Aswath Damodaran

VALUATION: IT'S NOT THAT COMPLICATED!

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Some Initial Thoughts

" One hundred thousand lemmings cannot be wrong"

Graffiti
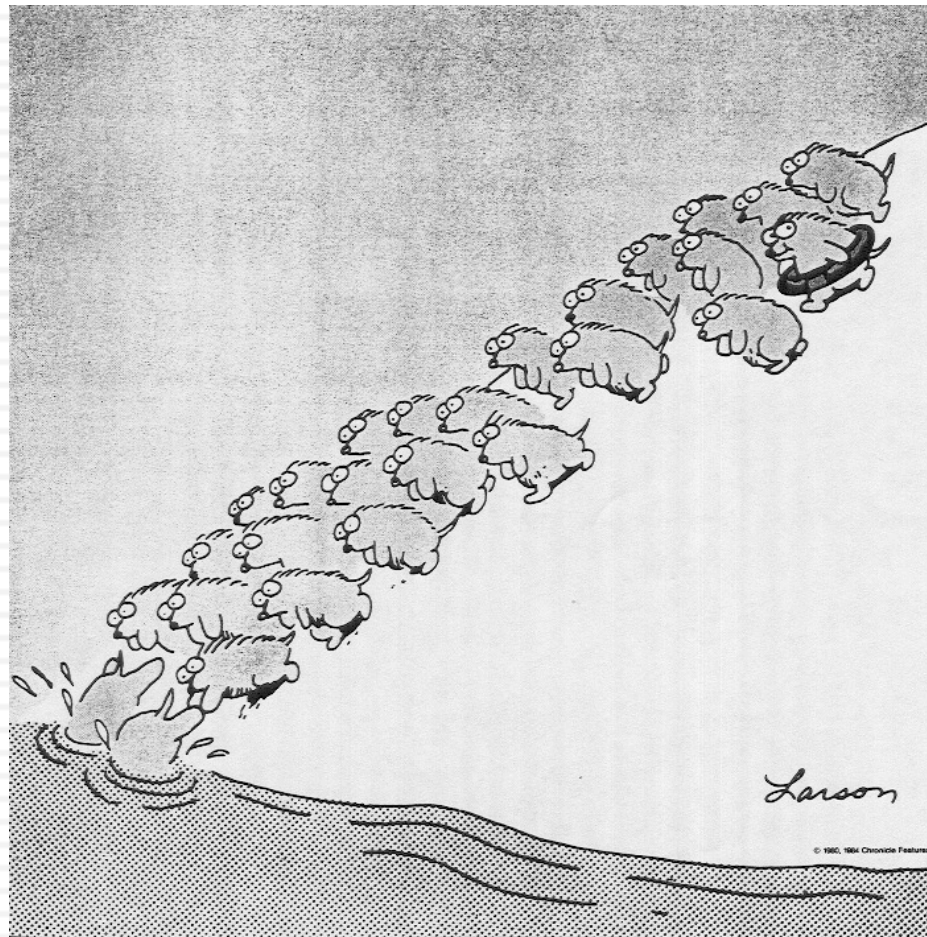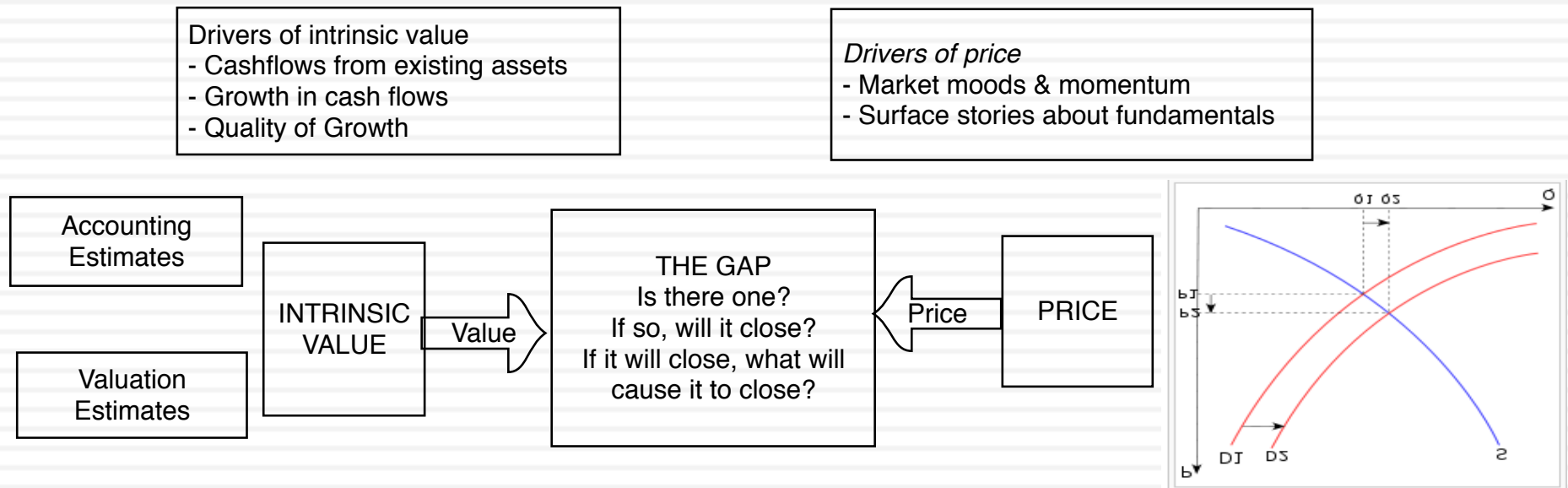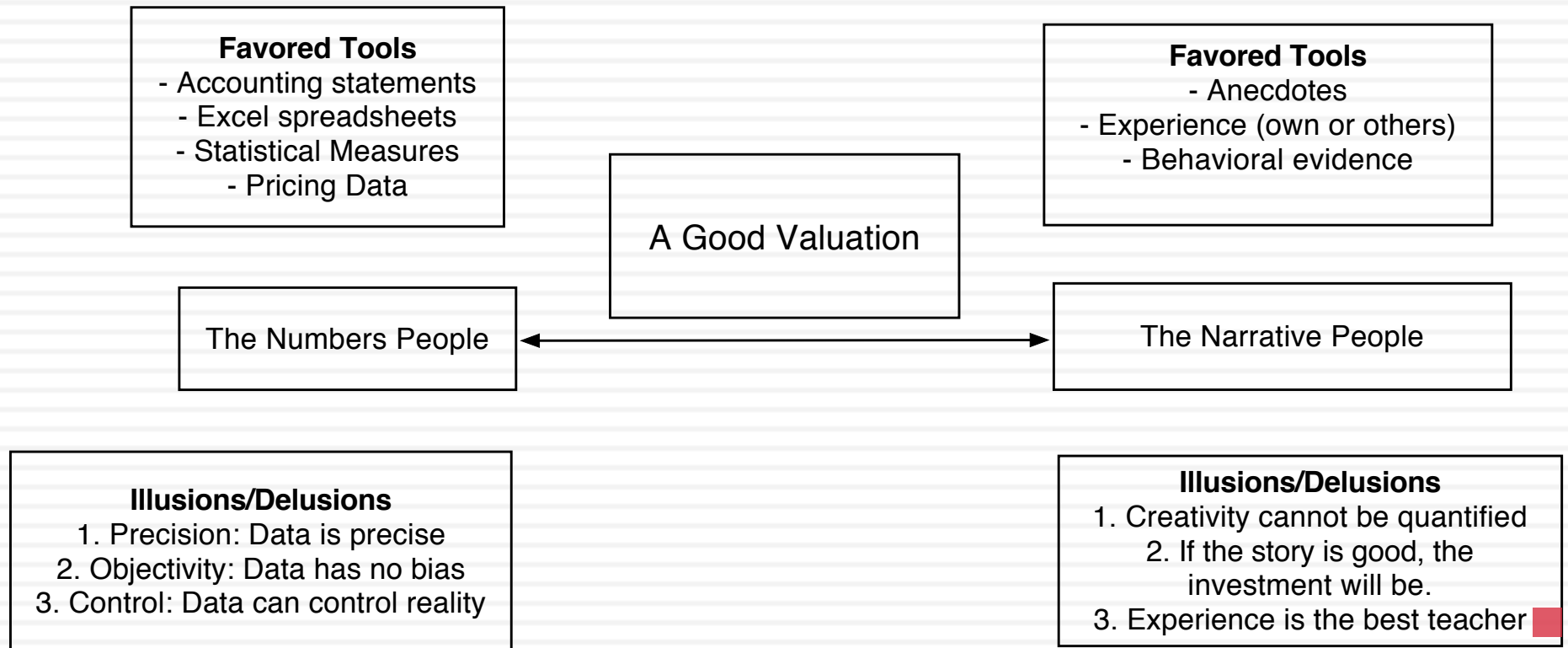
Theme 1: Characterizing Valuation as a discipline

- 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 <u>by doing</u>. 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			

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

Valuation Estimates

Theme 3: Good valuation = Story + Numbers

Favored Tools
- Accounting statements
- Excel spreadsheets
- Statistical Measures
- Pricing Data

A Good Valuation

Favored Tools
- Anecdotes
- Experience (own or others)
- Behavioral evidence

The Numbers People ←——————————→ The Narrative People

Illusions/Delusions
1. Precision: Data is precise
2. Objectivity: Data has no bias
3. Control: Data can control reality

Illusions/Delusions
1. Creativity cannot be quantified
2. If the story is good, the investment will be.
3. Experience is the best teacher

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

- 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.

- 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**, 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.

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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.
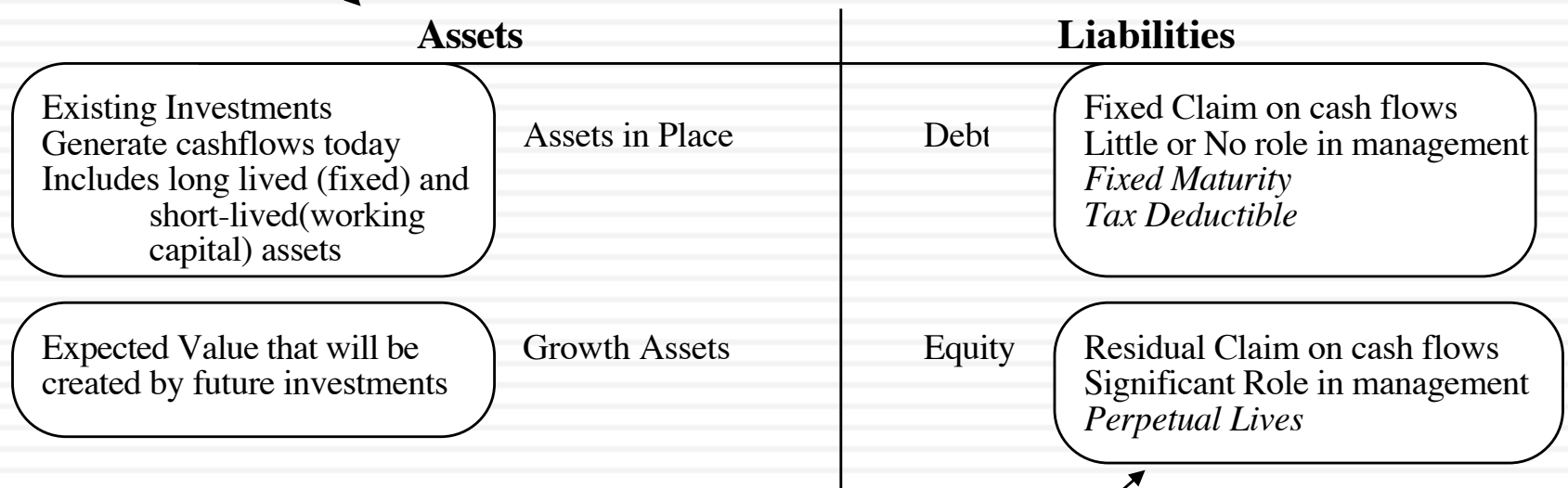
Risk Adjusted Value: Three Basic Propositions

☐ 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:

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

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.

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DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

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

Equity valuation: Value just the equity claim in the business

The Drivers of Value...

Growth from new investments
Growth created by making new investments; function of amount and quality of investments

Efficiency Growth
Growth generated by using existing assets better

Terminal Value of firm (equity)

Current Cashflows
These are the cash flows from existing investment,s, net of any reinvestment needed to sustain future growth. They can be computed before debt cashflows (to the firm) or after debt cashflows (to equity investors).

Expected Growth during high growth period

Stable growth firm, with no or very limited excess returns

Length of the high growth period
Since value creating growth requires excess returns, this is a function of
- Magnitude of competitive advantages
- Sustainability of competitive advantages

Cost of financing (debt or capital) to apply to discounting cashflows
Determined by
- Operating risk of the company
- Default risk of the company
- Mix of debt and equity used in financing

DISCOUNTED CASHFLOW VALUATION

Cashflow to Firm
EBIT (1-t)
- (Cap Ex - Depr)
- Change in WC
= FCFF

Expected Growth
Reinvestment Rate
* Return on Capital

Firm is in stable growth:
Grows at constant rate
forever

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

$FCFF_1$ $FCFF_2$ $FCFF_3$ $FCFF_4$ $FCFF_5$ $FCFF_n$

Value of Operating Assets
+ Cash & Non-op Assets
= Value of Firm
- Value of Debt
= Value of Equity

....

Forever

Discount at WACC= Cost of Equity (Equity/(Debt + Equity)) + Cost of Debt (Debt/(Debt+ Equity))

Cost of Equity

Cost of Debt
(Riskfree Rate
+ Default Spread) (1-t)

Weights
Based on Market Value

Riskfree Rate :
- No default risk
- No reinvestment risk
- In same currency and
in same terms (real or
nominal as cash flows

+

Beta
- Measures market risk

X

Risk Premium
- Premium for average
risk investment

Type of
Business

Operating
Leverage

Financial
Leverage

Base Equity
Premium

Country Risk
Premium

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Amgen: Status Quo

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

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

Reinvestment Rate
60%

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

Return on Capital
16%

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

First 5 years

Growth decreases gradually to 4%

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

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

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

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%

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Tata Motors: April 2010

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 = 170.61%
Tax rate = 21%; ROIC = 17.16%

Average reinvestment rate from 2005-09: 179.59%; without acquisitions: 70%

Reinvestment Rate = 70%

Expected Growth from new inv.
.70*.1716=0.1201

Return on Capital 17.16%

Stable Growth
g = 5%; Beta = 1.00
Country Premium= 3%
Cost of capital = 10.39%
Tax rate = 33.99%
ROC= 12%;
Reinvestment Rate=g/ROC
=5%/12% = 41.67%

Return on capital = 17.16%

Rs Cashflows

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

Op. Assets   231,914
+ Cash: 11418
+ Cross Hold. 140576
- Debt   109198
=Equity   274,710
Value/Share Rs 614

Year	1	2	3	4	5	6	7	8	9	10
EBIT (1-t)	22533	25240	28272	31668	35472	39236	42848	46192	49150	51607
- Reinvestment	15773	17668	19790	22168	24830	25242	25138	24482	23264	21503
FCFF	6760	7572	8482	9500	10642	13994	17711	21710	25886	30104

45278
18866
26412

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

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

On April 1, 2010
Tata Motors price = Rs 781

Cost of Equity 14.00%

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

Weights
E = 74.7% D = 25.3%

Riskfree Rate:
Rs Riskfree Rate= 5%

+

Beta 1.20

X

Mature market premium 4.5%

+

Lambda 0.80

X

Country Equity Risk Premium 4.50%

Unlevered Beta for Sectors: 0.98

Firm's D/E Ratio: 33.87%

Country Default Spread 3%

X

Relative Equity volatility = 1.50

Severstal: Valuation (April 2017)

	1997-2003	2004-2011	2012-2016	2016	Global Steel
Revenue Growth	4.26%	22.12%	-17.85%	-7.50%	-5.04%
Operating Margin	17.51%	19.13%	17.68%	25.81%	3.19%
ROIC	17.07%	19.31%	17.87%	32.58%	2.79%
Sales/Inv Capital	1.22	1.20	1.22	1.52	0.99

Revenue growth of **3% a year** for 5 years, moving back up to 2.5% in year 10

Pre-tax operating margin decreases to **19.13%** over time.

Sales to capital ratio of **1.20**

Stable Growth
g = 2.5%
Cost of capital = 8.5%
ROC= 8.5%;
Reinvestment Rate=2.5%/8.5% = 29.41%

Terminal Value$_{10}$= 868/(.085-.025) = $14.460

|	Base year	1	2	3	4	5	6	7	8	9	10
Revenue growth rate		3.00%	3.00%	3.00%	3.00%	3.00%	2.90%	2.80%	2.70%	2.60%	2.50%
Revenues	$ 5,916	$6,093	$6,276	$6,465	$6,659	$6,858	$7,057	$7,255	$7,451	$7,644	$7,835
EBIT (Operating) margin	25.81%	25.14%	24.48%	23.81%	23.14%	22.47%	21.80%	21.13%	20.47%	19.80%	19.13%
EBIT (Operating income)	$ 1,527	$1,532	$1,536	$1,539	$1,541	$1,541	$1,539	$1,533	$1,525	$1,513	$1,499
Tax rate	17.20%	17.20%	17.20%	17.20%	17.20%	17.20%	17.76%	18.32%	18.88%	19.44%	20.00%
EBIT(1-t)	$ 1,264	$1,269	$1,272	$1,274	$1,276	$1,276	$1,265	$1,252	$1,237	$1,219	$1,199
- Reinvestment		$ 148	$ 152	$ 157	$ 162	$ 166	$ 166	$ 165	$ 163	$ 161	$ 159
FCFF		$1,121	$1,120	$1,117	$1,114	$1,110	$1,100	$1,088	$1,074	$1,058	$1,040

	Terminal year
Revenues	$ 8,031.35
EBIT (Operating) margin	19.13%
EBIT (Operating income)	$ 1,536.40
Tax rate	20.00%
EBIT(1-t)	$ 1,229.12
- Reinvestment	$ 361.51
FCFF	$ 867.61

PV(Terminal value)	$ 6,066.96
PV (CF over next 10 years)	$ 6,987.62
Value of operating assets =	$13,054.58
- Debt	$ 2,013.00
- Minority interests	$ 15.00
+ Cash	$ 1,173.00
+ Non-operating assets	$ 266.00
Value of equity	$12,465.58
Number of shares	837.72
Estimated value /share	$ 14.88
Price	$ 13.84
Price as % of value	93.01%

Cost of capital = 10.34% (.852) + 4.00% (.148) = 9.32%

Cost of capital decreases to 8.5% from years 6-10

Cost of Equity
10.24%

Cost of Debt
Bond rating: BB+
(2.5%+2.5%)(1-.20) = 4.00%
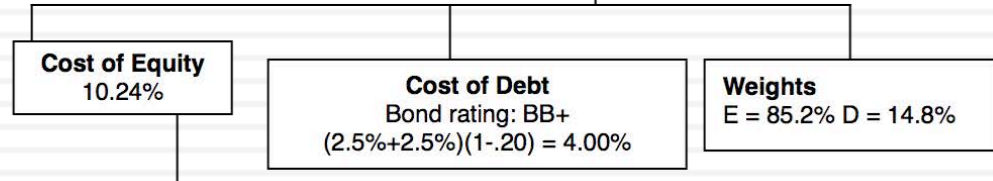
Weights
E = 85.2% D = 14.8%

In April 2017, the stock was trading at $13.84/share.

Riskfree Rate:
Riskfree rate = 2.5%

+

Beta
0.89

X

ERP
8.70%

D/E= 17.36%

Business	Weights	Unlevered Beta
Steel	74.83%	0.7355
Metals & Mining	25.17%	0.9178
Severstal	**100%**	**0.7814**

Region	Weight	ERP
Russia	64.52%	9.24%
Western Europe	19.91%	6.81%
Middle East	5.70%	7.03%
Africa	5.07%	12.00%
Asia	2.36%	7.12%
Latin America	1.49%	10.21%
North America	0.95%	5.69%
Severstal	**100.00%**	**8.70%**

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DCF INPUTS

"Garbage in, garbage out"

I. Measure earnings right..

Firm's history	Comparable Firms

Operating leases - Convert into debt - Adjust operating income

R&D Expenses - Convert into asset - Adjust operating income

Normalize Earnings

Cleanse operating items of
- Financial Expenses
- Capital Expenses
- Non-recurring expenses

Measuring Earnings

Update
- Trailing Earnings
- Unofficial numbers

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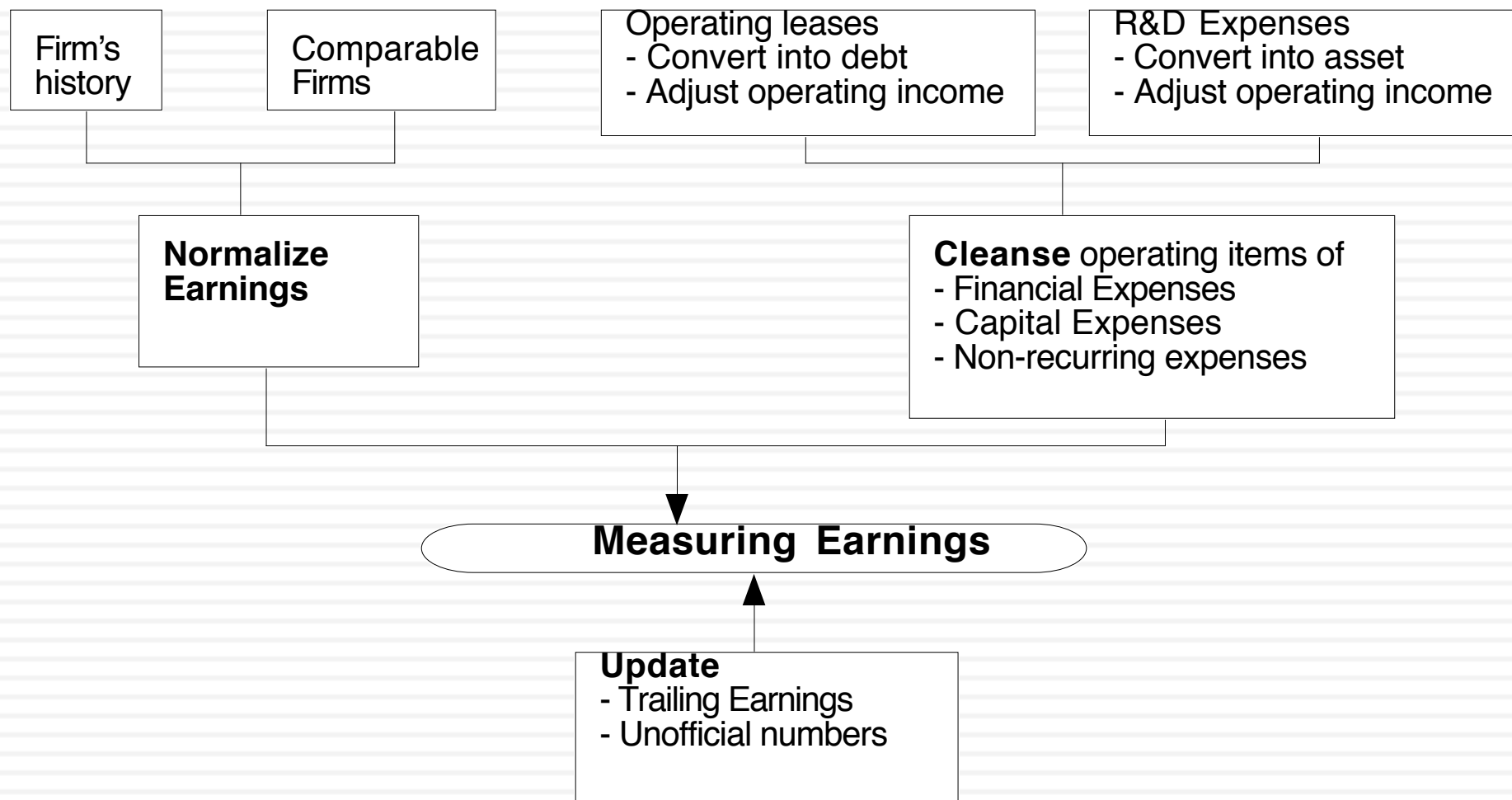
Operating Leases at Amgen in 2007

- 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
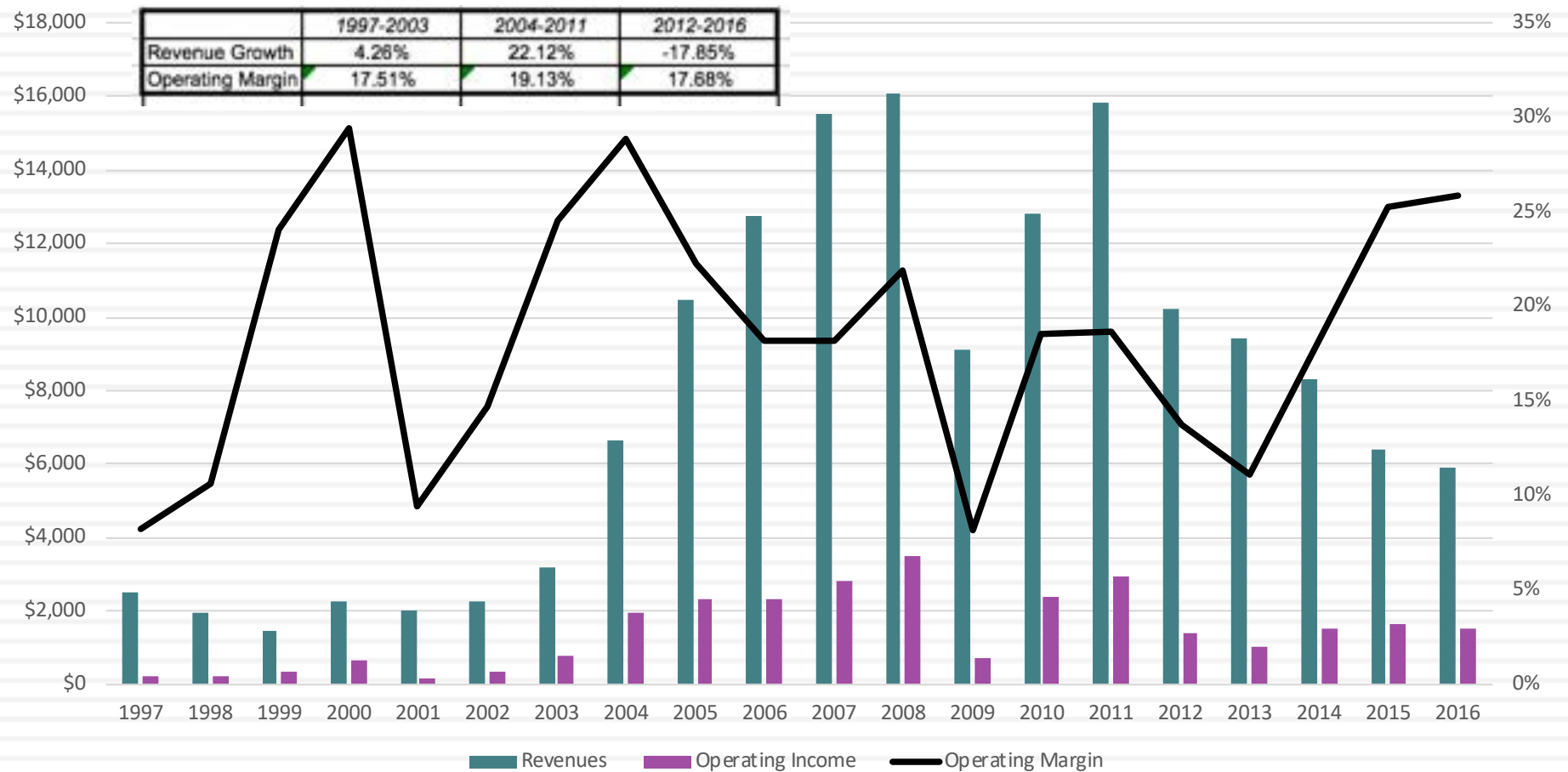
Capitalizing R&D Expenses: Amgen

□ 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

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Severstal: Reading the (historical) tea leaves

Severstal: Revenues, Operating Income and Margins

	1997-2003	2004-2011	2012-2016
Revenue Growth	4.26%	22.12%	-17.85%
Operating Margin	17.51%	19.13%	17.68%

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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 risk free 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%

- If I had chosen to value Severstal in rubles, I would have needed a Russian ruble risk freee rate. Starting with the Russian government bond rate (in rubles) of 8.38% in January 2017 and subtracting out the default spread of 2.89% at the start of the year (based on the bond rating), the riskfree rate in rubles is 5.49%:

  Risk free rate in Rubles = 8.38% - 2.89% = 5.49%

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Risk free rates will vary across currencies!

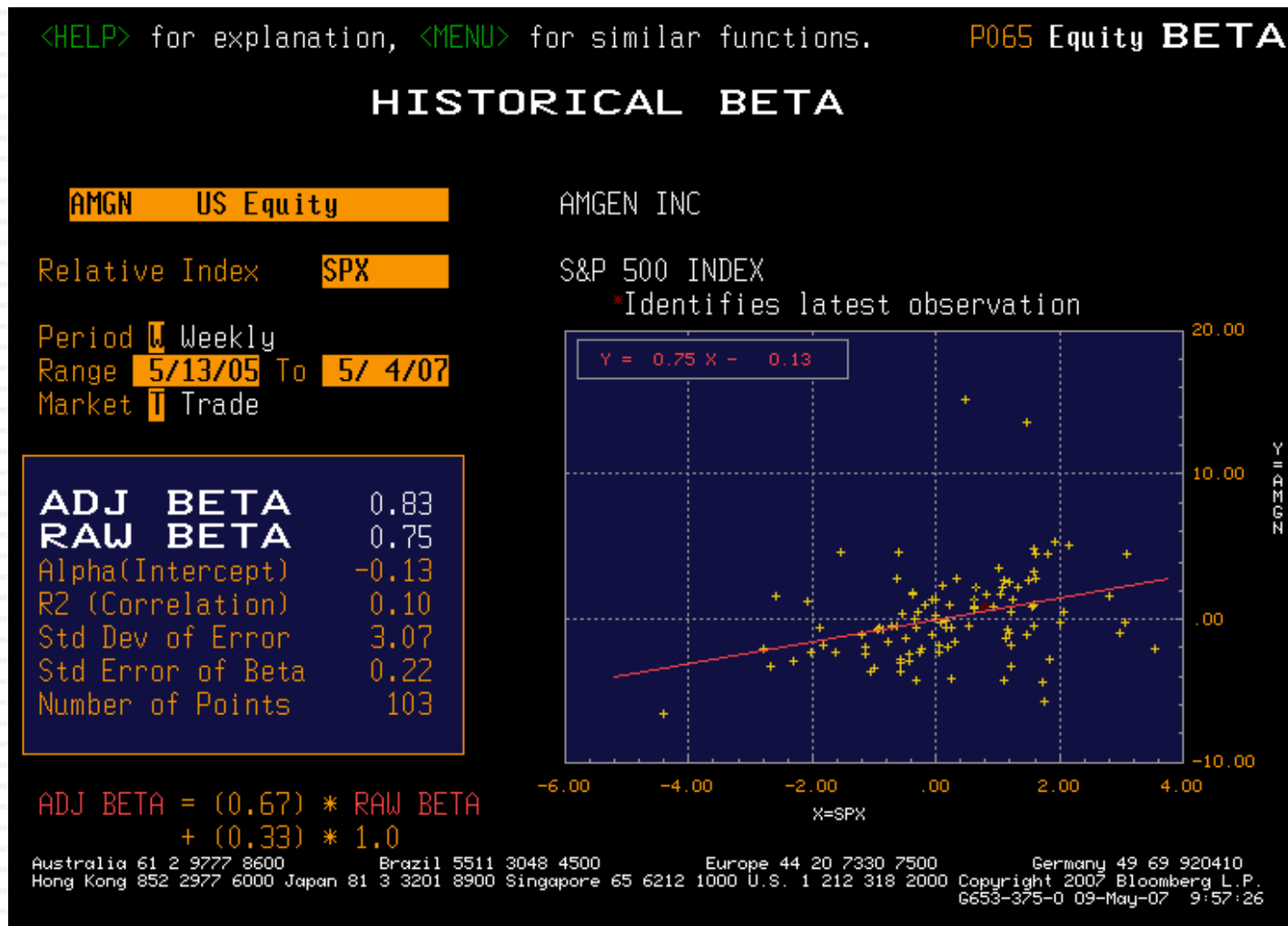Risk free Rates - January 2017

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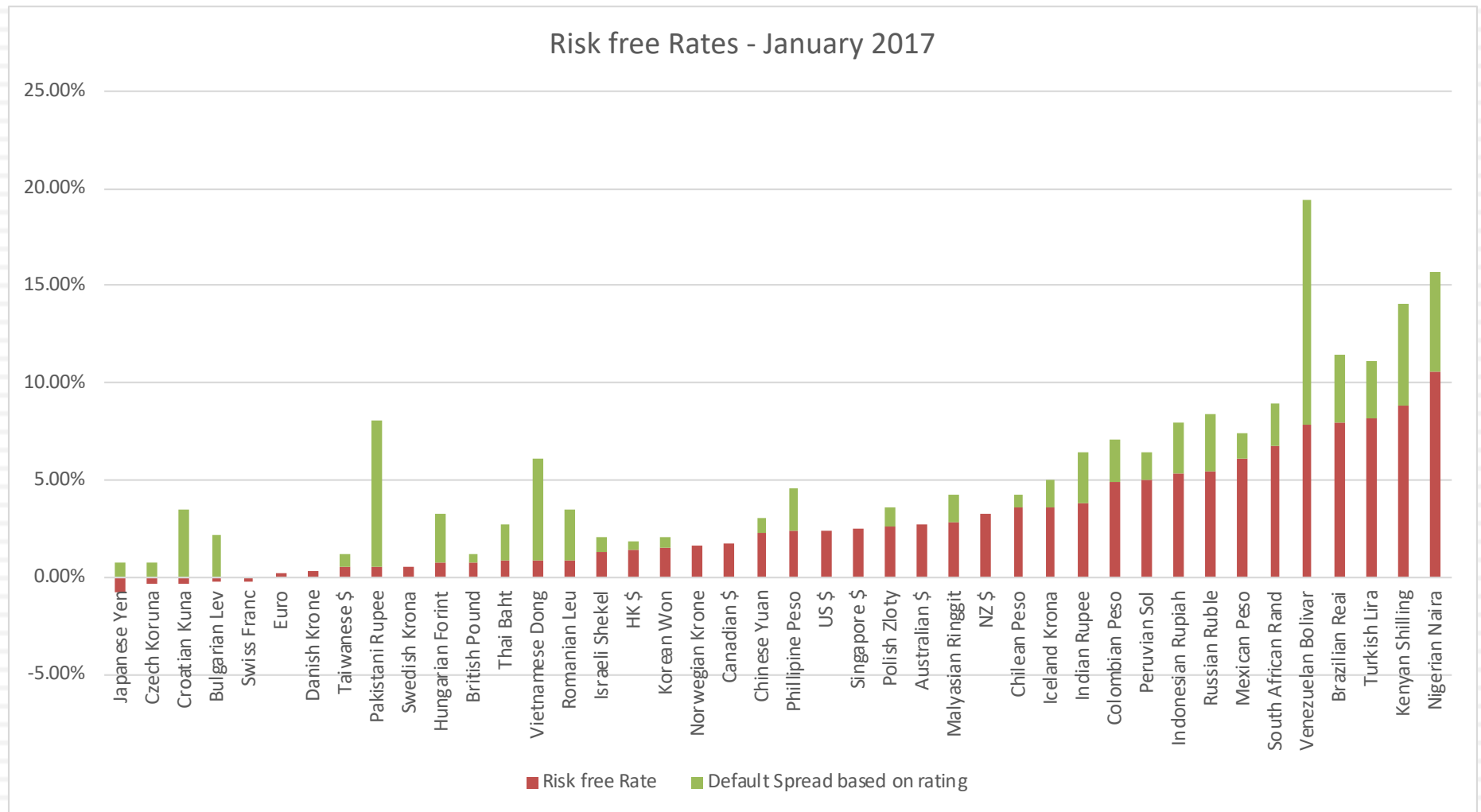
Risk free Rates in Currencies without a Government Bond Rate

□ 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 = $(1.0227) * (1.097/1.015) - 1 = 10.53\%$

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But valuations should not!

	In Indian Rupees	In US $
Risk free Rate	5.00%	2.00%
Expected inflation rate	4.00%	1.00%
Cost of capital		
- High Growth	12.50%	9.25%
- Stable Growth	10.39%	7.21%
Expected growth rate		
- High Growth	12.01%	8.78%
- Stable Growth	5.00%	2.00%
Return on Capital		
- High Growth	17.16%	13.78%
- Stable Growth	10.39%	7.21%
Value per share	Rs 614	$12.79/share (roughly Rs 614 at current exchange rate)

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

And can be meaningless if run against narrow indices..

Determinants of Betas

Beta of Equity

Beta of Firm

Nature of product or service offered by company:
Other things remaining equal, the more discretionary the product or service, the higher the beta.
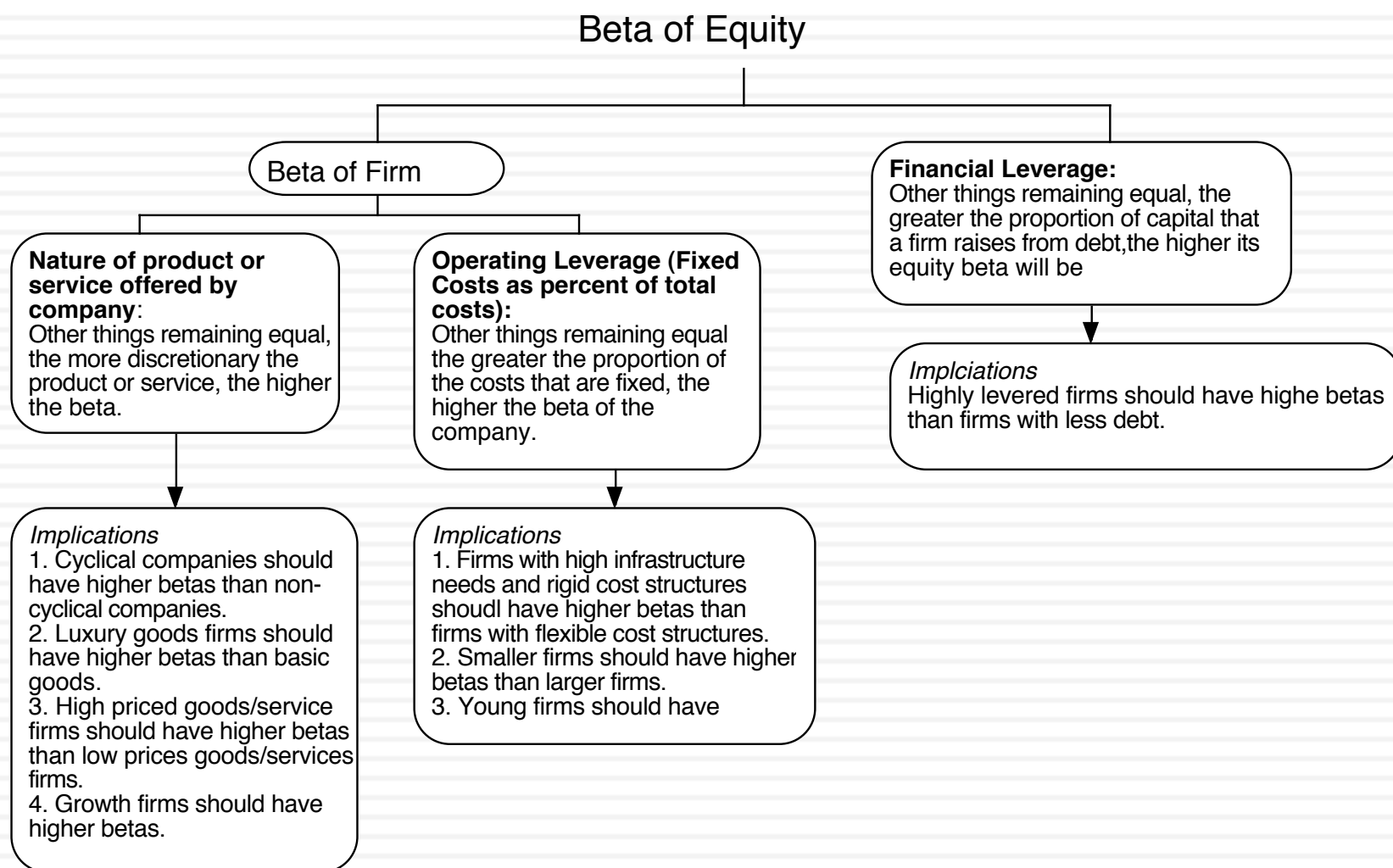
Operating Leverage (Fixed Costs as percent of total costs):
Other things remaining equal the greater the proportion of the costs that are fixed, the higher the beta of the company.

Financial Leverage:
Other things remaining equal, the greater the proportion of capital that a firm raises from debt,the higher its equity beta will be

Implications
1. Cyclical companies should have higher betas than non-cyclical companies.
2. Luxury goods firms should have higher betas than basic goods.
3. High priced goods/service firms should have higher betas than low prices goods/services firms.
4. Growth firms should have higher betas.

Implications
1. Firms with high infrastructure needs and rigid cost structures shoudl have higher betas than firms with flexible cost structures.
2. Smaller firms should have higher betas than larger firms.
3. Young firms should have

Implciations
Highly levered firms should have highe betas than firms with less debt.

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Bottom-up Betas

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

Possible Refinements

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

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

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

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

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

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

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

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

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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
- Severstal

Business	Revenues	EV/Sales	Estimated Value	Unlevered Beta
Steel	$5,462.00	1.0645	$5,814.36	0.7355
Metals & Mining	$1,154.00	1.6943	$1,955.23	0.9178
Severstal	$6,616.00		$7,769.59	0.7814

Levered Beta = 0.7814 (1+(1-.20)(.2597)) = 0.94

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
1928-2018	7.93%	6.26%	6.11%	4.66%
Std Error	2.09%	2.22%		
1969-2018	6.34%	4.00%	5.01%	3.04%
Std Error	2.38%	2.71%		
2009-2018	13.00%	11.21%	12.48%	11.00%
Std Error	3.71%	5.50%		

☐ 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

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But in the future..

Base year cash flow (last 12 mths)
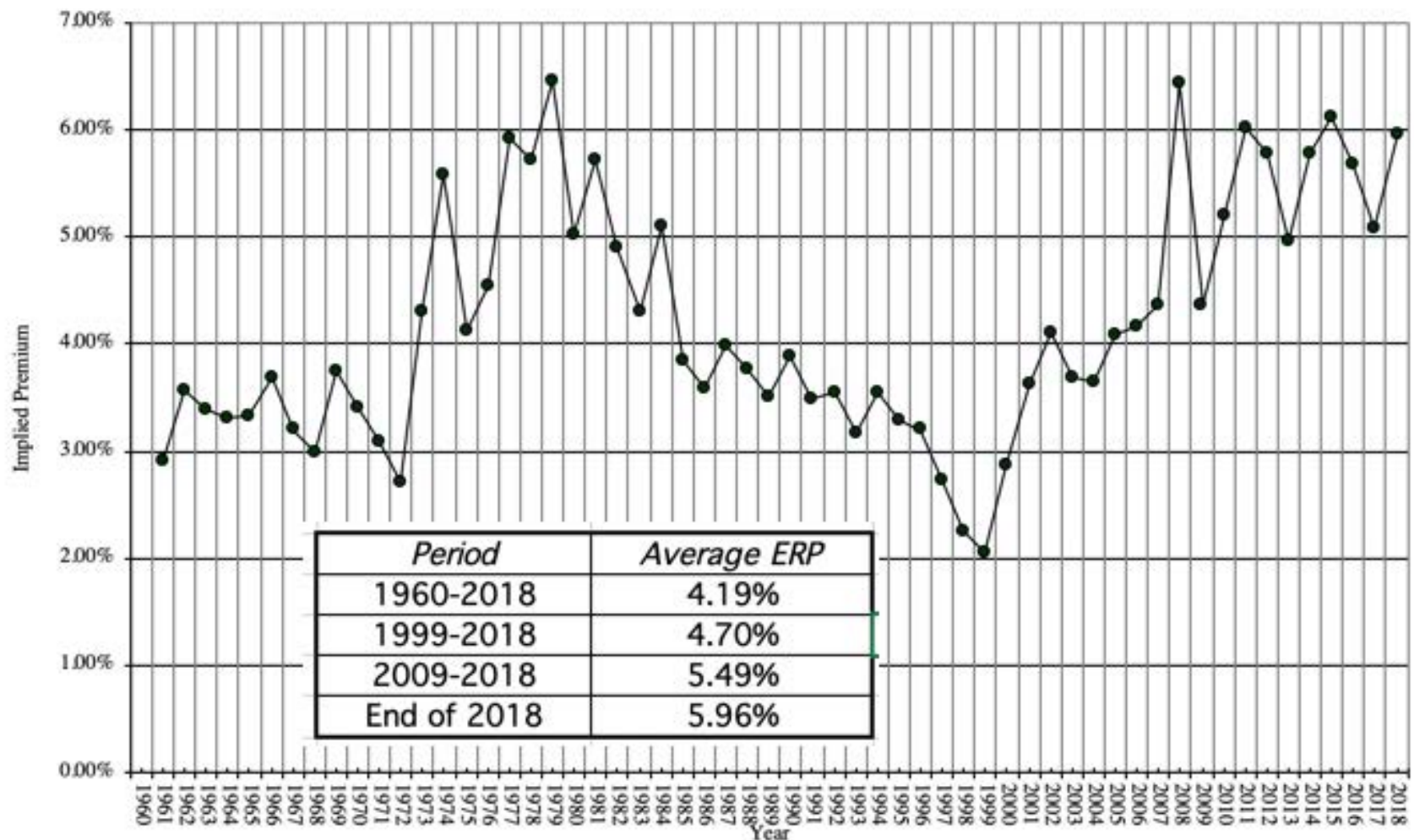Dividends (TTM):   52.25
+ Buybacks (TTM):   84.40
= Cash to investors (TTM): **136.65**

Expected cashflow growth in next 5 years
Cash flow growth = Top down analyst estimate of earnings growth for S&P 500 = 4.12%

	Last 12 months	1	2	3	4	5	Terminal Year
Expected Earnings	148.34	154.46	160.83	167.46	174.37	181.56	186.43
Expected Dividends + Buybacks =	136.65	$142.28	$148.15	$154.26	$160.62	$167.25	171.73

Earnings and Cash flows grow @2.68% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/19=
2506.85

$$2506.85 = \frac{142.28}{(1+r)} + \frac{148.15}{(1+r)^2} + \frac{154.26}{(1+r)^3} + \frac{160.62}{(1+r)^4} + \frac{167.25}{(1+r)^5} + \frac{167.25\,(1.0268)}{(r-.0268)(1+r)^5}$$

The last term in this equation is the expected index level at the end of year 5 (capturing price appreciaiton)

Solve for r

r = Implied Expected Return on Stocks = 8.64%

Minus

Risk free rate = T.Bond rate on 1/1/19= 2.68%

Equals

Implied Equity Risk Premium (1/1/19) = 8.64% - 2.68% = **5.96%**

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Implied Premiums in the US: 1960-2018

Implied Premium for US Equity Market: 1960-2018

Period	Average ERP
1960-2018	4.19%
1999-2018	4.70%
2009-2018	5.49%
End of 2018	5.96%

35

The Anatomy of a Crisis: Implied ERP from September 12, 2008 to January 1, 2009

Implied Equity Risk Premium - 9/12- 12/31/08

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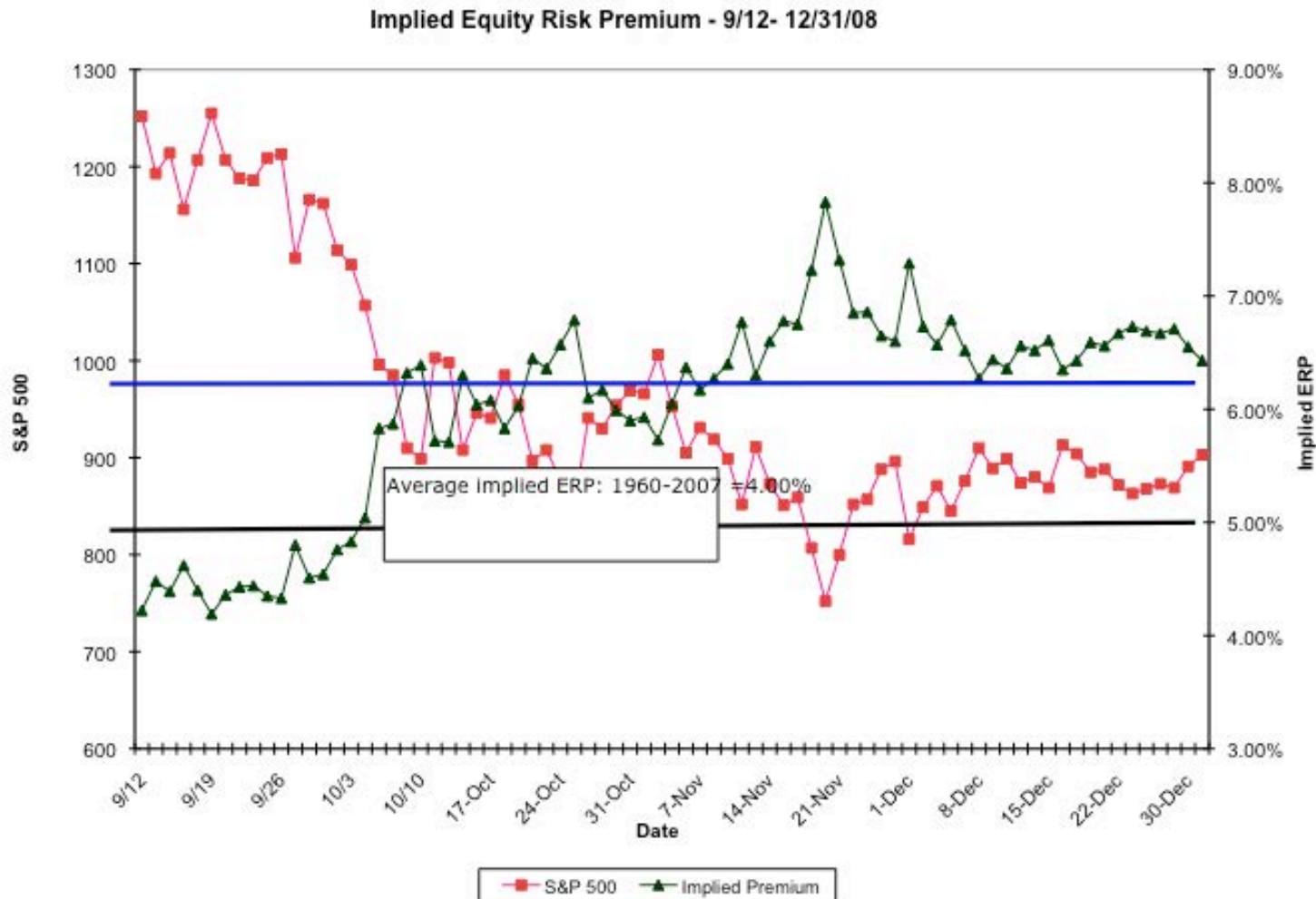
Implied Premium for India using the Sensex: April 2010

- 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%

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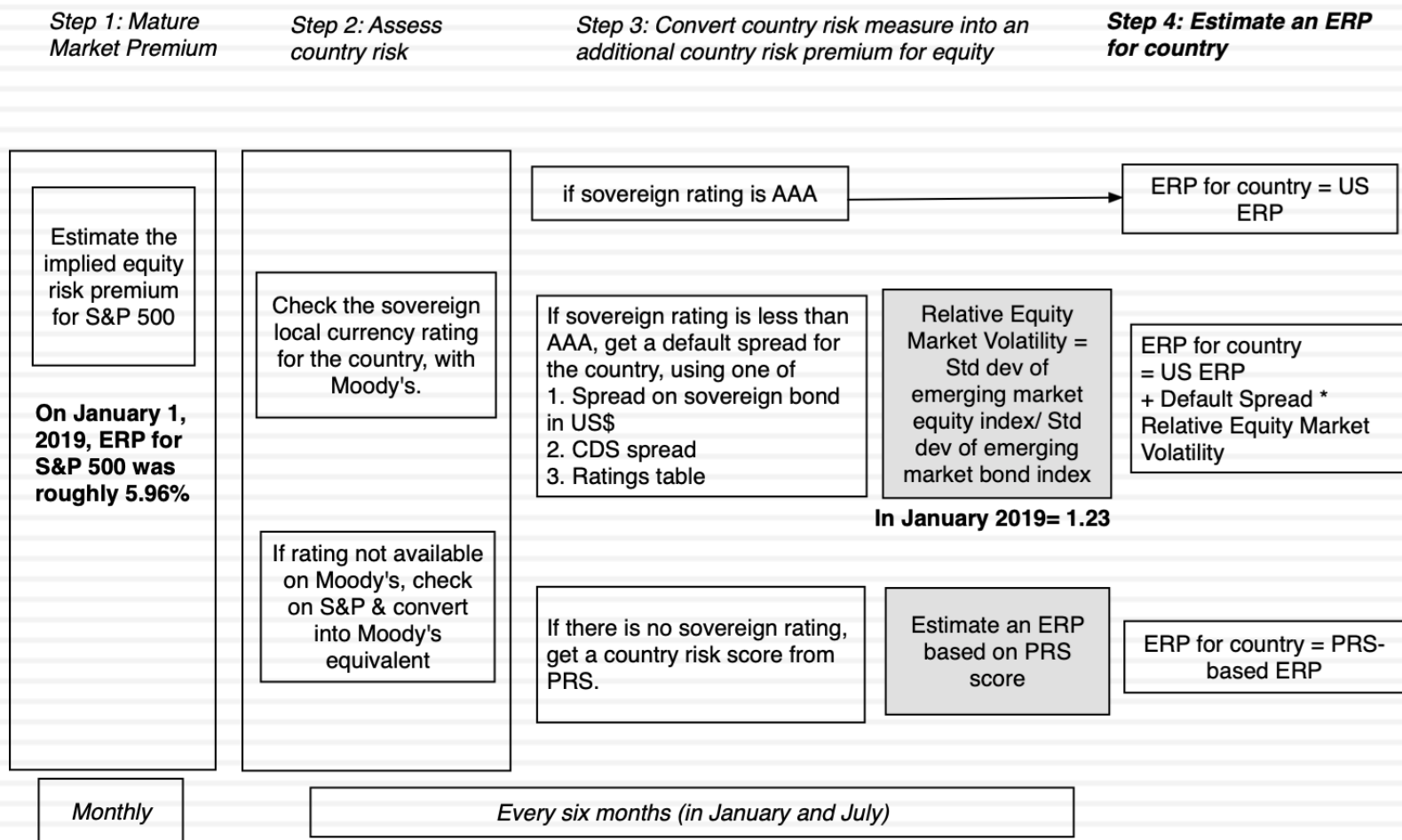
Global Equities?

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 Estimation Procedure - January 1, 2019

Step 1: Mature Market Premium	Step 2: Assess country risk	Step 3: Convert country risk measure into an additional country risk premium for equity	Step 4: Estimate an ERP for country

Estimate the implied equity risk premium for S&P 500

On January 1, 2019, ERP for S&P 500 was roughly 5.96%

Check the sovereign local currency rating for the country, with Moody's.

If rating not available on Moody's, check on S&P & convert into Moody's equivalent

if sovereign rating is AAA → ERP for country = US ERP

If sovereign rating is less than AAA, get a default spread for the country, using one of
1. Spread on sovereign bond in US$
2. CDS spread
3. Ratings table

Relative Equity Market Volatility = Std dev of emerging market equity index/ Std dev of emerging market bond index

In January 2019= 1.23

ERP for country = US ERP + Default Spread * Relative Equity Market Volatility

If there is no sovereign rating, get a country risk score from PRS.

Estimate an ERP based on PRS score

ERP for country = PRS-based ERP

Monthly

Every six months (in January and July)

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ERP : Jan 2019

Western Europe

Country	ERP	CRP	Country	ERP	CRP
Andorra	8.60%	2.64%	Italy	9.02%	3.06%
Austria	6.51%	0.55%	Jersey (States of)	6.80%	0.84%
Belgium	6.80%	0.84%	Liechtenstein	5.96%	0.00%
Cyprus	10.13%	4.17%	Luxembourg	5.96%	0.00%
Denmark	5.96%	0.00%	Malta	7.63%	1.67%
Finland	6.51%	0.55%	Netherlands	5.96%	0.00%
France	6.65%	0.69%	Norway	5.96%	0.00%
Germany	5.96%	0.00%	Portugal	9.02%	3.06%
Greece	14.99%	9.03%	Spain	8.18%	2.22%
Guernsey (States of)	6.80%	0.84%	Sweden	5.96%	0.00%
Iceland	7.63%	1.67%	Switzerland	5.96%	0.00%
Ireland	7.14%	1.18%	Turkey	10.96%	5.00%
Isle of Man	6.65%	0.69%	United Kingdom	6.65%	0.69%
			Western Europe	**7.11%**	**1.15%**

North America

	ERP	CRP
Canada	5.96%	0.00%
United States	5.96%	0.00%
North America	**5.96%**	**0.00%**

	ERP	CRP
Caribbean	**13.61%**	**7.65%**

Central and South America

	ERP	CRP
Argentina	13.60%	7.64%
Belize	14.99%	9.03%
Bolivia	10.96%	5.00%
Brazil	10.13%	4.17%
Chile	6.94%	0.98%
Colombia	8.60%	2.64%
Costa Rica	12.21%	6.25%
Ecuador	14.99%	9.03%
El Salvador	16.37%	10.41%
Guatemala	9.43%	3.47%
Honduras	12.21%	6.25%
Mexico	7.63%	1.67%
Nicaragua	13.60%	7.64%
Panama	8.60%	2.64%
Paraguay	9.43%	3.47%
Peru	7.63%	1.67%
Suriname	13.60%	7.64%
Uruguay	8.60%	2.64%
Venezuela	28.10%	22.14%
Central and South America	**10.61%**	**4.65%**

Africa

	ERP	CRP
Angola	14.99%	9.03%
Benin	12.21%	6.25%
Botswana	7.14%	1.18%
Burkina Faso	13.60%	7.64%
Cameroon	13.60%	7.64%
Cape Verde	13.60%	7.64%
Congo (DR)	14.99%	9.03%
Congo (Rep)	18.46%	12.50%
Côte d'Ivoire	10.96%	5.00%
Egypt	14.99%	9.03%
Ethiopia	12.21%	6.25%
Gabon	16.37%	10.41%
Ghana	14.99%	9.03%
Kenya	13.60%	7.64%
Morocco	9.43%	3.47%
Mozambique	19.83%	13.87%
Namibia	9.43%	3.47%
Nigeria	13.60%	7.64%
Rwanda	13.60%	7.64%
Senegal	10.96%	5.00%
South Africa	9.02%	3.06%
Swaziland	13.60%	7.64%
Tanzania	12.21%	6.25%
Tunisia	13.60%	7.64%
Uganda	13.60%	7.64%
Zambia	16.37%	10.41%
Africa	**12.63%**	**6.67%**

Eastern Europe & Russia

	ERP	CRP
Albania	12.21%	6.25%
Armenia	12.21%	6.25%
Azerbaijan	10.13%	4.17%
Belarus	14.99%	9.03%
Bosnia and Herzegovina	14.99%	9.03%
Bulgaria	8.60%	2.64%
Croatia	10.13%	4.17%
Czech Republic	6.94%	0.98%
Estonia	6.94%	0.98%
Georgia	10.13%	4.17%
Hungary	9.02%	3.06%
Kazakhstan	9.02%	3.06%
Kyrgyzstan	13.60%	7.64%
Latvia	7.63%	1.67%
Lithuania	7.63%	1.67%
Macedonia	10.96%	5.00%
Moldova	14.99%	9.03%
Montenegro	12.21%	6.25%
Poland	7.14%	1.18%
Romania	9.02%	3.06%
Russia	9.43%	3.47%
Serbia	10.96%	5.00%
Slovakia	7.14%	1.18%
Slovenia	8.18%	2.22%
Tajikistan	9.43%	3.47%
Ukraine	18.46%	12.50%
Eastern Europe & Russia	**9.24%**	**3.28%**

Middle East

	ERP	CRP
Abu Dhabi	6.65%	0.69%
Bahrain	13.60%	7.64%
Iraq	16.37%	10.41%
Israel	6.94%	0.98%
Jordan	12.21%	6.25%
Kuwait	6.65%	0.69%
Lebanon	14.99%	9.03%
Oman	9.02%	3.06%
Qatar	6.80%	0.84%
Ras Al Khaimah (Emirate of)	7.14%	1.18%
Saudi Arabia	6.94%	0.98%
Sharjah	7.63%	1.67%
United Arab Emirates	6.65%	0.69%
Middle East	**7.96%**	**2.00%**

Country	PRS	ERP	CRP	Country	PRS	ERP	CRP
Algeria	65	13.60%	7.64%	Malawi	61	16.37%	10.41%
Brunei	80.5	6.94%	0.98%	Mali	61.3	16.37%	10.41%
Gambia	63.3	14.99%	9.03%	Myanmar	62	16.37%	10.41%
Guinea	54.3	22.61%	16.65%	Niger	54.5	22.61%	16.65%
Guinea-Bissau	62	16.37%	10.41%	Sierra Leone	54.8	22.61%	16.65%
Guyana	66.5	12.21%	6.25%	Somalia	53.5	22.61%	16.65%
Haiti	60	18.46%	12.50%	Sudan	38.8	28.10%	22.14%
Iran	69.3	10.13%	4.17%	Syria	51.8	22.61%	16.65%
Korea, D.P.R.	53	22.61%	16.65%	Togo	61	16.37%	10.41%
Liberia	53.5	22.61%	16.65%	Yemen, Republic	48	28.10%	22.14%
Libya	66.5	12.21%	6.25%	Zimbabwe	59.3	18.46%	12.50%
Madagascar	64	14.99%	9.03%				

Asia

	ERP	CRP
Bangladesh	10.96%	5.00%
Cambodia	13.60%	7.64%
China	6.94%	0.98%
Fiji	10.96%	5.00%
Hong Kong	6.65%	0.69%
India	8.60%	2.64%
Indonesia	8.60%	2.64%
Japan	6.94%	0.98%
Korea	6.65%	0.69%
Macao	6.80%	0.84%
Malaysia	7.63%	1.67%
Maldives	13.60%	7.64%
Mauritius	8.18%	2.22%
Mongolia	14.99%	9.03%
Pakistan	14.99%	9.03%
Papua New Guinea	13.60%	7.64%
Philippines	8.60%	2.64%
Singapore	5.96%	0.00%
Solomon Islands	14.99%	9.03%
Sri Lanka	12.21%	6.25%
Taiwan	8.18%	2.22%
Thailand	8.18%	2.22%
Vietnam	10.96%	5.00%
Asia	**7.43%**	**1.47%**

Australia & New Zealand

	ERP	CRP
Australia	5.96%	0.00%
Cook Islands	12.21%	6.25%
New Zealand	5.96%	0.00%
Australia & New Zealand	**5.96%**	**0.00%**

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

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.

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One way of dealing with this: Revenue Weighted ERP

For Severstal in 2016

Region	Revenues	Weight	ERP
Russia	$3,805	64.52%	9.24%
Western Europe	$1,174	19.91%	6.81%
Middle East	$336	5.70%	7.03%
Africa	$299	5.07%	12.00%
Asia	$139	2.36%	7.12%
Central and South America	$88	1.49%	10.21%
North America	$56	0.95%	5.69%
Severstal	**$5,897**	**100.00%**	**8.70%**

For Coca Cola in 2012

Region	Revenues	Total ERP	CRP
Western Europe	19%	6.67%	0.67%
Eastern Europe & Russia	5%	8.60%	2.60%
Asia	15%	7.63%	1.63%
Latin America	15%	9.42%	3.42%
Australia	4%	6.00%	0.00%
Africa	4%	9.82%	3.82%
North America	40%	6.00%	0.00%
Coca Cola	100%	7.14%	1.14%

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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%**

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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:

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

- 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:

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

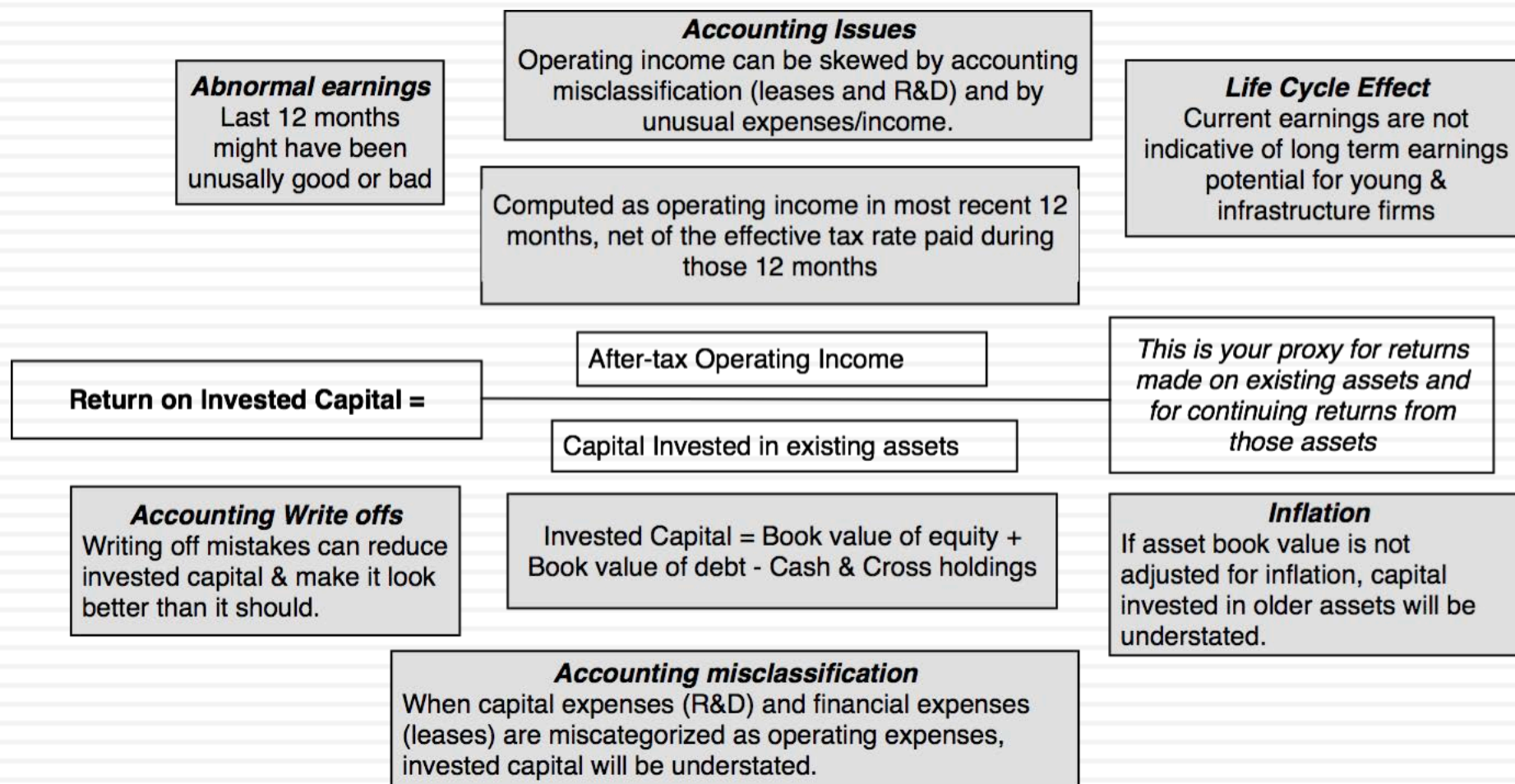 - The danger of focusing just on revenues is that it misses other exposures to risk (production and operations).

	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.

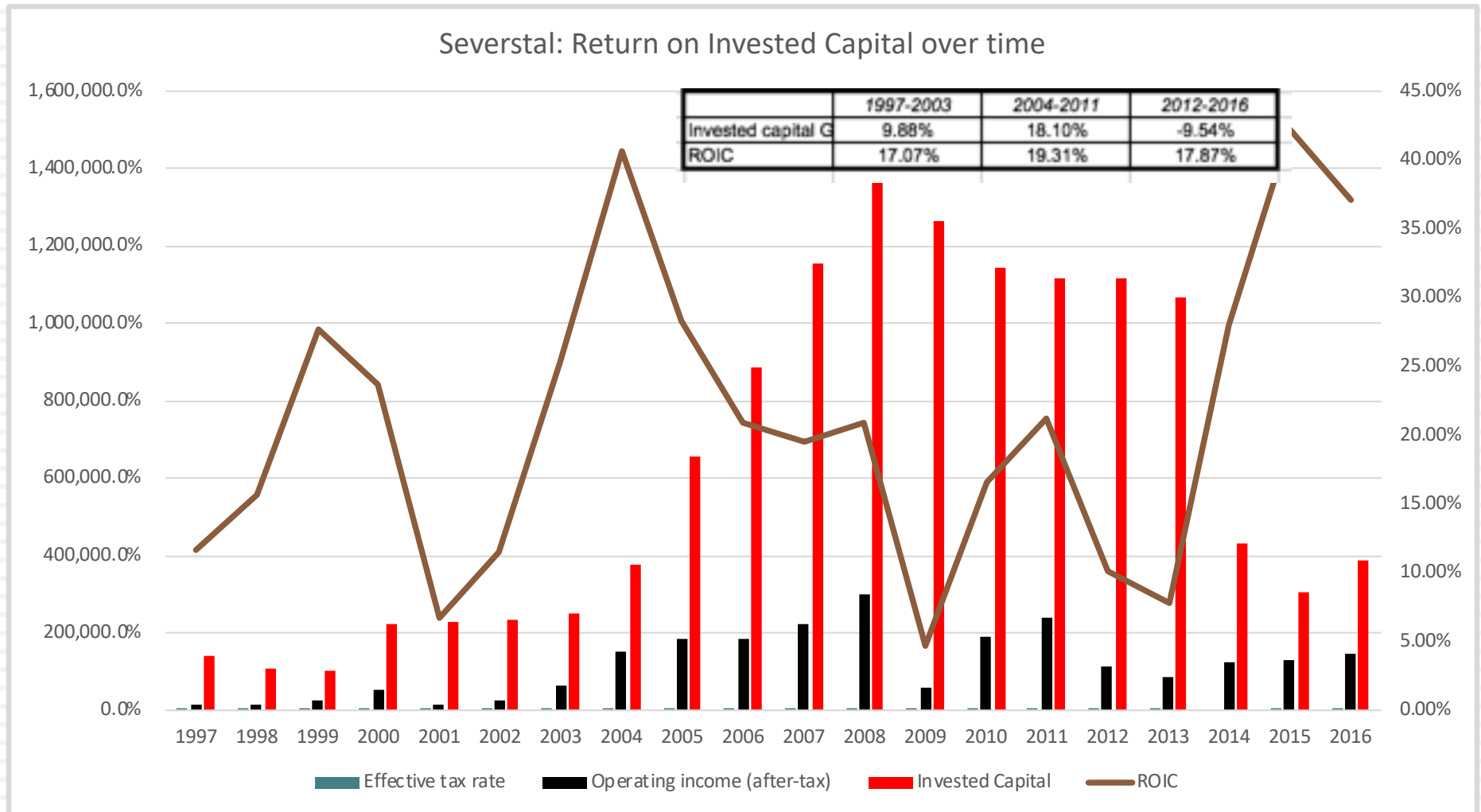# VIII. Growth has to be earned (not endowed or estimated): Sustainable Growth

```
                              Expected Growth
              ┌─────────────────────┴─────────────────────┐
        ┌──────────┐                              ┌──────────────────┐
        │Net Income│                              │ Operating Income │
        └────┬─────┘                              └────────┬─────────┘
       ┌─────┴─────┐                             ┌──────────┴──────────┐
 ┌───────────────┐   ┌──────────────────┐   ┌──────────────┐   ┌──────────────────┐
 │Retention Ratio=│ X │Return on Equity  │   │Reinvestment  │ X │Return on Capital =│
 │1 - Dividends/Net│  │Net Income/Book   │   │Rate =(Net Cap│   │EBIT(1-t)/Book    │
 │Income          │   │Value of Equity   │   │Ex + Chg in   │   │Value of Capital  │
 └───────────────┘   └──────────────────┘   │WC/EBIT(1-t)  │   └──────────────────┘
                                             └──────────────┘
```

1. <u>No free growth</u>: In the long term, to grow, you have to reinvest.

2. <u>Growth Quality</u>: For a given reinvestment, the higher the return you generate on your reinvestment, the faster you can grow.
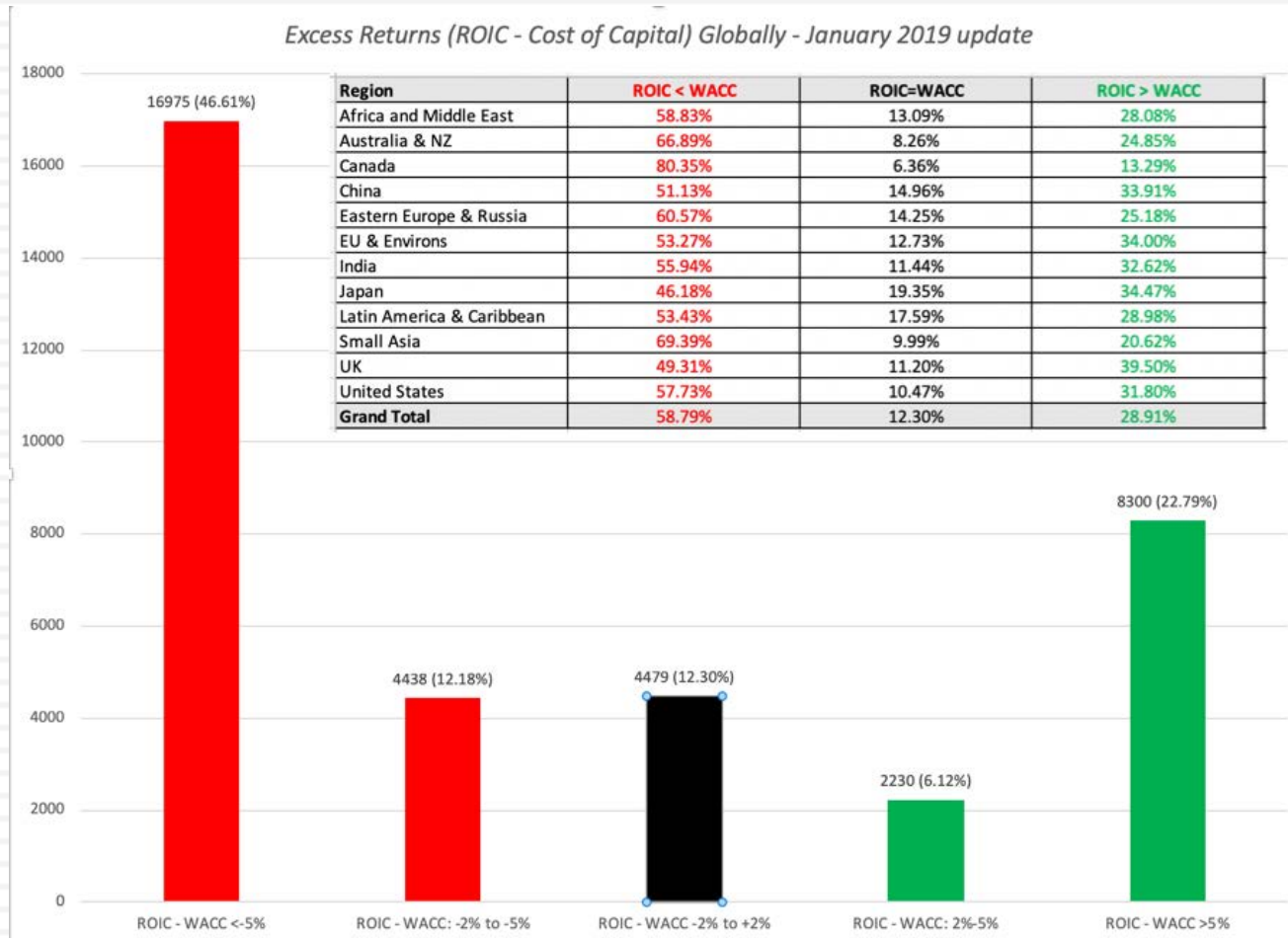
3. Scaling up is hard to do.

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Measuring Returns: The Quandary

Abnormal earnings
Last 12 months might have been unusally good or bad

Accounting Issues
Operating income can be skewed by accounting misclassification (leases and R&D) and by unusual expenses/income.

Computed as operating income in most recent 12 months, net of the effective tax rate paid during those 12 months

Life Cycle Effect
Current earnings are not indicative of long term earnings potential for young & infrastructure firms

Return on Invested Capital =

After-tax Operating Income

Capital Invested in existing assets

This is your proxy for returns made on existing assets and for continuing returns from those assets

Accounting Write offs
Writing off mistakes can reduce invested capital & make it look better than it should.

Invested Capital = Book value of equity + Book value of debt - Cash & Cross holdings

Inflation
If asset book value is not adjusted for inflation, capital invested in older assets will be understated.

Accounting misclassification
When capital expenses (R&D) and financial expenses (leases) are miscategorized as operating expenses, invested capital will be understated.

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Operating income, Reinvestment & Return on Capital -

Severstal: Return on Invested Capital over time

	1997-2003	2004-2011	2012-2016
Invested capital G	9.88%	18.10%	-9.54%
ROIC	17.07%	19.31%	17.87%

Effective tax rate — Operating income (after-tax) — Invested Capital — ROIC

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

Excess Returns (ROIC - Cost of Capital) Globally - January 2019 update

Region	ROIC < WACC	ROIC=WACC	ROIC > WACC
Africa and Middle East	58.83%	13.09%	28.08%
Australia & NZ	66.89%	8.26%	24.85%
Canada	80.35%	6.36%	13.29%
China	51.13%	14.96%	33.91%
Eastern Europe & Russia	60.57%	14.25%	25.18%
EU & Environs	53.27%	12.73%	34.00%
India	55.94%	11.44%	32.62%
Japan	46.18%	19.35%	34.47%
Latin America & Caribbean	53.43%	17.59%	28.98%
Small Asia	69.39%	9.99%	20.62%
UK	49.31%	11.20%	39.50%
United States	57.73%	10.47%	31.80%
Grand Total	58.79%	12.30%	28.91%

Chart data:
- ROIC - WACC <-5%: 16975 (46.61%)
- ROIC - WACC: -2% to -5%: 4438 (12.18%)
- ROIC - WACC -2% to +2%: 4479 (12.30%)
- ROIC - WACC: 2%-5%: 2230 (6.12%)
- ROIC - WACC >5%: 8300 (22.79%)

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?

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

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

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Terminal Value and Growth

Stable Growth Rate	Amgen	Tata Motors	Severstal
0%	$150,652	₹ 435,686	$489.513
1%	$154,479	₹ 435,686	$489.513
2%	$160,194	₹ 435,686	$489.513
3%	$167,784	₹ 435,686	
4%	$179,099	₹ 435,686	
5%		₹ 435,686	
6%			
Risk free Rate	4.78%	5.00%	2.50%
ROIC	10.00%	10.39%	8.50%
Cost of capital	8.08%	10.39%	8.50%

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THE LOOSE ENDS IN VALUATION...

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Getting from DCF to value per share: The Loose Ends

Discount FCFF at Cost of capital = Operating Asset Value

+

The adjustments to get to firm value

+ Cash & Marketable Securities

Discount? Premium?

+ Value of Cross holdings

Book value? Market value?

+ Value of other non-operating assets

What should be here? What should not?

=

Intangible assets (Brand Name) Premium

Synergy Premium

Value of business (firm)

Complexity discount

-

Debt

Underfunded pension/ health care obligations?

Lawsuits & Contingent liabilities?

=

Control Premium

Value of Equity

Minority Discount

Distress discount

Liquidity discount

→

Value per share

Option Overhang

Differences in cashflow/ voting rights across shares

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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

Mature firms, Negative excess returns	All firms	High Growth firms, High Excess Returns

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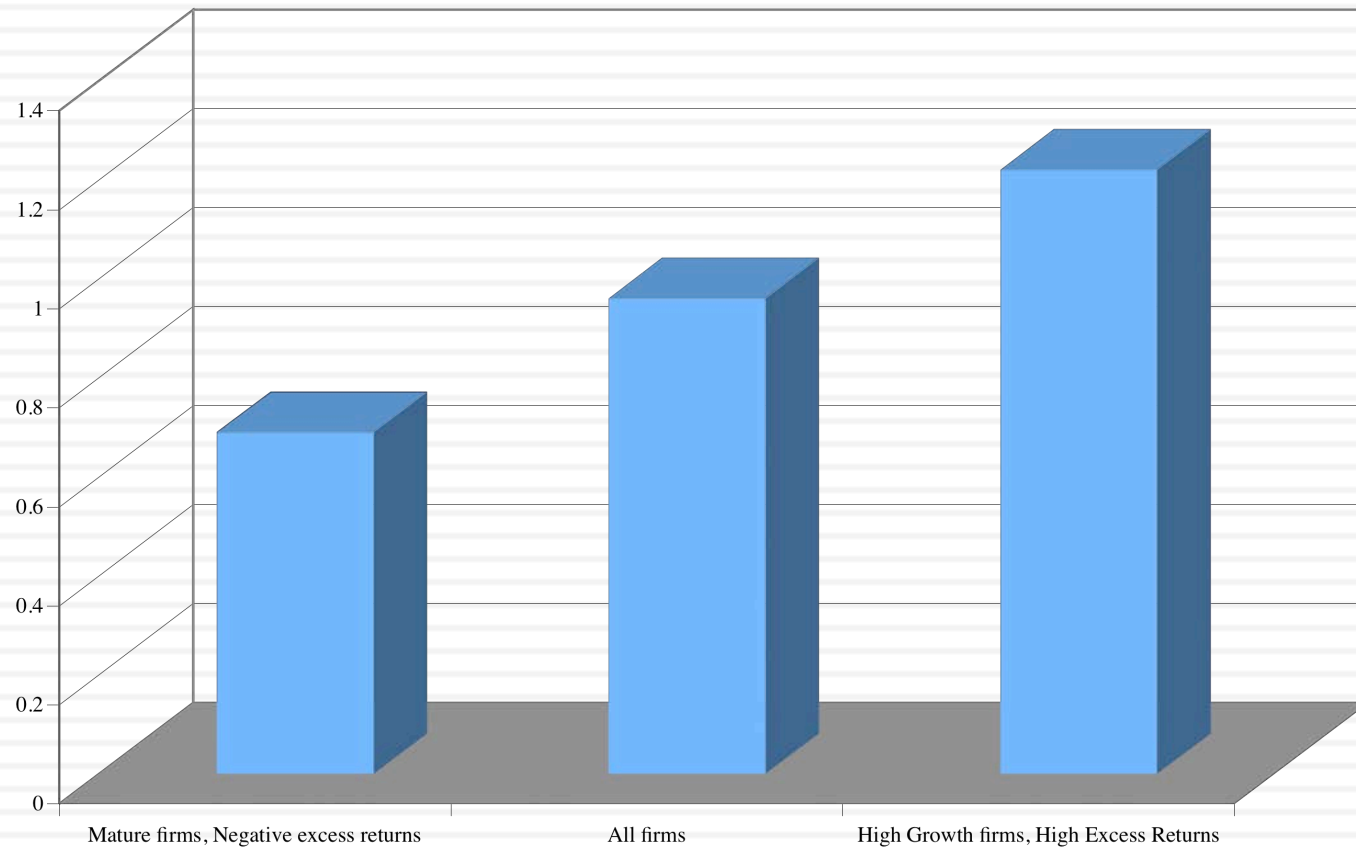
2. Dealing with Holdings in Other firms

- 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.

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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.

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Tata Motor's Cross Holdings

Tata Steel, 13,572₹

Tata Chemicals, 2,431₹

Other publicly held Tata Companies, 12,335₹

Non-public Tata companies, 112,238₹

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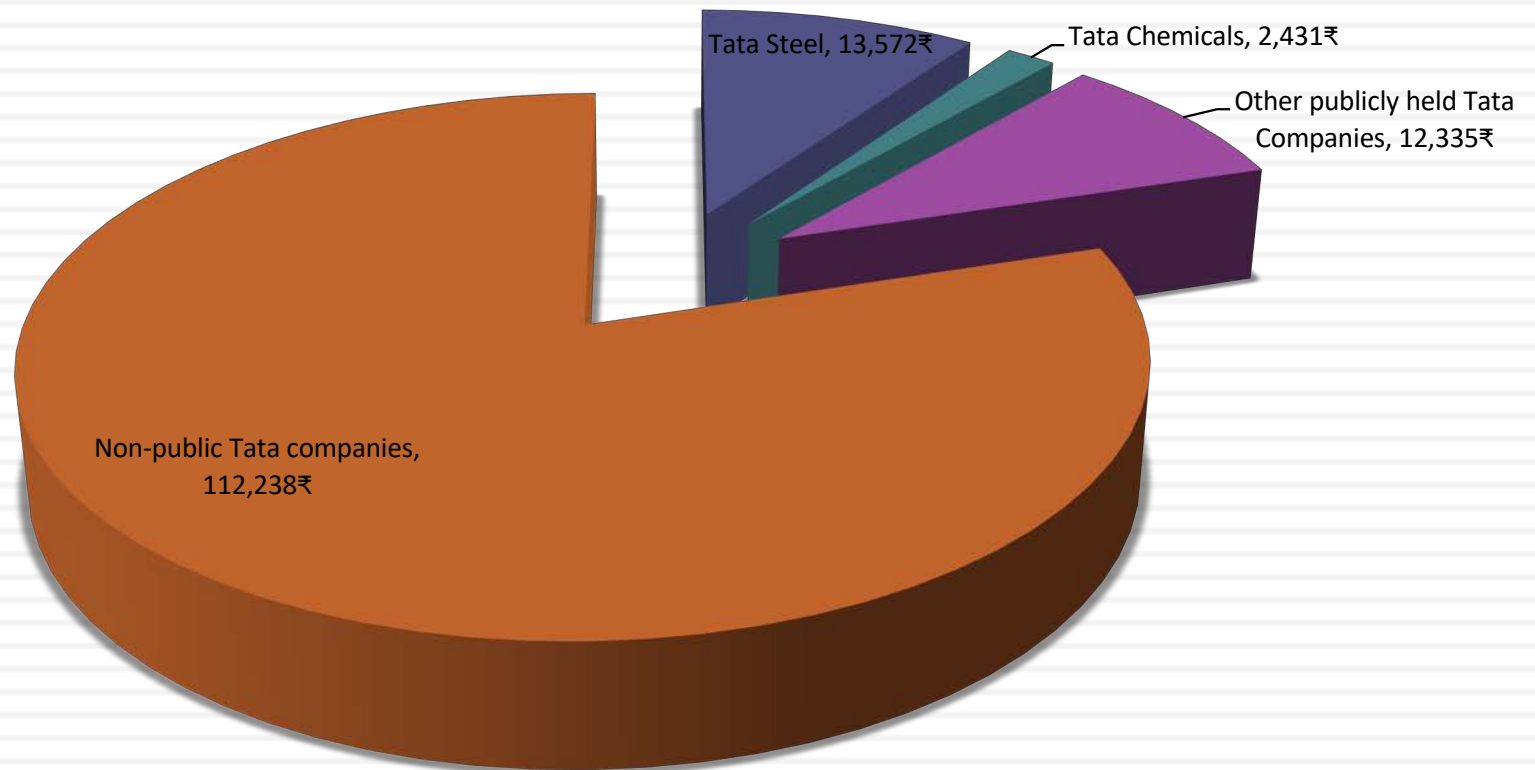
3. Other Assets that have not been counted yet..

- 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.

The "real estate" play

- Assume that Severstal 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?

    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

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

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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?

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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	0.2
		Complexity Score =			48.95	90.55

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Dealing with Complexity

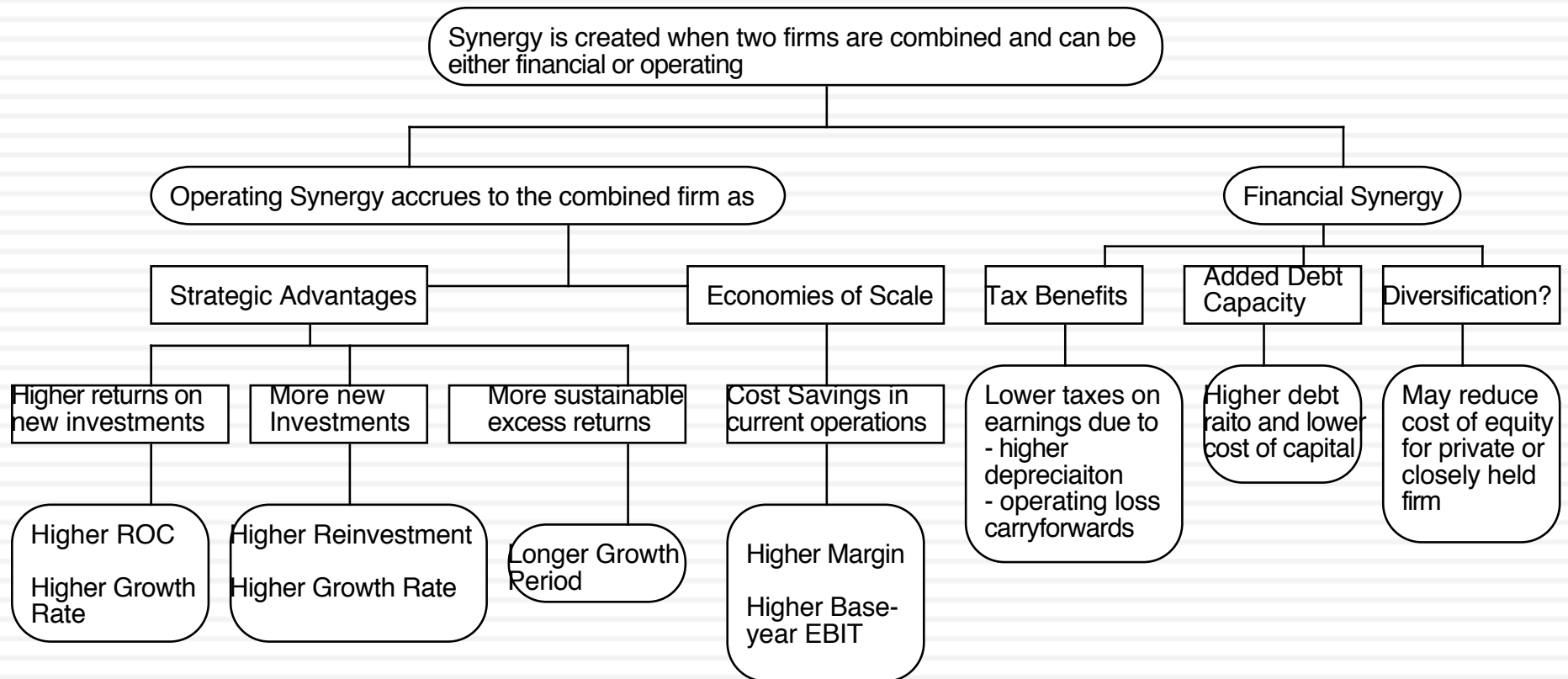- In Discounted Cashflow Valuation
  - The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
  - The Conservative Analyst: Don't value what you cannot see.
  - The Compromise: Adjust the value for complexity
    - Adjust cash flows 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

Synergy is created when two firms are combined and can be either financial or operating

- Operating Synergy accrues to the combined firm as
  - Strategic Advantages
    - Higher returns on new investments
      - Higher ROC
      - Higher Growth Rate
    - More new Investments
      - Higher Reinvestment
      - Higher Growth Rate
    - More sustainable excess returns
      - Longer Growth Period
  - Economies of Scale
    - Cost Savings in current operations
      - Higher Margin
      - Higher Base-year EBIT
- Financial Synergy
  - Tax Benefits
    - Lower taxes on earnings due to
      - higher depreciaiton
      - operating loss carryforwards
  - Added Debt Capacity
    - Higher debt raito and lower cost of capital
  - Diversification?
    - May reduce cost of equity for private or closely held firm

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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.

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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

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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

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.

Add on $ per box office $

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

Discounted back @ 7.61% cost of capital of entertainment companies

	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

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

74

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

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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 cutting: 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
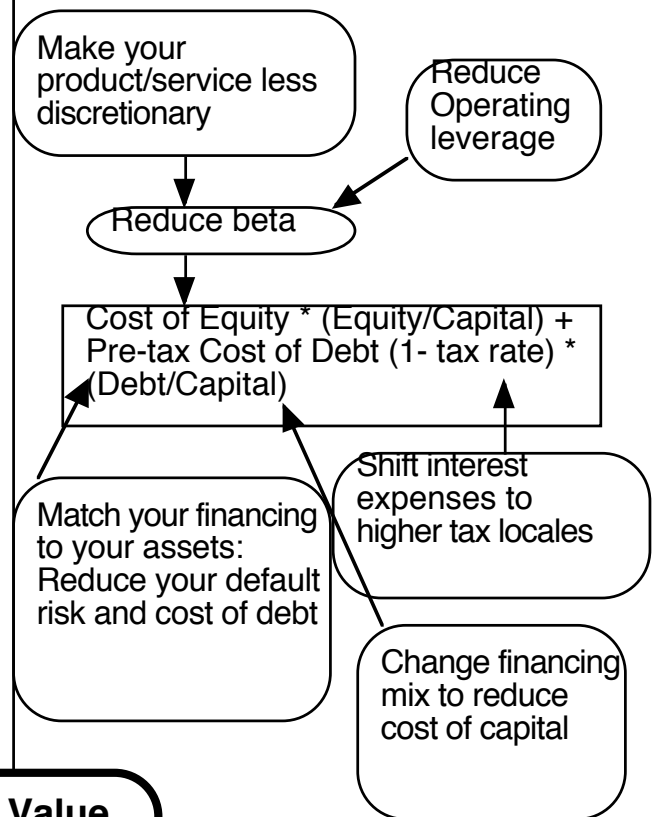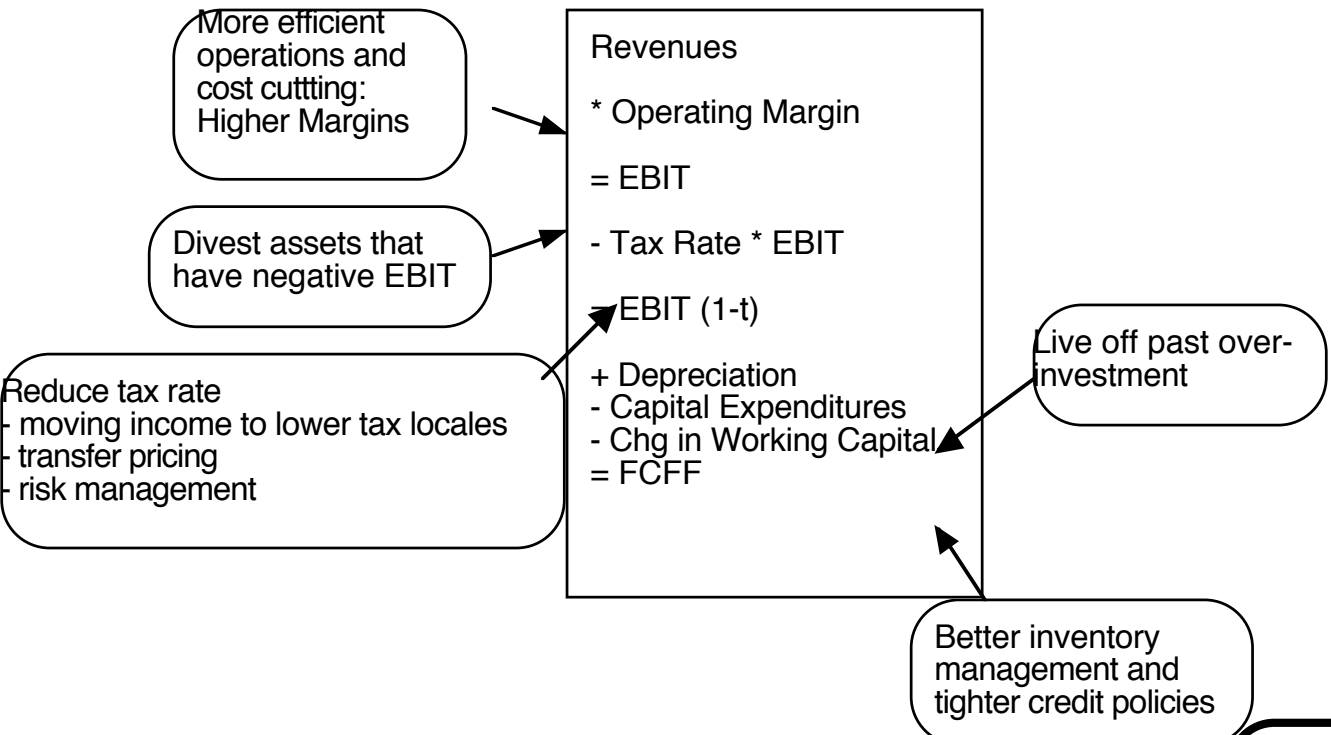
Firm Value

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

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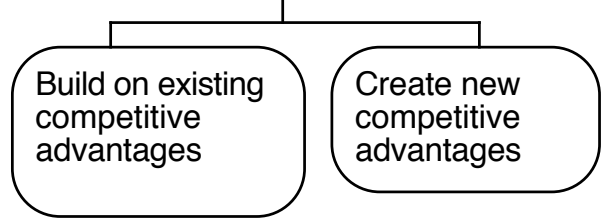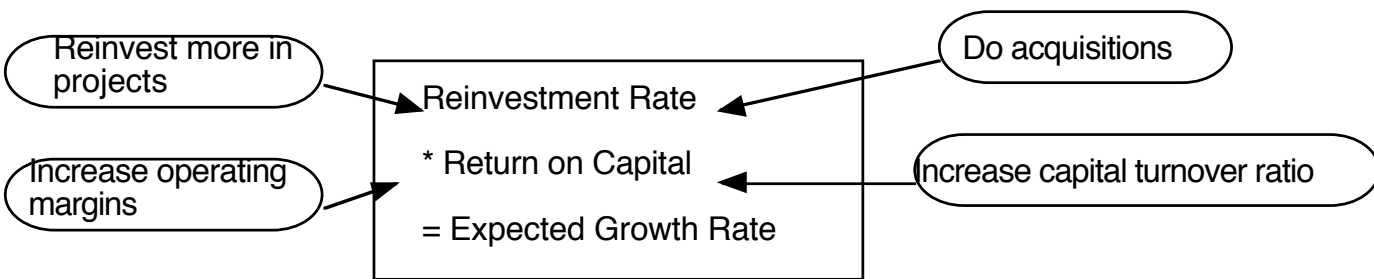
Adris Grupa (Status Quo): 4/2010

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%

Average from 2004-09
70.83%

Reinvestment Rate
70.83%

Expected Growth from new inv.
.7083*.0969 =0.0686
or 6.86%

Average from 2004-09
9.69%

Return on Capital
9.69%

Stable Growth
g = 4%; Beta = 0.80
Country Premium= 2%
Cost of capital = 9.92%
Tax rate = 20.00%
ROC=9.92%;
Reinvestment Rate=g/ROC
=4/9.92= 40.32%

HKR Cashflows

Terminal Value$_5$= 365/(.0992-.04) =6170 HRK

Op. Assets	4312	Year	1	2	3	4	5	
+ Cash:	1787	EBIT (1-t)	HRK 466	HRK 498	HRK 532	HRK 569	HRK 608	612
- Debt	141	- Reinvestment	HRK 330	HRK 353	HRK 377	HRK 403	HRK 431	246
- Minority int	465	FCFF	HRK 136	HRK 145	HRK 155	HRK 166	HRK 177	365
=Equity	5,484							

/ (Common + Preferred shares)
Value non-voting share
335 HRK/share

Discount at $ Cost of Capital (WACC) = 10.7% (.974) + 5.40% (0.026) = 10.55%

Cost of Equity
10.70%

Cost of Debt
(4.25%+ 0.5%+2%)(1-.20)
= 5.40 %

Weights
E = 97.4% D = 2.6%

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

Riskfree Rate:
HRK Riskfree Rate=
4.25%

+

Beta
0.70

X

Mature market premium
4.5%

+

Lambda
0.68

X

CRP for Croatia
(3%)

Lambda
0.42

X

CRP for Central Europe
(3%)

Unlevered Beta for Sectors: 0.68

Firm's D/E Ratio: 2.70%

Country Default Spread
2%

X

Rel Equity Mkt Vol
1.50

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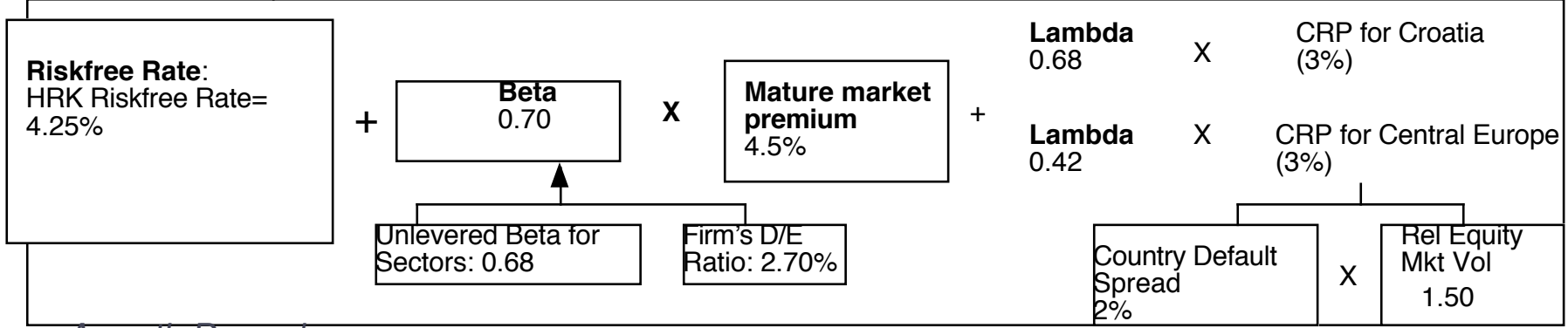
Adris Grupa: 4/2010 (Restructured)

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= FCFF   551 HRK
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Tax rate = 17.35%
Return on capital = 8.72%

Reinvestment Rate
70.83%

Increased ROIC to cost of capital

Expected Growth from new inv.
.7083*.01054=0.0747
or 7.47%

Return on Capital
10.54%

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

Terminal Value$_5$= 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 = 249 million HKR

Value per voting share =334 HKR + 249/9.616 = 362 HKR

Aswath Damodaran

THE DARK SIDE OF VALUATION: VALUING DIFFICULT-TO-VALUE COMPANIES
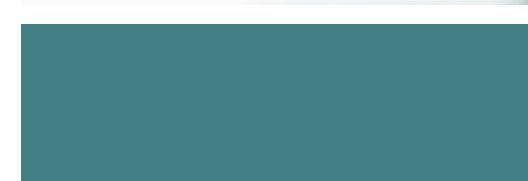
The fundamental determinants of value...

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

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

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

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

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)

Aswath Damodaran

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.

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I. The challenge with young companies...

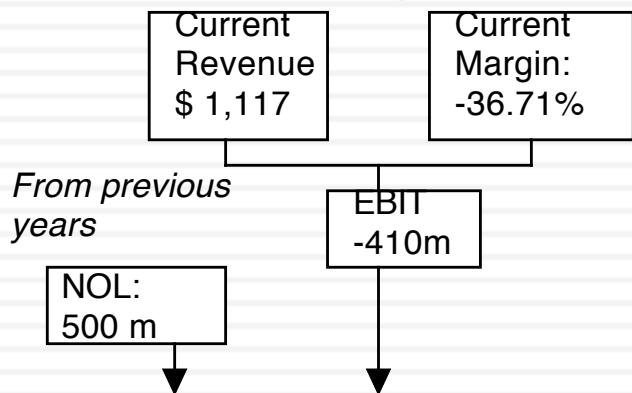Figure 5.2: Estimation Issues - Young and Start-up Companies

Making judgments on revenues/ profits difficult becaue you cannot draw on history. If you have no product/ service, it is difficult to gauge market potential or profitability. The company's entire value lies in future growth but you have little to base your estimate on.
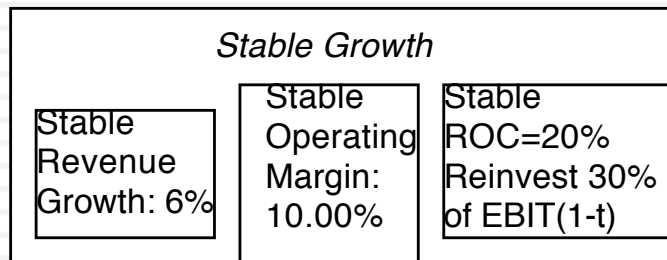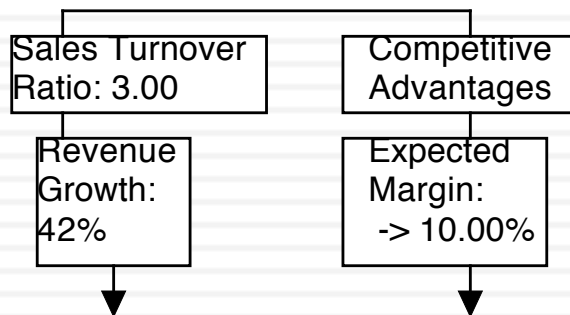
Cash flows from existing assets non-existent or negative.

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?

Different claims on cash flows can affect value of equity at each stage.

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

Limited historical data on earnings, and no market prices for securities makes it difficult to assess risk.

What is the value of equity in the firm?

Will the firm make it through the gauntlet of market demand and competition? Even if it does, assessing when it will become mature is difficult because there is so little to go on.

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86

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

Current Revenue $ 1,117

Current Margin: -36.71%

Sales to capital ratio and expected margin are retail industry average numbers

Stable Growth

Stable Revenue Growth: 6%

Stable Operating Margin: 10.00%

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

From previous years

EBIT -410m

NOL: 500 m

Sales Turnover Ratio: 3.00

Competitive Advantages

Revenue Growth: 42%

Expected Margin: -> 10.00%

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

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenue Growth	150.00%	100.00%	75.00%	50.00%	30.00%	25.20%	20.40%	15.60%	10.80%	6.00%	6%
Revenues	$ 2,793	$ 5,585	$ 9,774	$ 14,661	$ 19,059	$ 23,862	$ 28,729	$ 33,211	$ 36,798	$ 39,006	$ 41,346
Operating Margin	-13.35%	-1.68%	4.16%	7.08%	8.54%	9.27%	9.64%	9.82%	9.91%	9.95%	10.00%
EBIT	-$373	-$94	$407	$1,038	$1,628	$2,212	$2,768	$3,261	$3,646	$3,883	$4,135
EBIT(1-t)	-$373	-$94	$407	$871	$1,058	$1,438	$1,799	$2,119	$2,370	$2,524	$2,688
- Reinvestment	$600	$967	$1,420	$1,663	$1,543	$1,688	$1,721	$1,619	$1,363	$961	$155
FCFF	-$931	-$1,024	-$989	-$758	-$408	-$163	$177	$625	$1,174	$1,788	$1,881

	1	2	3	4	5	6	7	8	9	10
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%

Forever

Value of Op Assets $ 15,170
+ Cash $ 26
= Value of Firm $15,196
- Value of Debt $ 349
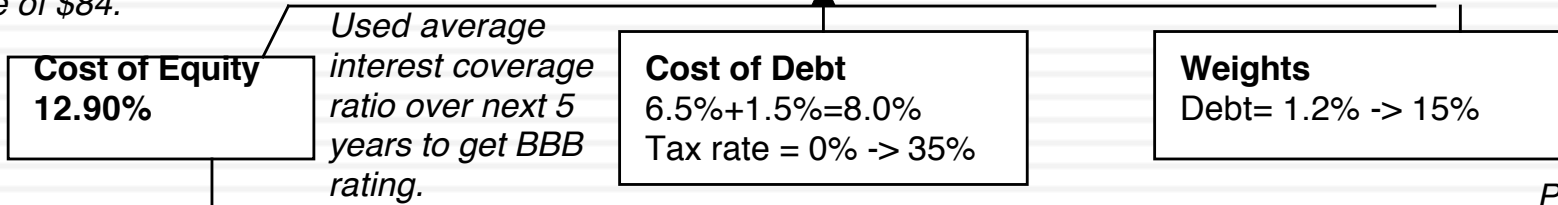= Value of Equity $14,847
- Equity Options $ 2,892
Value per share $ 35.08

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

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%

Amazon was trading at $84 in January 2000.

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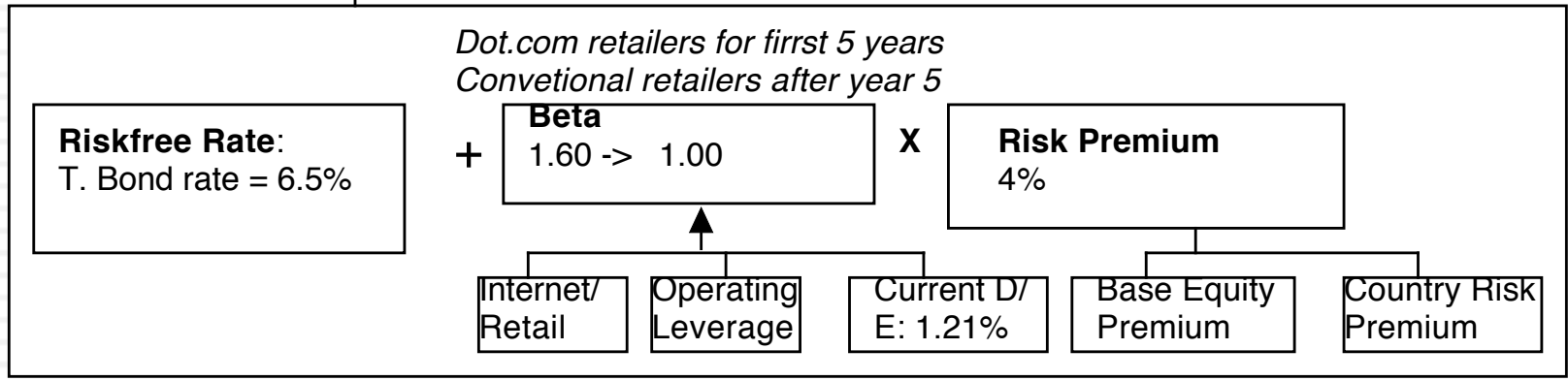
Lesson 1: Don't trust regression betas....

Aswath Damodaran
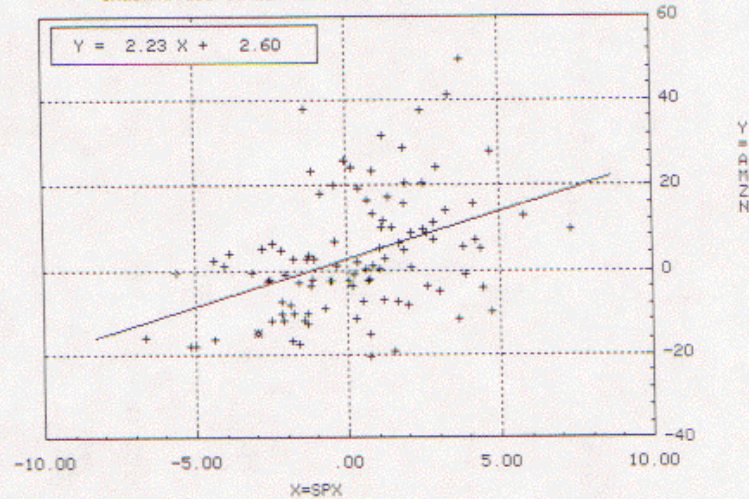
Lesson 2: Work backwards and keep it simple...

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

Aswath Damodaran

Lesson 3: Scaling up is hard to do…

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

Margin by which revenue growth rate exceeds industry average

Post-I.P.O. growth

Median of new issues from 1965 to 2005

Number of years after coming to market
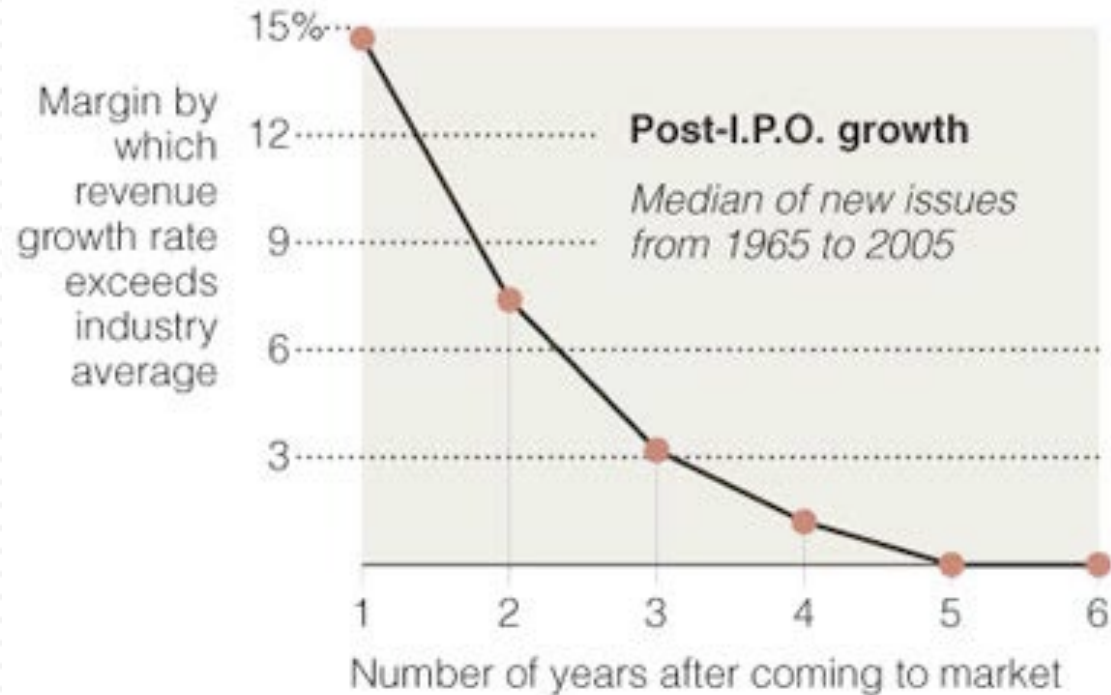
Source: Andrew Metrick

The New York Times

Aswath Damodaran

Lesson 4: Don't forget to pay for growth…

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%

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

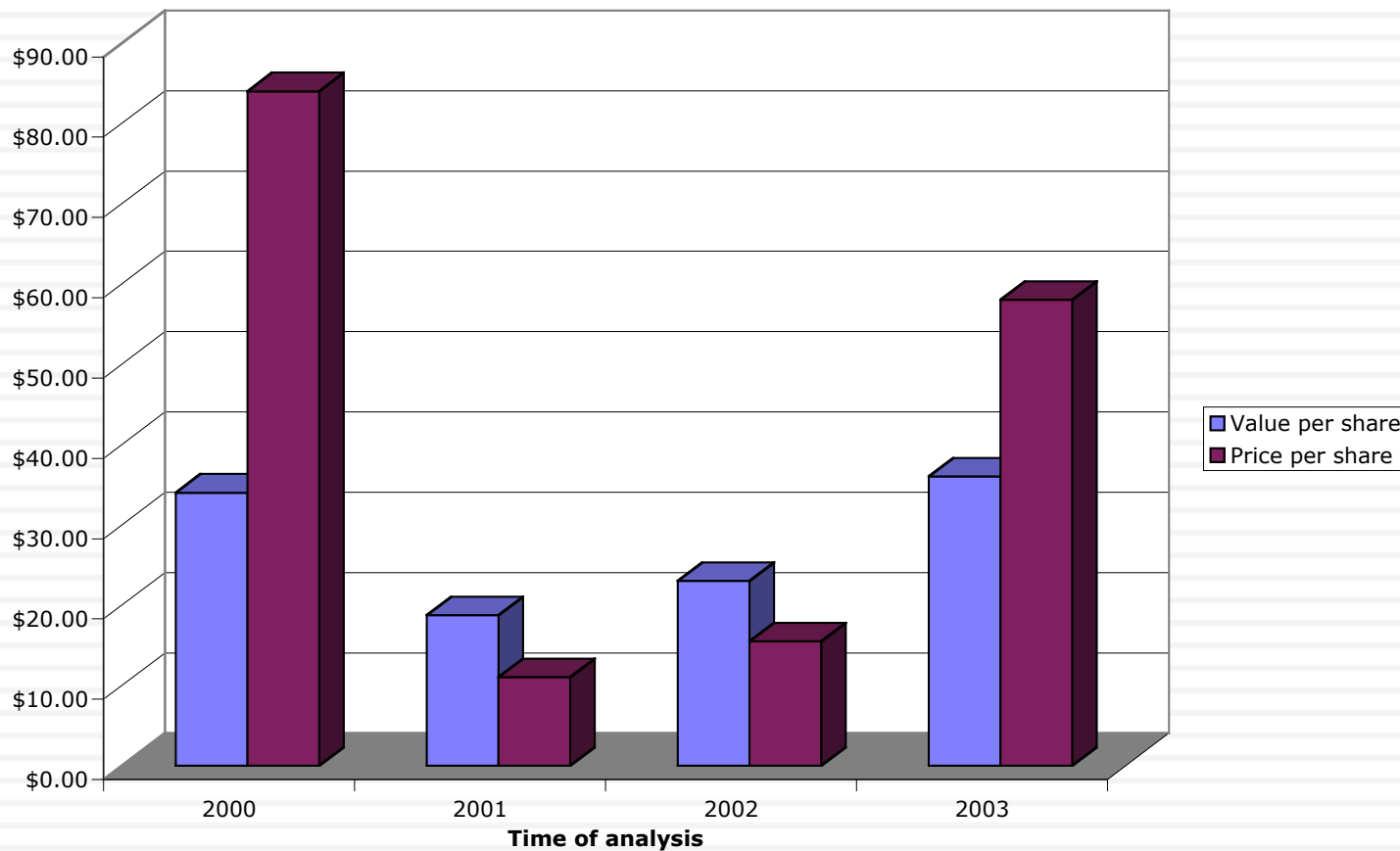|		Target pre-tax Operating Margin				
		6%	8%	10%	12%	14%
Compounded annual Revenue Growth rate	30%	$ (1.94)	$ 2.95	$ 7.84	$ 12.71	$ 17.57
	35%	$ 1.41	$ 8.37	$ 15.33	$ 22.27	$ 29.21
	40%	$ 6.10	$ 15.93	$ 25.74	$ 35.54	$ 45.34
	45%	$ 12.59	$ 26.34	$ 40.05	$ 53.77	$ 67.48
	50%	$ 21.47	$ 40.50	$ 59.52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

Aswath Damodaran

Lesson 6: Don't forget to mop up…

□ Watch out for "other" equity claims: If you buy equity in a young, growth company, watch out for other (often hidden) claims on the equity that don't take the form of common shares. In particular, watch for options granted to managers, employees, venture capitalists and others (you will be surprised…).

  ◻ Value these options as options (not at exercise value)
  ◻ Take into consideration expectations of future option grants when computing expected future earnings/cash flows.

□ Not all shares are equal: If there are differences in cash flow claims (dividends or liquidation) or voting rights across shares, value these differences.

  ◻ Voting rights matter even at well run companies

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Lesson 7: 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).

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And the market is often "more wrong"….

Amazon: Value and Price

Legend:
- Value per share
- Price per share

X-axis: Time of analysis (2000, 2001, 2002, 2003)
Y-axis: $0.00 to $90.00

Aswath Damodaran

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.

Alibaba: Pre-IPO valuation - September 2, 2014 (in US $)

	T12M	2012-13
Revenues	$9,268	$4,821
Operating Income	$4,702	$1,777
Effective tax rate	11.92%	
Operating Margin	50.73%	

Revenue growth of **25%** a year for 5 years, tapering down to 2.63% in year 10

Pre-tax operating margin decreases to 40% over time & tax rate rises to 25%

Sales to capital ratio maintained at 2.00

Stable Growth
g = 2.41%
Cost of capital = 8%
ROC= 8%;
Reinvestment Rate= 2.41%/8% = 30.125%

Terminal Value$_{10}$= 10,353/(.08-0241) = $185,198

|	1	2	3	4	5	6	7	8	9	10
Revenue growth rate	25.00%	25.00%	25.00%	25.00%	25.00%	20.48%	15.96%	11.45%	6.93%	2.41%
Revenues	$ 11,585	$ 14,481	$ 18,101	$ 22,626	$ 28,283	$ 34,075	$ 39,515	$ 44,038	$ 47,089	$ 48,224
EBIT (Operating) margi	49.66%	48.59%	47.51%	46.44%	45.37%	44.29%	43.22%	42.15%	41.07%	40.00%
EBIT (Operating incom	$ 5,753	$ 7,035	$ 8,600	$ 10,507	$ 12,831	$ 15,093	$ 17,078	$ 18,560	$ 19,341	$ 19,290
Tax rate	11.92%	11.92%	11.92%	11.92%	11.92%	14.54%	17.15%	19.77%	22.38%	25.00%
EBIT(1-t)	$ 5,067	$ 6,197	$ 7,575	$ 9,255	$ 11,301	$ 12,899	$ 14,149	$ 14,891	$ 15,012	$ 14,467
- Reinvestment	$ 1,158	$ 1,448	$ 1,810	$ 2,263	$ 2,828	$ 2,896	$ 2,720	$ 2,261	$ 1,525	$ 567
FCFF	$ 3,908	$ 4,749	$ 5,765	$ 6,992	$ 8,473	$ 10,002	$ 11,429	$ 12,630	$ 13,486	$ 13,900

Term yr
EBIT (1-t) $14,816
- Reinv 4,463
FCFF 10,353

Operating assets	$137,386
+ Cash	9330
- Debt	10068
+ Equity investments	2,087
+ Alipay provision	3,000
+ IPO Proceeds (est)	20,000
- Options	696
Value of equity	161,039
Value per share	$65.98

Cost of capital = 8.90% (.943) + 3.00% (.057) = 8.56%

Cost of capital decreases to 8% from years 6-10

Cost of Equity 8.90%

Cost of Debt 4% (1-.25) = 3.00%

Weights E = 94.3% D = 5.7%
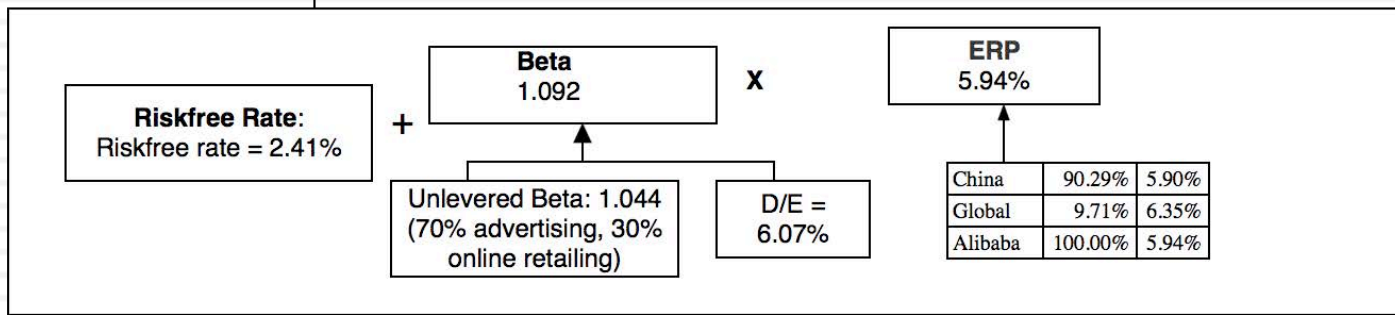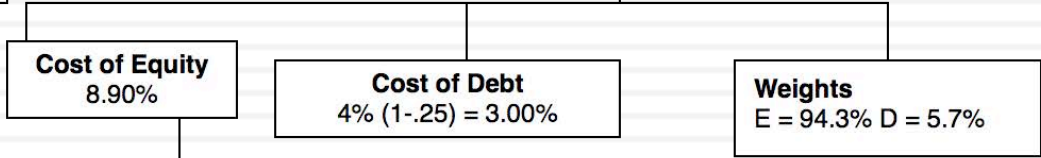
Two days after this valuation, the company (and its bankers) valued itself at about $155 billion and the shares at $63 apiece. The offering price was raised to $69 and the opening price was $93/share.

Beta 1.092

X

ERP 5.94%

Riskfree Rate: Riskfree rate = 2.41%

+

Unlevered Beta: 1.044 (70% advertising, 30% online retailing)

D/E = 6.07%

China	90.29%	5.90%
Global	9.71%	6.35%
Alibaba	100.00%	5.94%

Aswath Damodaran

II. Mature Companies in transition..

- Mature companies are generally the easiest group to value. They have long, established histories that can be mined for inputs. They have investment policies that are set and capital structures that are stable, thus making valuation more grounded in past data.

- However, this stability in the numbers can mask real problems at the company. The company may be set in a process, where it invests more or less than it should and does not have the right financing mix. In effect, the policies are consistent, stable and bad.

- If you expect these companies to change or as is more often the case to have change thrust upon them,

The perils of valuing mature companies...

Figure 7.1: Estimation Issues - Mature Companies

Lots of historical data on earnings and cashflows. Key questions remain if these numbers are volatile over time or if the existing assets are not being efficiently utilized.

Growth is usually not very high, but firms may still be generating healthy returns on investments, relative to cost of funding. Questions include how long they can generate these excess returns and with what growth rate in operations. Restructuring can change both inputs dramatically and some firms maintain high growth through acquisitions.

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?

Equity claims can vary in voting rights and dividends.

Operating risk should be stable, but the firm can change its financial leverage This can affect both the cost of equtiy and capital.

Maintaining excess returns or high growth for any length of time is difficult to do for a mature firm.

What is the value of equity in the firm?

Aswath Damodaran

Hormel Foods: The Value of Control Changing

Hormel Foods sells packaged meat and other food products and has been in existence as a publicly traded company for almost 80 years. In 2008, the firm reported after-tax operating income of $315 million, reflecting a compounded growth of 5% over the previous 5 years.

The Status Quo

Run by existing management, with conservative reinvestment policies (reinvestment rate = 14.34% and debt ratio = 10.4%.

Anemic growth rate and short growth period, due to reinvestment policy

Low debt ratio affects cost of capital

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	$315							
1	$324	2.75%	14.34%	19.14%	$62	$262	6.79%	$245
2	$333	2.75%	14.34%	19.14%	$64	$269	6.79%	$236
3	$342	2.75%	14.34%	19.14%	$65	$276	6.79%	$227
Beyond	$350	2.35%	7.23%	32.52%	$114	$4,840	7.23%	$3,974
Value of operating assets								$4,682
(Add) Cash								$155
(Subtract) Debt								$491
(Subtract) Management Options								$53
Value of equity in common stock								$4,293
Value per share								$31.91

New and better management

More aggressive reinvestment which increases the reinvestment rate (to 40%) and tlength of growth (to 5 years), and higher debt ratio (20%).

Operating Restructuring (1)
Expected growth rate = ROC * Reinvestment Rate
Expected growth rae (status quo) = 14.34% * 19.14% = 2.75%
Expected growth rate (optimal) = 14.00% * 40% = 5.60%
ROC drops, reinvestment rises and growth goes up.

Financial restructuring (2)
Cost of capital = Cost of equity (1-Debt ratio) + Cost of debt (Debt ratio)
Status quo = 7.33% (1-.104) + 3.60% (1-.40) (.104) = 6.79%
Optimal = 7.75% (1-.20) + 3.60% (1-.40) (.20) = 6.63%
Cost of equity rises but cost of capital drops.

Year	Operating income after taxes	Expected growth rate	ROC	Reinvestment Rate	Reinvestment	FCFF	Cost of capital	Present Value
Trailing 12 months	$315							
1	$333	5.60%	14.00%	40.00%	$133	$200	6.63%	$187
2	$351	5.60%	14.00%	40.00%	$141	$211	6.63%	$185
3	$371	5.60%	14.00%	40.00%	$148	$223	6.63%	$184
4	$392	5.60%	14.00%	40.00%	$260	$235	6.63%	$182
5	$414	5.60%	14.00%	40.00%	$223	$248	6.63%	$180
Beyond	$423	2.35%	6.74%	34.87%	$148	$6,282	6.74%	$4,557
Value of operating assets								$5,475
(Add) Cash								$155
(Subtract) Debt								$491
(Subtract) Management Options								$53
Value of equity in common stock								$5,085
Value per share								$37.80

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Probability of management change = 10%
Expected value =$31.91 (.90) + $37.80 (.10) = $32.50

(3)

(4)

Lesson 1: Cost cutting & increased efficiency are easier accomplished on paper than in practice…

Cost-synergy estimation is better, but there are patterns emerging in the errors

Mergers achieving stated percentage of expected cost savings, percent $N = 92$
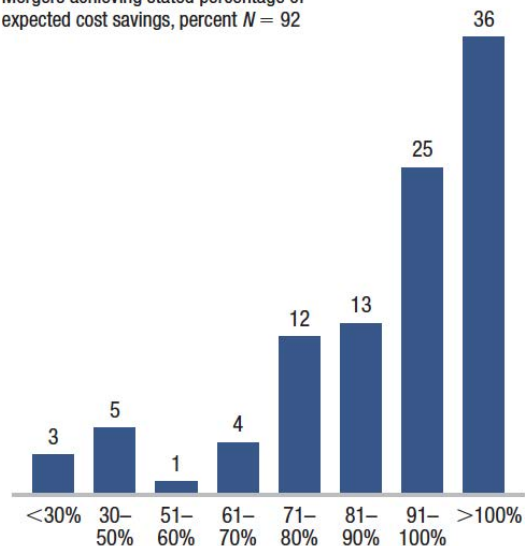
Typical sources of estimation error
- Underestimating one-time costs
- Using benchmarks from noncomparable situations
- Not sanity-checking management estimates against precedent transactions
- Failing to ground estimates in bottom-up analysis (e.g., location-by-location review of overlaps)

Source: McKinsey (2002) Postmerger Management Practice client survey; client case studies

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Lesson 2: Increasing growth is not always an option (or at least not a good option)

Modes of organic growth vary in value creation intensity—consumer goods industry

Category of growth	Shareholder value created for incremental $1 million of growth/ target acquisition size[1]	Revenue growth/ acquisition size necessary to double typical company's share price,[2] $ billions
New-product market development	1.75–2.00	5–6
Expanding an existing market	0.30–0.75	13–33
Maintaining/growing share in a growing market	0.10–0.50	20–100
Competing for share in a stable market	−0.25–0.40	n/m–25
Acquisition (25th to 75th percentile result)[3]	−0.5–0.20	n/m–50

Lesson 3: Financial leverage is a double-edged sword..

Exhibit 7.1: Optimal Financing Mix: Hormel Foods in January 2009

As debt ratio increases, equity becomes riskier.(higher beta) and cost of equity goes up. ①

As firm borrows more money, its ratings drop and cost of debt rises ②

Current Cost of Capital

Debt Ratio	Beta	Cost of Equity	Bond Rating	Interest rate on debt	Tax Rate	Cost of Debt (after-tax)	WACC	Firm Value (G)
0%	0.78	7.00%	AAA	3.60%	40.00%	2.16%	7.00%	$4,523
10%	0.83	7.31%	AAA	3.60%	40.00%	2.16%	6.80%	$4,665
10.39%	**0.83**	**7.33%**	**AAA**	**3.60%**	**40.00%**	**2.16%**	**6.79%**	**$4,680**
20%	0.89	7.70%	AAA	3.60%	40.00%	2.16%	6.59%	$4,815
30%	0.97	8.20%	A+	4.60%	40.00%	2.76%	6.57%	$4,834
40%	1.09	8.86%	A-	5.35%	40.00%	3.21%	6.60%	$4,808
50%	1.24	9.79%	B+	8.35%	40.00%	5.01%	7.40%	$4,271
60%	1.47	11.19%	B-	10.85%	40.00%	6.51%	8.38%	$3,757
70%	1.86	13.52%	CCC	12.35%	40.00%	7.41%	9.24%	$3,398
80%	2.70	18.53%	CC	14.35%	38.07%	8.89%	10.81%	$2,892
90%	5.39	34.70%	CC	14.35%	33.84%	9.49%	12.01%	$2,597

Optimal: Cost of capital lowest between 20 and 30%.

Debt ratio is percent of overall market value of firm that comes from debt financing.

At debt ratios > 80%, firm does not have enough operating income to cover interest expenses. Tax rate goes down to reflect lost tax benefits. ③

As cost of capital drops, firm value rises (as operating cash flows remain unchanged)

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III. 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?

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

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

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

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 cashflows (a distress sale value), DCF valuations will understate the value of the firm.

- Value of Equity= DCF value of equity (1 - Probability of distress) + Distress sale value of equity (Probability of distress)

- There are three ways in which we can estimate the probability of distress:
  - Use the bond rating to estimate the cumulative probability of distress over 10 years
  - Estimate the probability of distress with a probit
  - Estimate the probability of distress by looking at market value of bonds..

- The distress sale value of equity is usually best estimated as a percent of book value (and this value will be lower if the economy is doing badly and there are other firms in the same business also in distress).

	Current Revenue $ 4,390	Current Margin: 4.76%		Reinvestment: Capital expenditures include cost of new casinos and working capital					Stable Growth		

Current Revenue $ 4,390

Current Margin: 4.76%

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

Stable Growth

Stable Revenue Growth: 3%

Stable Operating Margin: 17%

Stable ROC=10% Reinvest 30% of EBIT(1-t)

EBIT $ 209m

Extended reinvestment break, due ot investment in past

Industry average

Expected Margin: -> 17%

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

Term. Year

	1	2	3	4	5	6	7	8	9	10	
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

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

|	1	2	3	4	5	6	7	8	9	10
Beta	3.14	3.14	3.14	3.14	3.14	2.75	2.36	1.97	1.59	1.20
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%

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Beta 3.14-> 1.20

+

X

Risk Premium 6%
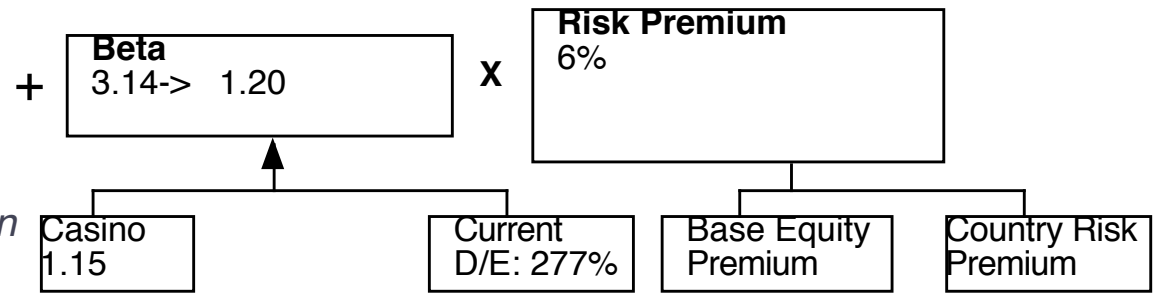
Las Vegas Sands Feburary 2009 Trading @ $4.25

Casino 1.15

Current D/E: 277%

Base Equity Premium

Country Risk Premium

Adjusting the value of LVS for distress..

- 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:

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

- Solving for the probability of bankruptcy, we get:
- $\pi_{Distress}$ = 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 = $8.12 (1 - .7666) + $0.00 (.7666) = $1.92

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The "sunny" side of distress: Equity as a call option to liquidate the firm

Net Payoff
on Equity

Face Value
of Debt
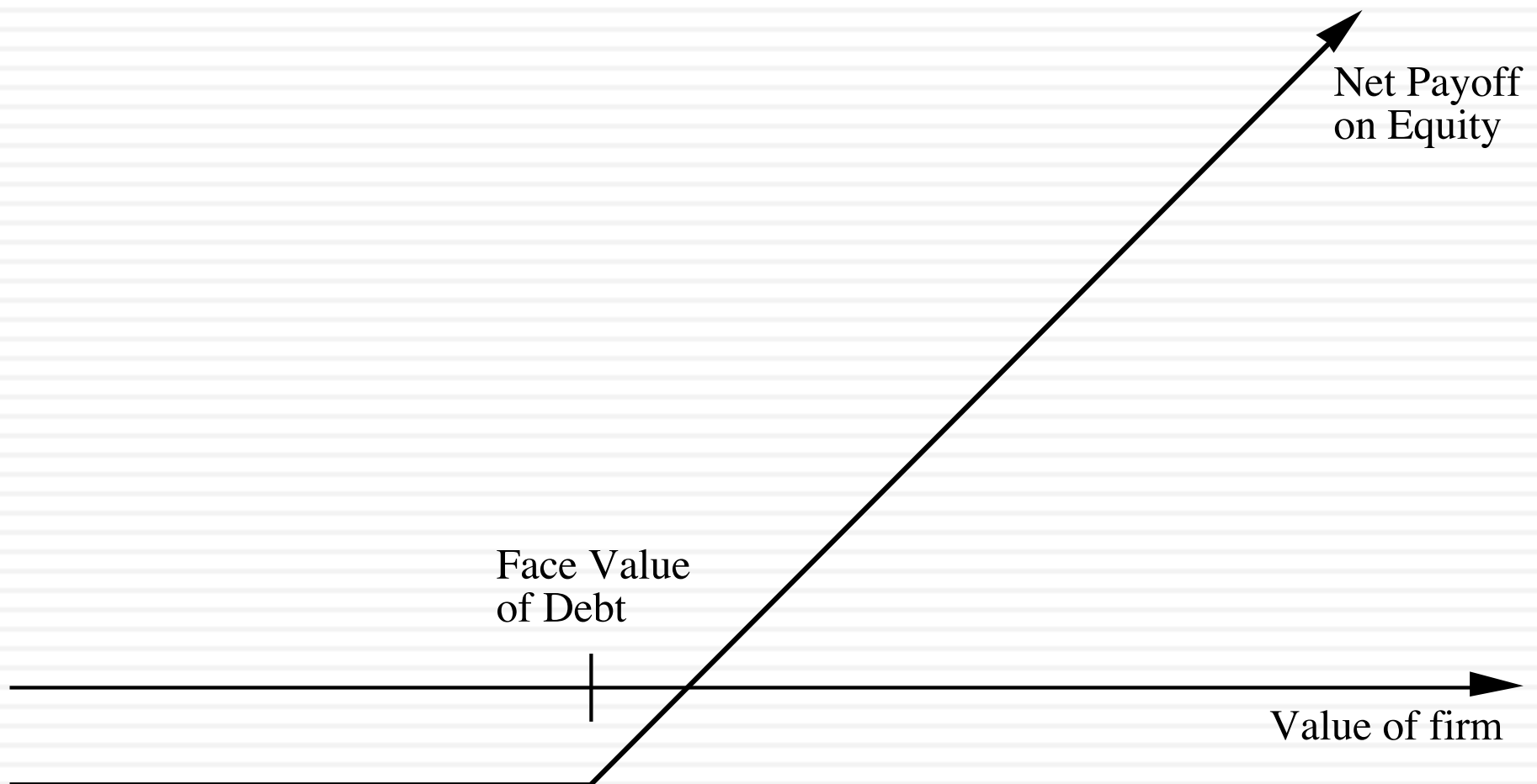
Value of firm

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..

Value of Equity as Firm Value Changes

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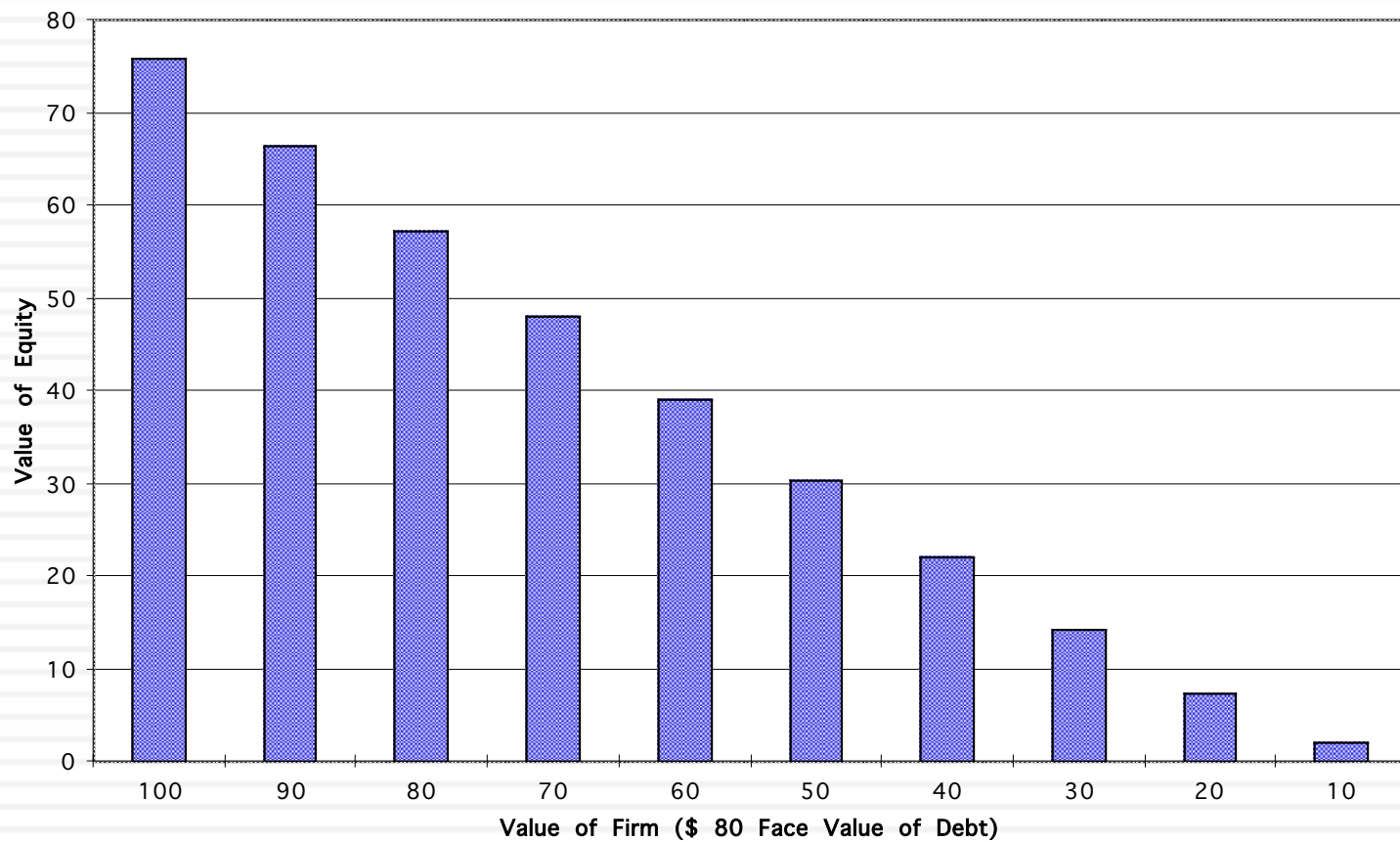
IV. Valuing Financial Service Companies

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?

Preferred stock is a significant source of capital.

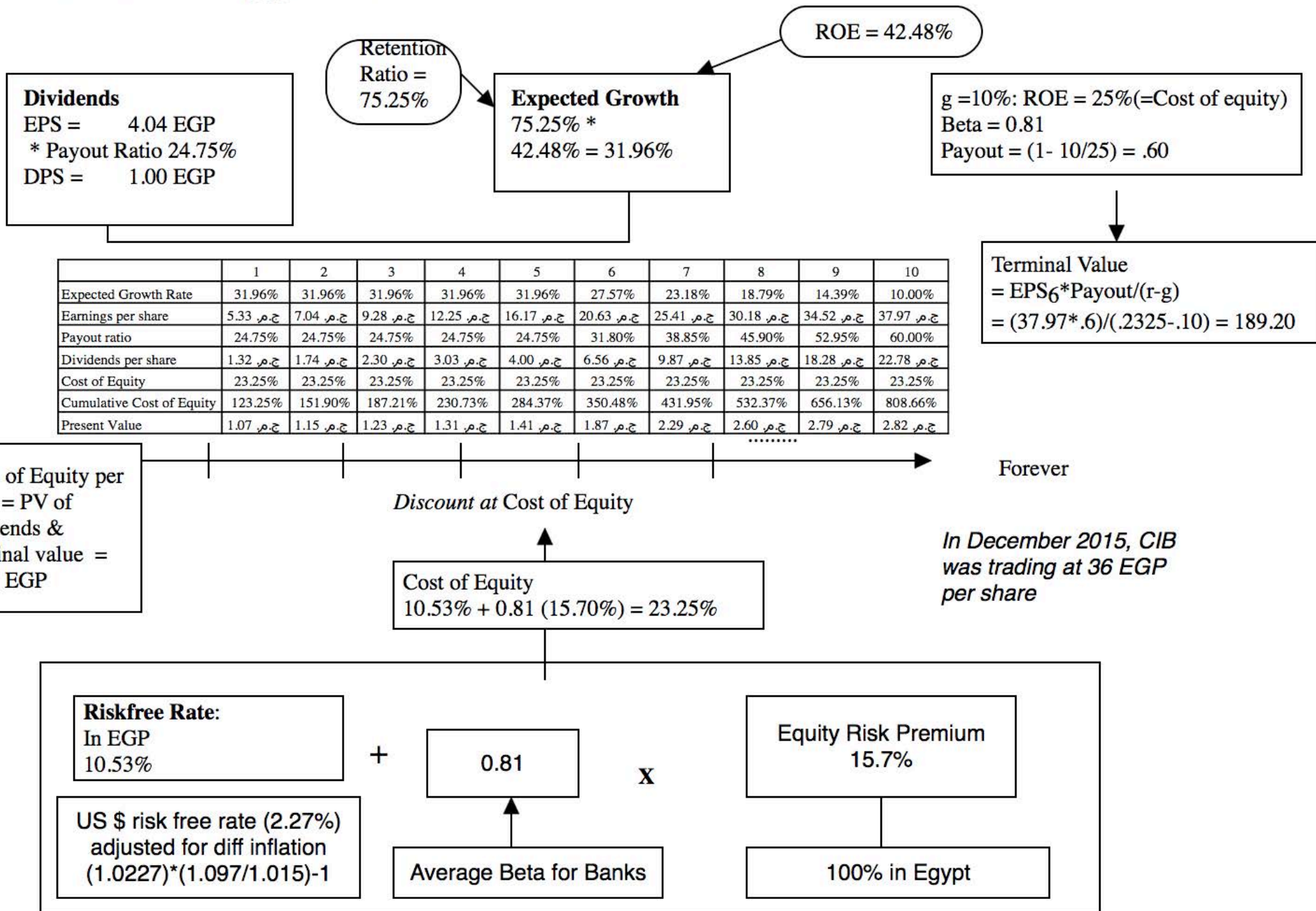How risky are the cash flows from both existing assets and growth assets?

What is the value of equity in the firm?

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

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

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114

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

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

	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

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%

+

0.81

X

Equity Risk Premium 15.7%

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

Average Beta for Banks

100% in Egypt

Lesson 1: Financial service companies are opaque…

- With financial service firms, we enter into a Faustian bargain. They tell us very little about the quality of their assets (loans, for a bank, for instance are not broken down by default risk status) but we accept that in return for assets being marked to market (by accountants who presumably have access to the information that we don't have).

- In addition, estimating cash flows for a financial service firm is difficult to do. So, we trust financial service firms to pay out their cash flows as dividends. Hence, the use of the dividend discount model.

Lesson 2: 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)

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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

	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										

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

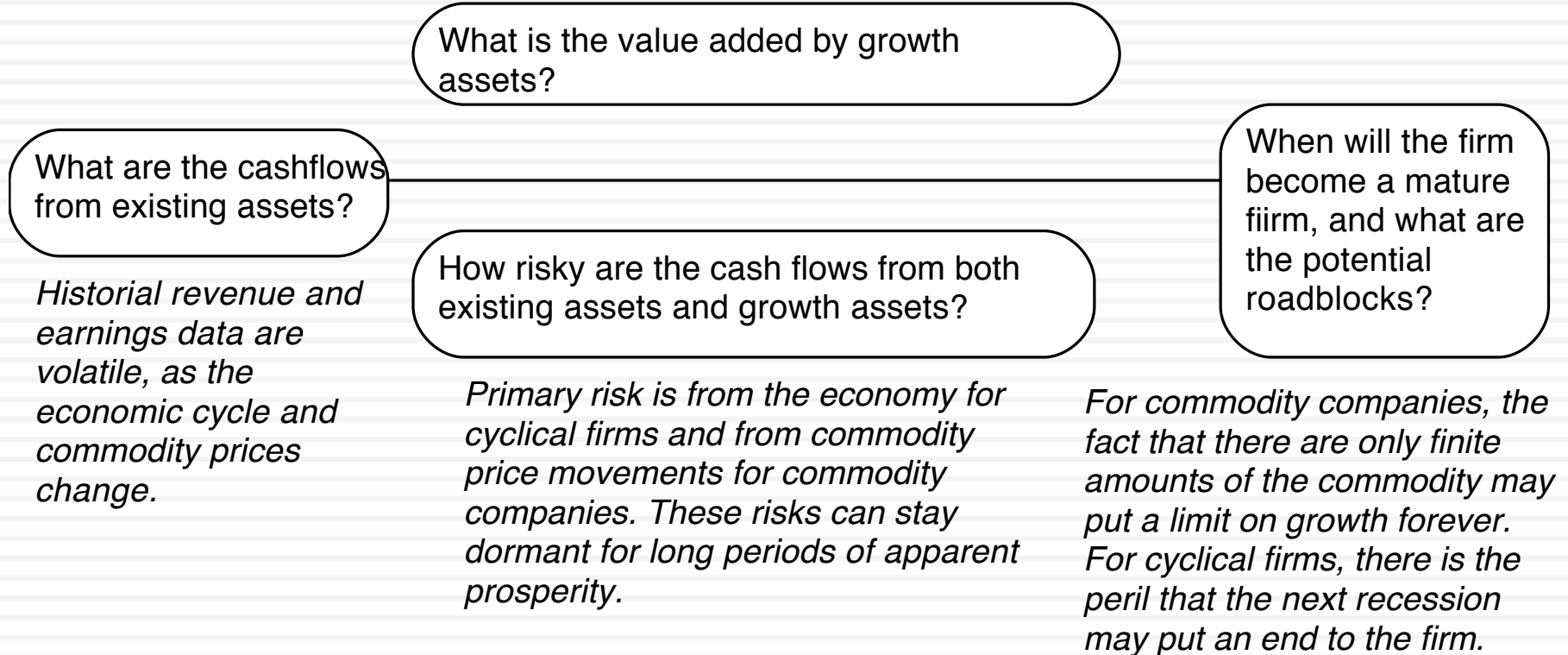Value per share adjusted for probability of catastrophic failure (bailout) resulting in complete loss of equity.

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

V. 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 is the value added by growth assets?

What are the cashflows from existing assets?

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

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.

Aswath Damodaran

Valuing a Cyclical Company - Toyota in Early 2009

Year	Revenues	Operating Income	EBITDA	Operating Margin
FY1 1992	¥10,163,380	¥218,511	¥218,511	2.15%
FY1 1993	¥10,210,750	¥181,897	¥181,897	1.78%
FY1 1994	¥9,362,732	¥136,226	¥136,226	1.45%
FY1 1995	¥8,120,975	¥255,719	¥255,719	3.15%
FY1 1996	¥10,718,740	¥348,069	¥348,069	3.25%
FY1 1997	¥12,243,830	¥665,110	¥665,110	5.43%
FY1 1998	¥11,678,400	¥779,800	¥1,382,950	6.68%
FY1 1999	¥12,749,010	¥774,947	¥1,415,997	6.08%
FY1 2000	¥12,879,560	¥775,982	¥1,430,982	6.02%
FY1 2001	¥13,424,420	¥870,131	¥1,542,631	6.48%
FY1 2002	¥15,106,300	¥1,123,475	¥1,822,975	7.44%
FY1 2003	¥16,054,290	¥1,363,680	¥2,101,780	8.49%
FY1 2004	¥17,294,760	¥1,666,894	¥2,454,994	9.64%
FY1 2005	¥18,551,530	¥1,672,187	¥2,447,987	9.01%
FY1 2006	¥21,036,910	¥1,878,342	¥2,769,742	8.93%
FY1 2007	¥23,948,090	¥2,238,683	¥3,185,683	9.35%
FY1 2008	¥26,289,240	¥2,270,375	¥3,312,775	8.64%
FY 2009 (Estim	¥22,661,325	¥267,904	¥1,310,304	1.18%
		¥1,306,867		7.33%

In early 2009, Toyota Motors had the highest market share in the sector. However, the global economic recession in 2008-09 had pulled earnings down.

Normalized Return on capital and Reinvestment (2)
Once earnings bounce back to normal, we assume that Toyota will be able to earn a return on capital equal to its cost of capital (5.09%). This is a sector, where earning excess returns has proved to be difficult even for the best of firms.
To sustain a 1.5% growth rate, the reinvestment rate has to be:
Reinvestment rate = 1.5%/5.09%
= 29.46%

Normalized Earnings (1)
As a cyclical company, Toyota's earnings have been volatile and 2009 earnings reflect the troubled global economy. We will assume that when economic growth returns, the operating margin for Toyota will revert back to the historical average.
Normalized Operating Income = Revenues in 2009 * Average Operating Margin (98--09)
= 22661 * .0733 =1660.7 billion yen

Operating Assets	19,640
+ Cash	2,288
+ Non-operating assets	6,845
- Debt	11,862
- Minority Interests	583
Value of Equity	
/ No of shares	/3,448
Value per share	¥4735

$$\text{Value of operating assets} = \frac{1660.7\,(1.015)\,(1-.407)\,(1-.2946)}{(.0509-.015)} = 19,640 \text{ billion}$$

Normalized Cost of capital (3)
The cost of capital is computed using the average beta of automobile companies (1.10), and Toyota's cost of debt (3.25%) and debt ratio (52.9% debt ratio. We use the Japanese marginal tax rate of 40.7% for computing both the after-tax cost of debt and the after-tax operating income
Cost of capital = 5.65% (.471) + 3.25% (1-.407) (.529) = 5.09%

Stable Growth (4)
Once earnings are normalized, we assume that Toyota, as the largest market-share company, will be able to maintain only stable growth (1.5% in Yen terms)

Aswath Damodaran

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

- With cyclical and commodity companies, it is undeniable that the value you arrive at will be affected by your views on the economy or the price of the commodity.

- Consequently, you will feel the urge to take a stand on these macro variables and build them into your valuation. Doing so, though, will create valuations that are jointly impacted by your views on macro variables and your views on the company, and it is difficult to separate the two.

- The best (though not easiest) thing to do is to separate your macro views from your micro views. Use current market based numbers for your valuation, but then provide a separate assessment of what you think about those market numbers.

Shell's Revenues & Oil Prices

Shell: Revenues vs Oil Price

Revenues = 39,992.77 + 4,039.39 * Average Oil Price   R squared = 96.44%
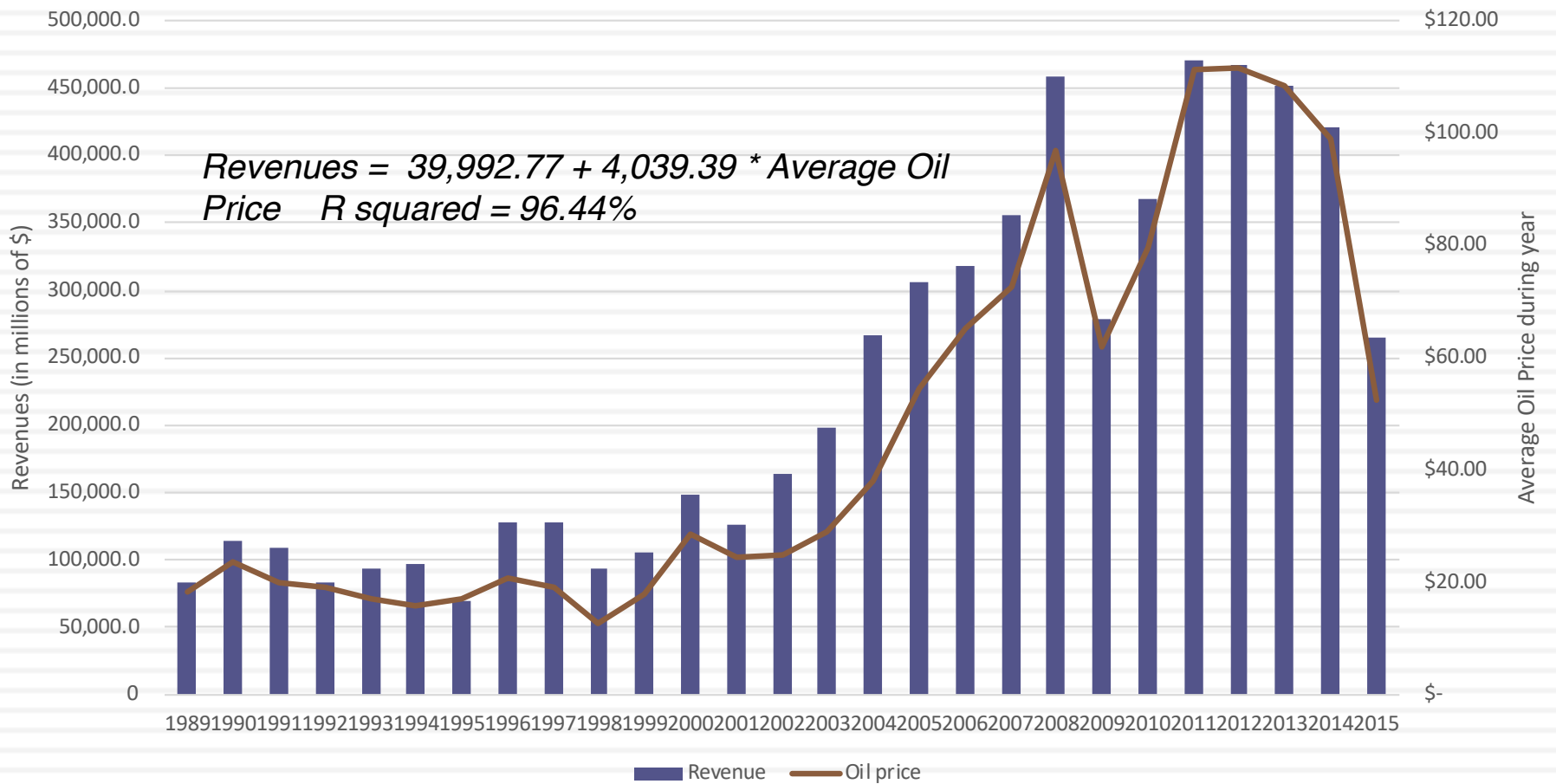
Shell: A "Oil Price" Neutral Valuation: March 2016

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)

Aswath Damodaran

Oil Price for steady state =

Not for Commercial Use
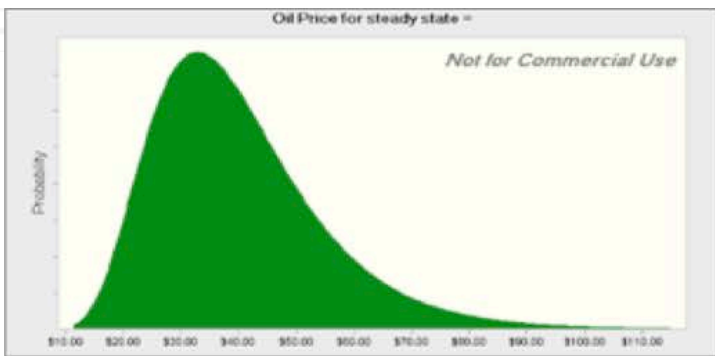
Revenue calculated from the oil price drawn from distribution
Revenue = 39992.77+4039.40*Oil Price/Barrel

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

Target Operating Margin

Not for Commercial Use

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

Value per share

Not for Commercial Use

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

125   *Aswath Damodaran*
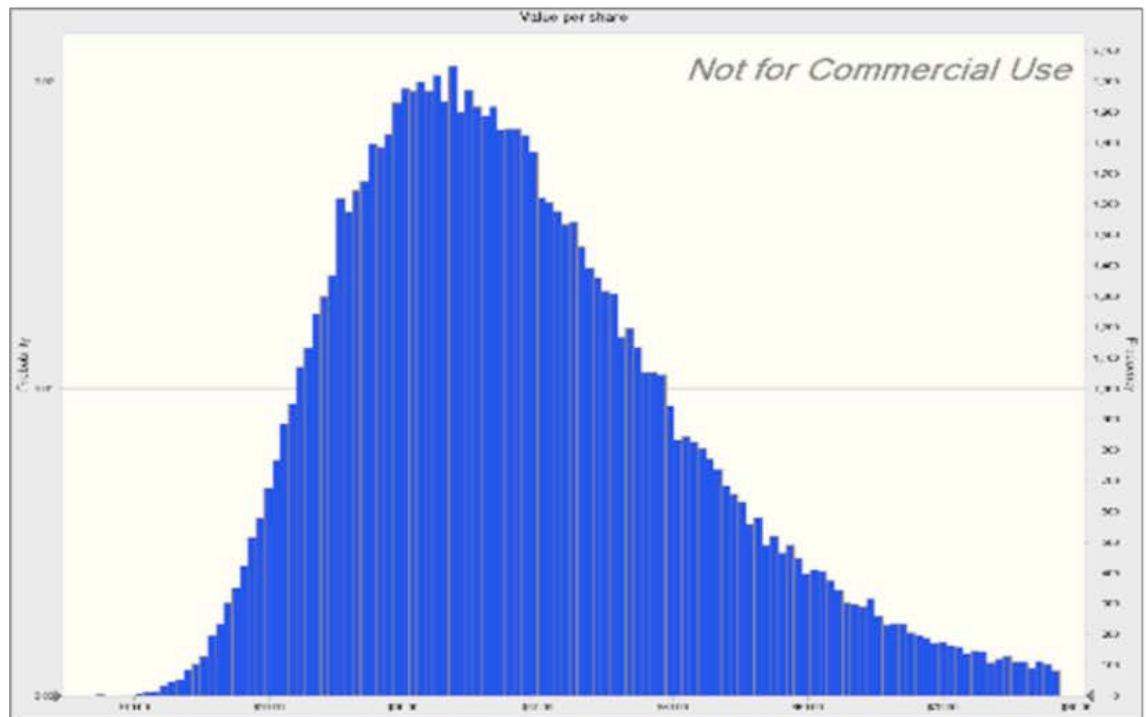
The optionality in commodities: Undeveloped reserves as an option

Net Payoff on Extraction

Cost of Developing Reserve

Value of estimated reserve of natural resource
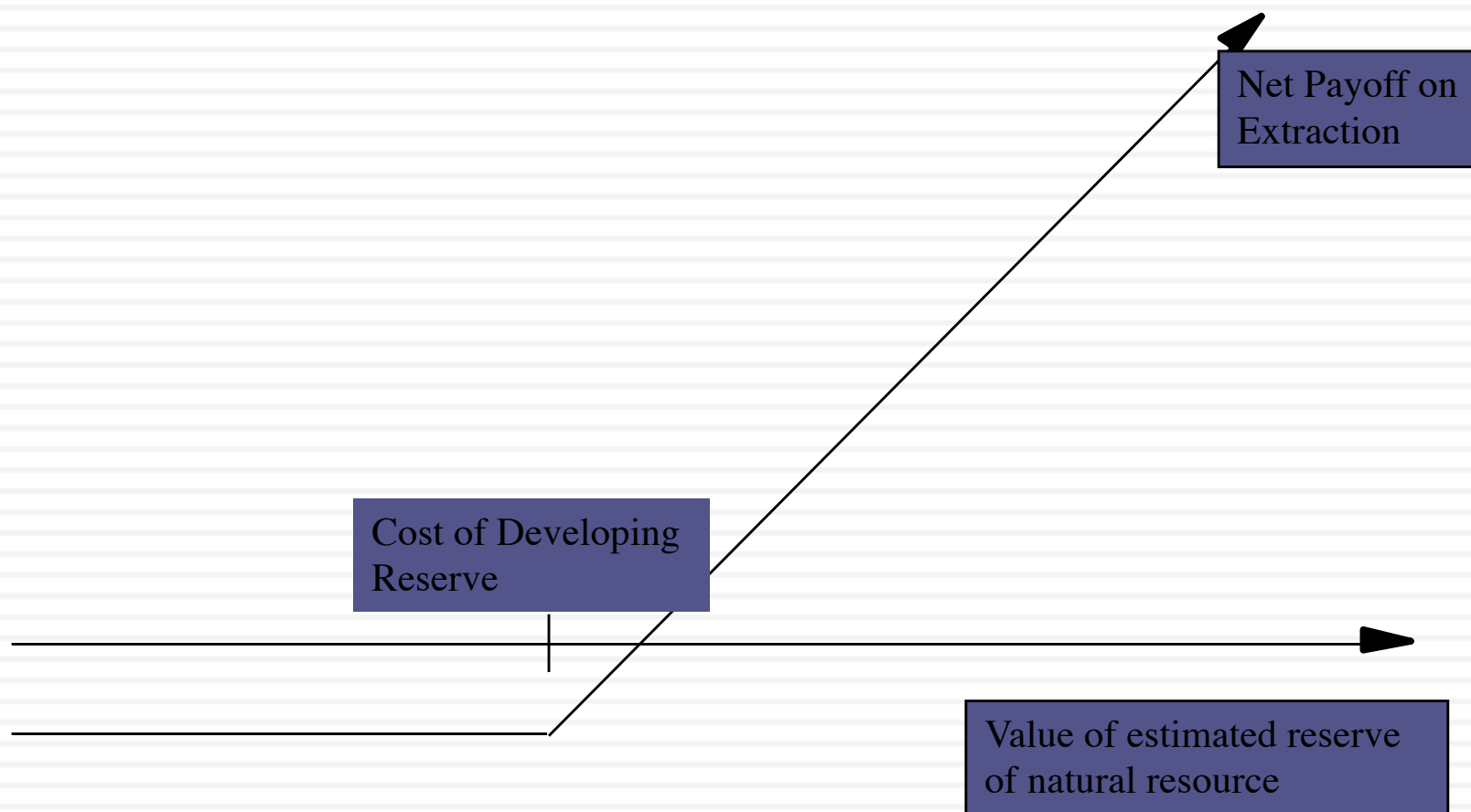
Valuing Gulf Oil

□ Gulf Oil was the target of a takeover in early 1984 at $70 per share (It had 165.30 million shares outstanding, and total debt of $9.9 billion).

◻ It had estimated reserves of 3038 million barrels of oil and the average cost of developing these reserves was estimated to be $10 a barrel in present value dollars (The development lag is approximately two years).

◻ The average relinquishment life of the reserves is 12 years.

◻ The price of oil was $22.38 per barrel, and the production cost, taxes and royalties were estimated at $7 per barrel.

◻ The bond rate at the time of the analysis was 9.00%.

◻ Gulf was expected to have net production revenues each year of approximately 5% of the value of the developed reserves. The variance in oil prices is 0.03.

Valuing Undeveloped Reserves

- Inputs for valuing undeveloped reserves
  - Value of underlying asset = Value of estimated reserves discounted back for period of development lag= 3038 * ($ 22.38 - $7) / 1.05^2 = $42,380.44
  - Exercise price = Estimated development cost of reserves = 3038 * $10 = $30,380 million
  - Time to expiration = Average length of relinquishment option = 12 years
  - Variance in value of asset = Variance in oil prices = 0.03
  - Riskless interest rate = 9%
  - Dividend yield = Net production revenue/ Value of developed reserves = 5%
- Based upon these inputs, the Black-Scholes model provides the following value for the call:
  - d1 = 1.6548   N(d1) = 0.9510
  - d2 = 1.0548   N(d2) = 0.8542
- Call Value= 42,380.44 $\exp^{(-0.05)(12)}$ (0.9510) -30,380 ($\exp^{(-0.09)(12)}$ (0.8542) = $ 13,306 million

The composite value…

- In addition, Gulf Oil had free cashflows to the firm from its oil and gas production of $915 million from already developed reserves and these cashflows are likely to continue for ten years (the remaining lifetime of developed reserves).

- The present value of these developed reserves, discounted at the weighted average cost of capital of 12.5%, yields:

  - Value of already developed reserves = $915 (1 - 1.125^{-10})/.125 = \$5065.83$

- Adding the value of the developed and undeveloped reserves

  - Value of undeveloped reserves   = $ 13,306 million
  - Value of production in place   = $ 5,066 million
  - Total value of firm   = $ 18,372 million
  - Less Outstanding Debt   = $ 9,900 million
  - Value of Equity   = $ 8,472 million
  - Value per share   = $ 8,472/165.3 = $51.25

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

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

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?
Equity: Risk in equity in the company
Firm: Risk in the firm's operations

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

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

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

Kristin's Kandy: Valuation in March 2006

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

Reinvestment Rate
46.67%

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

Return on Capital
13.64%

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

Terminal Value$_5$= 289/(.1254-.04) = 3,403

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

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

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

Cost of Equity 16.26%

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

Weights
E =70% D = 30%

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

+

Total Beta
2.94

1/3 of risk is market risk

Adjusted for ownrer non-diversification

X

Risk Premium
4.00%

Market Beta: 0.98

Aswath Damodaran

Unlevered Beta for Sectors: 0.78

Firm's D/E Ratio: 30/70

Mature risk premium 4%

Country Risk Premium 0%

Lesson 1: In private businesses, risk in the eyes of the "beholder" (buyer)

Private business owner with entire wealth invested in the business	Venture capitalist, with multiple holdings in the sector.	Public company investor with diversified portfolio
Exposed to all risk in the company. Total beta measures exposure to total risk. Total Beta = Market Beta/ Correlation of firm with market	Partially diversified. Diversify away some firm specific risk but not all. Beta will fall berbetween total and market beta.	Firm-specific risk is diversified away. Market or macro risk exposure captured in a market beta or betas.

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

**Total Beta measures all risk
= Market Beta/ (Portion of the
total risk that is market risk)**

Is exposed
to all the risk
in the firm

Private owner of business
with 100% of your weatlth
invested in the business

Demands a
cost of equity
that reflects this
risk

80 units
of firm
specific
risk

**Market Beta measures just
market risk**

Eliminates firm-
specific risk in
portfolio

20 units
of market
risk

Publicly traded company
with investors who are diversified

Demands a
cost of equity
that reflects only
market risk

Aswath Damodaran

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.

Aswath Damodaran

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.

And it is not just in private businesses..

☐ Severstal is closely held and is traded on the London stock exchange. Will the possibility of illiquidity affect your valuation of Severstal?

a. Yes

b. No

Will your answer be different if Severstal were traded on the MICEX?

a. Yes

b. No

NARRATIVE AND NUMBERS: VALUATION AS A BRIDGE

Valuation as a bridge

Number Crunchers   *Story Tellers*

Favored Tools
- Accounting statements
- Excel spreadsheets
- Statistical Measures
- Pricing Data

Favored Tools
- Anecdotes
- Experience (own or others)
- Behavioral evidence

A Good Valuation

The Numbers People ⟷ The Narrative People

Illusions/Delusions
1. Precision: Data is precise
2. Objectivity: Data has no bias
3. Control: Data can control reality

Illusions/Delusions
1. Creativity cannot be quantified
2. If the story is good, the investment will be.
3. Experience is the best teacher

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

The Auto Business

Low Growth

Year	Revenues ($)	% Growth Rate
2005	1,274,716.60	
2006	1,421,804.20	11.54%
2007	1,854,576.40	30.44%
2008	1,818,533.00	-1.94%
2009	1,572,890.10	-13.51%
2010	1,816,269.40	15.47%
2011	1,962,630.40	8.06%
2012	2,110,572.20	7.54%
2013	2,158,603.00	2.28%
2014	2,086,124.80	-3.36%
ounded Average =		5.63%

+

Low Margins

The Automobile Business: Pre-tax Operating Margins in 2015
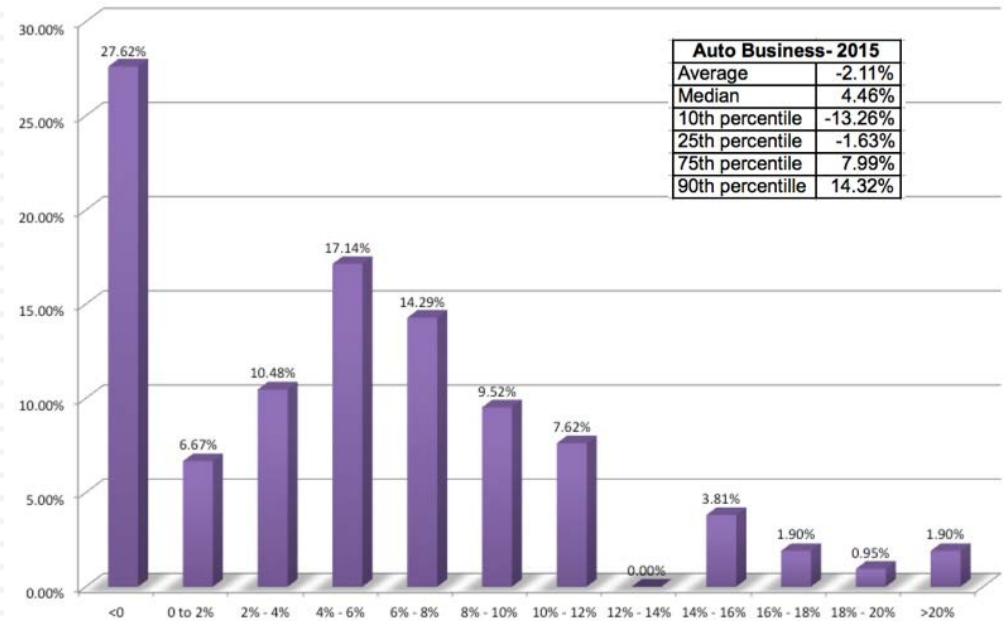
Auto Business- 2015	
Average	-2.11%
Median	4.46%
10th percentile	-13.26%
25th percentile	-1.63%
75th percentile	7.99%
90th percentille	14.32%

Bar chart values: <0: 27.62%, 0 to 2%: 6.67%, 2%-4%: 10.48%, 4%-6%: 17.14%, 6%-8%: 14.29%, 8%-10%: 9.52%, 10%-12%: 7.62%, 12%-14%: 0.00%, 14%-16%: 3.81%, 16%-18%: 1.90%, 18%-20%: 0.95%, >20%: 1.90%

High & Increasing Reinvestment

The Reinvestment Burden: Investment as % of Sales for Auto Business

In 2014, the auto business reinvested about 4.65% of sales back into the business, either in the form of additional plant and equipment (net capital expenditures) or

R&D/Sales values: 2005: 1.53%, 2006: 1.56%, 2007: 1.44%, 2008: 1.40%, 2009: 1.25%, 2010: 1.18%, 2011: 1.11%, 2012: 1.16%, 2013: 1.14%, 2014: 1.12%

(Cap Ex- Depr)/Sales values: 2006: 2.72%, 2005: 2.10%, 2007: 2.12%, 2008: 2.50%, 2009: 2.16%, 2010: 1.20%, 2011: 2.12%, 2012: 2.90%, 2013: 3.21%, 2014: 3.53%

=

Bad Business

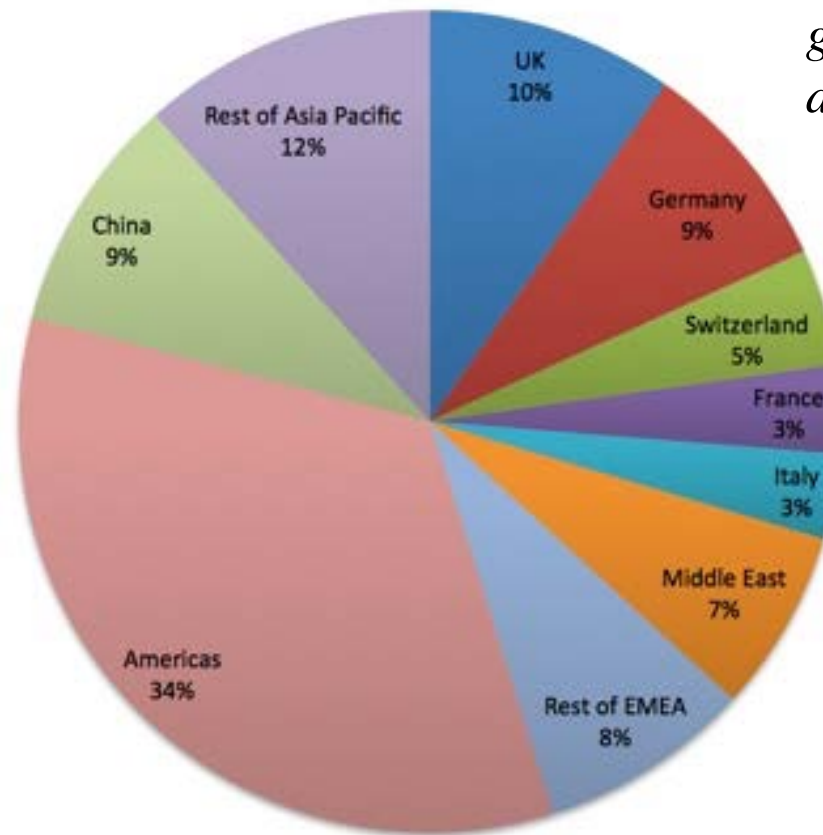|	ROIC	Cost of capital	ROiC - Cost of capital
2004	6.82%	7.93%	-1.11%
2005	10.47%	7.02%	3.45%
2006	4.60%	7.97%	-3.37%
2007	7.62%	8.50%	-0.88%
2008	3.48%	8.03%	-4.55%
2009	-4.97%	8.58%	-13.55%
2010	5.16%	8.03%	-2.87%
2011	7.55%	8.15%	-0.60%
2012	7.80%	8.55%	-0.75%
2013	7.83%	8.47%	-0.64%
2014	6.47%	7.53%	-1.06%

Only once in the last 10 years have auto companies collectively earned more than their cost of capital

What makes Ferrari different?

Ferrari sold only 7,255 cars in all of 2014

Ferrari sales (in units) have grown very little in the last decade & have been stable

Ferrari: Geographical Sales (2014)

UK 10%

Germany 9%

Switzerland 5%

France 3%

Italy 3%

Middle East 7%

Rest of EMEA 8%

Americas 34%

China 9%

Rest of Asia Pacific 12%

Ferrari had a profit margin of 18.2%, in the 95th percentile, partly because of its high prices and partly because it spends little on advertising.

Ferrari has not invested in new plants.

143

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. <u>An urban car service business</u>: I saw Uber primarily as a force in urban areas and only in the car service business.

2. Which <u>would expand the business moderately</u> (about 40% over ten years) by bringing in new users.

3. <u>With local networking benefits</u>: 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 <u>competitive advantages</u> (from being a first mover).

5. And <u>its existing low-capital business model</u>, with drivers as contractors and very little investment in infrastructure.

The Ferrari Narrative

- Ferrari will stay an exclusive auto club, deriving its allure from its scarcity and the fact that only a few own Ferraris.

- By staying exclusive, the company gets three benefits:

  - It can continue to charge nose bleed prices for its cars and sell them with little or no advertising.

  - It does not need to invest in new assembly plants, since it does not plan to ramp up production.

  - It sells only to the super rich, who are unaffected by overall economic conditions or market crises.

Probability of occurrence

Cannot assess | Low | Increasing

"IT" IS POSSIBLE
This could happen, but you are not sure what "this" is, when it will happen and what it will look like when it does.

Gauge market potential & test products

"IT" IS PLAUSIBLE
This is something that you can make a reasoned argument could happen, though you have no tangible evidence for it happening (yet).

Product success & Financial results

IT IS PROBABLE
This is something that you expect to happen, with some basis or evidence for that expectation. There can be substantial uncertainty in your expectations.

VALUATION RESPONSE
Value as an option, with the value increasing with the size of the possible market and the exclusivity of your firm's access to that market.

VALUATION RESPONSE
Show as expected growth, adjusting for risk in your expected return. Value will increase with size of the market and your firm's competitive advantages.

VALUATION RESPONSE
Show in base year numbers and expected cash flows, adjusting for risk in your expected return.

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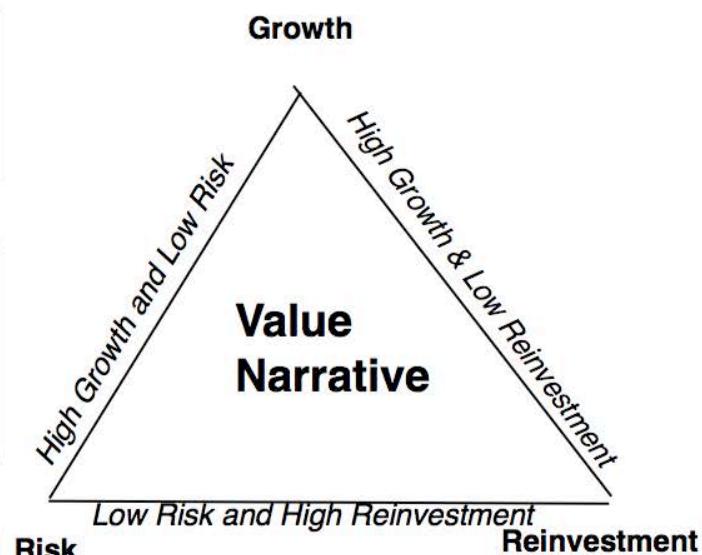
Profits without competition
Assuming that your company will grow and earn higher profits, with no competition.

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

The Improbable

Growth

High Growth and Low Risk

High Growth & Low Reinvestment

Value Narrative

Low Risk and High Reinvestment

Risk

Reinvestment

Aswath Damodaran

Uber: Possible, Plausible and Probable

Uber (My narrative))

Possible
Car ownership market
Option value

Plausible
Suburban car service & rental market
Higher growth rate

Probable
Urban taxi market
In Total Market size, Revenues & Earnings
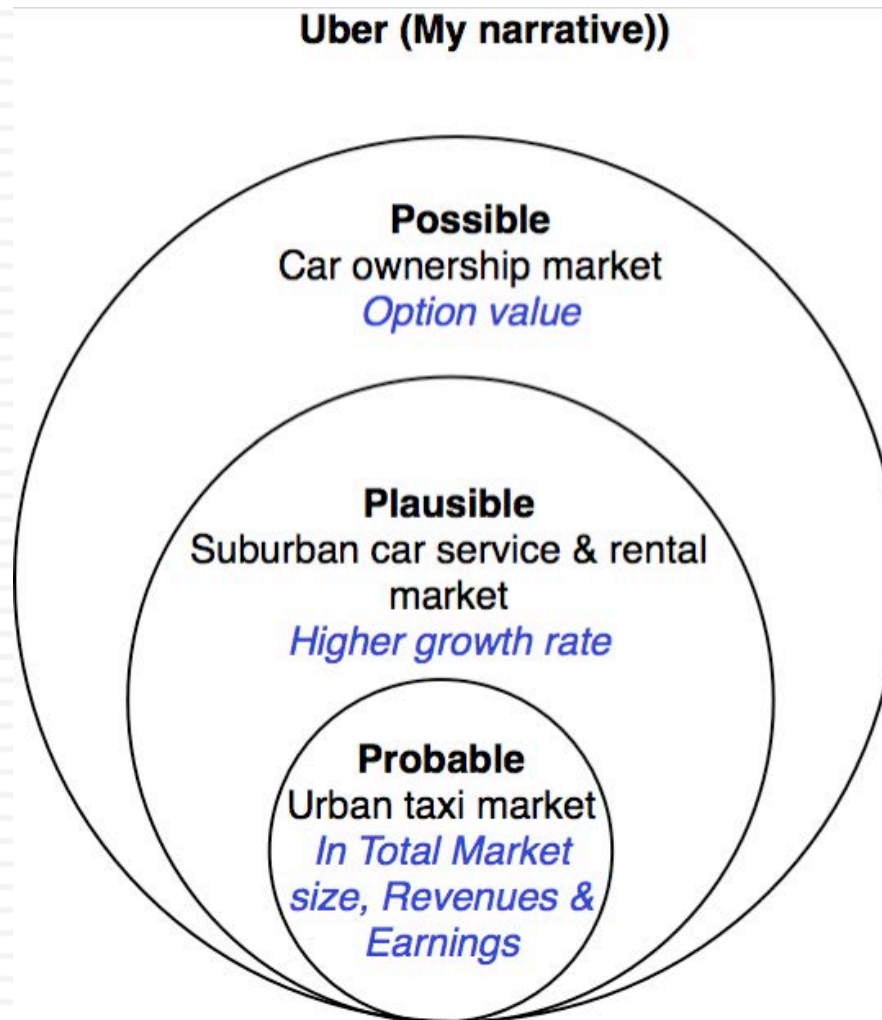
The Story

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

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

Theranos valued at $9 billion

125 COMPANIES

$1 billion $10 billion $40 billion

Valuations as of **October 2015**

Select companies from the chart or table for more detail.
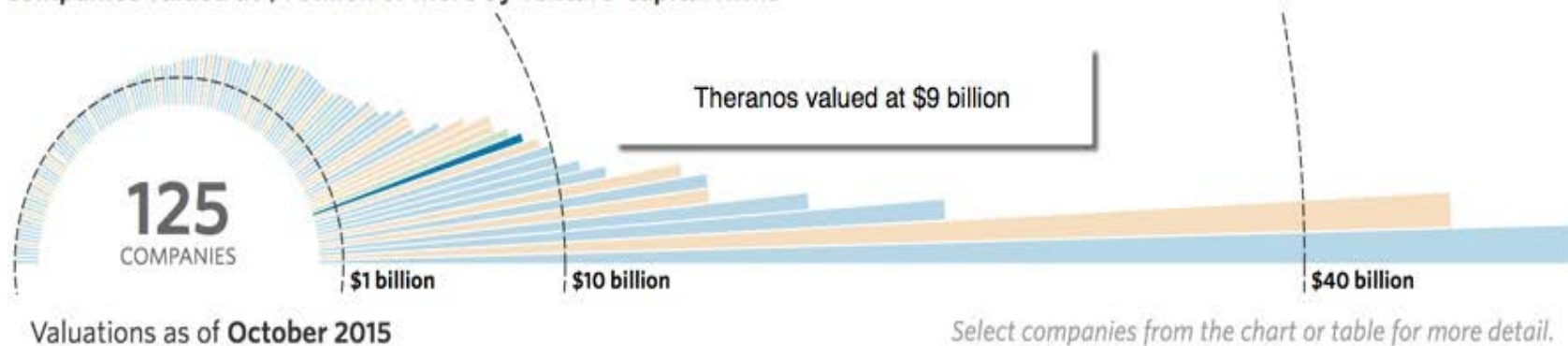
Tesla: Summary 15-year DCF Analysis (DCF valuation as of mid-year 2013)

	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Unit Volume	24,298	36,883	64,684	86,713	149,869	214,841	291,861	384,747	466,559	550,398	643,850	726,655	820,645	922,481	1,034,215	1,137,780
% Growth		52%	75%	34%	73%	43%	36%	32%	21%	18%	17%	13%	13%	12%	12%	10%
Automotive Revenue Per Unit ($)	93,403	85,342	83,432	78,932	65,465	58,258	56,407	55,553	55,991	56,586	56,969	57,540	58,138	58,603	59,002	59,554
% Growth		-9%	-2%	-5%	-17%	-11%	-3%	-2%	1%	1%	1%	1%	1%	1%	1%	1%
Automotive Sales	2,462	3,321	5,613	7,051	10,025	12,720	16,685	21,595	26,347	31,357	36,897	42,022	47,949	54,283	61,221	67,980
Development Service Sales	16	40	42	44	46	49	51	54	56	59	62	65	68	72	75	79
Total Sales	2,478	3,361	5,655	7,095	10,072	12,768	16,736	21,648	26,403	31,416	36,959	42,087	48,017	54,355	61,296	68,059
% Growth		36%	68%	25%	42%	27%	31%	29%	22%	19%	18%	14%	14%	13%	13%	11%
EBITDA	148	417	920	1,042	1,586	2,150	3,138	4,066	4,857	5,723	6,328	7,182	8,144	9,688	10,874	12,099
% Margin	6.0%	12.4%	16.3%	14.7%	15.7%	16.8%	18.7%	18.8%	18.4%	18.2%	17.1%	17.1%	17.0%	17.8%	17.7%	17.8%
D&A	103	158	172	203	301	353	389	537	606	696	811	938	1,088	1,260	1,451	1,661
% of Capex	41%	79%	55%	65%	62%	69%	78%	86%	79%	77%	75%	76%	76%	76%	76%	77%
EBIT	45	259	748	839	1,285	1,796	2,749	3,529	4,252	5,027	5,517	6,244	7,056	8,429	9,423	10,439
% Margin	1.8%	7.7%	13.2%	11.8%	12.8%	14.1%	16.4%	16.3%	16.1%	16.0%	14.9%	14.8%	14.7%	15.5%	15.4%	15.3%
Net Interest Income (Expense)	(27)	(1)	9	33	47	90	108	155	199	278	358	445	542	651	784	934
Other Income	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pretax Income	46	258	758	872	1,332	1,886	2,857	3,684	4,451	5,305	5,875	6,688	7,598	9,080	10,207	11,373
Income Taxes	3	2	14	34	86	262	462	641	807	1,003	1,134	1,317	1,470	1,761	2,028	2,323
% Effective Rate	6%	1%	2%	4%	6%	14%	16%	17%	18%	19%	19%	20%	19%	19%	20%	20%
Net Income	44	256	744	839	1,246	1,624	2,395	3,043	3,644	4,303	4,741	5,372	6,128	7,319	8,179	9,050
Plus																
After-tax Interest Expense (Income)	27	1	(9)	(33)	(47)	(90)	(108)	(154)	(199)	(278)	(357)	(444)	(541)	(650)	(782)	(932)
Depreciation of PP&E	103	158	172	203	301	353	389	537	606	696	811	938	1,088	1,260	1,451	1,661
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Less																
Change in Working Capital	(155)	(14)	(157)	(167)	(172)	(325)	(163)	(81)	(28)	(299)	(356)	(328)	(219)	(329)	(365)	(376)
% of Change in Sales		-2%	-7%	-12%	-6%	-12%	-4%	-2%	-1%	-6%	-6%	-6%	-4%	-5%	-5%	-6%
Capital Expenditures	250	200	312	312	486	510	497	623	765	906	1,078	1,236	1,437	1,660	1,898	2,149
% of Sales	10%	6%	6%	4%	5%	4%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Unlevered Free Cash Flow	78	229	750	863	1,186	1,702	2,343	2,884	3,314	4,113	4,472	4,959	5,456	6,597	7,315	8,005

EBITDA	12,099
Sales	68,059
Net Debt (Cash)	(260)
Tesla Diluted Shares	142

Exit EBITDA High	12.0 x	Exit PPG High	5.0%	Exit P/Sales High	180%
Exit EBITDA Low	8.0 x	Exit PPG Low	3.0%	Exit P/Sales Low	130%

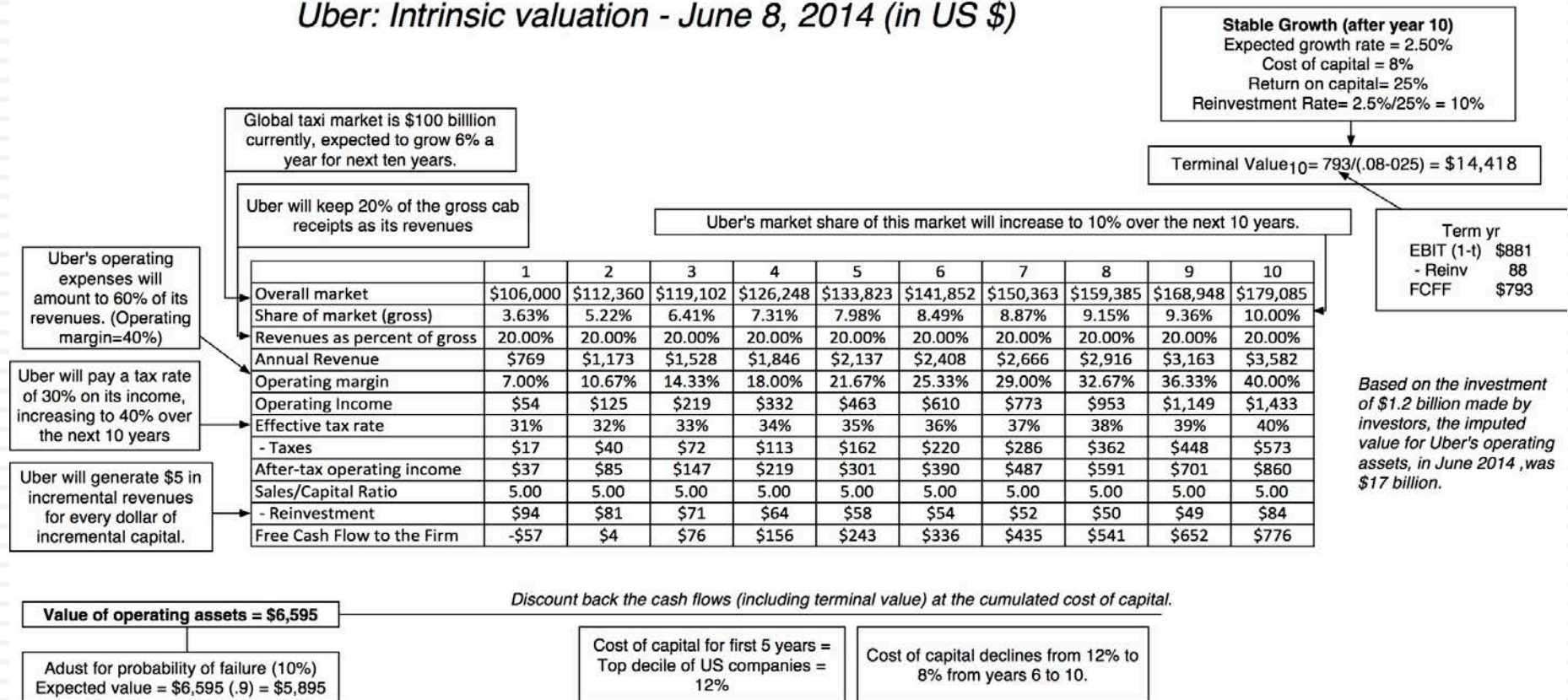|			
Discount Rate High	13.0%	FY Month of Valuation	1.0 (Beginning of this Month)
Discount Rage Low	9.0%	Month of FY End	12.0 (End of this Month)

Step 3: Connect your narrative to key drivers of value

The Uber narrative (June 2014)

Total Market	Uber is an **urban car service company**, competing against taxis & limos in urban areas, but it may expand demand for car service. **The global taxi/limo business is $100 billion in 2013, growing at 6% a year.**
X	
Market Share	Uber will have competitive advantages against traditional car companies & against newcomers in this business, but no global networking benefits. ***Target market share is 10%***
=	
Revenues (Sales)	
-	
Operating Expenses	Uber will maintain its current model of keeping 20% of car service payments, even in the face of competition, because of its first mover advantages. It will maintain its current low-infrastructure cost model, allowing it to earn high margins. **Target pre-tax operating margin is 40%.**
=	
Operating Income	
-	
Taxes	
=	
After-tax Operating Income	Uber has a low capital intensity model, since it does not own cars or other infrastructure, allowing it to maintain a high **sales to capital ratio for the sector (5.00)**
-	
Reinvestment	
=	
After-tax Cash Flow	The company is young and still trying to establish a business model, leading to a **high cost of capital (12%)** up front. As it grows, it will become safer and its cost of capital will drop to 8%.
Adjust for time value & risk	
Adjusted for operating risk with a discount rate and for failure with a probability of failure.	
	VALUE OF OPERATING ASSETS
	Cash — Uber has cash & capital, but there is a chance of failure. **10% probability of failure.**

Ferrari: From story to numbers

Valuation Input	The Story	Valuation Inputs
Revenues	*Keep it scarce*	Revenue growth of 4% (in Euro terms) a year for next 5 years, scaling down to 0.7% in year 10. Translates into an increase in production of about 25% in next 10 years
Operating Margin & Taxes		
Operating Income	*And pricey*	Ferrari's pre-tax operating margin stays at 18.2%, in the 95th percentile of auto business.
Reinvestment	*Little need for capacity expansion*	Sales/Invested Capital stays at 1.42, i.e. every euro invested generates 1.42 euros in sales
Cash Flow		
Discount Rate (Risk)	*Super-rich clients are recession-proof*	Cost of capital of 6.96% in Euros and no chance of default.

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

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.

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

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.

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

Value of operating assets = $6,595

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

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.

Aswath Damodaran

Ferrari: The "Exclusive Club" Value

	Base year	1	2	3	4	5	6	7	8	9	10	Terminal year
Stay Super Exclusive: Revenue growth is low												
Revenue growth rate		4.00%	4.00%	4.00%	4.00%	4.00%	3.34%	2.68%	2.02%	1.36%	0.70%	0.70%
Revenues	€ 2,763	€ 2,874	€ 2,988	€ 3,108	€ 3,232	€ 3,362	€ 3,474	€ 3,567	€ 3,639	€ 3,689	€ 3,714	€ 3,740
EBIT (Operating) margin	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%	18.20%
EBIT (Operating income)	€ 503	€ 523	€ 544	€ 566	€ 588	€ 612	€ 632	€ 649	€ 662	€ 671	€ 676	€ 681
Tax rate	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%
EBIT(1-t)	€ 334	€ 348	€ 361	€ 376	€ 391	€ 407	€ 420	€ 431	€ 440	€ 446	€ 449	€ 452
- Reinvestment		€ 78	€ 81	€ 84	€ 87	€ 91	€ 79	€ 66	€ 51	€ 35	€ 18	€ 22
FCFF		€ 270	€ 281	€ 292	€ 303	€ 316	€ 341	€ 366	€ 389	€ 411	€ 431	€ 431
Cost of capital		6.96%	6.96%	6.96%	6.96%	6.96%	6.96%	6.97%	6.98%	6.99%	7.00%	7.00%
PV(FCFF)		€ 252	€ 245	€ 238	€ 232	€ 225	€ 228	€ 228	€ 227	€ 224	€ 220	

Terminal value	€ 6,835
PV(Terminal value)	€ 3,485
PV (CF over next 10 years)	€ 2,321
Value of operating assets =	€ 5,806
- Debt	€ 623
- Minority interests	€ 13
+ Cash	€ 1,141
Value of equity	€ 6,311

High Prices + No selling cost = Preserve current operating margin

Minimal Reinvestment due to low growth

The super rich are not sensitive to economic downturns

155

Step 5: Keep the feedback loop

1. <u>Not just car service company.</u>: 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. <u>Not just urban</u>: Uber can create new demands for car service in parts of the country where taxis are not used (suburbia, small towns).

3. <u>Global networking benefits</u>: By linking with technology and credit card companies, Uber can have global networking benefits.

Aswath Damodaran

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)

Different narratives, Different Numbers

Total Market	Growth Effect	Network Effect	Competitive Advantages	Value of Uber
A4. Mobility Services	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	$90,457
A3. Logistics	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	$65,158
A4. Mobility Services	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	$52,346
A2. All car service	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	$47,764
A1. Urban car service	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	$31,952
A3. Logistics	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	$14,321
A1. Urban car service	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	$7,127
A2. All car service	B3. Increase market by 50%	C3. Strong local network effects	D3. Semi-strong	$4,764
A4. Mobility Services	B1. None	C1. No network effects	D1. None	$1,888
A3. Logistics	B1. None	C1. No network effects	D1. None	$1,417
A2. All car service	B1. None	C1. No network effects	D1. None	$1,094
A1. Urban car service	B1. None	C1. No network effects	D1. None	$799

The Ferrari Counter Narrative

Ferrari: The Rev-it-up Option

Valuation Input	The Story	Valuation Inputs
Revenues	Sales Push	Revenue growth of 12% (in Euro terms) a year for next 5 years, scaling down to 0.7% in year 10. Translates into an increase in production of about 100% in next 10 years
Operating Margin & Taxes		
Operating Income	With lower priced models & selling costs	Ferrari's pre-tax operating margin drops to 14.32%, in the 90th percentile of auto business.
Reinvestment	With investments in additional capacity	Sales/Invested Capital stays at 1.42, but higher sales create more reinvestment
Cash Flow		
Discount Rate (Risk)	Very rich are more sensitive to economic conditions	Cost of capital of 8% in Euros and no chance of default
Value		

Ferrari: The "Rev-it-up" Alternative

	Base year	1	2	3	4	5	6	7	8	9	10	Terminal year
		Get less exclusive: Double number of cars sold over next decade											
Revenue growth rate		12.00%	12.00%	12.00%	12.00%	12.00%	9.74%	7.48%	5.22%	2.96%	0.70%	0.70%
Revenues	€ 2,763	€ 3,095	€ 3,466	€ 3,882	€ 4,348	€ 4,869	€ 5,344	€ 5,743	€ 6,043	€ 6,222	€ 6,266	€ 6,309
EBIT (Operating) margin	18.20%	17.81%	17.42%	17.04%	16.65%	16.26%	15.87%	15.48%	15.10%	14.71%	14.32%	14.32%
EBIT (Operating income)	€ 503	€ 551	€ 604	€ 661	€ 724	€ 792	€ 848	€ 889	€ 912	€ 915	€ 897	€ 904
Tax rate	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%	33.54%
EBIT(1-t)	€ 334	€ 366	€ 401	€ 439	€ 481	€ 526	€ 564	€ 591	€ 606	€ 608	€ 596	€ 600
- Reinvestment		€ 233	€ 261	€ 293	€ 328	€ 367	€ 334	€ 281	€ 211	€ 126	€ 31	€ 35
FCFF		€ 133	€ 140	€ 147	€ 153	€ 159	€ 230	€ 310	€ 395	€ 482	€ 566	€ 565
Cost of capital		8.00%	8.00%	8.00%	8.00%	8.00%	7.90%	7.80%	7.70%	7.60%	7.50%	7.50%
PV(FCFF)		€ 123	€ 120	€ 117	€ 113	€ 108	€ 145	€ 181	€ 215	€ 244	€ 266	

Terminal value	€ 8,315
PV(Terminal value)	€ 3,906
PV (CF over next 10 years)	€ 1,631
Value of operating assets =	€ 5,537
- Debt	€ 623
- Minority interests	€ 13
+ Cash	€ 1,141
Value of equity	€ 6,042

Lower Prices + Some selling cost = Lower operating margin

Reinvestment reflects higher sales

The very rich are more sensitive to economic conditions

And the world is full of feedback.. My Ferrari afterthought!

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.
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

Aswath Damodaran

My Severstal Story

Aswath

				Severstal				
				The Reality-based Steel Company				
Severstal is a company in a bad business (shrinking revenues, margin pressures) that has worked at divesting the portions of its business that have the lowest margins (North America), reducing its debt load and focusing on its high margin domestic business. The company will continue to emphasize high margins over growth and while country and commodity price risk lurk, it will be able to weather the storms with its domestic profits.								
				The Assumptions				
	Base year	Years 1-5	Years 6-10			After year 10	Link to story	
Revenues (a)	$ 5,916	3.00%	2.50%			2.50%	Return to low growth after consolidation	
Operating margin (b)	25.81%	25.81%	19.13%			19.13%	Current margins are at all-time high. Will drop to peak 2004-11 margins with Russian operations	
Tax rate	17.20%	17.20%	20.00%			20.00%	Russian tax rate	
Reinvestment (c)		Sales to capital ratio = 1.20			RIR =	29.41%	Low growth reduces reinvestment needs	
Return on capital	32.58%	Marginal ROIC =	-1.76%			8.50%	Earn cost of capital in stable growth	
Cost of capital (d)		9.32%	8.50%			8.50%	Cost of capital higher due to country risk	
				The Cash Flows				
	Revenues	Operating Margin	EBIT		EBIT (1-t)	Reinvestment	FCFF	
1	$ 6,093	25.14%	$ 1,532		$ 1,269	$ 148	$	1,121
2	$ 6,276	24.48%	$ 1,536		$ 1,272	$ 152	$	1,120
3	$ 6,465	23.81%	$ 1,539		$ 1,274	$ 157	$	1,117
4	$ 6,659	23.14%	$ 1,541		$ 1,276	$ 162	$	1,114
5	$ 6,858	22.47%	$ 1,541		$ 1,276	$ 166	$	1,110
6	$ 7,057	21.80%	$ 1,539		$ 1,265	$ 166	$	1,100
7	$ 7,255	21.13%	$ 1,533		$ 1,252	$ 165	$	1,088
8	$ 7,451	20.47%	$ 1,525		$ 1,237	$ 163	$	1,074
9	$ 7,644	19.80%	$ 1,513		$ 1,219	$ 161	$	1,058
10	$ 7,835	19.13%	$ 1,499		$ 1,199	$ 159	$	1,040
Terminal year	$ 8,031	19.13%	$ 1,536		$ 1,229	$ 362	$	868
				The Value				
Terminal value			$ 14,460					
PV(Terminal value)			$ 6,067					
PV (CF over next 10 years)			$ 6,988					
Value of operating assets =			$ 13,055					
Adjustment for distress			$ -			Probability of failure = 0.00%		
- Debt & Mnority Interests			$ 2,028					
+ Cash & Other Non-operating assets			$ 1,439					
Value of equity			$ 12,466					
- Value of equity options			$ -					
Number of shares			837.72					
Value per share			$ 14.88			Stock was trading at = $13.84		

Detsky Mir

The Story

Detsky Mir will continue to be a fast-growing toy retailer focused primarily on Russia, where it has its strongest competitive advantages and will be able to maintain its above-average margins. The focus on Russia, though, will constrain growth as the company takes a higher market share over time.

The Assumptions

	Base year	Years 1-5	Years 6-10		After year 10	Link to story
Revenues (a)	$ 79,547	25.00%	6.00%		6.00%	High growth in Russia
Operating margin (b)	8.29%	8.29%	8.29%		8.29%	Strong competitive advantages
Tax rate	21.80%	21.80%	25.00%		25.00%	Increase to Russian marginal tax rate
Reinvestment (c)		Sales to capital ratio 2.44		RIR =	40.00%	Reinvest like global toy companies
Return on capital	43.93%	Marginal ROIC =	20.25%		15.00%	High ROIC in near term
Cost of capital (d)		12.90%	12.00%		12.00%	Cost of capital stays elevated

The Cash Flows

	Revenues	Operating Margin	EBIT	EBIT (1-t)	Reinvestment	FCFF
1	$ 99,434	8.29%	$ 8,244	$ 6,447	$ 8,142	$ (1,696)
2	$ 124,292	8.29%	$ 10,305	$ 8,058	$ 10,178	$ (2,120)
3	$ 155,365	8.29%	$ 12,881	$ 10,073	$ 12,722	$ (2,649)
4	$ 194,207	8.29%	$ 16,101	$ 12,591	$ 15,903	$ (3,312)
5	$ 242,758	8.29%	$ 20,126	$ 15,739	$ 19,879	$ (4,140)
6	$ 294,223	8.29%	$ 24,393	$ 18,919	$ 21,071	$ (2,152)
7	$ 345,418	8.29%	$ 28,638	$ 22,028	$ 20,961	$ 1,067
8	$ 392,395	8.29%	$ 32,532	$ 24,816	$ 19,234	$ 5,582
9	$ 430,849	8.29%	$ 35,720	$ 27,019	$ 15,745	$ 11,274
10	$ 456,700	8.29%	$ 37,864	$ 28,398	$ 10,584	$ 17,814
Terminal year	$ 484,102	8.29%	$ 40,135	$ 30,102	$ 12,041	$ 18,061

The Value

Terminal value	$ 301,016		
PV(Terminal value)	$ 91,614		
PV (CF over next 10 years)	$ 1,517		
Value of operating assets =	$ 93,131		
Adjustment for distress	$ 4,657	Probability of failure = 10.00%	
- Debt & Mnority Interests	$ 14,638		
+ Cash & Other Non-operating assets	$ 2,445		
Value of equity	$ 76,282		
- Value of equity options	$ -		
Number of shares	739.00		
Value per share	$ 103.22	Stock was trading at = $96.20	

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.

Aswath Damodaran

The Reasons for the allure…

- "If you think I'm crazy, you should see the guy who 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

Aswath Damodaran

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			

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

Valuation Estimates

Aswath Damodaran

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

— BB BIOTECH
— SPI Swiss Performanc (Rebased)
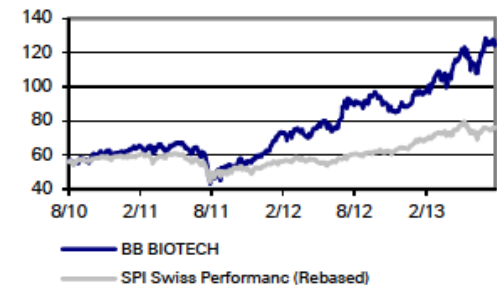
Performance (%)	1m	3m	12m
Absolute	-1.4	5.4	37.4

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Test 3: Are you pricing or valuing?

	1	2	3	4	5
EBITDA	$100.00	$120.00	$144.00	$172.80	$207.36
- Depreciation	$20.00	$24.00	$28.80	$34.56	$41.47
EBIT	$80.00	$96.00	$115.20	$138.24	$165.89
- Taxes	$24.00	$28.80	$34.56	$41.47	$49.77
EBIT (1-t)	$56.00	$67.20	$80.64	$96.77	$116.12
+ Depreciation	$20.00	$24.00	$28.80	$34.56	$41.47
- Cap Ex	$50.00	$60.00	$72.00	$86.40	$103.68
- Chg in WC	$10.00	$12.00	$14.40	$17.28	$20.74
FCFF	$16.00	$19.20	$23.04	$27.65	$33.18
Terminal Value					$1,658.88
Cost of capital	8.25%	8.25%	8.25%	8.25%	8.25%
Present Value	$14.78	$16.38	$18.16	$20.14	$1,138.35
Value of operating assets today	$1,207.81				
+ Cash	$125.00				
- Debt	$200.00				
Value of equity	**$1,132.81**				

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The tool for pricing: A multiple

```
┌─────────────────────┐  ┌──────────────────────────────┐  ┌────────────────────────────────────┐
│ Market value of     │  │ Market value for the firm    │  │ Market value of operating assets of │
│ equity              │  │ Firm value = Market value of │  │ firm                                │
└─────────────────────┘  │ equity                       │  │ Enterprise value (EV) = Market      │
                         │       + Market value of debt │  │ value of equity                     │
                         └──────────────────────────────┘  │       + Market value of debt        │
                                                           │       - Cash                        │
                                                           └────────────────────────────────────┘
```

Numerator = What you are paying for the asset

Multiple =

Denominator = What you are getting in return

Revenues	Earnings	Cash flow	Book Value
a. Accounting revenues	a. To Equity investors	a. To Equity	a. Equity
b. Drivers	- Net Income	- Net Income + Depreciation	= BV of equity
- # Customers	- Earnings per share	- Free CF to Equity	b. Firm
- # Subscribers	b. To Firm	b. To Firm	= BV of debt + BV of equity
= # units	- Operating income (EBIT)	- EBIT + DA (EBITDA)	c. Invested Capital
		- Free CF to Firm	= BV of equity + BV of debt - Cash

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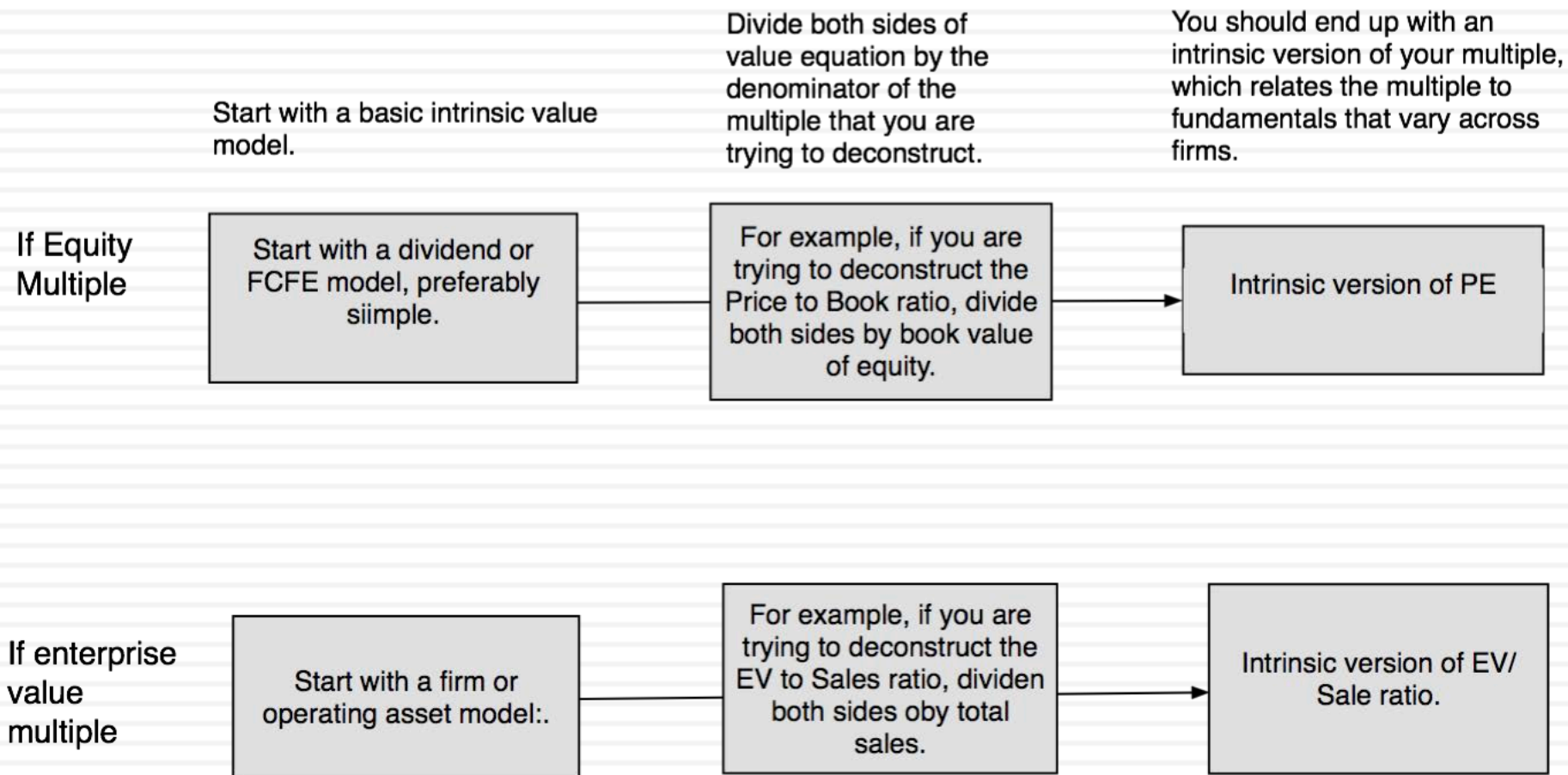# The Four Steps to Deconstructing Multiples

- ☐ Define the multiple
  - ◘ In use, the same multiple can be defined in different ways by different users. When comparing and using multiples, estimated by someone else, it is critical that we understand how the multiples have been estimated

- ☐ Describe the multiple
  - ◘ Too many people who use a multiple have no idea what its cross sectional distribution is. If you do not know what the cross sectional distribution of a multiple is, it is difficult to look at a number and pass judgment on whether it is too high or low.

- ☐ Analyze the multiple
  - ◘ It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.

- ☐ Apply the multiple
  - ◘ Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.

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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.

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A Simple Analytical device

Start with a basic intrinsic value model.

Divide both sides of value equation by the denominator of the multiple that you are trying to deconstruct.

You should end up with an intrinsic version of your multiple, which relates the multiple to fundamentals that vary across firms.

If Equity Multiple

Start with a dividend or FCFE model, preferably siimple.

For example, if you are trying to deconstruct the Price to Book ratio, divide both sides by book value of equity.

Intrinsic version of PE

If enterprise value multiple

Start with a firm or operating asset model:.

For example, if you are trying to deconstruct the EV to Sales ratio, dividen both sides oby total sales.

Intrinsic version of EV/ Sale ratio.

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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 EPSnnext year (Forward PE)

Forecasted EPS in future year

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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?

To analyze a steel company on a pricing basis

- In order to pick a multiple to price a steel company, it is worth remembering that
  - Steel companies are going through a depressed phase, with declining revenues and negative earnings (for many companies)
  - Leverage varies widely across airlines
- Would you analyze Severstal with an equity or an enterprise value multiple? Why?
- Given the value measure that you chose, what would you scale that measure to? (Would you use revenues, earnings, book value, something else?)

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?

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1. Multiples have skewed distributions...

PE Ratios for US Companies: January 2019
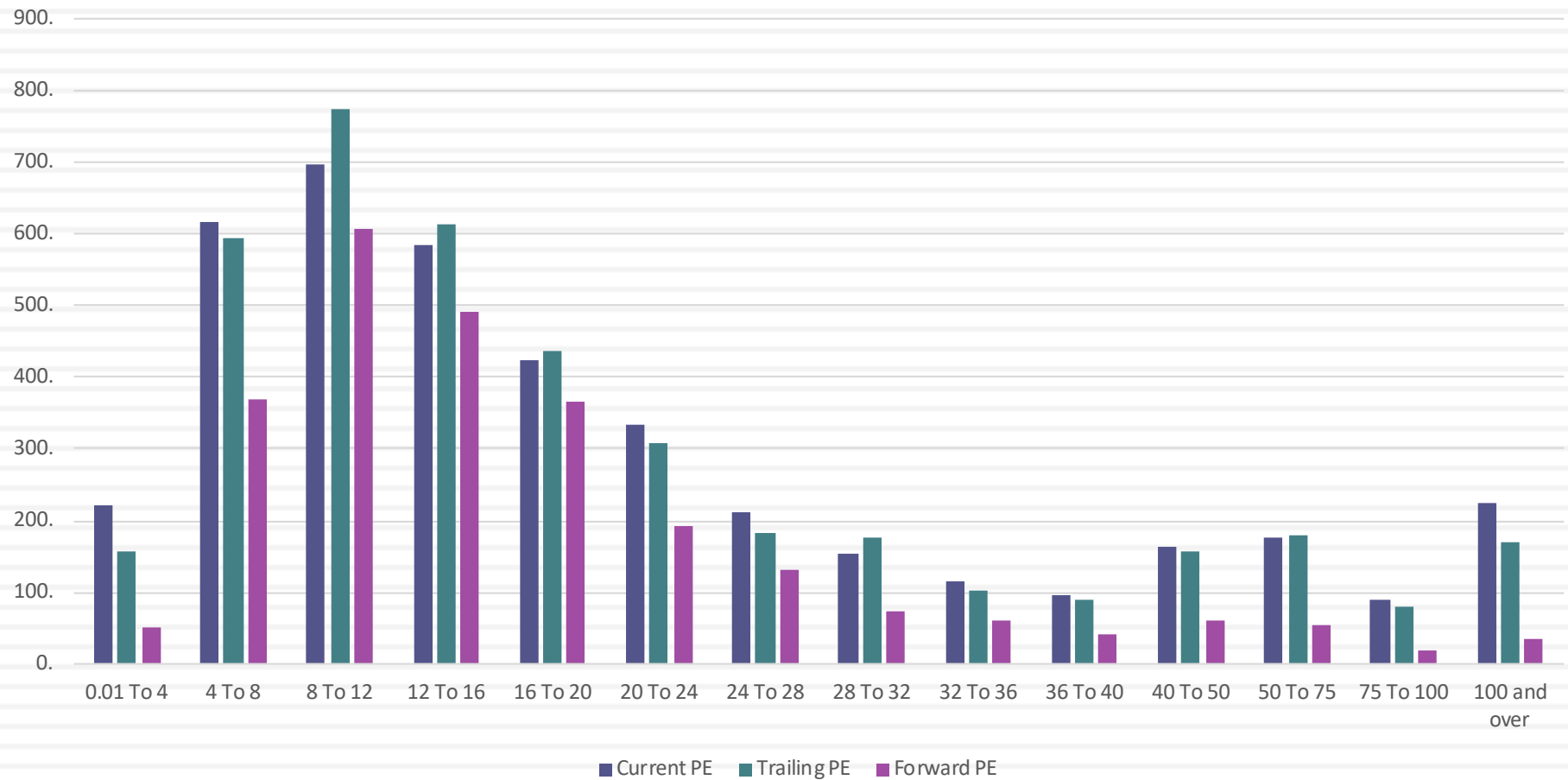
2. Making statistics "dicey"

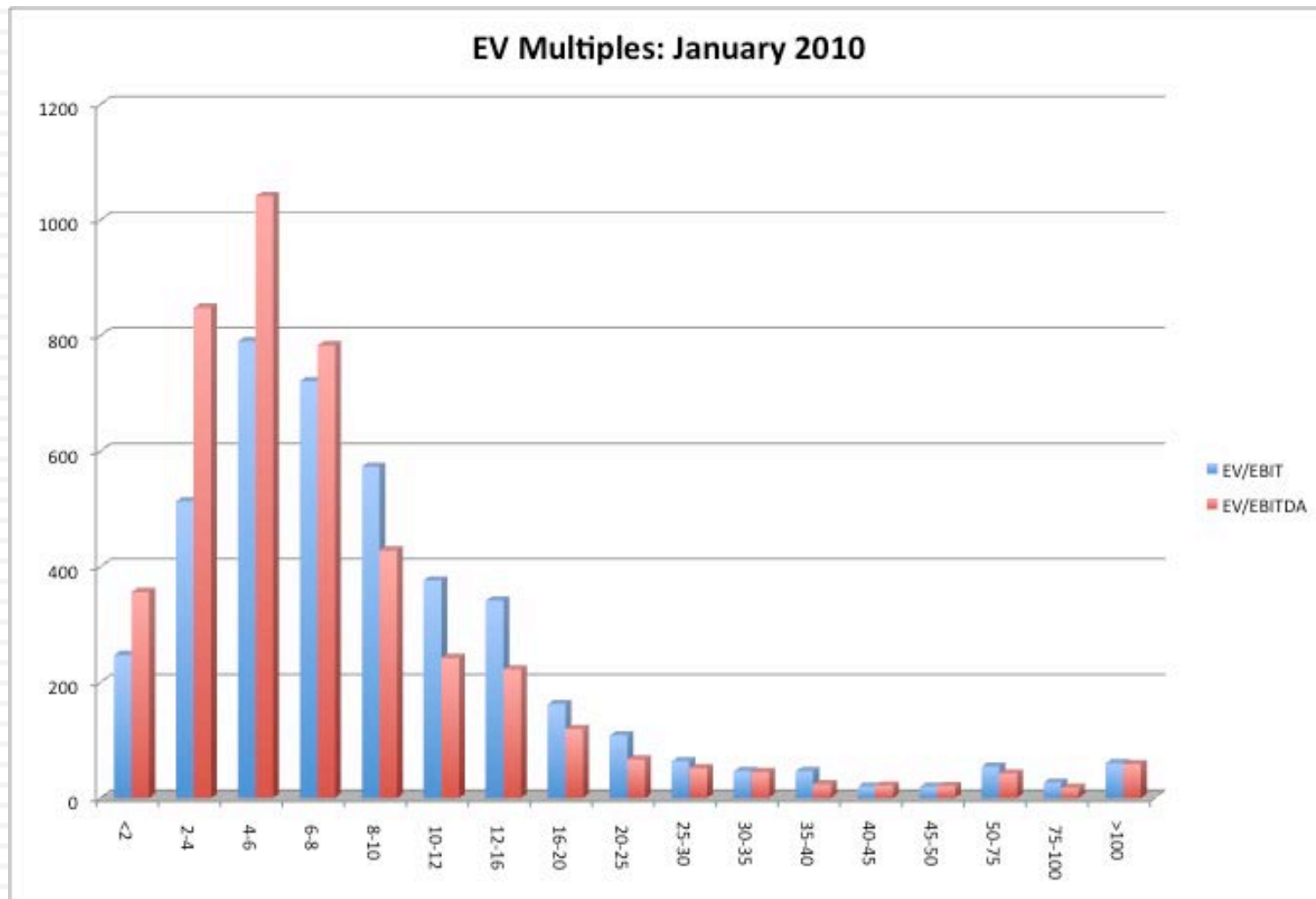|	Current PE	Trailing PE	Forward PE
Number of firms	7,209	7,209	7,209
Number with PE	2,965	2,957	2,489
Average	77.18	35.33	26.91
Median	18.61	15.80	14.44
Minimum	0.68	1.94	2.65
Maximum	48700.00	3400.00	1769.64
Standard deviation	990.76	118.07	66.67
Standard error	18.20	2.17	1.34
Skewness	41.60	15.55	13.63
25th percentile	11.70	10.36	10.12
75th percentile	32.35	27.31	23.16

US firms in January 2018

3. Markets have a lot in common : Comparing Global PEs
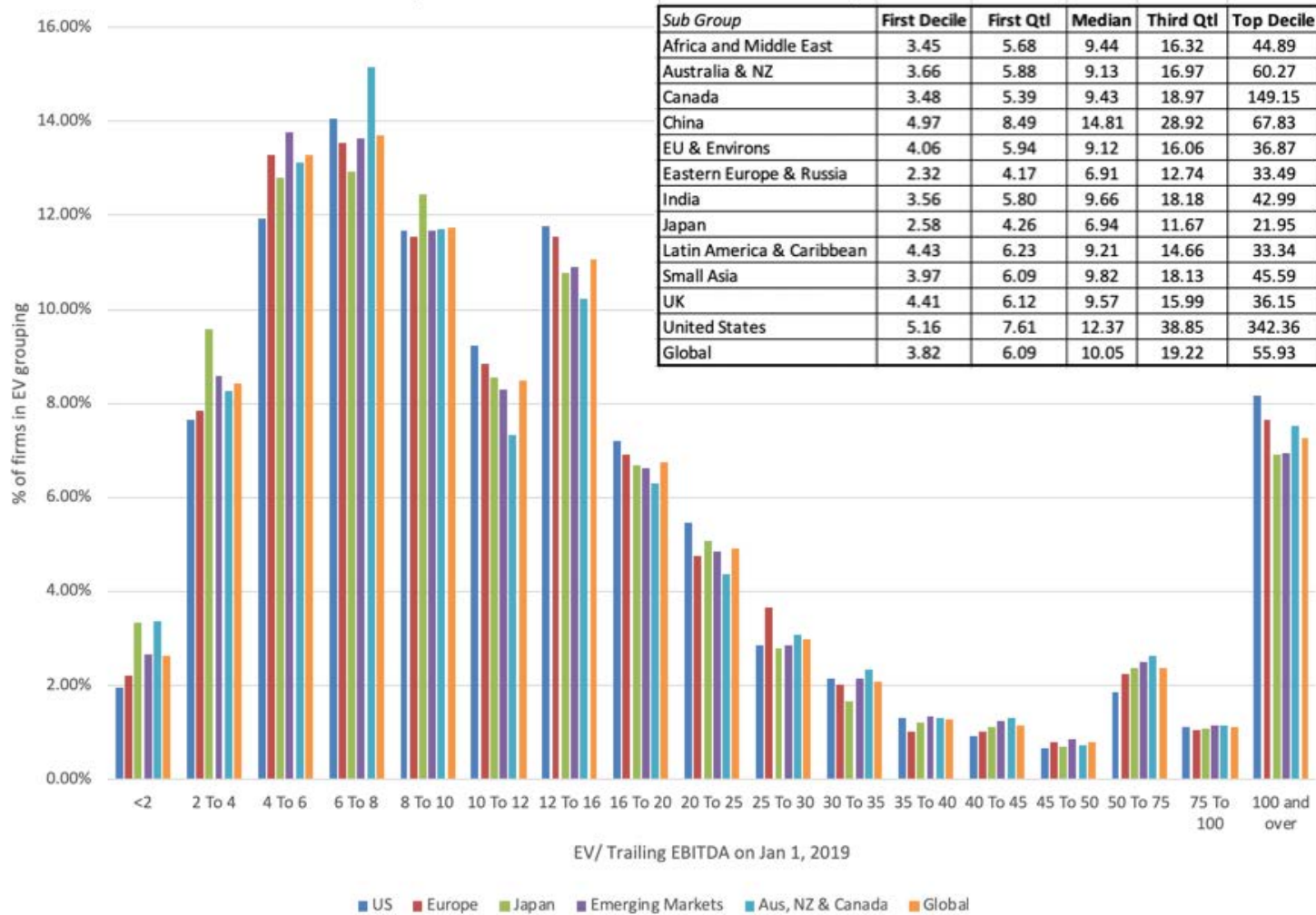
PE Ratios across the Globe: January 2019

Sub Group	Trailing PE Ratio				
	1st Decile	1st Quartile	Median	3rd Quartile	9th Decile
Africa and Middle East	4.82	7.23	11.32	18.51	34.21
Australia & NZ	5.65	9.26	15.15	26.42	52.69
Canada	3.20	6.75	12.58	22.99	53.36
China	6.03	11.27	20.63	37.25	72.73
EU & Environs	4.90	8.00	13.33	22.20	41.45
Eastern Europe & Russia	2.59	5.22	9.40	17.30	40.63
India	5.38	9.55	17.15	32.60	65.99
Japan	6.44	9.14	13.82	23.66	44.57
Latin America & Caribbean	5.19	8.85	14.12	20.98	42.11
Small Asia	5.34	8.58	13.43	24.22	52.49
UK	5.88	9.36	15.49	26.90	54.38
United States	6.09	10.36	15.80	27.31	53.70

Trailing PE (Price on 12/31/18 divided by trailing 12 month net income on that day)

Legend: US, Europe, Japan, Emerging Markets, Aus, NZ & Canada, Global

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

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But it may be in 2019, unless you are in Russia!

EV/EBITDA - Global Distribution in January 2019

Sub Group	First Decile	First Qtl	Median	Third Qtl	Top Decile
Africa and Middle East	3.45	5.68	9.44	16.32	44.89
Australia & NZ	3.66	5.88	9.13	16.97	60.27
Canada	3.48	5.39	9.43	18.97	149.15
China	4.97	8.49	14.81	28.92	67.83
EU & Environs	4.06	5.94	9.12	16.06	36.87
Eastern Europe & Russia	2.32	4.17	6.91	12.74	33.49
India	3.56	5.80	9.66	18.18	42.99
Japan	2.58	4.26	6.94	11.67	21.95
Latin America & Caribbean	4.43	6.23	9.21	14.66	33.34
Small Asia	3.97	6.09	9.82	18.13	45.59
UK	4.41	6.12	9.57	15.99	36.15
United States	5.16	7.61	12.37	38.85	342.36
Global	3.82	6.09	10.05	19.22	55.93

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Steel Companies in April 2017

Steel Companies: EV/Sales in April 2017
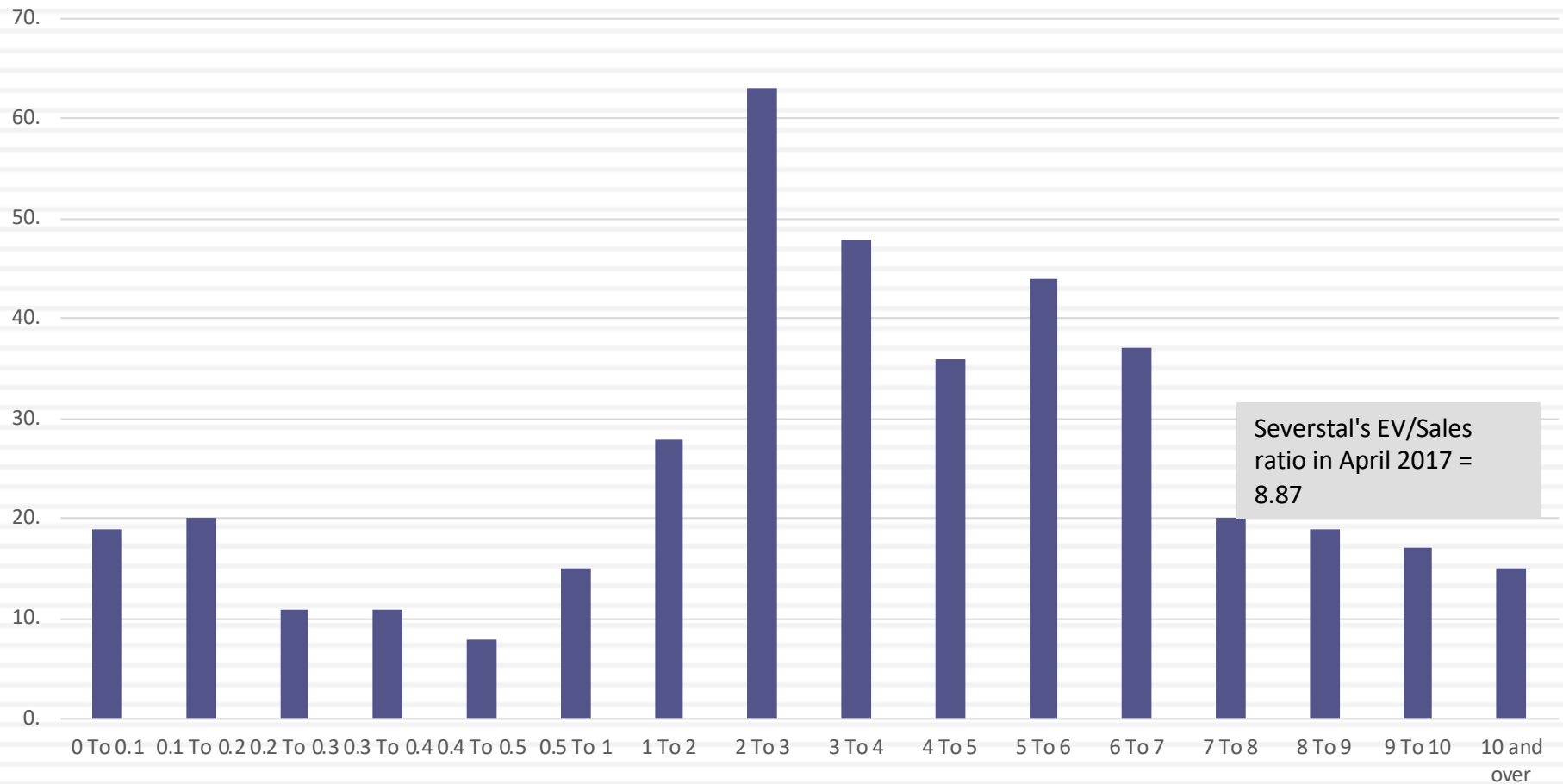
Severstal's EV/Sales ratio in April 2017 = 8.87

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EV Multiples across steel companies: April 2017

Broad Group	Number of firms	EV/EBITDA	EV/Invested Capital	EV/Sales
Australia, NZ and Canada	48	33.62	8.43	21.81
Developed Europe	46	35.05	5.05	3.84
Emerging Markets	438	53.97	6.01	5.64
Japan	47	39.20	4.44	3.33
United States	27	34.82	6.28	4.51
Global	606	48.92	6.02	6.56
Severstal	1	27.87	13.48	8.87
% under or over Global		-43.03%	124.02%	35.25%
% under or over Emerging		-48.36%	124.39%	57.13%

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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.

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PE Ratio: Understanding the Fundamentals

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

- With the dividend discount model,

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

- Dividing both sides by the current earnings per share,

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

- If this had been a FCFE Model,
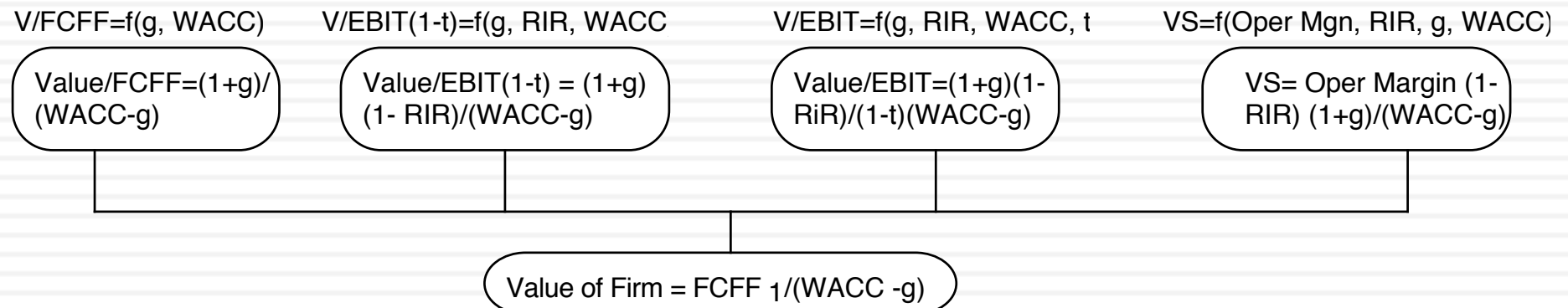
$$P_0 = \frac{FCFE_1}{r - g_n}$$

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

The Determinants of Multiples…

Value of Stock = DPS$_1$/(k$_e$ - g)

| PE=Payout Ratio (1+g)/(r-g) | PEG=Payout ratio (1+g)/g(r-g) | PBV=ROE (Payout ratio) (1+g)/(r-g) | PS= Net Margin (Payout ratio) (1+g)/(r-g) |

PE=f(g, payout, risk)   PEG=f(g, payout, risk)   PBV=f(ROE,payout, g, risk)   PS=f(Net Mgn, payout, g, risk)
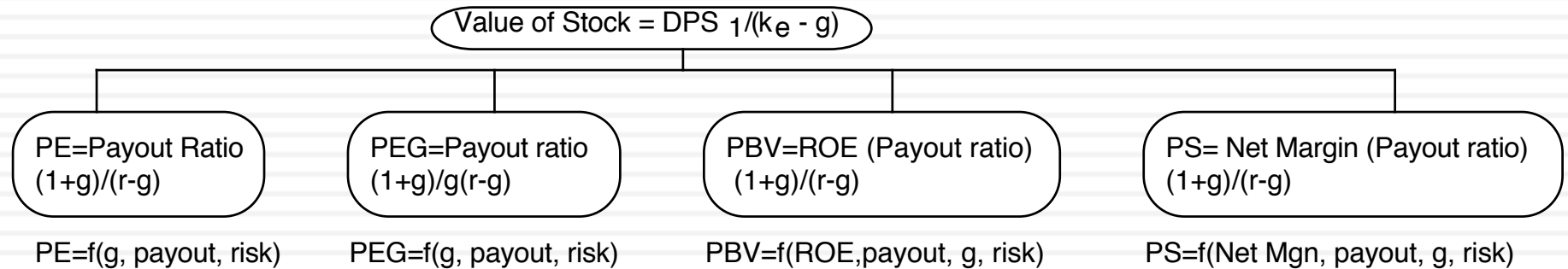
Equity Multiples

Firm Multiples

V/FCFF=f(g, WACC)   V/EBIT(1-t)=f(g, RIR, WACC   V/EBIT=f(g, RIR, WACC, t   VS=f(Oper Mgn, RIR, g, WACC)

| Value/FCFF=(1+g)/ (WACC-g) | Value/EBIT(1-t) = (1+g) (1- RIR)/(WACC-g) | Value/EBIT=(1+g)(1- RiR)/(1-t)(WACC-g) | VS= Oper Margin (1- RIR) (1+g)/(WACC-g) |

Value of Firm = FCFF$_1$/(WACC -g)

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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

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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.

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Fundamentals: Steel Companies in April 2017

Broad Group	EV/Sales	Historical growth in Revenues - Last 3 years	Expected growth in revenues - Next 2 years	Return on Capital (ROC or ROIC)	Pre-tax Operating Margin	Effective Tax Rate	Cost of capital in US$
Emerging Markets	5.64	-3.34%	9.51%	4.70%	5.35%	14.58%	7.78%
Global	6.56	-2.96%	8.03%	3.65%	4.56%	15.17%	7.54%
Severstal	8.87	-14.40%	5.61%	47.64%	25.81%	5.65%	9.13%
% under or over Global	35.25%	386.85%	-30.11%	1203.75%	466.30%	-62.75%	21.14%
% under or over Emerging	57.13%	331.78%	-41.01%	913.57%	382.24%	-61.25%	17.28%
Analysis	Higher priced	Lower Growth		Significantly more profitable		Lower taxes	More risky

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The Steel Business: Global Top 25 (in market cap)

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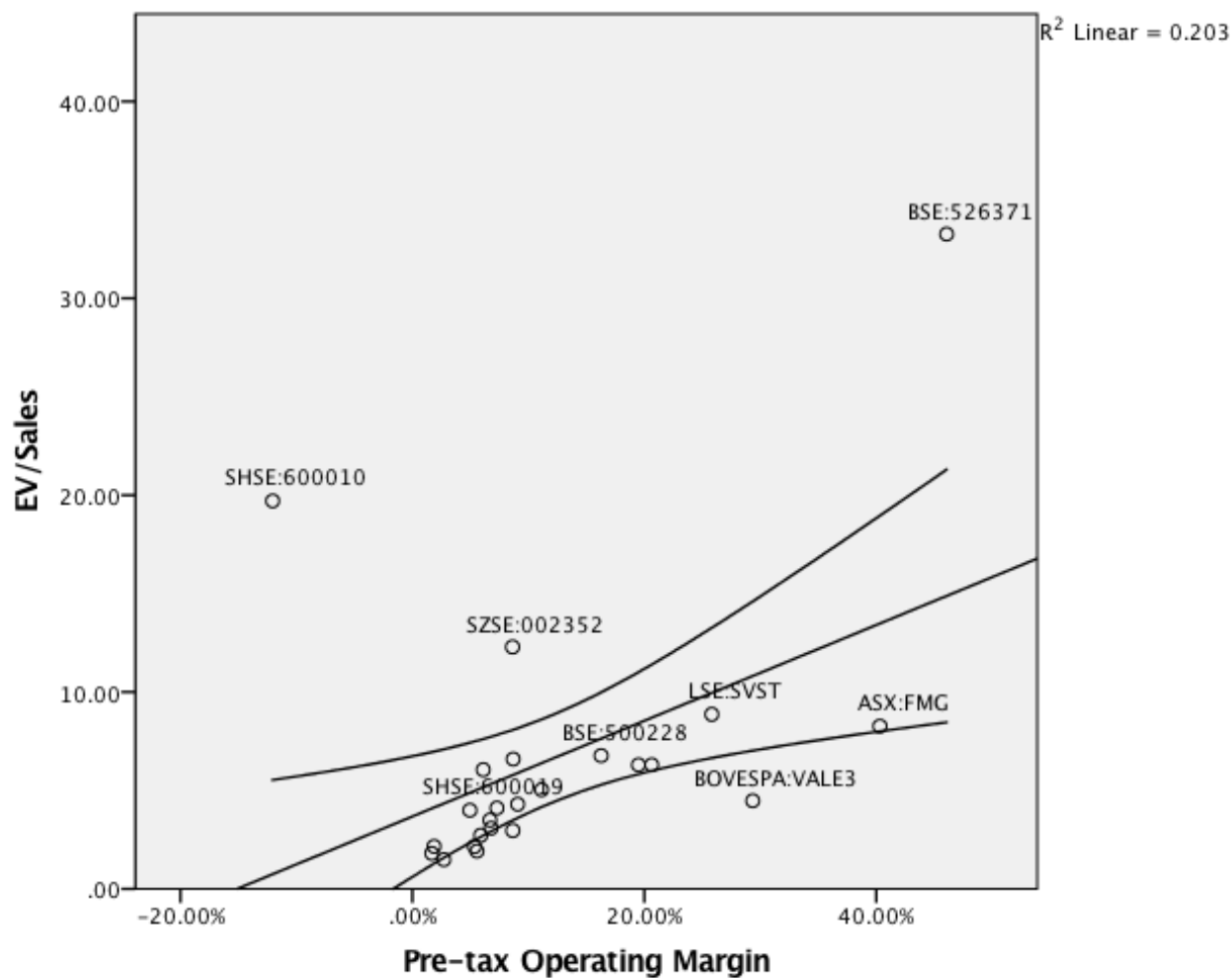
Is Severstal cheap or expensive?

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.845[a]	.713	.682	3.76185

a. Predictors: (Constant), Expected growth in revenues – Next 2 years, Pre–tax Operating Margin

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	633.972	2	316.986	22.399	.000[b]
	Residual	254.727	18	14.151		
	Total	888.699	20			

a. Dependent Variable: EV/Sales

b. Predictors: (Constant), Expected growth in revenues – Next 2 years, Pre–tax Operating Margin

Coefficients[a]

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	−1.911	1.439		−1.327	.201
	Pre–tax Operating Margin	.358	.070	.672	5.125	.000
	Expected growth in revenues – Next 2 years	.363	.132	.360	2.744	.013

a. Dependent Variable: EV/Sales

Predicted EV/Sales ratio for Severstal = -1.911 + 0.358 (25.61) + .363 (5.81) = 9.36

Actual EV/Sales ratio for Severstal = 8.87

Severstal is under priced by about 5.2% (=1- 8.87/9.36)

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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.

PE Ratio: Standard Regression for US stocks - January 2019

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.702[b]	.493	.492	2563.28776

a. Broad Group = United States

b. Predictors: (Constant), Payout Ratio (2019), Beta, Expected growth rate in EPS– Next 5 years

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)	-12.699	1.934		-6.566	.000
	Expected growth rate in EPS– Next 5 years	1.402	.068	.439	20.530	.000
	Beta	10.533	1.747	.128	6.030	.000
	Payout Ratio (New)	.255	.008	.630	32.632	.000

a. Broad Group = United States

b. Dependent Variable: Trailing PE

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

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I. PE ratio regressions across markets – January 2019

Region	Regression – January 2019	R^2
US	PE = 1.21 Beta + 23.50 Payout + 120.8 g_{EPS}	49.3%
Europe	PE = 11.10 – 1.98 Beta + 12.50 Payout + 33.30 g_{EPS}	21.6%
Japan	PE = 14.63 – 7.14 Beta + 10.5 Payout + 67.4 g_{EPS}	25.4%
Emerging Markets	PE = 14.38– 3.33 Beta + 5.90 Payout + 54.8 g_{EPS}	26.5%
Australia, NZ, Canada	PE = 3.93 – 1.52 Beta + 15.1 Payout + 91.7 g_{EPS}	30.0%
Global	**PE = 8.25 – 3.06 Beta + 1.70 Payout + 9.11 g_{EPS}**	**32.6%**

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

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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.

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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

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A closing thought...