VALUATION: IT'S NOT THAT COMPLICATED!

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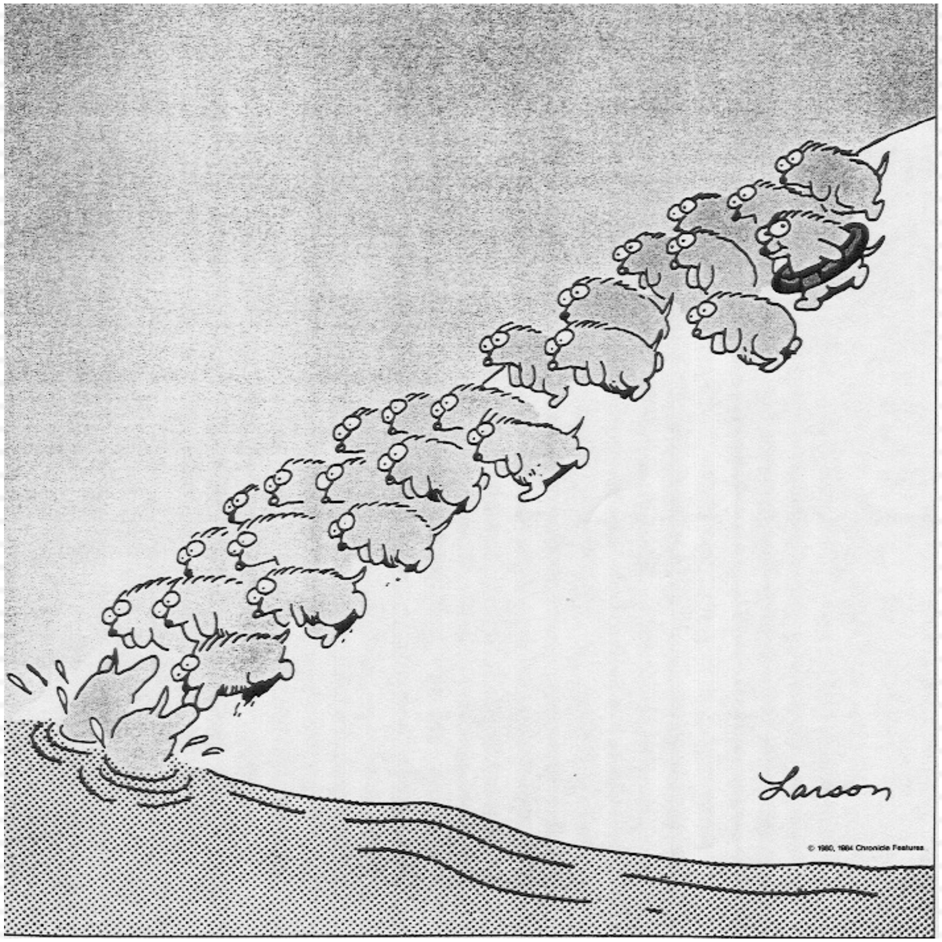
Some Initial Thoughts

" 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 by doing. The more you do it, the better you get at it. **Valuation is a craft.**

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

Drivers of intrinsic value
- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of price
- Market moods & momentum
- Surface stories about fundamentals

Accounting Estimates

Valuation Estimates

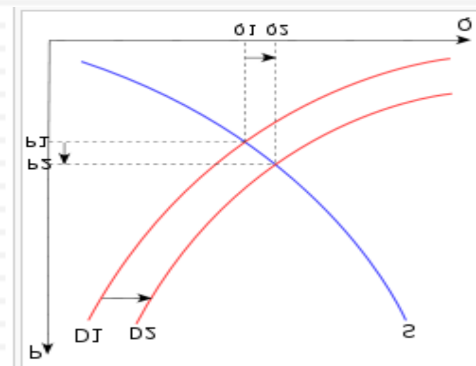
INTRINSIC VALUE

Value

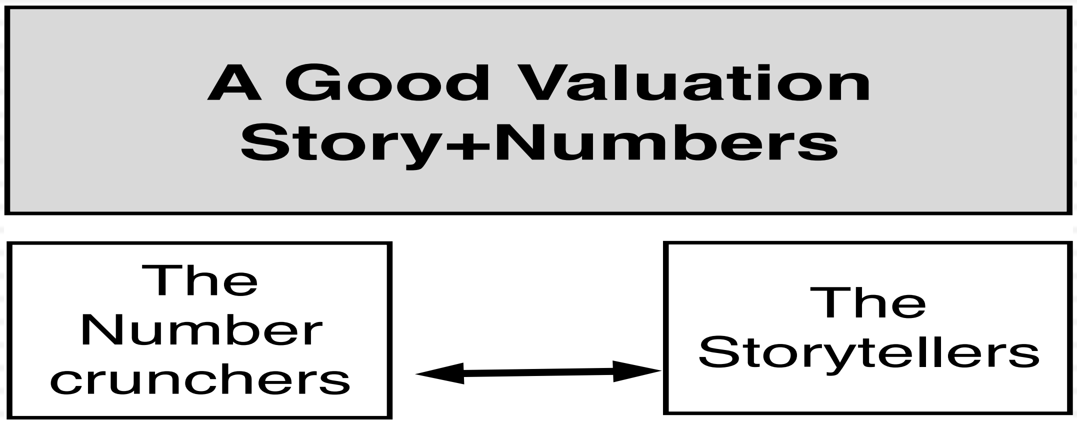
THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?

Price

PRICE



Theme 3: Good valuation = Story + Numbers



- A valuation that is all numbers, with no narrative holding it together is just a spreadsheet/model. It is not a valuation.
- A story about a company, no matter how compelling, is just a story unless you can connect it to the numbers.

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.

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:

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

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

DCF Choices: Equity Valuation versus Firm Valuation

Firm Valuation: Value the entire business

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).

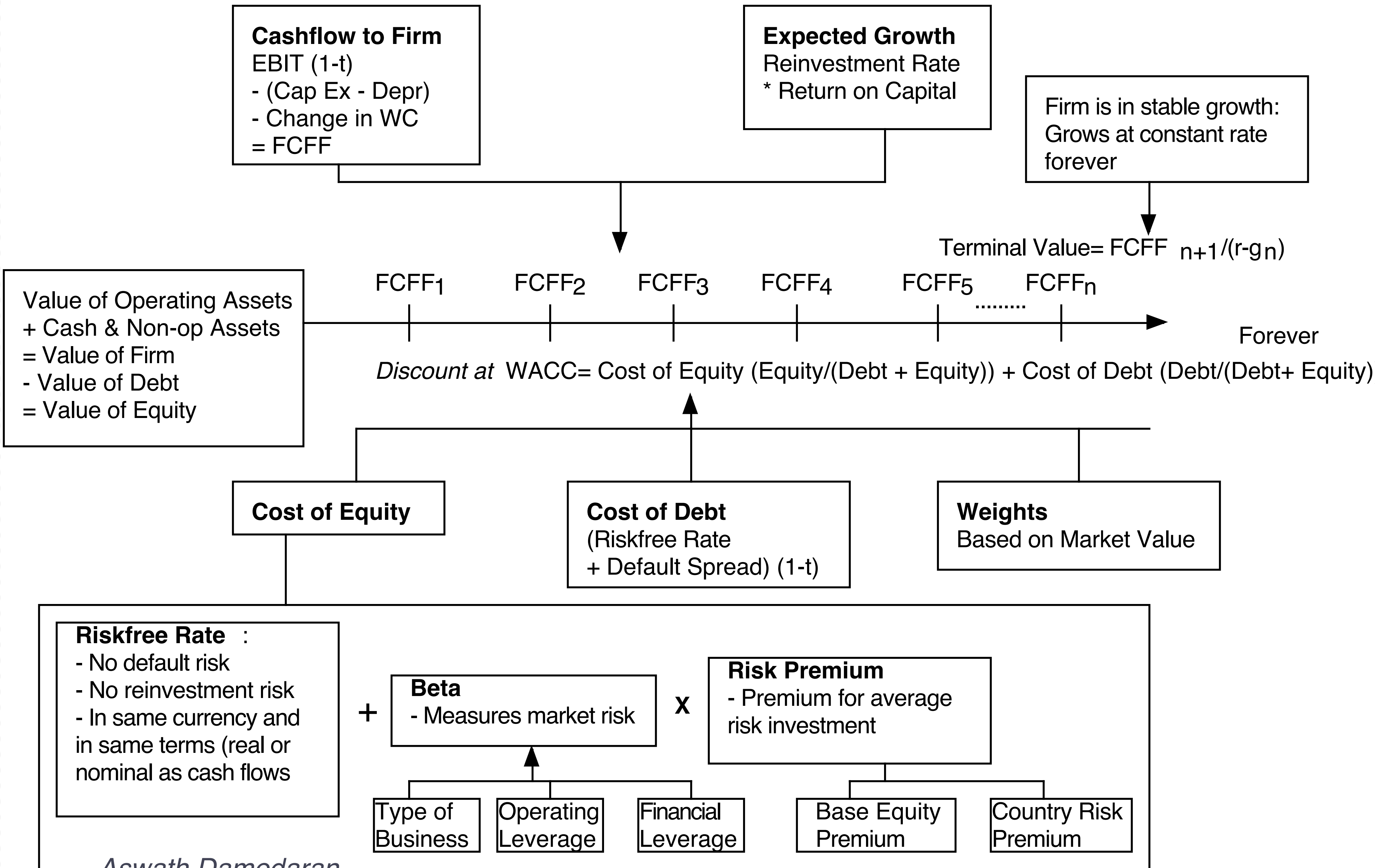
Expected Growth during high growth period

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



Amgen: Status Quo

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

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

Reinvestment Rate
60%

Return on Capital
16%

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

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

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

First 5 years

Growth decreases gradually to 4%

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

Term Yr
18718
12167
4867
7300

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

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

Debt ratio increases to 20%
Beta decreases to 1.10

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

Cost of Equity
11.70%

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

Weights
E = 90% D = 10%

Riskfree Rate:
Riskfree rate = 4.78%

+

Beta
1.73

X

Risk Premium
4%

Unlevered Beta for Sectors: 1.59

D/E=11.06%

Tata Motors: April 2010

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

Current Cashflow to Firm
EBIT(1-t) : Rs 20,116
- Nt CpX Rs 31,590
- Chg WC Rs 2,732
= FCFF - Rs 14,205
Reinv Rate = (31590+2732)/20116 = 170.61%; Tax rate = 21.00%
Return on capital = 17.16%

Reinvestment Rate
70%

Return on Capital
17.16%

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

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

Terminal $Value_5$= 23493/(.1039-.05) = Rs 435,686

45278
21785
23493

Rs Cashflows

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

Op. Assets Rs210,813
+ Cash: 11418
+ Other NO 140576
- Debt 109198
=Equity 253,628

Value/Share Rs 614

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

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

Cost of Equity
14.00%

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

Weights
E = 74.7% D = 25.3%

On April 1, 2010
Tata Motors price = Rs 781

Riskfree Rate:
Rs Riskfree Rate= 5%

+

Beta
1.20

X

Mature market premium
4.5%

+

Lambda
0.80

X

Country Equity Risk Premium
4.50%

Unlevered Beta for Sectors: 1.04

Firm's D/E Ratio: 33%

Country Default Spread
3%

X

Rel Equity Mkt Vol
1.50

Turkish Airlines: Valuation - July 2017

	Turk Air	*US Airlines*	*Global Airlines*
Revenue growth =	12.48%	3.54%	6.08%
Pre-tax operating margin=	-0.26%	16.31%	11.05%
Sales to capital =	0.63	1.42	1.10
Return on invested capital=	-0.15%	17.86%	9.92%

My Turkish Air Story
Turkish Air is a growing company in a bad business, burning through cash with losses, a large debt load and the government as the leading shareholder. It will continue to grow, with margins improving to global airline averages and reinvestment scaling down to reflect excess capacity.

Revenue growth of **16% a year** for 5 years, tapering down to 6% in year 10

Pre-tax operating margin increases to **11.05%** (Euro air average) over time.

Sales to capital ratio of **2.00** (median for mature airlines)

Stable Growth
g = 6%
Cost of capital = 10.50% (Global average)
ROC= 10.50%;
Reinvestment Rate=6%/10.5% = 57.14%

Terminal Value$_{10}$= 4,116/(.105-.06) = $91,456

	In terminal year
EBIT (1-t)	9,603 ₺
- Reinvestment	5,487 ₺
FCFF	4,116 ₺

	Base year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Revenue growth rate		16.00%	16.00%	16.00%	16.00%	16.00%	14.00%	12.00%	10.00%	8.00%	6.00%
Revenues	30,347 ₺	35,203 ₺	40,835 ₺	47,369 ₺	54,947 ₺	63,739 ₺	72,663 ₺	81,382 ₺	89,520 ₺	96,682 ₺	102,483 ₺
EBIT (Operating) margin	-0.26%	3.51%	7.28%	11.05%	11.05%	11.05%	11.05%	11.05%	11.05%	11.05%	11.05%
EBIT (Operating income)	-78 ₺	1,237 ₺	2,973 ₺	5,234 ₺	6,072 ₺	7,043 ₺	8,029 ₺	8,993 ₺	9,892 ₺	10,683 ₺	11,324 ₺
Tax rate	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	8.00%	11.00%	14.00%	17.00%	20.00%
EBIT(1-t)	-78 ₺	1,175 ₺	2,825 ₺	4,972 ₺	5,768 ₺	6,691 ₺	7,387 ₺	8,003 ₺	8,507 ₺	8,867 ₺	9,059 ₺
- Reinvestment		2,428 ₺	2,816 ₺	3,267 ₺	3,789 ₺	4,396 ₺	4,462 ₺	4,360 ₺	4,069 ₺	3,581 ₺	2,900 ₺
FCFF		-1,253 ₺	8 ₺	1,706 ₺	1,979 ₺	2,295 ₺	2,925 ₺	3,644 ₺	4,438 ₺	5,286 ₺	6,159 ₺

Terminal value	91,455.87 ₺
PV(Terminal value)	30,806.38 ₺
PV (CF over next 10 years)	11,704.01 ₺
Sum of PV	42,510.39 ₺
Probability of failure =	10.00%
Proceeds if firm fails =	21,255.19 ₺
Value of operating assets =	40,384.87 ₺
- Debt	41,366.07 ₺
+ Cash	6,425.00 ₺
Value of equity	5,443.80 ₺
Value of equity in common stock	5,443.80 ₺
Number of shares	1,380.00 ₺
Estimated value /share	3.94 ₺

Cost of capital = 18.58% (.34) + 8.50% (.66) = 11.92%

Cost of capital increases to 10.5% from years 6-10

Cost of Equity
18.58%

Cost of Debt
(7.62%+3.00%)(1-.20) = 8.50%

Weights
E = 34% D = 66%

In July 2017, the stock was trading at 8.67 TL per share.

Riskfree Rate:
Riskfree rate = 7.62%
(in Turkish Lira)

+

Beta
1.87

X

ERP
7.67%

Unlevered Beta for Businesses: 0.56

D/E=194%

Business	*Revenues*	*EV/Sales*	*Estimated Value*	*Weights*	*Unlevered Beta*
Air Transport	29,063 ₺	1.4420	41,910 ₺	90.74%	0.5334
Transportation	3,202 ₺	1.3351	4,275 ₺	9.26%	0.8176
Company	32,265 ₺		46,185 ₺		0.5597

Region	*Revenues*	*Weight*	*ERP*
Africa	3376	11.46%	12.00%
Asia	6467	21.95%	7.12%
Middle East	3471	11.78%	7.03%
North America	3903	13.24%	5.69%
Western Europe	8396	28.49%	6.81%
Turkey	3855	13.08%	9.24%
Total	**29468**	**100.00%**	**7.67%**

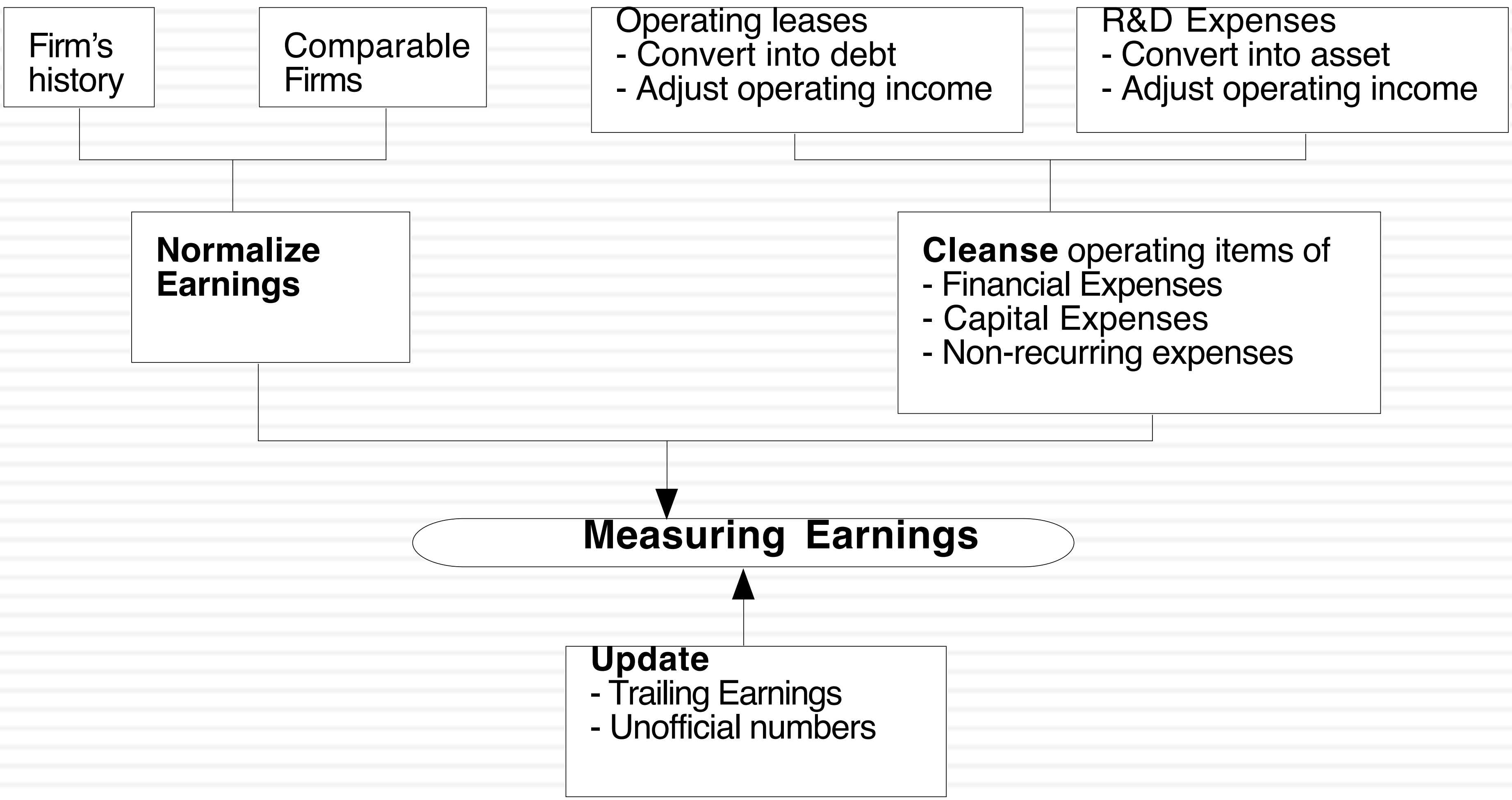
Aswat

Aswath Damodaran

DCF INPUTS

"Garbage in, garbage out"

I. Measure earnings right..



Operating Leases at Turkish Air in 2017

Pre-tax cost of debt based on Ba3 rating = 10.62%

Year	Commitment	Present Value
1	1,165 ₺	1,053 ₺
2	698 ₺	570 ₺
3	698 ₺	516 ₺
4	698 ₺	466 ₺
5	698 ₺	421 ₺
6 and beyond	729 ₺	398 ₺
Debt Value of leases =		3,424 ₺

Interest bearing debt = ₺ 37,942 million
Total Debt Outstanding = ₺ 37,942 + ₺ 3,424 = ₺ 41,366 million
Operating income (unadjusted) = - ₺672 million
Operating income adjusted for leases = ₺672 + ₺ 1166 – ₺571 = ₺ 78 million
This year's lease expense = ₺ 1166 million   *Depreciation = 3424/6 = ₺ 571*

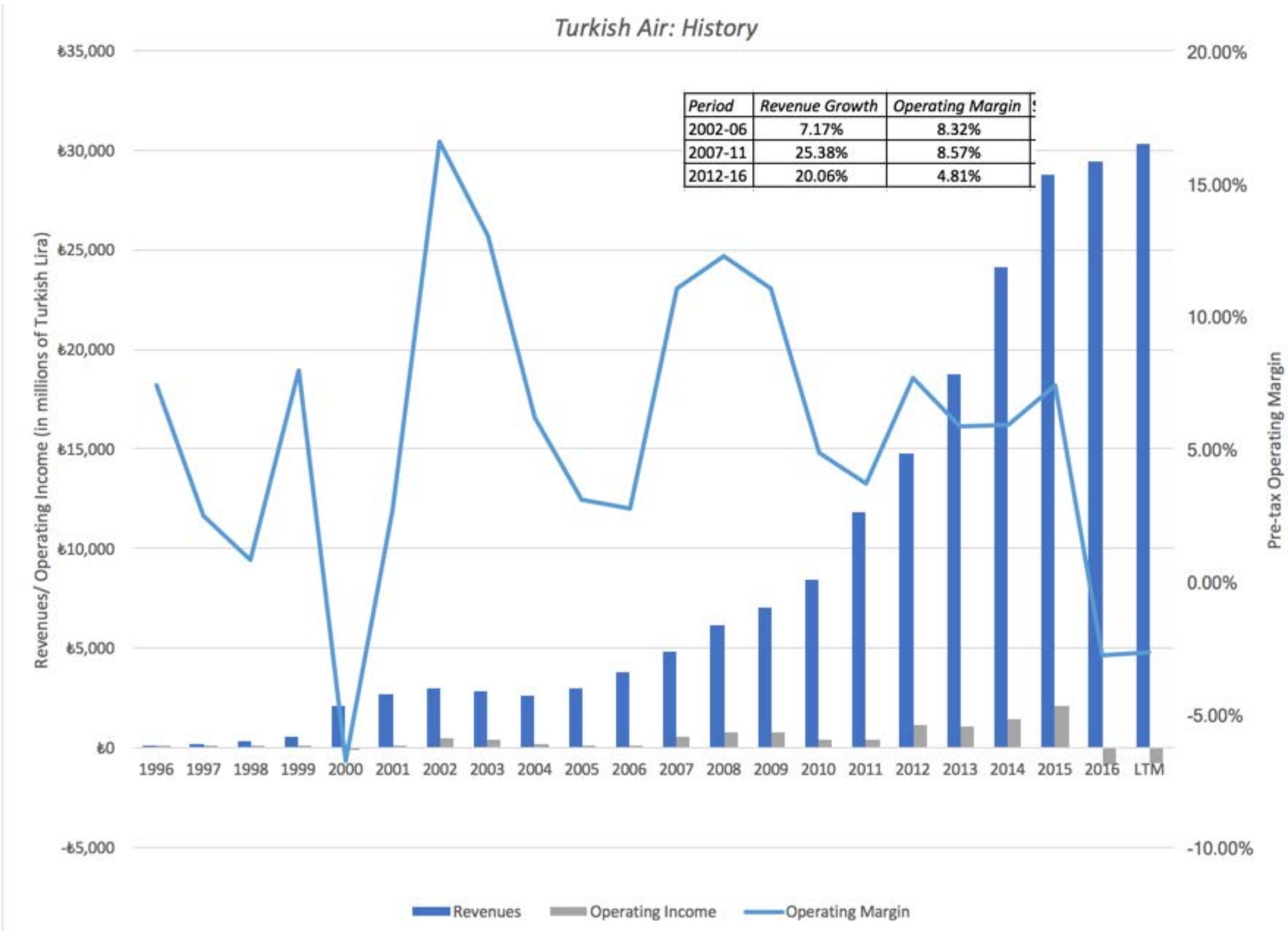
Capitalizing R&D Expenses: Amgen

- 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

Turkish Air: Growth, Cash Burn & Losses



Period	Revenue Growth	Operating Margin
2002-06	7.17%	8.32%
2007-11	25.38%	8.57%
2012-16	20.06%	4.81%

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.

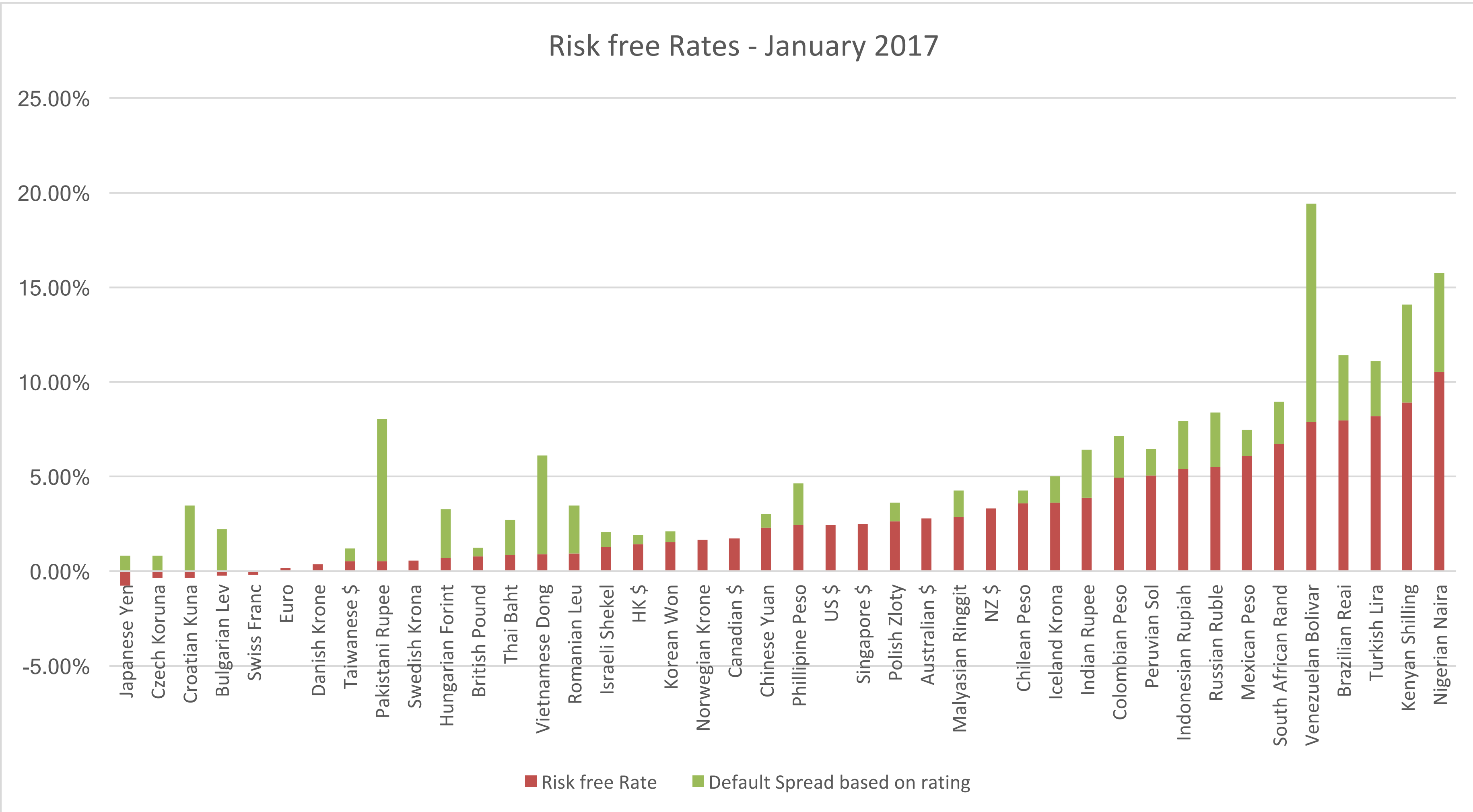
III. The government bond rate is not always the risk free rate

- 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%
- To value Turkish Airlines in Turkish Lira, I started with the ten-year Turkish government bond rate (in ₺) of 10.51%. I used Turkey's sovereign CDS spread of 2.89% and estimated a risk free rate of 7.62%:

  Risk free rate in Turkish Lira = 10.51% - 2.89% = 7.62%

Risk free rates will vary across currencies!



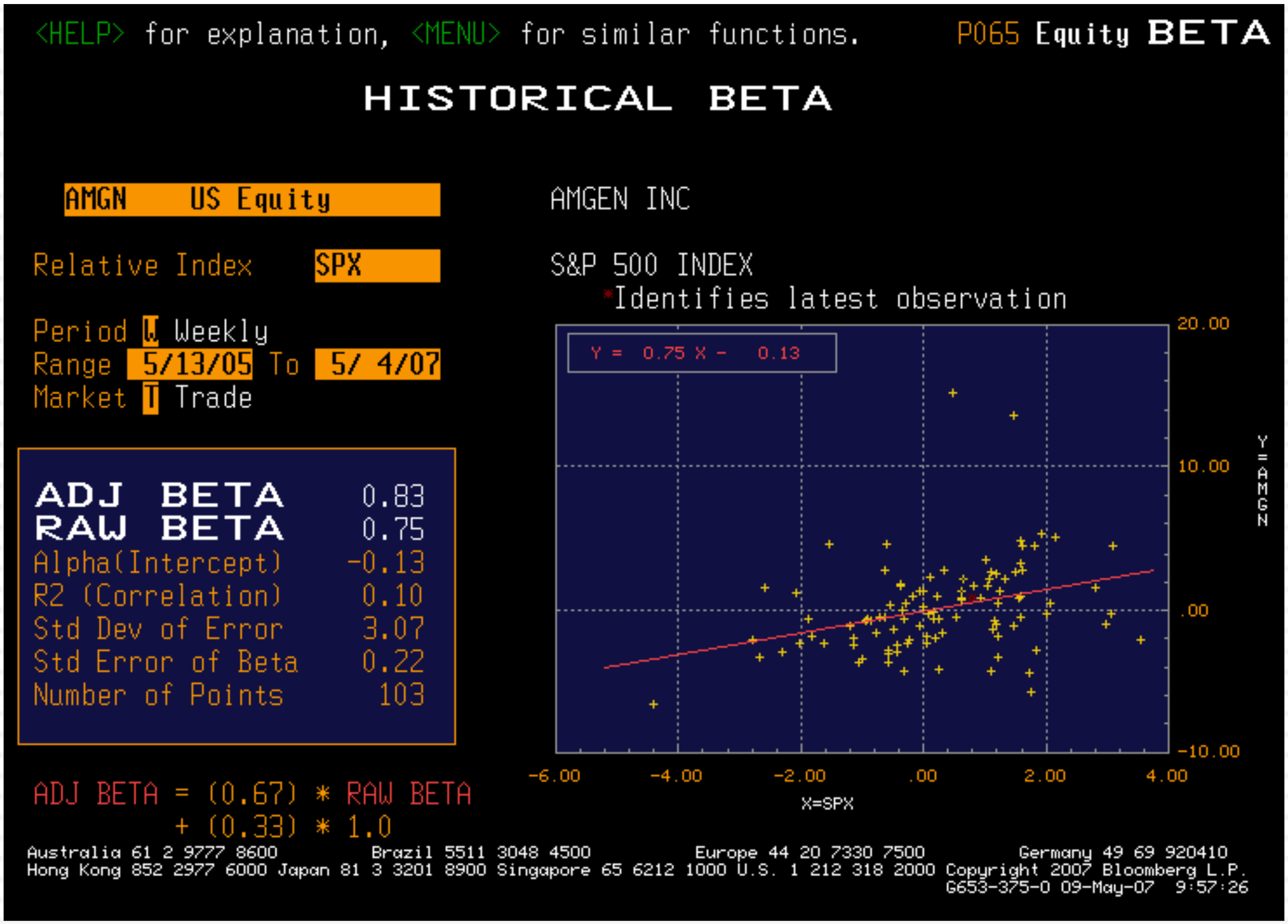
Risk free Rates in Currencies without a Government Bond Rate

- 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%

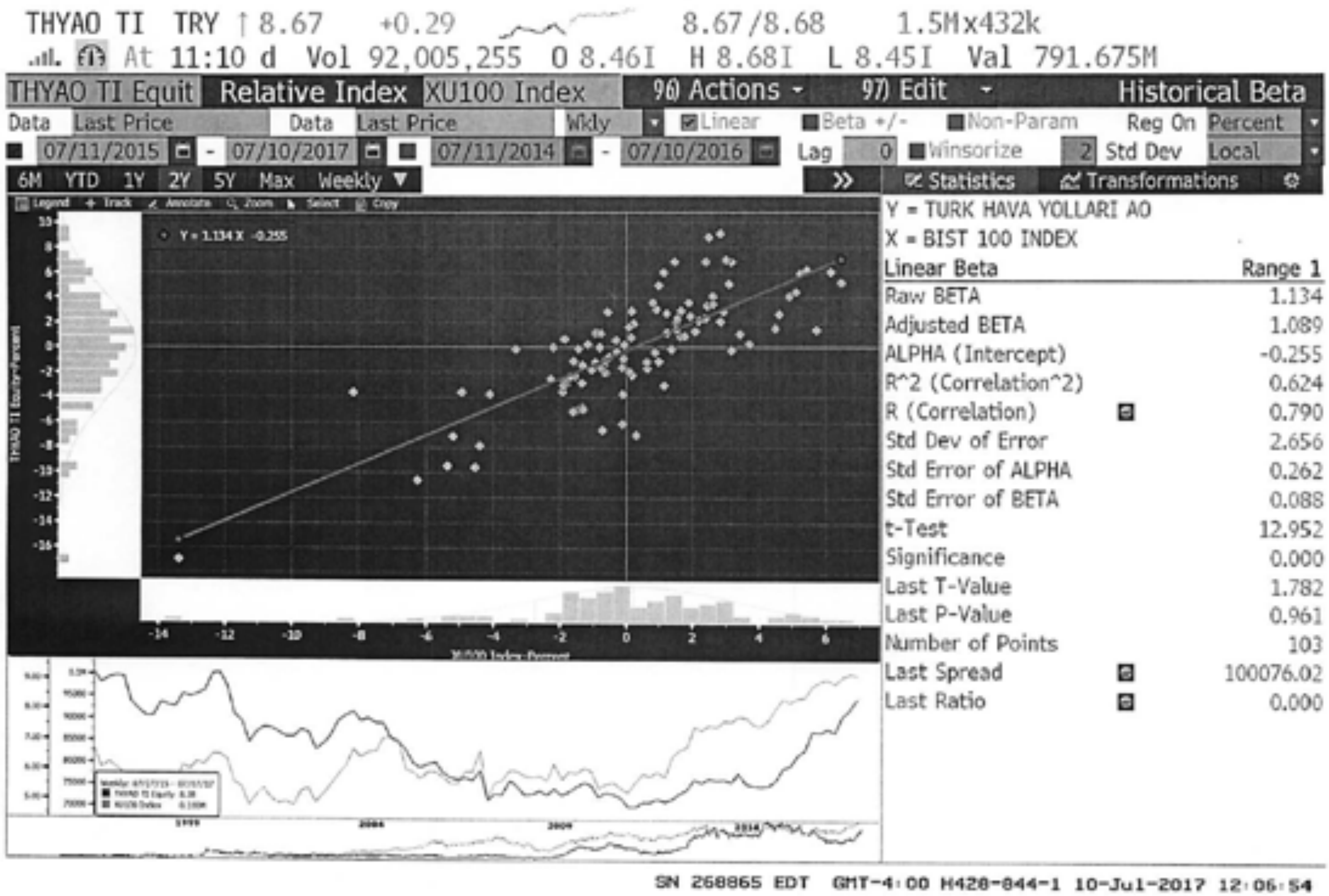
But valuations should not!

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

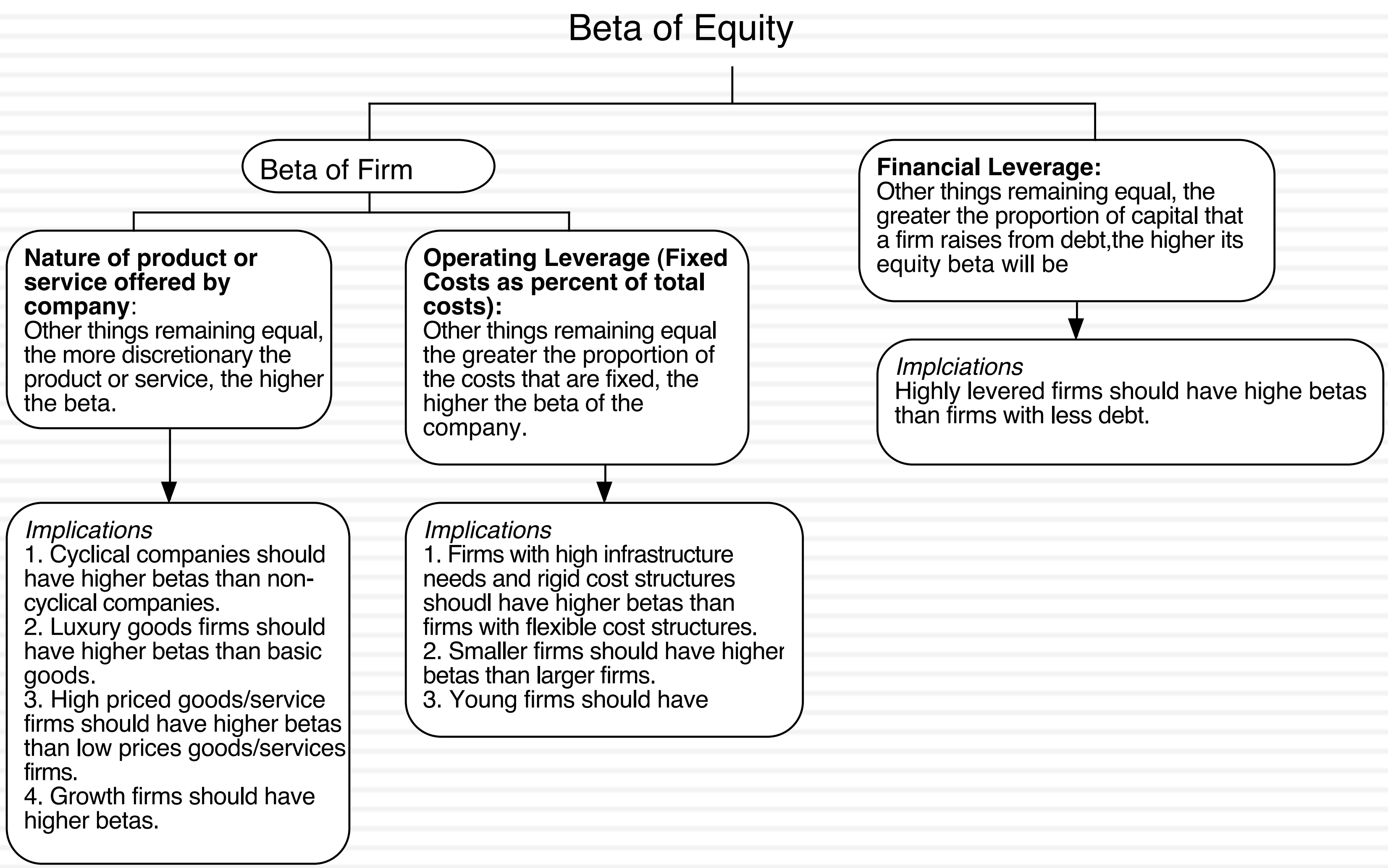
IV. Betas do not come from regressions… and are noisy…



And can be meaningless if run against narrow indices..



Determinants of Betas



Bottom-up Betas

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

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

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

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

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

Possible Refinements

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

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

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

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

Three examples…

- Amgen
  - The unlevered beta for pharmaceutical firms is 1.59. Using Amgen's debt to equity ratio of 11%, the bottom up beta for Amgen is
  - Bottom-up Beta = 1.59 (1+ (1-.35)(.11)) = 1.73
- Tata Motors
  - The unlevered beta for automobile firms is 0.98. Using Tata Motor's debt to equity ratio of 33.87%, the bottom up beta for Tata Motors is
  - Bottom-up Beta = 0.98 (1+ (1-.3399)(.3387)) = 1.20
- Turkish Air

Business	*Revenues*	*EV/Sales*	*Estimated Value*	*Weights*	*Unlevered Beta*
Air Transport	29,063 ₺	1.4420	41,910 ₺	90.74%	0.5334
Transportation	3,202 ₺	1.3351	4,275 ₺	9.26%	0.8176
Company	32,265 ₺		46,185 ₺		0.5597

Levered Beta = 0.5597 (1+(1-.20)(1.94)) = 1.87

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*
1928-2016	7.96%	6.24%	6.11%	4.62%
Std Error	2.13%	2.28%		
1967-2016	6.57%	4.37%	5.26%	3.42%
Std Error	2.42%	2.74%		
2007-2016	7.91%	3.62%	6.15%	2.30%
Std Error	6.06%	8.66%		

- 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 <u>backward looking</u>, is <u>noisy</u> and may reflect <u>selection bias</u>

But in the future..

Base year cash flow (last 12 mths)
Dividends (TTM): 45.39
+ Buybacks (TTM): 63.28
= Cash to investors (TTM): **108.67**

Payout ratio assumed to stay stable. 108.67 growing @ 5.54% a year

Expected growth in next 5 years
Top down analyst estimate of earnings growth for S&P 500: **5.54%**

	Last 12 months	1	2	3	4	5
Dividends + Buybacks	$108.67	$114.69	$121.04	$127.75	$134.82	$142.28

Earnings and Cash flows grow @2.45% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/17= **2238.83**

$$2238.83 = \frac{114.69}{(1+r)} + \frac{121.04}{(1+r)^2} + \frac{127.75}{(1+r)^3} + \frac{134.82}{(1+r)^4} + \frac{142.28}{(1+r)^5} + \frac{142.28(1.0245)}{(r-.0245)(1+r)^5}$$

You have to solve for the discount rate (r). I used the solver or Goal seek function in Excel

r = Implied Expected Return on Stocks = 8.14%

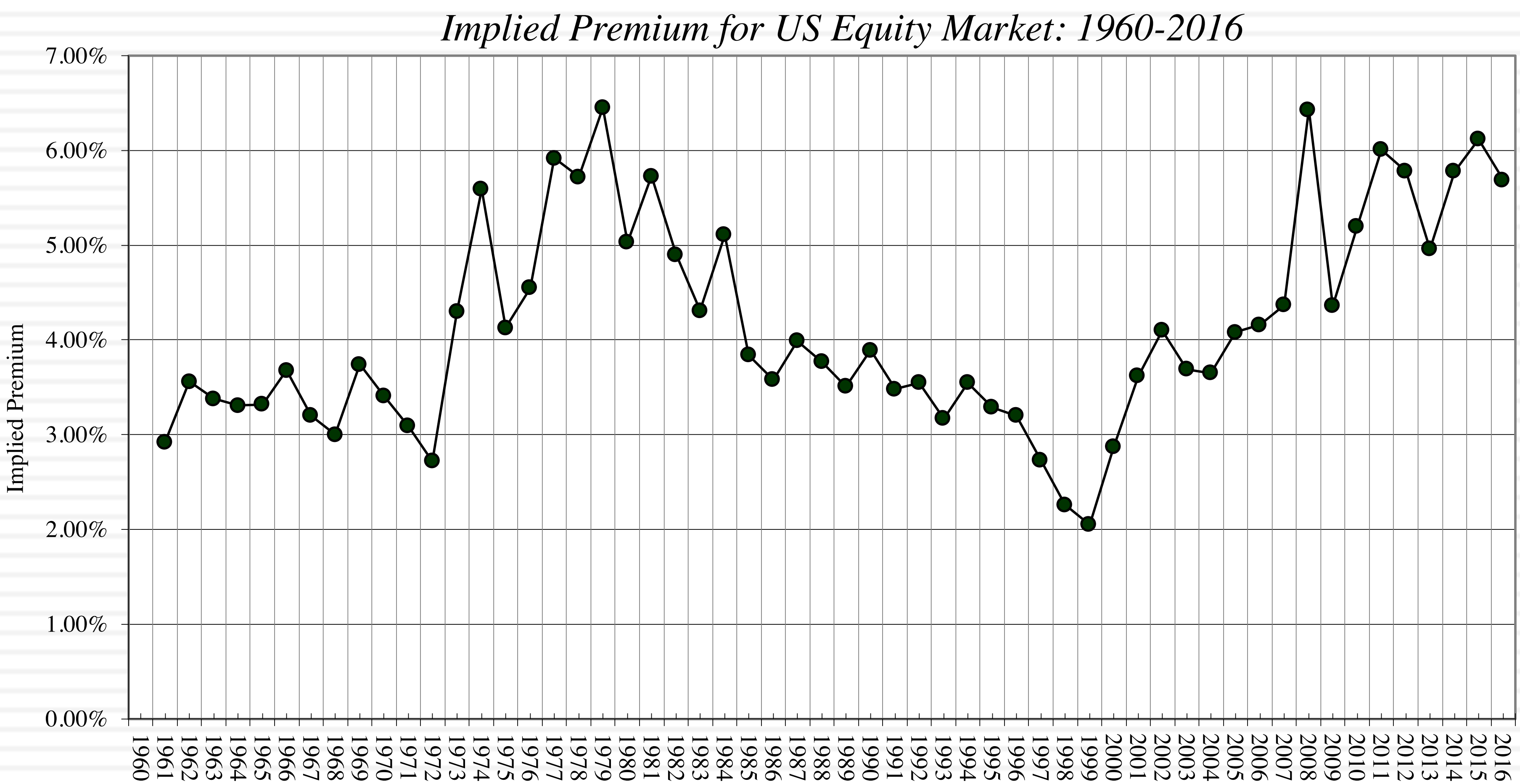
Minus

Risk free rate = T.Bond rate on 1/1/17= 2.45%

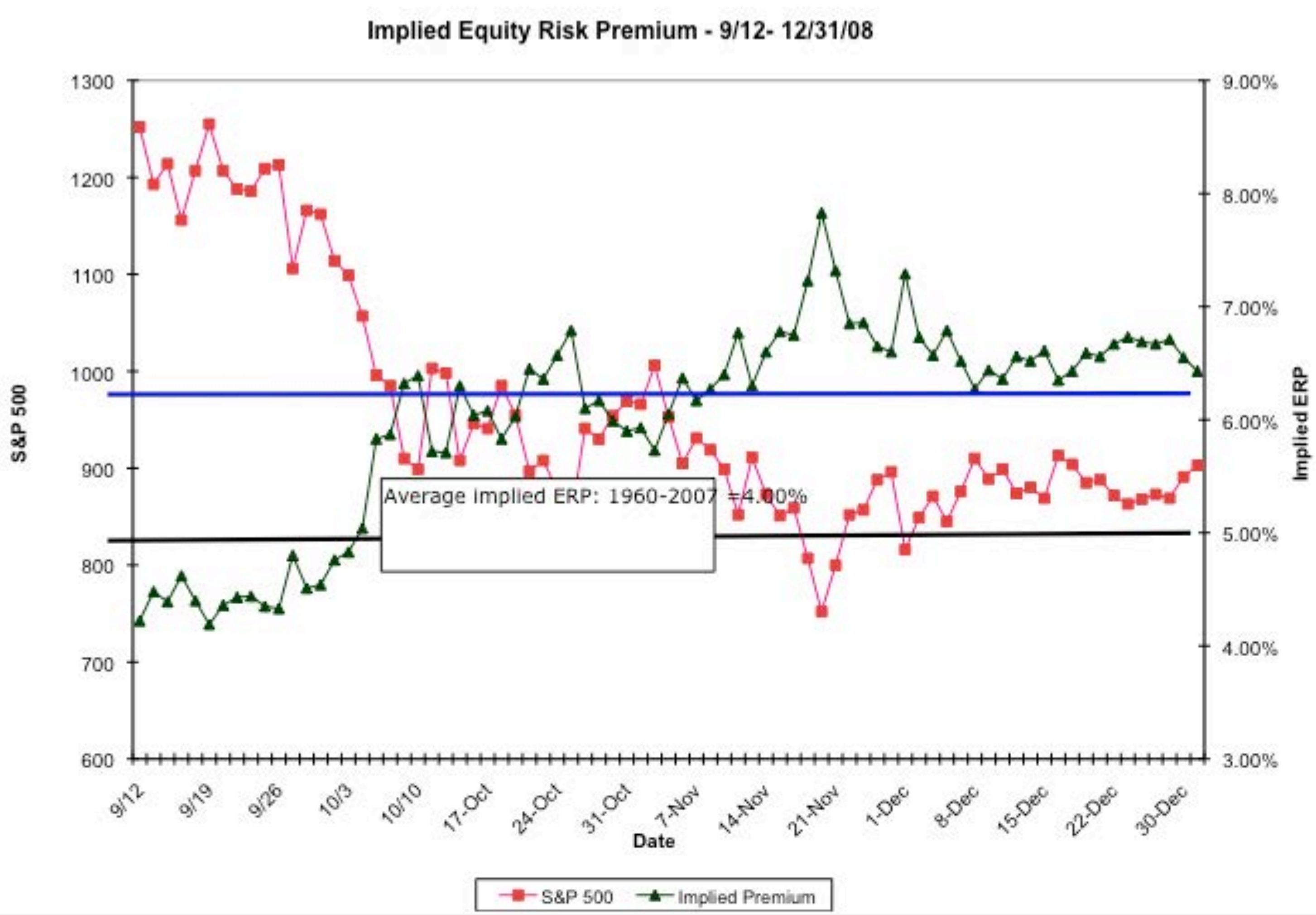
Equals

Implied Equity Risk Premium (1/1/17) = 8.14% - 2.45% = 5.69%

Implied Premiums in the US: 1960-2016



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



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%

Emerging versus Developed Markets: Implied Equity Risk Premiums

$$PBV = \frac{(Return\ on\ equity - Expected\ growth\ rate)}{(Cost\ of\ equity - Expected\ growth\ rate)}$$

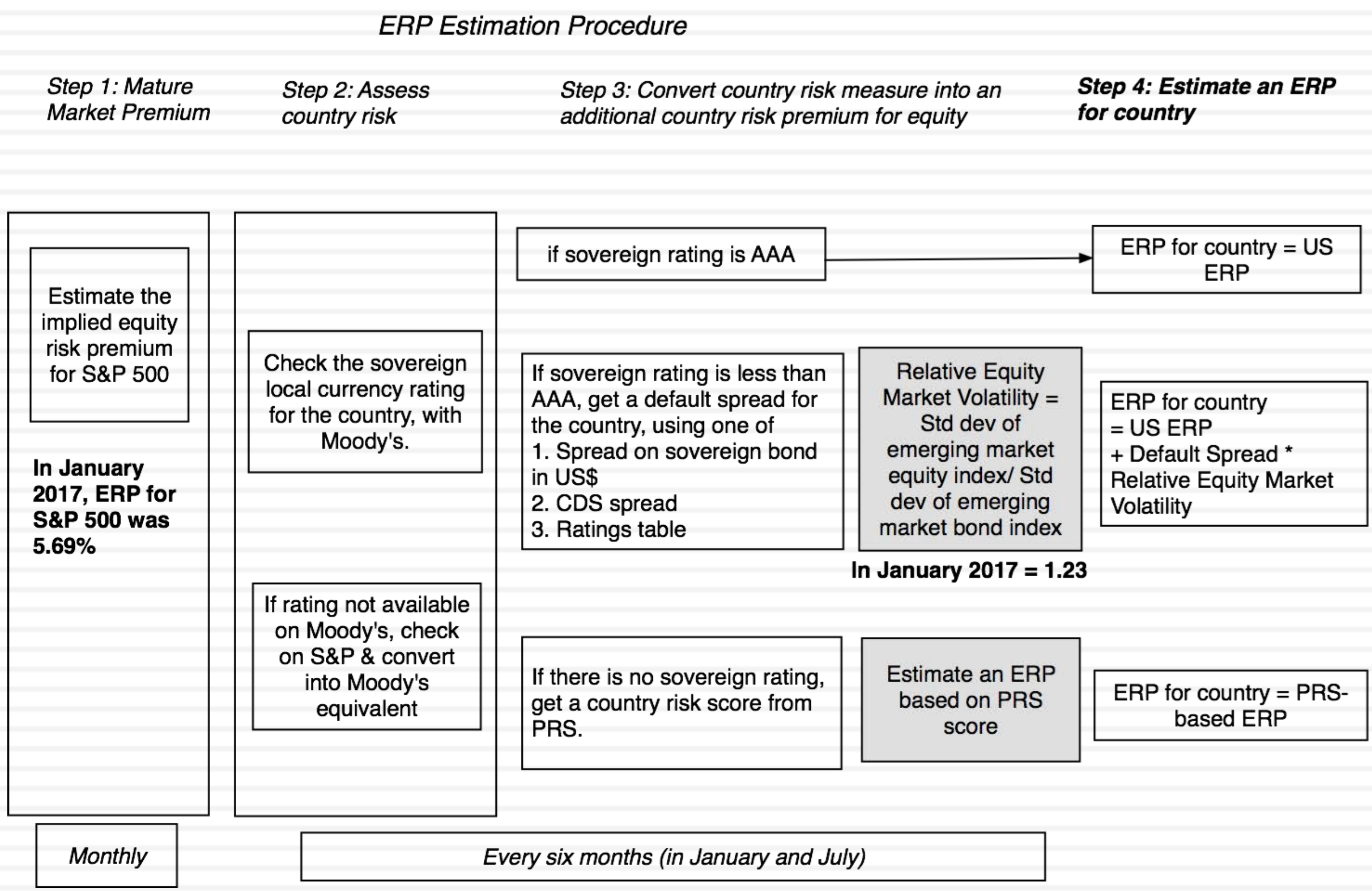
$$Cost\ of\ Equity = \frac{(ROE - Expected\ growth\ rate)}{PBV} + Expected\ growth\ rate$$

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 ERP**
2004	2.00	1.19	10.81%	11.65%	4.25%	3.75%	5.25%	7.28%	10.63%	**3.35%**
2005	2.09	1.27	11.12%	11.93%	4.22%	3.72%	5.22%	7.26%	10.50%	**3.24%**
2006	2.03	1.44	11.32%	12.18%	4.39%	3.89%	5.39%	7.55%	10.11%	**2.56%**
2007	1.67	1.67	10.87%	12.88%	4.70%	4.20%	5.70%	8.19%	10.00%	**1.81%**
2008	0.87	0.83	9.42%	11.12%	4.02%	3.52%	5.02%	10.30%	12.37%	**2.07%**
2009	1.20	1.34	8.48%	11.02%	2.21%	1.71%	3.21%	7.35%	9.04%	**1.69%**
2010	1.39	1.43	9.14%	11.22%	3.84%	3.34%	4.84%	7.51%	9.30%	**1.79%**
2011	1.12	1.08	9.21%	10.04%	3.29%	2.79%	4.29%	8.52%	9.61%	**1.09%**
2012	1.17	1.18	9.10%	9.33%	1.88%	1.38%	2.88%	7.98%	8.35%	**0.37%**
2013	1.56	1.63	8.67%	10.48%	1.76%	1.26%	2.76%	6.02%	7.50%	**1.48%**
2014	1.95	1.50	9.27%	9.64%	3.04%	2.54%	4.04%	6.00%	7.77%	**1.77%**
2015	1.88	1.56	9.69%	9.75%	2.17%	1.67%	3.17%	5.94%	7.39%	**1.45%**
2016	1.89	1.59	9.24%	10.16%	2.27%	1.77%	3.27%	5.72%	7.60%	**1.88%**

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* Std Deviation$_{\text{Country Equity}}$ / 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 : Jan 2017

Andorra	8.81%	3.12%	Jersey	6.26%	0.57%
Austria	6.26%	0.57%	Liechtenstein	5.69%	0.00%
Belgium	6.55%	0.86%	Luxembourg	5.69%	0.00%
Cyprus	12.09%	6.40%	Malta	7.40%	1.71%
Denmark	5.69%	0.00%	Netherlands	5.69%	0.00%
Finland	6.26%	0.57%	Norway	5.69%	0.00%
France	6.39%	0.70%	Portugal	9.24%	3.55%
Germany	5.69%	0.00%	Spain	8.40%	2.71%
Greece	19.89%	14.20%	Sweden	5.69%	0.00%
Guernsey	6.26%	0.57%	Switzerland	5.69%	0.00%
Iceland	7.40%	1.71%	Turkey	9.24%	3.55%
Ireland	7.40%	1.71%	UK	6.26%	0.57%
Isle of Man	6.26%	0.57%	**W.Europe**	**6.81%**	**1.12%**
Italy	8.40%	2.71%			

Albania	12.09%	6.40%
Armenia	12.09%	6.40%
Azerbaijan	9.24%	3.55%
Belarus	16.34%	10.65%
Bosnia and Her	14.93%	9.24%
Bulgaria	8.40%	2.71%
Croatia	9.96%	4.27%
Czech Republic	6.69%	1.00%
Estonia	6.69%	1.00%
Georgia	10.81%	5.12%
Hungary	8.81%	3.12%
Kazakhstan	8.81%	3.12%
Kyrgyzstan	13.51%	7.82%
Latvia	7.40%	1.71%
Lithuania	7.40%	1.71%
Macedonia	10.81%	5.12%
Moldova	14.93%	9.24%
Montenegro	12.09%	6.40%
Poland	6.90%	1.21%
Romania	8.81%	3.12%
Russia	9.24%	3.55%
Serbia	12.09%	6.40%
Slovakia	6.90%	1.21%
Slovenia	8.81%	3.12%
Ukraine	19.89%	14.20%
E.Europe	**9.09%**	**3.40%**

Country	ERP	CRP	Country	ERP	CRP
Algeria	13.72%	7.47%	Malawi	17.24%	10.99%
Brunei	9.75%	3.50%	Mali	13.90%	7.65%
Gambia	13.72%	7.47%	Myanmar	13.72%	7.47%
Guinea	20.00%	13.75%	Niger	17.24%	10.99%
Guinea-Bissau	12.48%	6.23%	Sierra Leone	16.61%	10.36%
Guyana	12.48%	6.23%	Somalia	20.00%	13.75%
Haiti	16.61%	10.36%	Sudan	20.00%	13.75%
Iran	11.22%	4.97%	Syria	20.00%	13.75%
Korea, D.P.R.	17.24%	10.99%	Tanzania	13.90%	7.65%
Liberia	17.24%	10.99%	Togo	13.72%	7.47%
Libya	20.00%	13.75%	Yemen, Republic	17.24%	10.99%
Madagascar	12.48%	6.23%	Zimbabwe	17.24%	10.99%

Canada	5.69%	0.00%
USA	5.69%	0.00%
North America	**5.69%**	**0.00%**

Caribbean	**13.81%**	**8.12%**

Argentina	14.93%	9.24%
Belize	18.48%	12.79%
Bolivia	10.81%	5.12%
Brazil	9.96%	4.27%
Chile	6.55%	0.86%
Colombia	8.40%	2.71%
Costa Rica	9.24%	3.55%
Ecuador	14.93%	9.24%
El Salvador	14.93%	9.24%
Guatemala	9.24%	3.55%
Honduras	13.51%	7.82%
Mexico	7.40%	1.71%
Nicaragua	13.51%	7.82%
Panama	8.40%	2.71%
Paraguay	9.24%	3.55%
Peru	7.40%	1.71%
Suriname	12.09%	6.40%
Uruguay	8.40%	2.71%
Venezuela	19.89%	14.20%
Latin America	**10.11%**	**4.42%**

Angola	12.09%	6.40
Botswana	6.90%	1.21
Burkina Faso	14.93%	9.24
Cameroon	13.51%	7.82
Cape Verde	13.51%	7.82
Congo (DR)	14.93%	9.24
Congo (Rep)	14.93%	9.24
Côte d'Ivoire	10.81%	5.12%
Egypt	14.93%	9.24%
Ethiopia	12.09%	6.40%
Gabon	12.09%	6.40%
Ghana	14.93%	9.24%
Kenya	12.09%	6.40%
Morocco	9.24%	3.55%
Mozambique	19.89%	14.20%
Namibia	8.81%	3.12%
Nigeria	12.09%	6.40%
Rwanda	13.51%	7.82%
Senegal	12.09%	6.40%
South Africa	8.40%	2.71%
Tunisia	10.81%	5.12%
Uganda	13.51%	7.82%
Zambia	14.93%	9.24%
Africa	**11.98%**	**6.29%**

Bahrain	9.96%	4.27%
Iraq	14.94%	9.25%
Israel	6.69%	1.00%
Jordan	12.09%	6.40%
Kuwait	6.40%	0.71%
Lebanon	13.51%	7.82%
Oman	7.96%	2.27%
Qatar	6.40%	0.71%
Ras Al Khaimah	6.90%	1.21%
Saudi Arabia	6.69%	1.00%
Sharjah	7.40%	1.71%
United Arab Emirates	6.40%	0.71%
Middle East	**7.50%**	**1.81%**

Bangladesh	10.81%	5.12%
Cambodia	13.51%	7.82%
China	6.55%	0.86%
Fiji	12.09%	6.40%
Hong Kong	6.26%	0.57%
India	8.81%	3.12%
Indonesia	8.81%	3.12%
Japan	6.69%	1.00%
Korea	6.39%	0.70%
Macao	6.55%	0.86%
Malaysia	7.40%	1.71%
Mauritius	7.95%	2.26%
Mongolia	16.34%	10.65%
Pakistan	14.93%	9.24%
Papua New Guinea	13.51%	7.82%
Philippines	8.40%	2.71%
Singapore	5.69%	0.00%
Sri Lanka	12.09%	6.40%
Taiwan	6.55%	0.86%
Thailand	7.95%	2.26%
Vietnam	12.09%	6.40%
Asia	**7.12%**	**1.43%**

Australia	5.69%	0.00%
Cook Islands	12.09%	6.40%
New Zealand	5.69%	0.00%
Australia & NZ	**5.70%**	**0.01%**

Black #: Total ERP
Red #: Country risk premium
AVG: 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.

Shifting Country Risk? Turkey CDS!

One way of dealing with this: Revenue Weighted ERP for Turk Air

Region	*Revenues*	*Weight*	*ERP*
Africa	3376	11.46%	12.00%
Asia	6467	21.95%	7.12%
Middle East	3471	11.78%	7.03%
North America	3903	13.24%	5.69%
Western Europe	8396	28.49%	6.81%
Turkey	3855	13.08%	9.24%
Total	**29468**	**100.00%**	**7.67%**

Natural Resource Twists? Royal Dutch

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

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

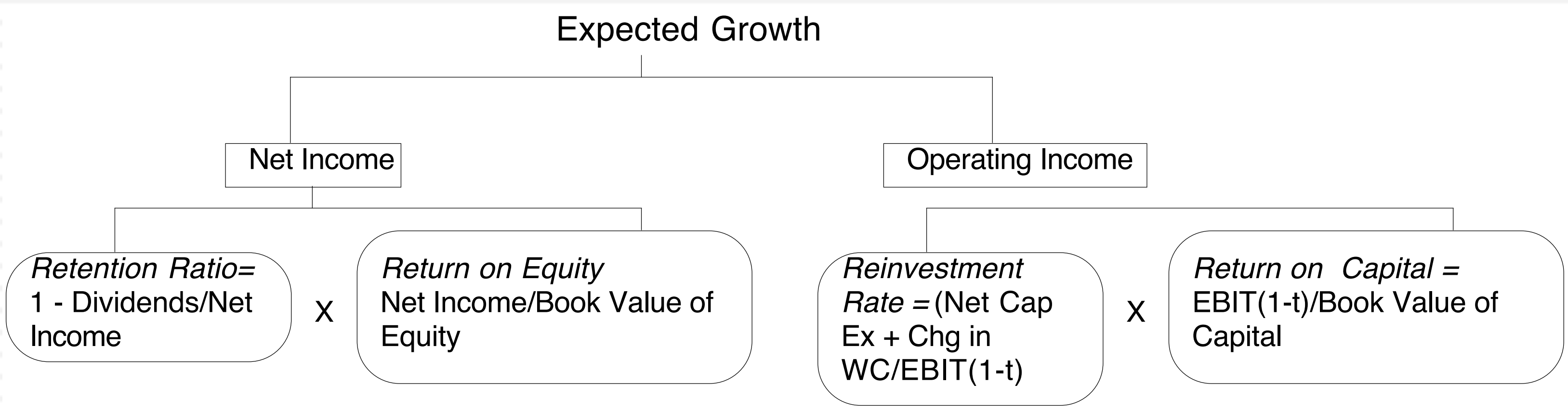
- **Just as beta measures exposure to macro economic risk, lambda measures exposure just to country risk. Like beta, it is scaled around one.**
- The easiest and most accessible data is on revenues. Most companies break their revenues down by region. One simplistic solution would be to do the following:

  Lambda = % of revenues domestically $_{firm}$/ % 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:
  - 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



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. <u>Scaling up</u> is hard to do.

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.

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

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

$$\textbf{Return on Invested Capital} = \frac{\text{After-tax Operating Income}}{\text{Capital Invested in existing assets}}$$

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

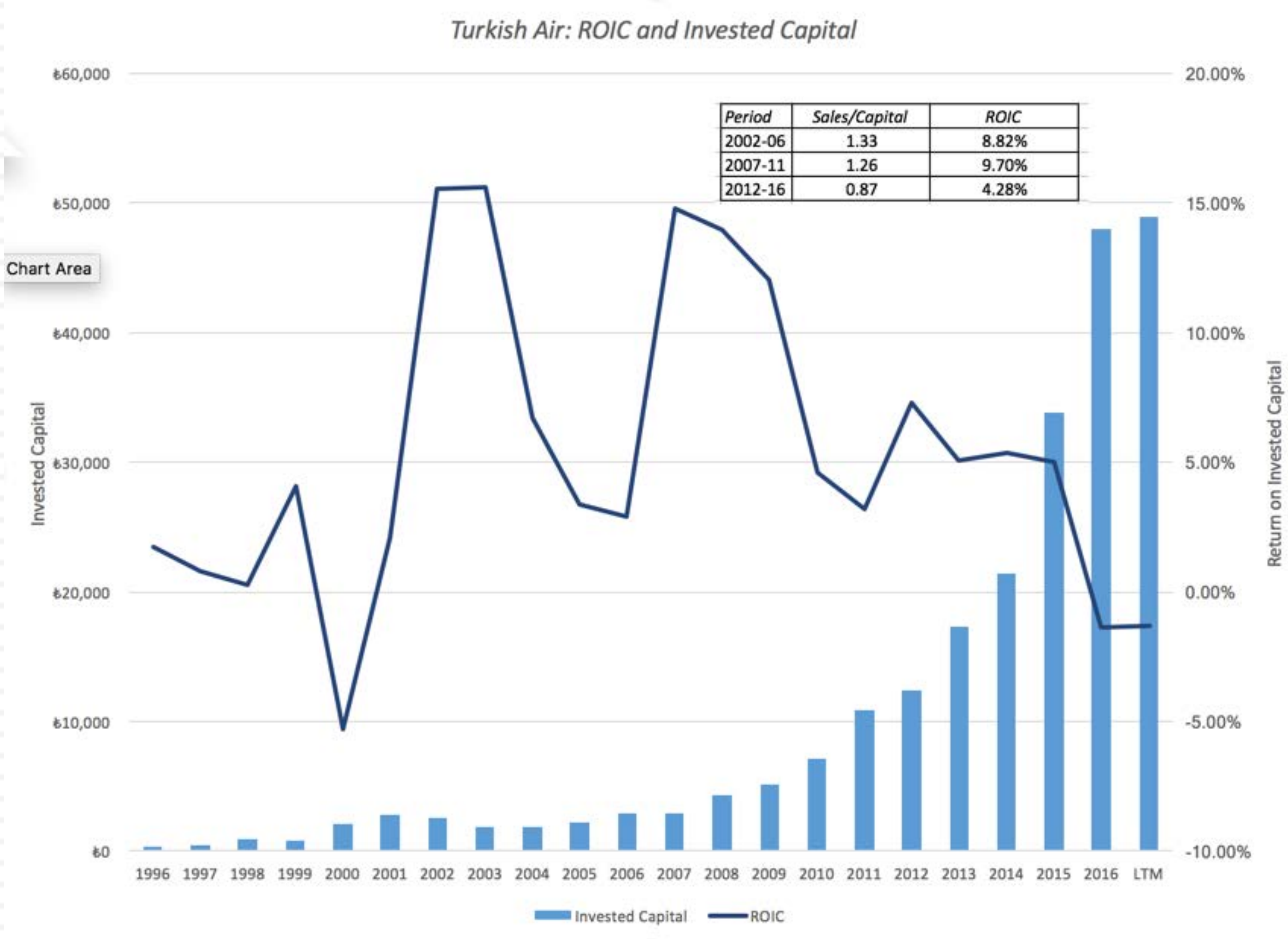
Accounting Write offs
Writing off mistakes can reduce invested capital & make it look better than it should.

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.

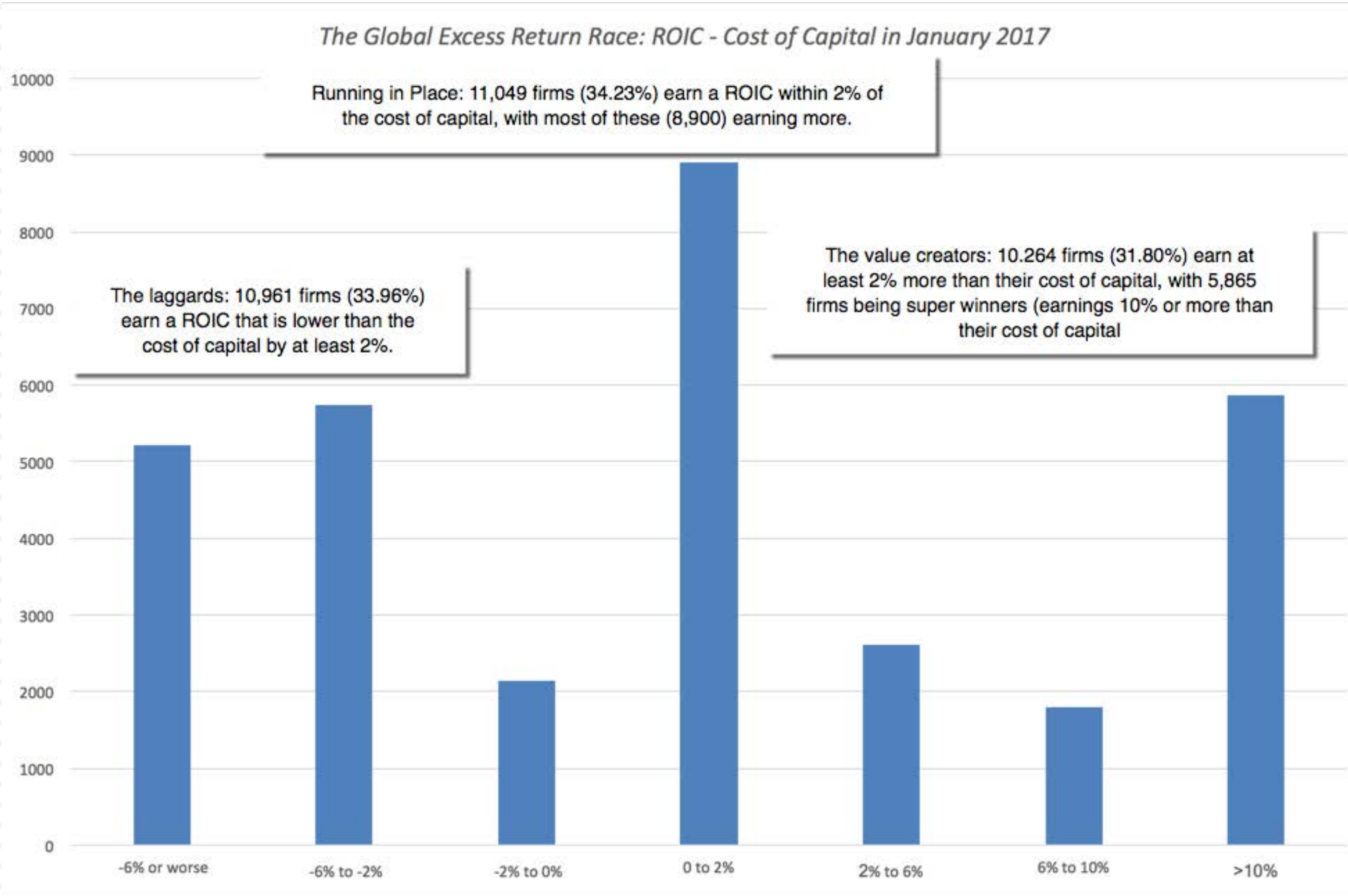
Accounting misclassification
When capital expenses (R&D) and financial expenses (leases) are miscategorized as operating expenses, invested capital will be understated.

Operating income, Reinvestment & Return on Capital -



Period	*Sales/Capital*	*ROIC*
2002-06	1.33	8.82%
2007-11	1.26	9.70%
2012-16	0.87	4.28%

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



A Regional Breakdown

Sub Group	Number of firms	Cost of Capital	ROIC	ROIC - Cost of Capital	% of firms with ROIC>WACC
Africa and Middle East	1,742	9.38%	7.08%	-2.29%	36.02%
Australia & NZ	1,527	7.67%	4.98%	-2.69%	28.35%
Canada	2,601	7.89%	3.14%	-4.76%	15.88%
China	4,793	8.05%	5.74%	-2.31%	38.84%
EU & Environs	4,812	8.07%	8.88%	0.81%	42.92%
Turkey	**402**	**9.24%**	**3.76%**	**-5.48%**	**68.15%**
Eastern Europe & Russia	491	9.90%	7.70%	-2.19%	33.98%
India	2,966	9.55%	13.56%	4.01%	39.84%
Japan	3,487	7.83%	7.37%	-0.46%	51.73%
Latin America	748	9.28%	7.90%	-1.38%	42.92%
Small Asia	7,500	9.06%	7.55%	-1.50%	35.18%
UK	1,193	8.04%	8.06%	0.02%	44.42%
United States	6,125	7.54%	10.23%	2.69%	42.40%

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?

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

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

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

Terminal Value and Growth

Stable Growth Rate	*Amgen*	*Tata Motors*	*Turkish Air*
0%	$150,652	₹ 435,686	91,456₺
1%	$154,479	₹ 435,686	91,456₺
2%	$160,194	₹ 435,686	91,456₺
3%	$167,784	₹ 435,686	91,456₺
4%	$179,099	₹ 435,686	91,456₺
5%		₹ 435,686	91,456₺
6%			91,456₺
Risk free Rate	4.78%	5.00%	7.62%
ROIC	10.00%	10.39%	10.50%
Cost of capital	8.08%	10.39%	10.50%

THE LOOSE ENDS IN VALUATION…

Aswath Damodaran

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

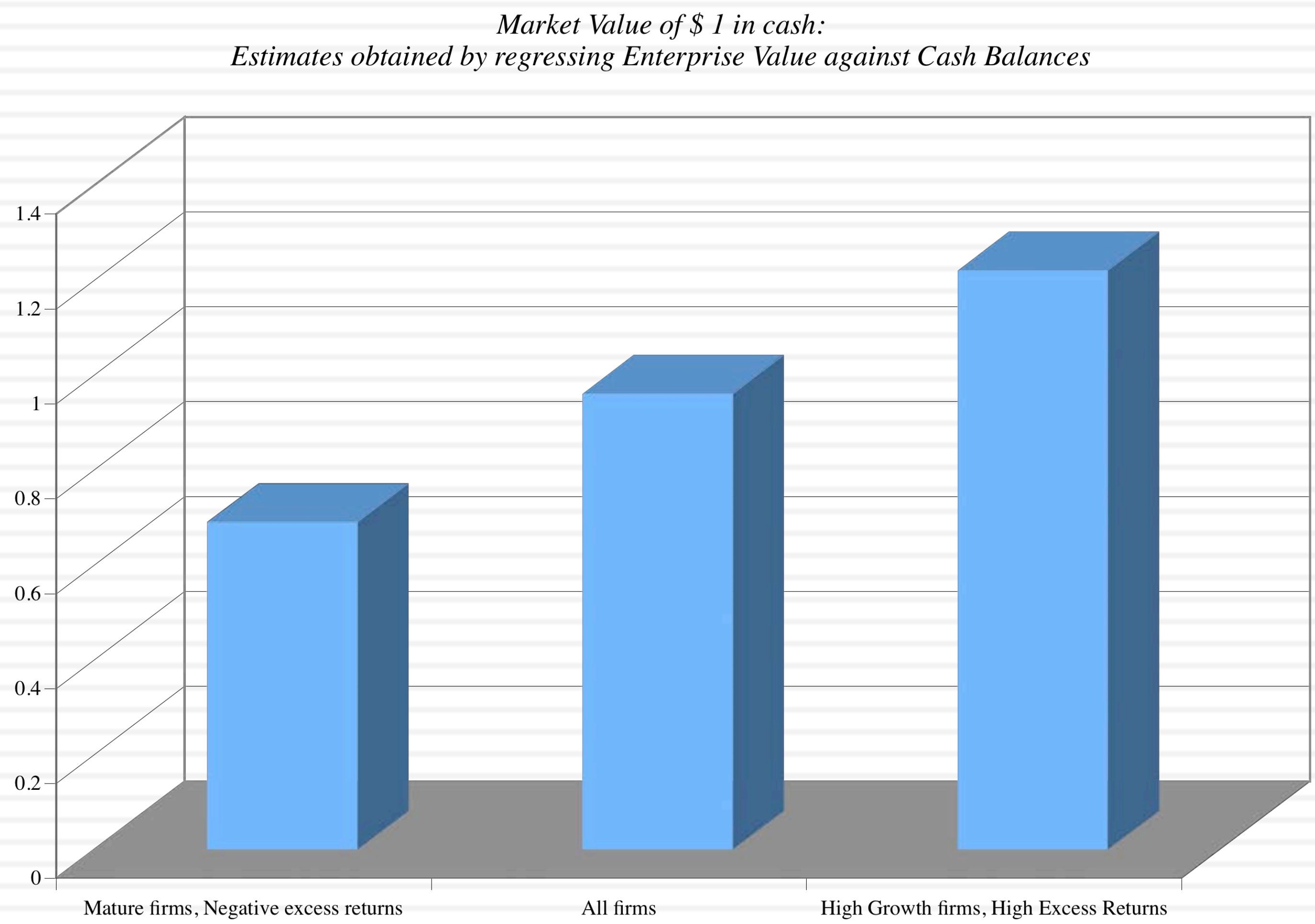
Differences in cashflow/ voting rights across shares

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?



2. Dealing with Holdings in Other firms

- Holdings in other firms can be categorized into
  - Minority passive holdings, in which case only the dividend from the holdings is shown in the balance sheet
  - Minority active holdings, in which case the share of equity income is shown in the income statements
  - Majority active holdings, in which case the financial statements are consolidated.
- We tend to be sloppy in practice in dealing with cross holdings. After valuing the operating assets of a firm, using consolidated statements, it is common to add on the balance sheet value of minority holdings (which are in book value terms) and subtract out the minority interests (again in book value terms), representing the portion of the consolidated company that does not belong to the parent company.

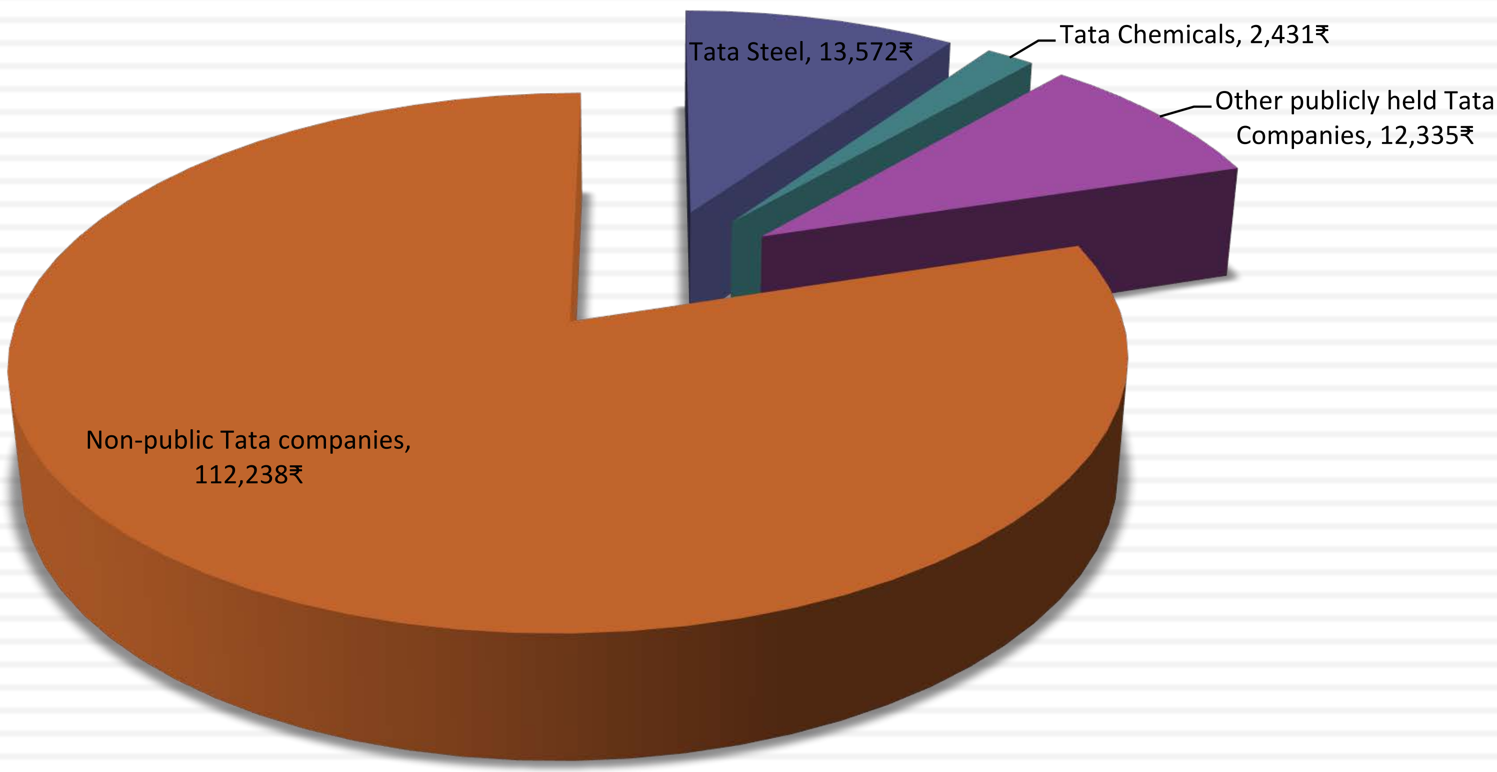
How to value holdings in other firms.. In a perfect world..

- In a perfect world, we would strip the parent company from its subsidiaries and value each one separately. The value of the combined firm will be
  - Value of parent company + Proportion of value of each subsidiary
- To do this right, you will need to be provided detailed information on each subsidiary to estimate cash flows and discount rates.

Two compromise solutions…

- The market value solution: When the subsidiaries are publicly traded, you could use their traded market capitalizations to estimate the values of the cross holdings. You do risk carrying into your valuation any mistakes that the market may be making in valuation.
- The relative value solution: When there are too many cross holdings to value separately or when there is insufficient information provided on cross holdings, you can convert the book values of holdings that you have on the balance sheet (for both minority holdings and minority interests in majority holdings) by using the average price to book value ratio of the sector in which the subsidiaries operate.

Tata Motor's Cross Holdings



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

- Unutilized assets: If you have assets or property that are not being utilized (vacant land, for example), you have not valued it yet. You can assess a market value for these assets and add them on to the value of the firm.
- Overfunded pension plans: If you have a defined benefit plan and your assets exceed your expected liabilities, you could consider the over funding with two caveats:
  - Collective bargaining agreements may prevent you from laying claim to these excess assets.
  - There are tax consequences. Often, withdrawals from pension plans get taxed at much higher rates.
- **Do not double count an asset**. If you count the income from an asset in your cash flows, you cannot count the market value of the asset in your value.

The "real estate" play

- Assume that Turkish Airlines has real estate investments underlying its operations. Assume that you estimate a real estate value of 10 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?

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

4. A Discount for Complexity: An Experiment

	Company A	Company B
Operating Income	\$ 1 billion	\$ 1 billion
Tax rate	40%	40%
ROIC	10%	10%
Expected Growth	5%	5%
Cost of capital	8%	8%
Business Mix	Single	Multiple Businesses
Holdings	Simple	Complex
Accounting	Transparent	Opaque

- Which firm would you value more highly?

Measuring Complexity: Volume of Data in Financial Statements

Company	*Number of pages in last 10Q*	*Number of pages in last 10K*
General Electric	65	410
Microsoft	63	218
Wal-mart	38	244
Exxon Mobil	86	332
Pfizer	171	460
Citigroup	252	1026
Intel	69	215
AIG	164	720
Johnson & Johnson	63	218
IBM	85	353

Measuring Complexity: A Complexity Score

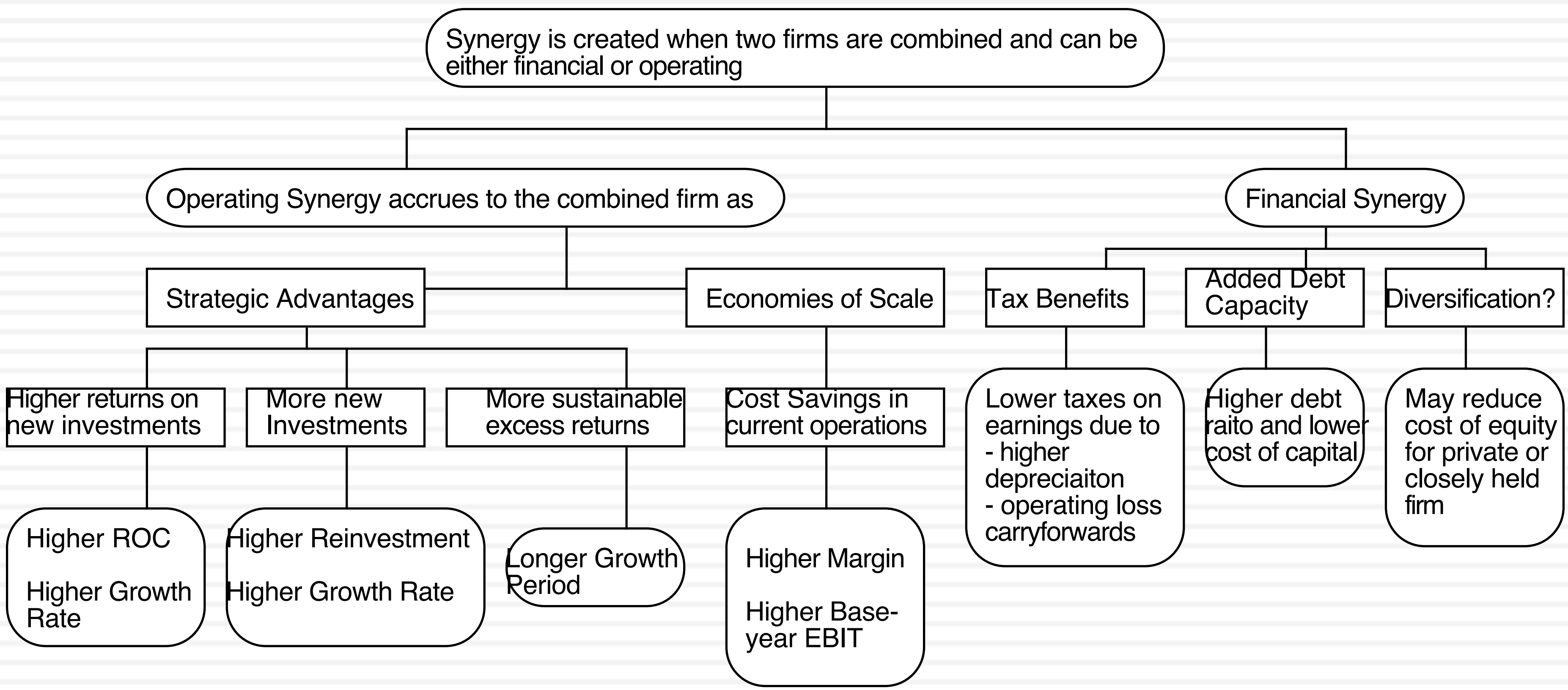
Item	Factors	Follow-up Question	Answer	Weighting factor	Gerdau Score	GE Score
Operating Income	1. Multiple Businesses	Number of businesses (with more than 10% of revenues) =	1	2.00	2	30
	2. One-time income and expenses	Percent of operating income =	10%	10.00	1	0.8
	3. Income from unspecified sources	Percent of operating income =	0%	10.00	0	1.2
	4. Items in income statement that are volatile	Percent of operating income =	15%	5.00	0.75	1
Tax Rate	1. Income from multiple locales	Percent of revenues from non-domestic locales =	70%	3.00	2.1	1.8
	2. Different tax and reporting books	Yes or No	No	Yes=3	0	3
	3. Headquarters in tax havens	Yes or No	No	Yes=3	0	0
	4. Volatile effective tax rate	Yes or No	Yes	Yes=2	2	0
Capital Expenditures	1. Volatile capital expenditures	Yes or No	Yes	Yes=2	2	2
	2. Frequent and large acquisitions	Yes or No	Yes	Yes=4	4	4
	3. Stock payment for acquisitions and investments	Yes or No	No	Yes=4	0	4
Working capital	1. Unspecified current assets and current liabilities	Yes or No	No	Yes=3	0	0
	2. Volatile working capital items	Yes or No	Yes	Yes=2	2	2
Expected Growth rate	1. Off-balance sheet assets and liabilities (operating leases and R&D)	Yes or No	No	Yes=3	0	3
	2. Substantial stock buybacks	Yes or No	No	Yes=3	0	3
	3. Changing return on capital over time	Is your return on capital volatile?	Yes	Yes=5	5	5
	4. Unsustainably high return	Is your firm's ROC much higher than industry average?	No	Yes=5	0	0
Cost of capital	1. Multiple businesses	Number of businesses (more than 10% of revenues) =	1	1.00	1	20
	2. Operations in emerging markets	Percent of revenues=	50%	5.00	2.5	2.5
	3. Is the debt market traded?	Yes or No	No	No=2	2	0
	4. Does the company have a rating?	Yes or No	Yes	No=2	0	0
	5. Does the company have off-balance sheet debt?	Yes or No	No	Yes=5	0	5
No-operating assets	Minority holdings as percent of book assets	Minority holdings as percent of book assets	0%	20.00	0	0.8
Firm to Equity value	Consolidation of subsidiaries	Minority interest as percent of book value of equity	63%	20.00	12.6	1.2
Per share value	Shares with different voting rights	Does the firm have shares with different voting rights?	Yes	Yes = 10	10	0
	Equity options outstanding	Options outstanding as percent of shares	0%	10.00	0	0.25
		Complexity Score =			48.95	90.55

Dealing with Complexity

- In Discounted Cashflow Valuation
  - The Aggressive Analyst: Trust the firm to tell the truth and value the firm based upon the firm's statements about their value.
  - The Conservative Analyst: Don't value what you cannot see.
  - The Compromise: Adjust the value for complexity
    - Adjust cash flows for complexity
    - Adjust the discount rate for complexity
    - Adjust the expected growth rate/ length of growth period
    - Value the firm and then discount value for complexity
- In relative valuation
  - In a relative valuation, you may be able to assess the price that the market is charging for complexity:
  - With the hundred largest market cap firms, for instance:

PBV = 0.65 + 15.31 ROE – 0.55 Beta + 3.04 Expected growth rate – 0.003 # Pages in 10K

5. The Value of Synergy



Valuing Synergy

(1) the firms involved in the merger are valued independently, by discounting expected cash flows to each firm at the weighted average cost of capital for that firm.

(2) the value of the combined firm, with no synergy, is obtained by adding the values obtained for each firm in the first step.

(3) The effects of synergy are built into expected growth rates and cashflows, and the combined firm is re-valued with synergy.

Value of Synergy = Value of the combined firm, with synergy - Value of the combined firm, without synergy

Inbev + SAB Miller: Where's the synergy?

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

The value of synergy

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

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

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

- There is often a temptation to add on premiums for intangibles. Here are a few examples.
  - Brand name
  - Great management
  - Loyal workforce
  - Technological prowess
- There are two potential dangers:
  - For some assets, the value may already be in your value and adding a premium will be double counting.
  - For other assets, the value may be ignored but incorporating it will not be easy.

Valuing Brand Name

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

Valuing a Franchise: Star Wars

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

Add on $ per box office $

Star Wars Franchise Valuation: December 2015

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

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

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

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

Discounted back @ 7.61% cost of capital of entertainment companies

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

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

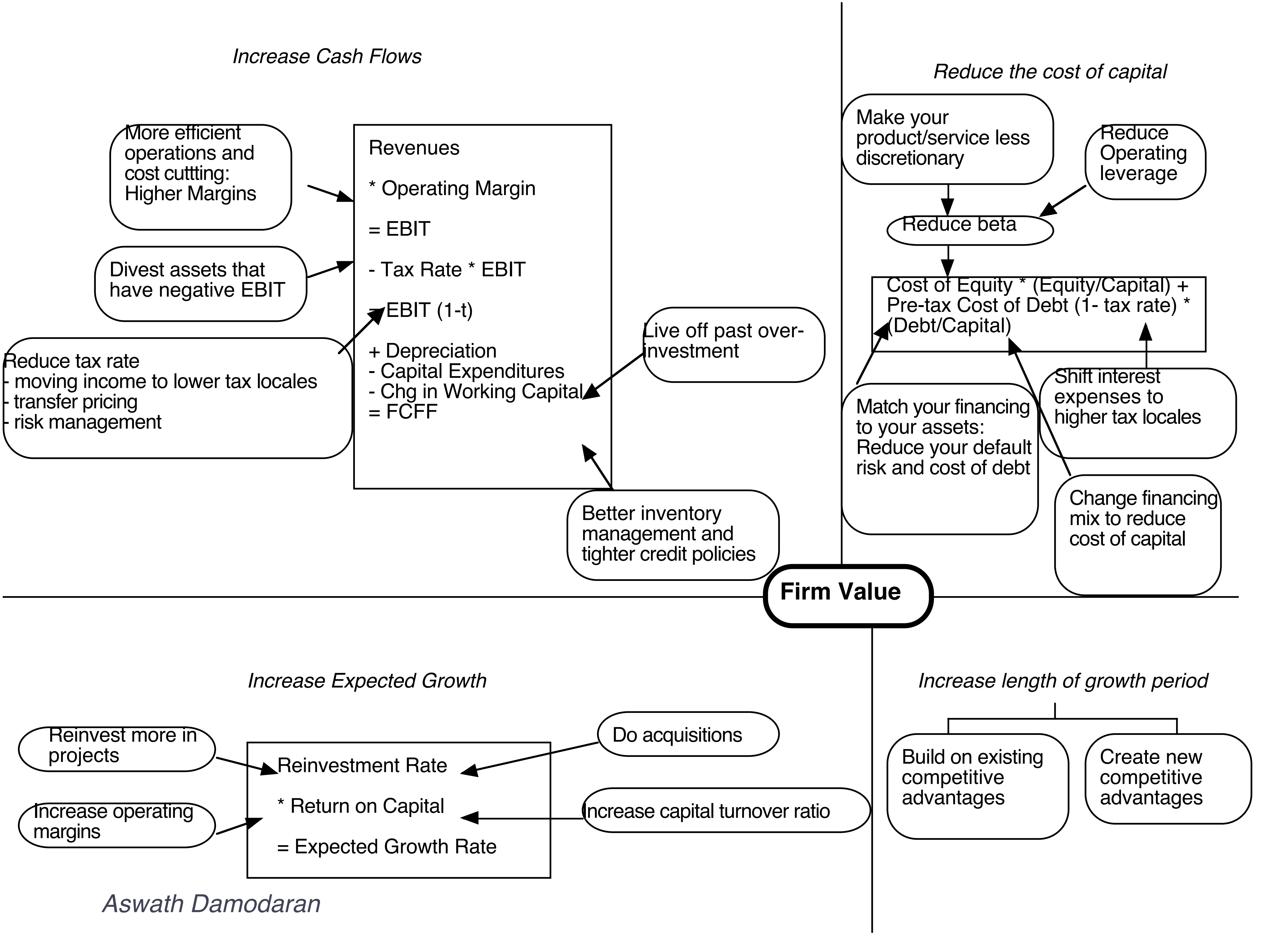
- General Rule: Debt generally has the following characteristics:
  - Commitment to make fixed payments in the future
  - The fixed payments are tax deductible
  - Failure to make the payments can lead to either default or loss of control of the firm to the party to whom payments are due.
- Defined as such, debt should include
  - All interest bearing liabilities, short term as well as long term
  - All leases, operating as well as capital
- Debt should not include
  - Accounts payable or supplier credit

But should consider other potential liabilities when getting to equity value…

- If you have under funded pension fund or health care plans, you should consider the under funding at this stage in getting to the value of equity.
  - If you do so, you should not double count by also including a cash flow line item reflecting cash you would need to set aside to meet the unfunded obligation.
  - You should not be counting these items as debt in your cost of capital calculations….
- If you have contingent liabilities - for example, a potential liability from a lawsuit that has not been decided - you should consider the expected value of these contingent liabilities
  - Value of contingent liability = Probability that the liability will occur * Expected value of liability

8. The Value of Control

- The value of the control premium that will be paid to acquire a block of equity will depend upon two factors -
  - Probability that control of firm will change: This refers to the probability that incumbent management will be replaced. this can be either through acquisition or through existing stockholders exercising their muscle.
  - Value of Gaining Control of the Company: The value of gaining control of a company arises from two sources - the increase in value that can be wrought by changes in the way the company is managed and run, and the side benefits and perquisites of being in control
  - Value of Gaining Control = Present Value (Value of Company with change in control - Value of company without change in control) + Side Benefits of Control



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

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%

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

HKR Cashflows

Year	1	2	3	4	5
EBIT (1-t)	HRK 466	HRK 498	HRK 532	HRK 569	HRK 608
- Reinvestment	HRK 330	HRK 353	HRK 377	HRK 403	HRK 431
FCFF	HRK 136	HRK 145	HRK 155	HRK 166	HRK 177

612
246
365

Op. Assets 4312
+ Cash: 1787
- Debt 141
- Minority int 465
=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

Adris Grupa: 4/2010 (Restructured)

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

Increased ROIC to cost of capital

Reinvestment Rate
70.83%

Expected Growth from new inv.
.7083*.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

628
246
367

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

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

When will the firm become a **mature firm**, 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

The Dark Side of Valuation…

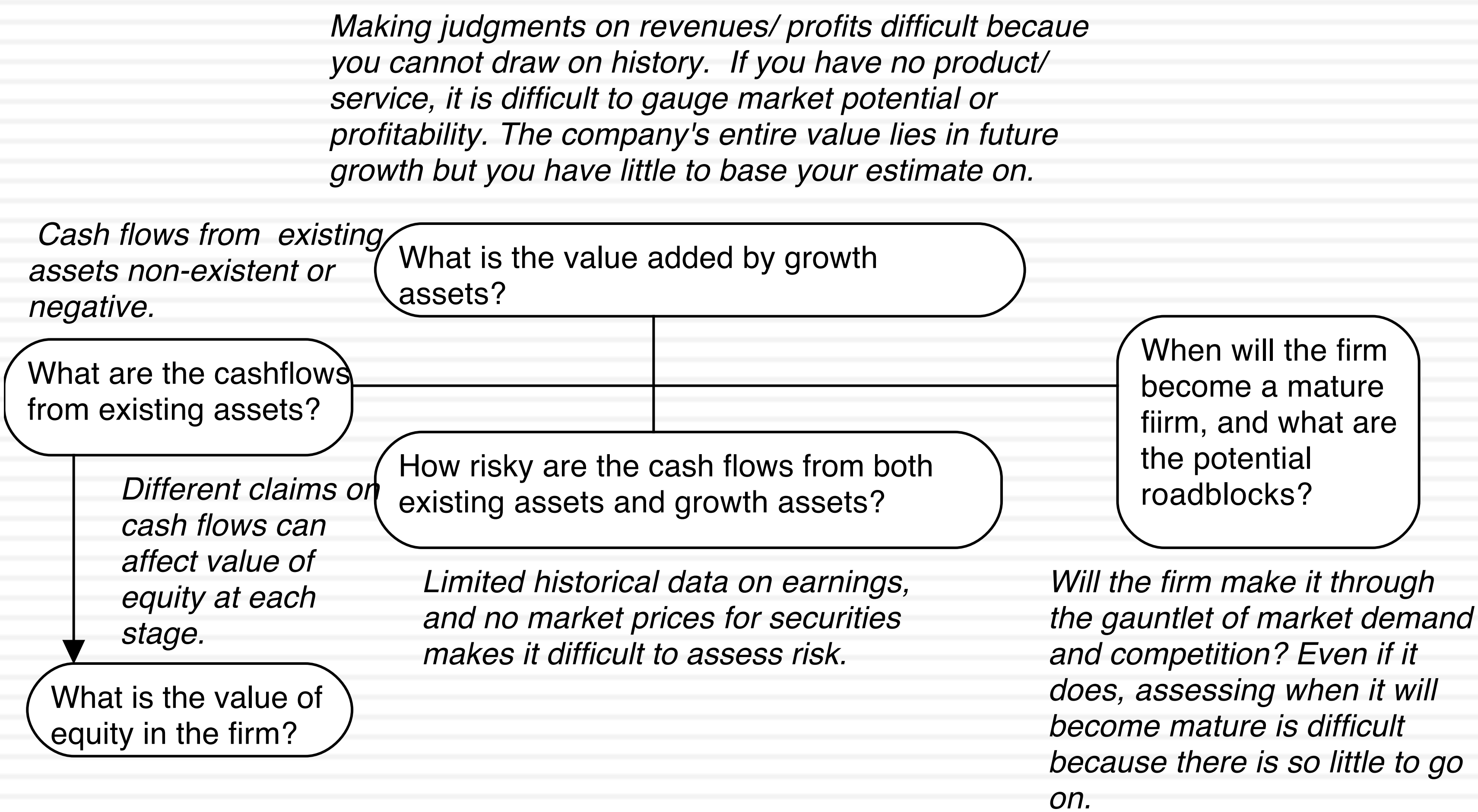
- Valuing stable, money making companies with consistent and clear accounting statements, a long and stable history and lots of comparable firms is easy to do.
- The true test of your valuation skills is when you have to value “difficult” companies. In particular, the challenges are greatest when valuing: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

Difficult to value companies…

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

I. The challenge with young companies…

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



Upping the ante.. Young companies in young businesses…

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

Amazon in January 2000

Current Revenue $ 1,117

Current Margin: -36.71%

EBIT -410m

From previous years

NOL: 500 m

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

Sales Turnover Ratio: 3.00

Competitive Advantages

Revenue Growth: 42%

Expected Margin: -> 10.00%

Stable Growth

Stable Revenue Growth: 6%

Stable Operating Margin: 10.00%

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

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

Forever

	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%

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.

Amazon was trading at $84 in January 2000.

Cost of Equity
12.90%

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

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

Weights
Debt= 1.2% -> 15%

Pushed debt ratio to retail industry average of 15%.

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

Riskfree Rate:
T. Bond rate = 6.5%

\+

Beta
1.60 -> 1.00

X

Risk Premium
4%

Internet/ Retail

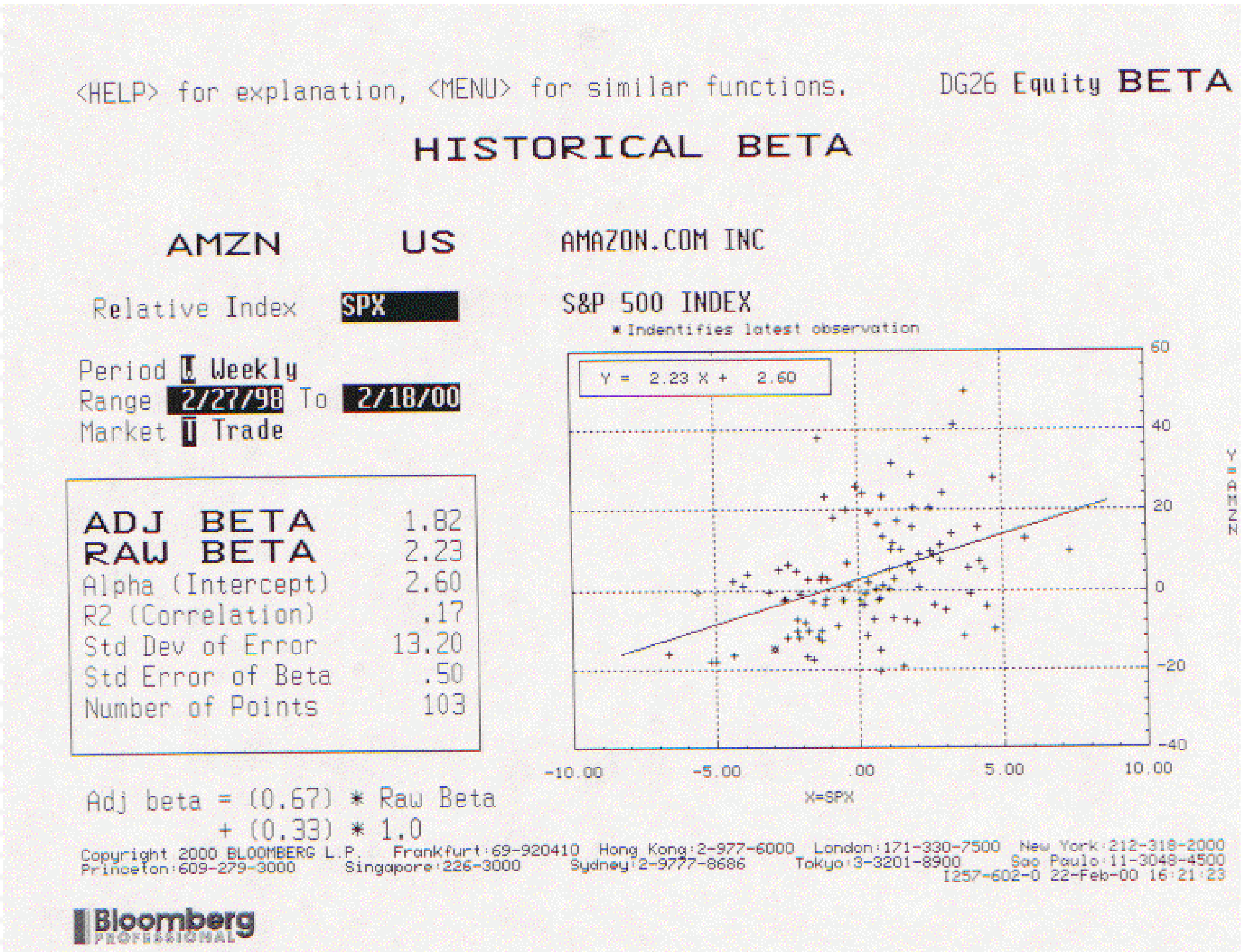
Operating Leverage

Current D/ E: 1.21%

Base Equity Premium

Country Risk Premium

Lesson 1: Don’t trust regression betas….

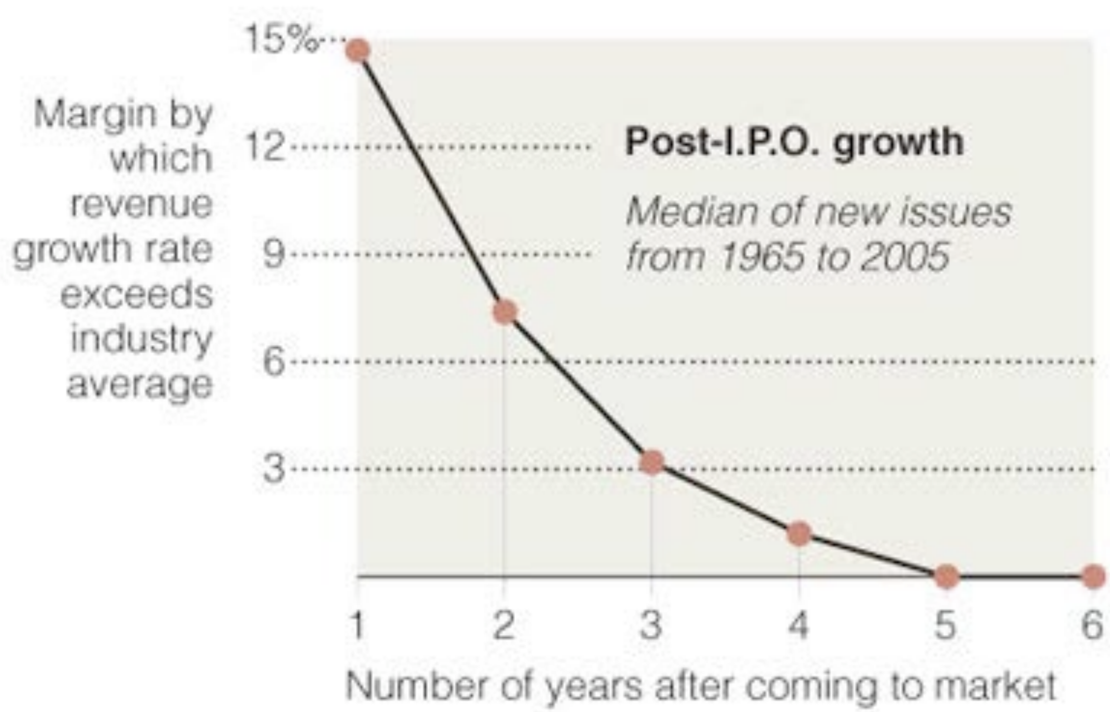


Lesson 2: Work backwards and keep it simple…

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

Lesson 3: Scaling up is hard to do…

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



Source: Andrew Metrick — The New York Times

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

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%

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

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

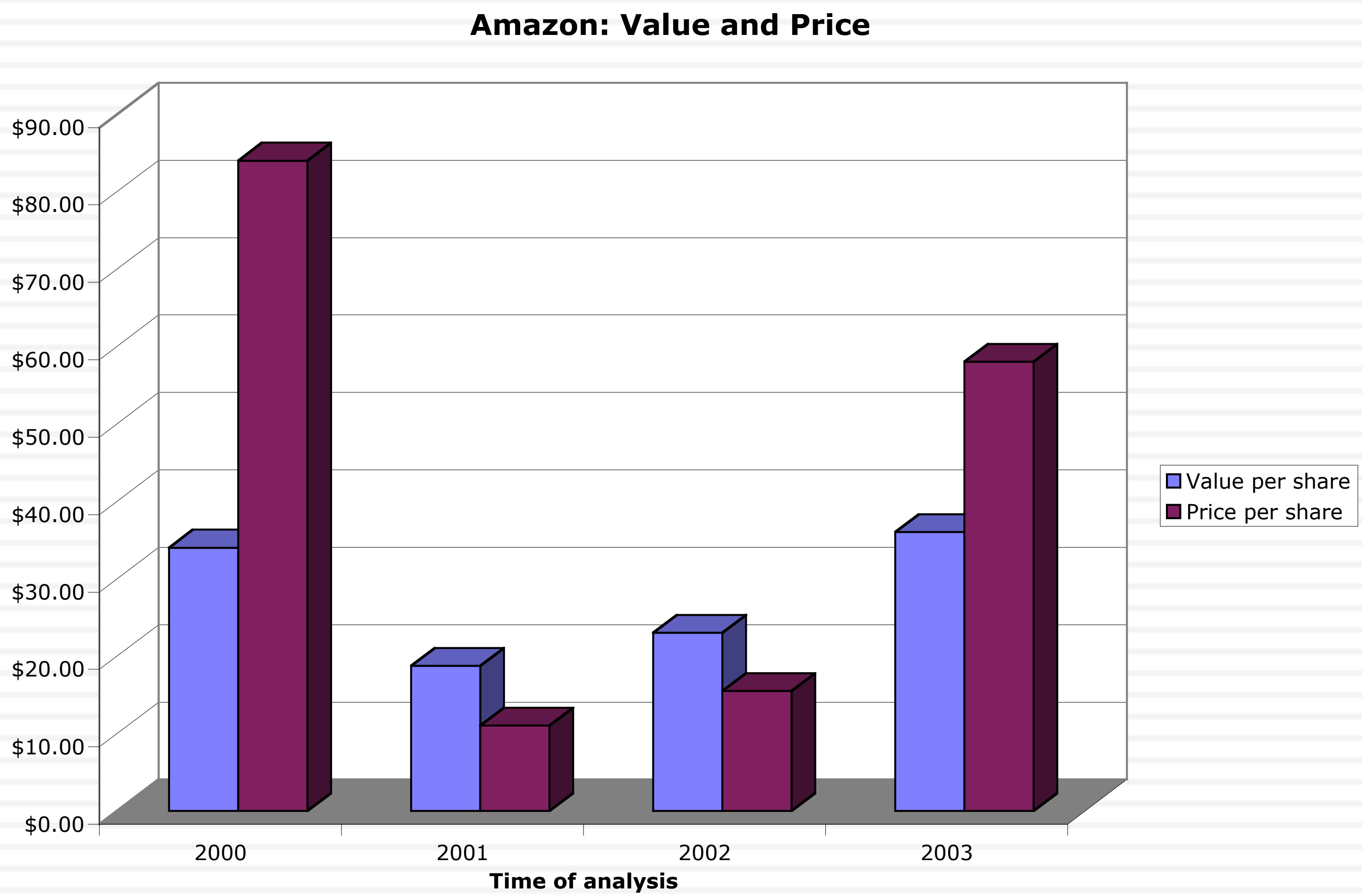
Lesson 6: Don’t forget to mop up…

- 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

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).

And the market is often "more wrong"….



Valuing an IPO

- Valuation issues:
  - Use of the proceeds from the offering: The proceeds from the offering can be held as cash by the firm to cover future investment needs, paid to existing equity investors who want to cash out or used to pay down debt.
  - Warrants/ Special deals with prior equity investors: If venture capitalists and other equity investors from earlier iterations of fund raising have rights to buy or sell their equity at pre-specified prices, it can affect the value per share offered to the public.
- Pricing issues:
  - Institutional set-up: Most IPOs are backed by investment banking guarantees on the price, which can affect how they are priced.
  - Follow-up offerings: The proportion of equity being offered at initial offering and subsequent offering plans can affect pricing.

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%

Riskfree Rate:
Riskfree rate = 2.41%

+

Beta
1.092

X

ERP
5.94%

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%

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.

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?

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%

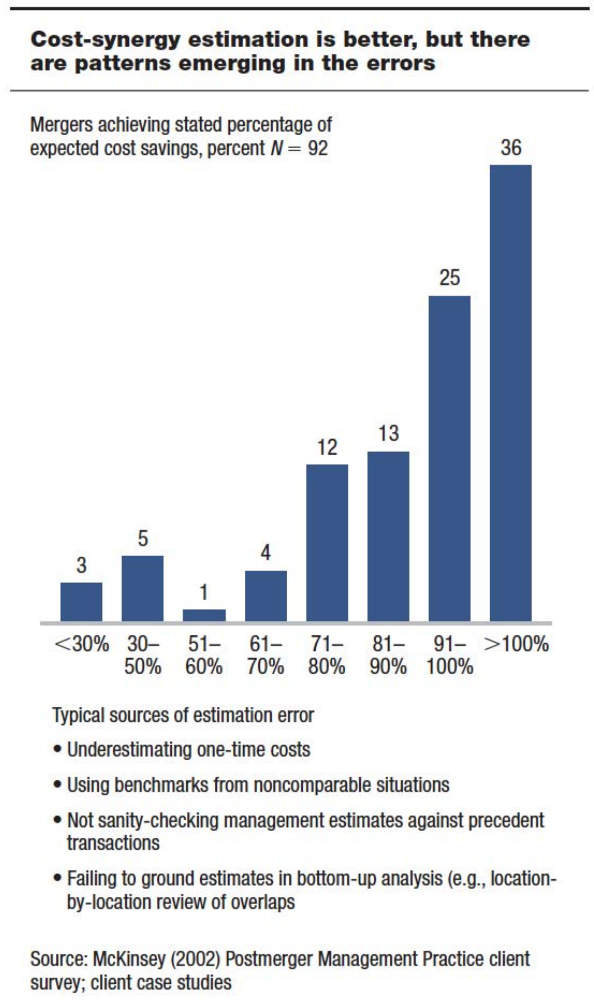
Cost of equity rises but cost of capital drops.

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

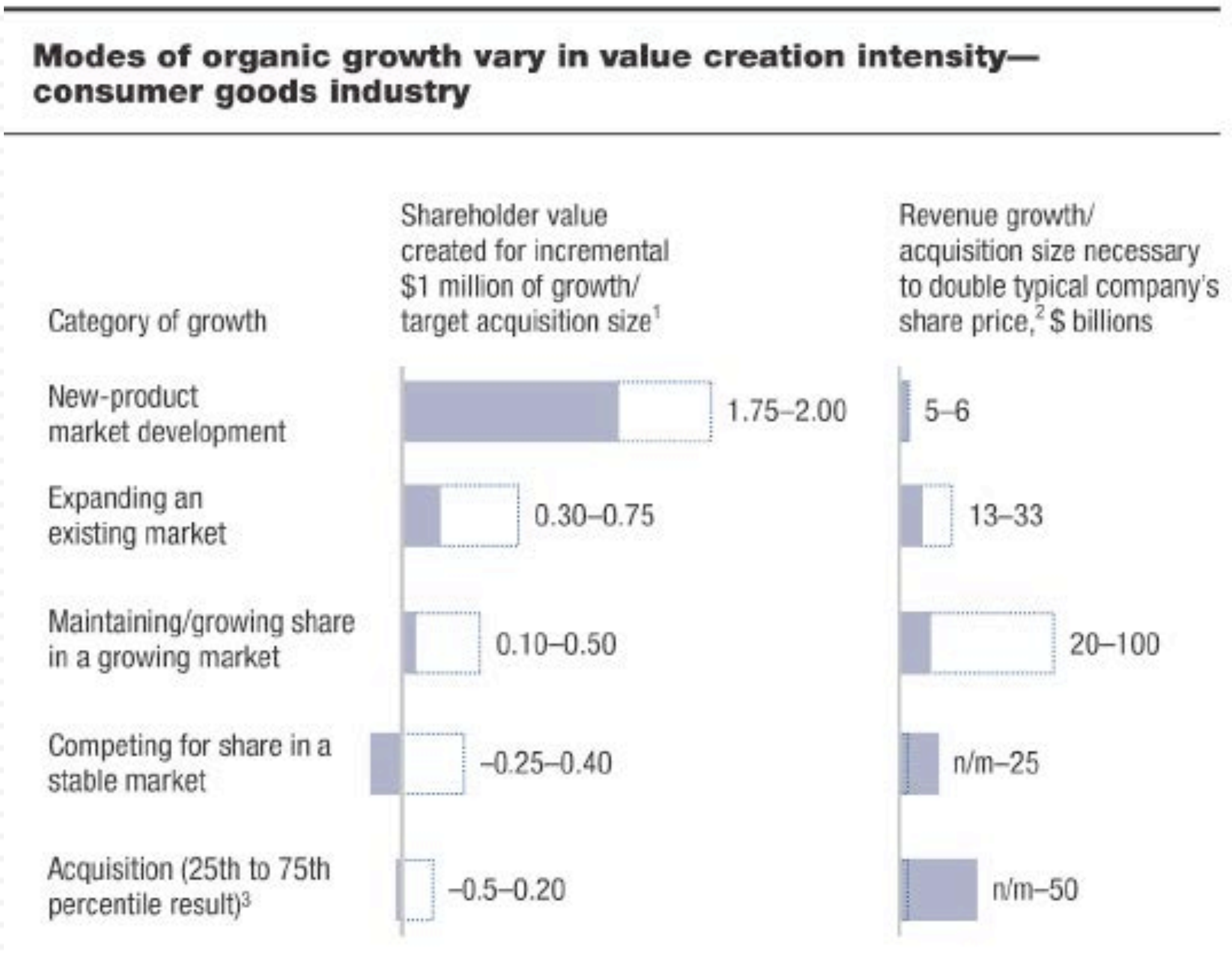
Probability of management change = 10% 3

Expected value =$31.91 (.90) + $37.80 (.10) = $32.50 4

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



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



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

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

Current Cost of Capital

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)

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?

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

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

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

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.

What is the value of equity in the firm?

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).

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

Current Revenue
$ 4,390

Current Margin:
4.76%

EBIT
$ 209m

Extended reinvestment break, due ot investment in past

Industry average

Expected Margin:
-> 17%

Stable Growth

Stable Revenue Growth: 3%

Stable Operating Margin: 17%

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

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

	1	2	3	4	5	6	7	8	9	10	Term. Year
Revenues	$4,434	$4,523	$5,427	$6,513	$7,815	$8,206	$8,616	$9,047	$9,499	$9,974	$10,273
Oper margin	5.81%	6.86%	7.90%	8.95%	10%	11.40%	12.80%	14.20%	15.60%	17%	17%
EBIT	$258	$310	$429	$583	$782	$935	$1,103	$1,285	$1,482	$1,696	$ 1,746
Tax rate	26.0%	26.0%	26.0%	26.0%	26.0%	28.4%	30.8%	33.2%	35.6%	38.00%	38%
EBIT * (1 - t)	$191	$229	$317	$431	$578	$670	$763	$858	$954	$1,051	$1,083
- Reinvestment	-$19	-$11	$0	$22	$58	$67	$153	$215	$286	$350	$ 325
FCFF	$210	$241	$317	$410	$520	$603	$611	$644	$668	$701	$758
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%	

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

Cost of Equity
21.82%

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

Weights
Debt= 73.5% ->50%

Riskfree Rate:
T. Bond rate = 3%

\+

Beta
3.14-> 1.20

X

Risk Premium
6%

Casino
1.15

Current
D/E: 277%

Base Equity Premium

Country Risk Premium

Aswath Damodaran

Las Vegas Sands
Feburary 2009
Trading @ $4.25

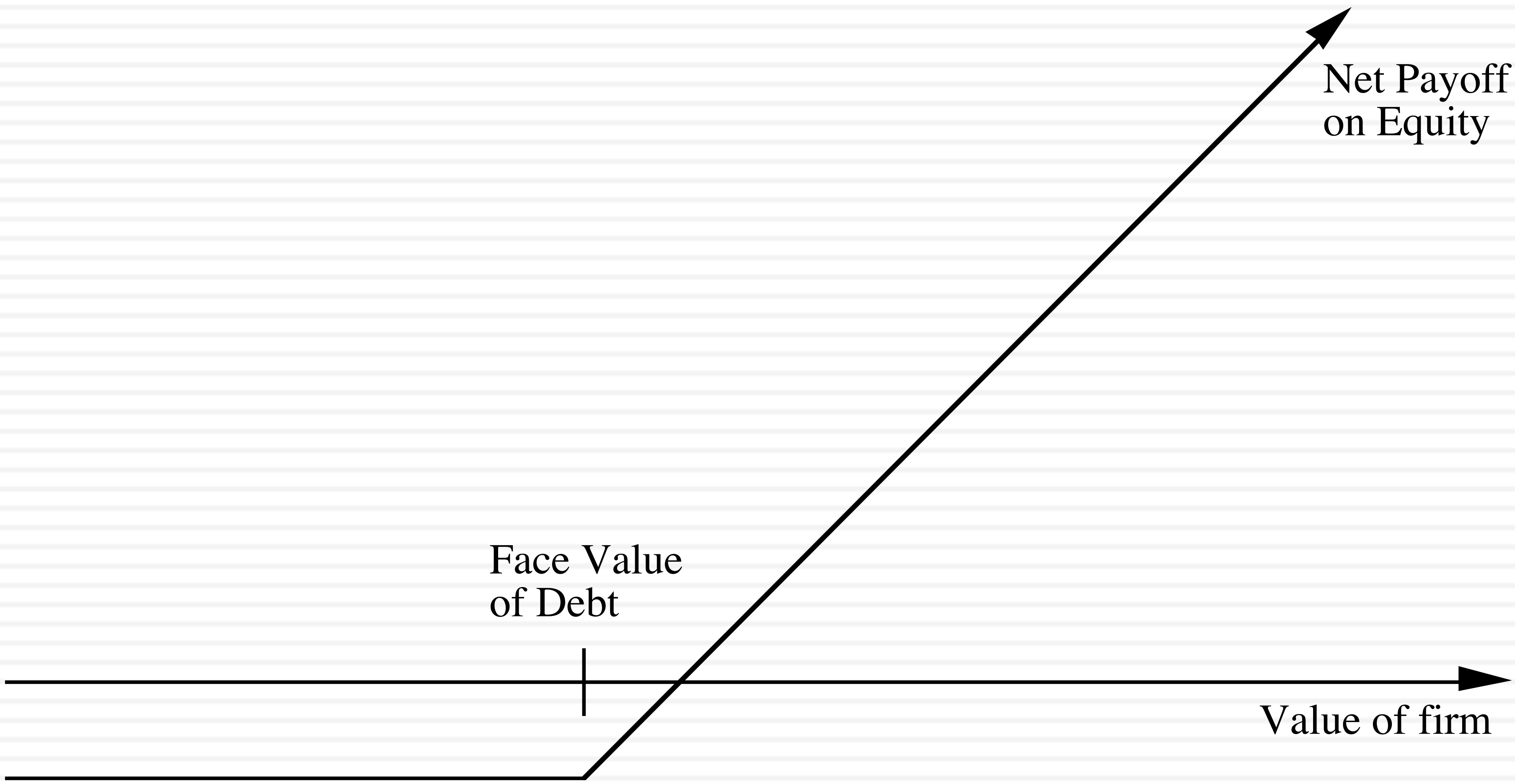
Adjusting the value of LVS for distress..

- In February 2009, LVS was rated B+ by S&P. Historically, 28.25% of B+ rated bonds default within 10 years. LVS has a 6.375% bond, maturing in February 2015 (7 years), trading at $529. If we discount the expected cash flows on the bond at the riskfree rate, we can back out the probability of distress from the bond price:

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

- Solving for the probability of bankruptcy, we get:
- π_{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

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



Application to valuation: A simple example

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

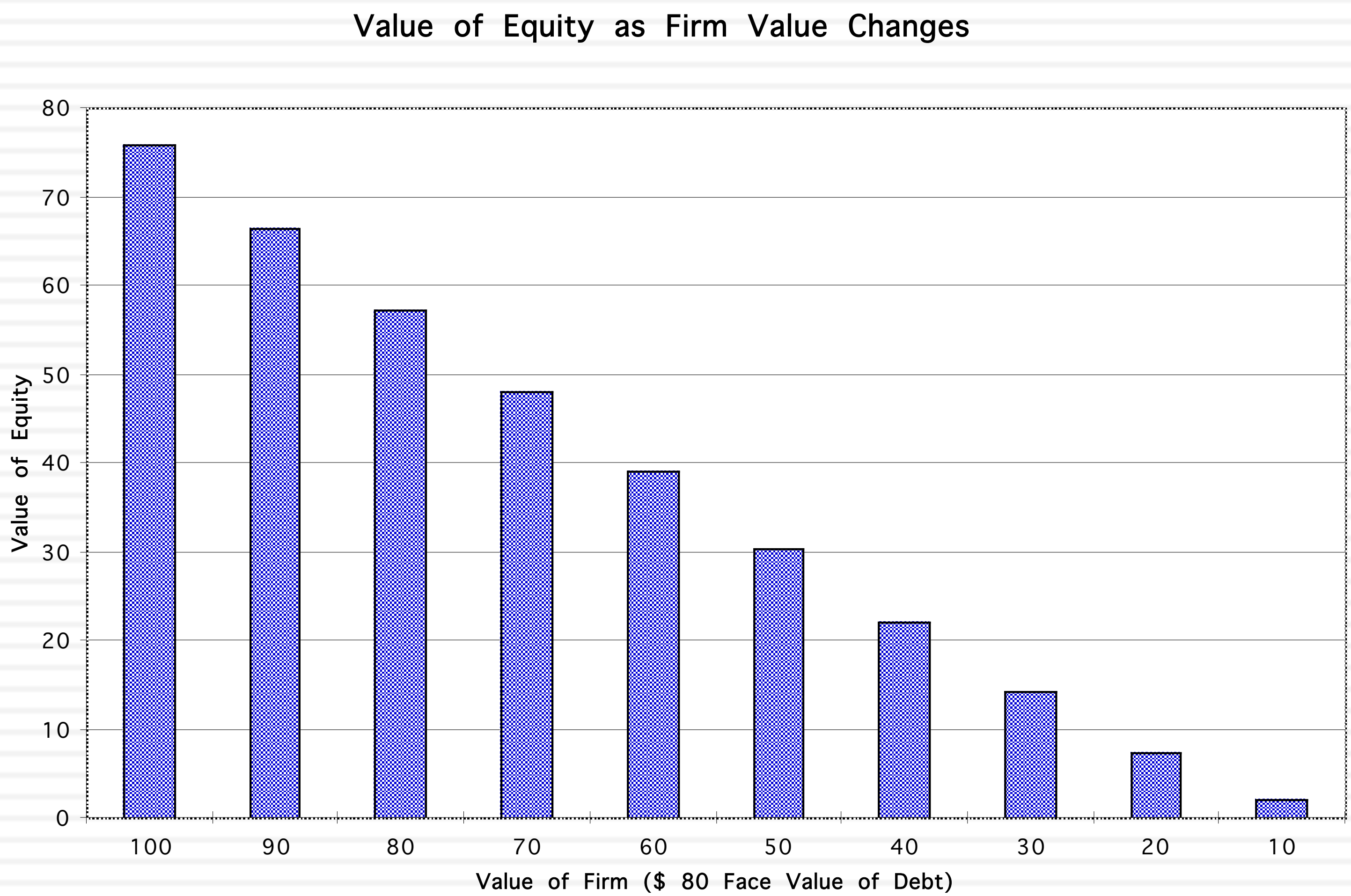
Model Parameters & Valuation

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

Firm value drops..

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

Equity value persists .. As firm value declines..



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?

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

Preferred stock is a significant source of capital.

What is the value of equity in the firm?

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

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

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%

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

+

0.81

Average Beta for Banks

X

Equity Risk Premium
15.7%

100% in Egypt

Lesson 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)

Deutsche Bank: A Crisis Valuation (October 2016)

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

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

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

Common Equity increases in tandem with Tier 1 capital

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

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

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

Return on equity increases to 5.85% (25th percentile of banks) in year 5 and 9,44% (cost of equity) in year 10

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.

Valuing a Cyclical Company - Toyota in Early 2009

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.

Year	Revenues	Operating Inco	EBITDA	Operating Marg
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 (Estin	¥22,661,325	¥267,904	¥1,310,304	1.18%
		¥1,306,867		7.33%

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

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%

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 = 8.65% (.471) + 3.25% (1-.407) (.529) = 5.09%

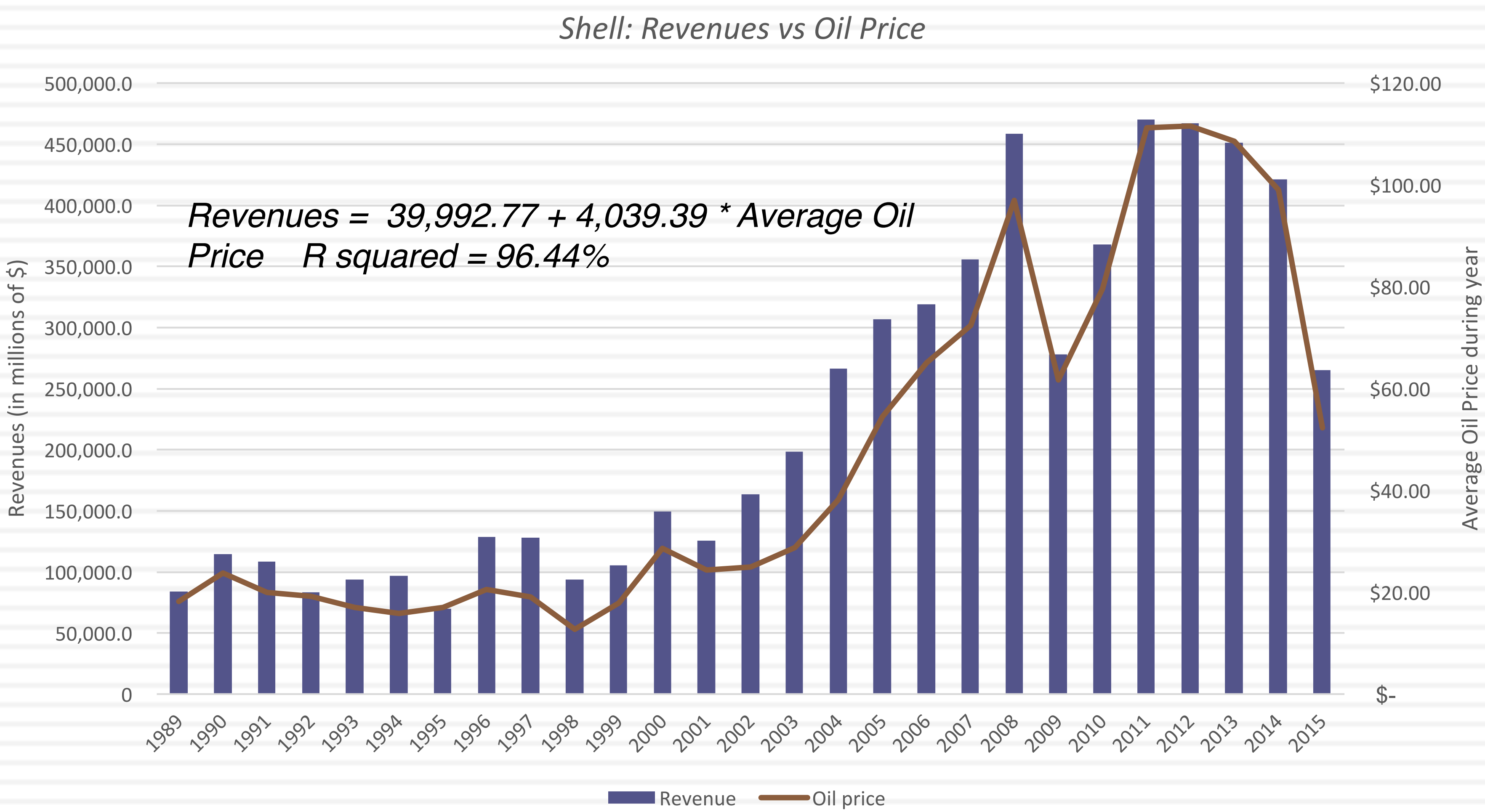
Stable Growth 4

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)

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

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

Shell's Revenues & Oil Prices



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

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

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

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

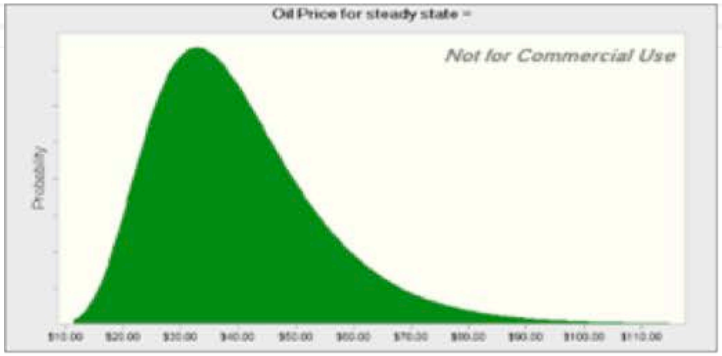
Operating margin converges on Shell's historical average margin of 9.35% from 200-2015

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

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

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

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

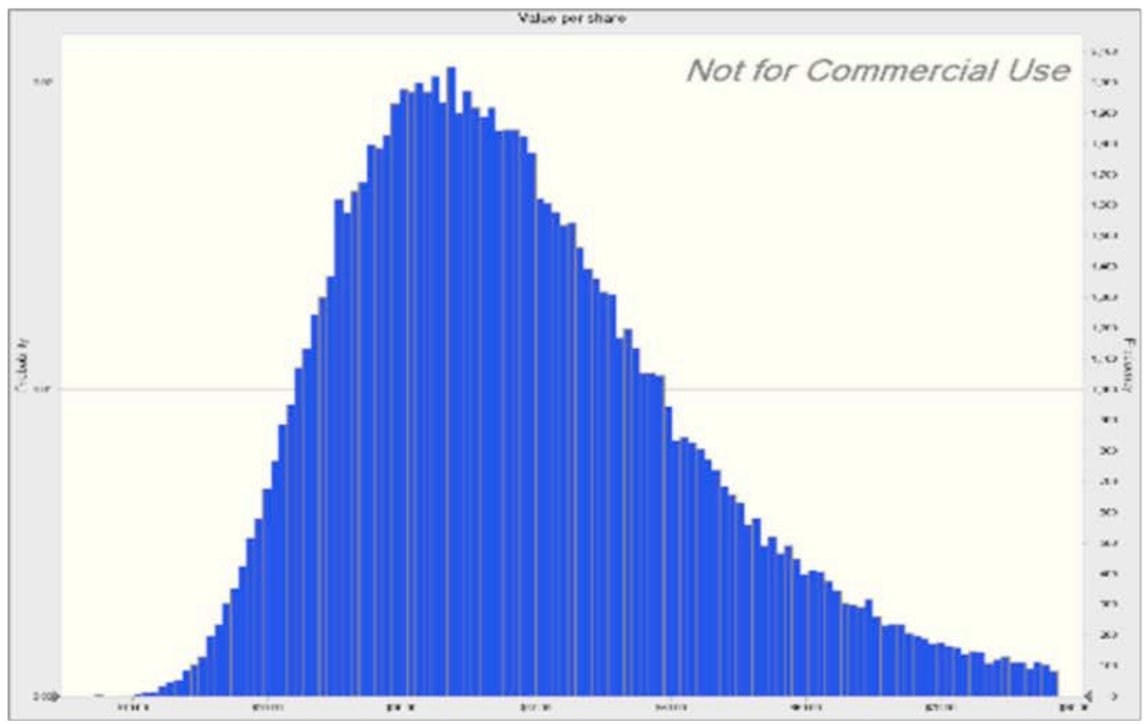


Revenue calculated from the oil price drawn from distribution
Revenue = 39992.77+4039.40*Oil Price/Barrel

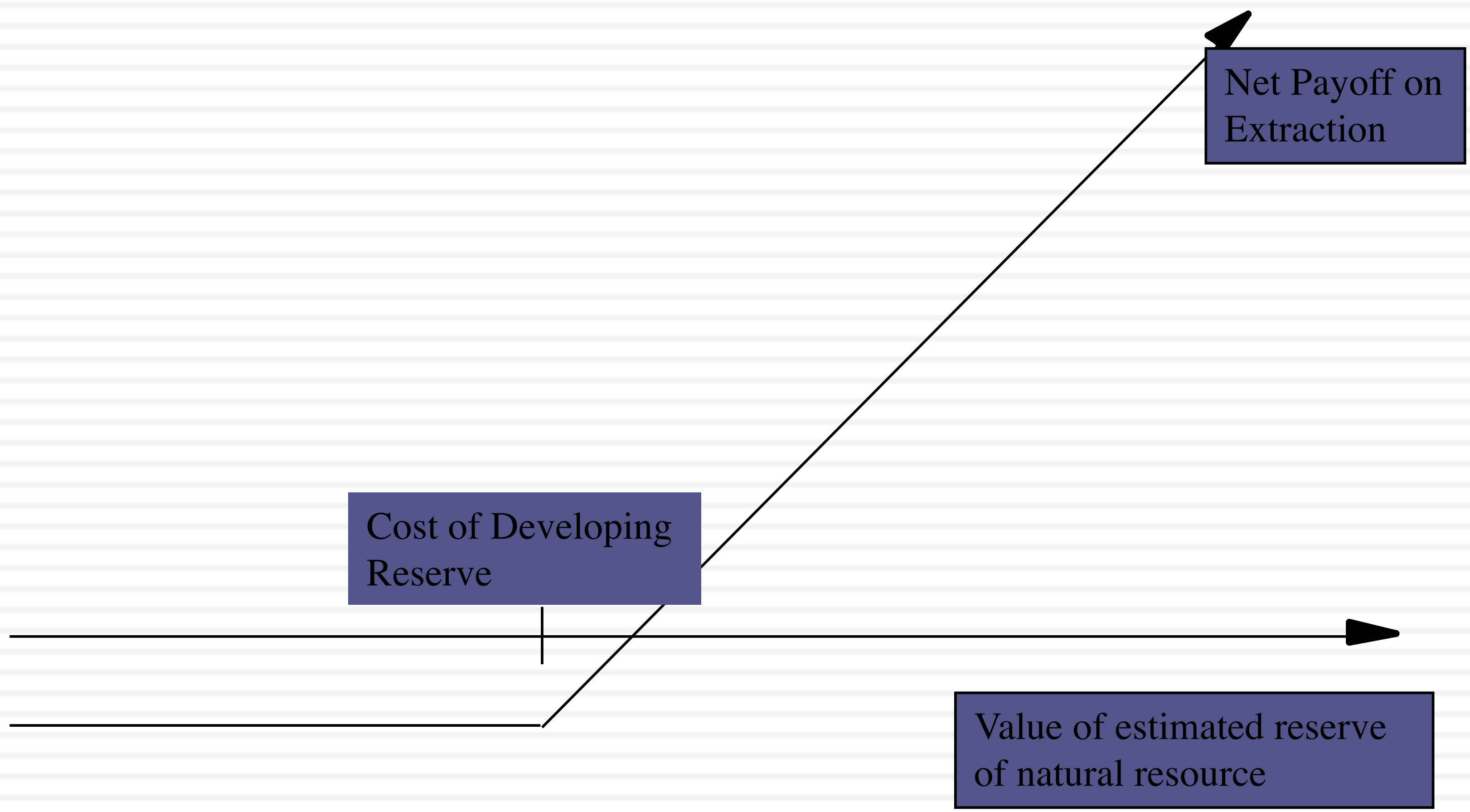
Pre-tax Operating Income based on revenue & selected margin
Pre-tax Operating Income = Revenues * Operating Margin

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

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



The optionality in commodities: Undeveloped reserves as an option



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%

Return on Capital
13.64%

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

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

Terminal Value5= 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

Market Beta: 0.98

Unlevered Beta for Sectors: 0.78

Firm's D/E Ratio: 30/70

X

Risk Premium
4.00%

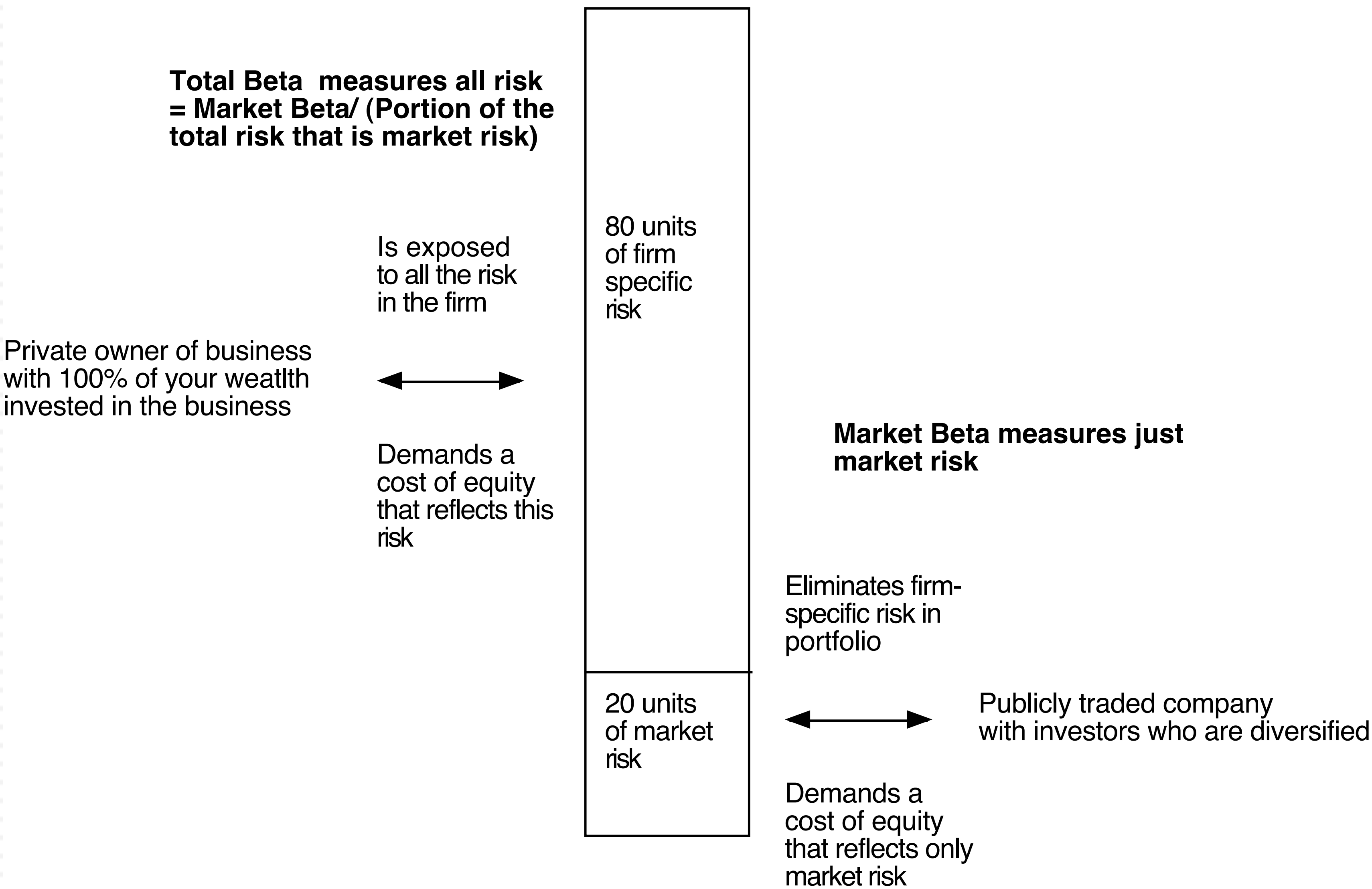
Mature risk premium
4%

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 Risk versus Market Risk

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

Lesson 2: With financials, trust but verify..

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

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

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

And it is not just in private businesses..

- With many Asian companies, the float (the shares that are traded) is a small percentage of the outstanding shares. Assume that you are doing intrinsic valuation of one such company. How, if at all, will you incorporate this low float in your valuation?

a) Lower expected cash flows
b) Raise the discount rate
c) Attach an illiquidity discount to value
d) Let the bid ask spread take care of it

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

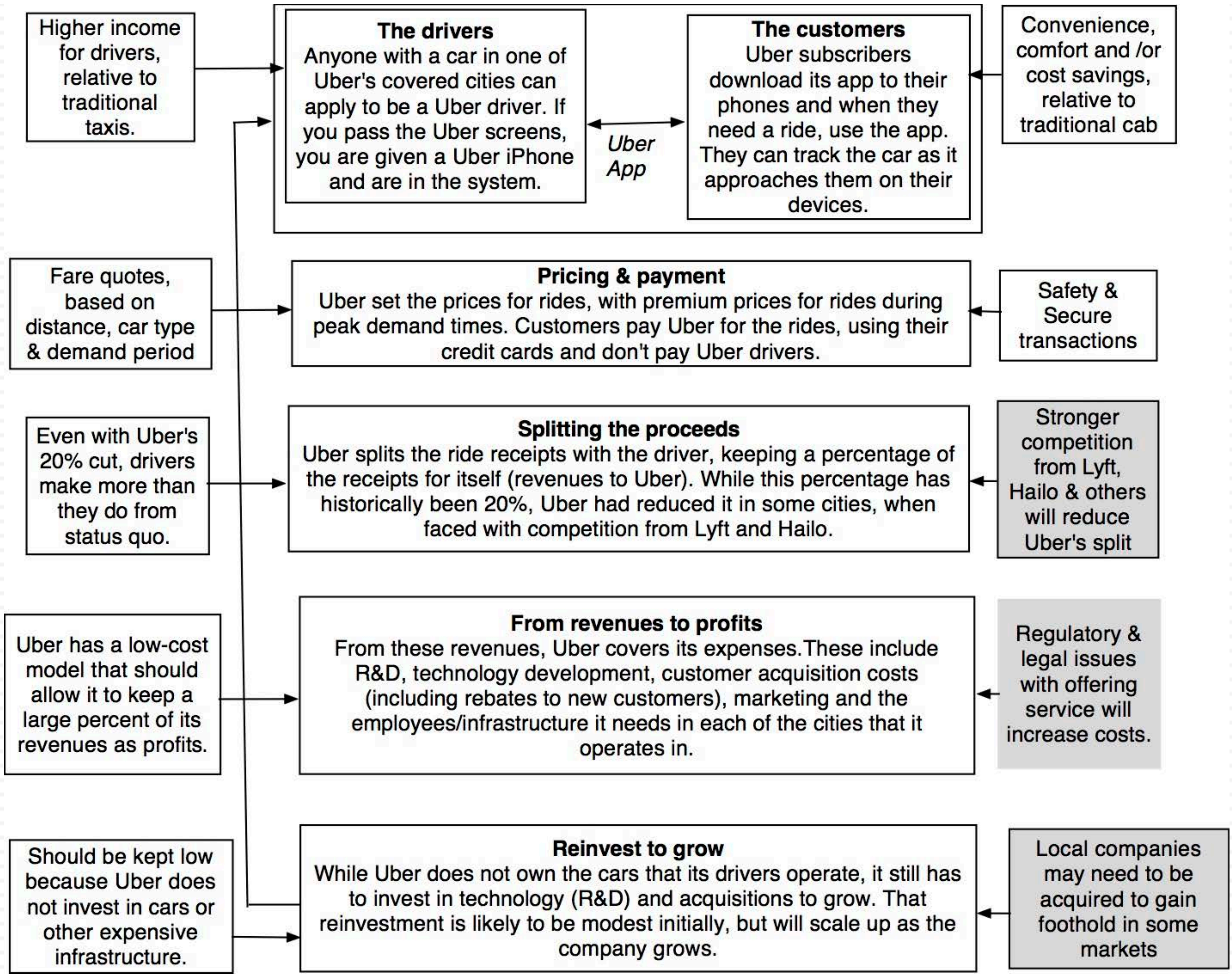
The Numbers People ⟷ The Narrative People

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

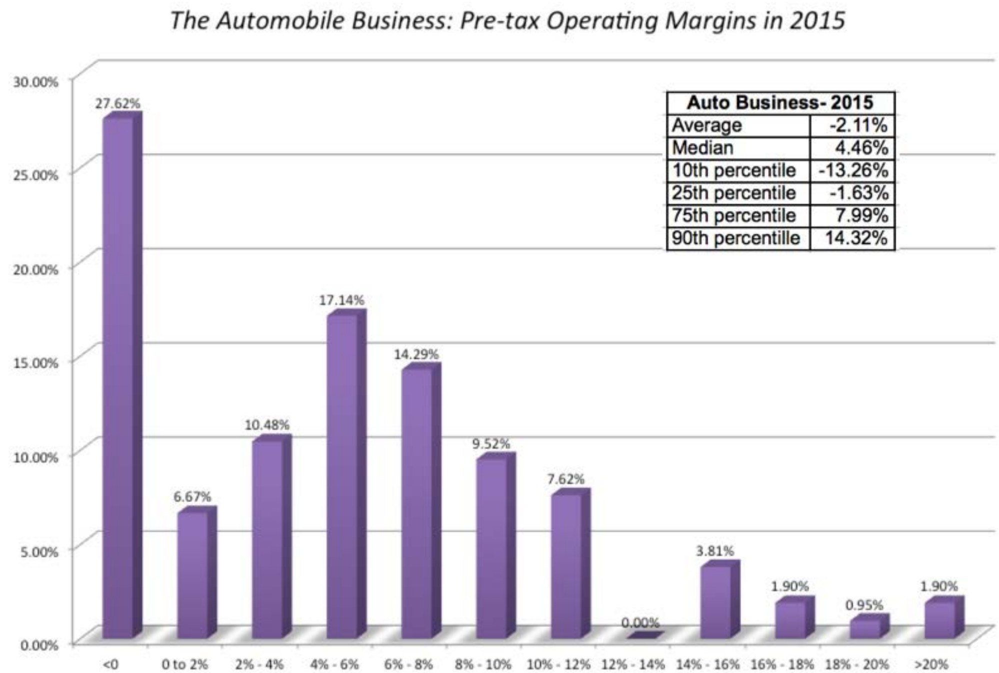
The Auto Business

Low Growth

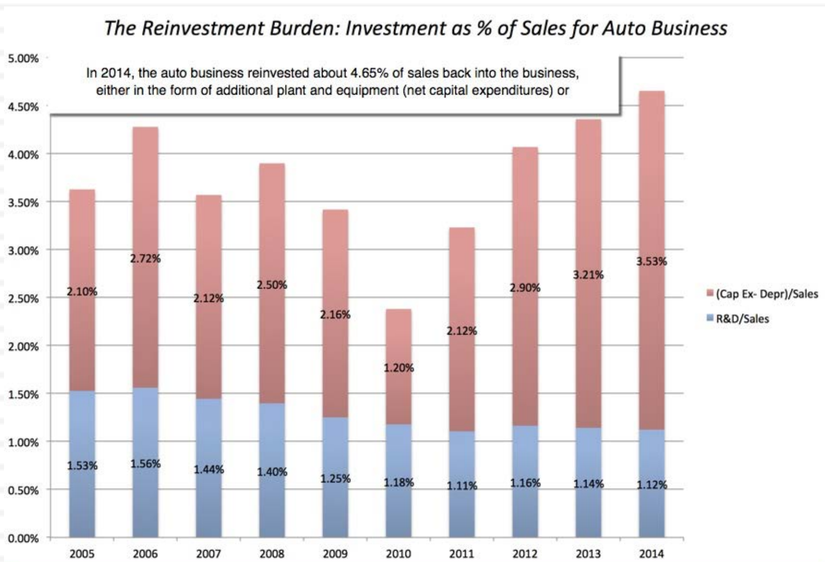
Year	Revenues ($)	% Growth Rate
2005	1,274,716.60	
2006	1,421,804.20	11.54%
2007	1,854,576.40	30.44%
2008	1,818,533.00	-1.94%
2009	1,572,890.10	-13.51%
2010	1,816,269.40	15.47%
2011	1,962,630.40	8.06%
2012	2,110,572.20	7.54%
2013	2,158,603.00	2.28%
2014	2,086,124.80	-3.36%
ounded Average =		5.63%

+

Low Margins



High & Increasing Reinvestment



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Bad Business

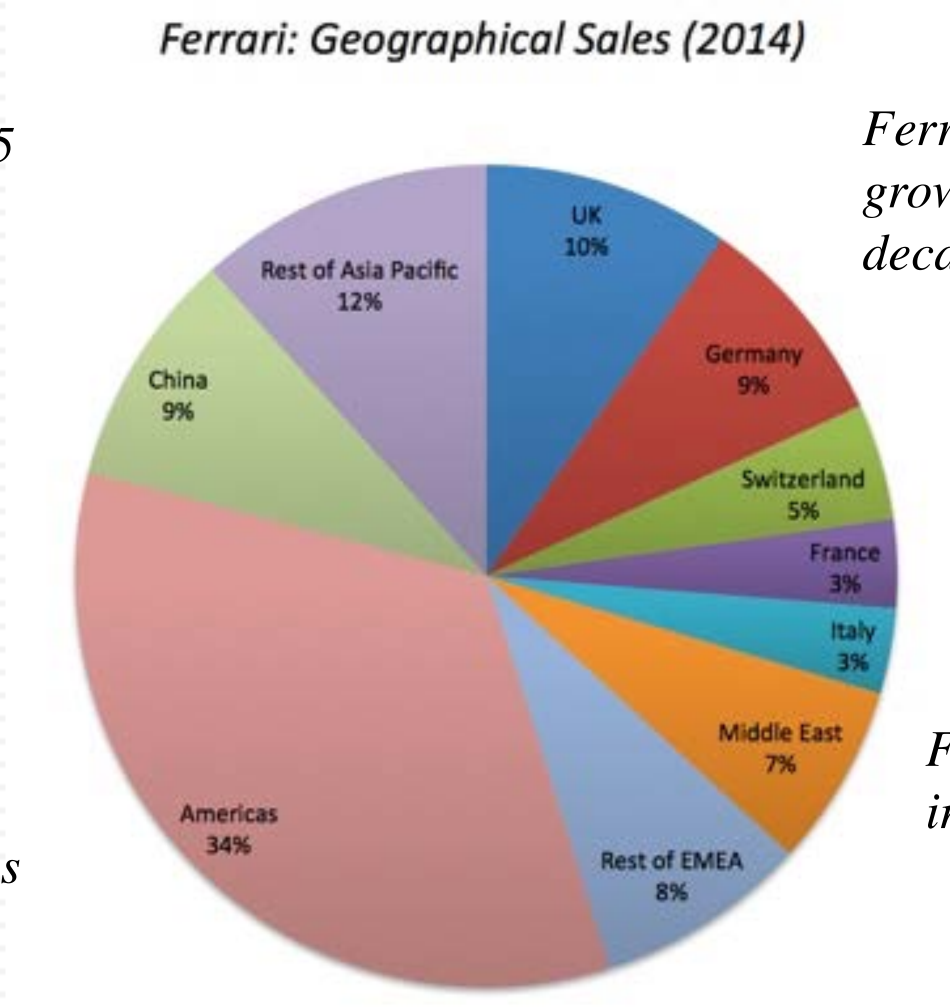
	ROIC	Cost of capital	ROIC - Cost of capital
2004	6.82%	7.93%	-1.11%
2005	10.47%	7.02%	3.45%
2006	4.60%	7.97%	-3.37%
2007	7.62%	8.50%	-0.88%
2008	3.48%	8.03%	-4.55%
2009	-4.97%	8.58%	-13.55%
2010	5.16%	8.03%	-2.87%
2011	7.55%	8.15%	-0.60%
2012	7.80%	8.55%	-0.75%
2013	7.83%	8.47%	-0.64%
2014	6.47%	7.53%	-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 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 sales (in units) have grown very little in the last decade & have been stable

Ferrari has not invested in new plants.

Step 1b: Create a narrative for the future

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

The Uber Narrative

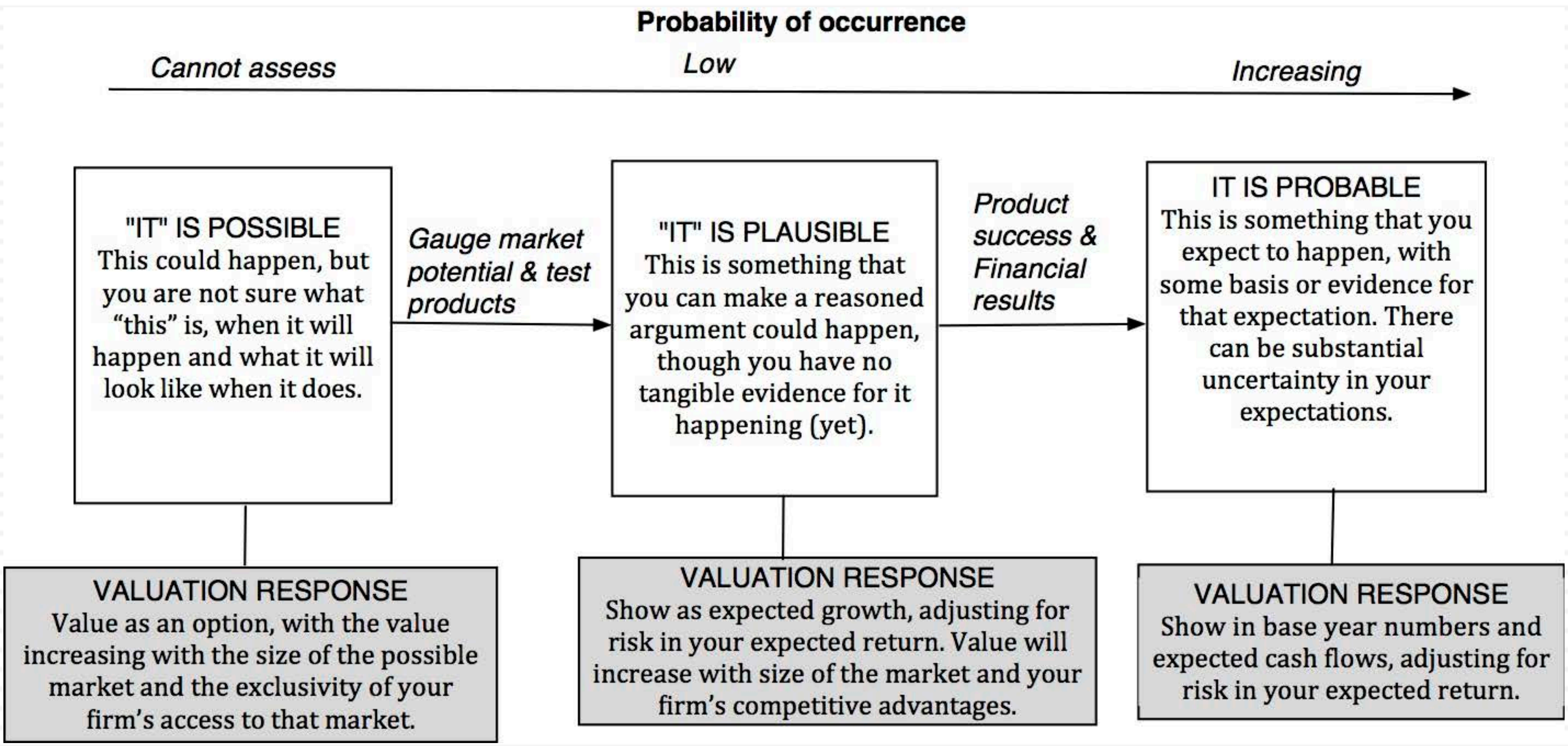
In June 2014, my initial narrative for Uber was that it would be

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

The 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.

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



The Impossible, The Implausible and the Improbable

The Impossible

Bigger than the economy
Assuming Growth rate for company in perpetuity> Growth rate for economy

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

Profit margin > 100%
Assuming earnings growth will exceeds revenue growth for a long enough period, and pushing margins above 100%

Depreciation without cap ex
Assuming that depreciation will exceed cap ex in perpetuity.

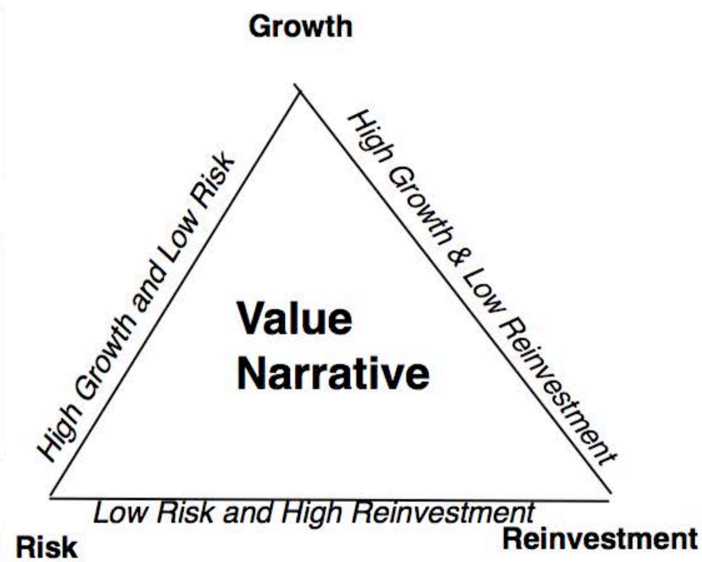
The Implausible

Growth without reinvestment
Assuming growth forever without reinvestment.

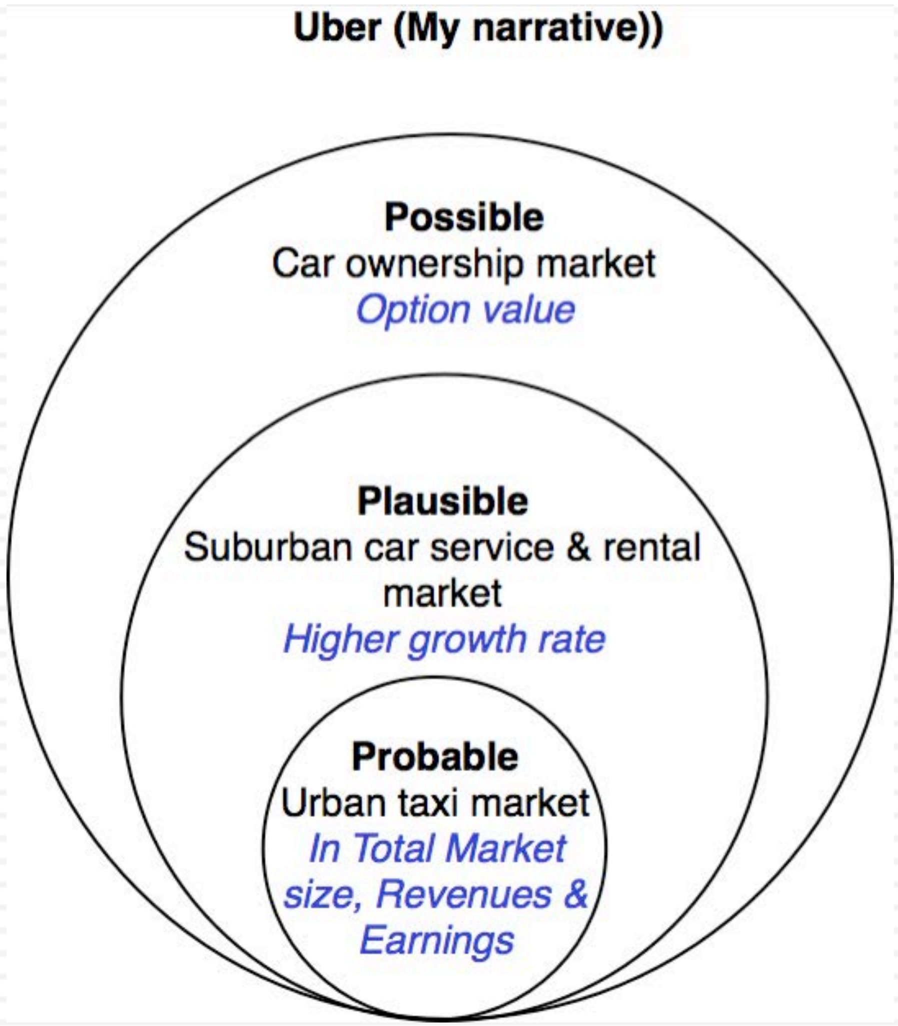
Profits without competition
Assuming that your company will grow and earn higher profits, with no competition.

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

The Improbable



Uber: Possible, Plausible and Probable



The Impossible: The Runaway Story

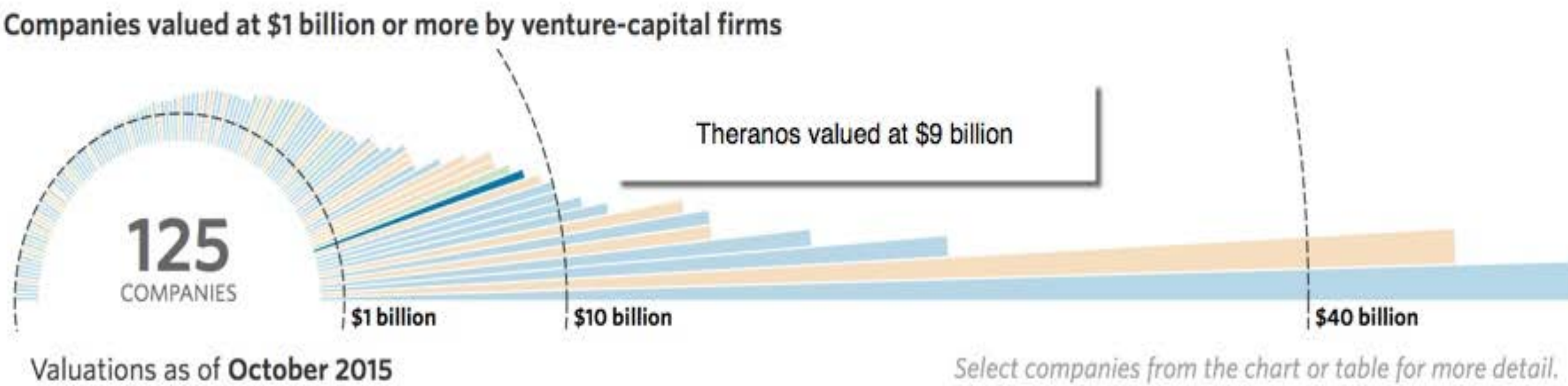
The Story

\+

The Checks (?)

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

\+ Money



The Improbable: Willy Wonkitis

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**

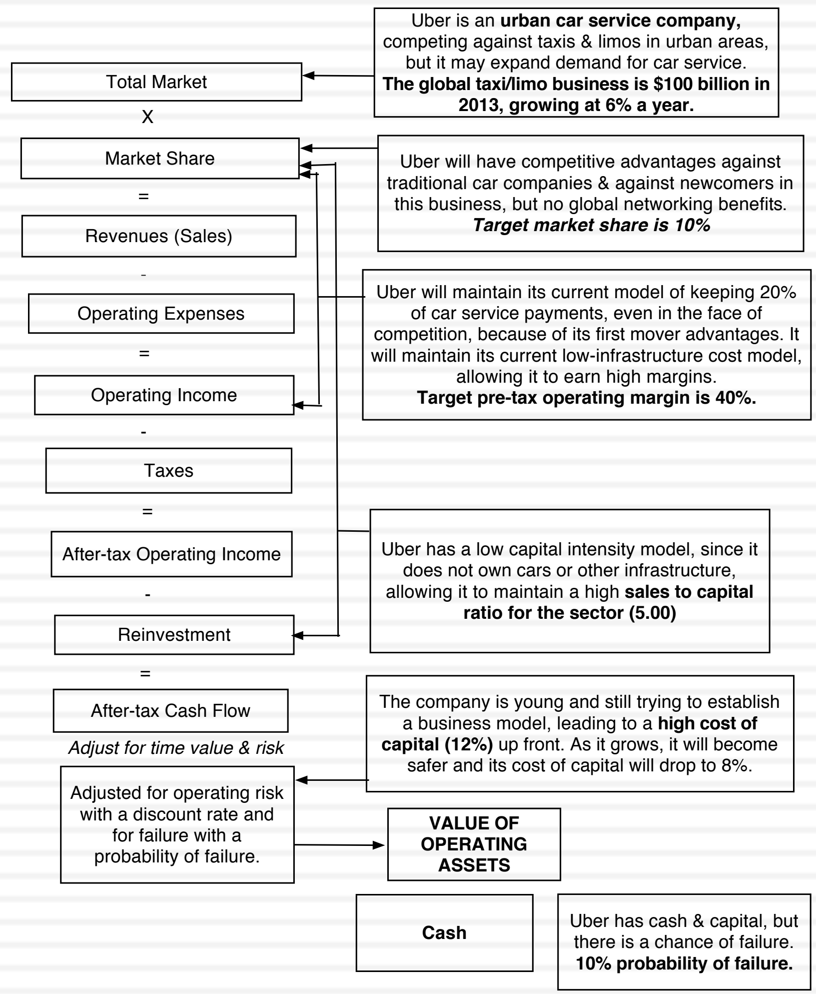
EBITDA	12,099
Sales	68,059
Net Debt (Cash)	(260)
Tesla Diluted Shares	142

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)



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

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

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

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

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

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

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

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

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

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

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.

Ferrari: The "Exclusive Club" Value

Stay Super Exclusive: Revenue growth is low

	Base year	1	2	3	4	5	6	7	8	9	10	Terminal year
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

Step 5: Keep the feedback loop

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

Valuing Bill Gurley's Uber narrative

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

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

Get less exclusive: Double number of cars sold over next decade

	Base year	1	2	3	4	5	6	7	8	9	10	Terminal year
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

Uber: The September 2015 Update

Input	*June 2014*	*September 2015*	*Rationale*
Total Market	$100 billion; Urban car service	$230 billion; Logistics	Market is broader, bigger & more global than I thought it would be. Uber's entry into delivery & moving businesses is now plausible, perhaps even probable.
Growth in market	Increase market size by 34%; CAGR of 6%.	Double market size; CAGR of 10.39%.	New customers being drawn to car sharing, with more diverse offerings.
Market Share	10% (Local Networking)	25% (Weak Global Networking)	Higher cost of entry will reduce competitors, but remaining competitors have access to capital & in Asia, the hometown advantage.
Slice of gross receipts	20% (Left at status quo)	15%	Increased competition will reduce car service company slice.
Operating margin	40% (Low cost model)	25% (Partial employee model)	Drivers will become partial employees, higher insurance and regulatory costs.
Cost of capital	12% (Ninth decile of US companies)	10% (75^{th} percentile of US companies)	Business model in place and substantial revenues.
Probability of failure	10%	0%	Enough cash on hand to find off threats to survival.
Value of equity	**$5.9 billion**	**$23.4 billion**	**Value increased more than four fold.**

Potential Market	Market size (in millions)
A1. Urban car service	$100,000
A2. All car service	$175,000
A3. Logistics	$230,000
A4. Mobility Services	$310,000

Increases overall market to $618 billion in year 10

Growth Effect	CAGR (next 10 years)
B1. None	3.00%
B2. Increase market by 25%	5.32%
B3. Increase market size by 50%	7.26%
B4: Double market size	10.39%

Network Effects	Market Share
C1. No network effects	5%
C2. Weak local network effects	10%
C3. Strong local network effects	15%
C4. Weak global network effects	25%
C5. Strong global network effects	40%

	Base	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Assumptions
Overall market	$230,000	$253,897	$280,277	$309,398	$341,544	$377,031	$416,204	$459,448	$507,184	$559,881	$618,052	**A3 & B4**
Share of market (gross)	4.71%	6.74%	8.77%	10.80%	12.83%	14.86%	16.89%	18.91%	20.94%	22.97%	25.00%	**C4**
Gross Billings	$10,840	$17,117	$24,582	$33,412	$43,813	$56,014	$70,277	$86,900	$106,218	$128,612	$154,513	
Revenues as percent of gross	20.00%	19.50%	19.00%	18.50%	18.00%	17.50%	17.00%	16.50%	16.00%	15.50%	15.00%	**D3**
Annual Revenue	$2,168	$3,338	$4,670	$6,181	$7,886	$9,802	$11,947	$14,338	$16,995	$19,935	$23,177	
Operating margin	-23.06%	-18.26%	-13.45%	-8.64%	-3.84%	0.97%	5.77%	10.58%	15.39%	20.19%	25.00%	**E2**
Operating Income	-$500	-$609	-$628	-$534	-$303	$95	$690	$1,517	$2,615	$4,026	$5,794	
Effective tax rate	30.00%	31.00%	32.00%	33.00%	34.00%	35.00%	36.00%	37.00%	38.00%	39.00%	40.00%	
- Taxes	-$150	-$189	-$201	-$176	-$103	$33	$248	$561	$994	$1,570	$2,318	
After-tax operating income	-$350	-$420	-$427	-$358	-$200	$62	$442	$956	$1,621	$2,456	$3,477	
Sales/Capital Ratio		5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	**F**
- Reinvestment		$234	$267	$302	$341	$383	$429	$478	$531	$588	$648	
Free Cash Flow to the Firm		-$654	-$694	-$660	-$541	-$322	$13	$478	$1,090	$1,868	$2,828	
Terminal value											$56,258	
Present value of FCFF		-$595	-$573	-$496	-$369	-$200	$7	$248	$520	$822	$1,152	
Present value of terminal value											$22,914	
Cost of capital	10.00%	10.00%	10.00%	10.00%	10.00%	10.00%	9.60%	9.20%	8.80%	8.40%	8.00%	**G1**

PV of cash flows during next 10 years =	$515	
PV of terminal value =	$22,914	
Value of operating assets	$23,429	
Probability of failure	0.00%	**G2**
Adjusted value of operating assets	$23,429	
Less Debt	$0	
Value of Equity	$23,429	

Capital Intensity
F: Status Quo: Sales/Capital = 5

Expense Profile	Operating Margin
E1: Independent contractor	40%
E2: Partial employee	25%
E3: Full employee	15%

Competitive Advantages	Slice of Gross Receipts
D1. None	5%
D2. Weak	10%
D3. Semi-strong	15%
D4. Strong & Sustainable	20%

Risk Estimates
G1. Cost of capital at 75th percentile of US companies = 10%
G2. Probability of failure in next 10 years= 0%

Uber Valuation: September 2015

My Turk Air Story

Turkish Airlines

The Story

Turkish Air is a growing company in a bad business, burning through cash with losses, a large debt load and the government as the leading shareholder. It will continue to grow, with margins improving to global airline averages and reinvestment scaling down to reflect excess capacity. The combination of losses and high debt creates a 10% chance of failure (or bailout), where equity will be worth nothing.

The Assumptions

	Base year	*Years 1-5*	*Years 6-10*		*After year 10*	*Link to story*
Revenues (a)	$ 30,347	16.00%	6.00%		6.00%	Growth plans + Turkish Lira inflation
Operating margin (b)	-0.26%	-0.26%	11.05%		11.05%	Improve to global average margin
Tax rate	5.00%	5.00%	20.00%		20.00%	Losses keep taxes down initially
Reinvestment (c)		Sales to capital ratio =	2.00	RIR =	57.14%	Excess capacity dampens reinvestment
Return on capital	-0.15%	Marginal ROIC =	31.61%		10.50%	Best case: Earn cost of capital
Cost of capital (d)		11.92%	10.50%		10.50%	

The Cash Flows

	Revenues	*Operating Margin*	*EBIT*	*EBIT (1-t)*	*Reinvestment*	*FCFF*
1	$ 35,203	3.51%	$ 1,237	$ 1,175	$ 2,428	$ (1,253)
2	$ 40,835	7.28%	$ 2,973	$ 2,825	$ 2,816	$ 8
3	$ 47,369	11.05%	$ 5,234	$ 4,972	$ 3,267	$ 1,706
4	$ 54,947	11.05%	$ 6,072	$ 5,768	$ 3,789	$ 1,979
5	$ 63,739	11.05%	$ 7,043	$ 6,691	$ 4,396	$ 2,295
6	$ 72,663	11.05%	$ 8,029	$ 7,387	$ 4,462	$ 2,925
7	$ 81,382	11.05%	$ 8,993	$ 8,003	$ 4,360	$ 3,644
8	$ 89,520	11.05%	$ 9,892	$ 8,507	$ 4,069	$ 4,438
9	$ 96,682	11.05%	$ 10,683	$ 8,867	$ 3,581	$ 5,286
10	$ 102,483	11.05%	$ 11,324	$ 9,059	$ 2,900	$ 6,159
Terminal year	$ 108,632	11.05%	$ 12,004	$ 9,603	$ 5,487	$ 4,116

The Value

Terminal value	$ 91,456		
PV(Terminal value)	$ 30,806		
PV (CF over next 10 years)	$ 11,704		
Value of operating assets =	$ 42,510		
Adjustment for distress	$ 2,126	Probability of failure =	10.00%
- Debt & Mnority Interests	$ 41,366		
+ Cash & Other Non-operating assets	$ 6,425		
Value of equity	$ 5,444		
- Value of equity options	$ -		
Number of shares	1,380.00		
Value per share	$ 3.94	Stock was trading at =	$8.67

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.

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

Pricing versus Valuation

Drivers of intrinsic value
- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of price
- Market moods & momentum
- Surface stories about fundamentals

Accounting Estimates

Valuation Estimates

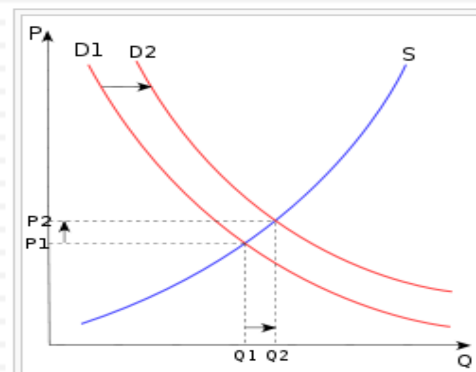
INTRINSIC VALUE

Value

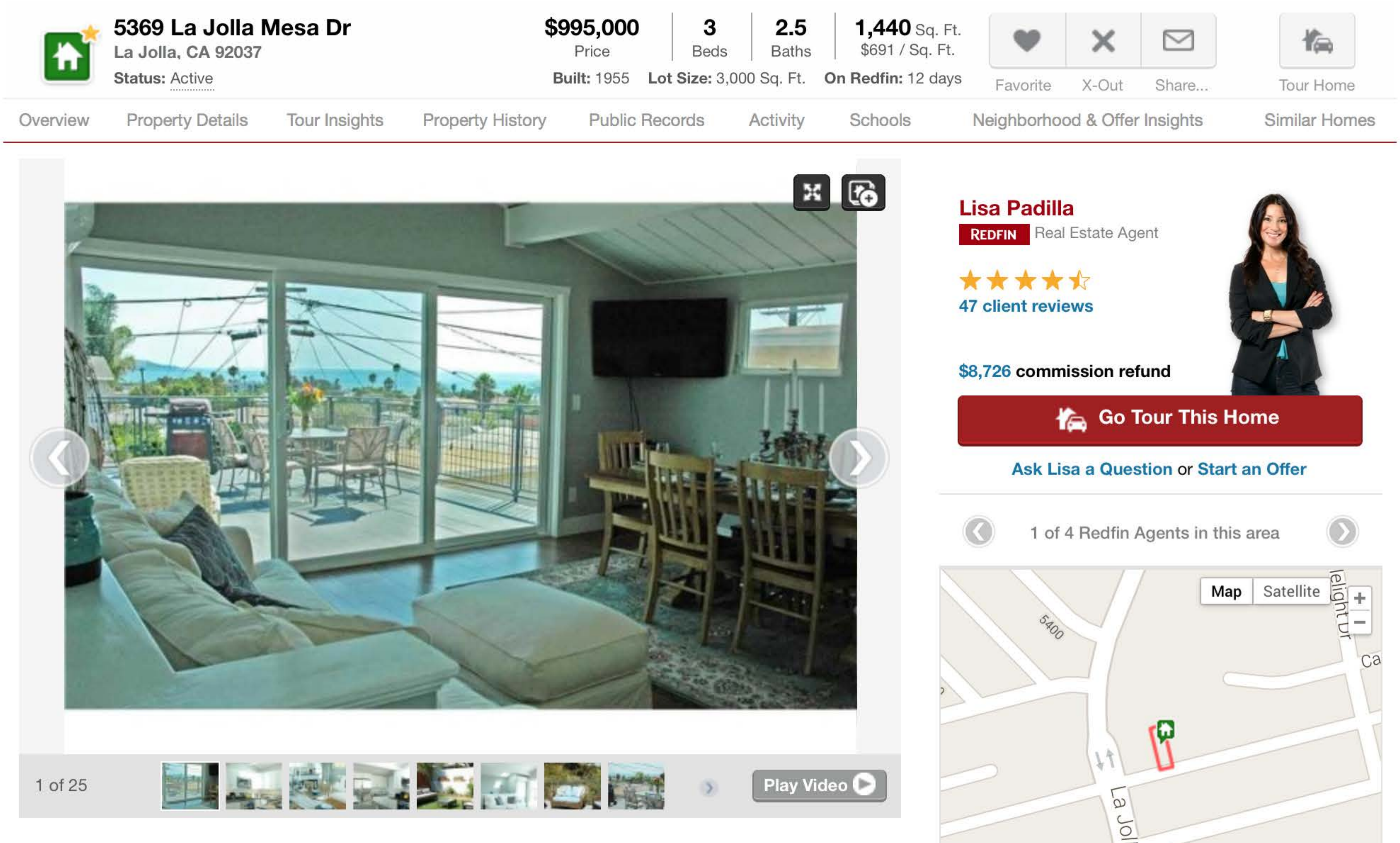
THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?

Price

PRICE



Test 1: Are you pricing or valuing?



Test 2: Are you pricing or valuing?

Europe
Switzerland

Biotechnology
Biotechnology

Reuters	Bloomberg	Exchange	Ticker
BION.S	BION SW	SWX	BION

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

Strong sector and stock-picking continue

Impressive performance

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

Biotech industry remains attractive

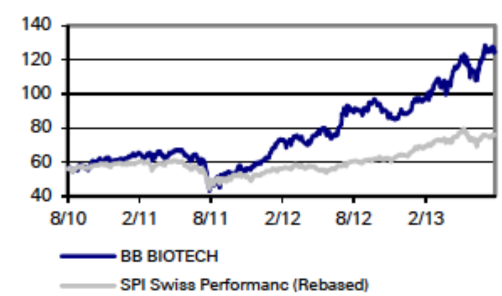
With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money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

Key changes

Target Price	106.50 to 164.50	↑	54.5%

Source: Deutsche Bank

Price/price relative



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

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**

The tool for pricing: A multiple

Market value of equity

Market value for the firm
Firm value = Market value of equity
+ Market value of debt

Market value of operating assets of firm
Enterprise value (EV) = Market value of equity
+ Market value of debt
- Cash

$$\text{Multiple} = \frac{\text{Numerator = What you are paying for the asset}}{\text{Denominator = What you are getting in return}}$$

Revenues
a. Accounting revenues
b. Drivers
- # Customers
- # Subscribers
= # units

Earnings
a. To Equity investors
- Net Income
- Earnings per share
b. To Firm
- Operating income (EBIT)

Cash flow
a. To Equity
- Net Income + Depreciation
- Free CF to Equity
b. To Firm
- EBIT + DA (EBITDA)
- Free CF to Firm

Book Value
a. Equity
= BV of equity
b. Firm
= BV of debt + BV of equity
c. Invested Capital
= BV of equity + BV of debt - Cash

The Pricing Game: Choices

Measure	Choices	Considerations/ Questions
Value	Enterprise, Equity or Firm Value?	1. Is this a financial service business? 2. Are there big differences in leverage?
Scalar	Revenues, Earnings, Cash Flows or Book Value?	1. How are you measuring value? 2. Is the scaling number positive? 3. How (and how much) do accounting choices affect the scaling measure?
Timing & Normalizing	Current, Trailing, Forward or Really Forward?	1. Where are you in the life cycle? 2. How much cyclicality is there in the number? 3. Can you get forecasted values?
Comparable	What is your peer group? (Global or local? Similar size or all firms? …)	1. How much do companies share in common globally? 2. Does company size affect business economics? 3. How big a sample of firms do you need? 4. How do you plan to control for differences?

The Four Steps to Deconstructing Multiples

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

Definitional Tests

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

Example 1: Price Earnings Ratio: Definition

PE = Market Price per Share / Earnings per Share

- There are a number of variants on the basic PE ratio in use. They are based upon how the price and the earnings are defined.

Price: is usually the current price

is sometimes the average price for the year

EPS: EPS in most recent financial year

EPS in trailing 12 months (Trailing PE)

Forecasted EPSnnext year (Forward PE)

Forecasted EPS in future year

Example 2: Enterprise Value /EBITDA Multiple

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

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

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

To analyze an airline on a pricing basis

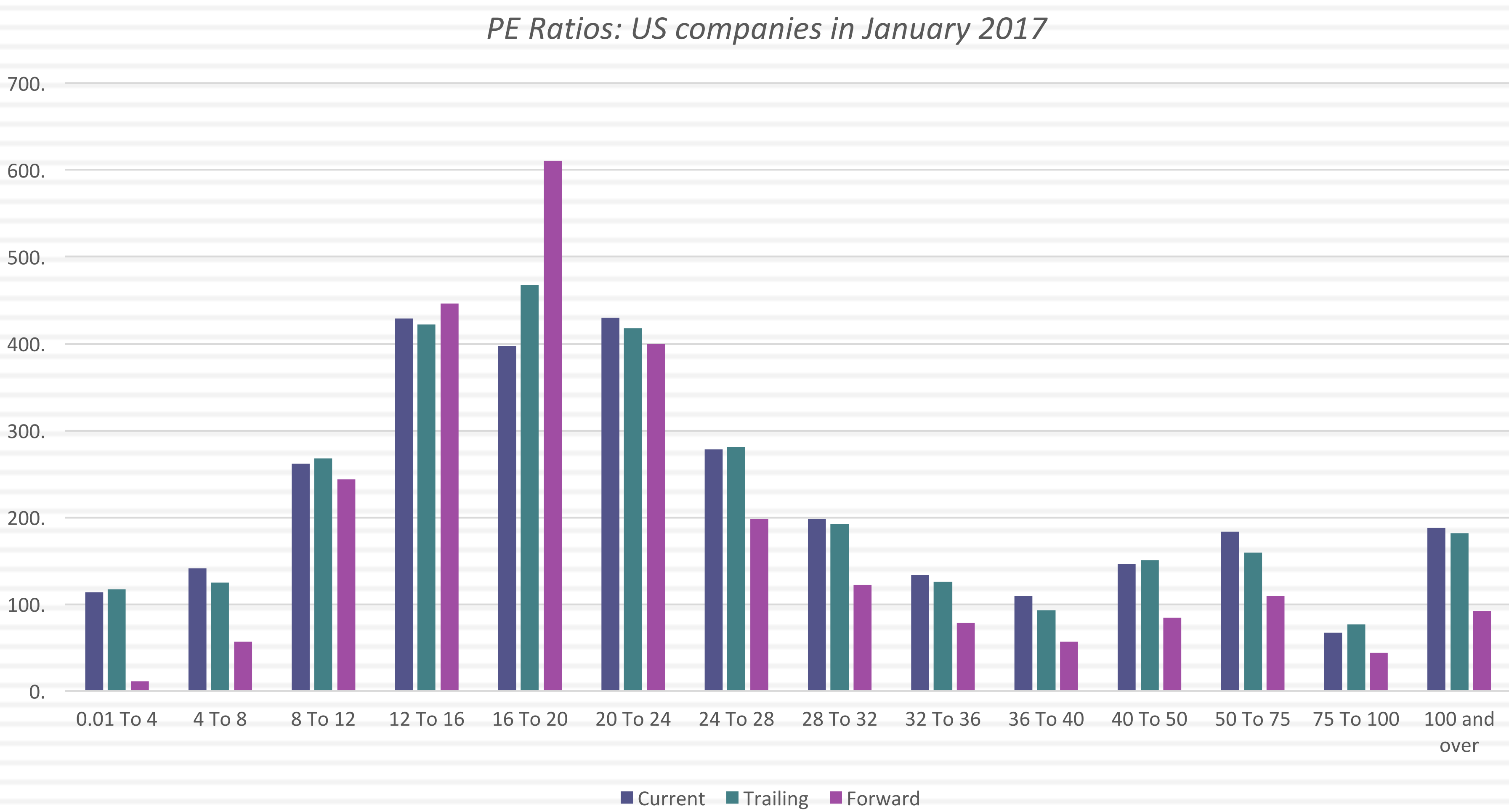
- In order to pick a multiple to price an airline it is worth remembering that
  - Many airlines, around the world, continue to lose money
  - Leverage varies widely across airlines, with borrowing coming from leases as well as conventional debt
- Given the differences in leverage across airlines, it is better to use an enterprise value multiple.
- Given that so many airlines lose money (have operating losses) and that the operating lease expense can be substantial and different across airlines, I will scale to EBITDAR.

Multiple used: EV/ EBITDAR

Descriptive Tests

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

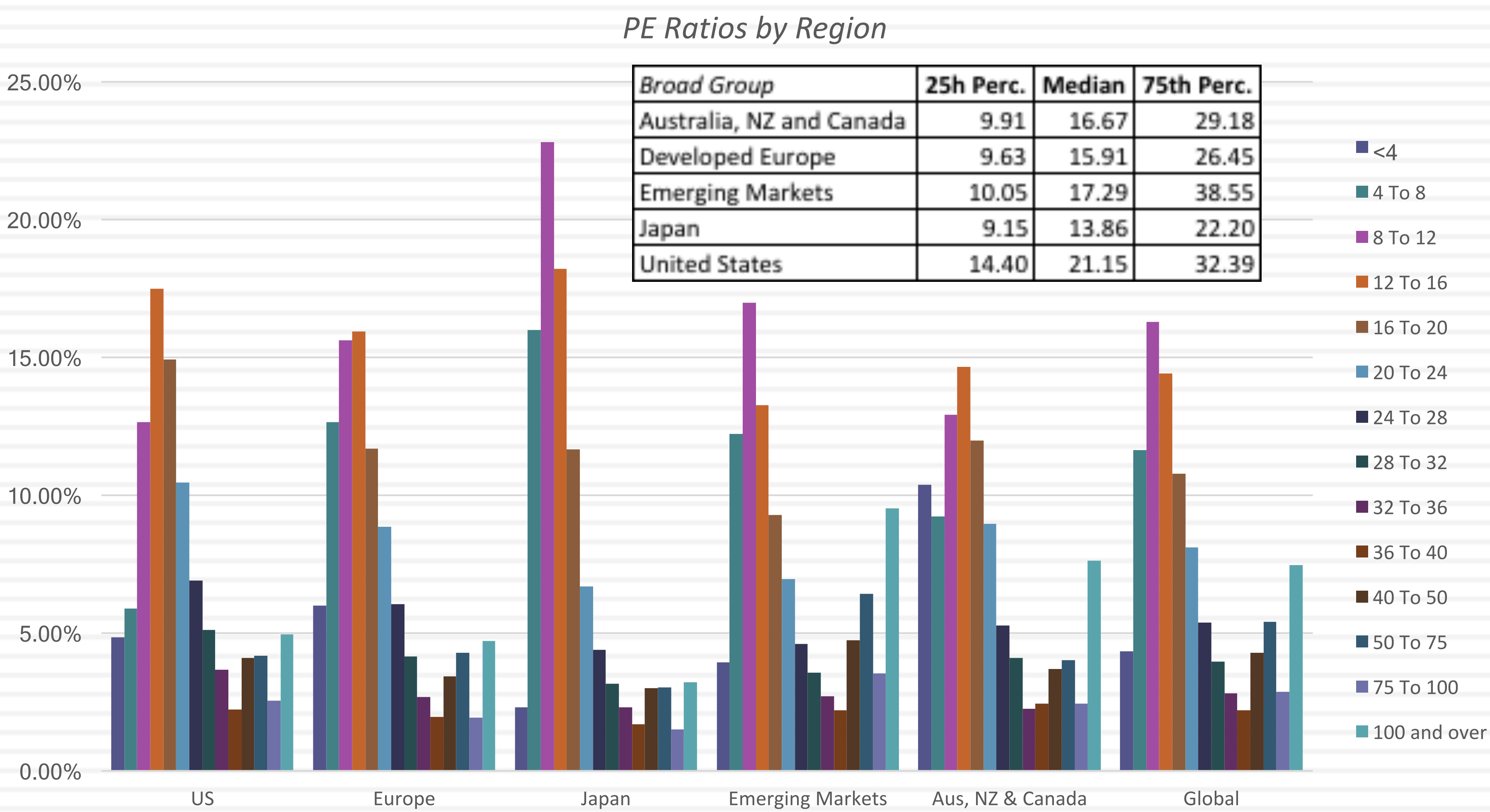
1. Multiples have skewed distributions…



2. Making statistics “dicey”

	Current PE	Trailing PE	Forward PE
Number of firms	7330	7330	7330
Number with PE	3,076.	3,081.	2,553.
Average	114.15	77.30	46.11
Median	21.57	21.15	19.25
Minimum	0.05	0.07	0.3
Maximum	134,400.00	62,228.00	28,210.00
Standard deviation	1603.68	769.28	337.16
Standard error	18.73	8.98	3.94
Skewness	80.51	73.51	80.08
25th percentile	14.33	14.40	15.04
75th percentile	33.33	32.39	26.63

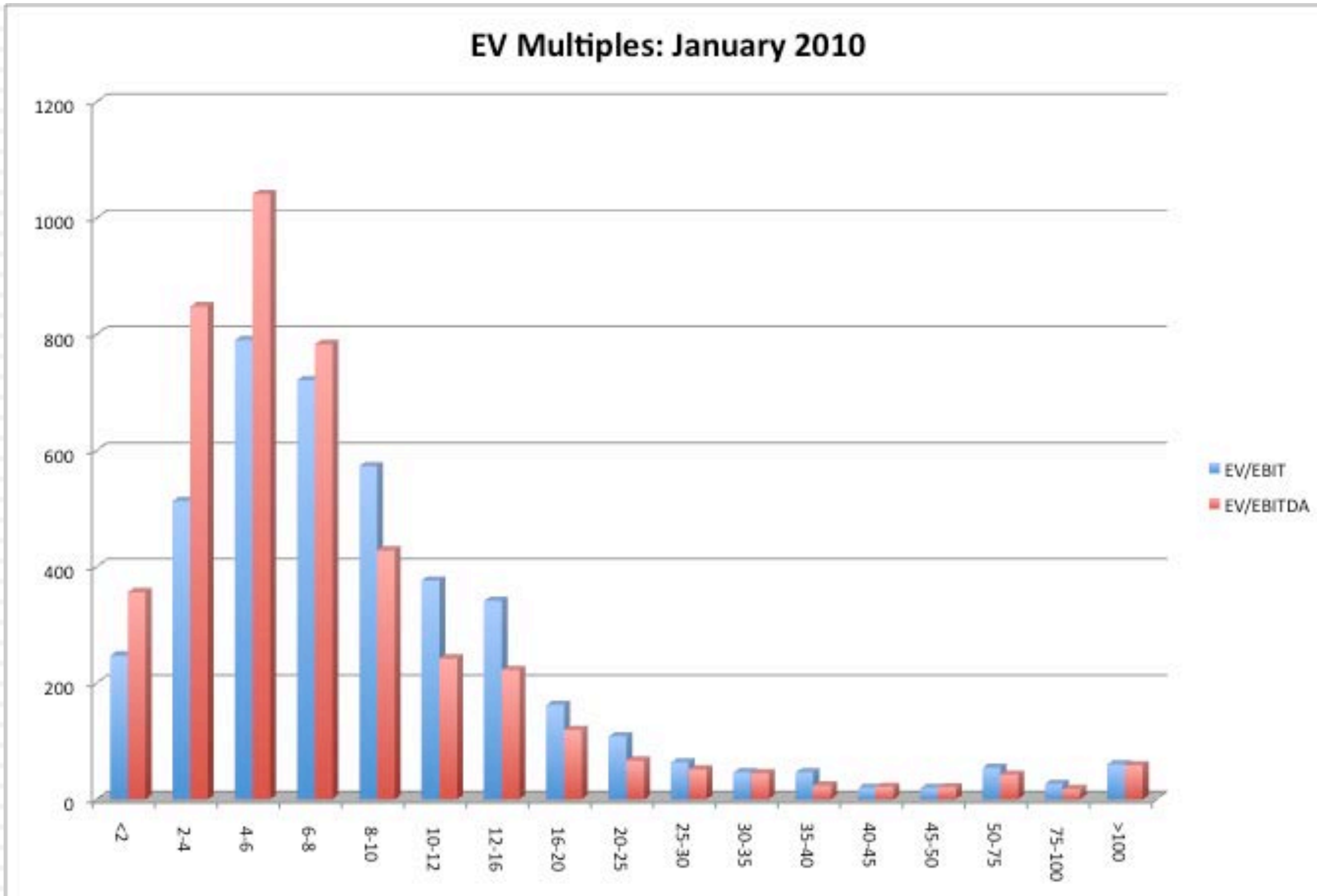
3. Markets have a lot in common : Comparing Global PEs



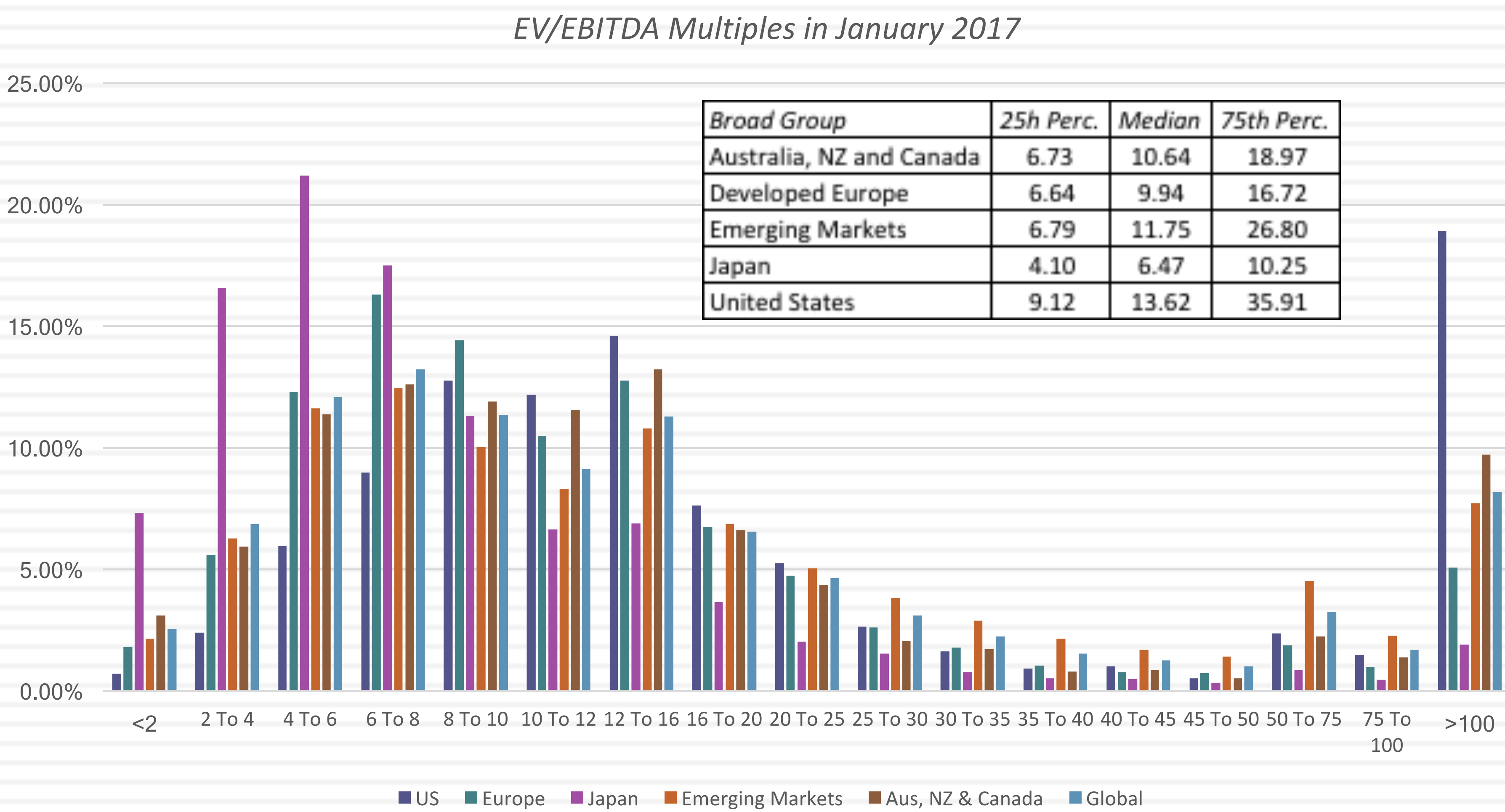
Broad Group	25h Perc.	Median	75th Perc.
Australia, NZ and Canada	9.91	16.67	29.18
Developed Europe	9.63	15.91	26.45
Emerging Markets	10.05	17.29	38.55
Japan	9.15	13.86	22.20
United States	14.40	21.15	32.39

Aswath Damodaran

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

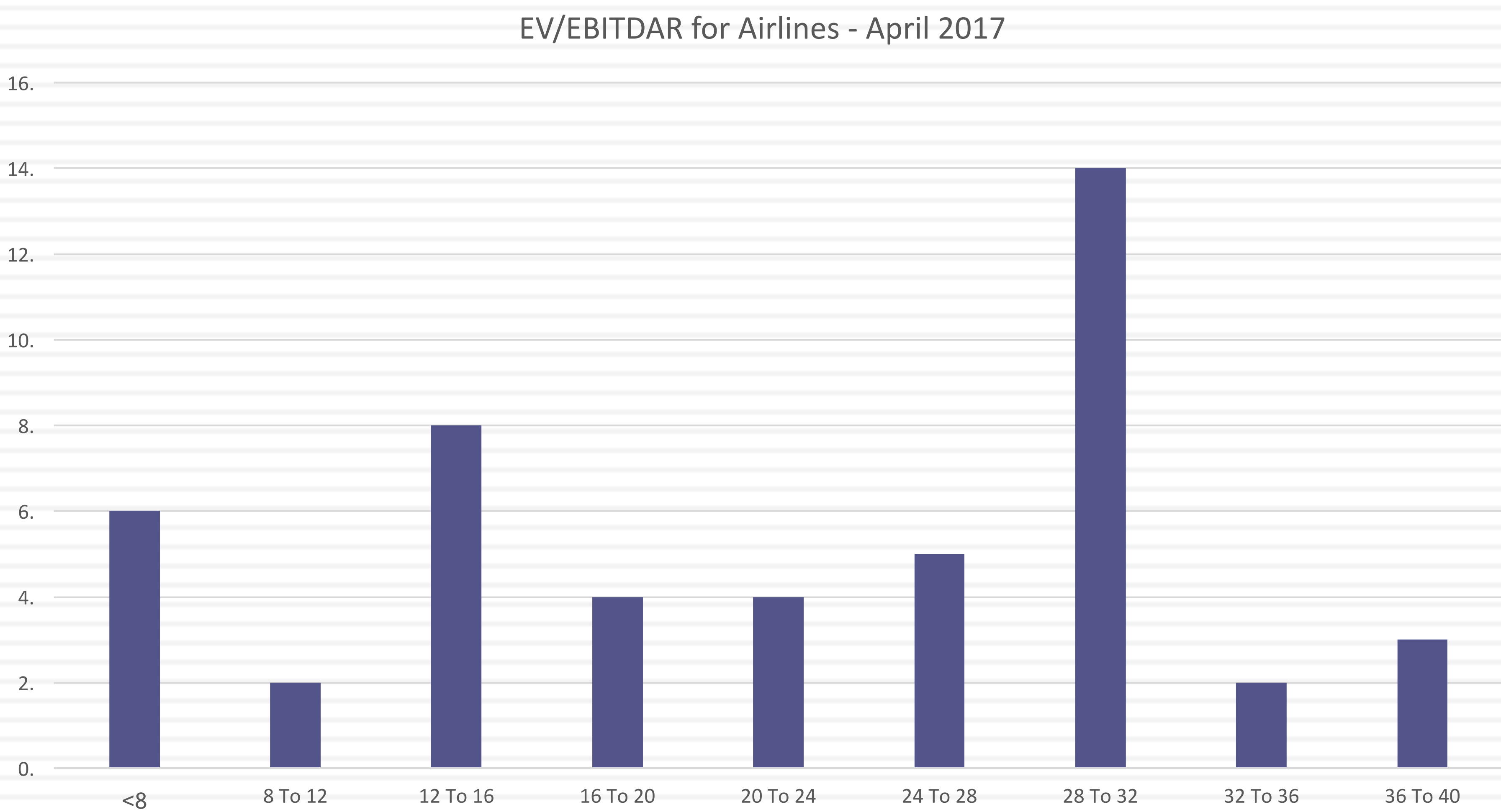


But it may be in 2017, unless you are in Japan!



Broad Group	*25h Perc.*	*Median*	*75th Perc.*
Australia, NZ and Canada	6.73	10.64	18.97
Developed Europe	6.64	9.94	16.72
Emerging Markets	6.79	11.75	26.80
Japan	4.10	6.47	10.25
United States	9.12	13.62	35.91

EV/EVITDAR across airlines: July 2017



Analytical Tests

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

A Simple Analytical device

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.

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,

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

- If this had been a FCFE Model,

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

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

EV/EBITDAR: Determinants

- The value of the operating assets of a firm can be written as:

$$EV_0 = \frac{FCFF_1}{WACC - g}$$

- Now the value of the firm can be rewritten as

$$EV_0 = \frac{(EBITDAR)(1-t) + DA(t) - R(1-t) - Cap\ Ex - Chg\ WC}{(Cost\ of\ Capital - g)}$$

- Dividing both sides of the equation by EBITDAR

$$\frac{EV_0}{EBITDAR} = \frac{(1-t)}{(WACC-g)} + \frac{DA(t)/EBITDAR}{(WACC-g)} + \frac{R(1-t)/EBITDAR}{(Cost\ of\ Capital - g)} - \frac{(Cap\ Ex + Chg\ WC)/EBITDAR}{(WACC-g)}$$

- The determinants of EV/EBITDA are:
  - The cost of capital
  - Expected growth rate
  - Tax rate
  - Reinvestment rate (or ROC)
  - Rental Expense as a percent of EBITDAR

The Determinants of Multiples…

Value of Stock = DPS 1/(ke - g)

PE=Payout Ratio (1+g)/(r-g)

PE=f(g, payout, risk)

PEG=Payout ratio (1+g)/g(r-g)

PEG=f(g, payout, risk)

PBV=ROE (Payout ratio) (1+g)/(r-g)

PBV=f(ROE,payout, g, risk)

PS= Net Margin (Payout ratio) (1+g)/(r-g)

PS=f(Net Mgn, payout, g, risk)

Equity Multiples

Firm Multiples

V/FCFF=f(g, WACC)

Value/FCFF=(1+g)/(WACC-g)

V/EBIT(1-t)=f(g, RIR, WACC

Value/EBIT(1-t) = (1+g)(1- RIR)/(WACC-g)

V/EBIT=f(g, RIR, WACC, t

Value/EBIT=(1+g)(1-RiR)/(1-t)(WACC-g)

VS=f(Oper Mgn, RIR, g, WACC)

VS= Oper Margin (1-RIR) (1+g)/(WACC-g)

Value of Firm = FCFF 1/(WACC -g)

Application Tests

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

An Example: Comparing PE Ratios across a Sector: PE

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

PE, Growth and Risk

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

Variable	*Coefficient*	*SE*	*t-ratio*	*Probability*
Constant	13.1151	3.471	3.78	0.0010
Growth rate	121.223	19.27	6.29	≤ 0.0001
Emerging Market	-13.853 1	3.606	-3.84	0.0009

Emerging Market is a dummy: 1 if emerging market

0 if not

- Is Indosat cheap?

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

At 7.8 times earnings, Indosat is over valued.

Comparisons to the entire market: Why not?

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

PE Ratio: Standard Regression for US stocks - January 2017

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.653[b]	.427	.426	2275.70504

a. Broad Group = United States

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

The regression is run with growth and payout entered as decimals, i.e., 25% is entered as 0.25)

Coefficients[a,b,c]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-3.945	1.838		-2.146	.032
	Beta	3.527	1.607	.043	2.194	.028
	Expected growth rate in EPS- Next 5 years	174.025	5.490	.633	31.699	.000
	Payout Ratio	20.584	1.045	.399	19.692	.000

a. Broad Group = United States

b. Dependent Variable: Trailing PE

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

PE ratio regressions across markets – January 2017

Region	Regression – January 2017	R^2
US	$PE = 170.55\ g_{EPS} + 19.43\ Payout - 0.62\ Beta$	42.6%
Europe	$PE = 13.89 + 21.42 g_{EPS} + 14.90\ Payout - 2.44\ Beta$	25.1%
Japan	$PE = 5.82 + 46.38\ g_{EPS} + 28.73\ Payout - 1.52\ Beta$	32.7%
Emerging Markets	$PE = 14.59 + 20.23\ g_{EPS} + 10.88\ Payout - 1.07\ Beta$	12.2%
Australia, NZ, Canada	$PE = 8.85 + 52.08\ g_{EPS} + 14.64\ Payout$ (Beta not significant)	17.1%
Global	$PE = 15.21 + 48.98\ g_{EPS} + 14.01\ Payout - 2.52\ Beta$	18.2%

g_{EPS}=Expected Growth: Expected growth in EPS or Net Income: Next 5 years
Beta: Regression or Bottom up Beta
Payout ratio: Dividends/ Net income from most recent year. Set to zero, if net income < 0

Turk Air: Over or Under Priced?

Company Name	*EV/EBITDAR*	*Cost of capital in US$*	*Market Debt to capital ratio*	*Historical growth in Revenues - Last 5 years*	*Return on Capital (ROC or ROIC)*	*Pre-tax Operating Margin*	*Normalize d ROIC*
Turk Air	40.08	8.19%	36.09%	20.10%	-0.43%	-1.32%	5.29%
Median	**29.50**	**5.85%**	**12.11%**	**5.46%**	**11.91%**	**12.48%**	**7.52%**
Average	**36.88**	**6.03%**	**14.25%**	**6.07%**	**12.26%**	**13.03%**	**9.32%**
Turk Air versus Median	35.87%	40.10%	198.00%	268.13%	-103.65%	-110.55%	-29.66%
Judgment	**Over priced**	**More risky**	**More levered**	**Faster growing**	**Less profitable**		

A closing thought…