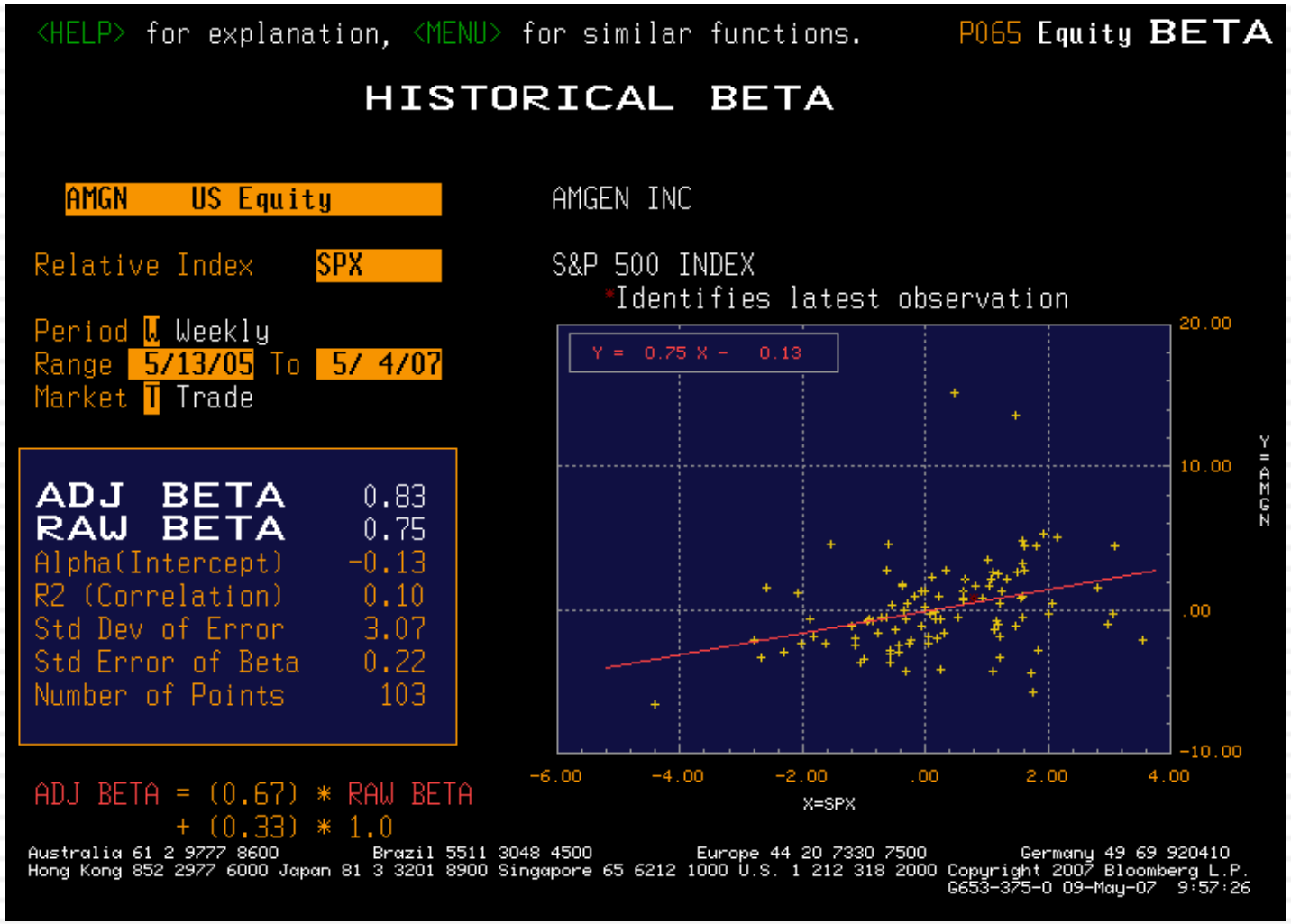
Risk Premium
8.11%

D/E = 89.04%

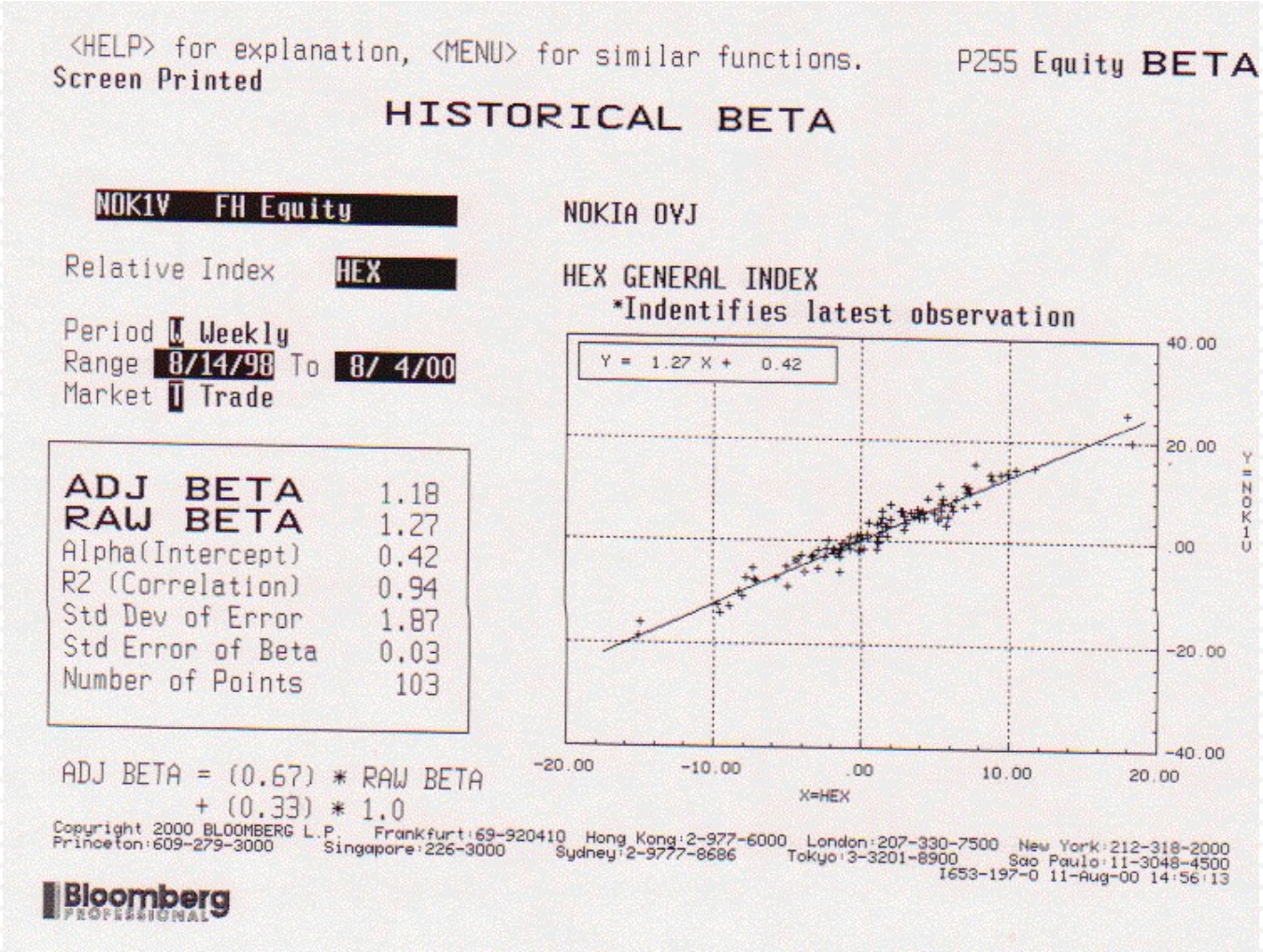
Business	Revenues	EV/Sales	Estimated Value	Unlevered Beta
Furn/Home Furnishings	$ 20,657	0.9785	$ 20,213	0.97
Electronics (Consumer & Office)	$ 2,807	0.5769	$ 1,619	1.30
Arcelik	$ 23,464		$ 21,833	0.99

Region	Revenues	ERP	Weight
Europe	13,272 ₺	6.68%	49.37%
Turkey	8,425 ₺	10.53%	31.34%
Asia	2,299 ₺	7.00%	8.55%
Africa & Mid East	1,926 ₺	9.08%	7.16%
Rest of the World	963 ₺	7.39%	3.58%
Total	26,885 ₺	8.11%	100.00%

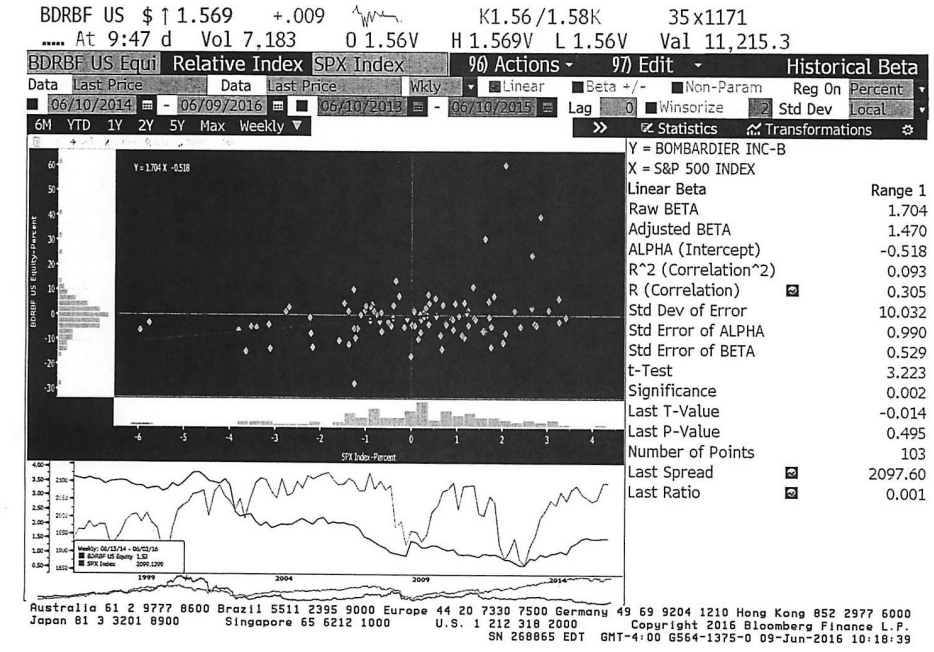
IV. Betas do not come from regressions… and are noisy…

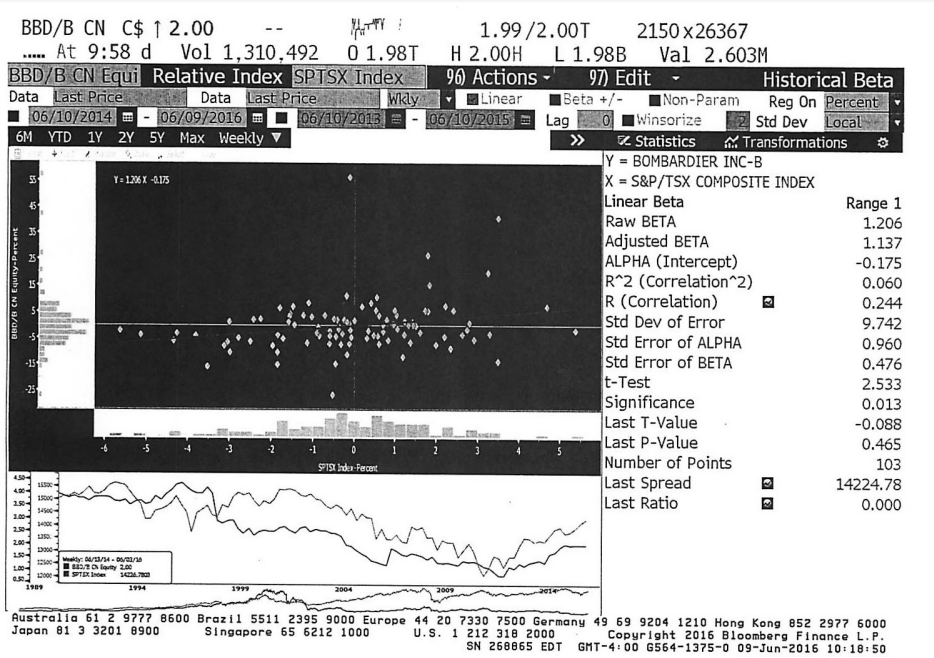


But should not be trusted, even when they look great…

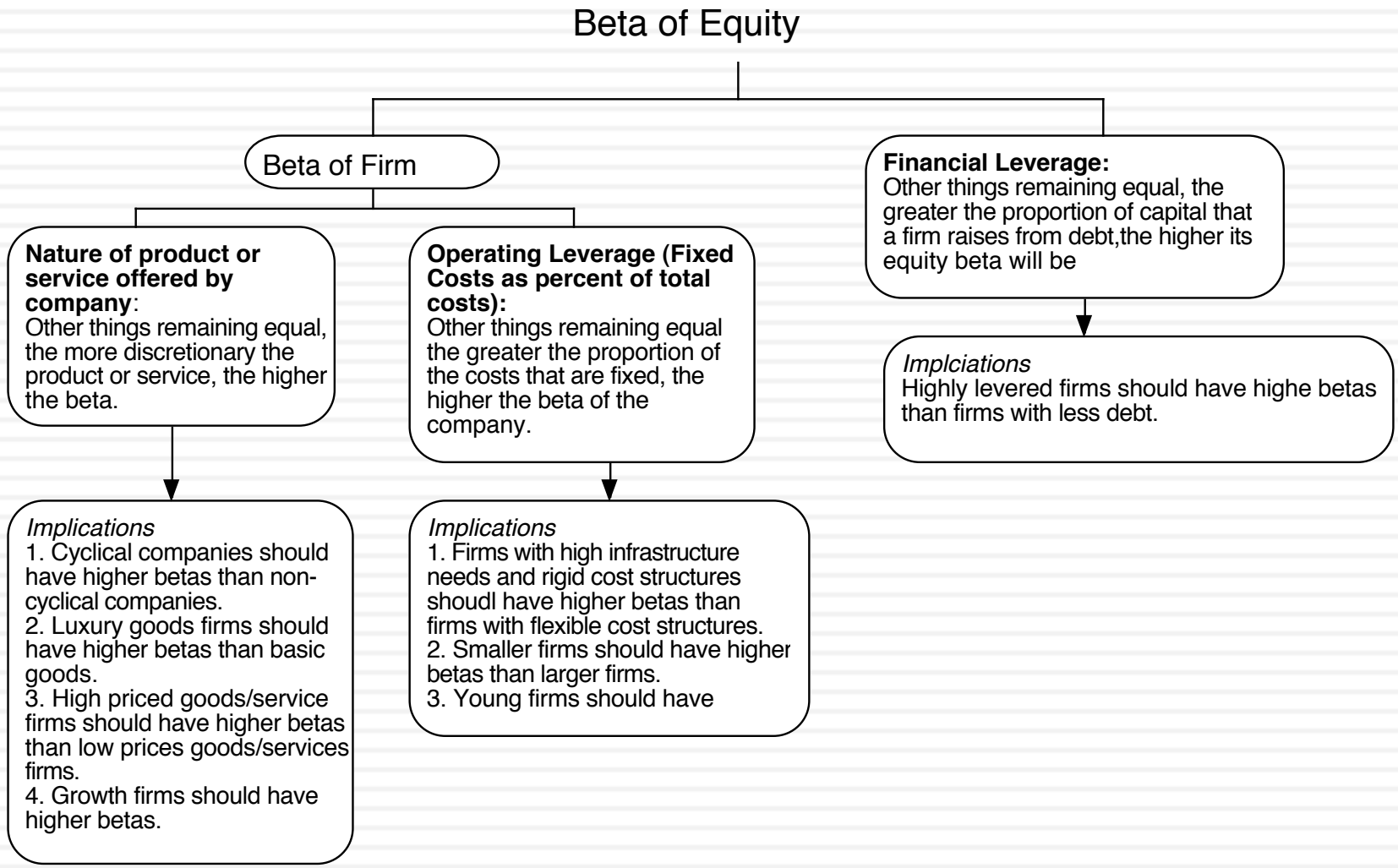


And subject to game playing

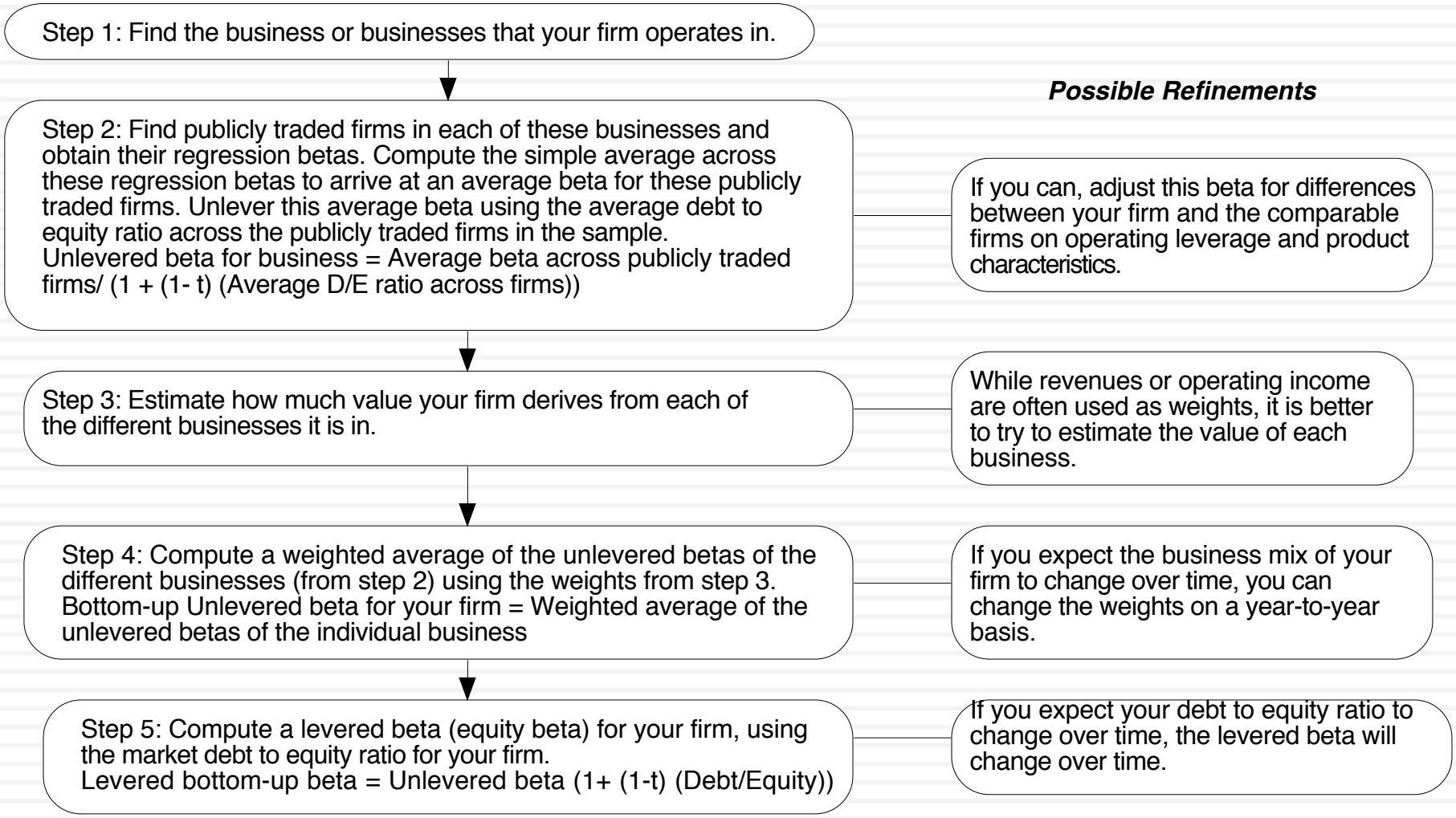




Determinants of Betas



Bottom-up Betas



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
- Infosys in 2022 (Client-based)

Client Business	*Revenues*	*EV/Sales*	*Estimated Value*	*Weights*	*Unlevered Beta*
Financial Services	₹ 5,218	6.3536	$ 33,153.32	57.61%	0.5906
Retail	₹ 2,379	0.9811	$ 2,334.03	4.06%	0.8681
Communications	₹ 2,035	2.1781	$ 4,432.34	7.70%	0.5764
Energy & Utilities	₹ 1,942	2.2634	$ 4,395.60	7.64%	0.5392
Manufacturing	₹ 1,787	2.3838	$ 4,259.80	7.40%	1.1250
Technology	₹ 1,346	1.6694	$ 2,246.95	3.90%	1.0873
Healthcare	₹ 1,142	5.8873	$ 6,723.33	11.68%	1.0052
Infosys	₹ 15,849		$ 57,545.35		0.7042

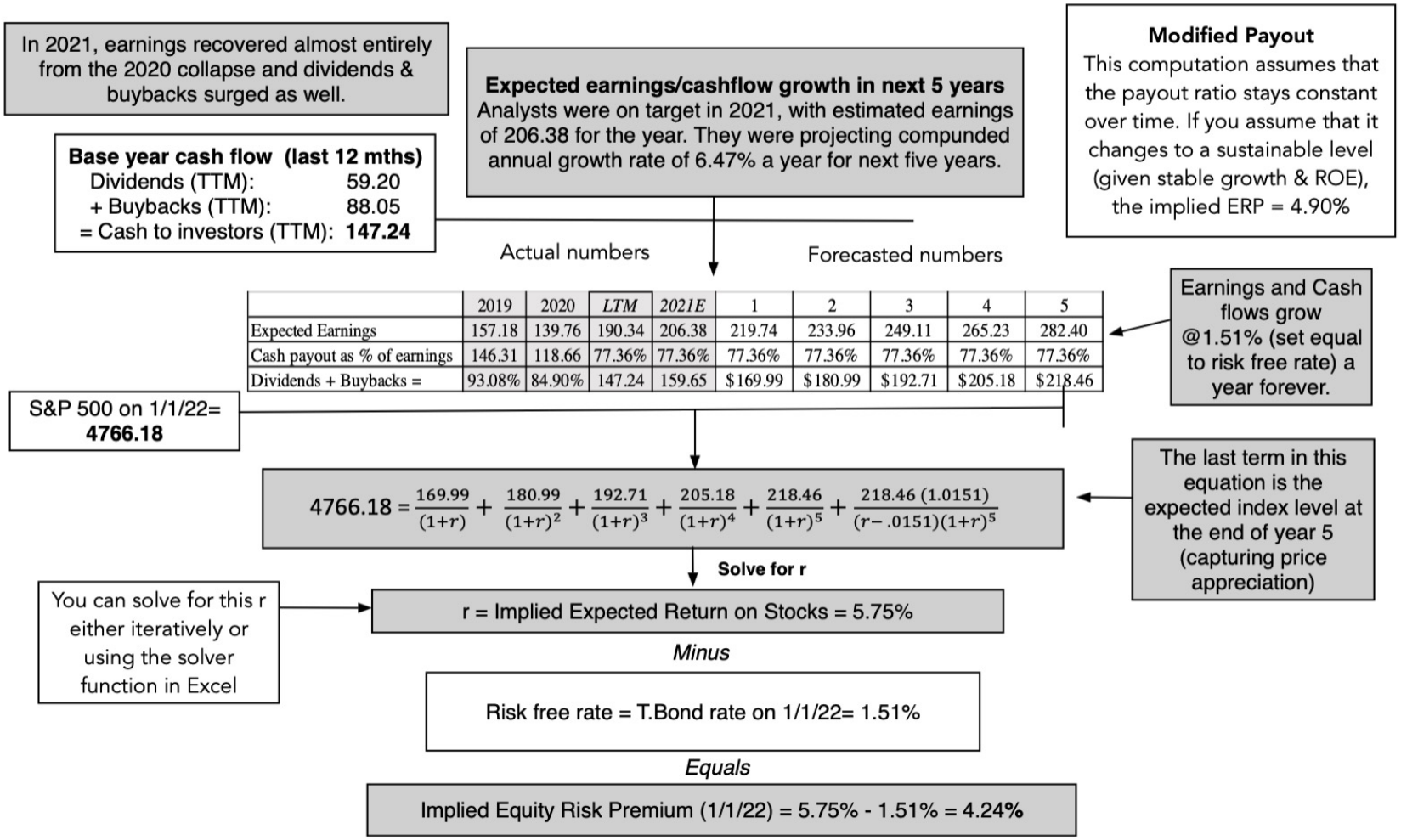
Levered Beta = = 0.70 (1+ (1-.30)(0.009)) = 10.72

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%		

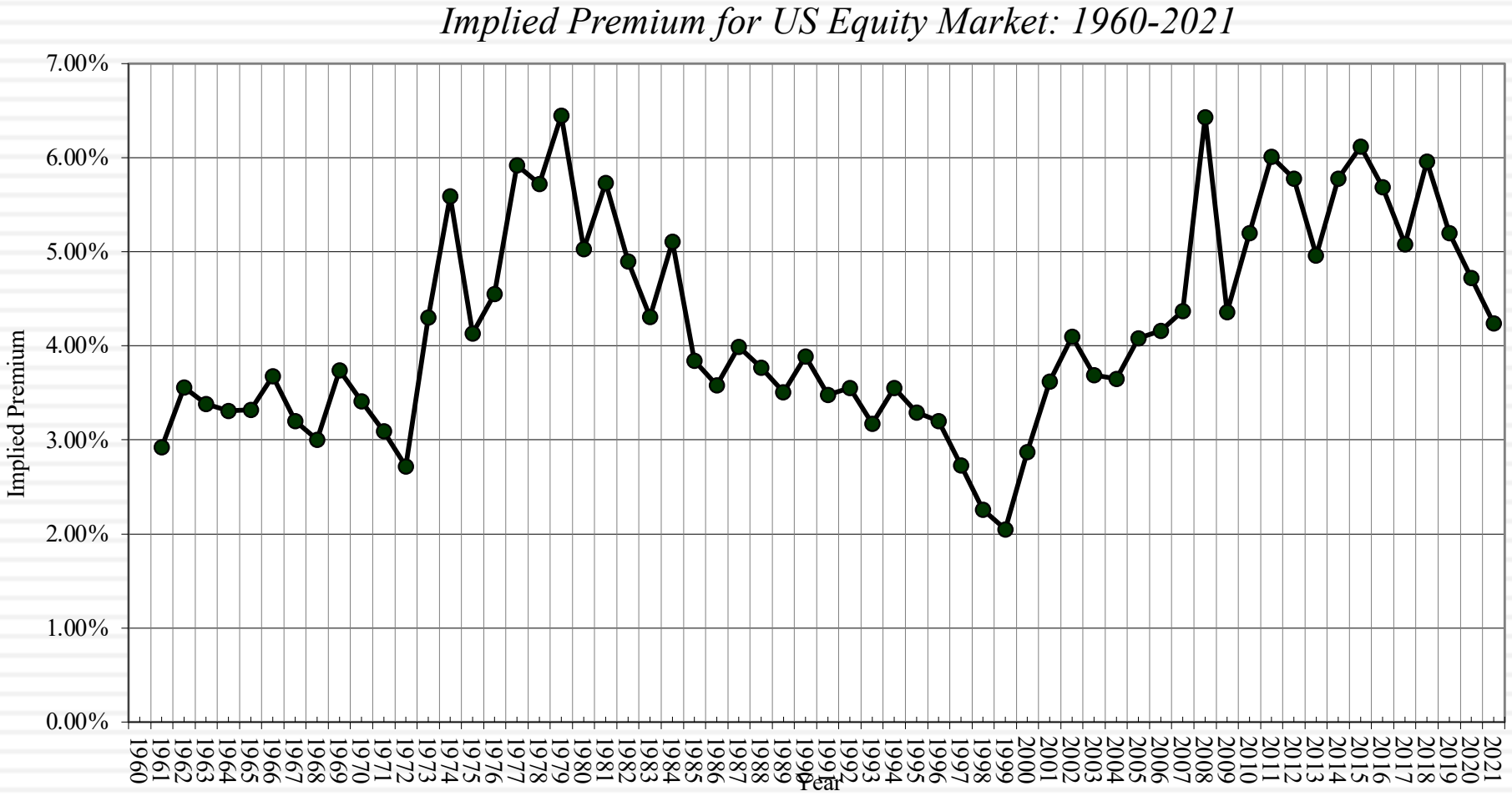
- If you are going to use a historical risk premium, make it
  - Long term (because of the standard error)
  - Consistent with your risk free rate
  - A "compounded" average
- No matter which estimate you use, recognize that it is backward looking, is noisy and may reflect selection bias

But in the future..

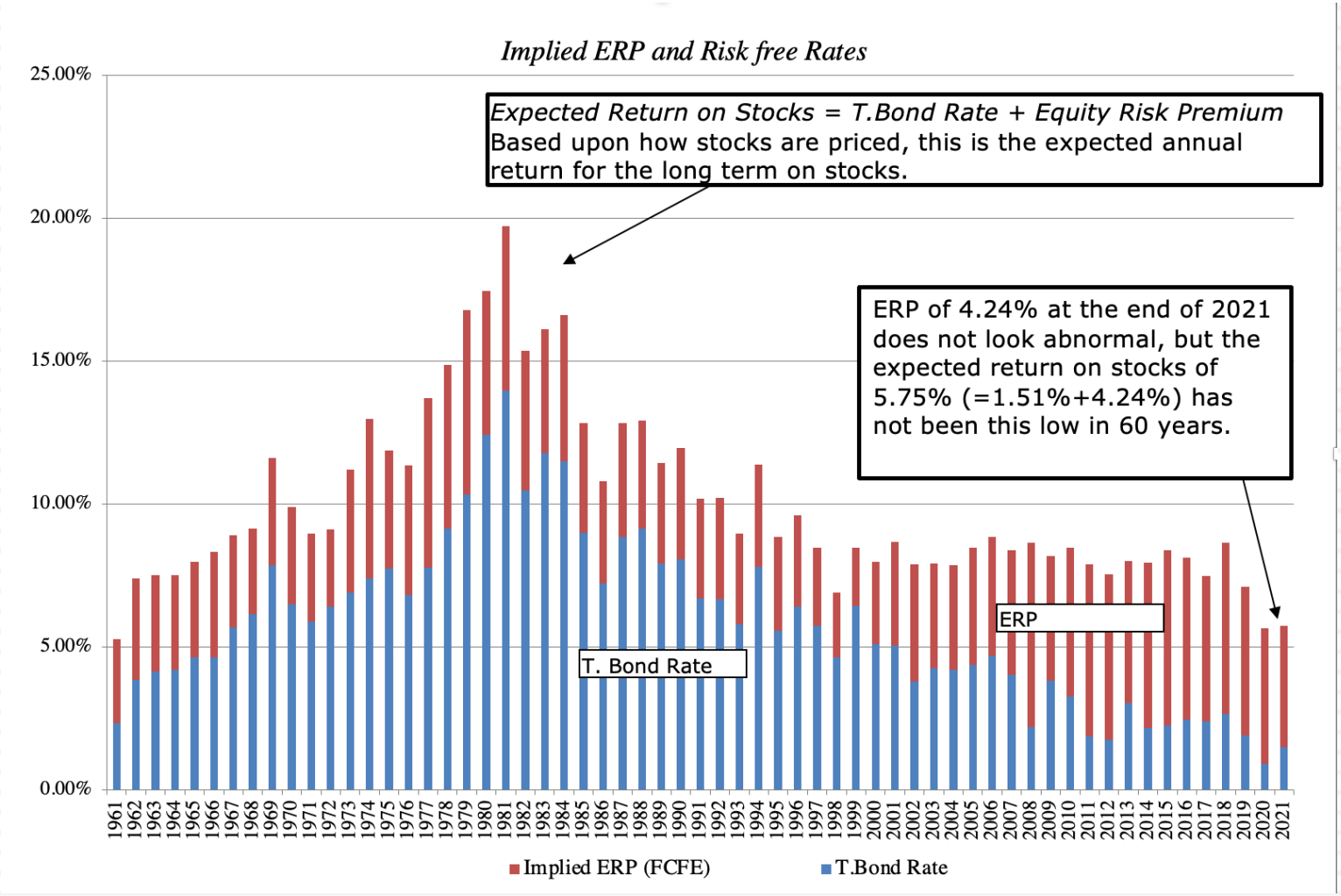


	2019	2020	*LTM*	*2021E*	1	2	3	4	5
Expected Earnings	157.18	139.76	190.34	206.38	219.74	233.96	249.11	265.23	282.40
Cash payout as % of earnings	146.31	118.66	77.36%	77.36%	77.36%	77.36%	77.36%	77.36%	77.36%
Dividends + Buybacks =	93.08%	84.90%	147.24	159.65	$169.99	$180.99	$192.71	$205.18	$218.46

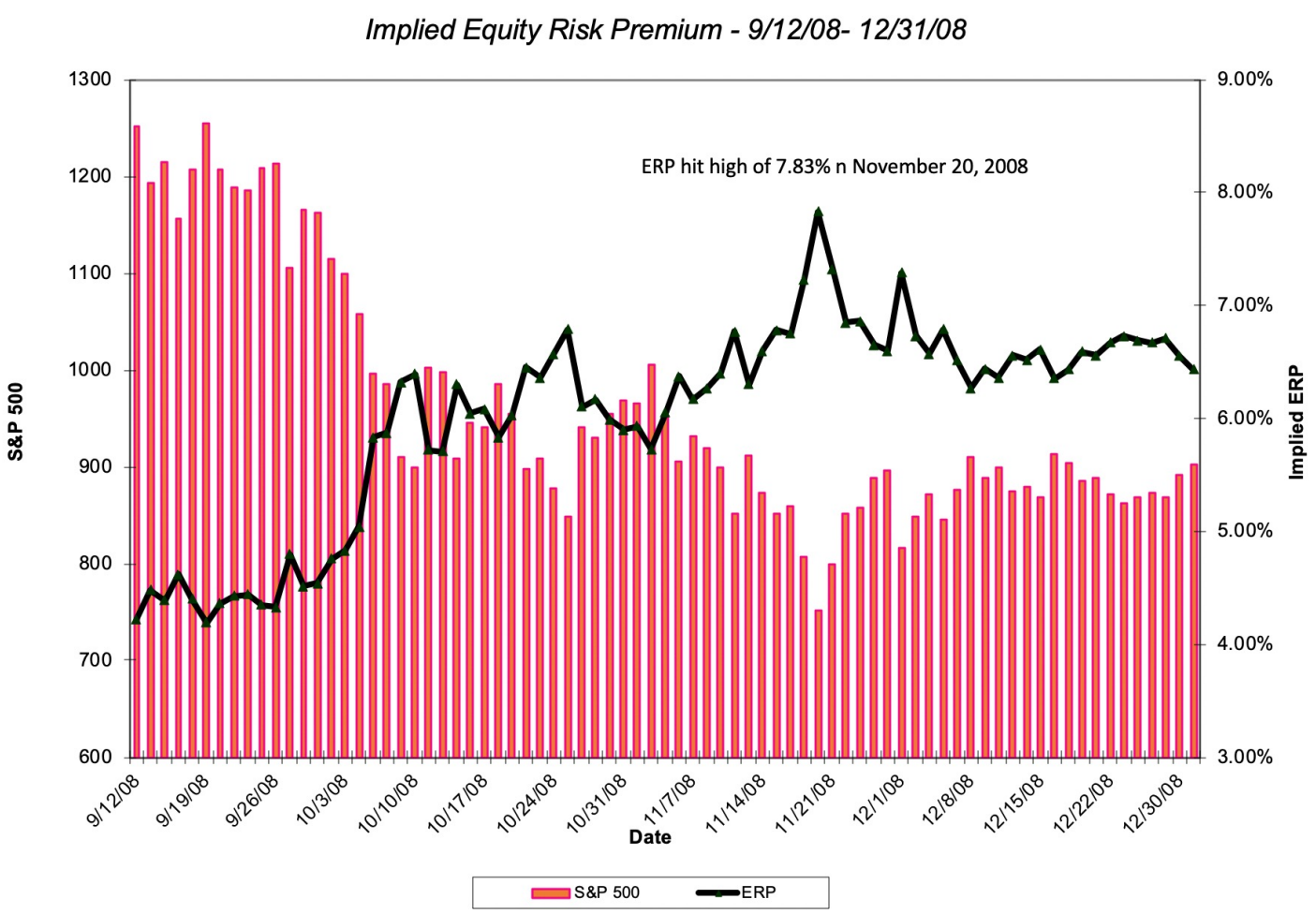
Implied ERP for the S&P 500: History



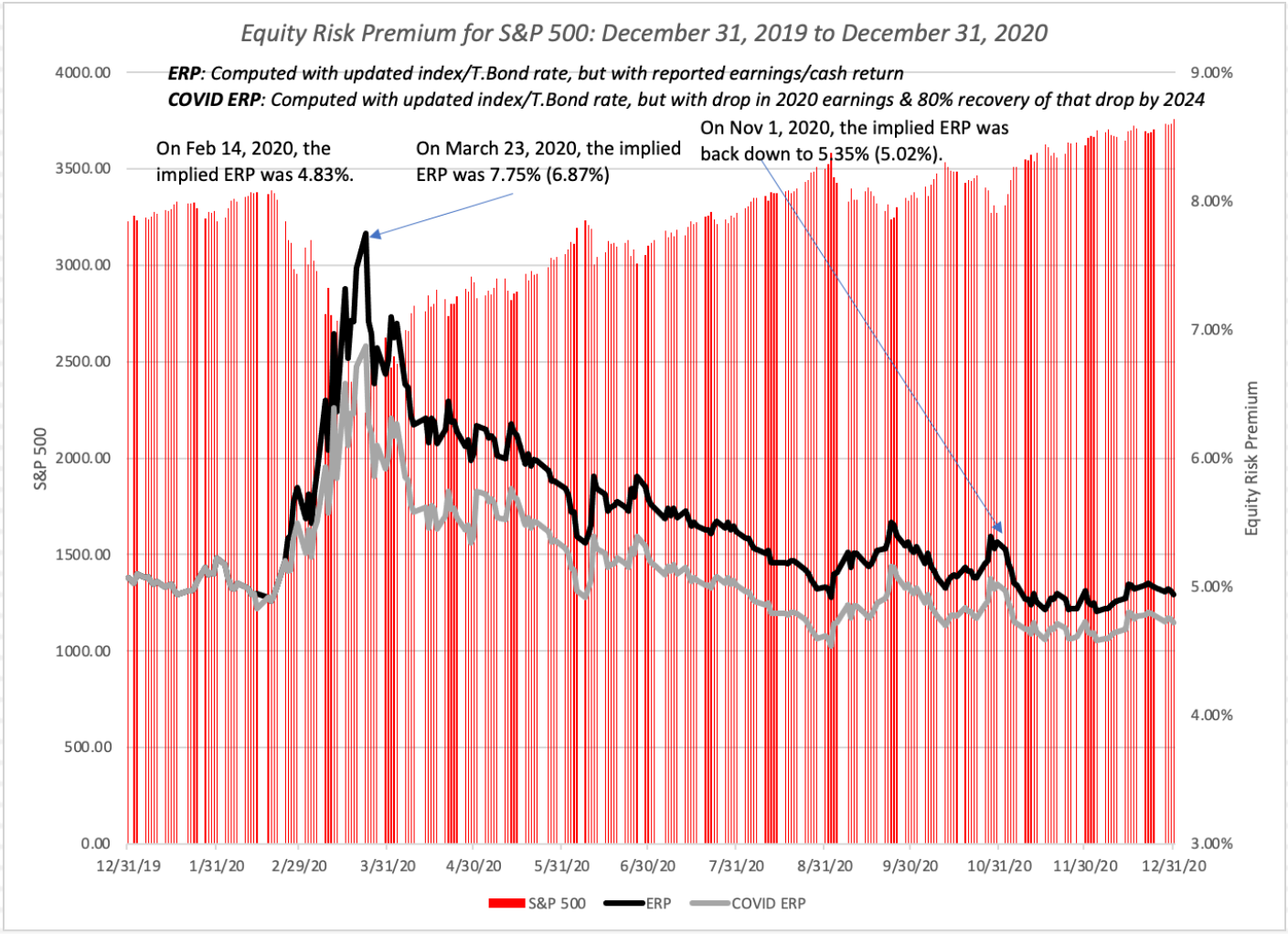
Another Perspective on US stocks



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%

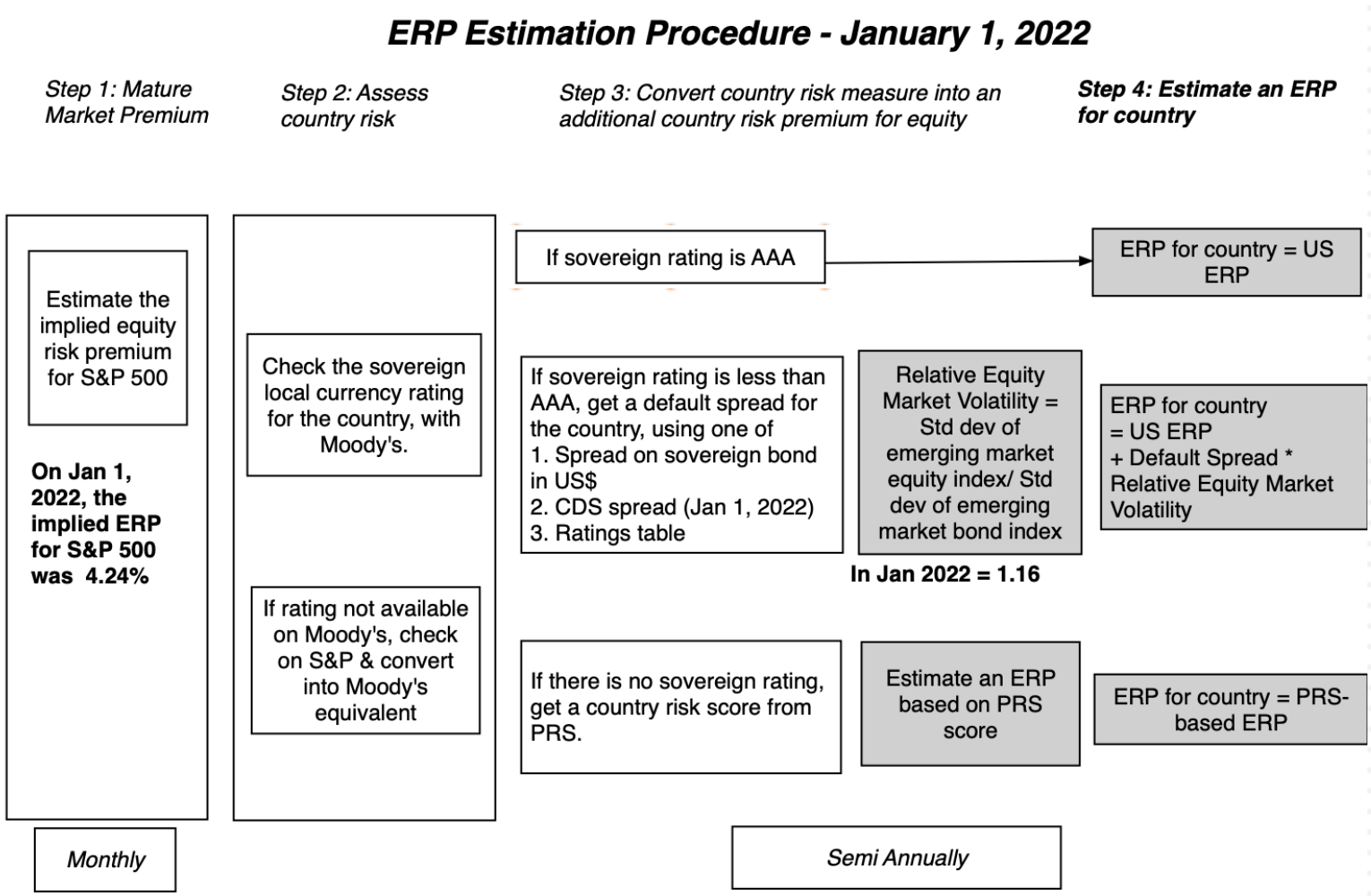
Global Equities?

Start of year	PBV (Developed)	PBV (Emerging)	ROE (Developed)	ROE (Emerging)	US T.Bond Rate	Growth Rate (Developed)	Growth Rate (Emerging)	Cost of Equity (Developed)	Cost of Equity (Emerging)	Differential
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= Default Spread* $\text{Std Deviation}_{\text{Country Equity}} / \text{Std Deviation}_{\text{Country Bond}}$
    - 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% (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 : July 2022

Andorra (Principality of)	Baa2	2.28%	8.67%
Austria	Aa1	0.48%	6.57%
Belgium	Aa3	0.72%	6.85%
Cyprus	Ba1	3.00%	9.51%
Denmark	Aaa	0.00%	6.01%
Finland	Aa1	0.48%	6.57%
France	Aa2	0.59%	6.70%
Germany	Aaa	0.00%	6.01%
Greece	Ba3	4.31%	11.04%
Guernsey (States of)	Aaa	0.00%	6.01%
Iceland	A2	1.02%	7.19%
Ireland	A1	0.85%	7.00%
Isle of Man	Aa3	0.72%	6.85%

Italy	Baa3	2.64%	9.08%
Jersey (States of)	Aaa	0.00%	6.01%
Liechtenstein	Aaa	0.00%	6.01%
Luxembourg	Aaa	0.00%	6.01%
Malta	A2	1.02%	7.19%
Netherlands	Aaa	0.00%	6.01%
Norway	Aaa	0.00%	6.01%
Portugal	Baa2	2.28%	8.67%
Spain	Baa1	1.92%	8.24%
Sweden	Aaa	0.00%	6.01%
Switzerland	Aaa	0.00%	6.01%
Turkey	B2	6.60%	13.70%
United Kingdom	Aa3	0.72%	6.85%
Western Europe		**1.16%**	**7.17%**

Albania	B1	5.40%	12.30%
Armenia	Ba3	4.31%	11.04%
Azerbaijan	Ba2	3.61%	10.22%
Belarus	Ca	14.39%	22.79%
Bosnia and Herzegovina	B3	7.80%	15.10%
Bulgaria	Baa1	1.92%	8.24%
Croatia	Ba1	3.00%	9.51%
Czech Republic	Aa3	0.72%	6.85%
Estonia	A1	0.85%	7.00%
Georgia	Ba2	3.61%	10.22%
Hungary	Baa2	2.28%	8.67%
Kazakhstan	Baa2	2.28%	8.67%
Kyrgyzstan	B3	7.80%	15.10%
Latvia	A3	1.44%	7.69%
Lithuania	A2	1.02%	7.19%
Macedonia	Ba3	4.31%	11.04%
Moldova	B3	7.80%	15.10%
Montenegro	B1	5.40%	12.30%
Poland	A2	1.02%	7.19%
Romania	Baa3	2.64%	9.08%
Russia	Ca	14.39%	22.79%
Serbia	Ba2	3.61%	10.22%
Slovakia	A2	1.02%	7.19%
Slovenia	A3	1.44%	7.69%
Tajikistan	B3	7.80%	15.10%
Ukraine	Caa3	12.00%	19.99%
Uzbekistan	B1	5.40%	12.30%
E. Europe & Russia		**8.85%**	**14.86%**

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%

Canada	Aaa	0.00%	6.01%
United States	Aaa	0.00%	6.01%
US & Canada		**0.00%**	**6.01%**

Caribbean		**9.06%**	**15.07%**

Argentina	Ca	14.39%	22.79%
Belize	Caa3	12.00%	19.99%
Bolivia	B2	6.60%	13.70%
Brazil	Ba2	3.61%	10.22%
Chile	A1	0.85%	7.00%
Colombia	Baa2	2.28%	8.67%
Costa Rica	B2	6.60%	13.70%
Ecuador	Caa3	12.00%	19.99%
El Salvador	Caa3	12.00%	19.99%
Guatemala	Ba1	3.00%	9.51%
Honduras	B1	5.40%	12.30%
Mexico	Baa1	1.92%	8.24%
Nicaragua	B3	7.80%	15.10%
Panama	Baa2	2.28%	8.67%
Paraguay	Ba1	3.00%	9.51%
Peru	Baa1	1.92%	8.24%
Suriname	Caa3	12.00%	19.99%
Uruguay	Baa2	2.28%	8.67%
Venezuela	C	17.50%	26.41%
Latin America		**5.20%**	**11.21%**

Country	Rating	CRP	ERP
Angola	B3	7.80%	15.10%
Benin	B1	5.40%	12.30%
Botswana	A3	1.44%	7.69%
Burkina Faso	Caa1	8.99%	16.49%
Cameroon	B2	6.60%	13.70%
Cape Verde	B3	7.80%	15.10%
Congo (Democratic Republic of)	Caa1	8.99%	16.49%
Congo (Republic of)	Caa2	10.80%	18.60%
Côte d'Ivoire	Ba3	4.31%	11.04%
Egypt	B2	6.60%	13.70%
Ethiopia	Caa2	10.80%	18.60%
Gabon	Caa1	8.99%	16.49%
Ghana	Caa1	8.99%	16.49%
Kenya	B2	6.60%	13.70%
Mali	Caa2	10.80%	18.60%
Mauritius	Baa2	2.28%	8.67%
Morocco	Ba1	3.00%	9.51%
Mozambique	Caa2	10.80%	18.60%
Namibia	B1	5.40%	12.30%
Niger	B3	7.80%	15.10%
Nigeria	B2	6.60%	13.70%
Rwanda	B2	6.60%	13.70%
Senegal	Ba3	4.31%	11.04%
South Africa	Ba2	3.61%	10.22%
Swaziland	B3	7.80%	15.10%
Tanzania	B2	6.60%	13.70%
Togo	B3	7.80%	15.10%
Tunisia	Caa1	8.99%	16.49%
Uganda	B2	6.60%	13.70%
Zambia	Ca	14.39%	22.79%
Africa		**7.36%**	**13.37%**

Abu Dhabi	Aa2	0.59%	6.70%
Bahrain	B2	6.60%	13.70%
Iraq	Caa1	8.99%	16.49%
Israel	A1	0.85%	7.00%
Jordan	B1	5.40%	12.30%
Kuwait	A1	0.85%	7.00%
Lebanon	C	17.50%	26.41%
Oman	Ba3	4.31%	11.04%
Qatar	Aa3	0.72%	6.85%
Ras Al Khaimah (Emirate of)	A1	0.85%	7.00%
Saudi Arabia	A1	0.85%	7.00%
Sharjah	Baa3	2.64%	9.08%
United Arab Emirates	Aa2	0.59%	6.70%
Middle East		**2.02%**	**8.03%**

Bangladesh	Ba3	4.31%	11.04%
Cambodia	B2	6.60%	13.70%
China	A1	0.85%	7.00%
Fiji	B1	5.40%	12.30%
Hong Kong	Aa3	0.72%	6.85%
India	Baa3	2.64%	9.08%
Indonesia	Baa2	2.28%	8.67%
Japan	A1	0.85%	7.00%
Korea	Aa2	0.59%	6.70%
Laos	Caa3	12.00%	19.99%
Macao	Aa3	0.72%	6.85%
Malaysia	A3	1.44%	7.69%
Maldives	Caa1	8.99%	16.49%
Mongolia	B3	7.80%	15.10%
Pakistan	B3	7.80%	15.10%
Papua New Guinea	B2	6.60%	13.70%
Philippines	Baa2	2.28%	8.67%
Singapore	Aaa	0.00%	6.01%
Solomon Islands	Caa1	8.99%	16.49%
Sri Lanka	Ca	14.39%	22.79%
Taiwan	Aa3	0.72%	6.85%
Thailand	Baa1	1.92%	8.24%
Vietnam	Ba3	4.31%	11.04%
Asia		**1.56%**	**7.57%**

Australia	Aaa	0.00%	6.01%
Cook Islands	Caa1	8.99%	16.49%
New Zealand	Aaa	0.00%	6.01%
Australia & NZ		**0.00%**	**6.01%**

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.

Infosy: Equity Risk Premium in 2022

Region	*Revenues*	*Weight*	*ERP*
North America	₹ 10,066	61.71%	6.01%
Western Europe	₹ 4,039	24.76%	7.17%
Rest of the World	₹ 1,726	10.58%	6.18%
India	₹ 480	2.94%	9.08%
Infosys	₹ 16,311	100.00%	6.41%

Natural Resource Twists? Royal Dutch

Country	*Oil & Gas Production*	*% of Total*	*ERP*
Denmark	17396	3.83%	6.20%
Italy	11179	2.46%	9.14%
Norway	14337	3.16%	6.20%
UK	20762	4.57%	6.81%
Rest of Europe	*874*	*0.19%*	*7.40%*
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%
Rest of Asia & ME	*24480*	*5.39%*	*7.74%*
Oceania	*7858*	*1.73%*	*6.20%*
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%
Rest of Latin America	*576*	*0.13%*	*10.78%*
Royal Dutch Shell	**454326**	**100.00%**	**8.26%**

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

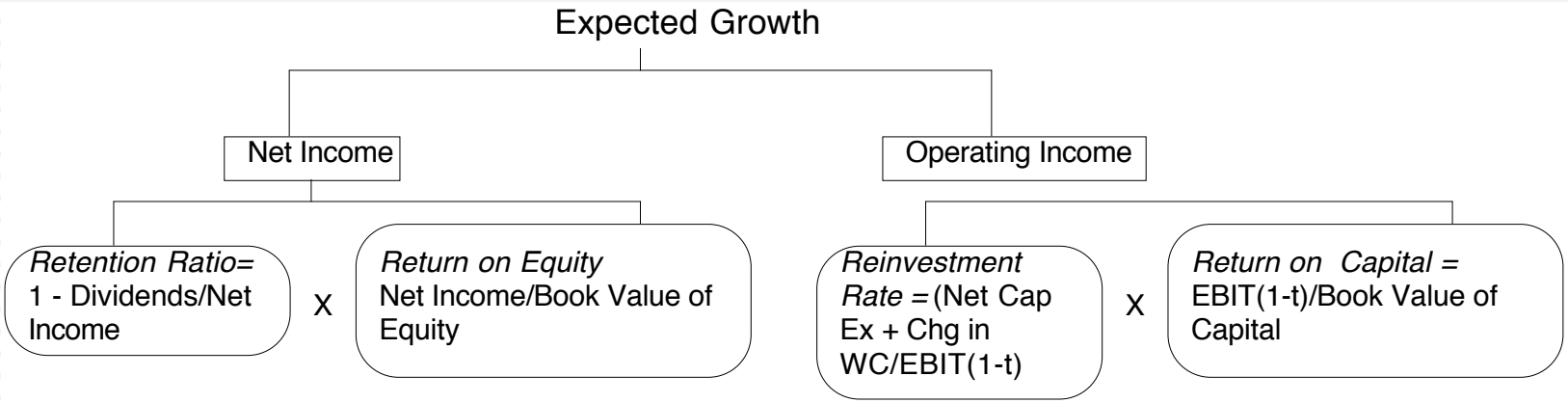
- **Just as beta measures exposure to macro economic risk, lambda measures exposure just to country risk. Like beta, it is scaled around one.**
- The easiest and most accessible data is on revenues. Most companies break their revenues down by region. One simplistic solution would be to do the following:

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

- 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).

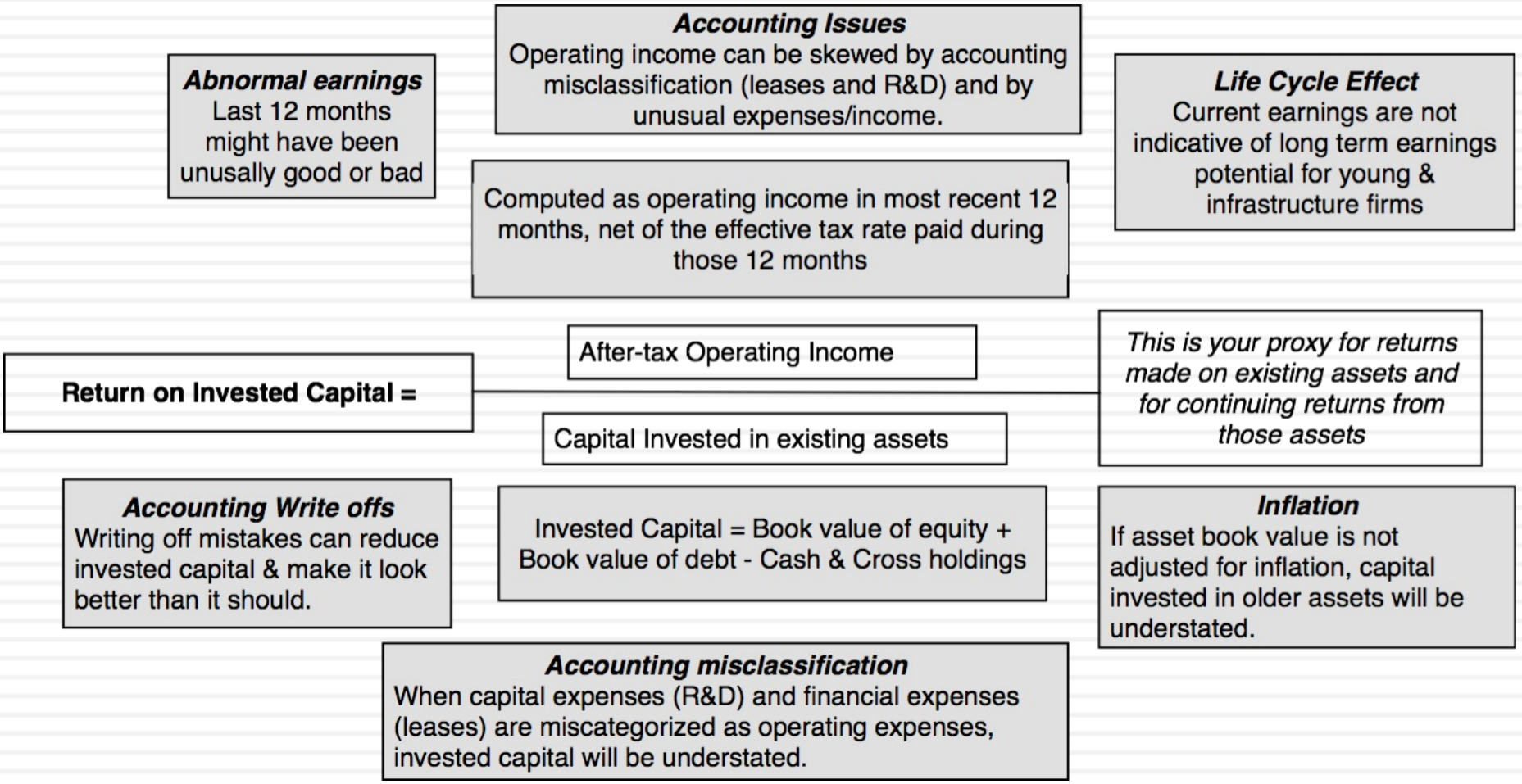
	Tata Motors	*TCS*
% of production/operations in India	High	High
% of revenues in India	91.37% (in 2009) Estimated 70% (in 2010)	7.62%
Lambda	0.80	0.20
Flexibility in moving operations	Low. Significant physical assets.	High. Human capital is mobile.

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

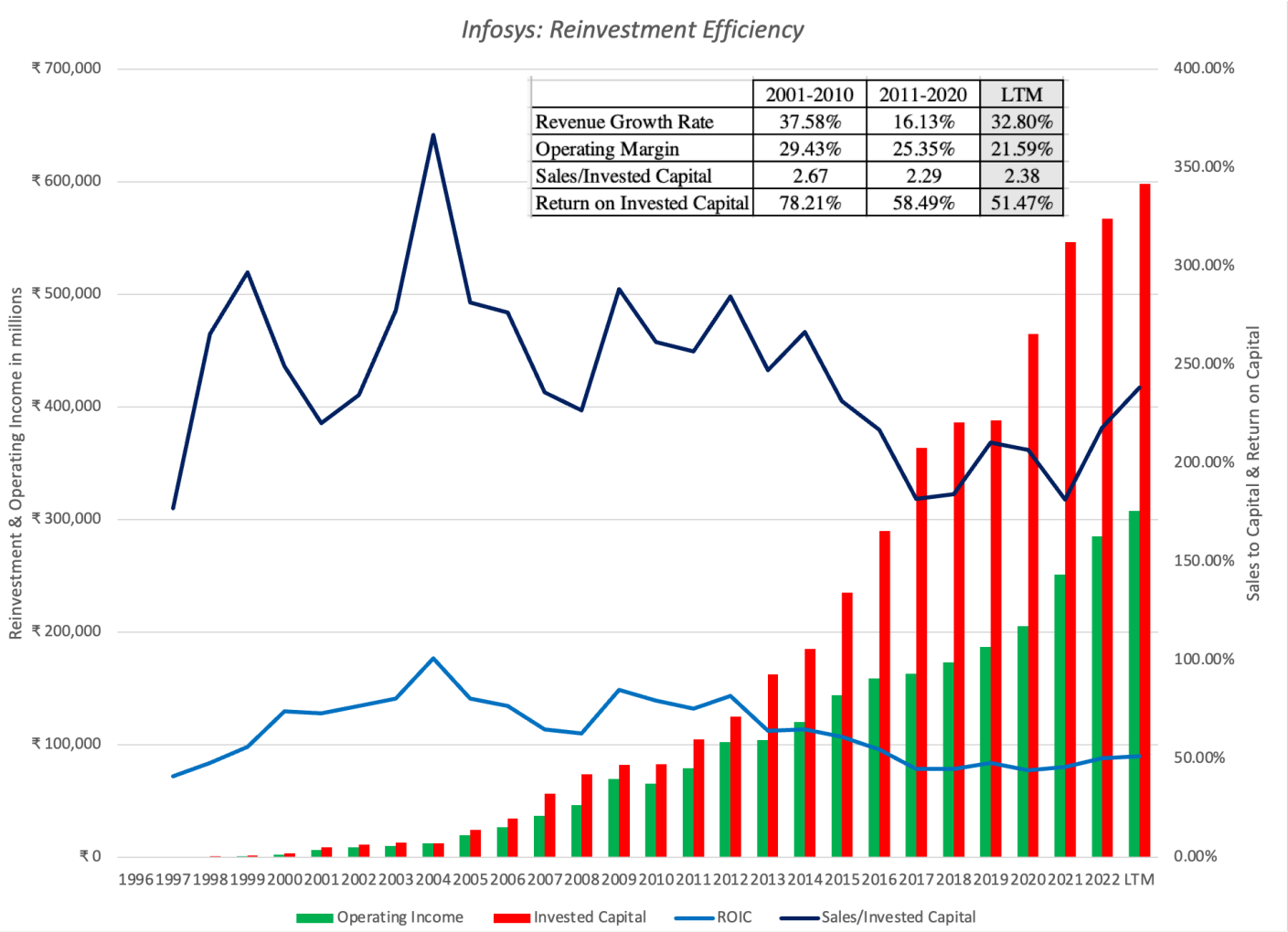


1. No free growth: In the long term, to grow, you have to reinvest.
2. Growth Quality: For a given reinvestment, the higher the return you generate on your reinvestment, the faster you can grow.
3. Scaling up is hard to do: As companies get larger, it gets more difficult to sustain value-adding growth.

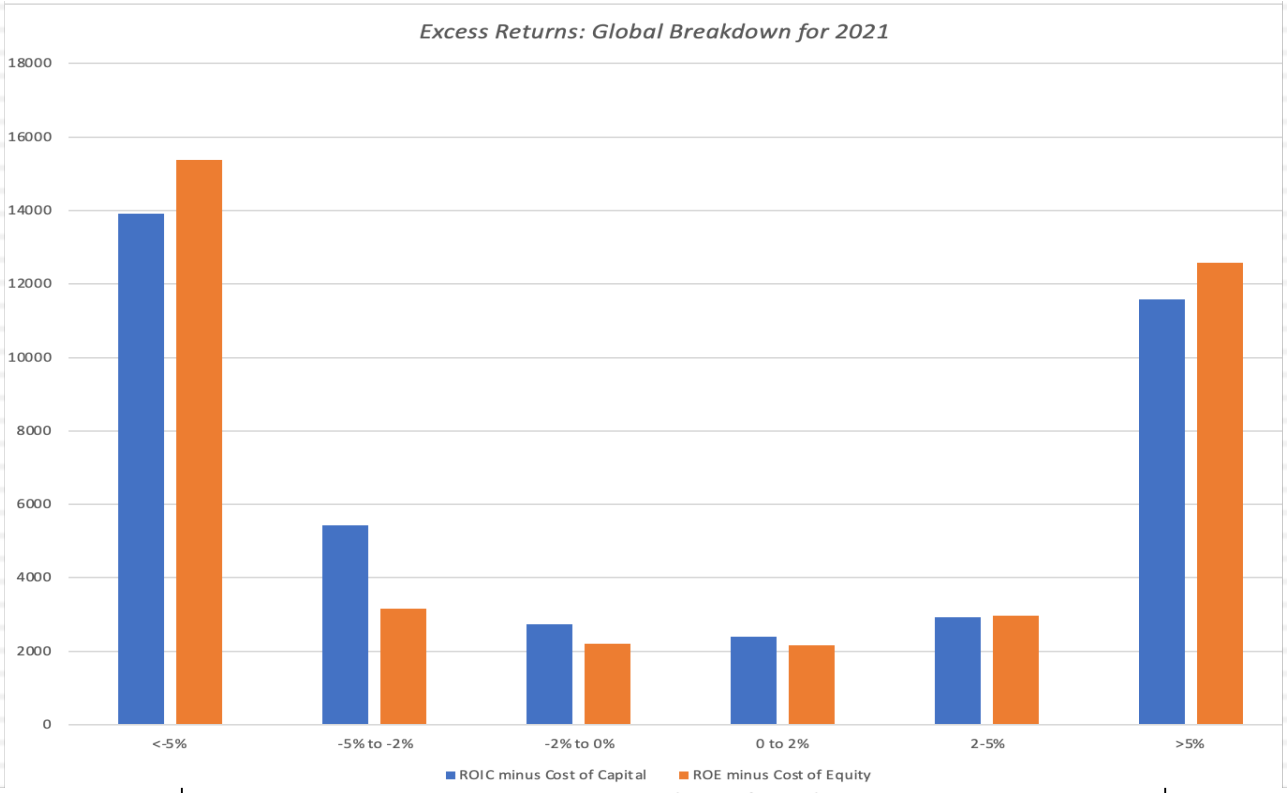
Measuring Returns: The Quandary



Reinvestment & Return on Capital – Infosys History



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



		Return on Capital - Cost of Capital						
Sub Group	Number of firms	<-5%	-5% to -2%	-2% to +2%	2% to 5%	>5%	Positive	Negative
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%	11.57%	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…

This tax rate locks in forever. Does it make sense to use an effective tax rate?

Are you reinvesting enough to sustain your stable growth rate?
Reinv Rate = g/ ROC
Is the ROC that of a stable company?

$$\text{Terminal Value}_n = \frac{EBIT_{n+1}\ (1 - \text{tax rate})\ (1 - \text{Reinvestment Rate})}{\text{Cost of capital} - \text{Expected growth rate}}$$

This is a mature company. It's cost of capital should reflect that.

This growth rate should be less than the nomlnal growth rate of the economy

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 negtive in a perpetual growth model.	Myth 5.5: If your terminal value is a high proportion of your DCF value, it is flawed.

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

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 destory 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.

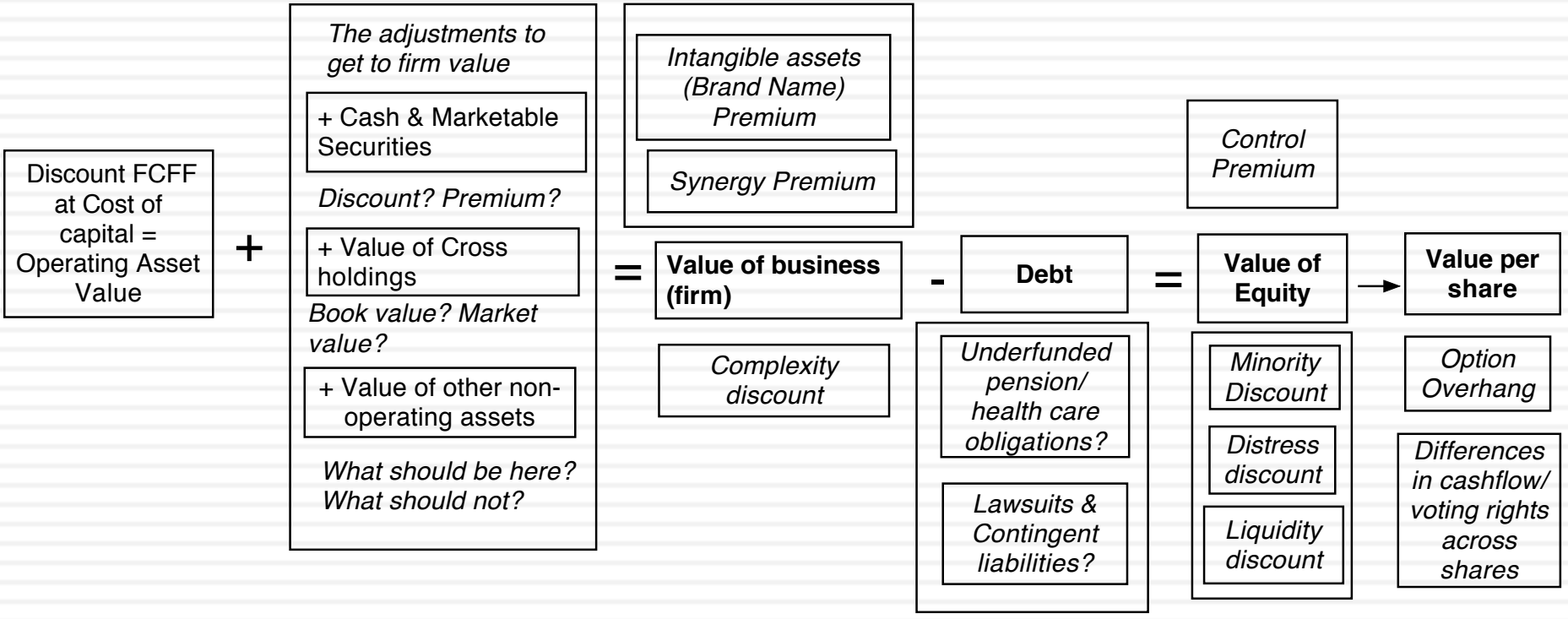
Terminal Value and Growth

Stable Growth Rate	*Amgen*	*Tata Motors*	*Infosys*	*Heineken*
0%	$150,652	₹ 435,686	₹ 6,621,835	€59,438
1%	$154,479	₹ 435,686	₹ 7,121,223	€59,438
2%	$160,194	₹ 435,686	₹ 7,749,410	€59,438
3%	$167,784	₹ 435,686	₹ 8,567,947	
4%	$179,099	₹ 435,686	₹ 9,685,038	
5%		₹ 435,686	₹ 11,310,066	
Risk free Rate	4.78%	5.00%	4.77%	-0.50%
ROIC	10.00%	10.39%	20.00%	5.00%
Cost of capital	8.08%	10.39%	9.28%	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



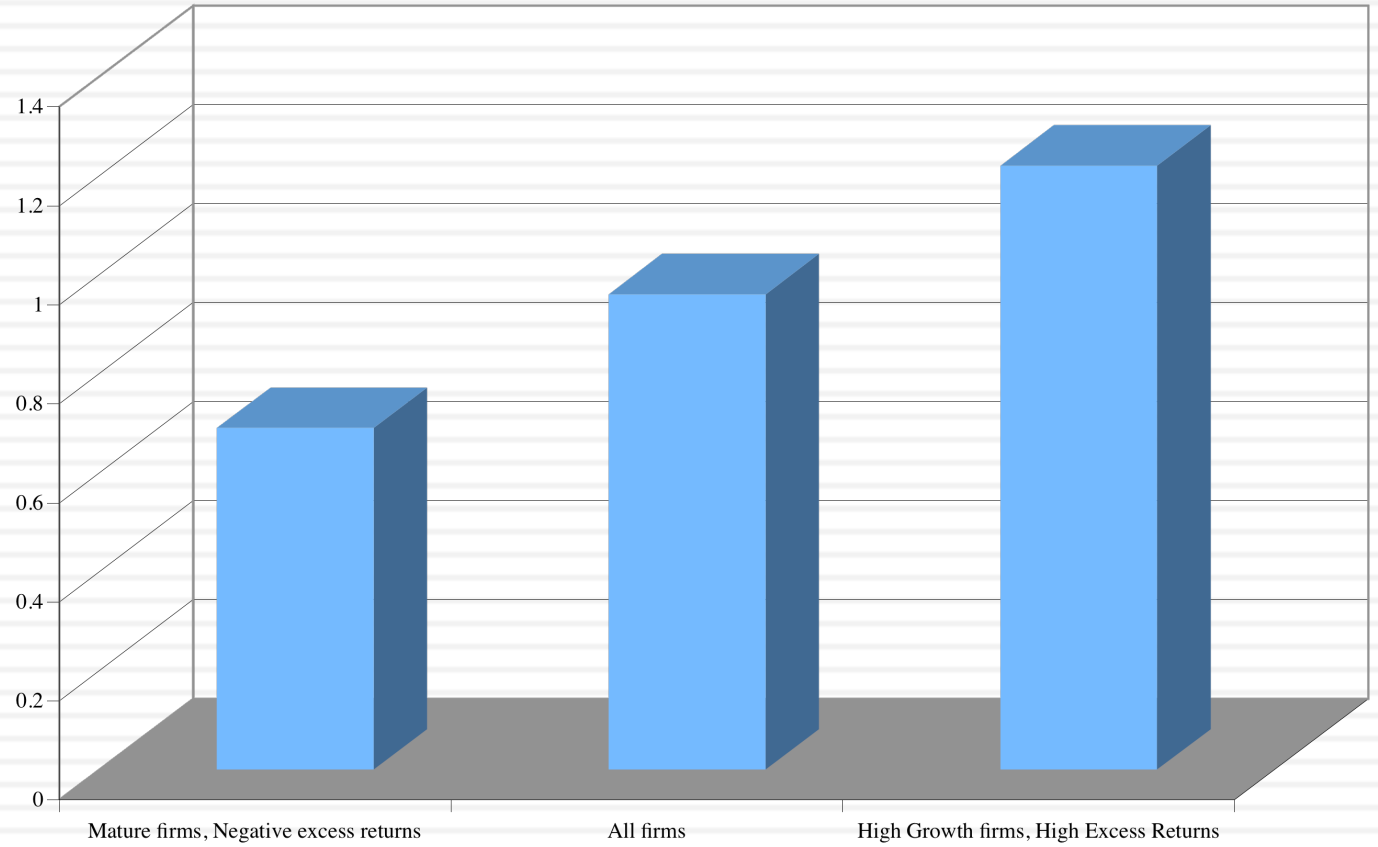
1. The Value of Cash
An Exercise in Cash Valuation

	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.

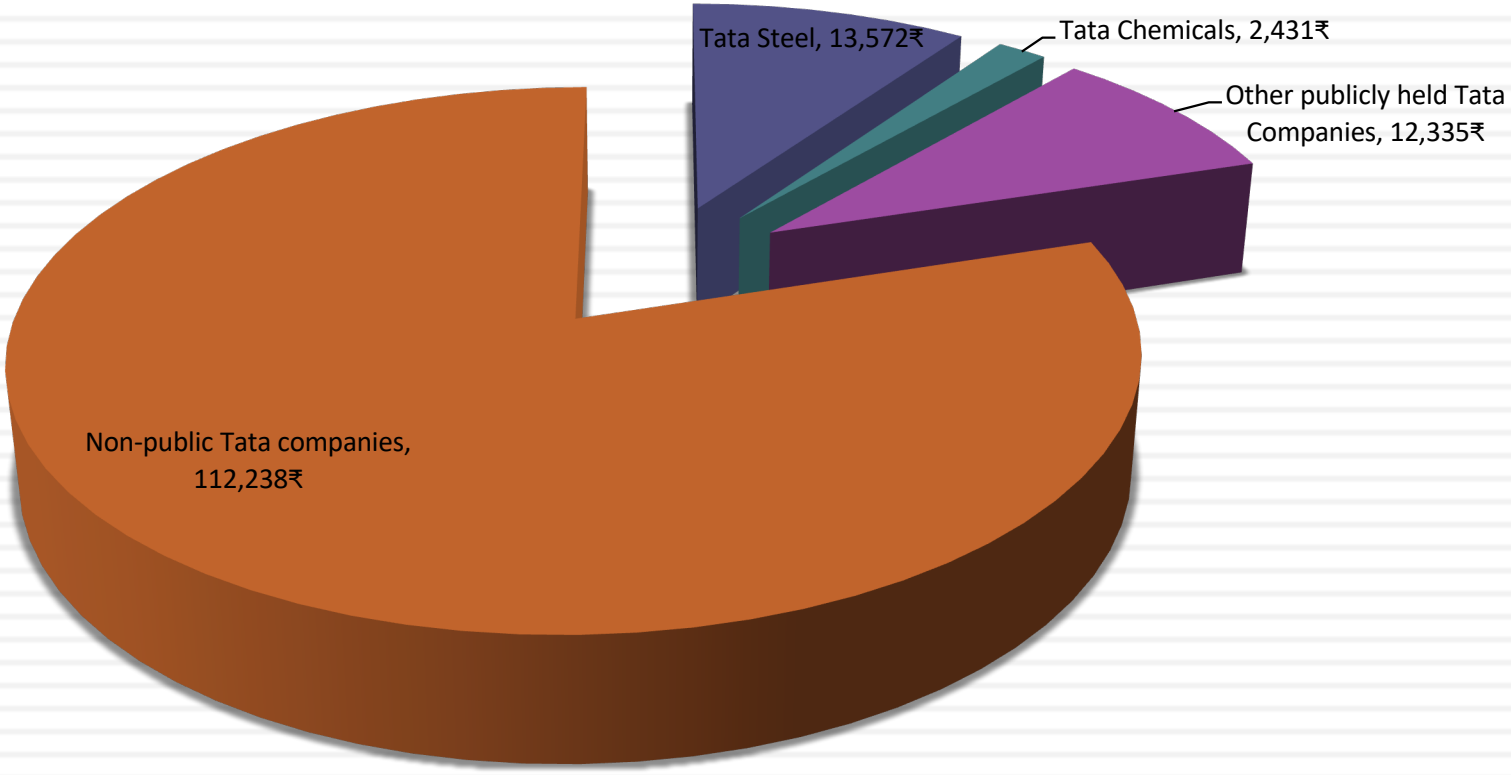
How to value holdings in other firms.. In a perfect world..

- 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?

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

Company	*Number of pages in last 10Q*	*Number of pages in last 10K*
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

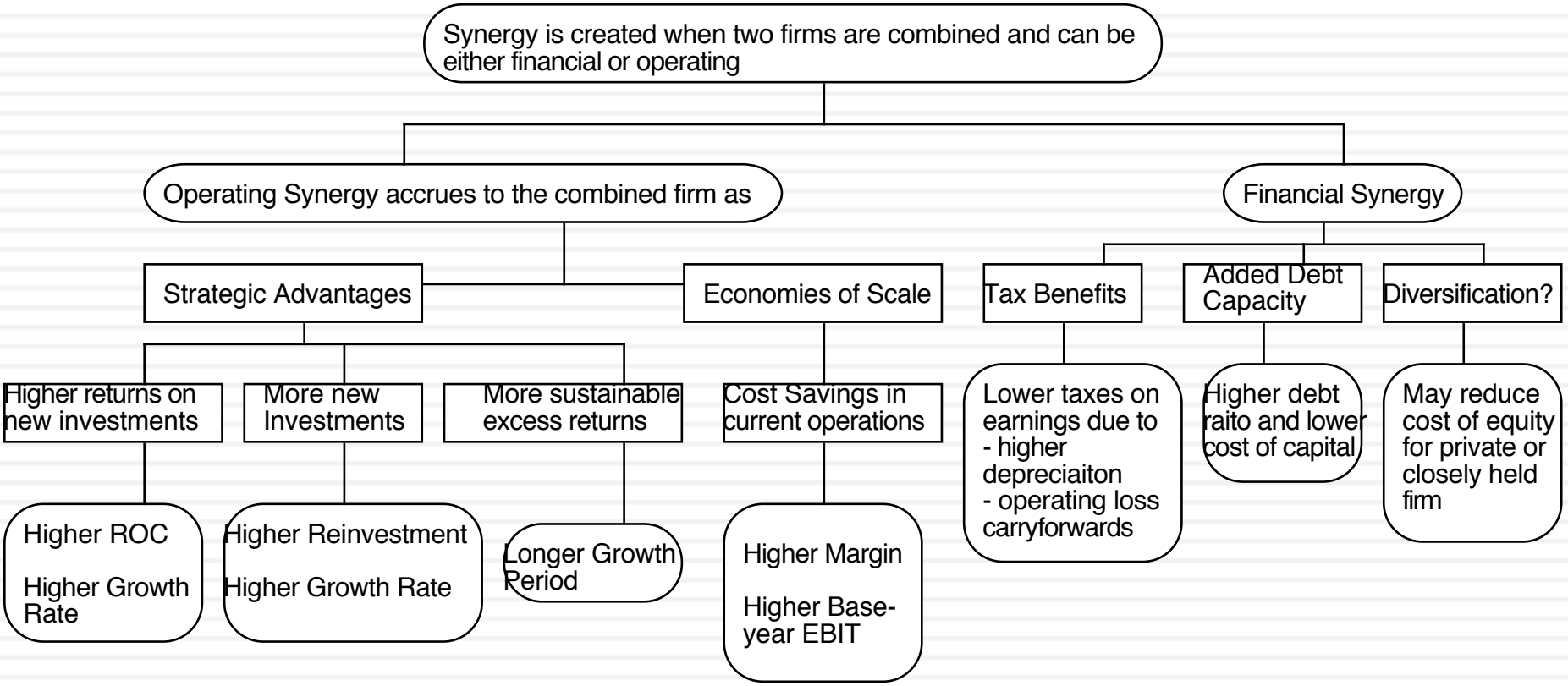
Item	Factors	Follow-up Question	Answer	Weighting factor	Gerdau Score	GE Score
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	1	2.00	2	30
	2. One-time income and expenses	Percent of operating income =	10%	10.00	1	0.8
	3. Income from unspecified sources	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	0.25
		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:

PBV = 0.65 + 15.31 ROE – 0.55 Beta + 3.04 Expected growth rate – 0.003 # 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?

	Inbev	*SABMiller*	*Combined firm (status quo)*	*Combined firm (synergy)*
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

	Inbev	*SABMiller*	*Combined firm (status quo)*	*Combined firm (synergy)*
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%
Value of firm				
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

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

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

Valuing a Franchise: Star Wars

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

Add on $ per box office $

Star Wars Franchise Valuation: December 2015

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

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

	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
Total - Revenues	$10,800	$11,236	$11,690	$5,508	$5,731	$5,962
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

Operating Margin
20.14% for movies
15% for non-movies
30% tax rate

Discounted back @ 7.61% cost of capital of entertainment 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…

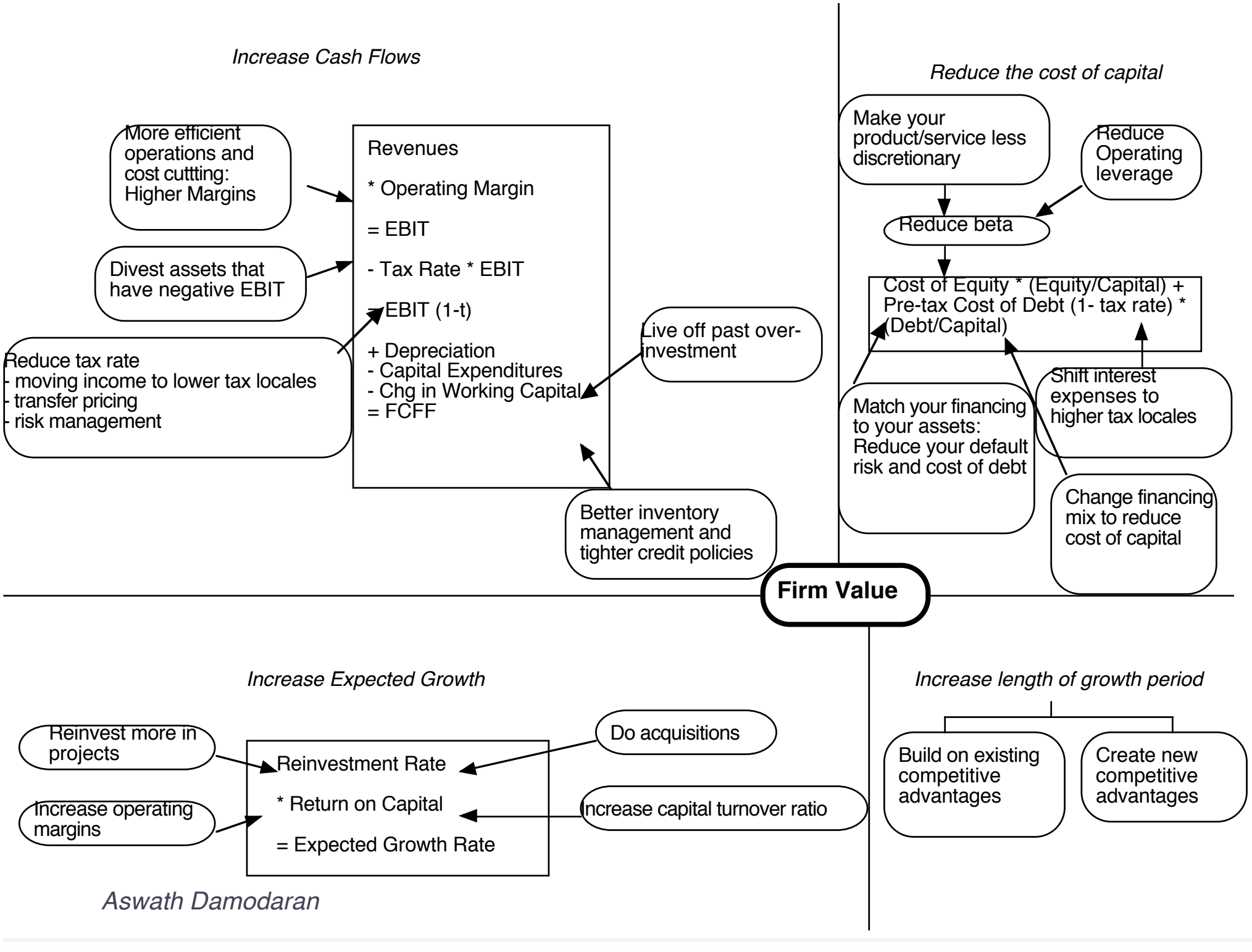
- General Rule: Debt generally has the following characteristics:
  - Commitment to make fixed payments in the future
  - The fixed payments are tax deductible
  - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- Defined as 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…

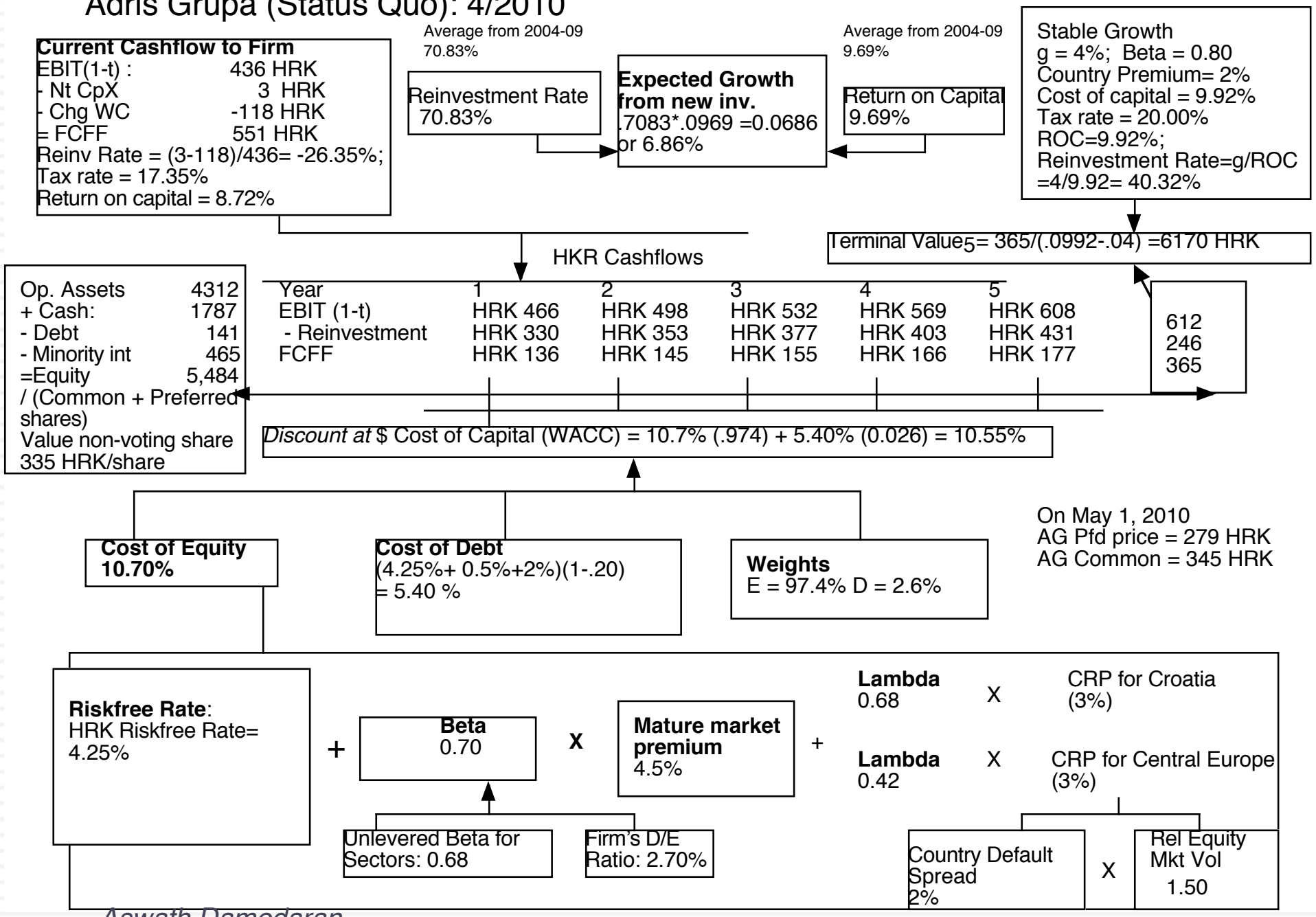
- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
  - If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.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

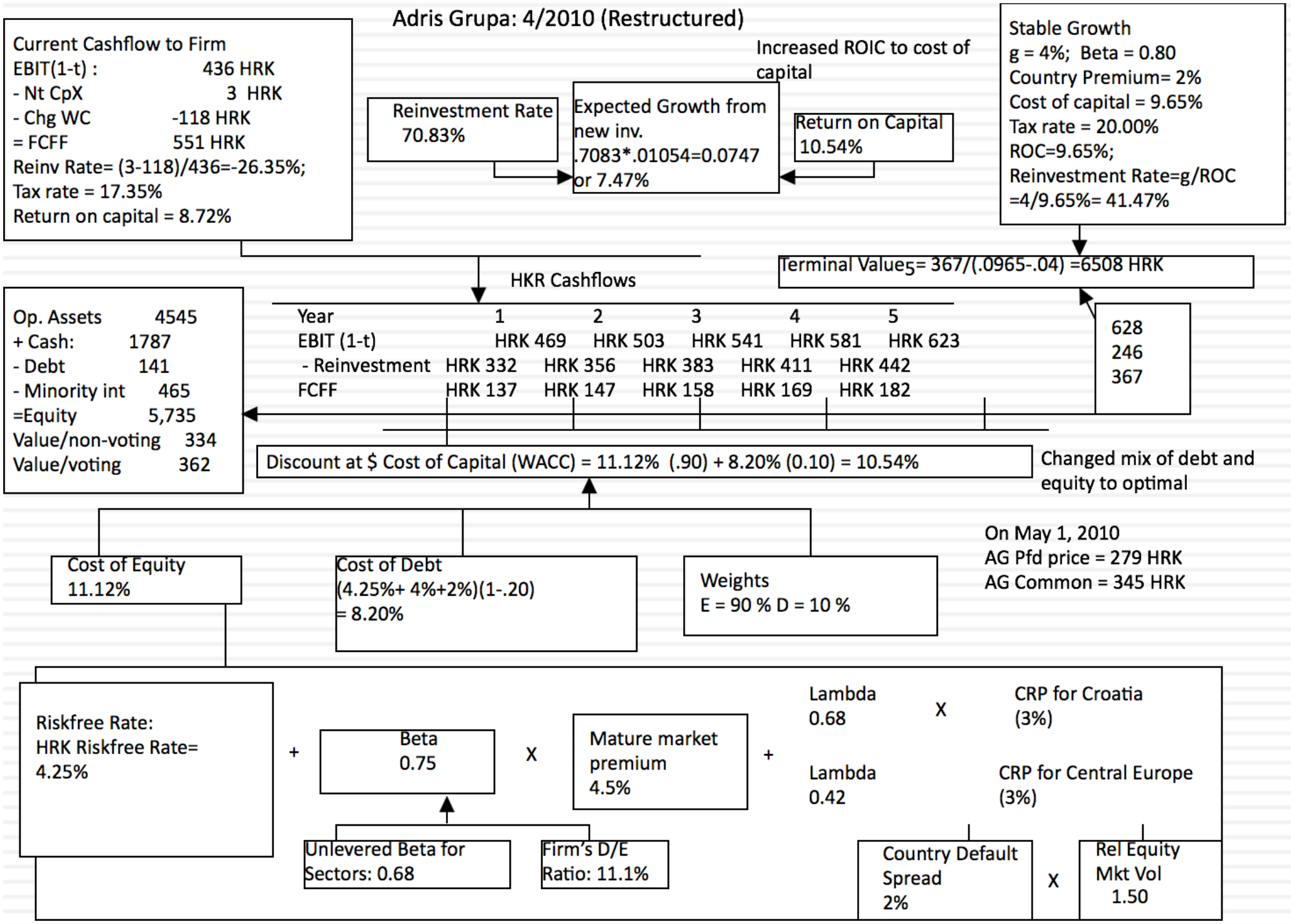
8. The Value of Control

- 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
More efficient operations and cost cuttting: Higher Margins
Divest assets that have negative EBIT
Reduce tax rate
- moving income to lower tax locales
- transfer pricing
- risk management
Revenues
* Operating Margin
= EBIT
- Tax Rate * EBIT
= EBIT (1-t)
+ Depreciation
- Capital Expenditures
- Chg in Working Capital
= FCFF
Live off past over-investment
Better inventory management and tighter credit policies
Reduce the cost of capital
Make your product/service less discretionary
Reduce Operating leverage
Reduce beta
Cost of Equity * (Equity/Capital) + Pre-tax Cost of Debt (1- tax rate) * (Debt/Capital)
Match your financing to your assets: Reduce your default risk and cost of debt
Shift interest expenses to higher tax locales
Change financing mix to reduce cost of capital
Firm Value
Increase Expected Growth
Reinvest more in projects
Increase operating margins
Reinvestment Rate
* Return on Capital
= Expected Growth Rate
Do acquisitions
Increase capital turnover ratio
Increase length of growth period
Build on existing competitive advantages
Create new competitive advantages
Aswath Damodaran

Adris Grupa (Status Quo): 4/2010




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%
Reinvestment Rate 70.83%
Expected Growth from new inv. .7083*.01054=0.0747 or 7.47%
Increased ROIC to cost of capital
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%
Terminal Value5= 367/(.0965-.04) =6508 HRK
HKR Cashflows
Year 1 2 3 4 5
EBIT (1-t) HRK 469 HRK 503 HRK 541 HRK 581 HRK 623
- Reinvestment HRK 332 HRK 356 HRK 383 HRK 411 HRK 442
FCFF HRK 137 HRK 147 HRK 158 HRK 169 HRK 182
628
246
367
Op. Assets 4545
+ Cash: 1787
- Debt 141
- Minority int 465
=Equity 5,735
Value/non-voting 334
Value/voting 362
Discount at $ Cost of Capital (WACC) = 11.12% (.90) + 8.20% (0.10) = 10.54%
Changed mix of debt and equity to optimal
On May 1, 2010
AG Pfd price = 279 HRK
AG Common = 345 HRK
Cost of Equity 11.12%
Cost of Debt (4.25%+ 4%+2%)(1-.20) = 8.20%
Weights E = 90 % D = 10 %
Riskfree Rate: HRK Riskfree Rate= 4.25%
+
Beta 0.75
X
Mature market premium 4.5%
+
Lambda 0.68
X
CRP for Croatia (3%)
Lambda 0.42
CRP for Central Europe (3%)
Unlevered Beta for Sectors: 0.68
Firm's D/E Ratio: 11.1%
Country Default Spread 2%
X
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

Twitter						Apr-22
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, impulsivness) 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 margiins 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

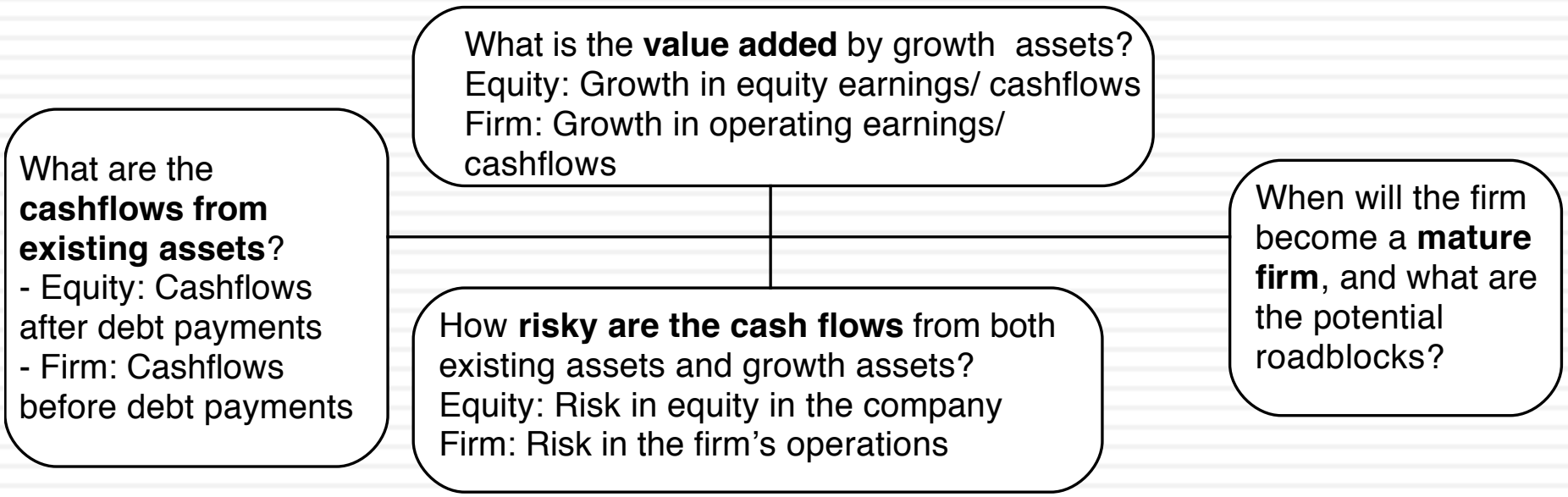
- When Musk announced his acquisition bid for Twitter at $54.20/share, he contended that the company could be worth more, and that the changes that needed to be made could be done more easily if Twitter was a private business.
- One of the ideas floating around is that Twitter could adopt a subscription 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!

Aswath Damodaran

The fundamental determinants of value…



The Dark Side of Valuation…

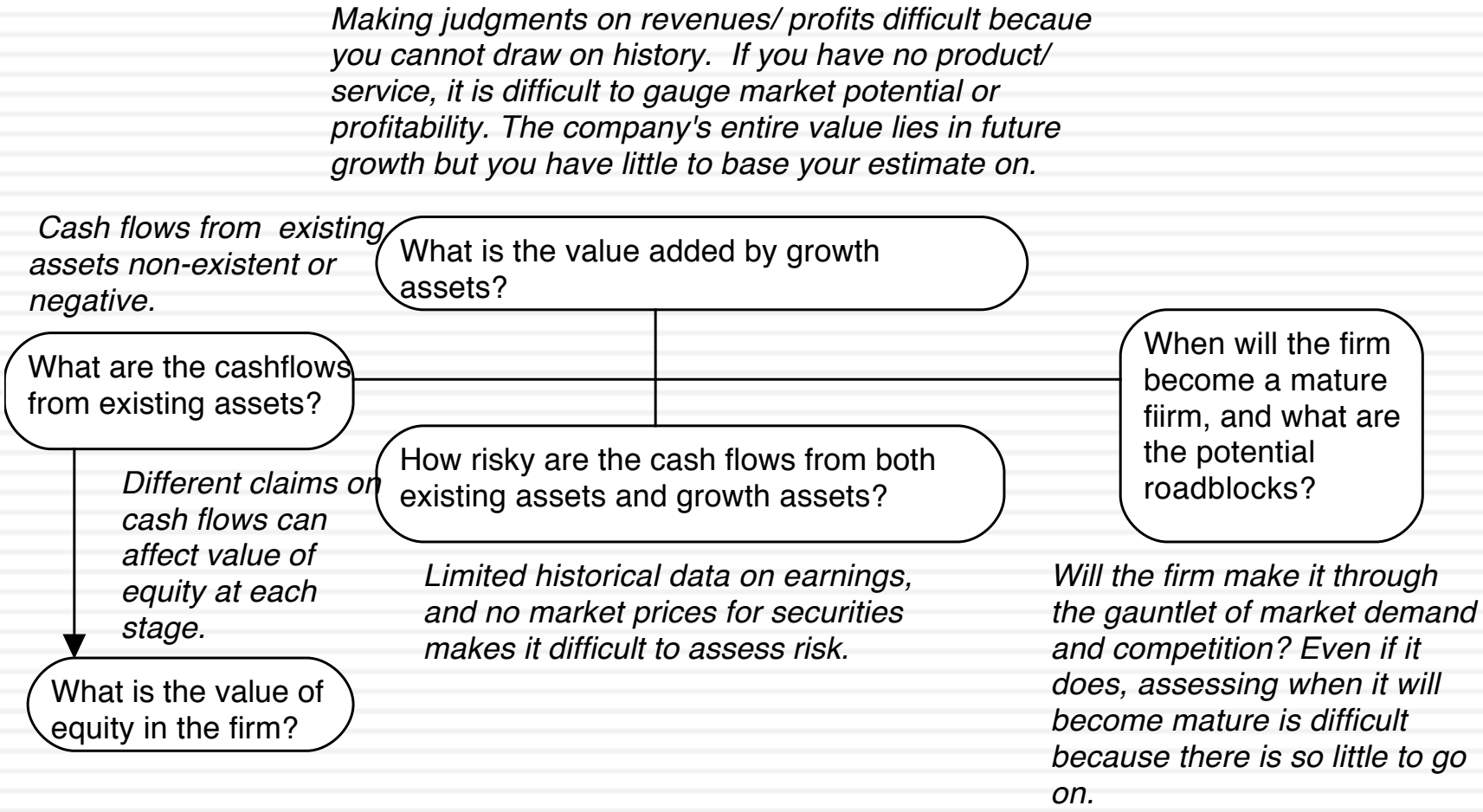
- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value "difficult" companies. In particular, the challenges are greatest when valuing:
  - 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



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)

Current Revenue $ 1,117

Current Margin: -36.71%

From previous year

EBIT -410m

NOL: 500 m

Growth potential

Profit potential

Investment efficiency

Revenue Growth: 42%

Expected Margin: -> 10.00%

Sales to Capital : 3.00

Stable Growth

Revenue Growth: 6%

Operating Margin: 10.00%

ROC=20% Reinvest 30% of EBIT(1-t)

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

	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

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

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

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%

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%.

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

Riskfree Rate:
T. Bond rate = 6.5%

\+ Beta
1.60 -> 1.00

X Risk Premium
4%

Internet/ Retail

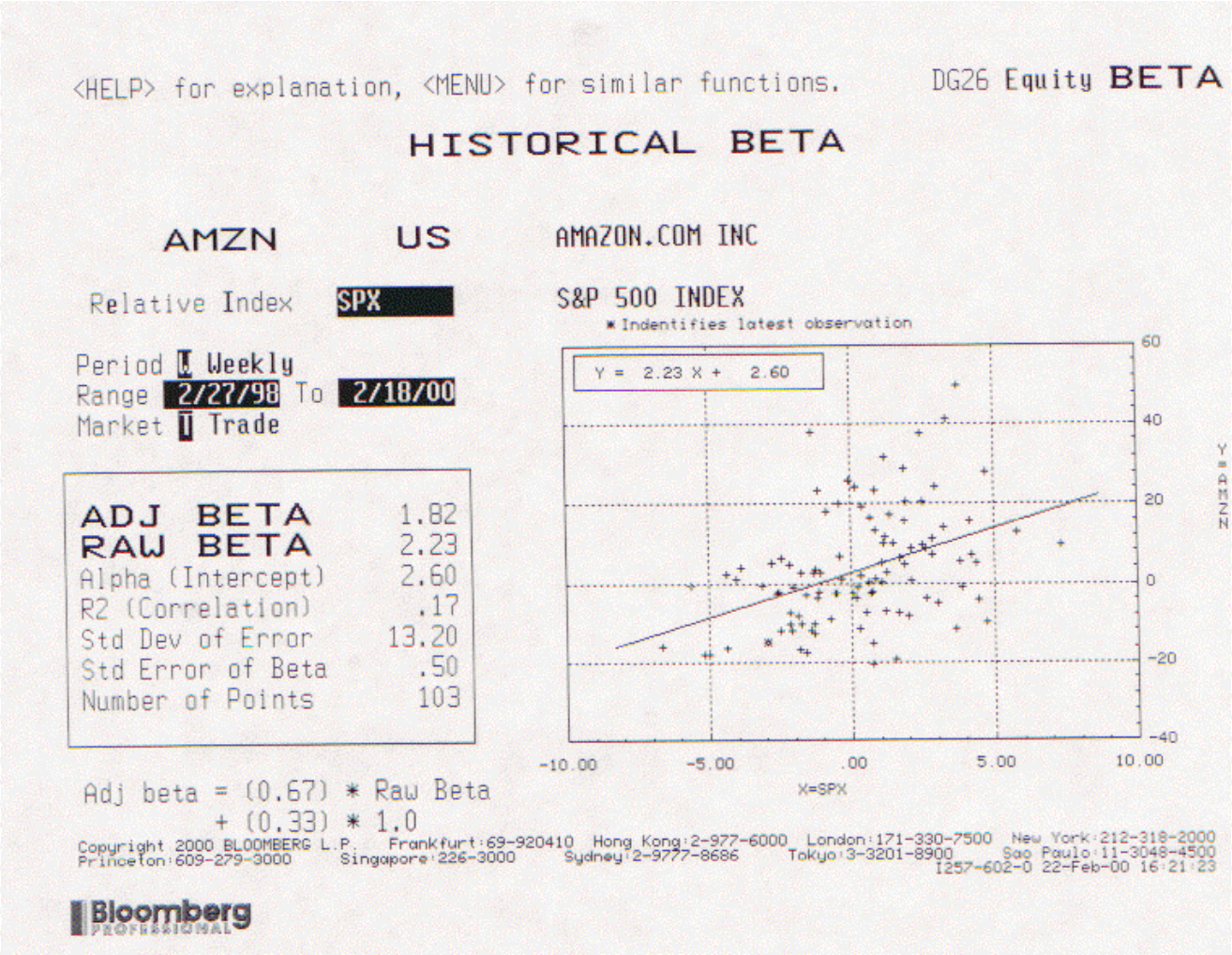
Operating Leverage

Current D/E: 1.21%

Base Equity Premium

Country Risk Premium

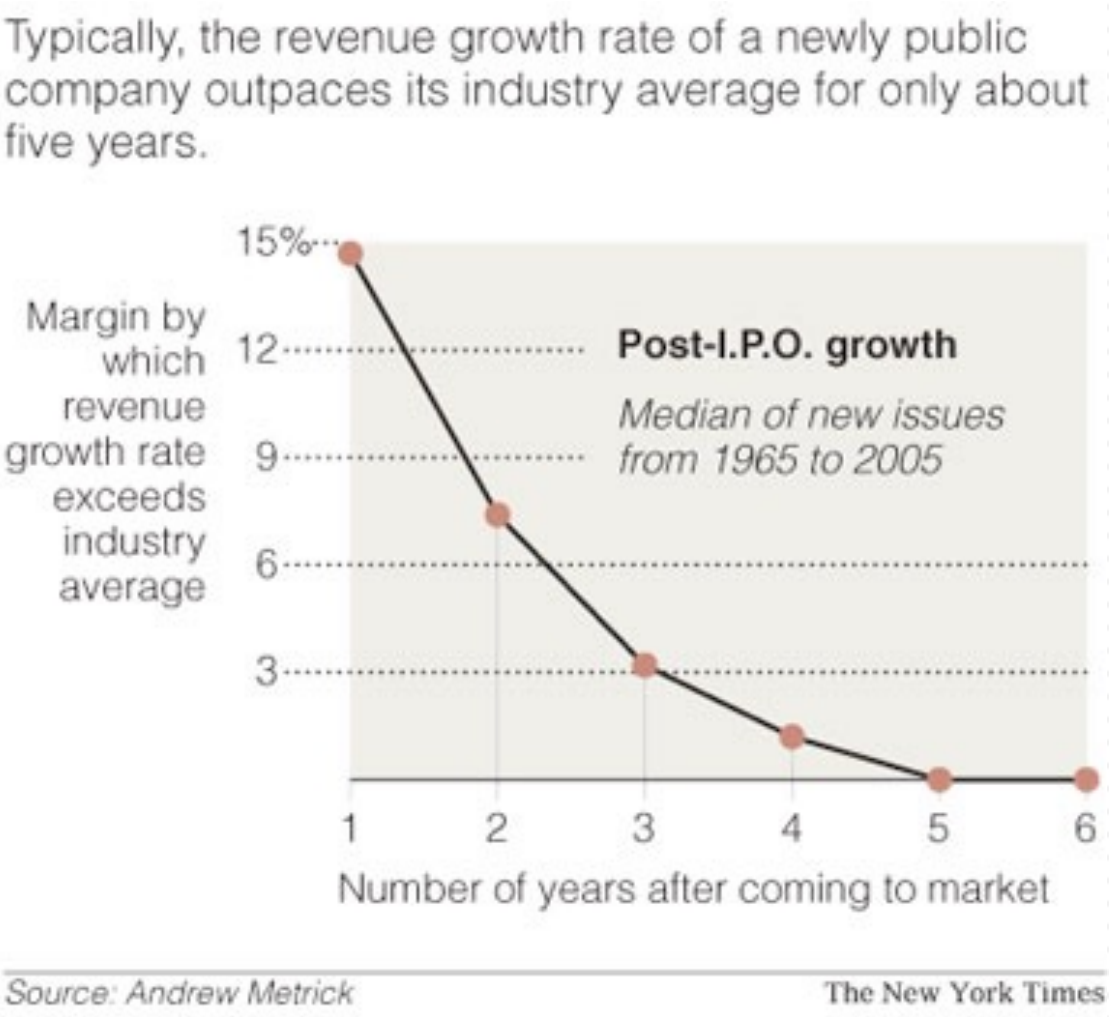
Lesson 1: Don't trust regression betas….



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…



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

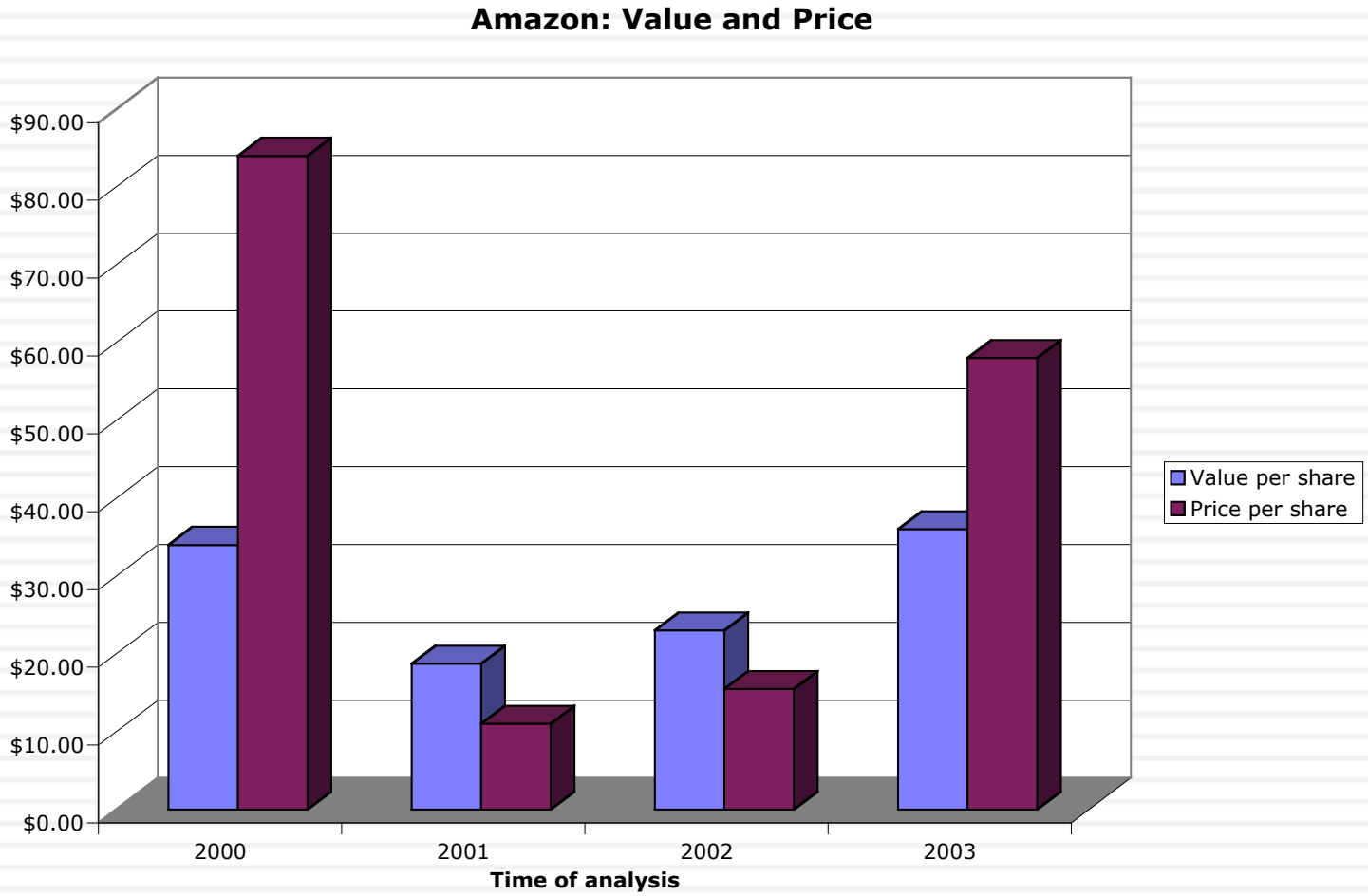
Lesson 5: There are always scenarios where the market price can be justified…

Compounded annual Revenue Growth rate	Target pre-tax Operating Margin				
	6%	8%	10%	12%	14%
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"….



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.

Paytm						Sep-21
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			
+IPO 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…

Historial 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?

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

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

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

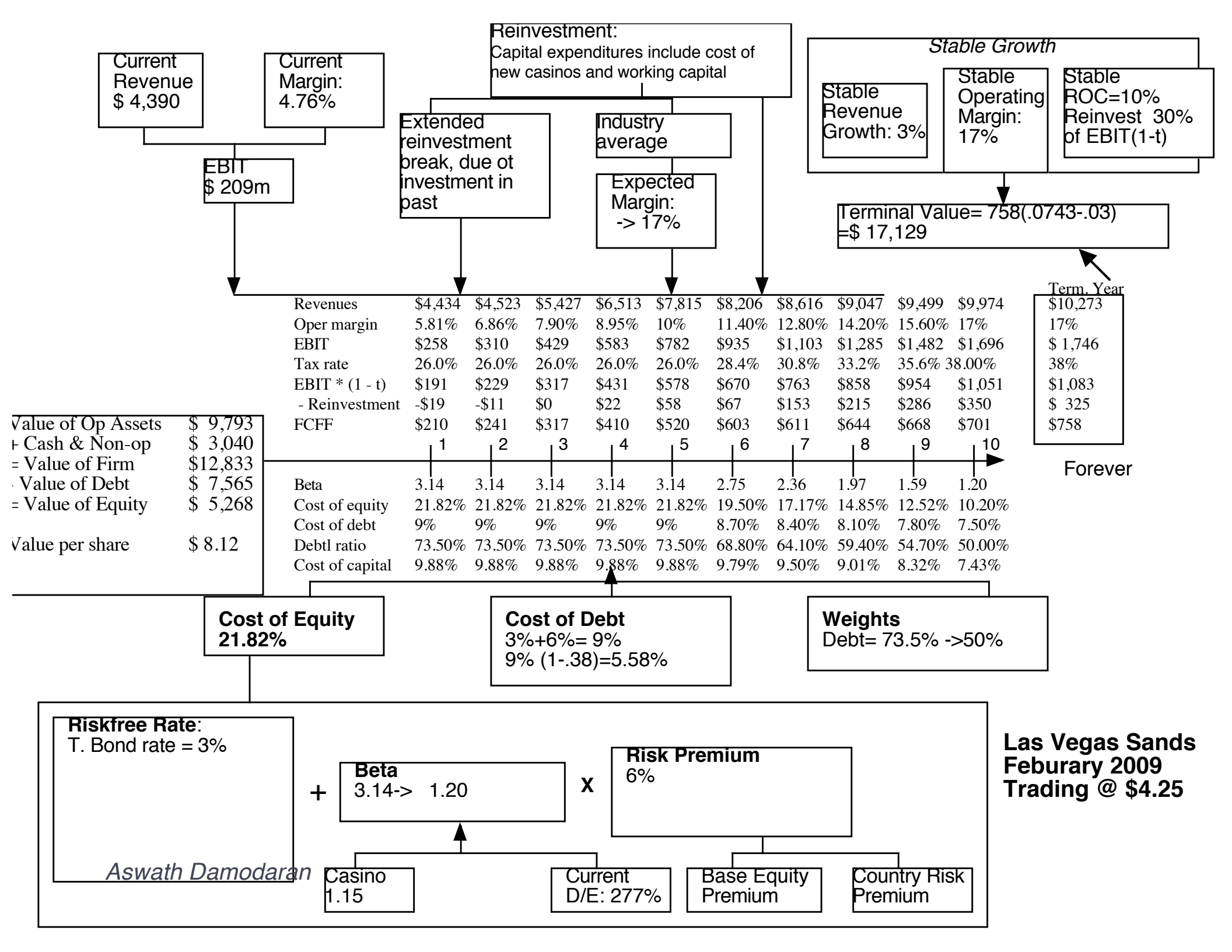
What is the value of equity in the firm?

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

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

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

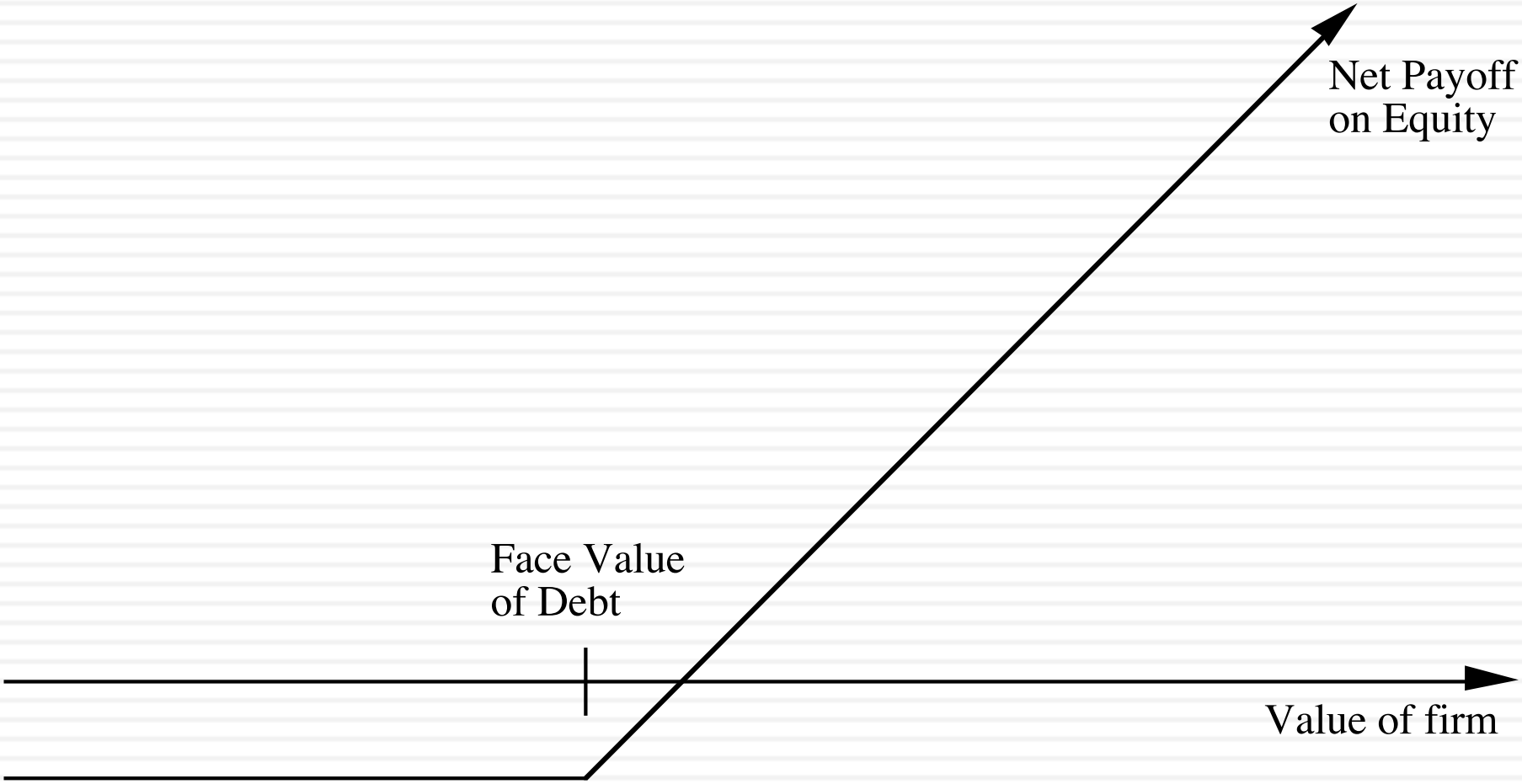
$\pi_{Distress}$ = Annual probability of default = 13.54%

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?

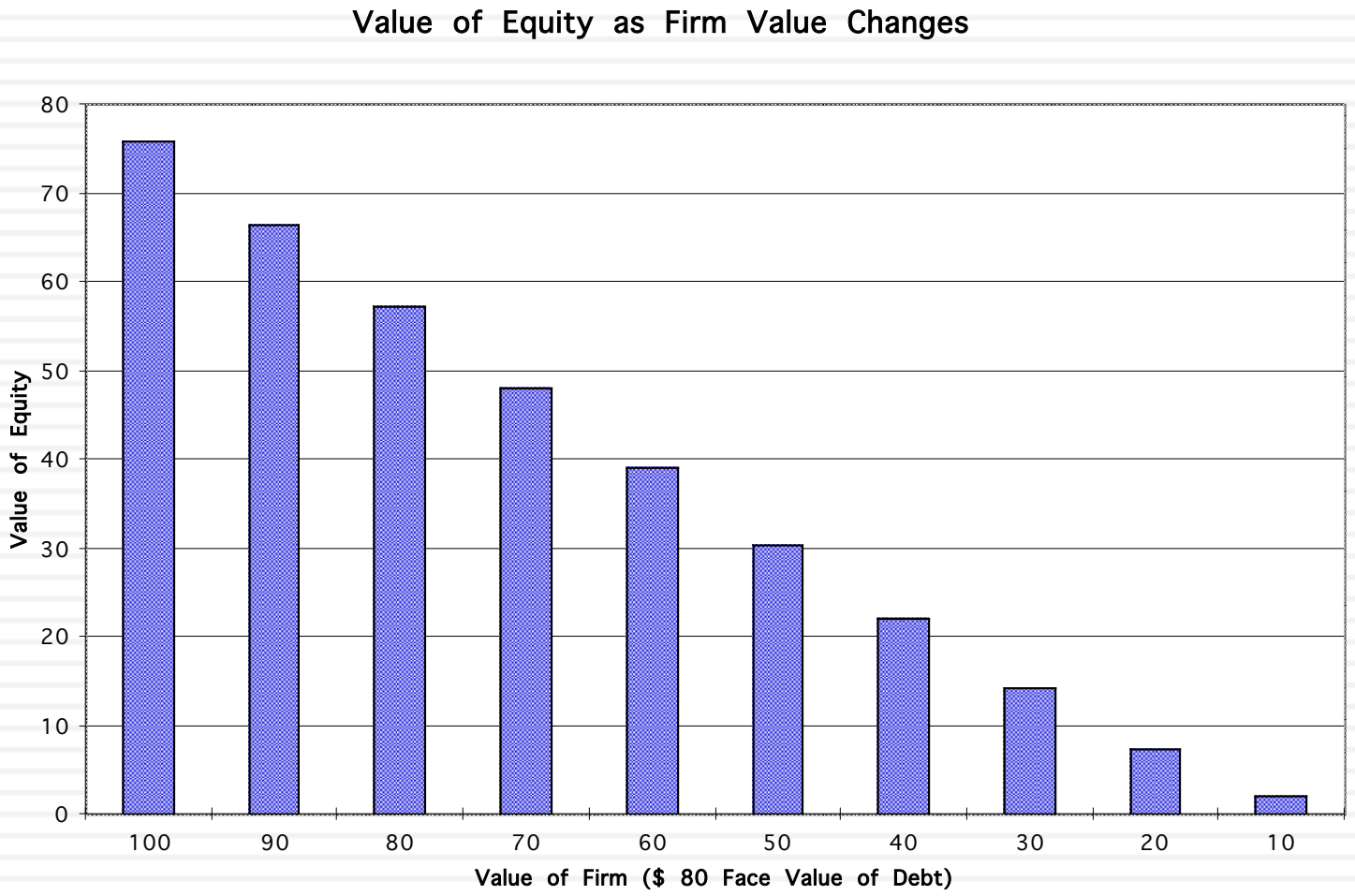
Model Parameters & Valuation

- The inputs
  - Value of the underlying asset = S = Value of the firm = $ 100 million
  - Exercise price = K = Face Value of outstanding debt = $ 80 million
  - Life of the option = t = Life of zero-coupon debt = 10 years
  - Variance in the value of the underlying asset = σ^2 = Variance in firm value = 0.16
  - Riskless rate = r = Treasury bond rate corresponding to option life = 10%
- The output
  - The Black-Scholes model provides the following value for the call:
    - d1 = 1.5994 N(d1) = 0.9451
    - d2 = 0.3345 N(d2) = 0.6310
  - Value of the call = 100 (0.9451) - 80 $\exp^{(-0.10)(10)}$ (0.6310) = $75.94 million
  - Value of the outstanding debt = $100 - $75.94 = $24.06 million
  - Interest rate on debt = ($ 80 / $24.06)$^{1/10}$ -1 = 12.77%

Firm value drops..

- Assume now that a catastrophe wipes out half the value of this firm (the value drops to $ 50 million), while the face value of the debt remains at $ 80 million.
- The inputs
  - Value of the underlying asset = S = Value of the firm = $ 50 million
  - All the other inputs remain unchanged
- The output
  - Based upon these inputs, the Black-Scholes model provides the following value for the call:
    - d1 = 1.0515 N(d1) = 0.8534
    - d2 = -0.2135 N(d2) = 0.4155
  - Value of the call = 50 (0.8534) - 80 $\exp^{(-0.10)(10)}$ (0.4155) = $30.44 million
  - Value of the bond= $50 - $30.44 = $19.56 million

Equity value persists .. As firm value declines..



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 fiirm, and what are the potential roadblocks?

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

Preferred stock is a significant source of capital.

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 ot 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 = Net Income + Depreciation – Cap Ex – 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

ROE = 42.48%

Retention Ratio = 75.25%

Dividends
EPS = 4.04 EGP
* Payout Ratio 24.75%
DPS = 1.00 EGP

Expected Growth
75.25% *
42.48% = 31.96%

g =10%: ROE = 25%(=Cost of equity)
Beta = 0.81
Payout = (1- 10/25) = .60

	1	2	3	4	5	6	7	8	9	10
Expected Growth Rate	31.96%	31.96%	31.96%	31.96%	31.96%	27.57%	23.18%	18.79%	14.39%	10.00%
Earnings per share	5.33 ج.م	7.04 ج.م	9.28 ج.م	12.25 ج.م	16.17 ج.م	20.63 ج.م	25.41 ج.م	30.18 ج.م	34.52 ج.م	37.97 ج.م
Payout ratio	24.75%	24.75%	24.75%	24.75%	24.75%	31.80%	38.85%	45.90%	52.95%	60.00%
Dividends per share	1.32 ج.م	1.74 ج.م	2.30 ج.م	3.03 ج.م	4.00 ج.م	6.56 ج.م	9.87 ج.م	13.85 ج.م	18.28 ج.م	22.78 ج.م
Cost of Equity	23.25%	23.25%	23.25%	23.25%	23.25%	23.25%	23.25%	23.25%	23.25%	23.25%
Cumulative Cost of Equity	123.25%	151.90%	187.21%	230.73%	284.37%	350.48%	431.95%	532.37%	656.13%	808.66%
Present Value	1.07 ج.م	1.15 ج.م	1.23 ج.م	1.31 ج.م	1.41 ج.م	1.87 ج.م	2.29 ج.م	2.60 ج.م	2.79 ج.م	2.82 ج.م

Terminal Value
= EPS_6*Payout/(r-g)
= (37.97*.6)/(.2325-.10) = 189.20

Value of Equity per share = PV of Dividends & Terminal value = 41.93 EGP

Forever

Discount at Cost of Equity

In December 2015, CIB was trading at 36 EGP per share

Cost of Equity
10.53% + 0.81 (15.70%) = 23.25%

Riskfree Rate:
In EGP
10.53%

US $ risk free rate (2.27%) adjusted for diff inflation
(1.0227)*(1.097/1.015)-1

+

0.81

Average Beta for Banks

x

Equity Risk Premium
15.7%

100% in Egypt

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 = Net Income – 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 * T	$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

Aswath Damodaran

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.

What are the cashflows from existing assets?

Historial revenue and earnings data are volatile, as the economic cycle and commodity prices change.

What is the value added by growth assets?

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

Primary risk is from the economy for cyclical firms and from commodity price movements for commodity companies. These risks can stay dormant for long periods of apparent prosperity.

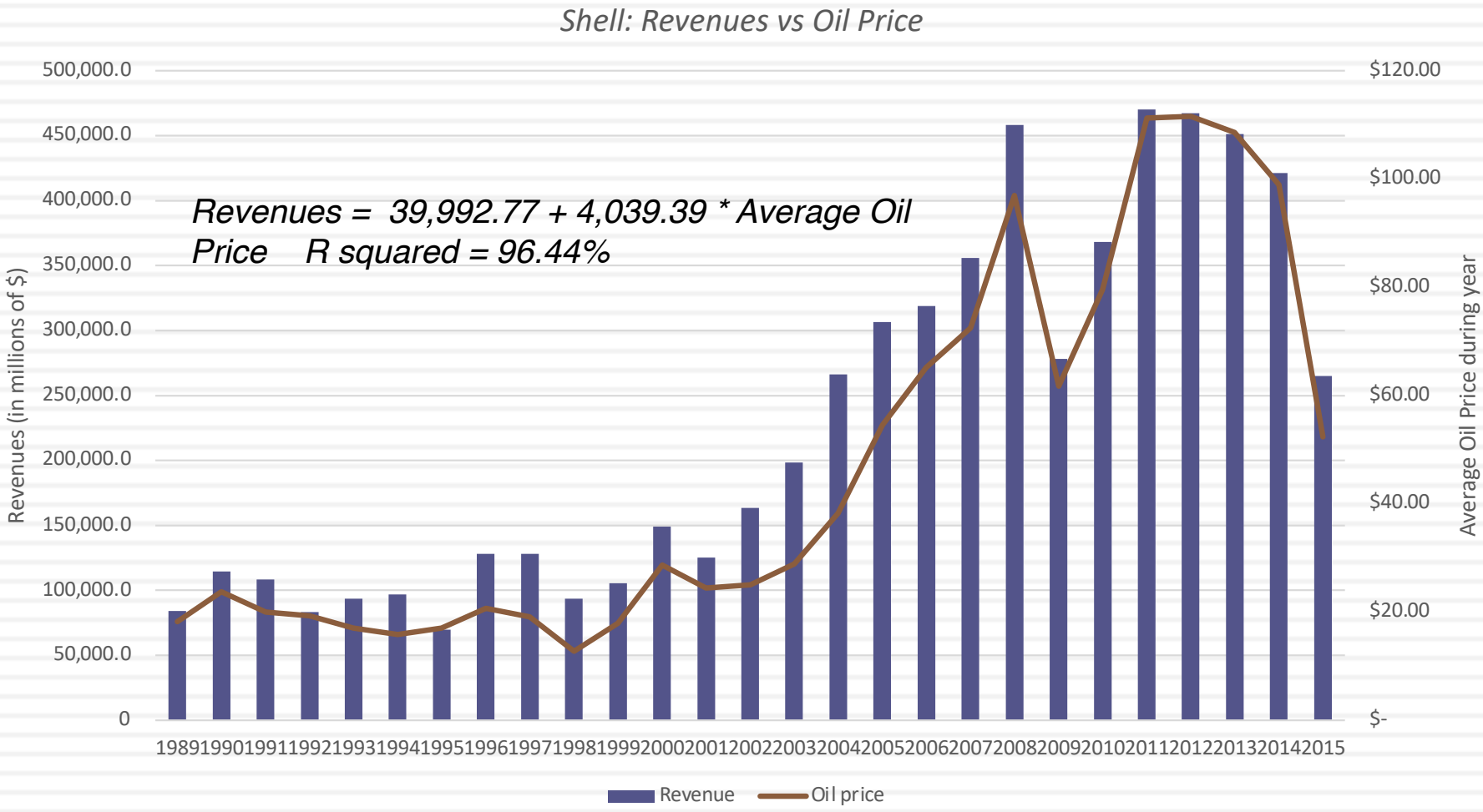
When will the firm become a mature fiirm, and what are the potential roadblocks?

For commodity companies, the fact that there are only finite amounts of the commodity may put a limit on growth forever. For cyclical firms, there is the peril that the next recession may put an end to the firm.

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: 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 Interets	$ 1,245.00						
Value of Equity	$ 165,477.41						
Number of shares	4209.7						
Value per share	$ 39.31						

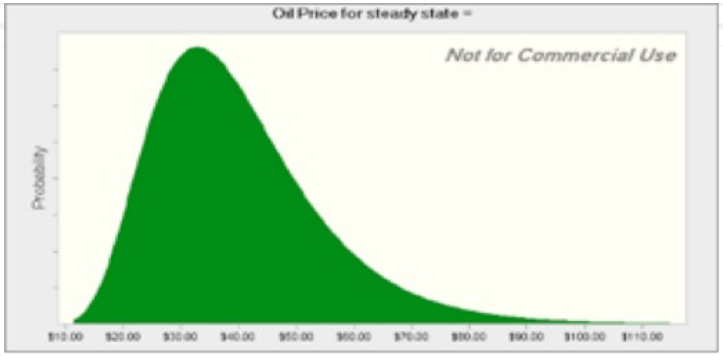
Operating margin converges on Shell's historical average margin of 9.35% from 200-2015

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)

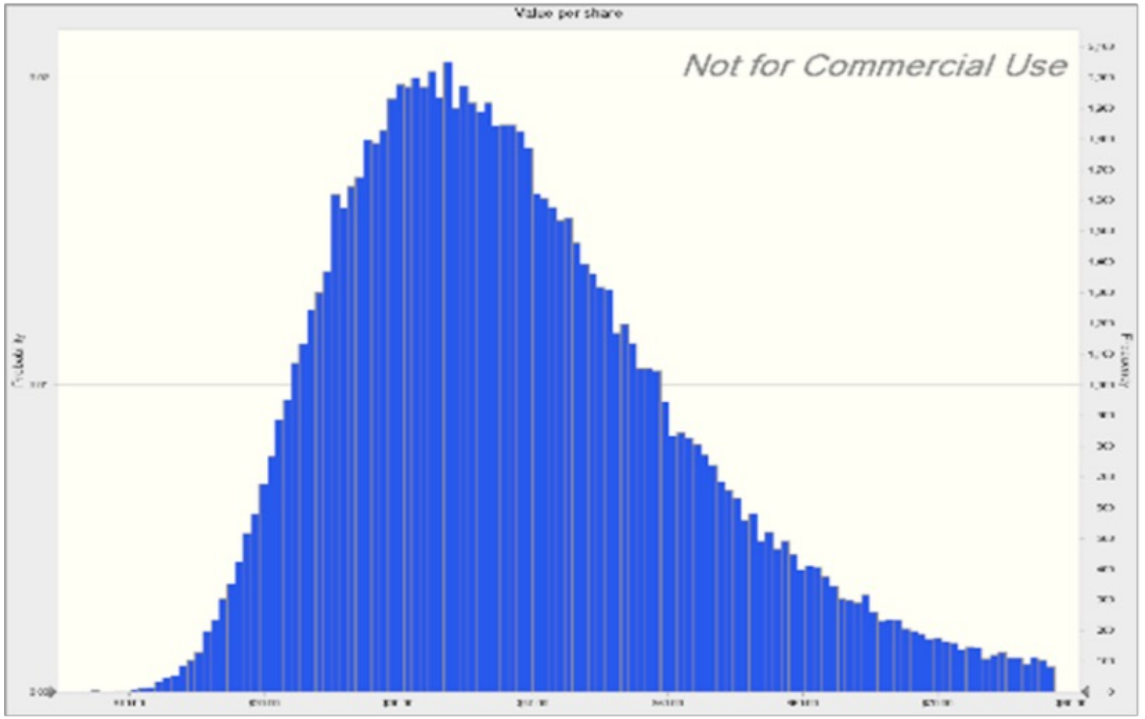


Revenue calculated from the oil price drawn from distribution
Revenue = 39992.77+4039.40*Oil Price/Barrel

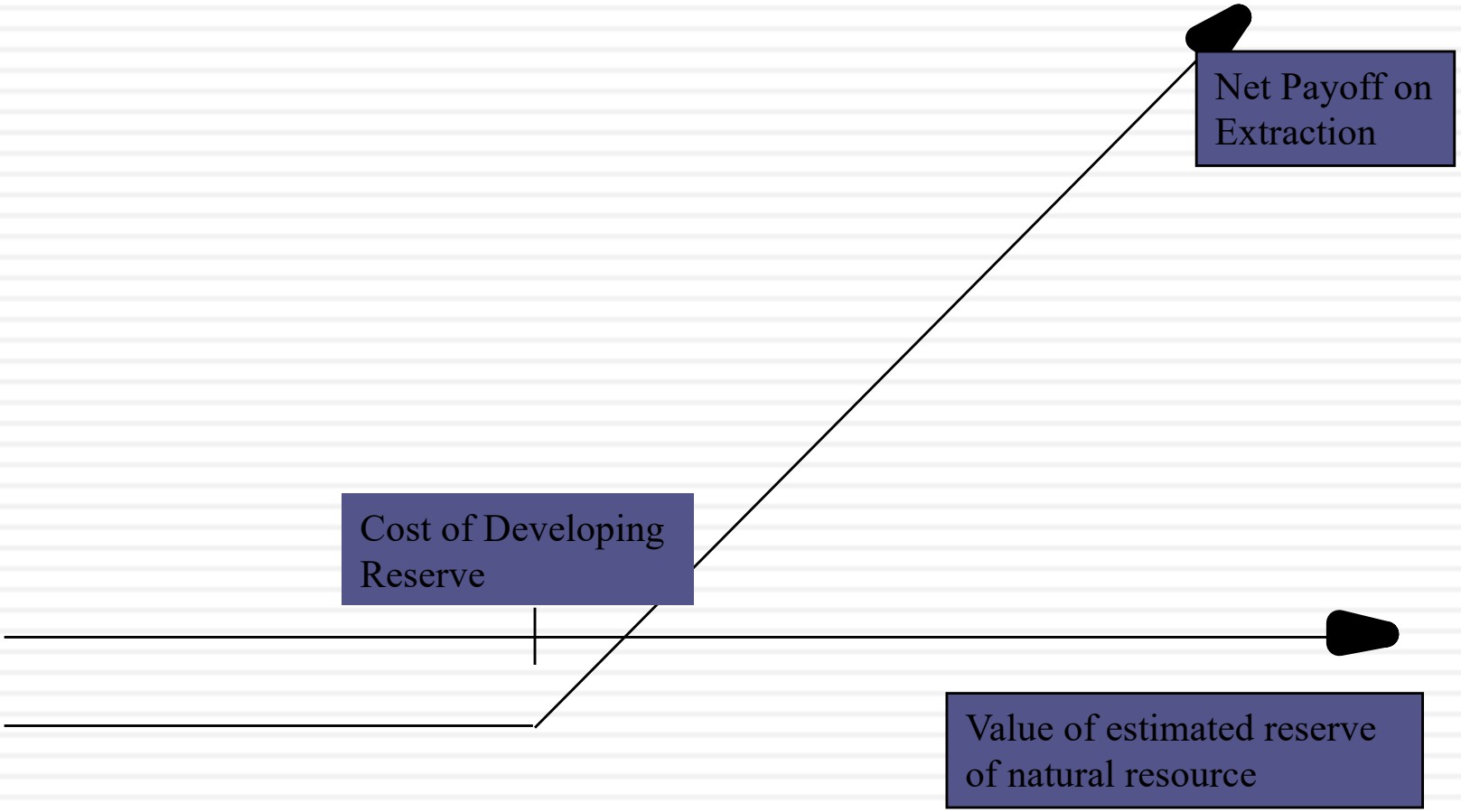
Pre-tax Operating Income based on revenue & selected margin
Pre-tax Operating Income = Revenues * Operating Margin

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

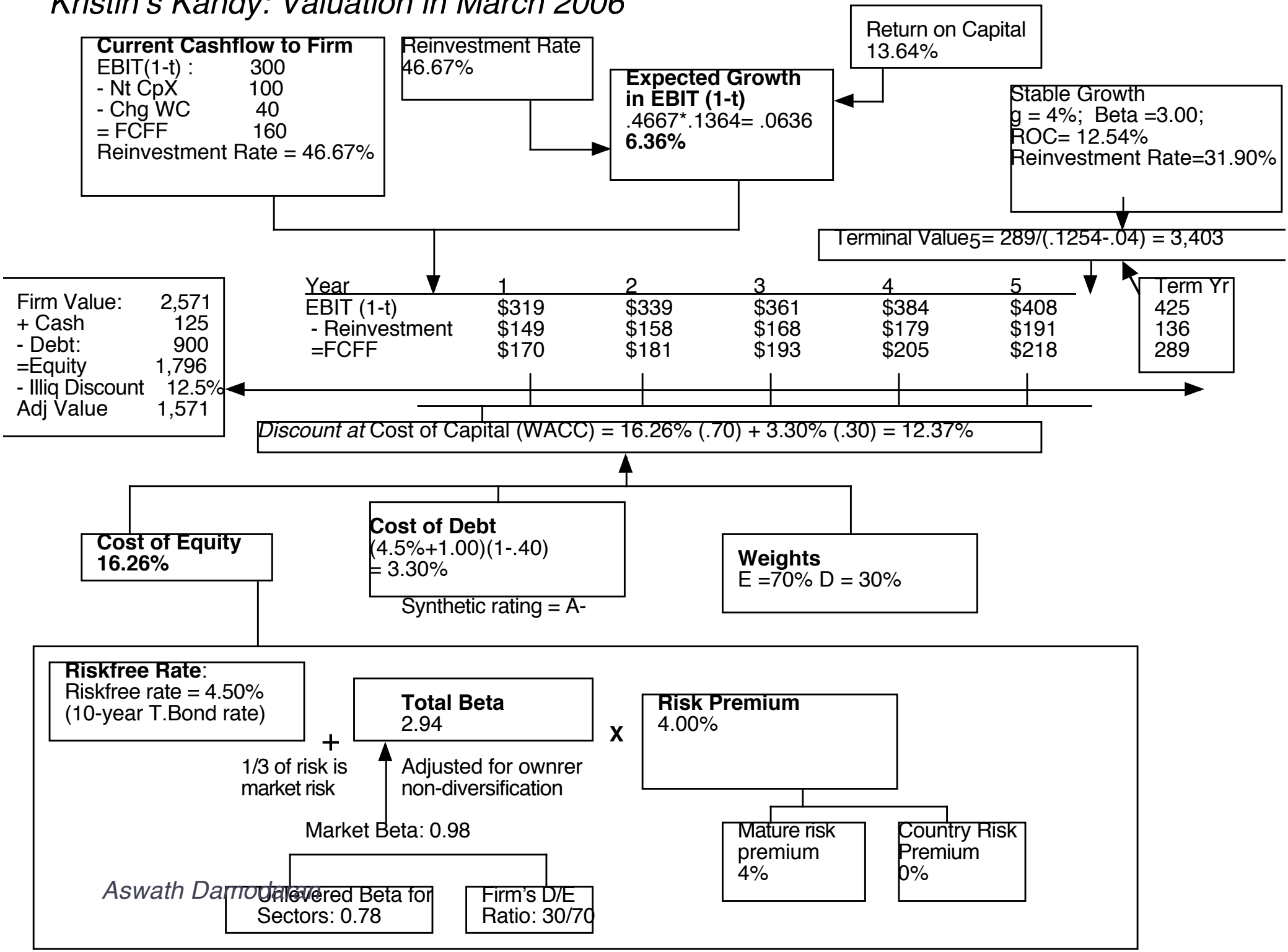
How **risky are the cash flows** from both existing assets and growth assets?
Equity: Risk in equity in the company
Firm: Risk in the firm's operations

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

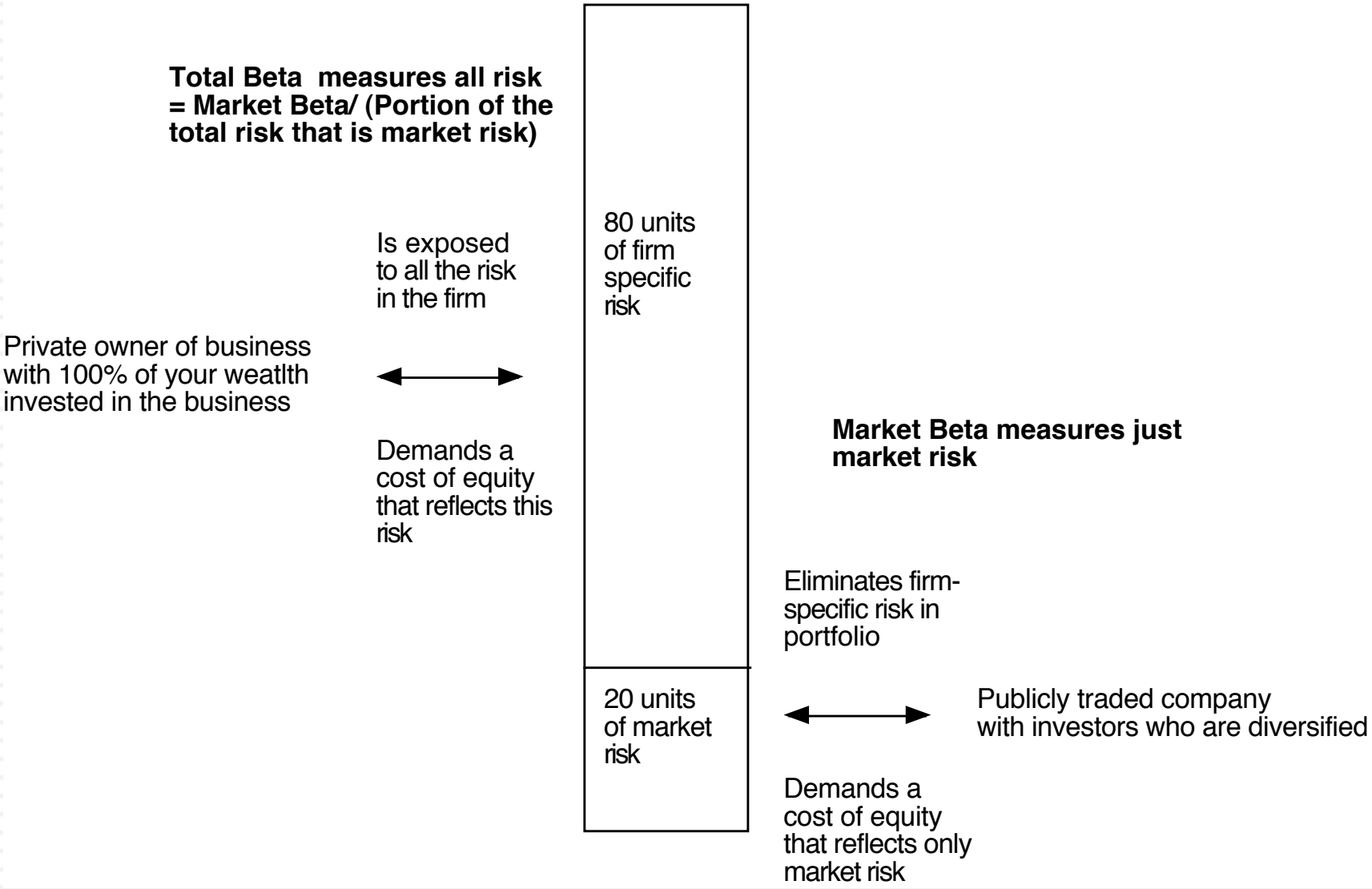
When will the firm become a **mature fiirm**, and what are the potential roadblocks?

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

Kristin's Kandy: Valuation in March 2006



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

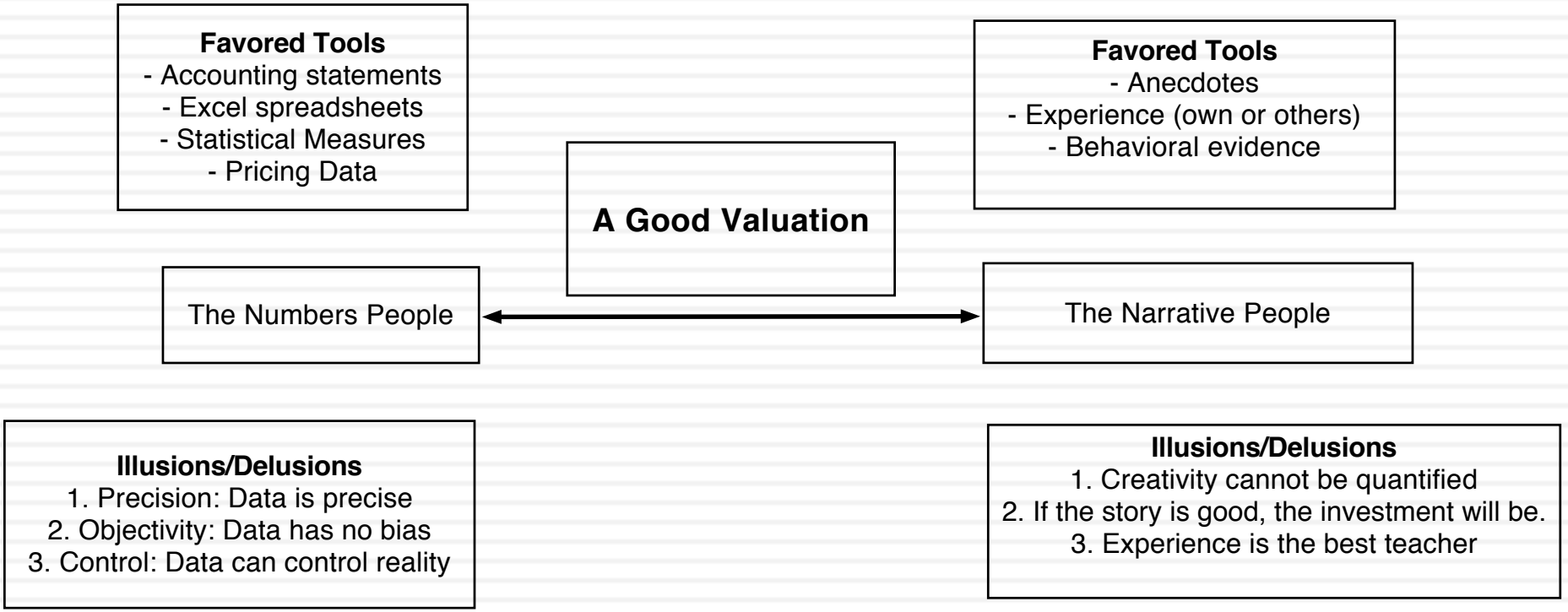
b. No

- 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?

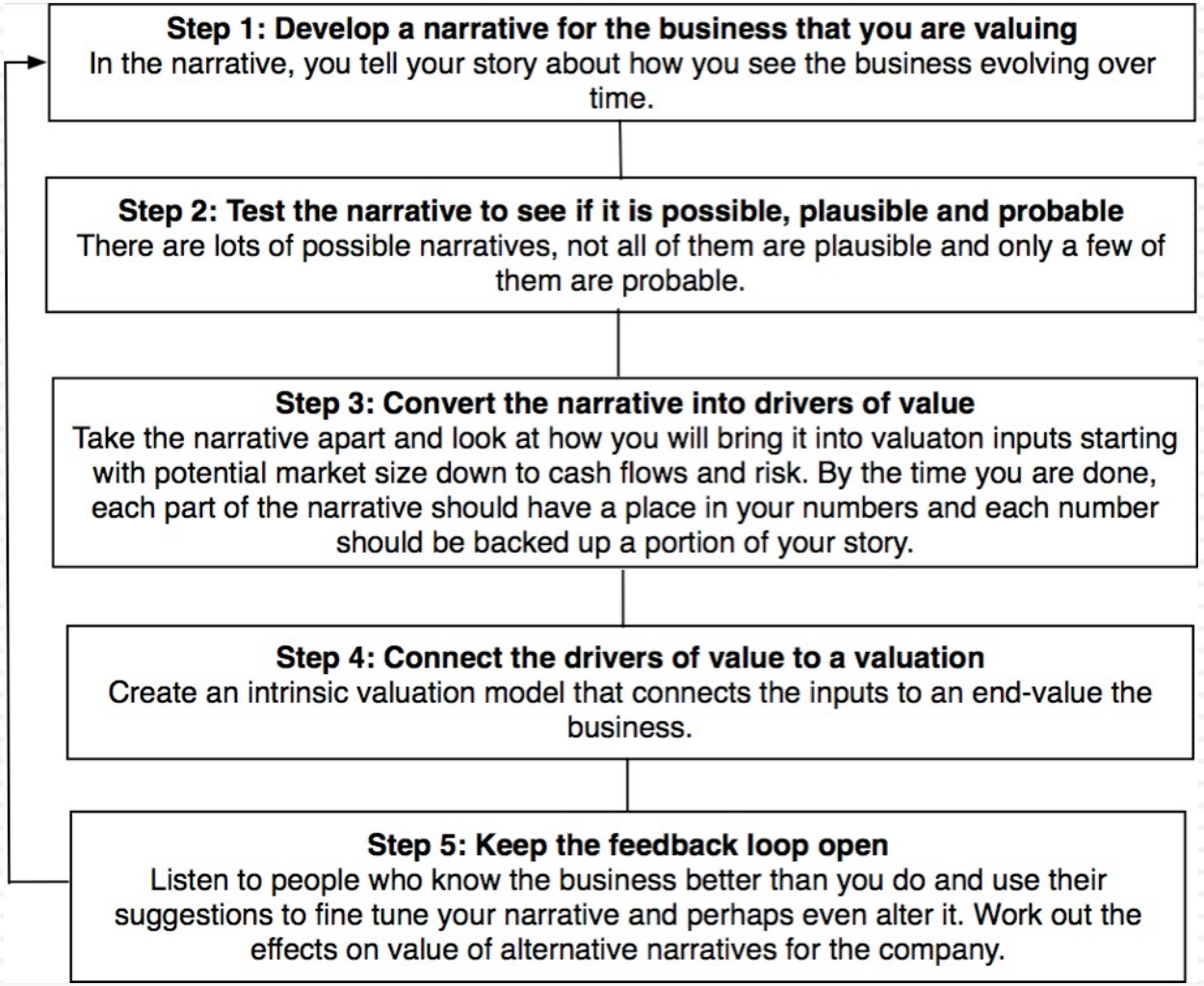
NARRATIVE AND NUMBERS: VALUATION AS A BRIDGE

Work on your weak side…

Valuation = Stories + Numbers

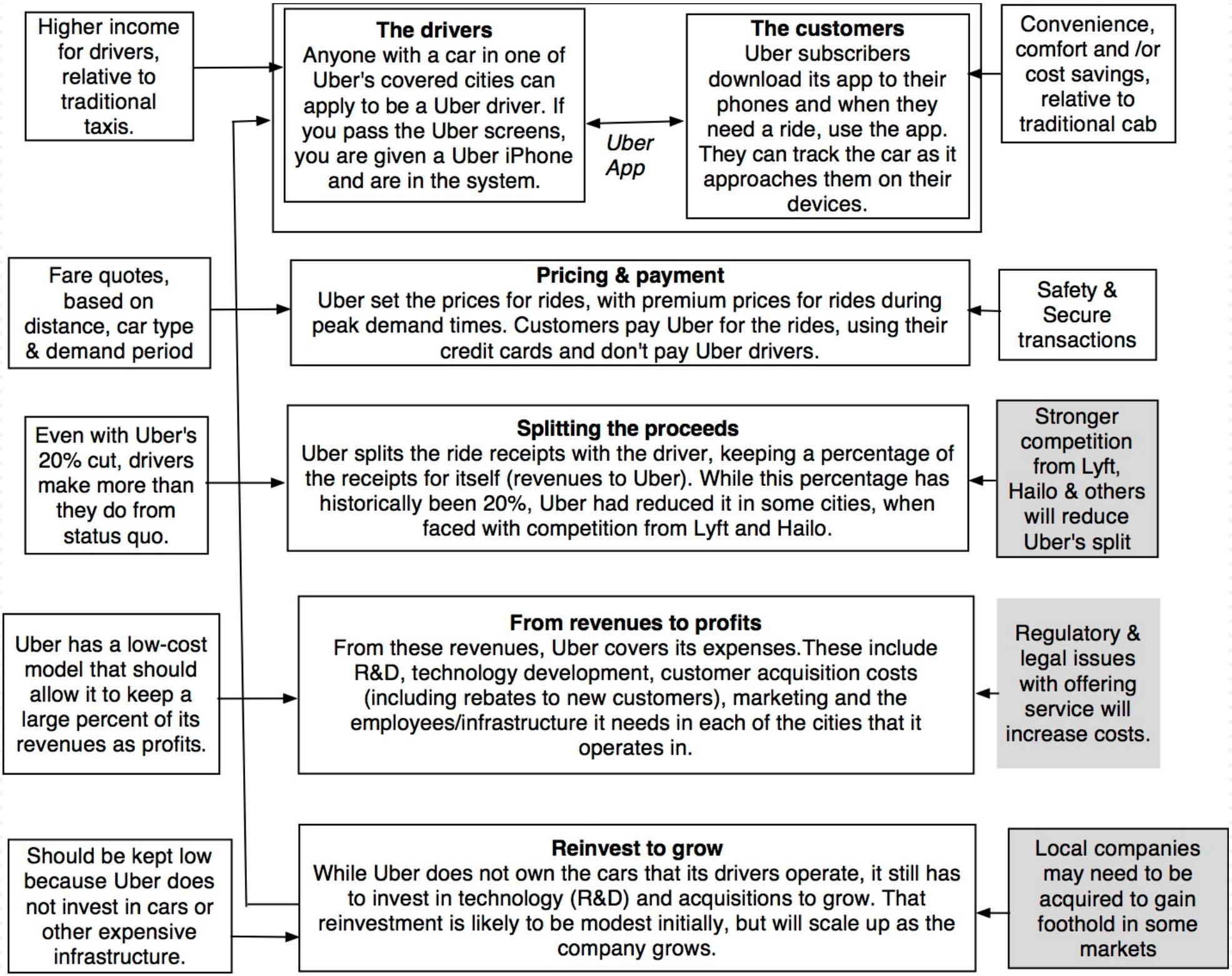


From Story to Numbers: The Steps



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.


Higher income for drivers, relative to traditional taxis.
The drivers
Anyone with a car in one of Uber's covered cities can apply to be a Uber driver. If you pass the Uber screens, you are given a Uber iPhone and are in the system.
Uber App
The customers
Uber subscribers download its app to their phones and when they need a ride, use the app. They can track the car as it approaches them on their devices.
Convenience, comfort and /or cost savings, relative to traditional cab
Fare quotes, based on distance, car type & demand period
Pricing & payment
Uber set the prices for rides, with premium prices for rides during peak demand times. Customers pay Uber for the rides, using their credit cards and don't pay Uber drivers.
Safety & Secure transactions
Even with Uber's 20% cut, drivers make more than they do from status quo.
Splitting the proceeds
Uber splits the ride receipts with the driver, keeping a percentage of the receipts for itself (revenues to Uber). While this percentage has historically been 20%, Uber had reduced it in some cities, when faced with competition from Lyft and Hailo.
Stronger competition from Lyft, Hailo & others will reduce Uber's split
Uber has a low-cost model that should allow it to keep a large percent of its revenues as profits.
From revenues to profits
From these revenues, Uber covers its expenses.These include R&D, technology development, customer acquisition costs (including rebates to new customers), marketing and the employees/infrastructure it needs in each of the cities that it operates in.
Regulatory & legal issues with offering service will increase costs.
Should be kept low because Uber does not invest in cars or other expensive infrastructure.
Reinvest to grow
While Uber does not own the cars that its drivers operate, it still has to invest in technology (R&D) and acquisitions to grow. That reinvestment is likely to be modest initially, but will scale up as the company grows.
Local companies may need to be acquired to gain foothold in some markets

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

	India	*China*	*United States*	*EU*
General				
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
Food Delivery				
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

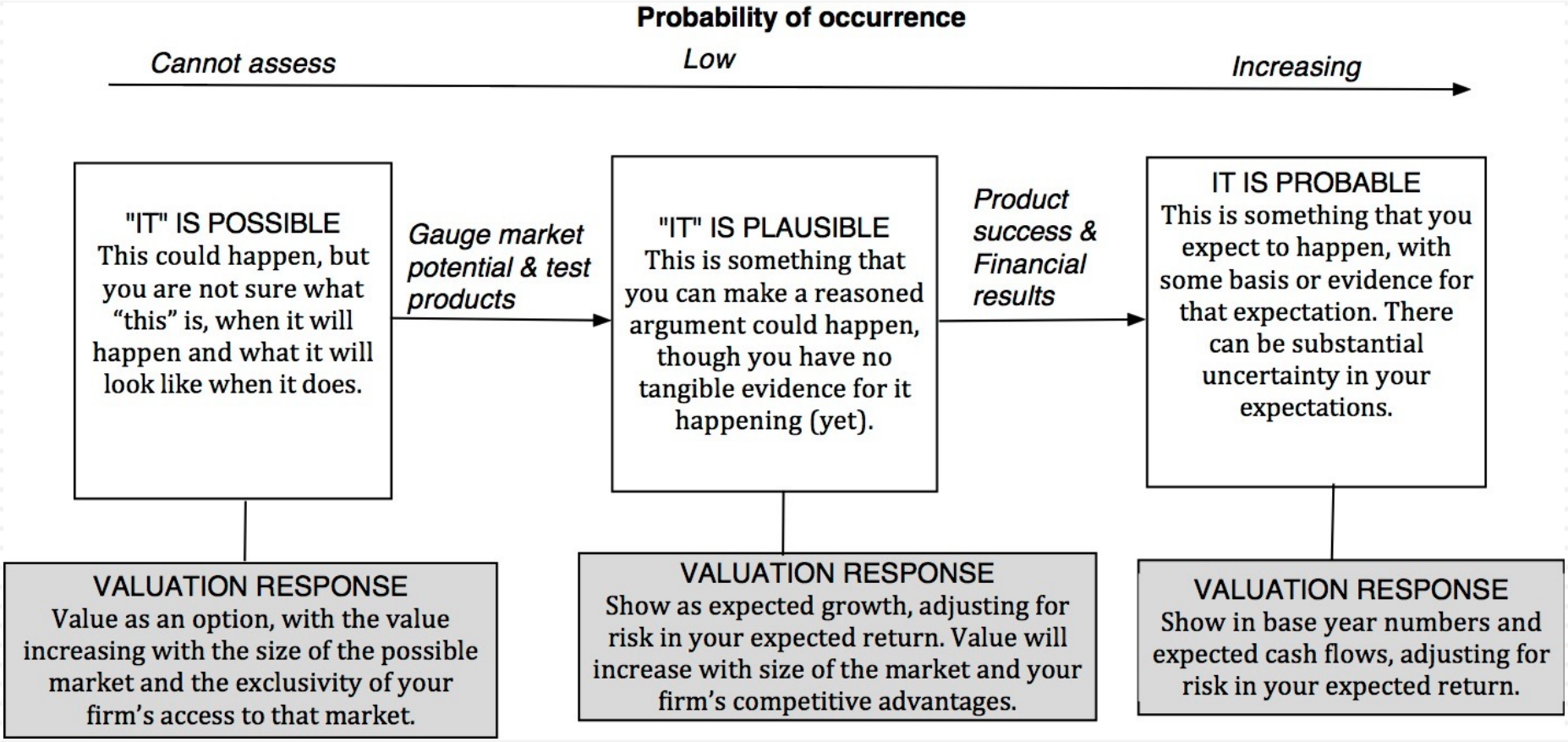
In June 2014, my initial narrative for Uber was that it would be

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



The Impossible, The Implausible and the Improbable

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 exceeds 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.

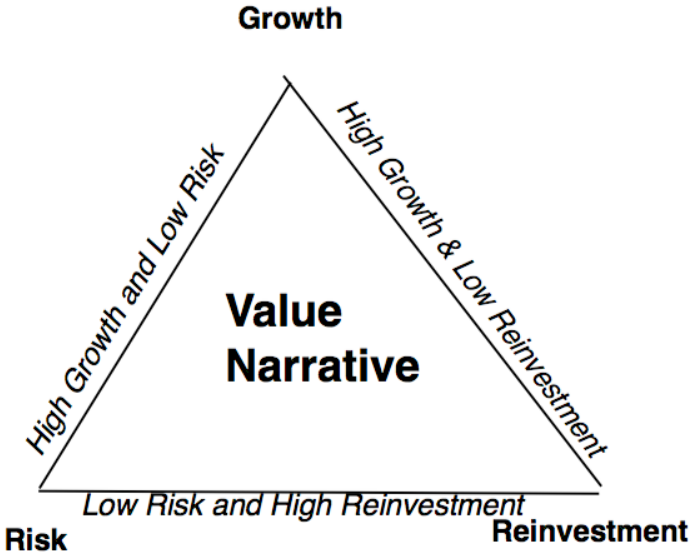
The Implausible

Growth without reinvestment
Assuming growth forever without reinvestment.

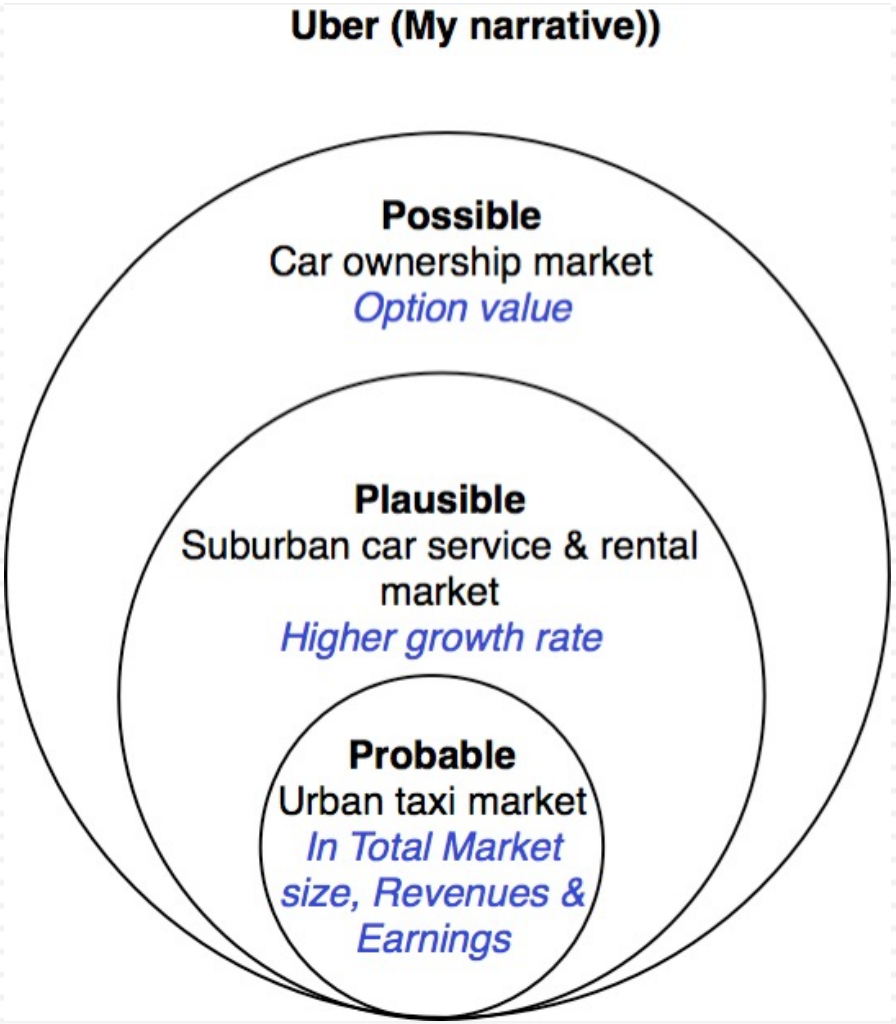
Profits without competition
Assuming that your company will grow and earn higher profits, with no competition.

Returns without risk
Assuming that you can generate high returns in a business with no risk.

The Improbable



Uber: Possible, Plausible and Probable



The Impossible: The Runaway Story

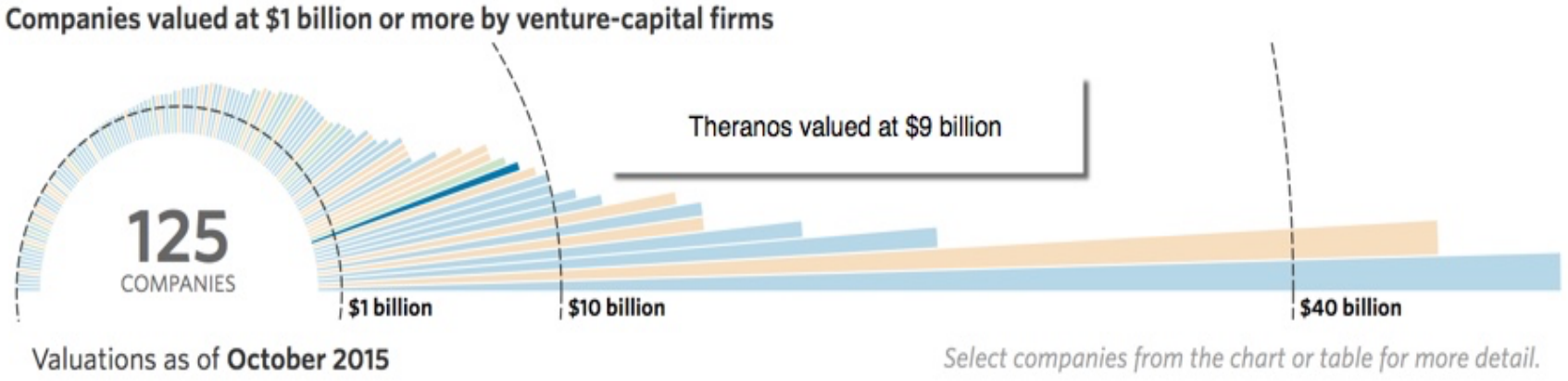
The Story

+

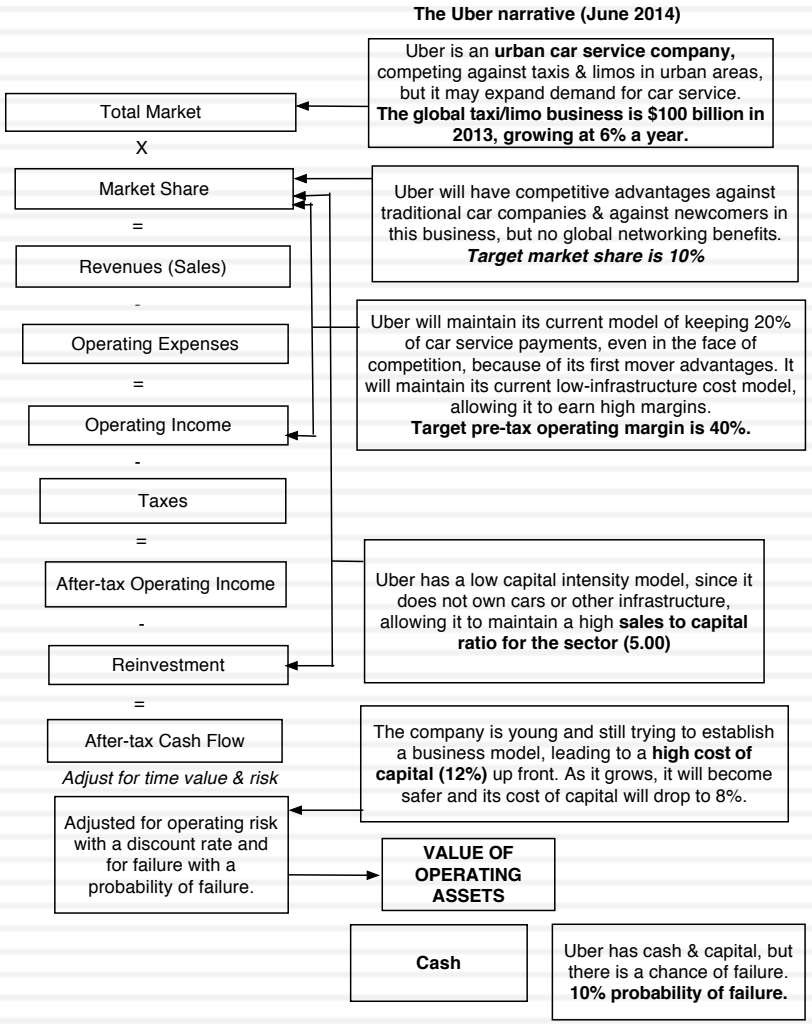
The Checks (?)

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	Epidemologist	79
Elizabeth Holmes	Founder & CEO, Theranos	31
Sunny Balwani	President & COO, Theranos	NA

+ Money



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 $)

Stable Growth (after year 10)
Expected growth rate = 2.50%
Cost of capital = 8%
Return on capital= 25%
Reinvestment Rate= 2.5%/25% = 10%

Terminal Value$_{10}$= 793/(.08-025) = $14,418

Term yr
EBIT (1-t) $881
- Reinv 88
FCFF $793

Global taxi market is $100 billlion currently, expected to grow 6% a year for next ten years.

Uber will keep 20% of the gross cab receipts as its revenues

Uber's market share of this market will increase to 10% over the next 10 years.

Uber's operating expenses will amount to 60% of its revenues. (Operating margin=40%)

Uber will pay a tax rate of 30% on its income, increasing to 40% over the next 10 years

Uber will generate $5 in incremental revenues for every dollar of incremental capital.

	1	2	3	4	5	6	7	8	9	10
Overall market	$106,000	$112,360	$119,102	$126,248	$133,823	$141,852	$150,363	$159,385	$168,948	$179,085
Share of market (gross)	3.63%	5.22%	6.41%	7.31%	7.98%	8.49%	8.87%	9.15%	9.36%	10.00%
Revenues as percent of gross	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%	20.00%
Annual Revenue	$769	$1,173	$1,528	$1,846	$2,137	$2,408	$2,666	$2,916	$3,163	$3,582
Operating margin	7.00%	10.67%	14.33%	18.00%	21.67%	25.33%	29.00%	32.67%	36.33%	40.00%
Operating Income	$54	$125	$219	$332	$463	$610	$773	$953	$1,149	$1,433
Effective tax rate	31%	32%	33%	34%	35%	36%	37%	38%	39%	40%
- Taxes	$17	$40	$72	$113	$162	$220	$286	$362	$448	$573
After-tax operating income	$37	$85	$147	$219	$301	$390	$487	$591	$701	$860
Sales/Capital Ratio	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
- Reinvestment	$94	$81	$71	$64	$58	$54	$52	$50	$49	$84
Free Cash Flow to the Firm	-$57	$4	$76	$156	$243	$336	$435	$541	$652	$776

Based on the investment of $1.2 billion made by investors, the imputed value for Uber's operating assets, in June 2014 ,was $17 billion.

Value of operating assets = $6,595

Adust for probability of failure (10%)
Expected value = $6,595 (.9) = $5,895

Discount back the cash flows (including terminal value) at the cumulated cost of capital.

Cost of capital for first 5 years = Top decile of US companies = 12%

Cost of capital declines from 12% to 8% from years 6 to 10.

Zomato						Jul-21
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 bouncecback 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 growsto 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%	Newworking 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

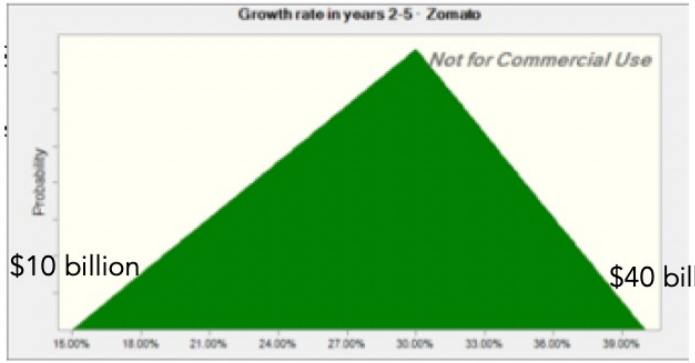
1. Not just car service company.: Uber is a car company, not just a car service company, and there may be a day when consumers will subscribe to a Uber service, rather than own their own cars. It could also expand into logistics, i.e., moving and transportation businesses.
2. Not just urban: Uber can 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

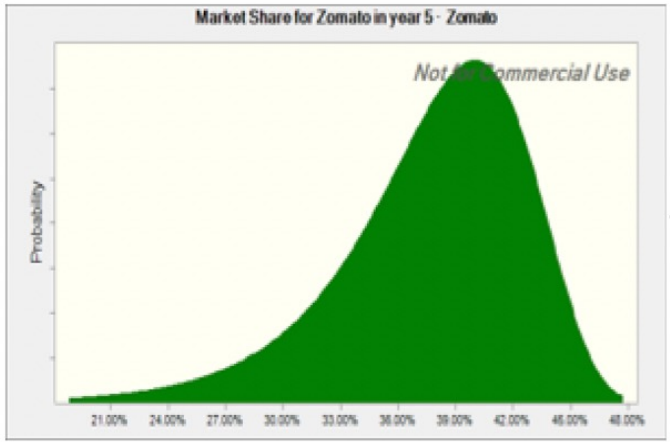
	Uber (Gurley)	*Uber (Gurley Mod)*	*Uber (Damodaran)*
Narrative	Uber will expand the car service market substantially, bringing in mass transit users & non-users from the suburbs into the market, and use its networking advantage to gain a dominant market share, while maintaining its revenue slice at 20%.	Uber will expand the car service market substantially, bringing in mass transit users & non-users from the suburbs into the market, and use its networking advantage to gain a dominant market share, while cutting prices and margins (to 10%).	Uber will expand the car service market moderately, primarily in urban environments, and use its competitive advantages to get a significant but not dominant market share 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)

Zomato: Monte Carlo Simulation of Value/Share

Growth in Indian Food Delivery Market

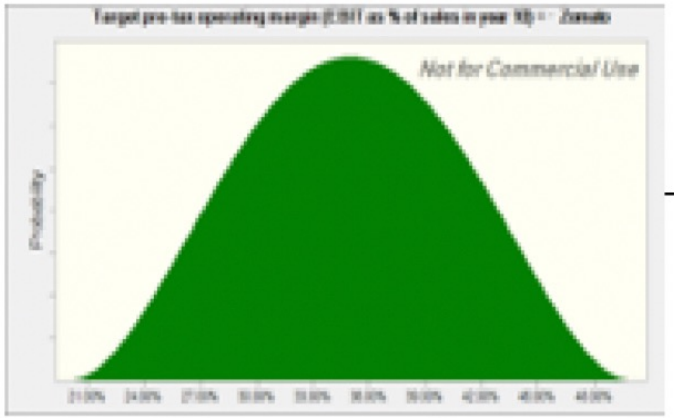


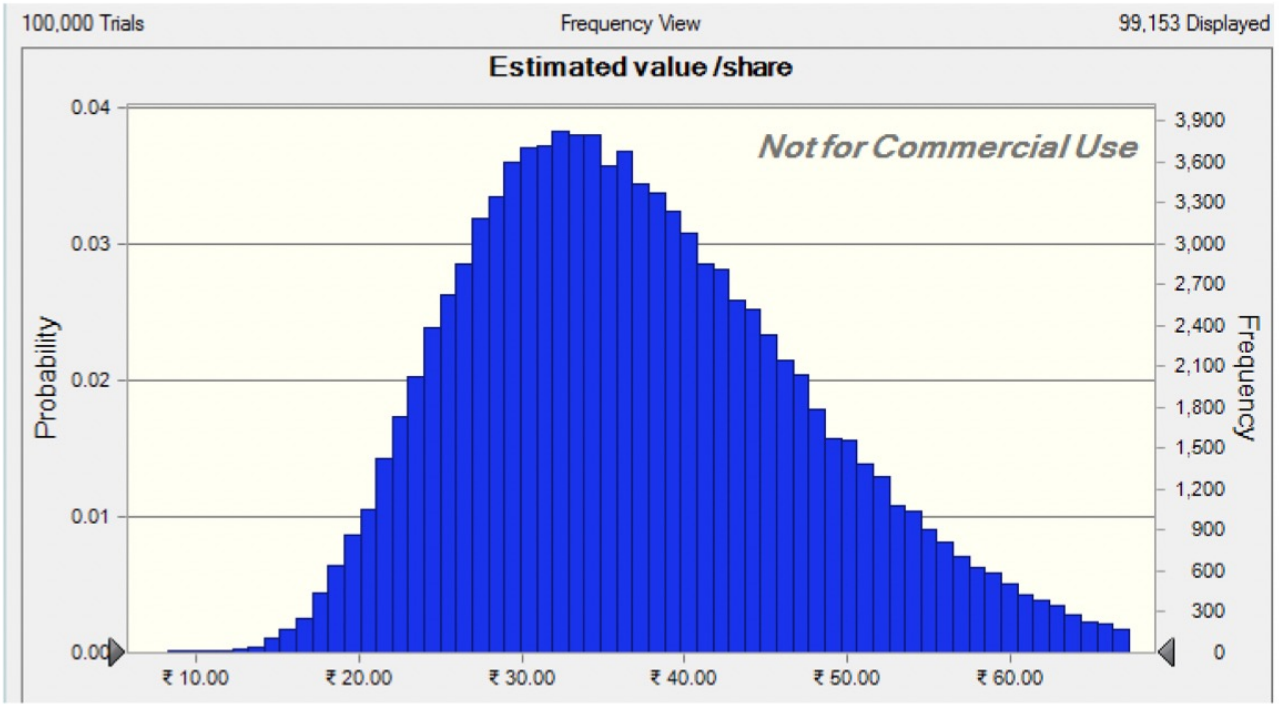
Zomato's Market Share



Correlation = 0.50

Zomato's Operating Margin (Pre-tax)





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

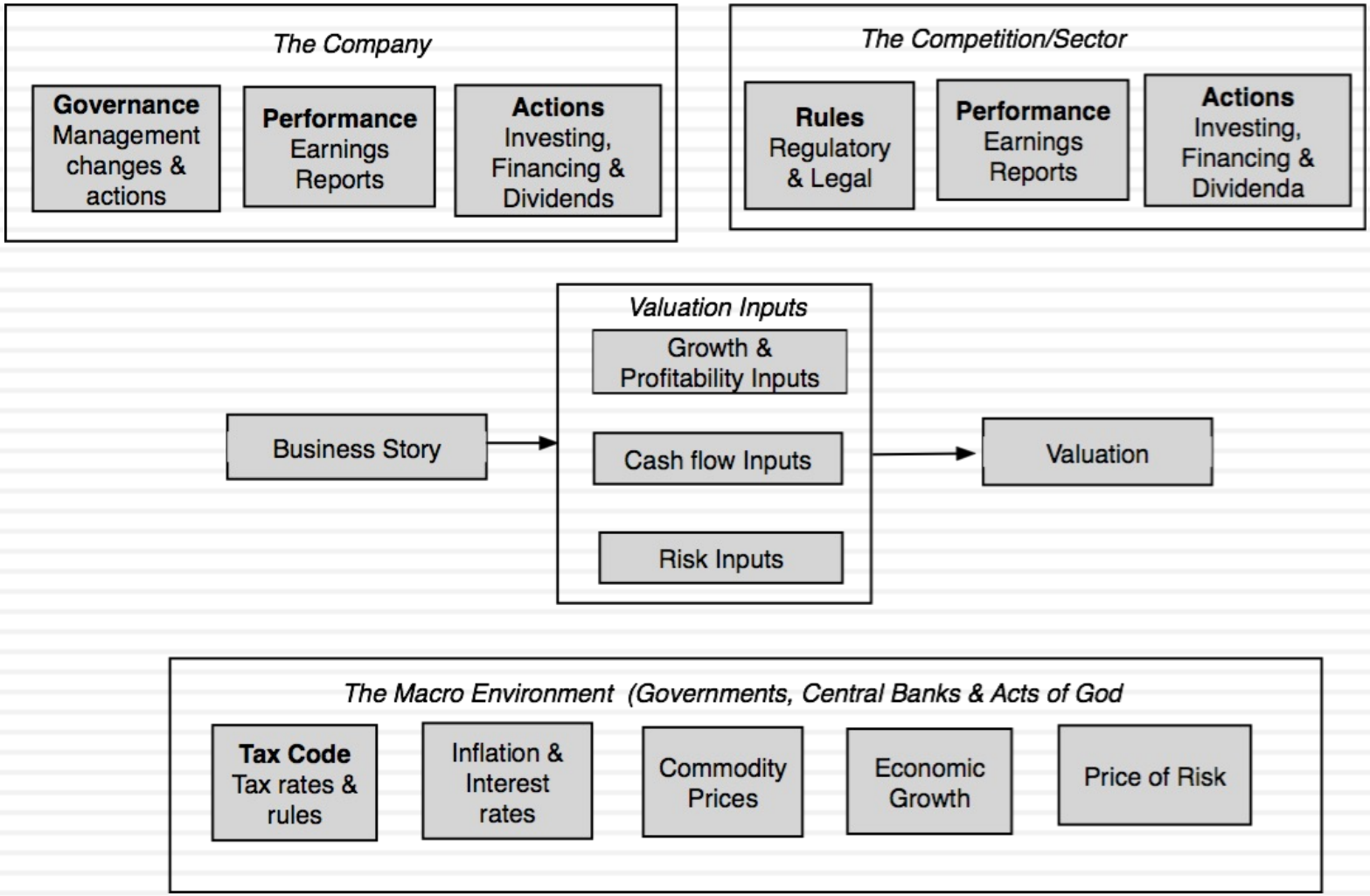
Feedback on Zomato

- 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	
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	Probable
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	
Restaurant Delivery Juggernaut + Low Growth India	₹ 1,125,000.00	40%	25%	45%	9.50%	₹ 36.48	Plausible
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

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.
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

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

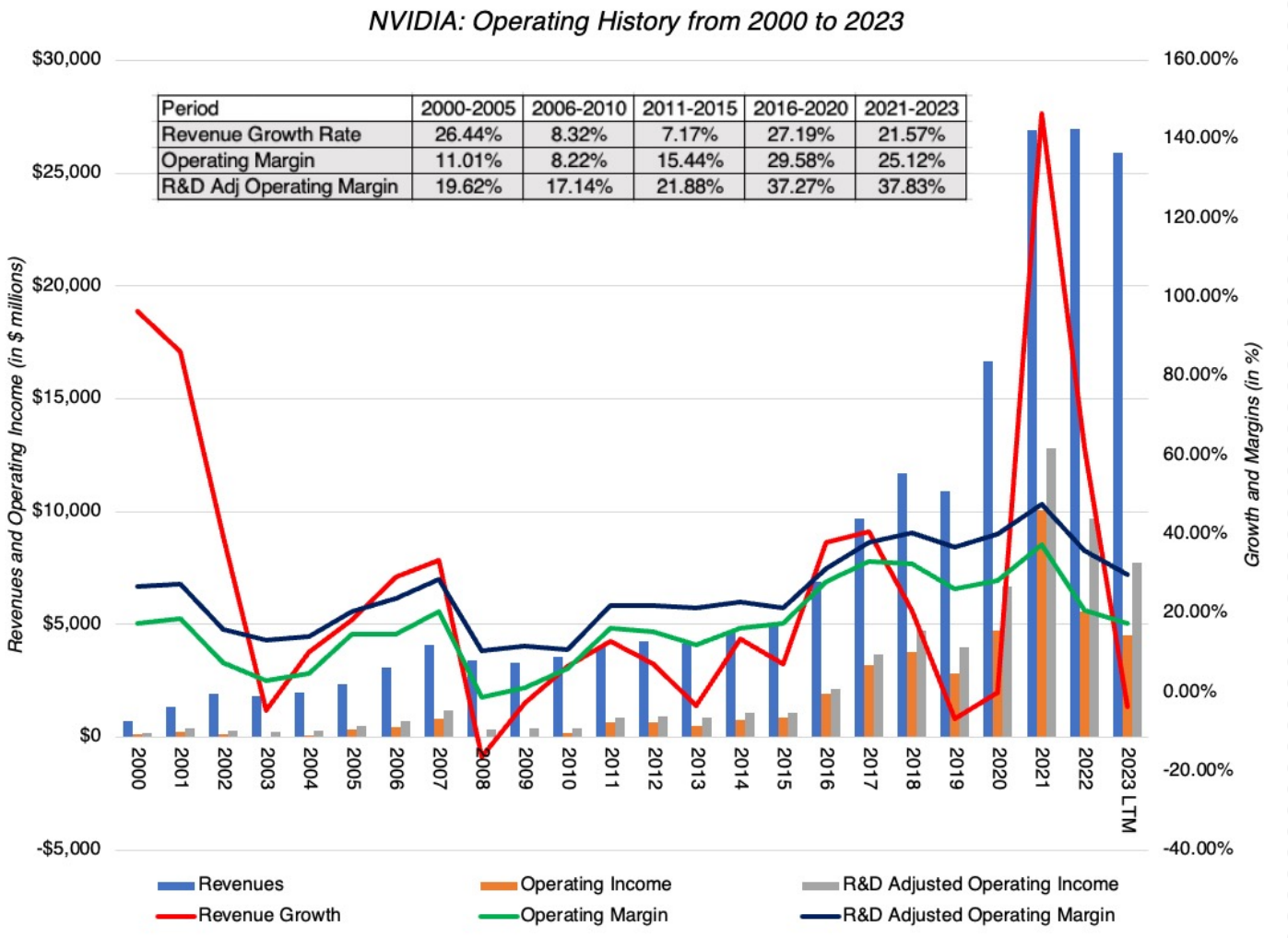
Valuation as a Craft

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

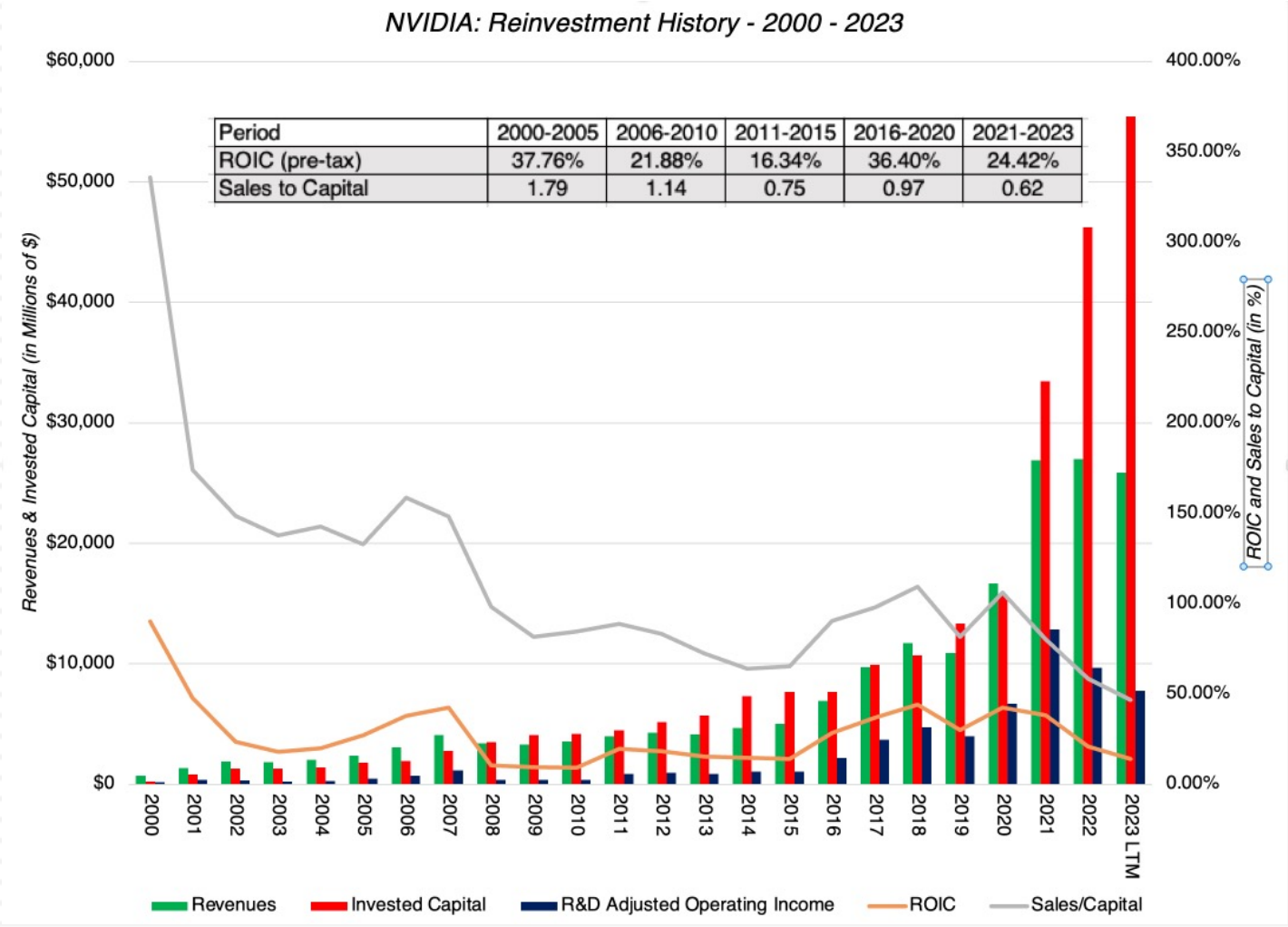
Be Flexible, Adaptable and Creative!

- The structure of intrinsic valuation is simple, while being adaptable and flexible.
- When someone claims that you cannot do an intrinsic valuation, it is based upon one or both false presumptions:
  - That intrinsic valuation can only be used for businesses with long histories and positive earnings & cash flows.
  - That uncertainty about the future is a good basis for not trying to estimate what will happen in the future.
- In fact, every innovation or change in markets is greeted with attempts to either just price it blindly or to invent new valuation models that upend common sense.

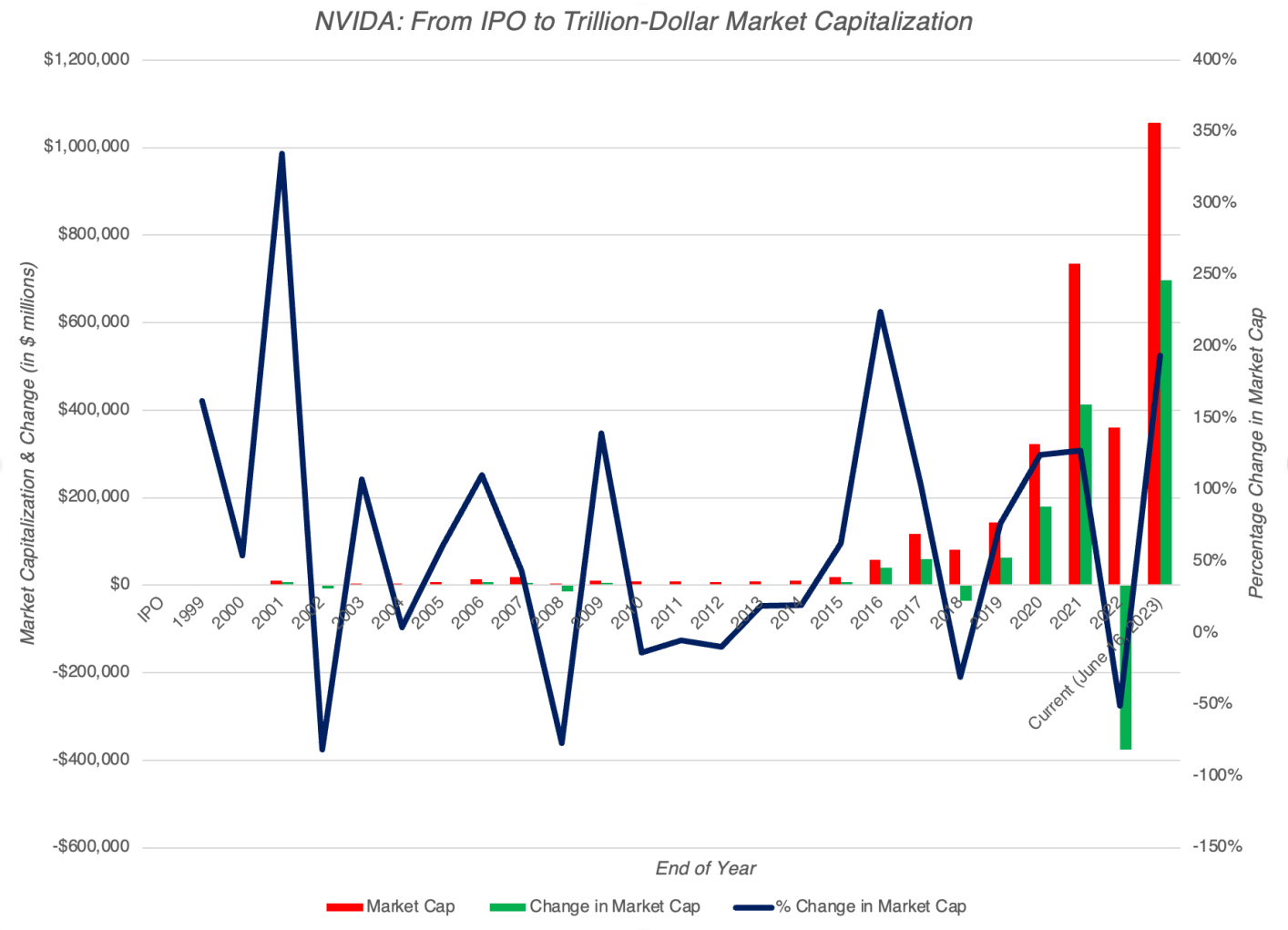
NVIDIA
1. Opportunistic Growth



2. With Large (but Productive) Reinvestment!



3. And a Mega Market Payoff



The AI Chip Story

- The AI story has particular resonance with NVIDIA because unlike most other companies, where it is mostly hand-waving about potential, it has substance in place already and a market that is its target. In particular, NVIDIA has spent much of the last few years investing and developing products for a nascent AI market. This lead time has given NVIDIA not just market leadership, but revenues and profits already. Much of the excited reaction to NVIDIA's most recent earnings report came from the company reporting a surge in its data center revenues, with much of the increase coming from AI chips.
- While the company does not explicitly break out how much of the data center revenues are from AI chips, it is estimated that the total market for those chips in 2022 was about $15 billion, with NVIDIA holding a dominant market share of about 80%. If those estimates are right, the bulk of the data center revenues for NVIDIA in 2022, which amounted to $15 billion in all, comes from AI-optimized chips.
- The ChatGPT jolt to market expectations has played out in increases in expected growth of the AI chip market over the next decade, with estimates for the overall AI chip market in 2030 ranging from $200 billion at the low end to close to $300 billion at the high end.

NVIDIA: The Lead In to the Story

- The driver of NVIDIA's success has been its high-performance GPU cards, but it is very likely that the businesses that bought these cards and drove NVIDIA's success in the last decade will be different from the businesses that will make it successful in the next one.
- For much of the last decade, it was gaming and crypto users that allowed the company to set itself apart from the competition, but the bad news is that both of these markets are maturing, with lower expected growth in the future.
- The good news, for NVIDIA, is that it has two other businesses that are ready to step in and contribute to growth.
  - The first is AI, where NVIDIA commands a hefty market share of what is now a relatively small market, but one that is almost certain to grow ten-fold or greater over the decade.
  - The other is in the automobiles business, where more powerful computing is seen as the ingredient needed to open up automated driving and other enhancements. NVIDIA is only a small player in this space, and while it does not enjoy the dominance that it does in AI, a growing market will allow NVIDIA to acquire a significant market share.

The NVIDIA Growth Story

- Revenue Growth: NVIDIA will remain a high growth company for two reasons.
  - The first is that in spite of its scaling up due to growth over the last decade, at least in terms of revenues, it has a modest market share of the overall semiconductor market, with revenues that are less than half of the revenues posted by Intel or TSMC.
  - The second, and more important reason, is that while its gaming revenue growth is starting to flag, it is well-positioned in AI and Auto, two markets poised for rapid growth. In my story, I will assume that these markets will deliver on their growth promise and that NVIDIA will maintain a dominant, albeit lower, market share of the AI chip business, while gaining a significant share (15%) of the Auto chip business

	AI		*Auto*		*Gaming & Other*		NVIDIA	
	Current	*In 2033*	*Current*	*In 2033*	*Current*	*In 2033*	*Current*	*In 2033*
Total Market ($ Mil)	$15,000	$325,000	$20,000	$200,000	Revenue growth: 15% for years 1-5, declining thereafter.		Revenues increase 10-fold over next decade	
Market Share	75%	60%	3.00%	15%				
NVIDIA revenues ($ Mil)	$11,250	$195,000	$600	$30,000	$14,028	$41,672	$25,878	$266,672

NVIDIA: The Rest of the Story

- Profitability: The semiconductor business has a cost structure that has relatively little flex to it, but I will assume in my NVIDIA story that the right margin to focus on is the R&D adjusted version, and that NVIDIA will bounce back quickly from its 2022 margin setback to deliver higher margins than its peer group. While my target R&D adjusted margin of 40% may look high, it is worth remembering that the company delivered 42.5% as margin in 2020 and 38.4% as margin in 2021.
- Investment Efficiency: NVIDIA has invested heavily in the last decade, generating only 65 cents in revenues for every dollar of capital invested (including the investment in R&D), in 2022. I believe that given the company's larger scale, with the payoff from past investments augmenting revenues, the company's sales to invested capital will approach the global industry median, which is $1.15 in revenues for every dollar of capital invested.
- Risk: I estimated NVIDIA's cost of capital based upon its geographic exposure and very low debt ratio to be 13.13%, but chose to use the industry average for US semiconductor companies, which was 12.21%, as the cost of capital in the initial growth period. Over time, I will assume that this cost of capital will drift down towards the overall market average cost of capital of 8.85%.

Nvidia — Jun-23

Base Year and Comparison	Company	Industry
Revenue Growth	-15.29%	8.81%
Revenue	$14,028	
Operating Margin	25.64%	22.96%
Operating Income	$3,597	
EBIT (1-t)	$3,238	

Growth Story (Revenue)
Even as gaming and other chip businesses mature, NVIDIA"s investments in the AI and Auto chip businesses will deliver healthy growth over the next decade.

Profitability Story (Margin)
Margins improve, first as NVIDIA rebounds from a down-year and then long term, because of competitive advantages, especially in their growth businesses and economies of scale.

Growth Efficiency Story
Sales to capital moves to industry median, as company is able to slow its investment pace, and see payoffs from past investments in AI & Auto.

Terminal Value	
Growth Rate	3.60%
Cost of capital	8.85%
Return on capital	20.00%
Reinvestment Rate	18.00%

Value of Rest	$106,978
Value of AI	$417,459
Value of Auto	$58,568
Probability of failure =	0.00%
Value of operating assets =	$583,005
- Debt	$12,080
- Minority interests	$0
+ Cash	$15,320
+ Non-operating assets	$505
Value of equity	$586,750
- Value of options	$0
Value of equity in common sto	$586,750
Number of shares	2,470.00
Estimated value /share	**$237.55**
Price per share	$409.00
% Under or Over Valued	72.17%

	1	2	3	4	5	6	7	8	9	10	Terminal year
Revenue (Gaming/Other)	$ 16,132	$ 18,552	$ 21,335	$ 24,535	$ 28,215	$ 31,804	$ 35,125	$ 37,991	$ 40,225	$ 41,673	$ 43,173
Revenue (AI)	$ 29,253	$ 46,512	$ 63,027	$ 78,798	$ 93,825	$ 116,292	$ 137,643	$ 157,878	$ 176,997	$ 195,000	$ 202,020
Revenue (Auto)	$ 1,848	$ 3,672	$ 6,072	$ 9,048	$ 12,600	$ 15,504	$ 18,696	$ 22,176	$ 25,944	$ 30,000	$ 31,080
Revenues (Total)	$ 47,233	$ 68,736	$ 90,434	$ 112,381	$ 134,640	$ 163,600	$ 191,464	$ 218,045	$ 243,166	$ 266,673	$ 276,273
R&D Adj Operating Margin	35.00%	37.00%	38.00%	39.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%
Operating Income	$ 16,532	$ 25,432	$ 34,365	$ 43,829	$ 53,856	$ 65,440	$ 76,585	$ 87,218	$ 97,266	$ 106,669	$ 17,269
EBIT (1-t)	$ 14,878	$ 22,889	$ 30,928	$ 39,446	$ 48,471	$ 56,933	$ 64,332	$ 70,647	$ 75,868	$ 80,002	$ 12,952
Reinvestment	$ 18,698	$ 18,868	$ 19,085	$ 19,356	$ 25,183	$ 24,229	$ 23,114	$ 21,844	$ 20,441	$ 8,348	$ 2,331
FCFF	$ (3,820)	$ 4,021	$ 11,844	$ 20,090	$ 23,288	$ 32,704	$ 41,218	$ 48,802	$ 55,427	$ 71,654	$ 10,621
										$ 58,568.24	
Cost of Capital	12.21%	12.21%	12.21%	12.21%	12.21%	11.54%	10.86%	10.19%	9.52%	8.85%	
Cumulated WACC	0.8912	0.7942	0.7078	0.6308	0.5622	0.5040	0.4546	0.4126	0.3767	0.3461	
Sales to Capital	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	1.15	
ROIC	37.16%	38.97%	39.85%	40.79%	41.77%	40.31%	38.88%	37.46%	36.06%	34.65%	20.00%

Risk Story
Initial cost of capital set equal to semiconductor industry average, for first 5 years, moving towards average for entire market over time.

Competitive Advantages
Strong competitive edges allow NVIDIA to earn well above its cost of capital for the next decade and beyond.

AI and Auto Business: Market Size and Market Share				
	AI		*Auto*	
	Current	*In 2033*	*Current*	*In 2033*
Total Market ($ M)	$15,000	$325,000	$20,000	$200,000
Market Share	75%	60%	3.00%	15%
NVIDIA revenues	$11,250	$195,000	$600	$30,000

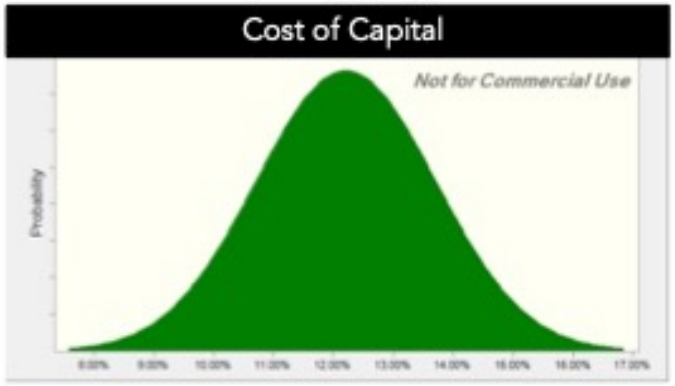
NVIDA: Value Simulation

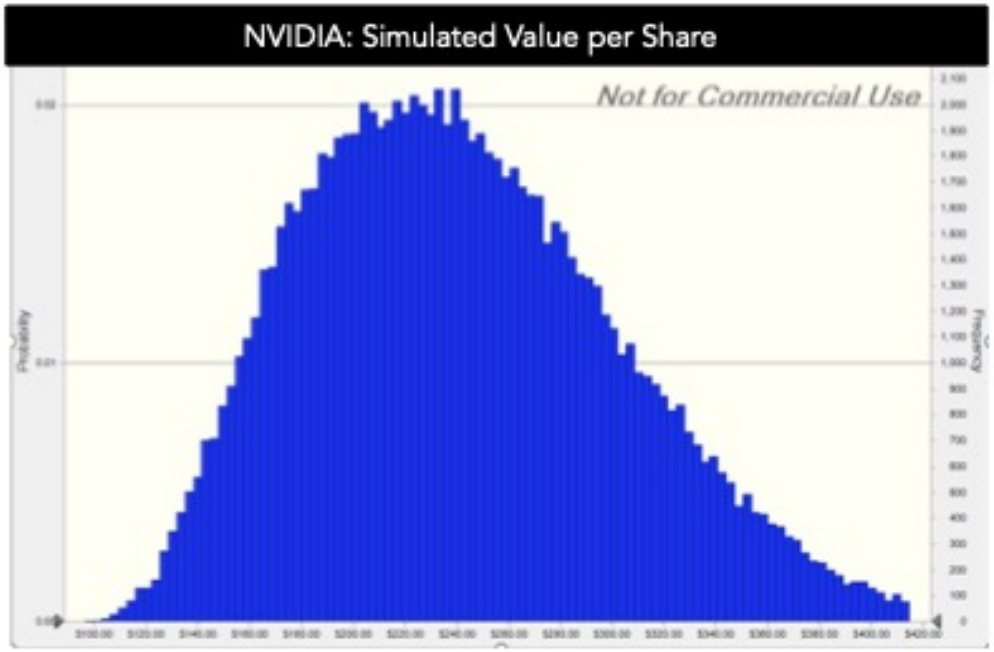
- Revenue Growth
  - Base Case: Revenues of $267 billion in 2033
  - Distribution:

	Base Case	*Distribution*	*Rationale*
AI: Total Market	$325 billiion	Uniform: $225 to $425 billion	Range of outside estimates
AI: NVIDIA Share	60%	Lognormal: Std Dev = 15%	More errors on upside than down
Auto: Total Market	$200 billion	Uniform: $100 - $300 billion	Range of outside estimates
Auto: NVIDIA Share	15%	Lognormal: Std Dev = 10%	More errors on upside than down
Gaming & Other: CAGR	15%	Triangular: 5% to 25%	Supplemental (to Gaming) business absence or presence

- Operating Margin
  - Base Case: Pre-tax operating margin of 40% (target)
  - Distribution: Triangular, with 30% (low) and 50% (high)
- Reinvestment
  - Base Case: Sales to Invested Capital of 1.15
  - Distribution: Lognormal, with range from 0.8-1.94
- Cost of Capital
  - Base Case: Industry average of 12.21%
  - Distribution: Normal Distribution (with standard dev of 1.5%)

NVIDIA: VALUE SIMULATION (JUNE 12, 2023)





Percentile	Value Per Share
0%	$96.51
10%	$166.01
20%	$186.59
30%	$203.88
40%	$220.23
50%	$236.28
60%	$252.97
70%	$271.77
80%	$294.04
90%	$326.17
100%	$555.75

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?

"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

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

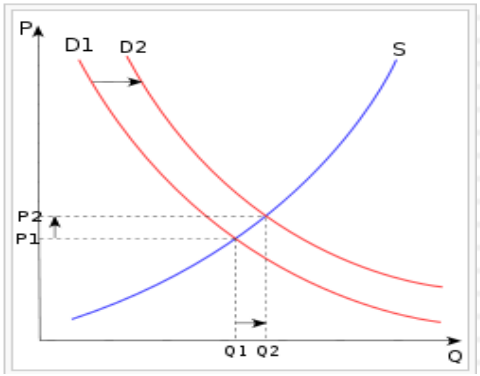
INTRINSIC VALUE

Value

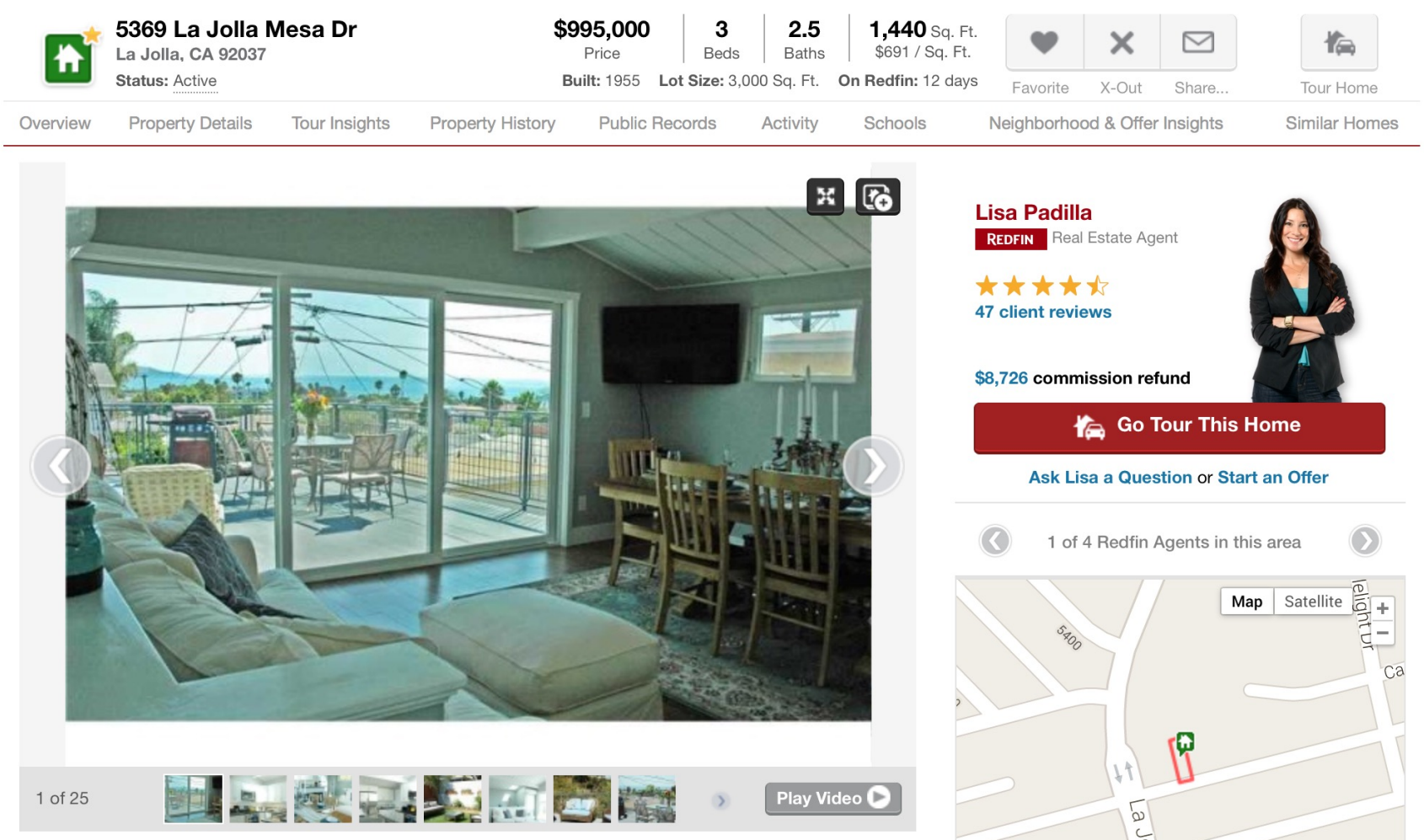
THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?

Price

PRICE



Test 1: Are you pricing or valuing?



Test 2: Are you pricing or valuing?

Europe
Switzerland

Biotechnology
Biotechnology

Reuters	Bloomberg	Exchange	Ticker
BION.S	BION SW	SWX	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

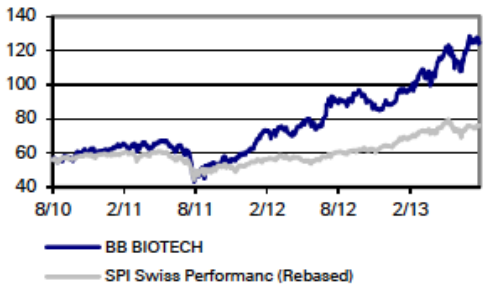
With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money 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%

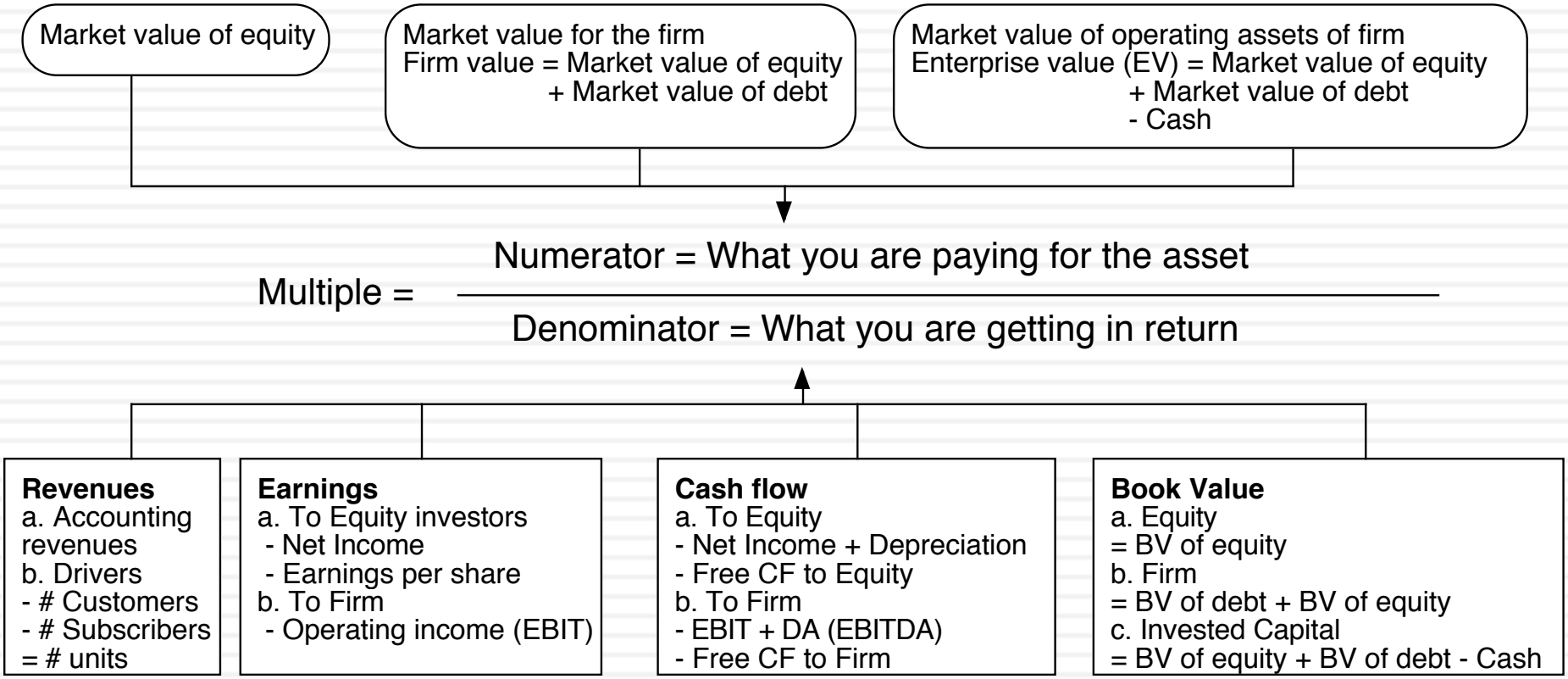
Source: Deutsche Bank

Price/price relative



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

The tool for pricing: A multiple



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.

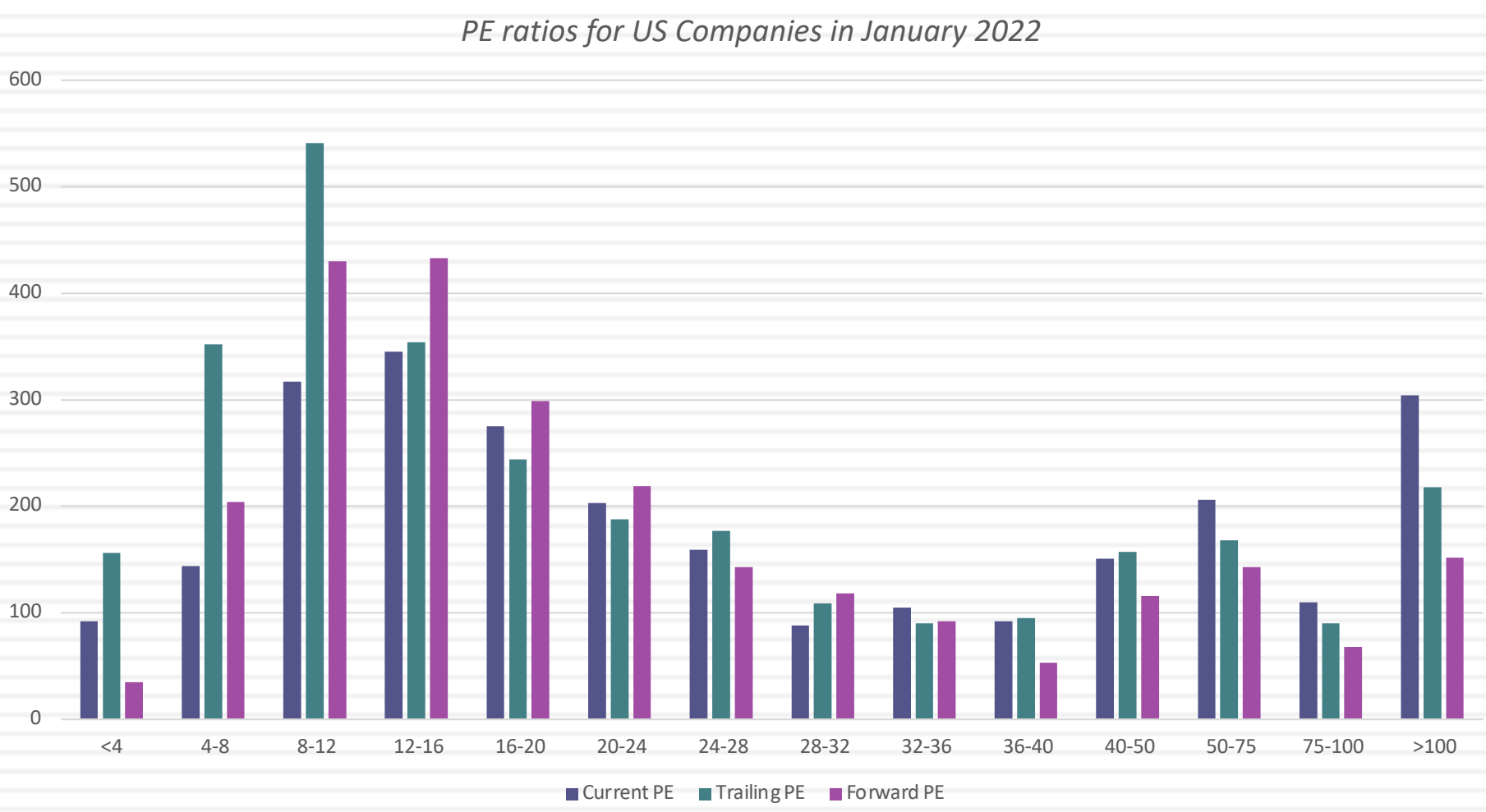
$$\frac{\text{Enterprise Value}}{\text{EBITDA}} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt} - \text{Cash}}{\text{Earnings before Interest, Taxes and Depreciation}}$$

- 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…



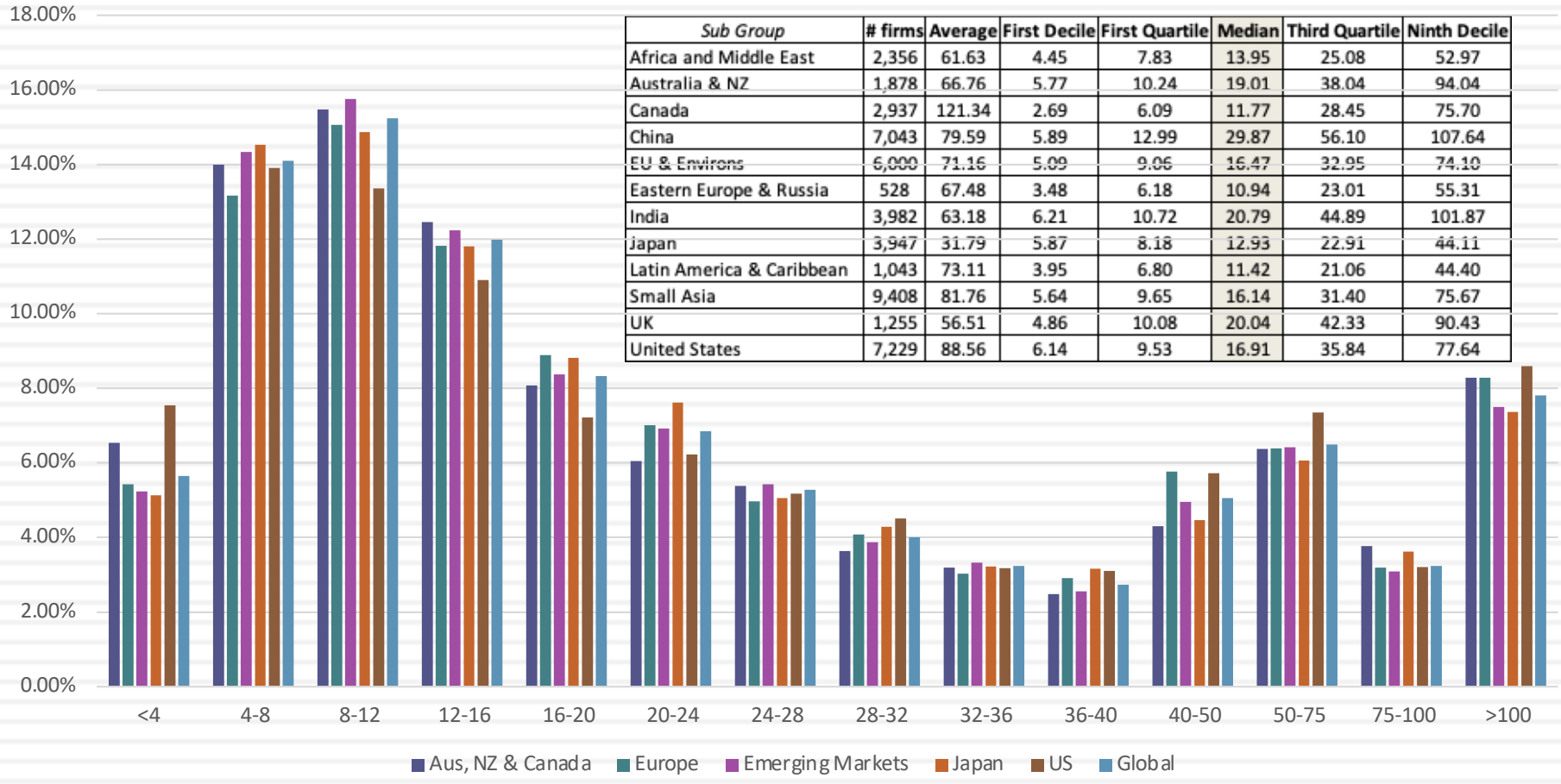
2. Making statistics "dicey"

	Current PE	Trailing PE	Forward PE
Total Number of firms	7082	7082	7082
Firms with PE	2948	2838	2387
Average	**60.52**	**70.85**	**35.79**
Median	**18.49**	**18.28**	**17.56**
10the 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

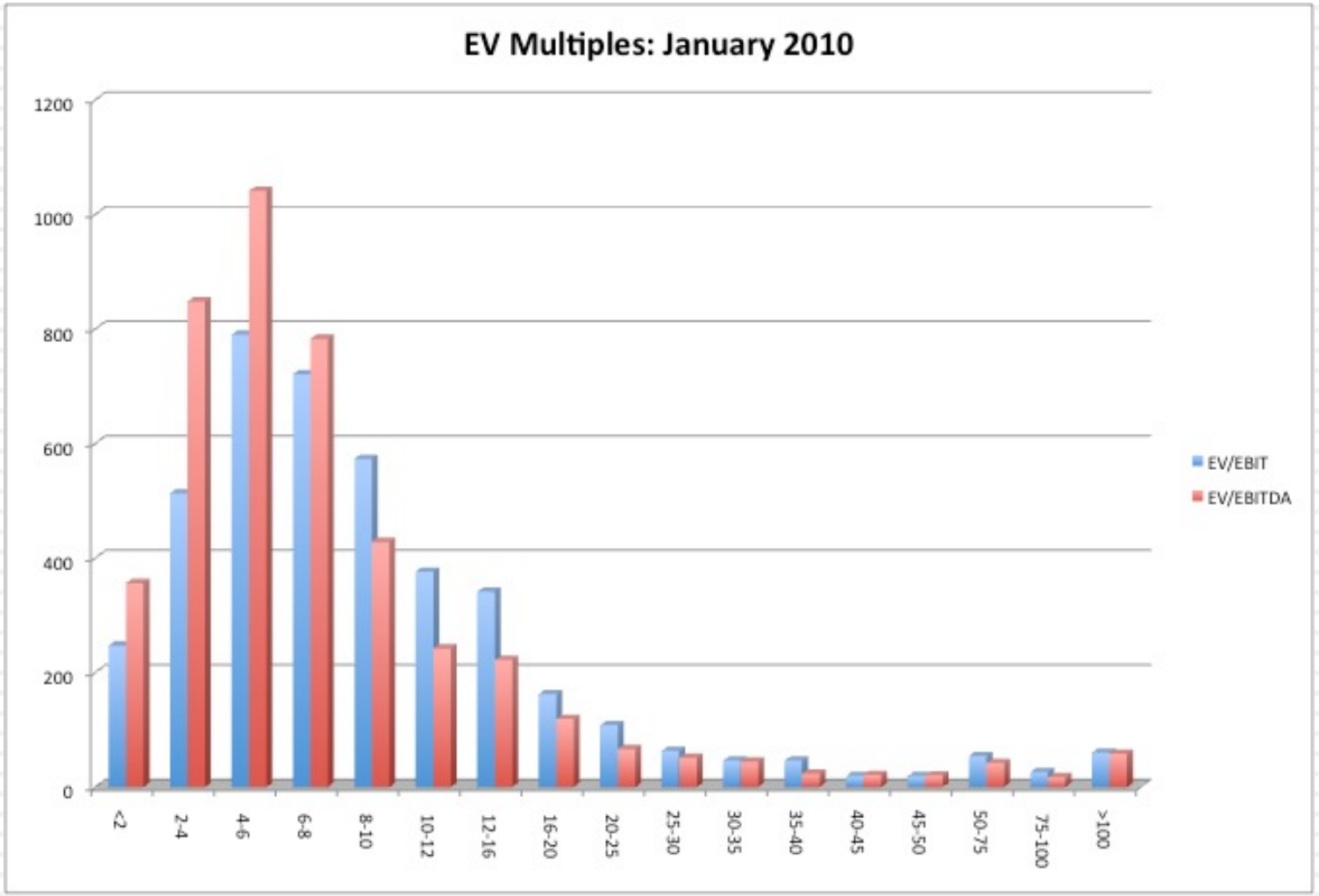
3. Markets have a lot in common : Comparing Global PEs

PE Ratios, by Geography, in January 2022

Sub Group	# firms	Average	First Decile	First Quartile	Median	Third Quartile	Ninth Decile
Africa and Middle East	2,356	61.63	4.45	7.83	13.95	25.08	52.97
Australia & NZ	1,878	66.76	5.77	10.24	19.01	38.04	94.04
Canada	2,937	121.34	2.69	6.09	11.77	28.45	75.70
China	7,043	79.59	5.89	12.99	29.87	56.10	107.64
EU & Environs	6,000	71.16	5.09	9.06	16.47	32.95	74.10
Eastern Europe & Russia	528	67.48	3.48	6.18	10.94	23.01	55.31
India	3,982	63.18	6.21	10.72	20.79	44.89	101.87
Japan	3,947	31.79	5.87	8.18	12.93	22.91	44.11
Latin America & Caribbean	1,043	73.11	3.95	6.80	11.42	21.06	44.40
Small Asia	9,408	81.76	5.64	9.65	16.14	31.40	75.67
UK	1,255	56.51	4.86	10.08	20.04	42.33	90.43
United States	7,229	88.56	6.14	9.53	16.91	35.84	77.64



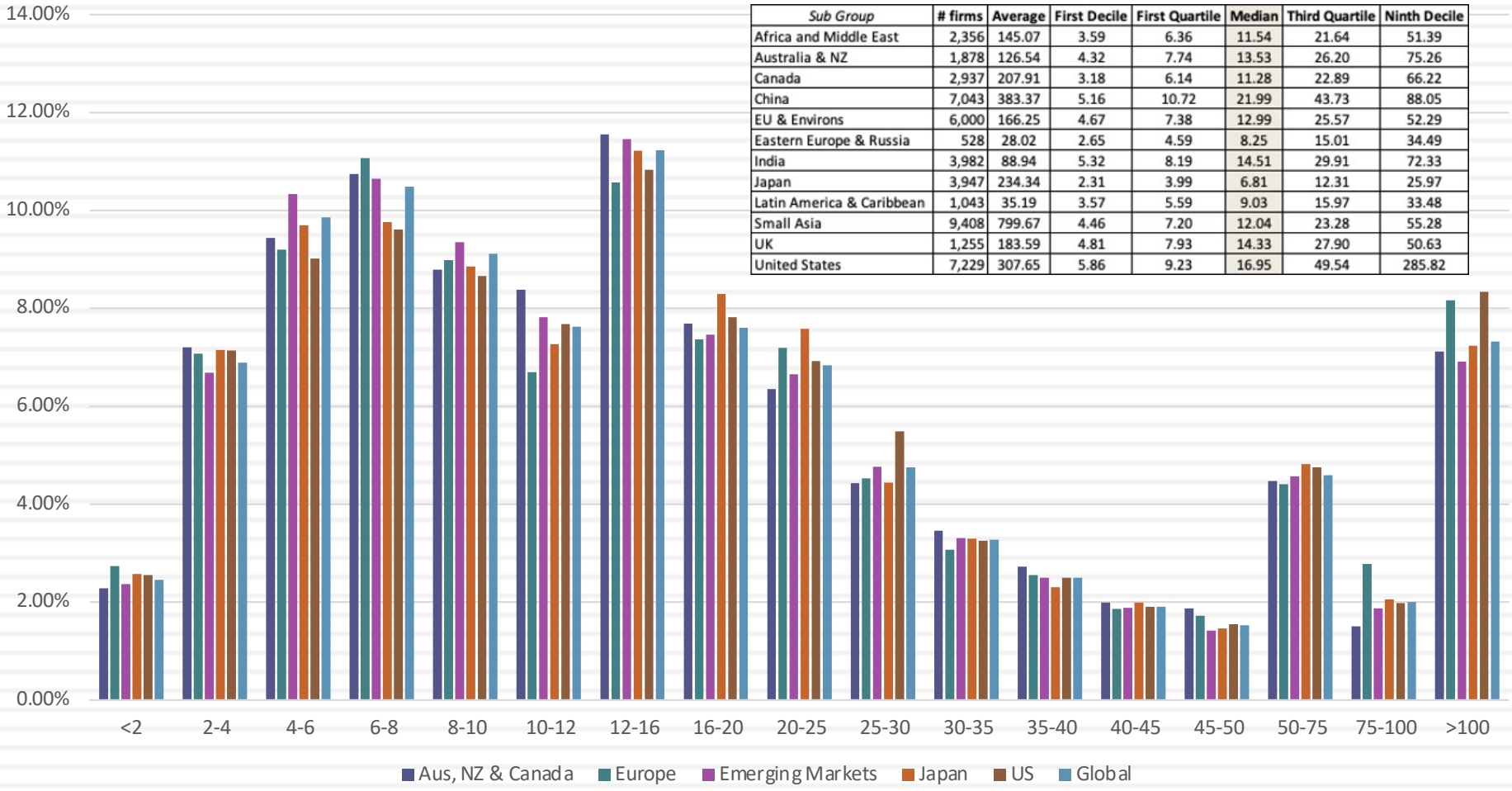
4. Simplistic rules almost always break down…6 times EBITDA was not cheap in the US in 2010



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

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

Sub Group	# firms	Average	First Decile	First Quartile	Median	Third Quartile	Ninth Decile
Africa and Middle East	2,356	145.07	3.59	6.36	11.54	21.64	51.39
Australia & NZ	1,878	126.54	4.32	7.74	13.53	26.20	75.26
Canada	2,937	207.91	3.18	6.14	11.28	22.89	66.22
China	7,043	383.37	5.16	10.72	21.99	43.73	88.05
EU & Environs	6,000	166.25	4.67	7.38	12.99	25.57	52.29
Eastern Europe & Russia	528	28.02	2.65	4.59	8.25	15.01	34.49
India	3,982	88.94	5.32	8.19	14.51	29.91	72.33
Japan	3,947	234.34	2.31	3.99	6.81	12.31	25.97
Latin America & Caribbean	1,043	35.19	3.57	5.59	9.03	15.97	33.48
Small Asia	9,408	799.67	4.46	7.20	12.04	23.28	55.28
UK	1,255	183.59	4.81	7.93	14.33	27.90	50.63
United States	7,229	307.65	5.86	9.23	16.95	49.54	285.82



Infosys: A Relative Valuation in November 2022

Company	*Market Cap (US $ Millions)*	*PE*	*PBV*	*EV/Sales*	*EV/EBITDA*	*EV/Invested Capital*
Tata Consultancy Services Limited (NSEI:TCS)	$140,607	28.89	11.88	5.30	20.52	20.78
Infosys Limited (NSEI:INFY)	**$77,115**	**26.03**	**7.72**	**4.26**	**17.97**	**9.91**
HCL Technologies Limited (NSEI:HCLTECH)	$33,876	18.91	4.14	2.67	12.47	4.94
Wipro Limited (BSE:507685)	$25,497	18.39	2.94	2.22	12.23	3.61
Tech Mahindra Limited (NSEI:TECHM)	$11,201	16.56	3.10	1.75	11.15	3.65
Larsen & Toubro Infotech Limited (NSEI:LTI)	$9,766	31.02	8.40	4.28	23.58	12.37
Mindtree Limited (NSEI:MINDTREE)	$6,578	28.30	9.44	4.16	20.54	18.67
Mphasis Limited (BSE:526299)	$4,450	23.07	4.86	2.61	16.01	5.73
Persistent Systems Limited (BSE:533179)	$3,213	32.33	7.24	3.59	21.23	9.09
Coforge Limited (NSEI:COFORGE)	$2,767	30.34	7.42	3.14	19.12	7.33
Happiest Minds Technologies Limited (BSE:543227)	$1,692	63.62	19.30	10.54	45.64	42.57
Average		28.86	7.86	4.05	20.04	12.60
First Quartile		20.99	4.50	2.64	14.24	5.33
Median		28.30	7.42	3.59	19.12	9.09
Third Quartile		30.68	8.92	4.27	20.88	15.52

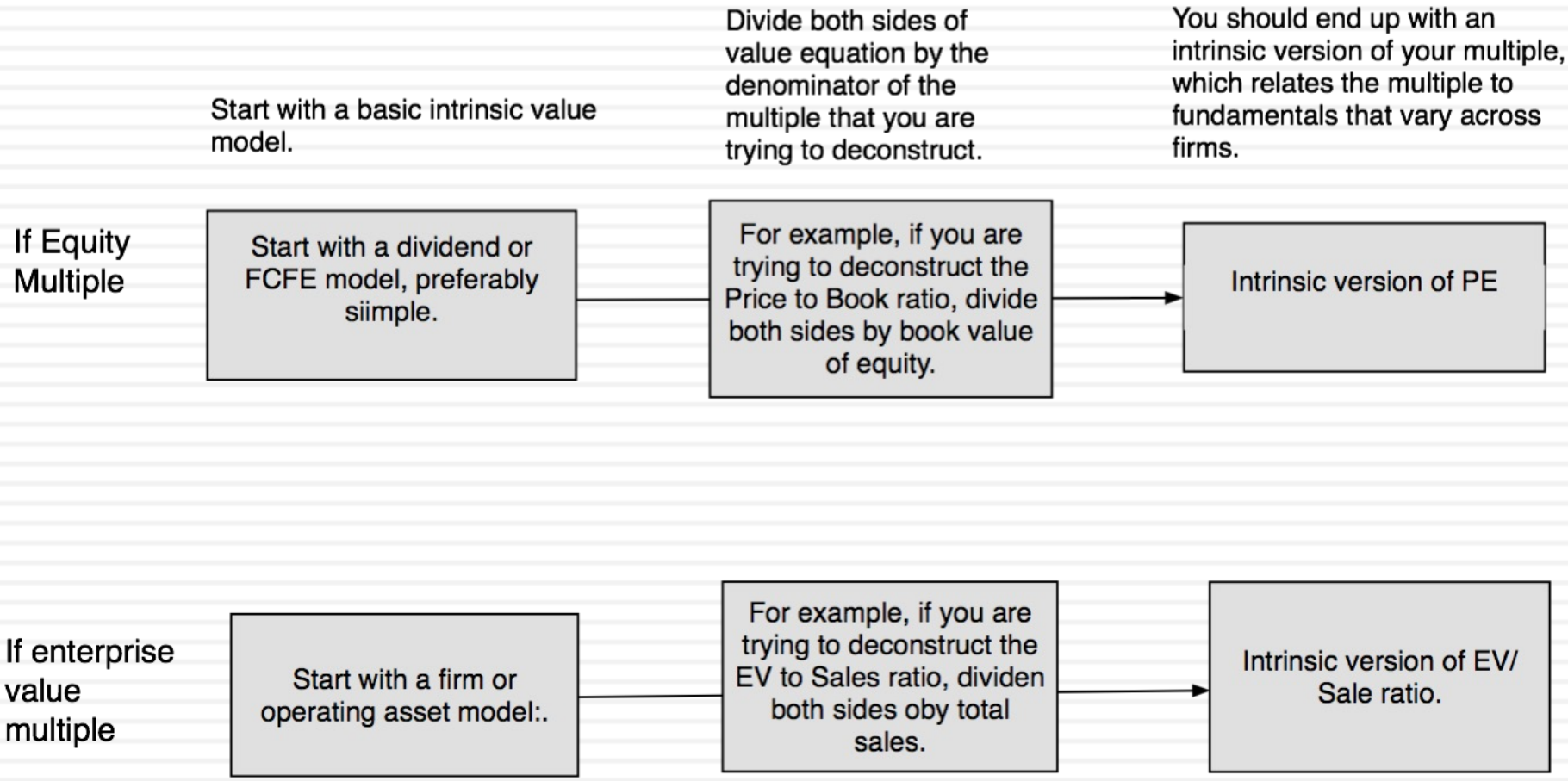
Infosys: Controlling for Diffrences

Company	*Market Cap (US $ Millions)*	*Expected Growth*	*ROE*	*ROIC*	*Operating Margin*
Tata Consultancy Services Limited (NSEI:TCS)	$140,607	10.70%	41.11%	95.06%	24.26%
Infosys Limited (NSEI:INFY)	**$77,115**	**12.30%**	**29.65%**	**50.26%**	**21.59%**
HCL Technologies Limited (NSEI:HCLTECH)	$33,876	9.70%	21.89%	33.27%	17.98%
Wipro Limited (BSE:507685)	$25,497	8.81%	15.97%	24.90%	15.34%
Tech Mahindra Limited (NSEI:TECHM)	$11,201	10.40%	18.75%	28.31%	13.57%
Larsen & Toubro Infotech Limited (NSEI:LTI)	$9,766	16.20%	27.08%	48.59%	16.81%
Mindtree Limited (NSEI:MINDTREE)	$6,578	22.10%	33.36%	85.91%	19.12%
Mphasis Limited (BSE:526299)	$4,450	16.10%	21.08%	33.33%	15.20%
Persistent Systems Limited (BSE:533179)	$3,213	23.50%	22.40%	36.25%	14.31%
Coforge Limited (NSEI:COFORGE)	$2,767	21.00%	24.44%	33.11%	14.17%
Happiest Minds Technologies Limited (BSE:543227)	$1,692	24.00%	30.33%	89.38%	22.13%
Average		15.89%	26.01%	50.76%	17.68%
First Quartile		10.55%	21.49%	33.19%	14.75%
Median		16.10%	24.44%	36.25%	16.81%
Third Quartile		21.55%	29.99%	68.08%	20.36%

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



PE Ratio: Understanding the Fundamentals

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

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

- Dividing both sides by the current earnings per share,

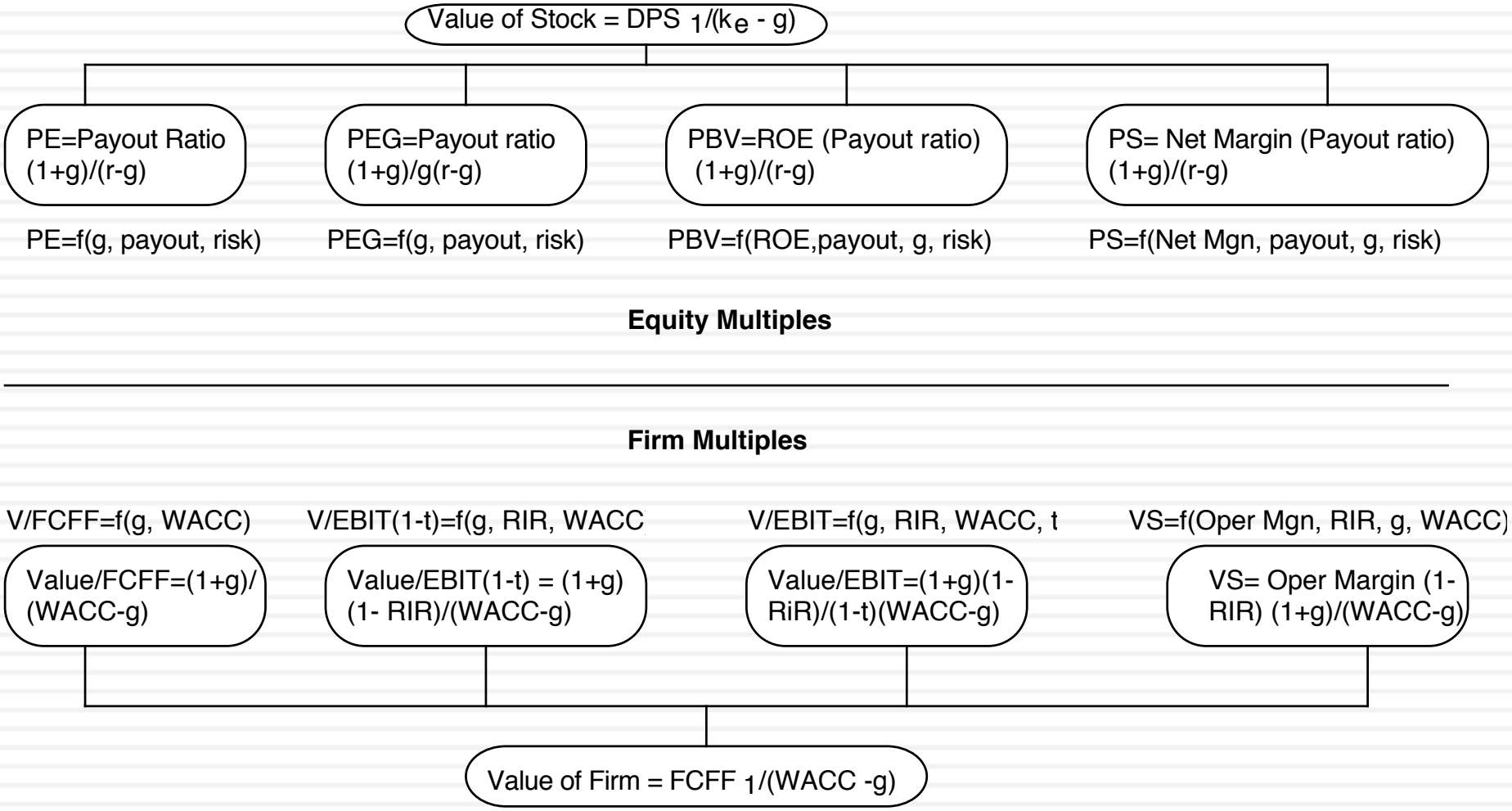
$$\frac{P_0}{EPS_0} = PE = \frac{\text{Payout Ratio} * (1 + g_n)}{r - g_n}$$

- If this had been a FCFE Model,

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

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

The Determinants of Multiples…



Application Tests

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

An Example: Comparing PE Ratios across a Sector: PE

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

PE, Growth and Risk

- Dependent variable is: PE
- R squared = 66.2% R squared (adjusted) = 63.1%

Variable		*Coefficient*	*SE*	*t-ratio*	*Probability*
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

0 if not

- Is Indosat cheap?

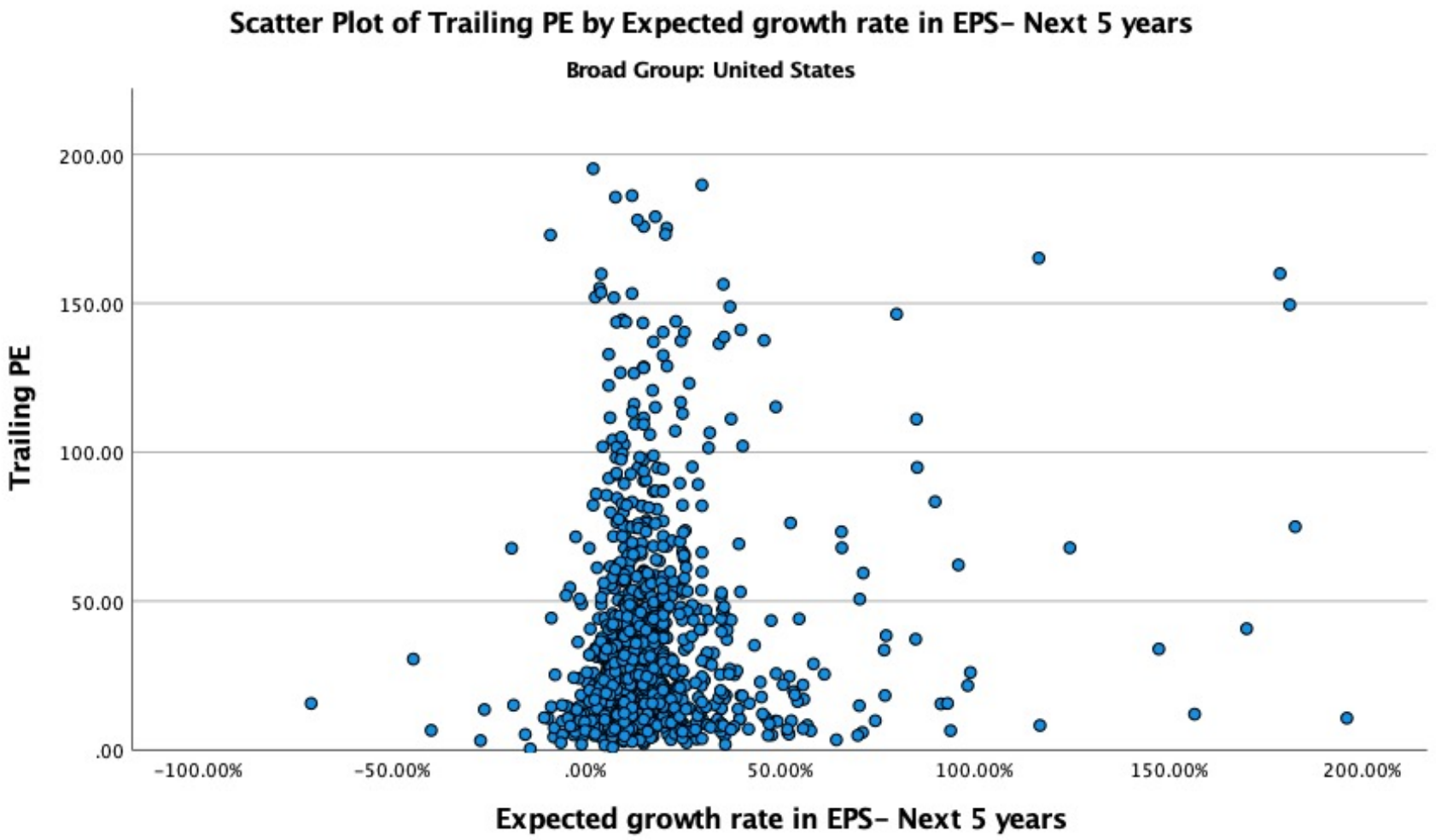
PE = 13.13 + 121.22 (.06) -13.85 (1) = 6.55

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



PE Ratio: Standard Regression for US stocks - January 2022

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.231[b]	.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[a,b,c]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
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 $)

PE ratio regressions across markets

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

g_{EPS}=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 nmber 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…