MY VALUATION JOURNEY: HAVE FAITH, YOU MUST!

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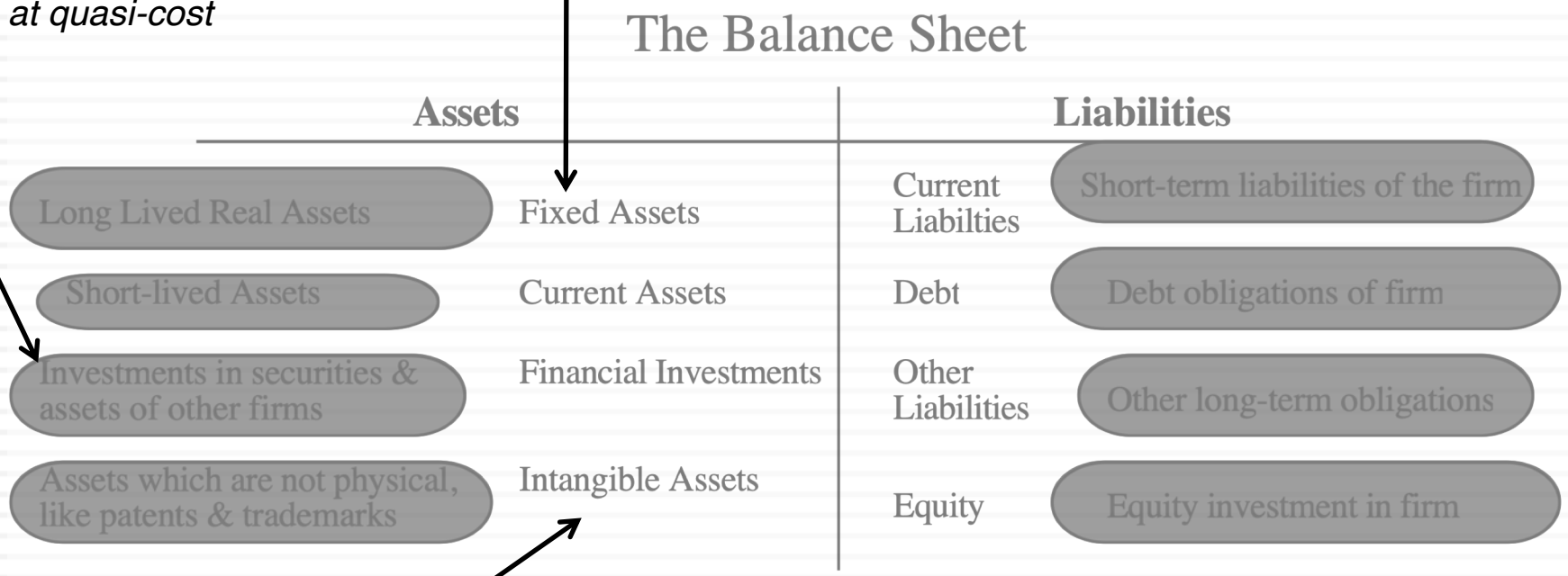
I. Don't mistake accounting for finance

Valued based upon motive for investment – some marked to market, some recorded at cost and some at quasi-cost

Assets are recorded at original cost, adjusted for depreciation.



True intangible assets like brand name, patents and customer did not show up. The only intangible asset of any magnitude (goodwill) is a plug variable that is of consequence only if you do an acquisition.

Equity reflects original capital invested and historical retained earnings.

The financial balance sheet

Recorded at intrinsic value (based upon cash flows and risk), not at original cost

Value will depend upon magnitude of growth investments and excess returns on these investments

Intrinsic value of equity, reflecting intrinsic value of assets, net of true value of debt outstanding.

Ferrari: Balance Sheets

Accounting Balance Sheet

Cash	164	Debt	623
Other current asset	3,131	Minority Interest	13
PP&E	591	Other liabilities	1,894
Financial Inv	216	**Equity**	**2,474**
Goodwill	781		
Other Intangibles	278		
Total Assets	5,004		

Intrinsic Value Balance Sheet

Cash	164	Debt	623
Assets in Place	5,489	Minority Interest	13
Growth Assets	658	**Equity**	**6,311**

Market Price Balance Sheet

Cash	164	Debt	623
Assets in Place	5,489	Minority Interest	13
Growth Assets	5,347	**Equity**	**11,000**

Twitter: Balance Sheets at the IPO

Accounting Balance Sheet

Cash	$550	Debt (leases)	$21
PP&E	$ 62	Preferred stock	$835
Intangible assets	$6	Equity	$202
Goodwill	$ 47		

Intrinsic Value Balance Sheet (post-IPO)

Cash	$ 1,616	Debt	$ 214
Assets in place	$ 73	Equity	$11,106
Growth assets	$ 9,631		

Market Price Balance Sheet (post-IPO)

Cash	$ 1,816	Debt	$ 214
Assets in place	$ 73	Equity	$28,119
Growth assets	$ 26,444		

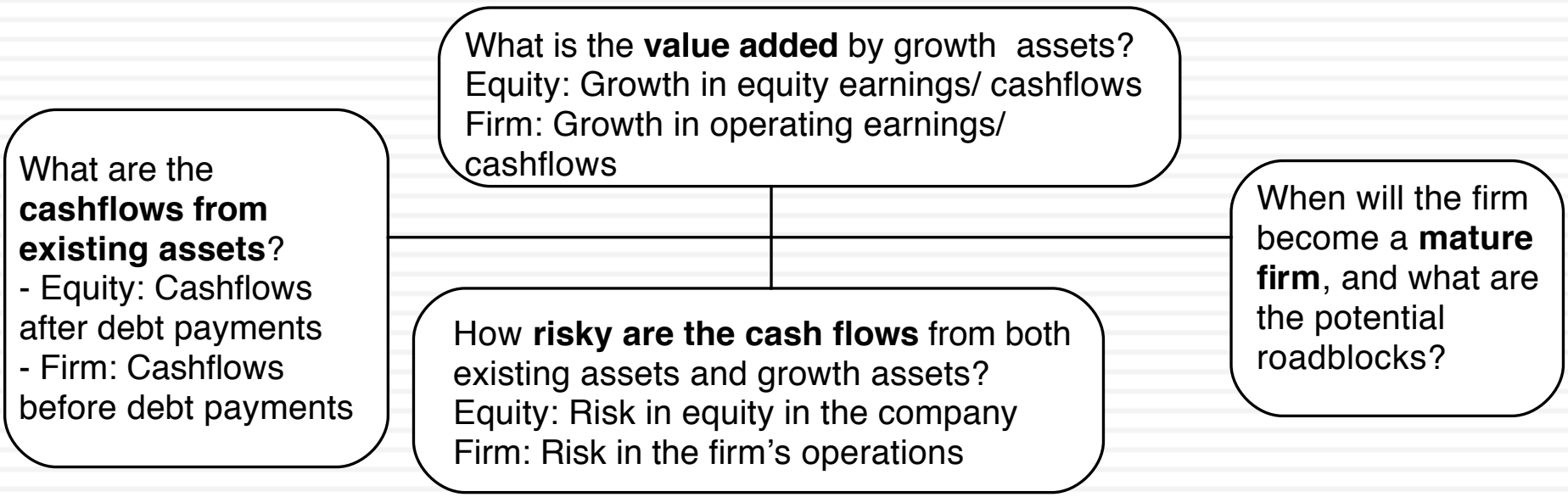
II. Don't assume that D+CF = DCF

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

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

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

The drivers of value..



DCF as a tool for intrinsic valuation

Value of growth
The future cash flows will reflect expectations of how quickly earnings will grow in the future (as a positive) and how much the company will have to reinvest to generate that growth (as a negative). The net effect will determine the value of growth.
Expected Cash Flow in year t = E(CF) = Expected Earnings in year t - Reinvestment needed for growth

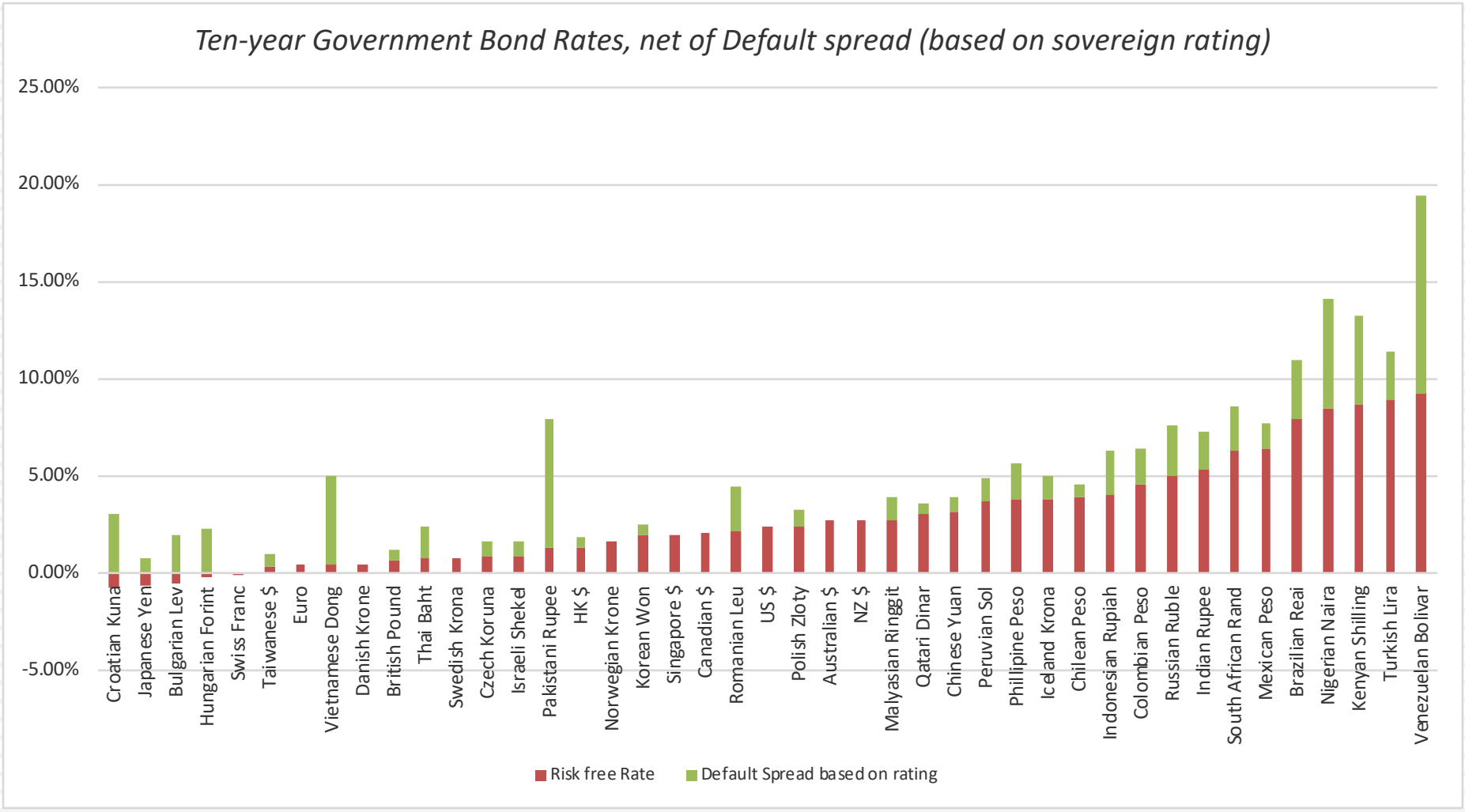
Cash flows from existing assets
The base earnings will reflect the earnings power of the existing assets of the firm, net of taxes and any reinvestment needed to sustain the base earnings.

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

Steady state
The value of growth comes from the capacity to generate excess returns. The length of your growth period comes from the strength & sustainability of your competitive advantages.

Risk in the Cash flows
The risk in the investment is captured in the discount rate as a beta in the cost of equity and the default spread in the cost of debt.

1. Match your cash flows to your discount rates..



2. Risk is not in the past..

	Arithmetic Average		Geometric Average	
	Stocks - T. Bills	Stocks - T. Bonds	Stocks - T. Bills	Stocks - T. Bonds
1928-2017	8.09%	6.38%	6.26%	4.77%
Std Error	2.10%	2.24%		
1968-2017	6.58%	4.24%	5.28%	3.29%
Std Error	2.39%	2.70%		
2008-2017	9.85%	5.98%	8.01%	4.56%
Std Error	6.12%	8.70%		

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

But in the future..

Base year cash flow (last 12 mths)
Dividends (TTM): 48.12
+ Buybacks (TTM): 60.16
= Cash to investors (TTM): **108.28**

Expected cashflow growth in next 5 years
Cash flow growth = Top down analyst estimate of earnings growth for S&P 500 = 7.05%

	Last 12 months	1	2	3	4	5	*Terminal Year*
Expected Earnings	124.94	133.75	143.18	153.27	164.08	175.64	179.88
Expected Dividends + Buybacks =	108.28	$ 115.91	$ 124.08	$ 132.83	$ 142.19	$ 152.22	155.88

Earnings and Cash flows grow @2.41% (set equal to risk free rate) a year forever.

S&P 500 on 1/1/18= **2673.61**

$$2673.61 = \frac{115.91}{(1+r)} + \frac{124.08}{(1+r)^2} + \frac{132.82}{(1+r)^3} + \frac{142.19}{(1+r)^4} + \frac{152.22}{(1+r)^5} + \frac{152.22\ (1.0241)}{(r-0.0241)(1+r)^5}$$

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

Solve for r

r = Implied Expected Return on Stocks = 7.49%

Minus

Risk free rate = T.Bond rate on 1/1/18= 2.41%

Equals

Implied Equity Risk Premium (1/1/18) = 7.49% - 2.41% = **5.08%**

3. Globalization is not a buzz word

- As companies get globalized, the valuations that we do have to reflect that globalization. In particular, we need to be wary of
  - Currency mismatches: Multinationals derive their revenues in many currencies but you have to be currency-consistent.
  - Beta gaming: When a company is listed in many markets, you can get very different betas, depending on how you set up and run a beta regression
  - Equity Risk Premiums: The standard practice of estimating equity risk premiums based on your country of incorporation will lead to skewed valuations.

ERP : Jan 2018

Andorra	Baa2	7.27%	2.19%
Austria	Aa1	5.54%	0.46%
Belgium	Aa3	5.78%	0.70%
Cyprus	Ba3	9.23%	4.15%
Denmark	Aaa	5.08%	0.00%
Finland	Aa1	5.54%	0.46%
France	Aa2	5.65%	0.57%
Germany	Aaa	5.08%	0.00%
Greece	Caa2	15.46%	10.38%
Guernsey	Aa3	5.78%	0.70%
Iceland	A3	6.46%	1.38%
Ireland	A2	6.06%	0.98%
Isle of Man	Aa2	5.65%	0.57%
Italy	Baa2	7.27%	2.19%
Jersey	Aa3	5.78%	0.70%
Liechtenstein	Aaa	5.08%	0.00%
Luxembourg	Aaa	5.08%	0.00%
Malta	A3	6.46%	1.38%
Netherlands	Aaa	5.08%	0.00%
Norway	Aaa	5.08%	0.00%
Portugal	Ba1	7.96%	2.88%
Spain	Baa2	7.27%	2.19%
Sweden	Aaa	5.08%	0.00%
Switzerland	Aaa	5.08%	0.00%
Turkey	Ba1	7.96%	2.88%
United Kingdom	Aa2	5.65%	0.57%
Western Europe		6.01%	0.93%

Canada	Aaa	5.08%	0.00%
United States	Aaa	5.08%	0.00%
North America		5.08%	0.00%

Caribbean		11.39%	6.31%

Argentina	B2	11.42%	6.34%
Belize	B3	12.58%	7.50%
Bolivia	Ba3	9.23%	4.15%
Brazil	Ba2	8.54%	3.46%
Chile	Aa3	5.78%	0.70%
Colombia	Baa2	7.27%	2.19%
Costa Rica	Ba2	8.54%	3.46%
Ecuador	B3	12.58%	7.50%
El Salvador	Caa1	13.72%	8.64%
Guatemala	Ba1	7.96%	2.88%
Honduras	B1	10.27%	5.19%
Mexico	A3	6.46%	1.38%
Nicaragua	B2	11.42%	6.34%
Panama	Baa2	7.27%	2.19%
Paraguay	Ba1	7.96%	2.88%
Peru	A3	6.46%	1.38%
Suriname	B1	10.27%	5.19%
Uruguay	Baa2	7.27%	2.19%
Venezuela	Caa3	16.60%	11.52%
Latin America		8.63%	3.55%

Angola		11.42%	6.34%
Botswana		6.06%	0.98%
Burkina Faso		11.42%	6.34%
Cameroon		11.42%	6.34%
Cape Verde		11.42%	6.34%
Congo (DR)		12.58%	7.50%
Congo (Rep of)		15.46%	10.38%
Côte d'Ivoire		9.23%	4.15%
Egypt		12.58%	7.50%
Ethiopia		10.27%	5.19%
Gabon		12.58%	7.50%
Ghana		12.58%	7.50%
Kenya		10.27%	5.19%
Morocco		7.96%	2.88%
Mozambique		16.60%	11.52%
Namibia		7.96%	2.88%
Nigeria		11.42%	6.34%
Rwanda		11.42%	6.34%
Senegal		9.23%	4.15%
South Africa		7.62%	2.54%
Swaziland		5.08%	11.42%
Tunisia		10.27%	5.19%
Uganda		11.42%	6.34%
Zambia		12.58%	7.50%
Africa		**10.63%**	**5.58%**

Albania	B1	10.27%	5.19%
Armenia	B1	10.27%	5.19%
Azerbaijan	Ba2	8.54%	3.46%
Belarus	Caa1	13.72%	8.64%
Bosnia	B3	12.58%	7.50%
Bulgaria	Baa2	7.27%	2.19%
Croatia	Ba2	8.54%	3.46%
Czech Republic	A1	5.89%	0.81%
Estonia	A1	5.89%	0.81%
Georgia	Ba2	8.54%	3.46%
Hungary	Baa3	7.62%	2.54%
Kazakhstan	Baa3	7.62%	2.54%
Kyrgyzstan	B2	11.42%	6.34%
Latvia	A3	6.46%	1.38%
Lithuania	A3	6.46%	1.38%
Macedonia	Ba3	9.23%	4.15%
Moldova	B3	12.58%	7.50%
Montenegro	B1	10.27%	5.19%
Poland	A2	6.06%	0.98%
Romania	Baa3	7.62%	2.54%
Russia	Ba1	7.96%	2.88%
Serbia	Ba3	9.23%	4.15%
Slovakia	A2	6.06%	0.98%
Slovenia	Baa1	6.92%	1.84%
Tajikistan	B3	7.96%	2.88%
Ukraine	Caa2	15.46%	10.38%
E. Europe		7.75%	2.69%

Abu Dhabi	Aa2	5.65%	0.57%
Bahrain	B1	10.27%	5.19%
Iraq	Caa1	13.72%	8.64%
Israel	A1	5.89%	0.81%
Jordan	B1	10.27%	5.19%
Kuwait	Aa2	5.65%	0.57%
Lebanon	B3	12.58%	7.50%
Oman	Baa2	7.27%	2.19%
Qatar	Aa3	5.78%	0.70%
Ras Al Khaimah	A2	6.06%	0.98%
Saudi Arabia	A1	5.89%	0.81%
Sharjah	A3	6.46%	1.38%
United Arab Emirates	Aa2	5.65%	0.57%
Middle East		6.69%	1.61%

Country	*PRS*	*ERP*	*CRP*	*Country*	*PRS*	*ERP*	*CRP*
Algeria	62.3	12.58%	7.50%	Malawi	61.3	13.73%	8.65%
Brunei	76.3	6.06%	0.98%	Mali	60.8	13.73%	8.65%
Gambia	59.3	15.46%	10.38%	Myanmar	63.8	12.58%	7.50%
Guinea	58.3	15.46%	10.38%	Niger	53.7	18.91%	13.83%
Guinea-Bissau	63.8	12.58%	7.50%	Sierra Leone	54.3	18.91%	13.83%
Guyana	68.5	9.23%	4.15%	Somalia	52	18.91%	13.83%
Haiti	61.8	13.73%	8.65%	Sudan	48	25.32%	20.24%
Iran	73.3	7.27%	2.19%	Syria	47	25.32%	20.24%
Korea, D.P.R.	56	16.60%	11.52%	Tanzania	63.3	12.58%	7.50%
Liberia	53	18.91%	13.83%	Togo	61	13.73%	8.65%
Libya	62	13.73%	8.65%	Yemen, Republic	49.3	25.32%	20.24%
Madagascar	64.5	11.42%	6.34%	Zimbabwe	58.5	15.46%	10.38%

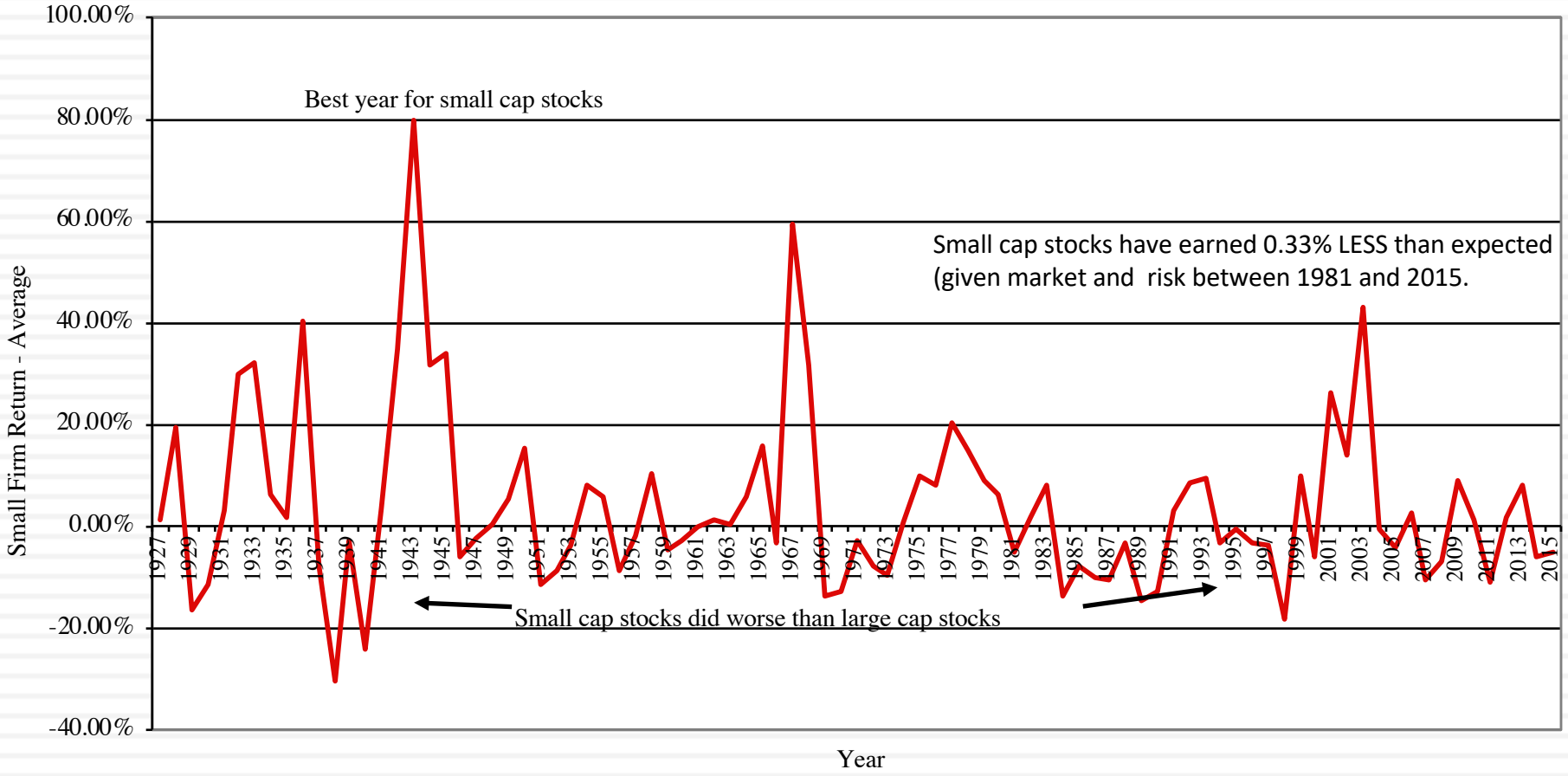
Bangladesh	Ba3	9.23%	4.15%
Cambodia	B2	11.42%	6.34%
China	A1	5.89%	0.81%
Fiji	Ba3	9.23%	4.15%
Hong Kong	Aa2	5.65%	0.57%
India	Baa2	7.27%	2.19%
Indonesia	Baa3	7.62%	2.54%
Japan	A1	5.89%	0.81%
Korea	Aa2	5.65%	0.57%
Macao	Aa3	5.78%	0.70%
Malaysia	A3	6.46%	1.38%
Mauritius	Baa1	6.92%	1.84%
Mongolia	Caa1	13.72%	8.64%
Pakistan	B3	12.58%	7.50%
Papua New Guinea	B2	11.42%	6.34%
Philippines	Baa2	7.27%	2.19%
Singapore	Aaa	5.08%	0.00%
Sri Lanka	B1	10.27%	5.19%
Taiwan	Aa3	5.78%	0.70%
Thailand	Baa1	6.92%	1.84%
Vietnam	B1	10.27%	5.19%
Asia		6.27%	1.19%

Australia	Aaa	5.08%	0.00%
Cook Islands	B1	10.27%	5.19%
New Zealand	Aaa	5.08%	0.00%
Australia & New Zealand		5.08%	0.00%

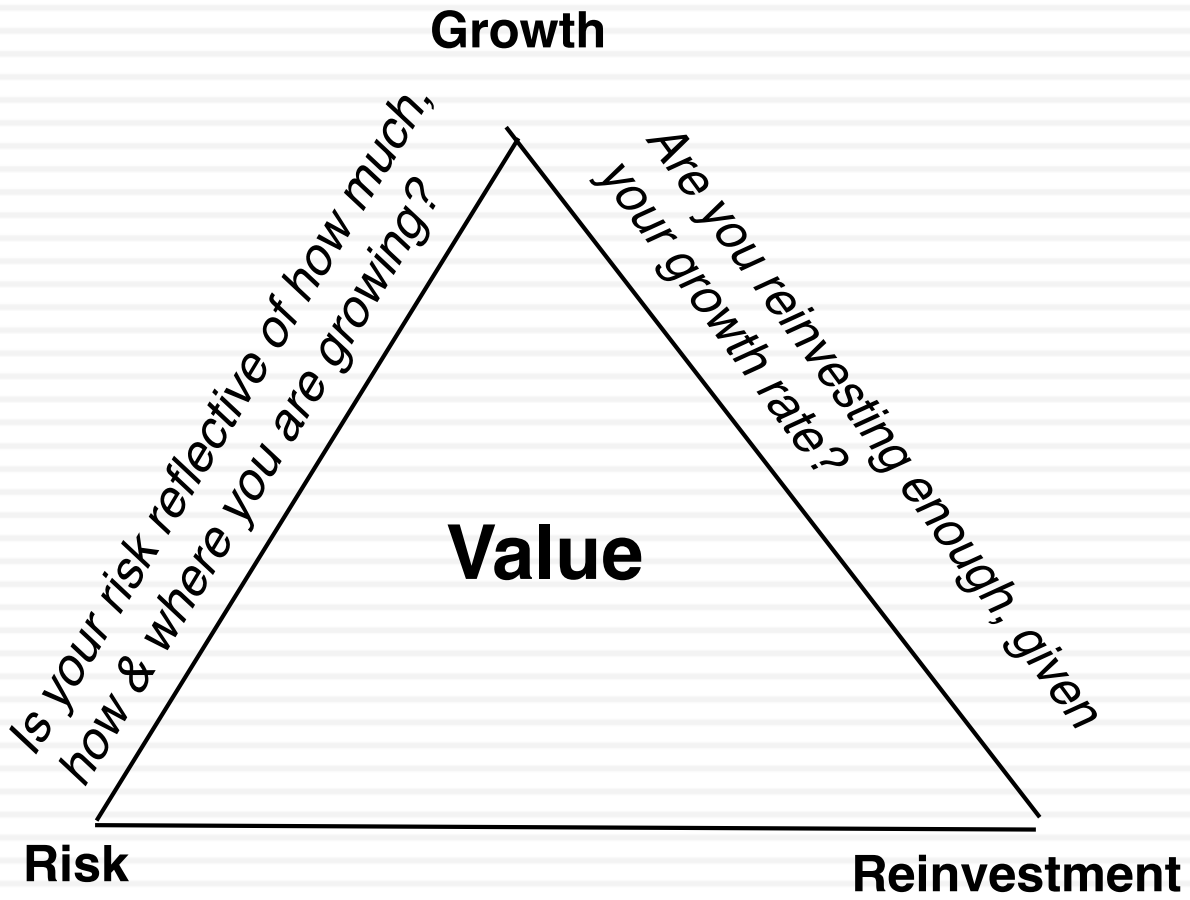
Red #: Country risk premium
Regional #: GDP weighted average

4. Everyone may do it, but that does not make it right.. The small cap premium

Figure 4: Small Firm Premium over time- 1927 -2015



5. Don't let your inputs be at war with each other..



Is your risk consistent with your reinvestment strategy?

The Improbable: Willy Wonkitis

Tesla: Summary 15-year DCF Analysis (DCF valuation as of mid-year 2013)

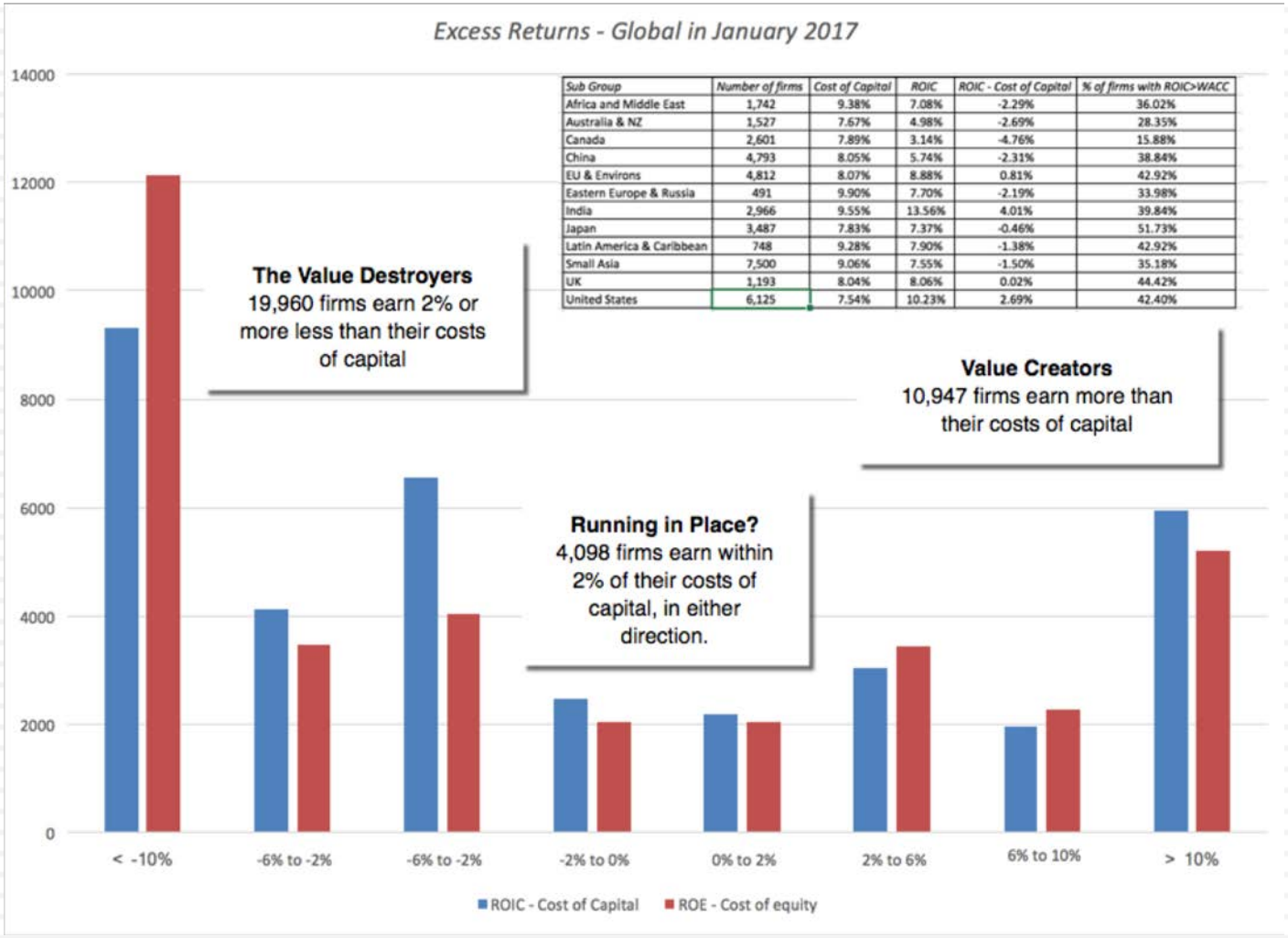
	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Unit Volume	24,298	36,883	64,684	86,713	149,869	214,841	291,861	384,747	466,559	550,398	643,850	726,655	820,645	922,481	1,034,215	1,137,780
% Growth		52%	75%	34%	73%	43%	36%	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%

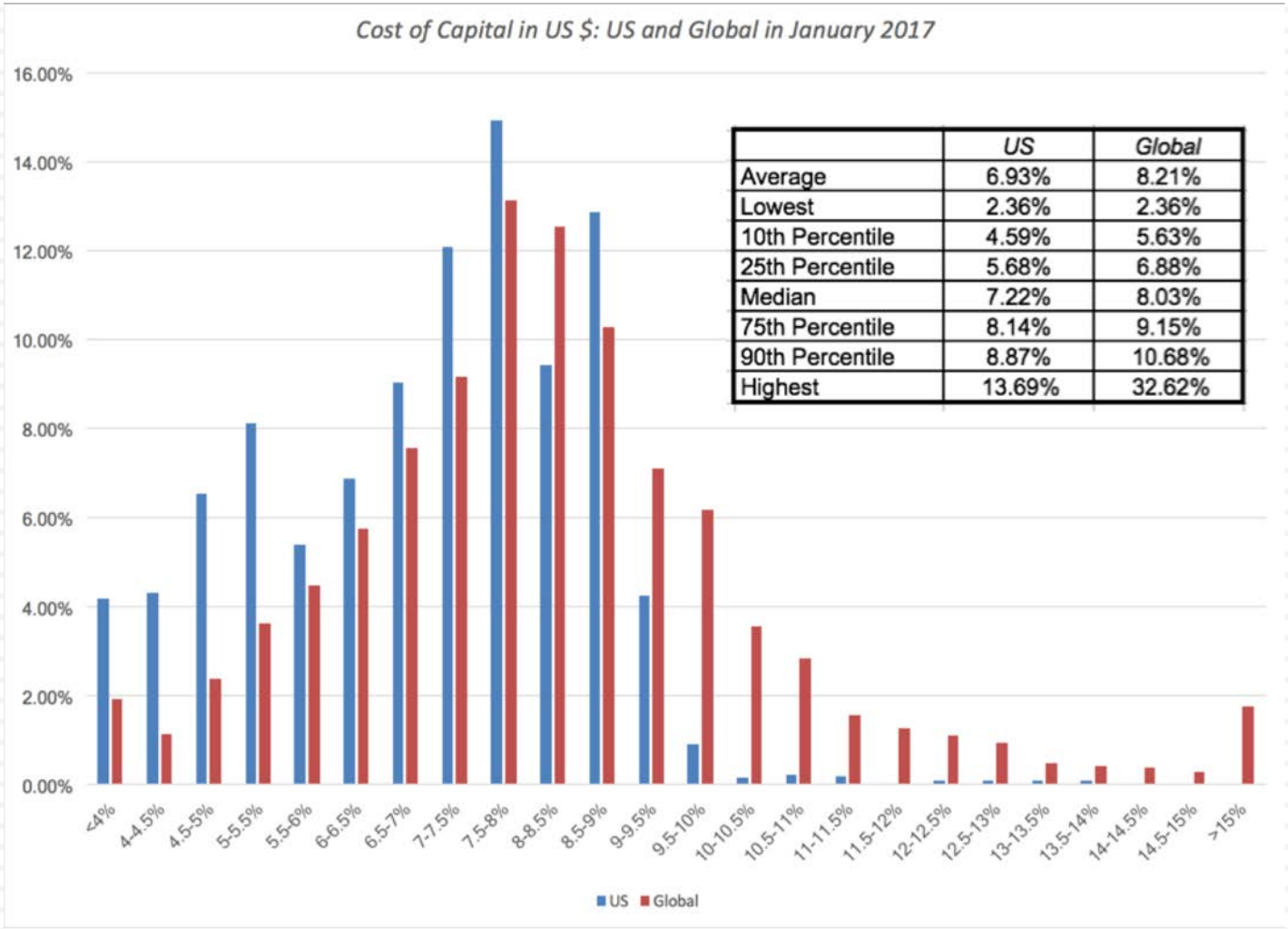
Discount Rate High	13.0%	FY Month of Valuation	1.0 (Beginning of this Month)
Discount Rage Low	9.0%	Month of FY End	12.0 (End of this Month)

And consider the trade offs..



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%
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 & Caribbean	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%

6. Don’t sweat the small stuff



	US	Global
Average	6.93%	8.21%
Lowest	2.36%	2.36%
10th Percentile	4.59%	5.63%
25th Percentile	5.68%	6.88%
Median	7.22%	8.03%
75th Percentile	8.14%	9.15%
90th Percentile	8.87%	10.68%
Highest	13.69%	32.62%

7. Don't let your terminal value run away with your valuation

- In the terminal value equation, the growth seems to be the magic input, the key driver of value.

$$Terminal\ Value_n = \frac{Free\ Cash\ Flow_{n+1}}{(r-g)}$$

- Since that growth rate has to be maintained in perpetuity, it cannot exceed the growth rate of the economy in which you operate:
  - If your valuation is in nominal terms, it is the nominal growth rate of the economy. If it is is real terms, it is the real growth rate.
  - If your company is purely domestic, it is the growth rate of the domestic economy. If it is global, it is the global economy.

My Simple Proxy: The Risk free Rate

- I use a simpler and more easily observable number as a cap on stable growth: the risk free rate that I have used in the valuation. This take into account the currency automatically (since higher inflation currencies have higher risk free rates) and it is not unreasonable to argue that it is a good proxy for the nominal growth rate in the economy.
- There are three reasons I do it:
  - The best predictor nominal growth in the US economy at the start of every decade has been the US treasury bond rate at the time.
  - It preserves consistency. If you believe, as many have, that the risk free rate is too low in US $ or Euros, it compensates for the resulting too-low cost of capital by also capping the growth rate at the same number (at least in terminal value).
  - It puts a control on my biases.

A Consistent Version of Terminal Value

- The terminal value equation can be restated:

$$\text{Terminal Value in year n} = \frac{EBIT_{n+1}\ (1-t)(1-\frac{g}{ROC})}{(\text{Cost of Capital} - g)}$$

Terminal Value for a firm with $100 million in after-tax operating income & cost of capital = 10% (for different g and ROIC)

		Return on capital in perpetuity				
		6%	8%	10%	12%	14%
Growth rate forever	0.00%	$1,000	$1,000	$1,000	$1,000	$1,000
	0.50%	$965	$987	$1,000	$1,009	$1,015
	1.00%	$926	$972	$1,000	$1,019	$1,032
	1.50%	$882	$956	$1,000	$1,029	$1,050
	2.00%	$833	$938	$1,000	$1,042	$1,071
	2.50%	$778	$917	$1,000	$1,056	$1,095
	3.00%	$714	$893	$1,000	$1,071	$1,122

Dangerous Practice 1: Just grow the FCFF another year!

Valuation of a firm with expected growth in earnings of 10% for next 5 yeras and 3% thereafter; Cost of capital is 10% abd Return on capital is 15%

Terminal Value = FCFF in year 6/ (.10-.03)

		Just Grow FCFF		Recompute FCFF	
Year	EBIT(1-t)	FCFF	Term Value	FCFF	Term Value
1	$ 108.00	$ 36.00		$ 36.00	
2	$ 116.64	$ 38.88		$ 38.88	
3	$ 125.97	$ 41.99		$ 41.99	
4	$ 136.05	$ 45.35		$ 45.35	
5	$ 146.93	$ 48.98	$ 720.67	$ 48.98	$ 1,729.61
6	$ 151.34	$ 50.45		$ 121.07	
Value today	$ 605.27			$ 1,073.95	

Reinvestment Rate in first 5 years = g/ ROC = 10%/15% = 66.67%

FCFF in year 6 = $29.39 (1.03)

Reinvestment Rate in year 6 = g/ ROC = 3%/15% = 20%
FCFF in year 6 = 149.87 (1-.20) = $119.90

Dangerous Practice 2: No reinvestment needed!

- Approximately half of all the DCFs assume that when you get to stable growth, you can set capital expenditures = depreciation, ignore working capital changes and effectively make the reinvestment rate zero, while allowing the firm to continue growing at a stable growth rate.
- That argument fails at two levels.
  - If you reinvest nothing, your invested capital stays constant during your stable growth period, and as operating income rises, your return on invested capital will approach infinity.
  - Even if you assume a growth rate = inflation rate, you will have to replace your existing productive assets as they age and the same inflation that aids you on your revenues will cause the capital expenditures to exceed depreciation.

Dangerous Practice 3: Just use an exit multiple

- In a large proportion of DCFs, the terminal value is estimated by using a multiple of some operating metric (revenues, earnings etc.) in year n to get to a terminal value in that year:

$$\text{Trojan Horse DCF} = \frac{E(CF_1)}{(1+r)} + \frac{E(CF_2)}{(1+r)^2} + \frac{E(CF_3)}{(1+r)^3} \ldots + \frac{(EBITDA_n * \text{Peer Group } \frac{EV}{EBITDA})}{(1+r)^n}$$

- In almost every case where this is done, the multiple that is used to estimate the terminal value comes from looking at what how peer group companies trade today.
- That makes this a pricing, not an intrinsic valuation.

8. Don't let your macro views drown out your micro views..

- When you are asked to value a company, you should keep your focus on what drives that value. If you bring in your specific macro views into the valuation, the value that you obtain for a company will be a joint result of what you think about the company and your macro views.
- **Bottom line**: If you have macro views, provide them separately. You should be as macro-neutral as you can be, in your company valuations.
- **Follow up**: If you find macro risk dominating your thoughts, deal with it frontally.

Severstal: Valuation (April 2017)

Cash flows from existing assets

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

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

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

Sales to capital ratio of **1.20**

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

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

The value of growth

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

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

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

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

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

The Risk in the Cash flow

Cost of Equity
10.24%

Cost of Debt
Bond rating: BB+
(2.5%+2.5%)(1-.20) = 4.00%

Weights
E = 85.2% D = 14.8%

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

Riskfree Rate:
Riskfree rate = 2.5%

+ **Beta** 0.89 X

ERP
8.70%

D/E= 17.36%

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

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

The **Chimera DCF** mixes dollar cash flows with peso discount rates, nominal cash flows with real costs of capital and cash flows before debt payments with costs of equity, violating basic consistency rules

In a **Dreamstate DCF**, you build amazing companies on spreadsheets, making outlandish assumptions about growth and operating margins over time.

In a **Dissonant DCF**, assumptions about growth, risk and cash flows are not consistent with each other, with little or no explanation given for the mismatch.

In a **Trojan Horse DCF**, Just as the Greeks used a wooden horse to smuggle soldiers into Troy, analysts use the Trojan Horse of cash flows to smuggle in a pricing (in the form of a terminal value, estimated by using a multiple).

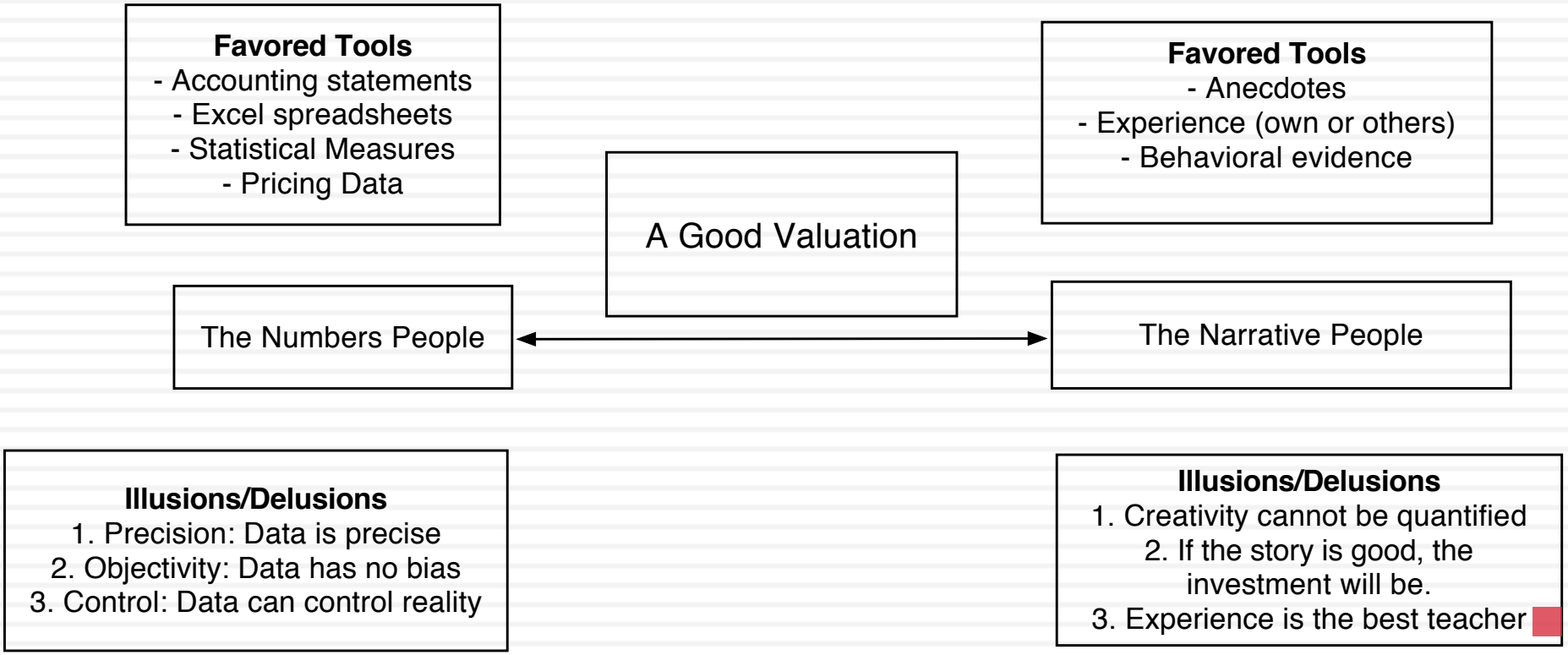
A **Kabuki DCF** is a work of art, where analyst and rule maker (or court) go through the motions of valuation, with the intent of developing models that are legally or accounting-rule defensible rather than yielding reasonable values.

D+CF ≠ DCF

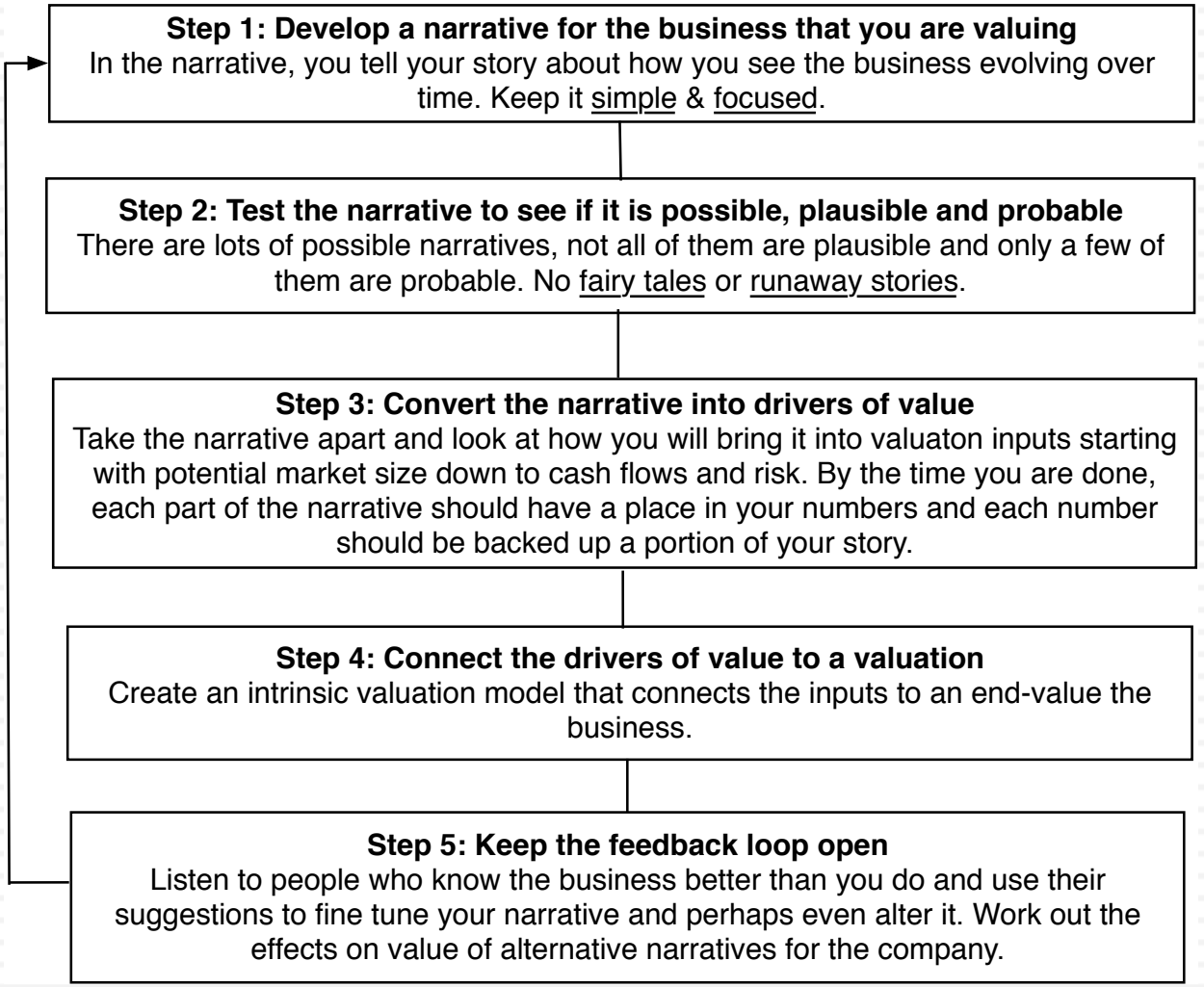
In a **Robo DCF**, the analyst builds a valuation almost entirely from the most recent financial statements and automated forecasts.

A **Mutant DCF** is a collection of numbers where items have familiar names (free cash flow, cost of capital) but the analyst putting it together has neither a narrative nor a sense of the basic principles of

III. Don't mistake modeling for valuation



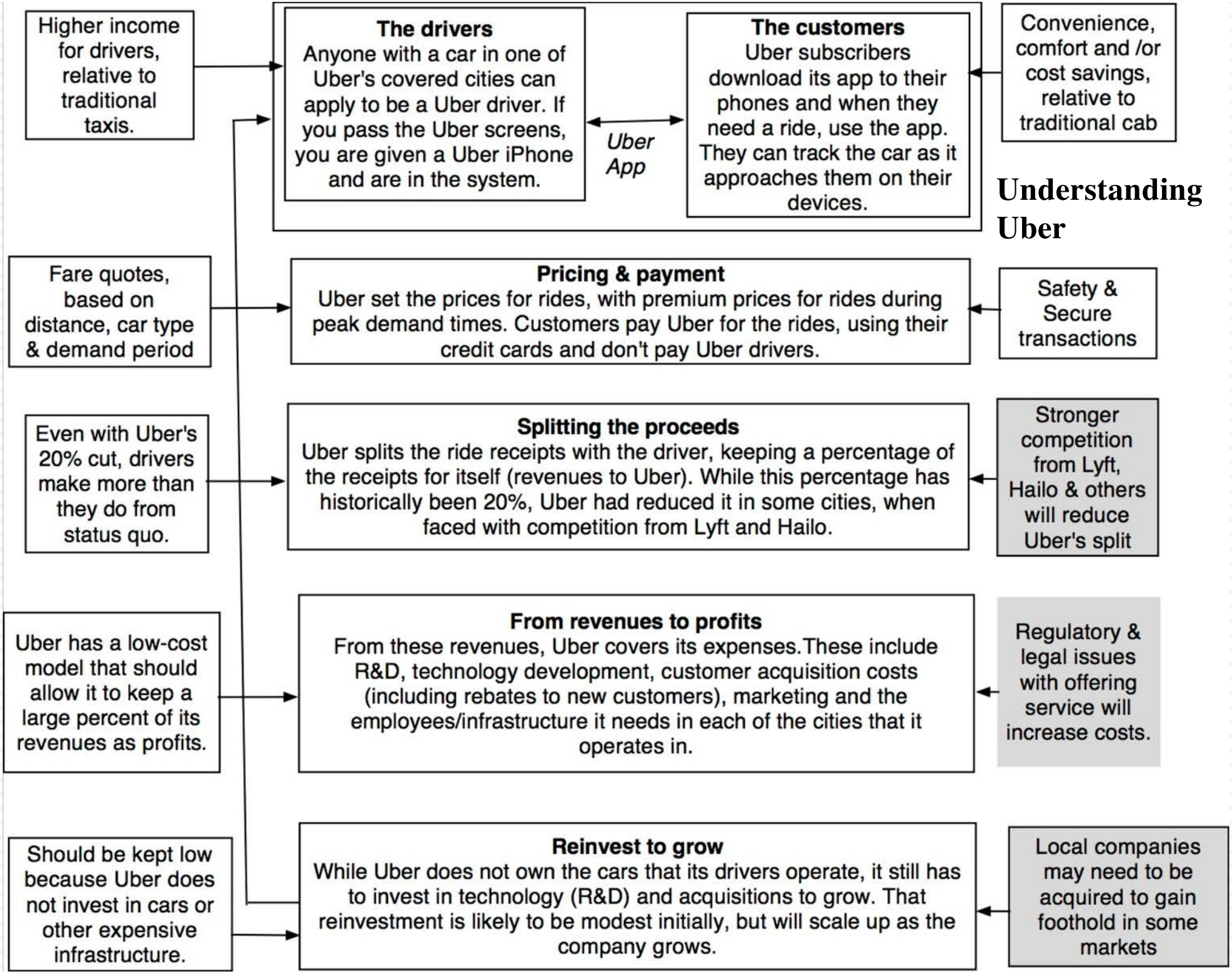
From story to numbers and beyond..



Step Zero: 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.

Understanding Uber



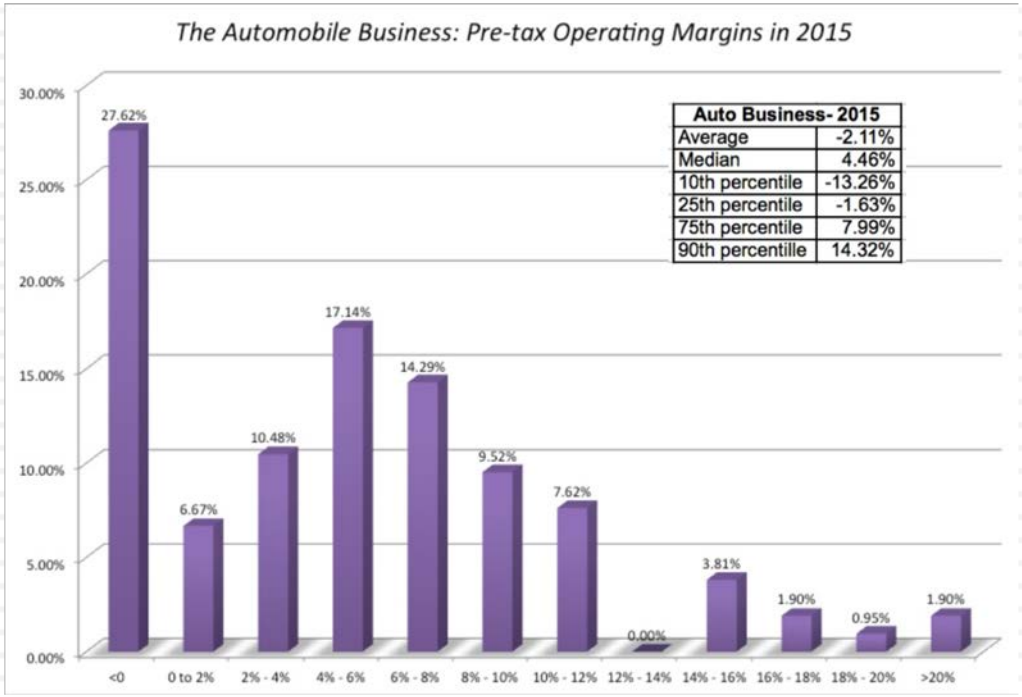
The Auto Business

Low Growth

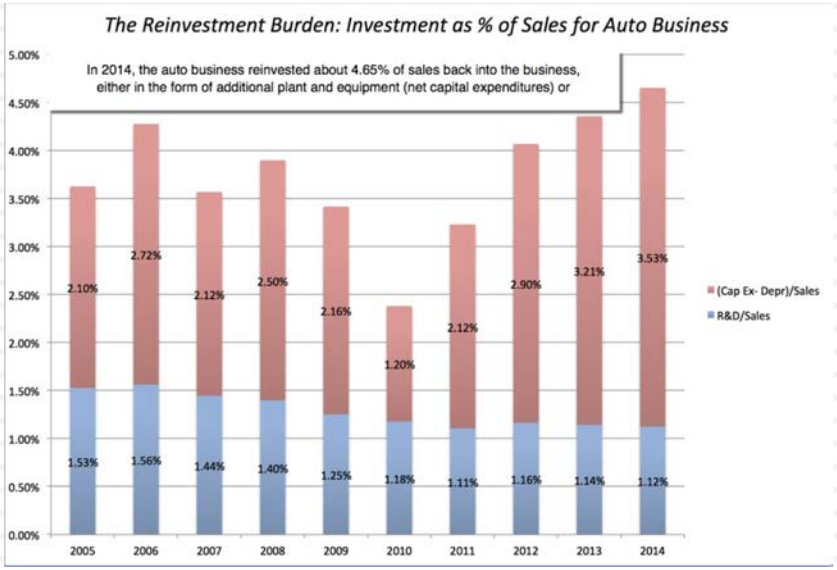
Year	Revenues ($)	% Growth Rate
2005	1,274,716.60	
2006	1,421,804.20	11.54%
2007	1,854,576.40	30.44%
2008	1,818,533.00	-1.94%
2009	1,572,890.10	-13.51%
2010	1,816,269.40	15.47%
2011	1,962,630.40	8.06%
2012	2,110,572.20	7.54%
2013	2,158,603.00	2.28%
2014	2,086,124.80	-3.36%
ounded Average =		5.63%

+

Low Margins



High & Increasing Reinvestment



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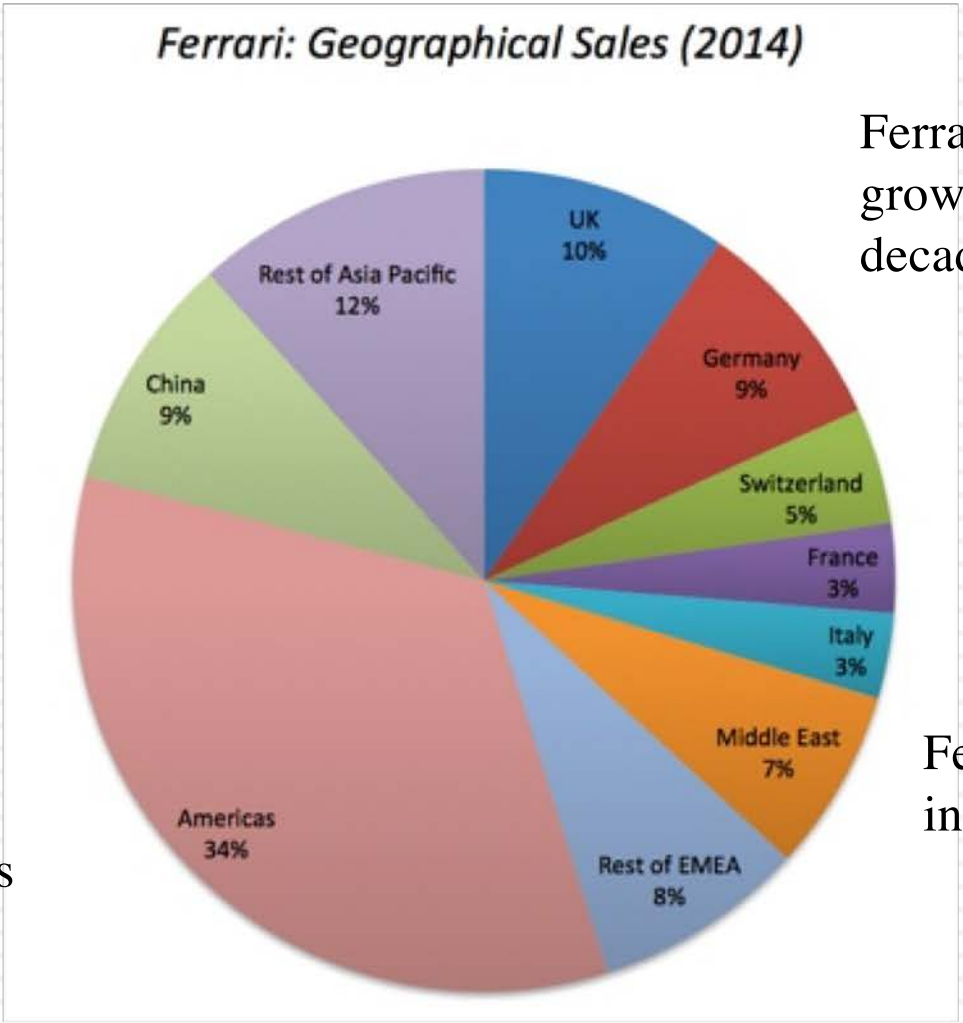
Bad Business

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

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

Ferrari has not invested in new plants.

Step 1: The Uber Narrative

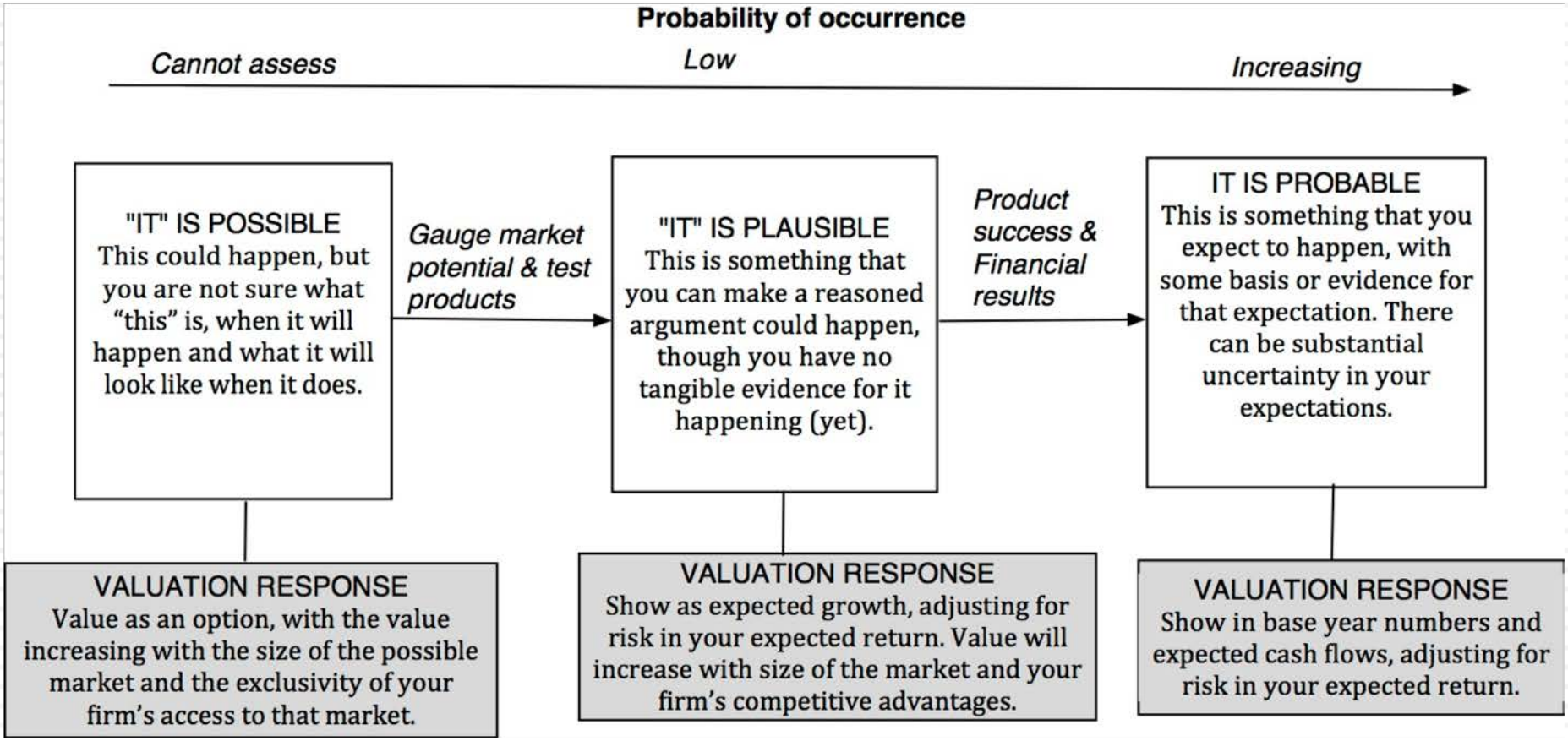
In June 2014, my initial narrative for Uber was that it would be

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.

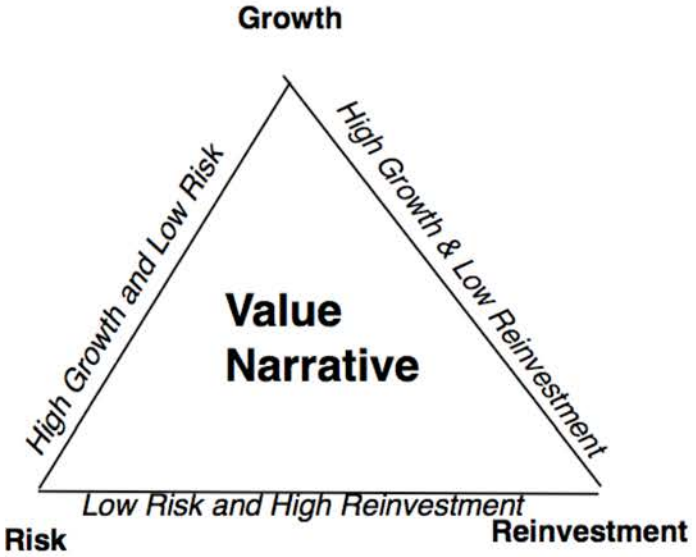
The Implausible

Growth without reinvestment
Assuming growth forever without reinvestment.

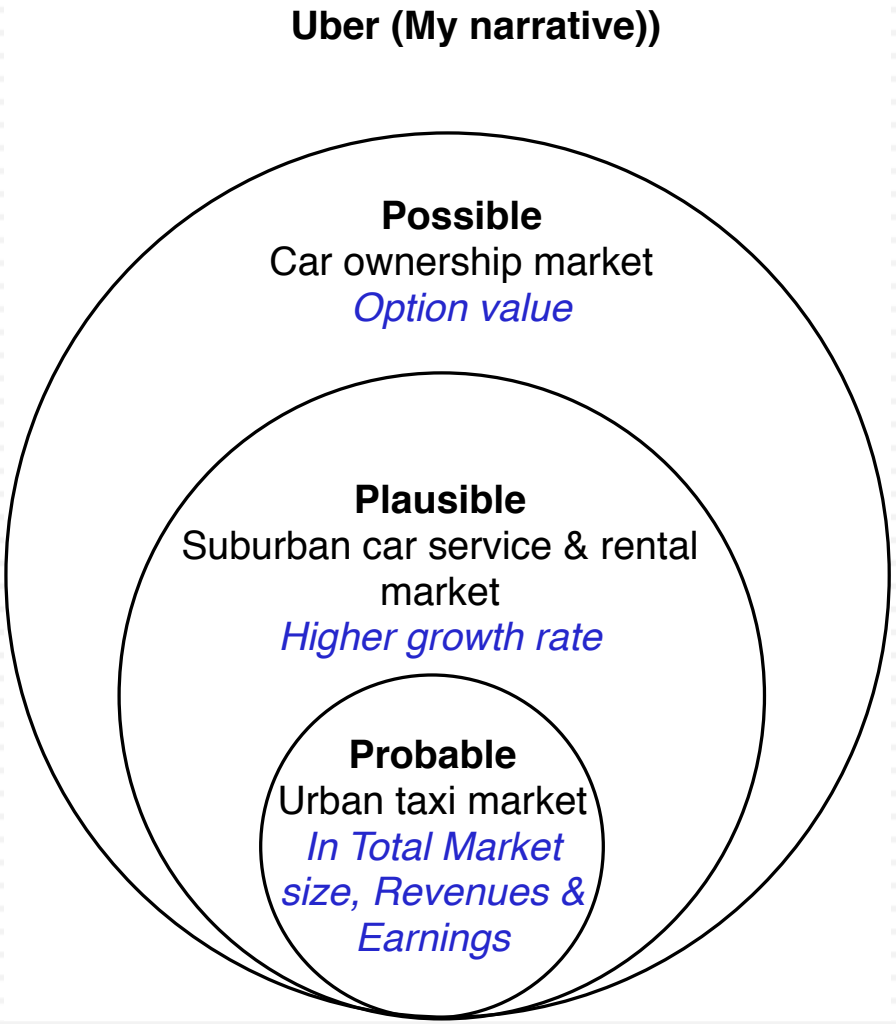
Profits without competition
Assuming that your company will grow and earn higher profits, with no competition.

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

The Improbable



Uber: Possible, Plausible and Probable



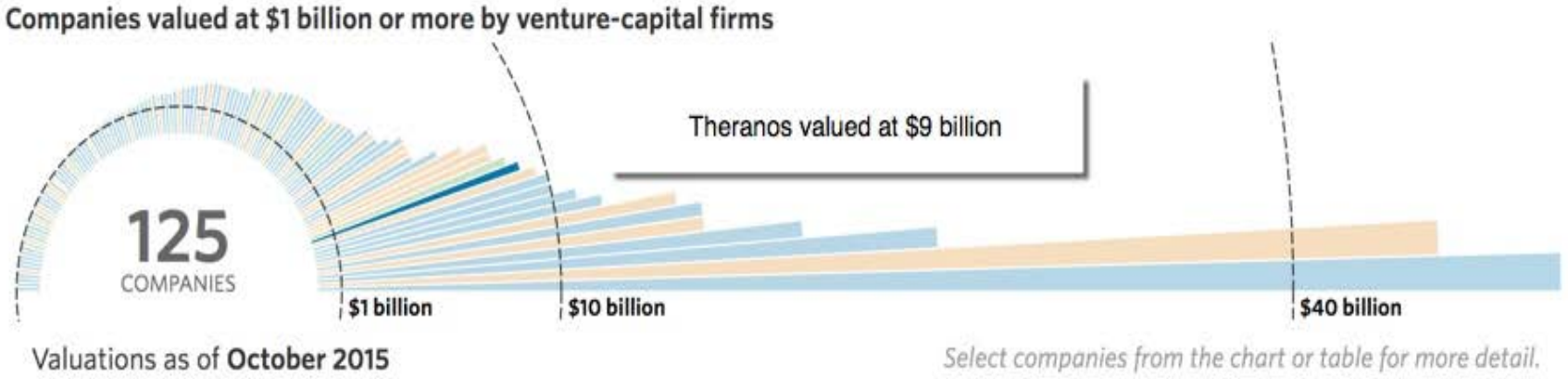
The Impossible: The Runaway Story

The Story

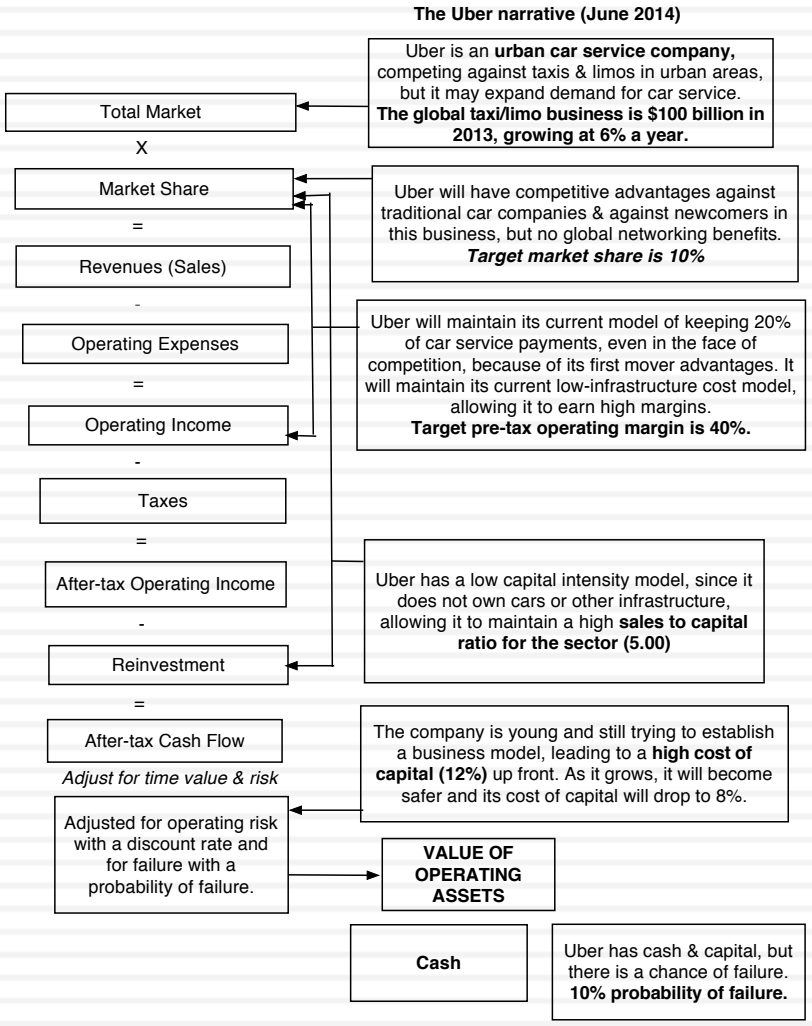
The Checks (?)

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

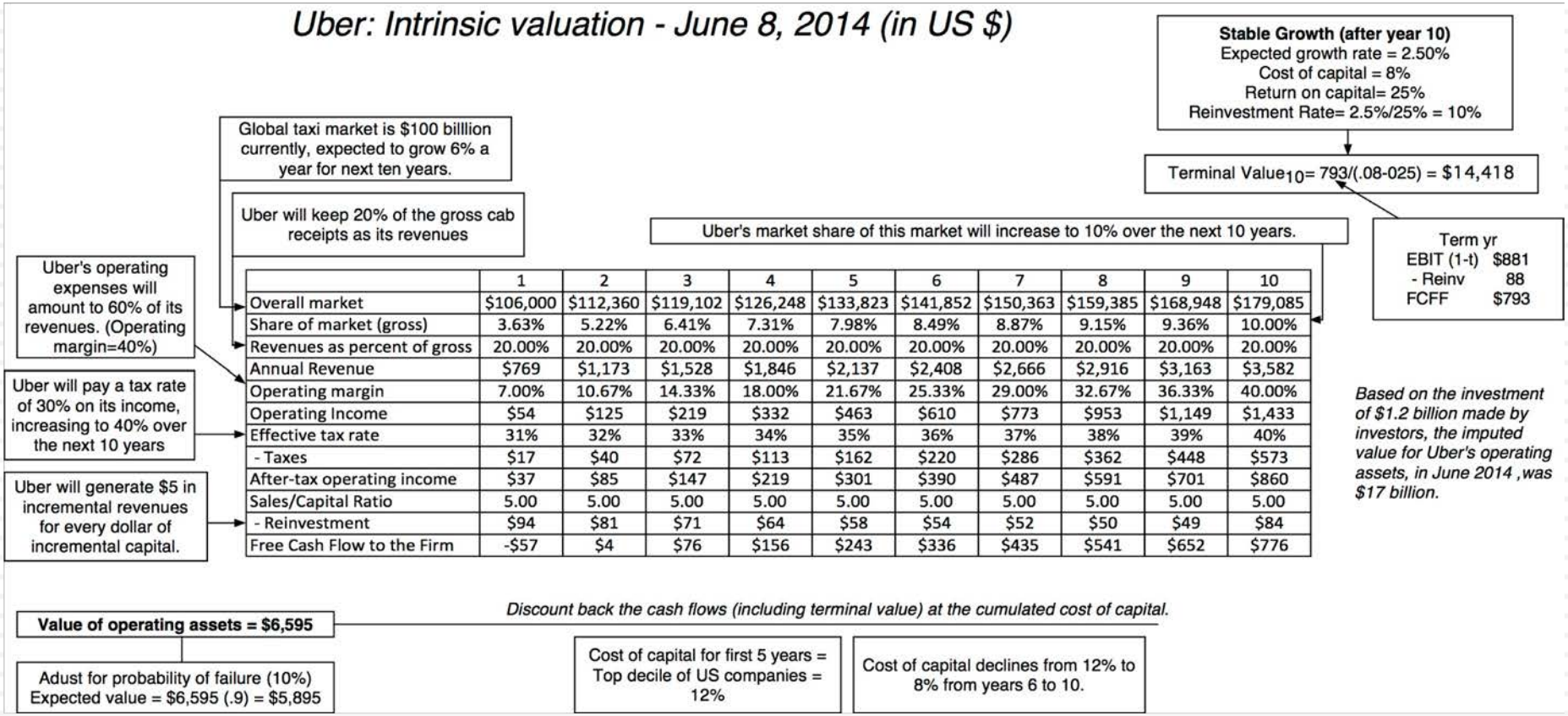
Money



Step 3: Connect your narrative to key drivers of value



Step 4: Value the company (Uber)



	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

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 open

- When you tell a story about a company (either explicitly or implicitly), it is natural to feel attached to that story and to defend it against all attacks. Nothing can destroy an investor more than hubris.
- Being open to other views about a company is not easy, but here are some suggestions that may help:
  - Face up to the uncertainty in your own estimates of value.
  - Present the valuation to people who don't think like you do.
  - Create a process where people who disagree with you the most have a say.
  - Provide a structure where the criticisms can be specific and pointed, rather than general.

The Gurley Pushback

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

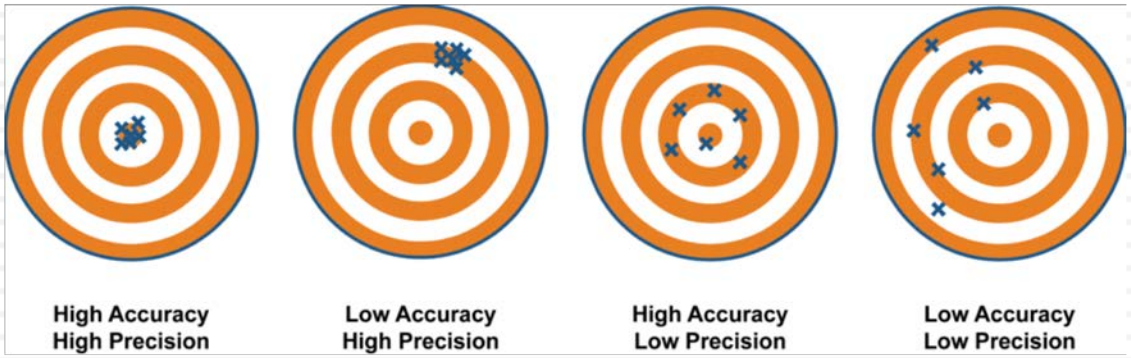
Total Market	*Growth Effect*	*Network Effect*	*Competitive Advantages*	*Value of Uber*
A4. Mobility Services	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	$90,457
A3. Logistics	B4. Double market size	C5. Strong global network effects	D4. Strong & Sustainable	$65,158
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 Real World Intrudes: Be ready to modify narrative as events unfold

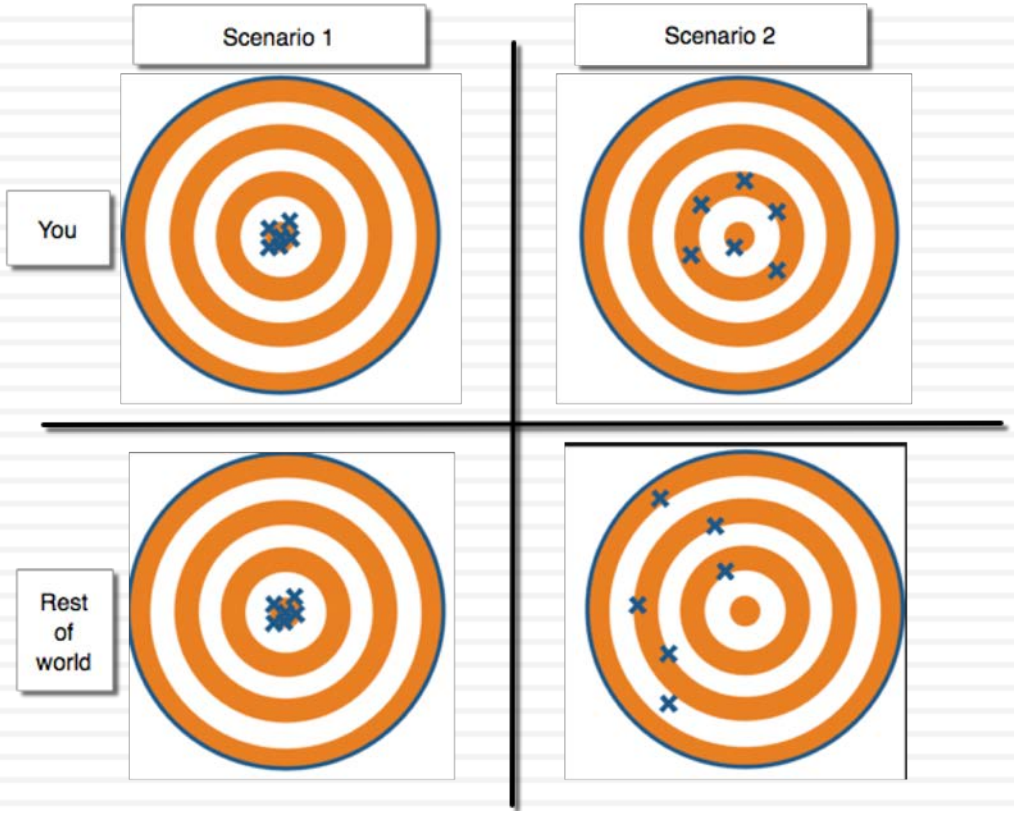
Narrative Break/End	Narrative Shift	Narrative Change (Expansion or Contraction)
Events, external (legal, political or economic) or internal (management, competitive, default), that can cause the narrative to break or end.	Improvement or deterioration in initial business model, changing market size, market 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

IV. Don't mistake precision for accuracy.. And accuracy for payoff..

Better accurate than precise

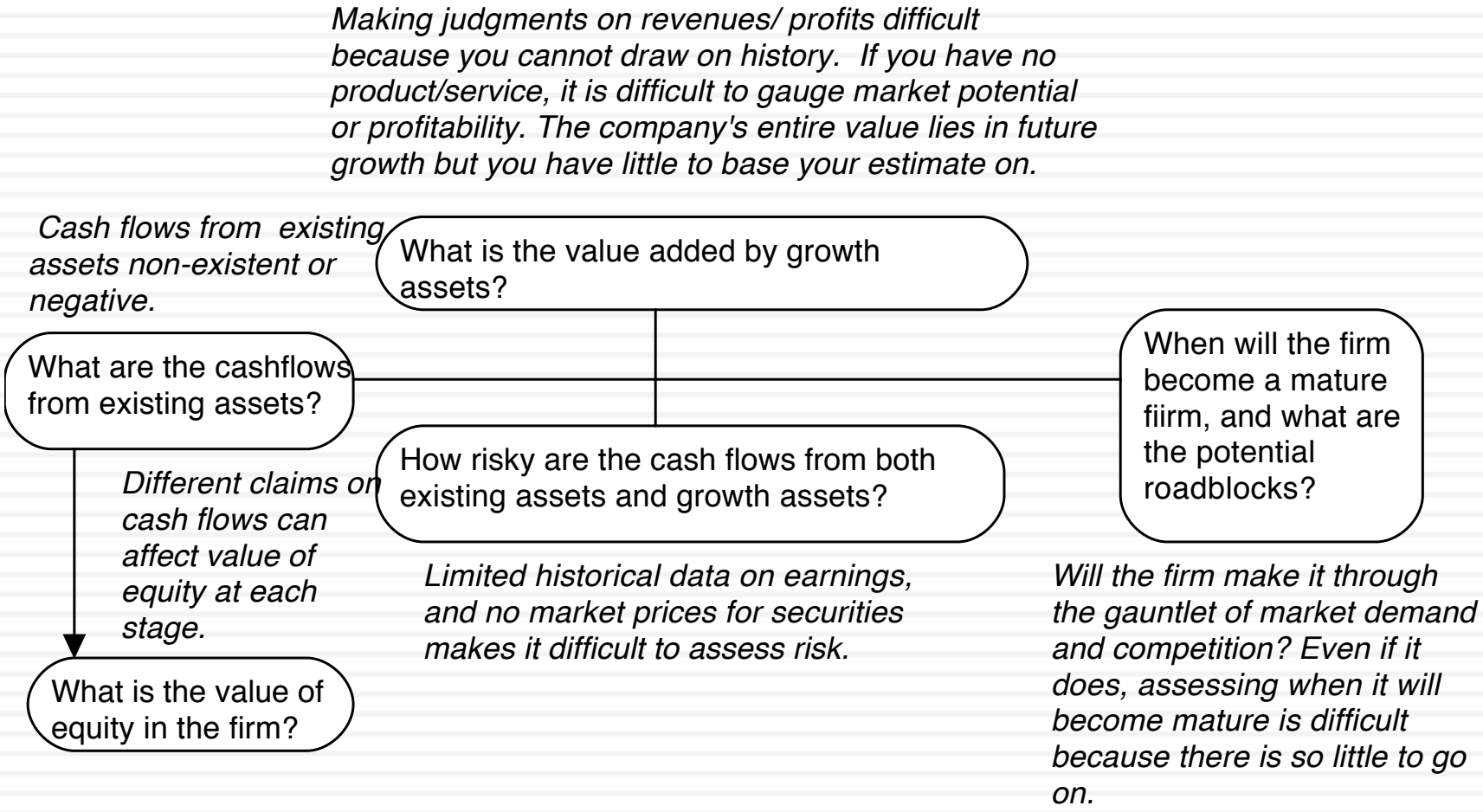


It's all relative



Valuing a start up is hard to do..

Figure 3: Estimation Issues - Young and Start-up Companies



And the dark side will beckon..

- With young start up companies, you will be told that it is "too difficult" or even "impossible" to value these companies, because there is so little history and so much uncertainty in the future.
- Instead, you will be asked to come over to the "dark side", where
  - You will see value metrics that you have never seen before
  - You will hear "macro" stories, justifying value
  - You will be asked to play the momentum game
- While all of this behavior is understandable, none of it makes the uncertainty go away. You have a choice. You can either hide from uncertainty or face up to it.

Twitter: Setting the table in October 2013

	Last 10K	Trailing 12 month
Revenues	$316.93	$534.46
Operating Income	($77.06)	($134.91)
Adjusted Operating Income		$7.66
Invested Capital		$955.00
Adjusted Operating Margin		1.44%
Sales/ Invested Capital		$0.56

Twitter: Priming the Pump for Valuation

1. Make small revenues into big revenues

	2011		2012		2013	
	%	$	%	$	%	$
Google	32.09%	$27.74	31.46%	$32.73	33.24%	$38.83
Facebook	3.65%	$3.15	4.11%	$4.28	5.04%	$5.89
Yahoo!	3.95%	$3.41	3.37%	$3.51	3.10%	$3.62
Microsoft	1.27%	$1.10	1.63%	$1.70	1.78%	$2.08
IAC	1.15%	$0.99	1.39%	$1.45	1.47%	$1.72
AOL	1.17%	$1.01	1.02%	$1.06	0.95%	$1.11
Amazon	0.48%	$0.41	0.59%	$0.61	0.71%	$0.83
Pandora	0.28%	$0.24	0.36%	$0.37	0.50%	$0.58
Twitter	0.16%	$0.14	0.28%	$0.29	0.50%	$0.58
Linkedin	0.18%	$0.16	0.25%	$0.26	0.32%	$0.37
Millennial Media	0.05%	$0.04	0.07%	$0.07	0.10%	$0.12
Other	55.59%	$48.05	55.47%	$57.71	52.29%	$61.09
Total Market	100%	$86.43	100.00%	$104.04	100.00%	$116.82

		Annual growth rate in Global Advertising Spending				
		2.00%	2.50%	3.00%	3.50%	4.00%
Online advertising share of market	20%	$124.78	$131.03	$137.56	$144.39	$151.52
	25%	$155.97	$163.79	$171.95	$180.49	$189.40
	30%	$187.16	$196.54	$206.34	$216.58	$227.28
	35%	$218.36	$229.30	$240.74	$252.68	$265.16
	40%	$249.55	$262.06	$275.13	$288.78	$303.04

My estimate for 2023: Overall online advertising market will be close to $200 billion and Twitter will have about 5.7% ($11.5 billion)

2. Make losses into profits

Company	*Operating Margin*
Google Inc. (NasdaqGS:GOOG)	22.82%
Facebook, Inc. (NasdaqGS:FB)	29.99%
Yahoo! Inc. (NasdaqGS:YHOO)	13.79%
Netlfix	3.16%
Groupon	2.53%
LinkedIn Corporation (NYSE:LNKD)	5.18%
Pandora Media, Inc. (NYSE:P)	-9.13%
Yelp, Inc. (NYSE:YELP)	-6.19%
OpenTable, Inc. (NasdaqGS:OPEN)	24.90%
RetailMeNot	45.40%
Travelzoo Inc. (NasdaqGS:TZOO)	15.66%
Zillow, Inc. (NasdaqGS:Z)	-66.60%
Trulia, Inc. (NYSE:TRLA)	-6.79%
Aggregate	20.40%

My estimate for Twitter: Operating margin of 25% in year 10

3. Reinvest for growth

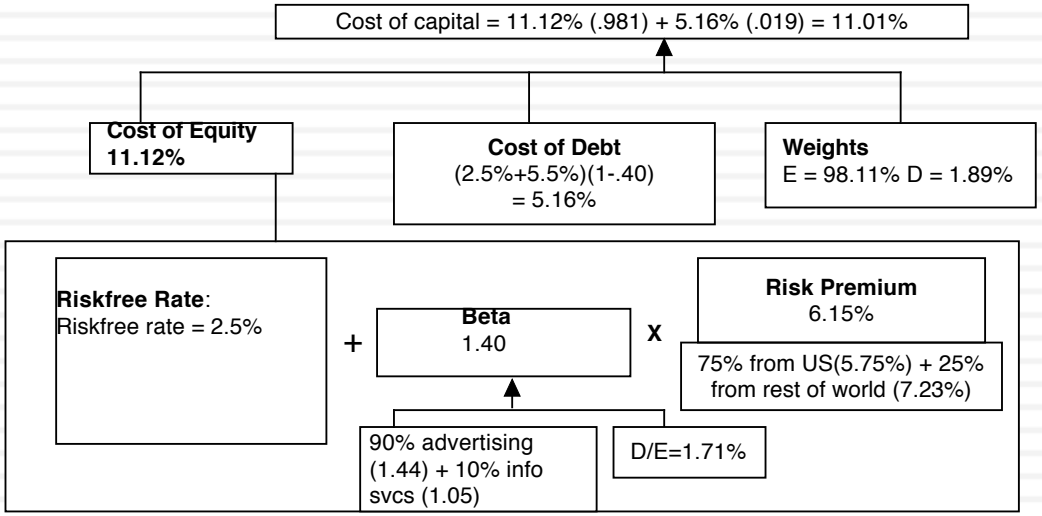
	Sales/ Invested Capital
Twitter (2013)	1.10
Advertising Companies	1.40
Social Media Companies	1.05

My estimate for Twitter: Sales/Capital will be 1.50 for next 10 years

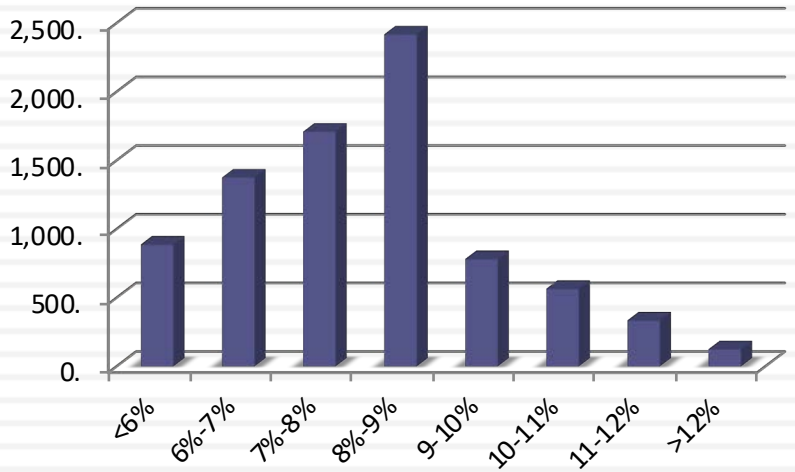
The Cost of Capital for Twitter

Risk in the discount rate

My estimate for Twitter



Cost of Capital: US - Nov '13



0% *Survival Risk* 100%

Probability that the firm will not make it as a going concern

Certain to make it as going concern → *Certain to fail*

My assumption for Twitter

Twitter Pre-IPO Valuation: October 27, 2013

Starting numbers

	Last 10K	Trailing 12 month
Revenues	$316.93	$534.46
Operating income	-$77.06	-$134.91
Adjusted Operating Income		$7.67
Invested Capital		$955.00
Adjusted Operatng Margin		1.44%
Sales/ Invested Capital		0.56
Interest expenses	$2.49	$5.30

Revenue growth of 51.5% a year for 5 years, tapering down to 2.5% in year 10

Pre-tax operating margin increases to 25% over the next 10 years

Sales to capital ratio of **1.50** for incremental sales

Stable Growth
g = 2.5%; Beta = 1.00;
Cost of capital = 8%
ROC= **12**%;
Reinvestment Rate=2.5%/12% = 20.83%

Terminal Value$_{10}$= 1466/(.08-.025) = $26,657

	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Revenues	$ 810	$1,227	$1,858	$2,816	$4,266	$6,044	$7,973	$9,734	$10,932	$11,205
Operating Income	$ 31	$ 75	$ 158	$ 306	$ 564	$ 941	$1,430	$1,975	$ 2,475	$ 2,801
Operating Income after tax	$ 31	$ 75	$ 158	$ 294	$ 395	$ 649	$ 969	$1,317	$ 1,624	$ 1,807
- Reinvestment	$ 183	$ 278	$ 421	$ 638	$ 967	$1,186	$1,285	$1,175	$ 798	$ 182
FCFF	$(153)	$ (203)	$ (263)	$ (344)	$ (572)	$ (537)	$ (316)	$ 143	$ 826	$ 1,625

Terminal year (11)

EBIT (1-t)	$ 1,852
- Reinvestment	$ 386
FCFF	$ 1,466

Operating assets	$9,705
+ Cash	321
+ IPO Proceeds	1295
- Debt	214
Value of equity	11,106
- Options	713
Value in stock	10,394
/ # of shares	582.46
Value/share	$17.84

Cost of capital = 11.12% (.981) + 5.16% (.019) = 11.01%

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

Cost of Equity
11.12%

Cost of Debt
(2.5%+5.5%)(1-.40)
= 5.16%

Weights
E = 98.1% D = 1.9%

Riskfree Rate:
Riskfree rate = 2.5%

+

Beta
1.40

90% advertising (1.44) + 10% info svcs (1.05)

D/E=1.71%

x

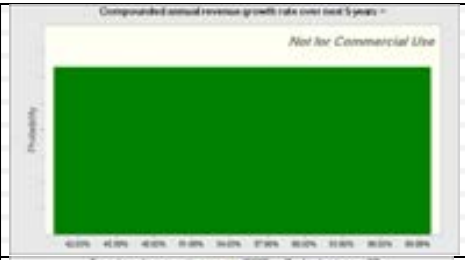
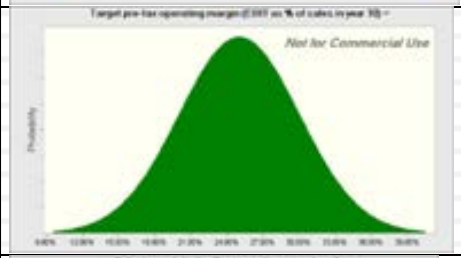
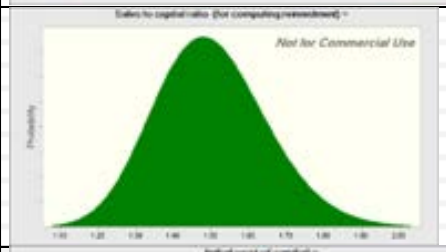
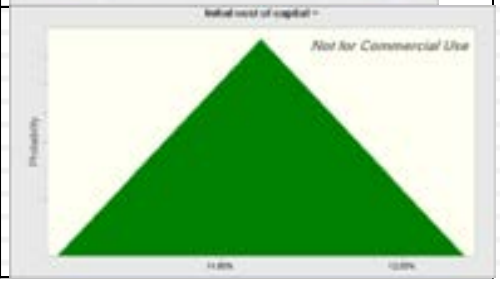
Risk Premium
6.15%

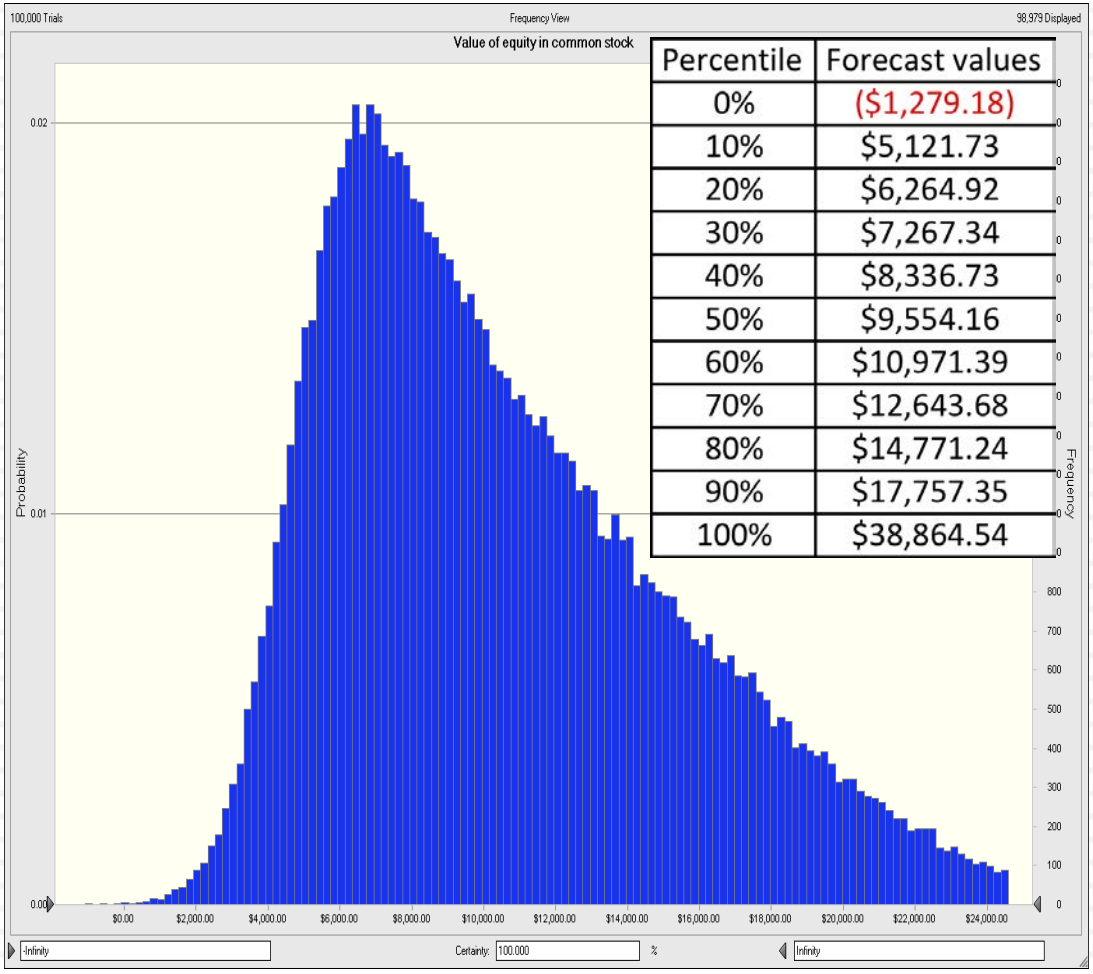
75% from US(5.75%) + 25% from rest of world (7.23%)

A sobering reminder: You will be "wrong" and it is okay

- 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.
- Remember that it is not just your value that is changing, but so is the price, and the price will change a great deal more than the value.

And your value is not a fact, but an estimate..

Revenue Growth Rate Distribution: Uniform Expected Value = 55% Minimum Value: 40% Maximum Value: 70%	
Target Operating Margin Distribution: Normal Expected Value = 25% Standard Deviation = 5%	
Sales to Capital Ratio Distribution: Lognormal Expected value: 1.50 Standard deviation: 0.15	
Cost of Capital Distribution: Triangular Expected value: 11.22% Minimum value: 10.02% Maximum value: 12.22%	



Percentile	Forecast values
0%	($1,279.18)
10%	$5,121.73
20%	$6,264.92
30%	$7,267.34
40%	$8,336.73
50%	$9,554.16
60%	$10,971.39
70%	$12,643.68
80%	$14,771.24
90%	$17,757.35
100%	$38,864.54

Forecasting in the face of uncertainty. A test:

- In which of these two cities would you find it easier to forecast the weather?

Weather changeability for Honolulu, Hawaii

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	1.7°	1.2°
Average change in low temperature day-to-day	1.5°	2.0°

Precipitation	Last Month	Last Year
Chance of dry day after a precip day	67%	81%
Chance of precip day after a dry day	7%	13%

Weather changeability for Epping, North Dakota

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	8.5°	7.7°
Average change in low temperature day-to-day	7.1°	8.6°

Precipitation	Last Month	Last Year
Chance of dry day after a precip day	50%	65%
Chance of precip day after a dry day	38%	20%

V. Don't mistake price for value!

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

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

Accounting Estimates

Valuation Estimates

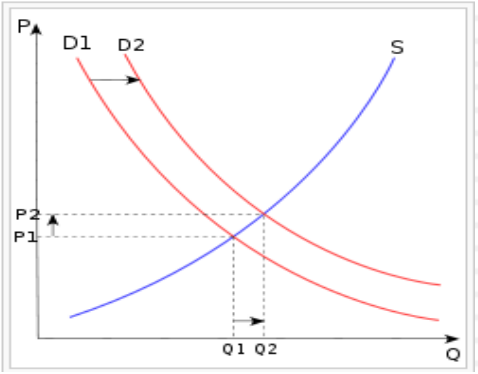
INTRINSIC VALUE

Value

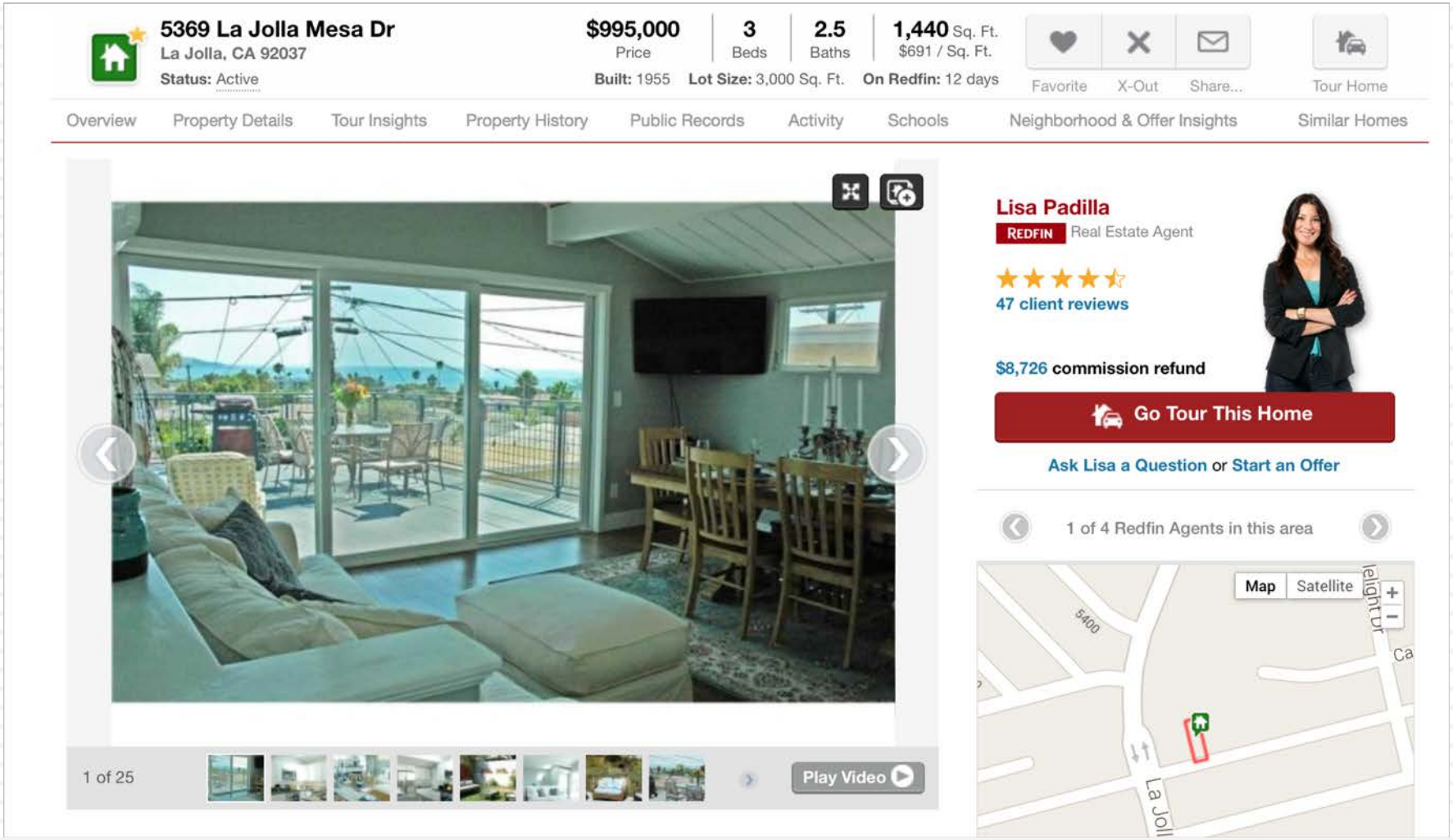
THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?

Price

PRICE



Test 1: Are you pricing or valuing?



Test 2: Are you pricing or valuing?

Europe
Switzerland

Biotechnology
Biotechnology

Reuters	Bloomberg	Exchange	Ticker
BION.S	BION SW	SWX	BION

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

Strong sector and stock-picking continue

Impressive performance

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

Biotech industry remains attractive

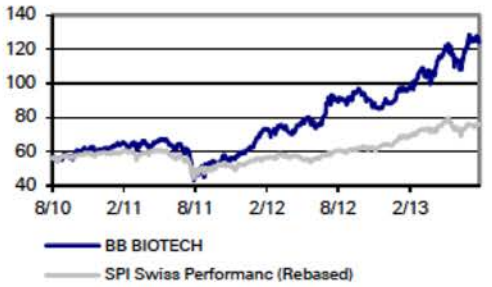
With the re-rating of the pharma sector, investors have also showed increased interest in biotech stocks. Established biotech stocks have delivered encouraging financial results and approvals, while there has also been substantial industry consolidation, which is not surprising in times of "cheap" money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

Key changes

Target Price 106.50 to 164.50 ↑ 54.5%

Source: Deutsche Bank

Price/price relative



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

The determinants of price

Mood and Momentum
Price is determined in large part by mood and momentum, which, in turn, are driven by behavioral factors (panic, fear, greed).

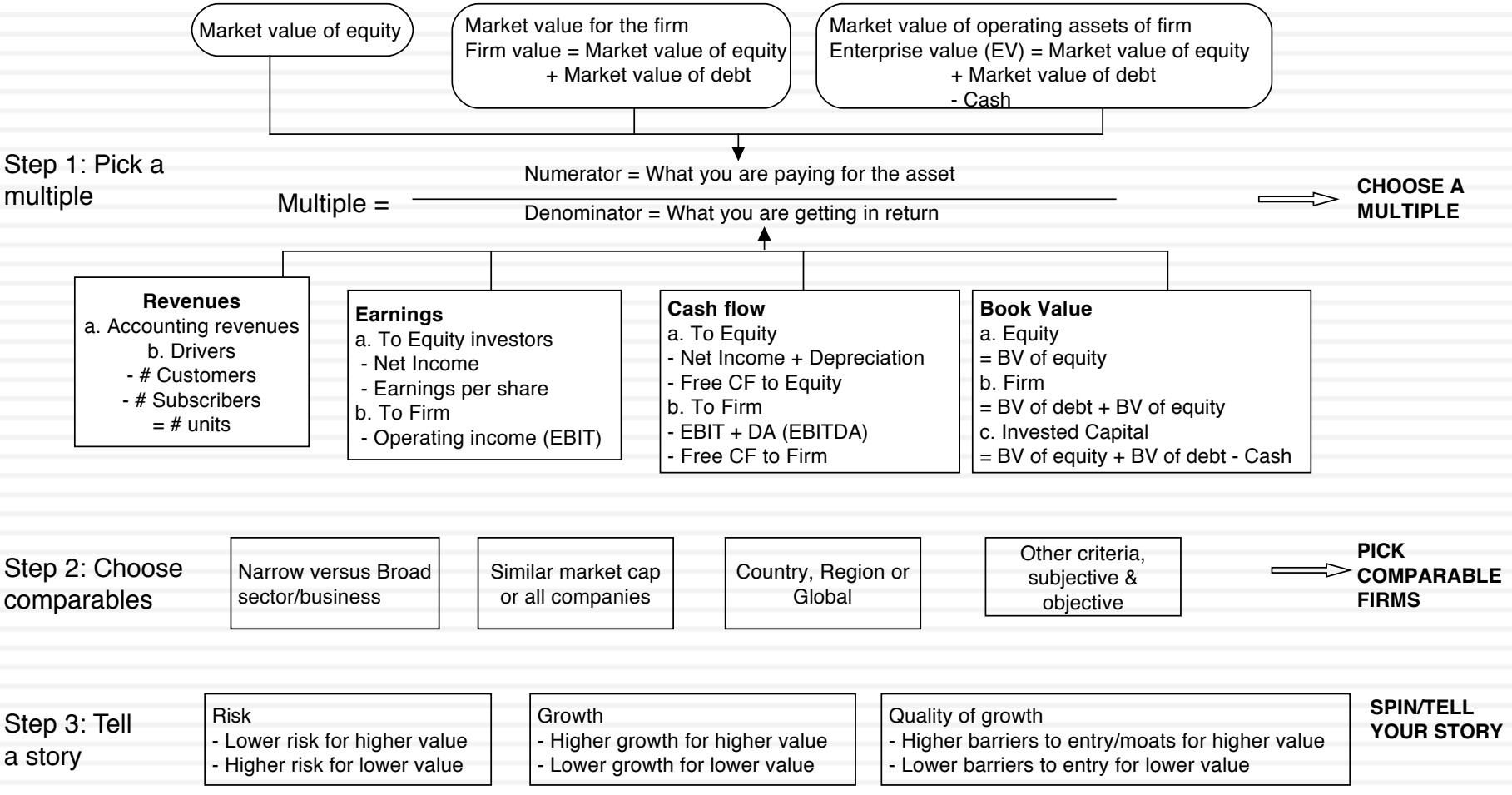
Liquidity & Trading Ease
While the value of an asset may not change much from period to period, liquidity and ease of trading can, and as it does, so will the price.

The Market Price

Incremental information
Since you make money on price changes, not price levels, the focus is on incremental information (news stories, rumors, gossip) and how it measures up, relative to expectations

Group Think
To the extent that pricing is about gauging what other investors will do, the price can be determined by the "herd".

Multiples and Comparable Transactions



To be a better pricer, here are four suggestions

- Check your multiple or consistency/uniformity
  - 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
- Look at all the data, not just the key statistics
  - 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.
- Don't forget the fundamentals ultimately matter
  - It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.
- Don't define comparables based only on sector
  - Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.

Pricing Twitter: Start with the "comparables"

Company	*Market Cap*	*Enterprise value*	*Revenues*	*EBITDA*	*Net Income*	*Number of users (millions)*	*EV/User*	*EV/Revenue*	*EV/EBITDA*	*PE*
Facebook	$173,540.00	$160,090.00	$7,870.00	$3,930.00	$1,490.00	1230.00	$130.15	20.34	40.74	116.47
Linkedin	$23,530.00	$19,980.00	$1,530.00	$182.00	$27.00	277.00	$72.13	13.06	109.78	871.48
Pandora	$7,320.00	$7,150.00	$655.00	-$18.00	-$29.00	73.40	$97.41	10.92	NA	NA
Groupon	$6,690.00	$5,880.00	$2,440.00	$125.00	-$95.00	43.00	$136.74	2.41	47.04	NA
Netflix	$25,900.00	$25,380.00	$4,370.00	$277.00	$112.00	44.00	$576.82	5.81	91.62	231.25
Yelp	$6,200.00	$5,790.00	$233.00	$2.40	-$10.00	120.00	$48.25	24.85	2412.50	NA
Open Table	$1,720.00	$1,500.00	$190.00	$63.00	$33.00	14.00	$107.14	7.89	23.81	52.12
Zynga	$4,200.00	$2,930.00	$873.00	$74.00	-$37.00	27.00	$108.52	3.36	39.59	NA
Zillow	$3,070.00	$2,860.00	$197.00	-$13.00	-$12.45	*34.50*	$82.90	14.52	NA	NA
Trulia	$1,140.00	$1,120.00	$144.00	-$6.00	-$18.00	*54.40*	$20.59	7.78	NA	NA
Tripadvisor	$13,510.00	$12,860.00	$945.00	$311.00	$205.00	*260.00*	$49.46	13.61	41.35	65.90
						Average	$130.01	11.32	350.80	267.44
						Median	$97.41	10.92	44.20	116.47

Read the tea leaves: See what the market cares about

	Market Cap	Enterprise value	Revenues	EBITDA	Net Income	Number of users (millions)
Market Cap	1.					
Enterprise value	0.9998	1.				
Revenues	0.8933	0.8966	1.			
EBITDA	0.9709	0.9701	0.8869	1.		
Net Income	0.8978	0.8971	0.8466	0.9716	1.	
Number of users (millions)	0.9812	0.9789	0.8053	0.9354	0.8453	1.

Twitter had 240 million users at the time of its IPO. What price would you attach to the company?

Use the “market metric” and “market price”

- The most important variable, in late 2013, in determining market value and price in this sector (social media, ill defined as that is) is the number of users that a company has.
- Looking at comparable firms, it looks like the market is paying about $100/user in valuing social media companies, with a premium for “predictable” revenues (subscriptions) and user intensity.
- Twitter has about 240 million users and can be valued based on the $100/user:
- Enterprise value = 240 * 100 = $24 billion

IV. Valuation is a craft, and you should never stop learning

- 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.**

Uber, The Global Logistics Company with a behavior problem (June 2017)

The Story

Uber is a logistics company, doubling the market size by drawing in new users. It will enjoy weak global networking benefits while seeing its slice of revenues slip (85/15), higher costs (with drivers as partial employees) and low capital intensity. *The extracurricular problems at the company, with it legal tangle with Google's Waymo division and accusations of condoning of sexual harassment will slow the company down in the near term but not damage it enough to alter its story significantly.*

The Assumptions

	Base year	Years 1-5	Years 6-10	After year 10	Story link
Total Market	$200,000	Grow 10.39% a year		Grow 1.5% a year	Delivery & Moving + Ridesharing
Gross Market Share	10.00%	10%>40%		40%	Big player
Revenue Share	20.00%	20% -> 15%		15.00%	Lower revenue share
Operating Margin	-43.08%	-43.08% ->20%		20.00%	Cost pressures continue
Reinvestment	NA	Sales to capital ratio of 3.00		Reinvestment rate = 7.5%	More capital investment model
Cost of capital	NA	10.00%	10%->8.00%	8.00%	At 75th percentile of US firms
Risk of failure	5% chance of failure, if pricing meltdown leads to capital being cut off				Cash on hand + Capital access

The Cash Flows

	Total Market	Market Share	Revenues (15% of Gross)	EBIT (1-t)	Reinvestment	FCFF
1	$ 220,780	13.00%	$ 8,826	$ (2,105)	$ 775	$ (2,880)
2	$ 243,719	16.00%	$ 11,309	$ (1,983)	$ 828	$ (2,811)
3	$ 269,041	19.00%	$ 13,930	$ (1,564)	$ 874	$ (2,438)
4	$ 296,995	22.00%	$ 16,661	$ (820)	$ 911	$ (1,731)
5	$ 327,853	25.00%	$ 19,466	$ 270	$ 935	$ (665)
6	$ 361,917	28.00%	$ 22,294	$ 1,715	$ 943	$ 772
7	$ 399,520	31.00%	$ 25,080	$ 3,511	$ 929	$ 2,583
8	$ 441,030	34.00%	$ 27,741	$ 3,884	$ 887	$ 2,997
9	$ 486,853	37.00%	$ 30,173	$ 4,224	$ 811	$ 3,414
10	$ 537,437	40.00%	$ 32,246	$ 4,514	$ 691	$ 3,823
Terminal year	$ 548,723	40.00%	$ 32,923	$ 4,609	$ 484	$ 4,125

The Value

Terminal value	$ 69,920	
PV(Terminal value)	$ 28,479	
PV (CF over next 10 years)	$ (2,103)	
Value of operating assets =	$ 26,376	
Probability of failure	5%	
Value in case of failure	$ -	
Adjusted Value for operating assets	$ 25,057	
+ Cash on hand	$ 5,000	
+ Cross holdings	$ 6,000	
Value of all assets	$ 36,057	Most recent pricing put the price at greater than $70 billion

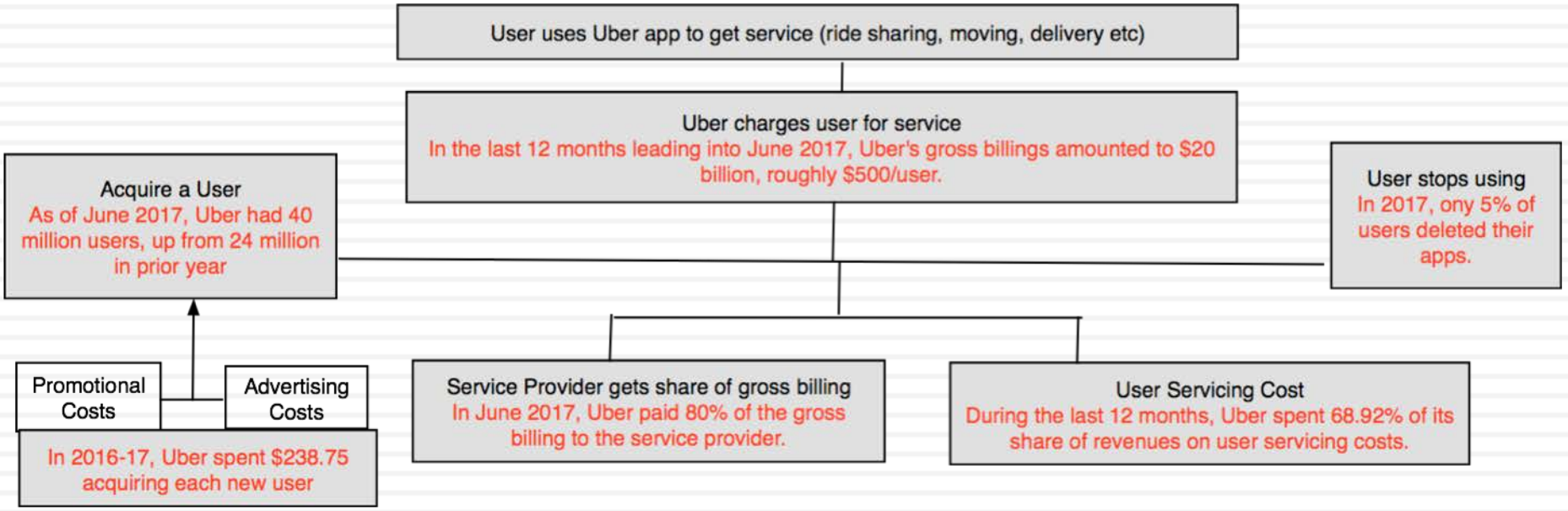
Push back on Uber Valuation

- Input disagreement: Lots of inputs and assumptions and I could be wrong on any or all of them..
- Model debate: DCF was designed for old economy companies and not suited to new economy firms that are more focused on accumulating users & subscribers, making them stick with the firm and sell them products & services over long periods.
- DCF is flexible: DCF models are much more flexible than most people give them credit for, and that they can be modified to reflect other frameworks. If you have a problem with a DCF value, it should not be with the model but with the person using that model.

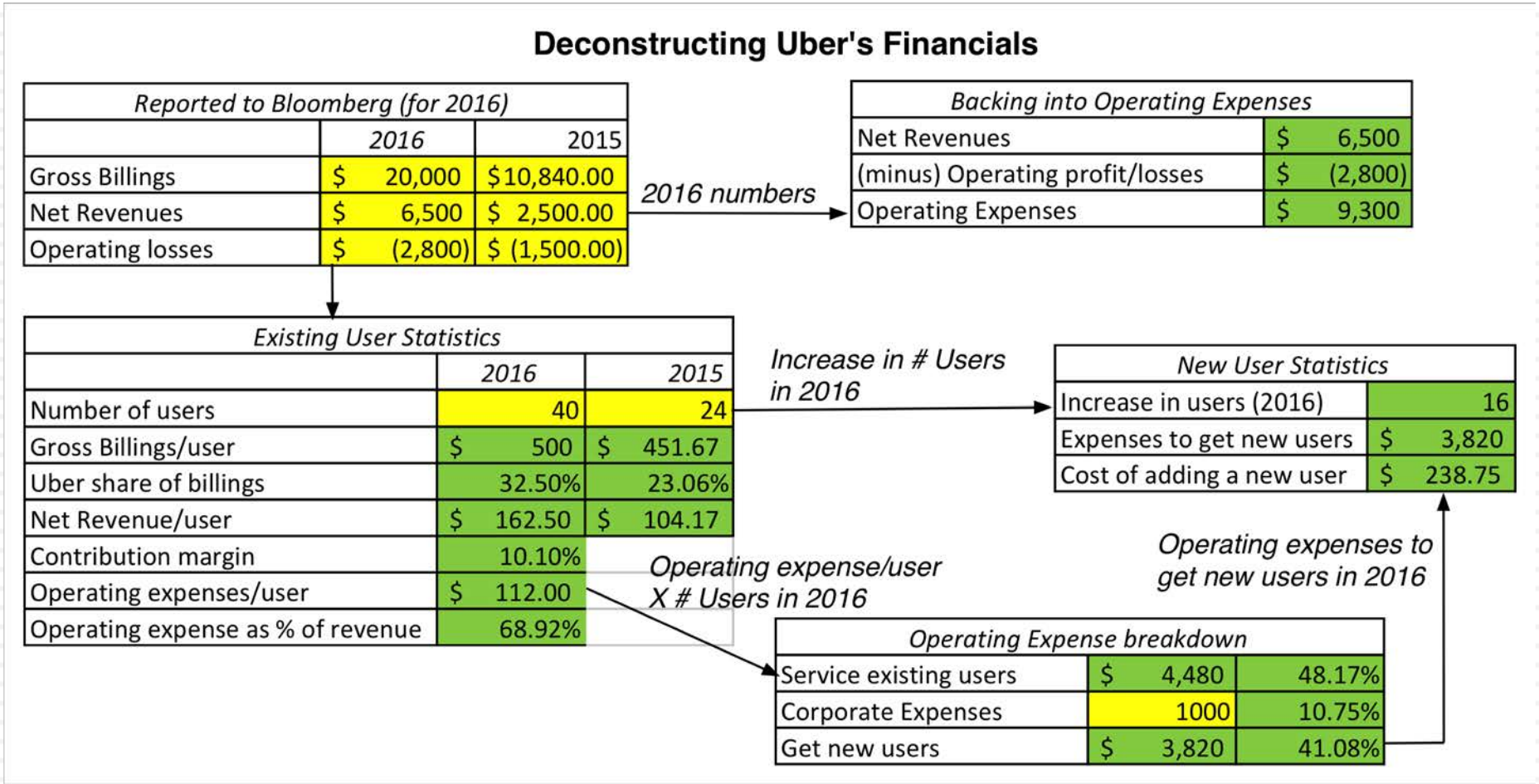
User/ Subscriber/Member Based Valuation

- A user, subscriber or member has value only because he/she generates revenues for the company. The key to valuing a unit then becomes identifying the link to cash flows and value.
- To **value users**, you have to value an individual user first and then estimate the cost of acquiring new users.
  - The value of an existing user is the present value of the expected cash flows that you will generate from that user, over the lifetime that he or she remains a user.
  - The value of a new user will be the value of a user, net of the cost of acquiring a user.
  - The aggregate value of users will be the sum of the values of existing and new users.
- To get to the **value of a company**, you have to net out the other centralized/non-user specific costs that it will face.

Uber User Economics



Uber: Deconstructing the Financials



Reported to Bloomberg (for 2016)	2016	2015
Gross Billings	$ 20,000	$10,840.00
Net Revenues	$ 6,500	$ 2,500.00
Operating losses	$ (2,800)	$ (1,500.00)

Backing into Operating Expenses	
Net Revenues	$ 6,500
(minus) Operating profit/losses	$ (2,800)
Operating Expenses	$ 9,300

Existing User Statistics	2016	2015
Number of users	40	24
Gross Billings/user	$ 500	$ 451.67
Uber share of billings	32.50%	23.06%
Net Revenue/user	$ 162.50	$ 104.17
Contribution margin	10.10%	
Operating expenses/user	$ 112.00	
Operating expense as % of revenue	68.92%	

New User Statistics	
Increase in users (2016)	16
Expenses to get new users	$ 3,820
Cost of adding a new user	$ 238.75

Operating Expense breakdown		
Service existing users	$ 4,480	48.17%
Corporate Expenses	1000	10.75%
Get new users	$ 3,820	41.08%

Uber's Existing User Value

Growth rate in Operating Expenses
Assumed that 80% of operating expenses are variable. Growth rate is 9.9% /year.

Growth rate in Revenues
Assumed 12% growth in annual revenues/user over next 15 years

User Lifetime
Assumed to be 15 years, with an annual renewal probability of 95%.

Value of Existing Users: Uber

	Base	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Gross Billings	$ 500.00	$560.00	$627.20	$702.46	$786.76	$881.17	$986.91	$1,105.34	$1,237.98	$1,386.54	$1,552.92	$1,739.27	$1,947.99	$2,181.75	$2,443.56	$2,736.78
Net Revenue	$ 100.00	$112.00	$125.44	$140.49	$157.35	$176.23	$197.38	$ 221.07	$ 247.60	$ 277.31	$ 310.58	$ 347.85	$ 389.60	$ 436.35	$ 488.71	$ 547.36
Cost of Service	$ 48.17	$ 52.94	$ 58.18	$ 63.94	$ 70.27	$ 77.23	$ 84.87	$ 93.27	$ 102.51	$ 112.66	$ 123.81	$ 136.07	$ 149.54	$ 164.34	$ 180.61	$ 198.49
Operating Profit	$ 51.83	$ 59.06	$ 67.26	$ 76.55	$ 87.08	$ 99.01	$112.51	$ 127.79	$ 145.09	$ 164.65	$ 186.78	$ 211.79	$ 240.06	$ 272.01	$ 308.10	$ 348.87
Operating Profit after tax	$ 36.28	$ 41.34	$ 47.08	$ 53.59	$ 60.96	$ 69.31	$ 78.76	$ 89.46	$ 101.56	$ 115.26	$ 130.74	$ 148.25	$ 168.04	$ 190.41	$ 215.67	$ 244.21
PV of operating profit		$ 37.58	$ 38.91	$ 40.26	$ 41.63	$ 43.03	$ 44.46	$ 45.91	$ 47.38	$ 48.88	$ 50.41	$ 51.96	$ 53.54	$ 55.15	$ 56.79	$ 58.46
Value of user (full life)	$ 714.36															
Probability of full life	46.33%															
Expected life of dropouts	3.75															
Value per existing user	$ 410.31															
Number of existing users	40.00															
Value of existing users	**$ 16,412**															

Adjustment for drop outs
Users who don't make it through full life are assigned an expected life of 25% of the full life, an approximation.

Risk Adjusted Discount Rate
Used a 10% cost of capital, set at 75th percentile of US companies.

Uber's New User Value

Base year Value/ New User
Value of User = $410.31
Cost of adding New User = $238.78
Value added by new user = $171.53

Value Added by New Users: Uber in June 2017

	Base Year	1	2	3	4	5	6	7	8	9	10
Total Users	40.00	48.00	60.10	75.75	95.56	120.57	129.57	137.56	145.88	154.70	164.04
New Users	0.00	10.00	14.50	18.65	23.60	29.79	15.04	14.46	15.20	16.11	17.08
Value per new user	$171.53	$174.11	$176.72	$179.37	$182.06	$184.79	$187.56	$190.38	$193.23	$196.13	$199.07
Value added by new users		$1,741	$2,562	$3,345	$4,296	$5,505	$2,820	$2,753	$2,937	$3,159	$3,400
Terminal Value											$7,031
Present Value		**$ 1,555**	**$ 2,043**	**$ 2,381**	**$ 2,730**	**$ 3,124**	**$ 1,429**	**$ 1,245**	**$ 1,186**	**$ 1,139**	**$ 3,359**
Value Added by New Users	**$ 20,191**										

User Growth rates
Years 1-5: 25%
Years 6-10: 10%

Cost of capital
Used 12%, the 90th percentile of US companies

Beyond year 10
User growth continues at 2.1% a year

Uber Corporate Expense Value (Drag)

Base year number
Absent information, assumed

Tax Rate
Assumed =30%

Cost of capital
Used 10%

	Base year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Corporate Expenses	-$1,000	-$1,040	-$1,081	-$1,125	-$1,170	-$1,216	-$1,265	-$1,316	-$1,368	-$1,423	-$1,480
After-tax Corporate Expenses		-$728	-$757	-$787	-$819	-$851	-$886	-$921	-$958	-$996	-$1,036
Terminal Value											-$13,388
PV of Corporate Expenses		-$662	-$626	-$591	-$559	-$529	-$500	-$473	-$447	-$422	-$5,561
Value drag from expenses	-$10,369										

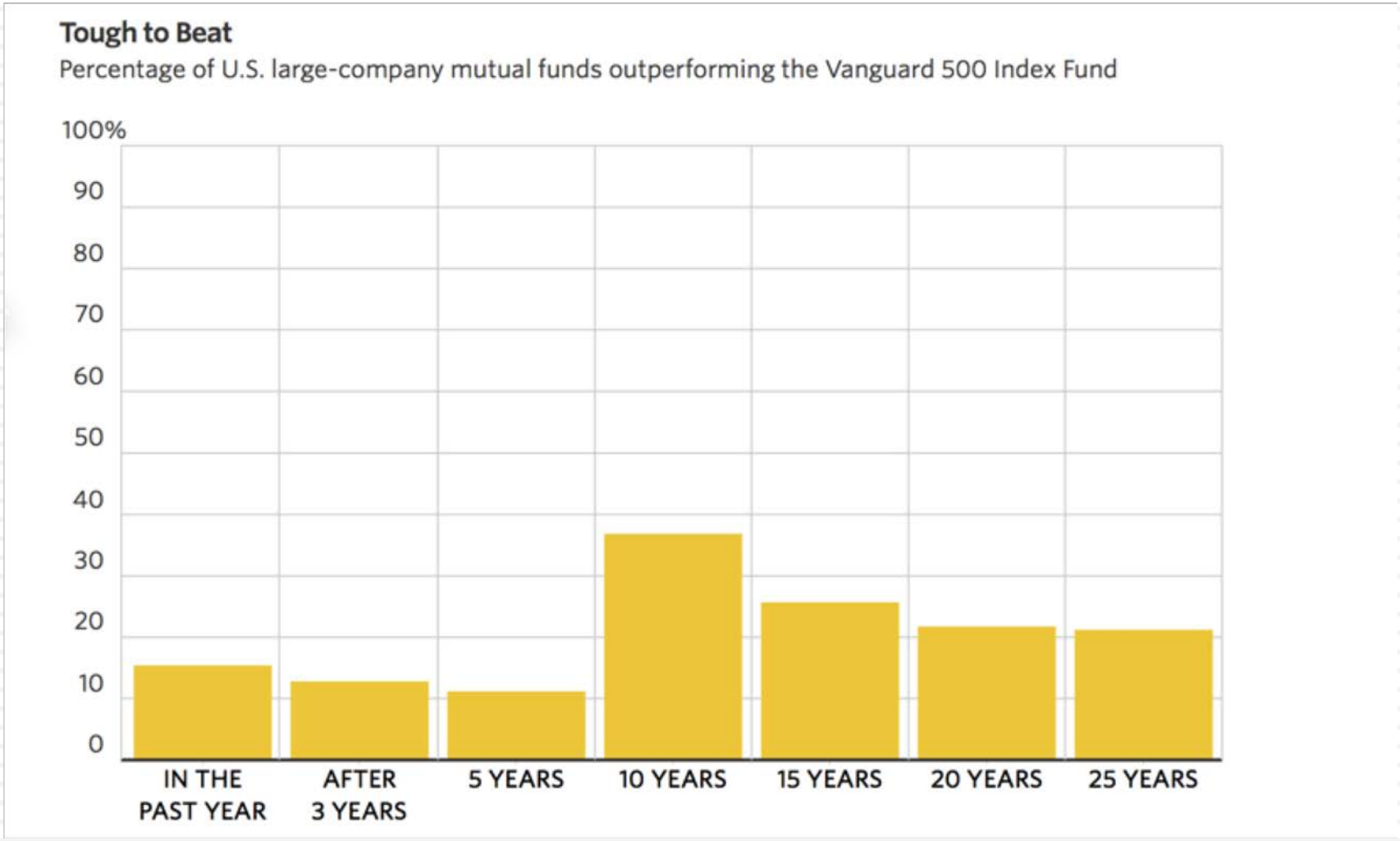
Uber Valuation

	User Value	*Asset value*	*Company Value*	*Equity Value*
Existing Users	$16,412.49			
New Users	$20,190.70			
User Value	$36,603.19	**$36,603.19**		
- Corporate Expense Drag		$(10,369.28)		
Uber Operating Assets		$26,233.91	**$26,233.91**	
+ Cash			$5,000.00	
+ Didi Cross Holding			$6,000.00	
Uber Firm Value			$37,233.91	**$37,233.91**
- Debt				$-
Value of Equity				**$37,233.91**

VII. Investing is an act of faith..

- When investing, we are often told that if you are virtuous (careful in your research, good at valuation, have a long time horizon), you will be rewarded (with high returns).
- That pitch is amplified by anecdotal evidence of righteous ones, i.e., those who have followed the path to success.
- Those who chose not to be virtuous are labeled as "speculators", viewed as shallow and deserving of the fate that awaits them.
- If you have faith in investing, you will be tested.

Active Investing is a loser's game

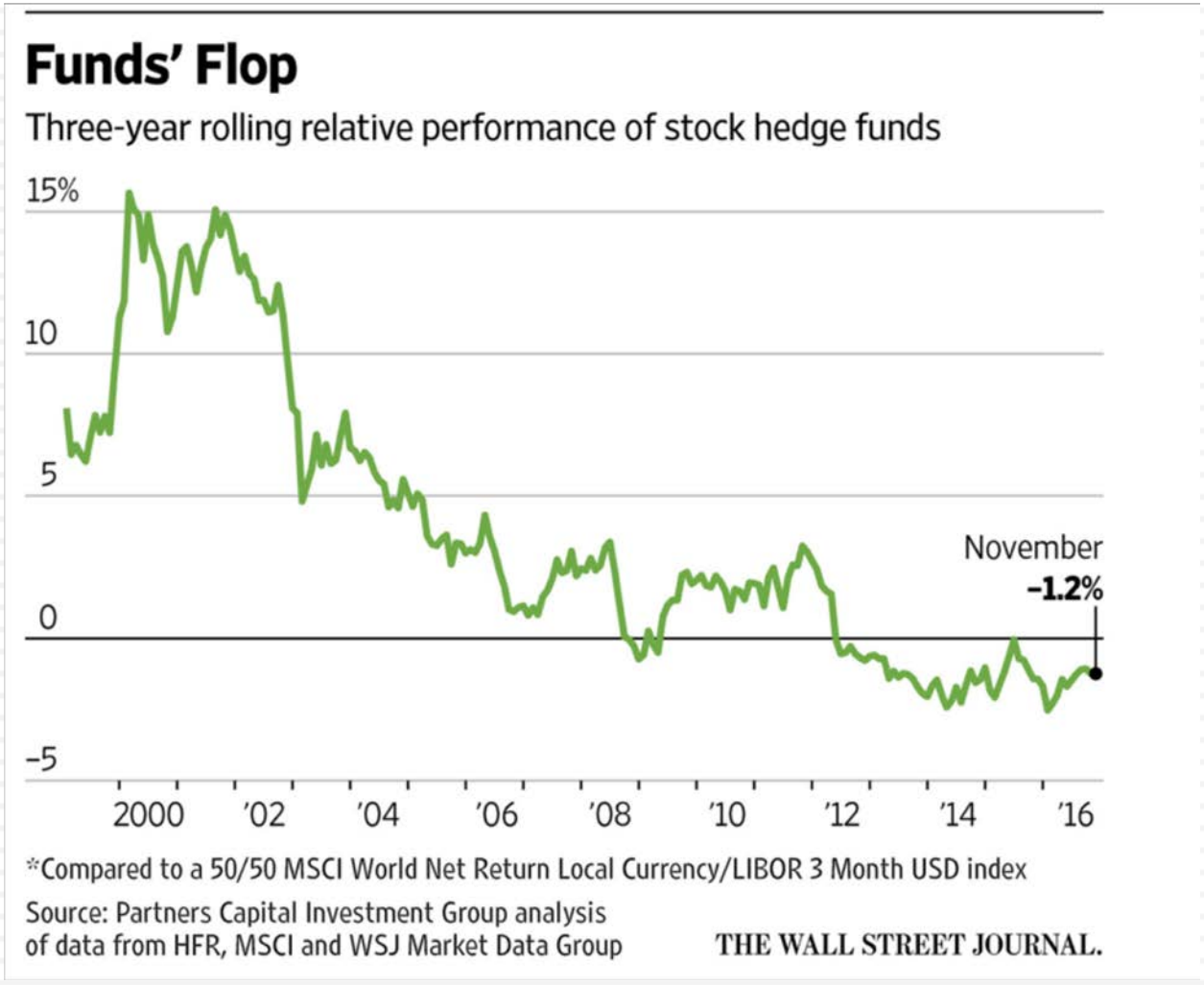


And it stays that way across styles..

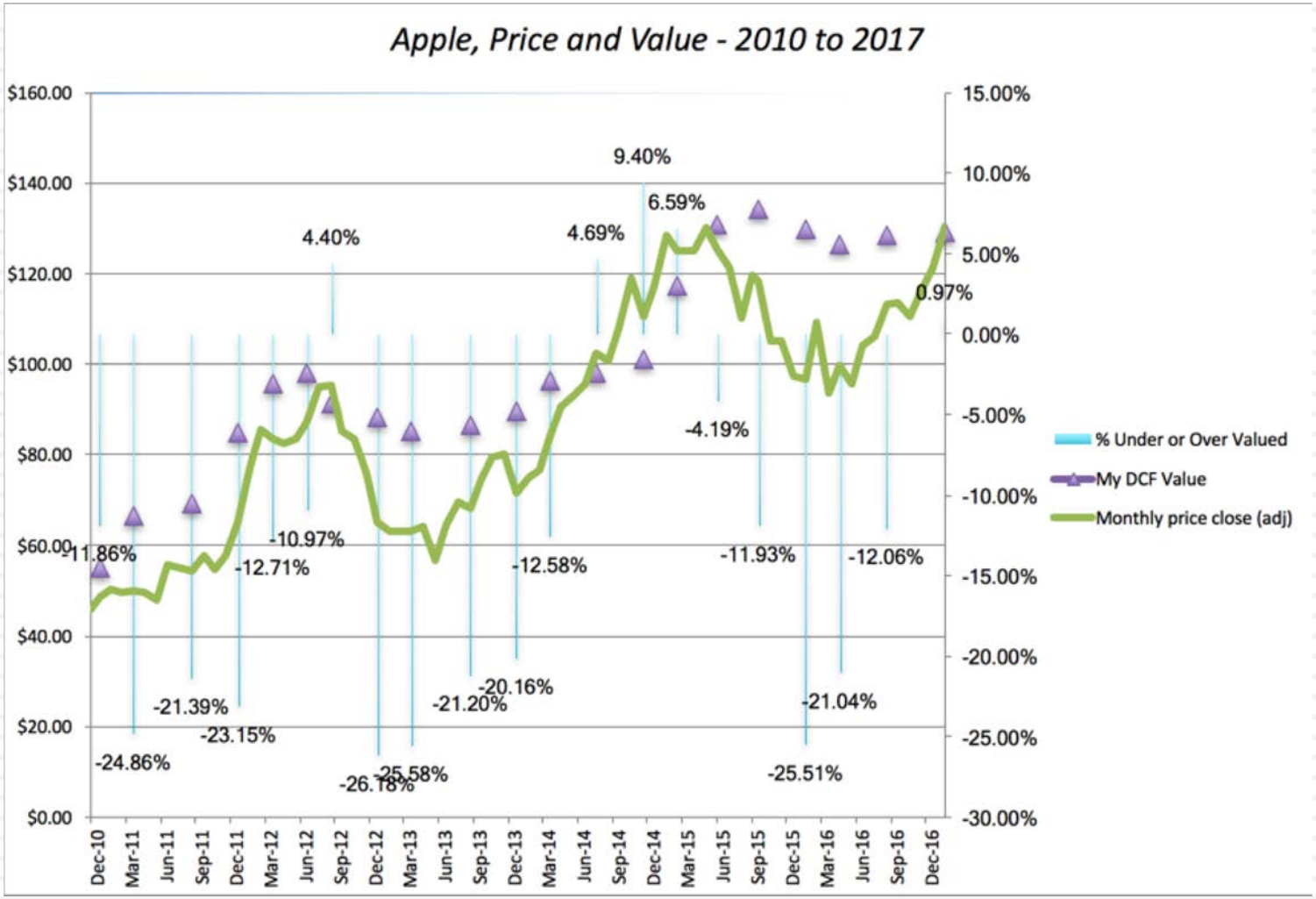
	% of US Mutual Funds that beat their respective indices			
	Value	Growth	Core	All
Large	82.17%	86.54%	88.26%	84.15%
Mid-cap	70.27%	81.48%	76.51%	76.69%
Small	92.31%	91.89%	91.44%	90.13%
All Equity				88.43%
Real Estate				82.64%

S&P computes these percentages for the last year, the last 3 years & the last 10 years. There is not a single period or a single fund grouping where the number is <50%.

And the ”smart” money does not stay smart for very long



Investment Heaven is a promise, not a guarantee..



Follow the yellow brick road..