




I. Price or Value? What's your game?

January 2017

Aswath Damodaran

Test 1: Are you pricing or valuing?

2

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

\$995,000
Price

3
Beds





2.5
Baths

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

Built: 1955


Lot Size: 3,000 Sq. Ft.



On Redfin: 12 days

Favorite X-Out Share... Tour Home

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




Lisa Padilla
REDFIN Real Estate Agent

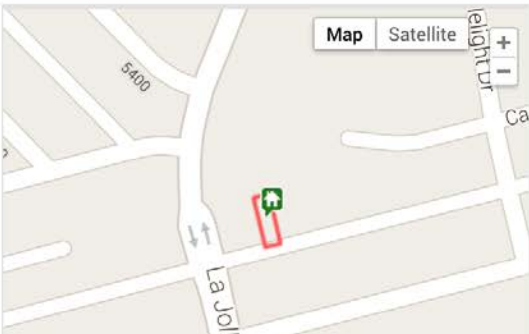
★★★★★
47 client reviews



\$8,726 commission refund

 Go Tour This Home

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

1 of 4 Redfin Agents in this area



1 of 25  

Test 2: Are you pricing or valuing?

3

Rating
Buy

Europe
Switzerland

Biotechnology
Biotechnology

Company
BB BIOTECH

Reuters
BION.S

Bloomberg
BION SW

Exchange
SWX

Ticker
BION

Date
13 August 2013

Forecast Change

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.

BB Biotech shares remain attractive

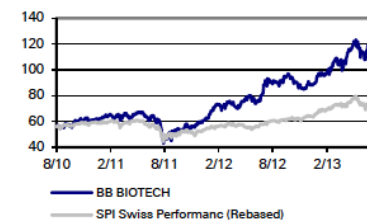
In the first 6M of 2013, BB Biotech increased its NAV by 36%, which marks good outperformance against the Nasdaq Biotech Index (NBI)'s 27%. This is a remarkable performance after 2012 when BBB's NAV increase of 45% also

Key changes

Target Price 106.50 to 164.50 ↑ 54.5%

Source: Deutsche Bank

Price/price relative

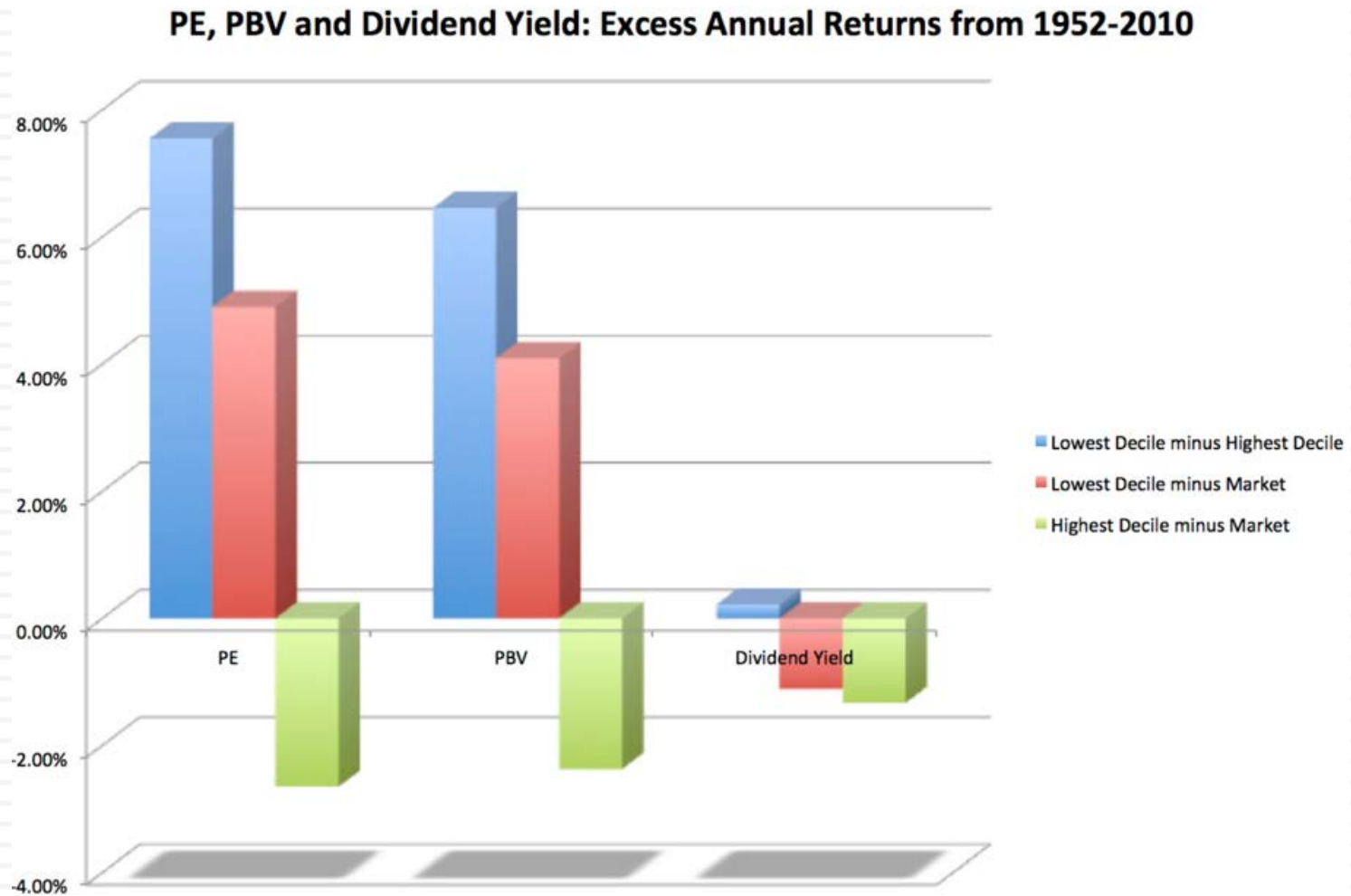


Performance (%)	1m	3m	12m
Absolute	-1.4	5.4	37.4
SPI Swiss Performance IX	0.5	-1.4	26.4

Source: Deutsche Bank

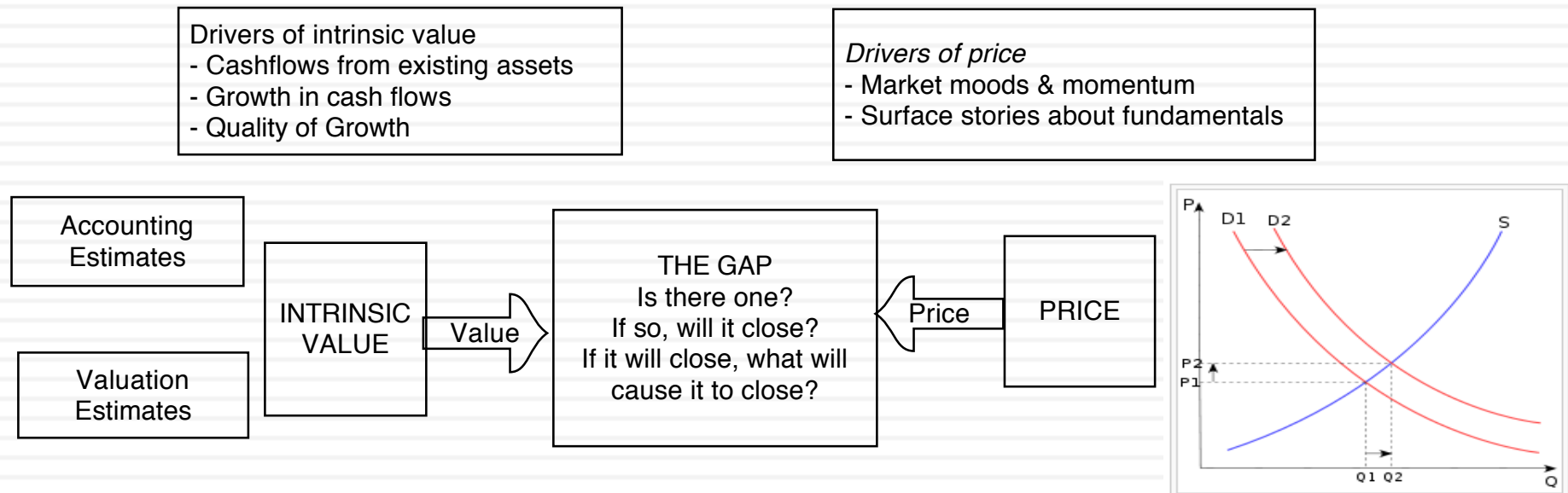
Test 3: Are you pricing or valuing?

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Price versus Value: The Set up

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Intrinsic Value: The Essence

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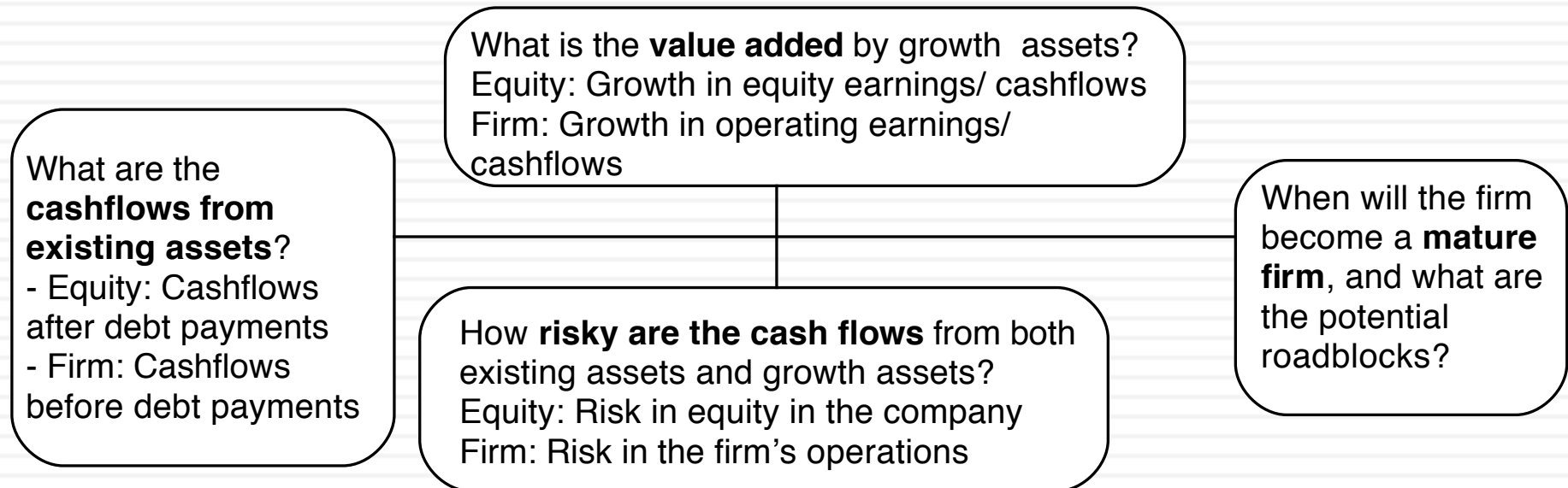
- The value of a risky asset can be estimated by discounting the expected cash flows on the asset over its life at a risk-adjusted discount rate:

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

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.

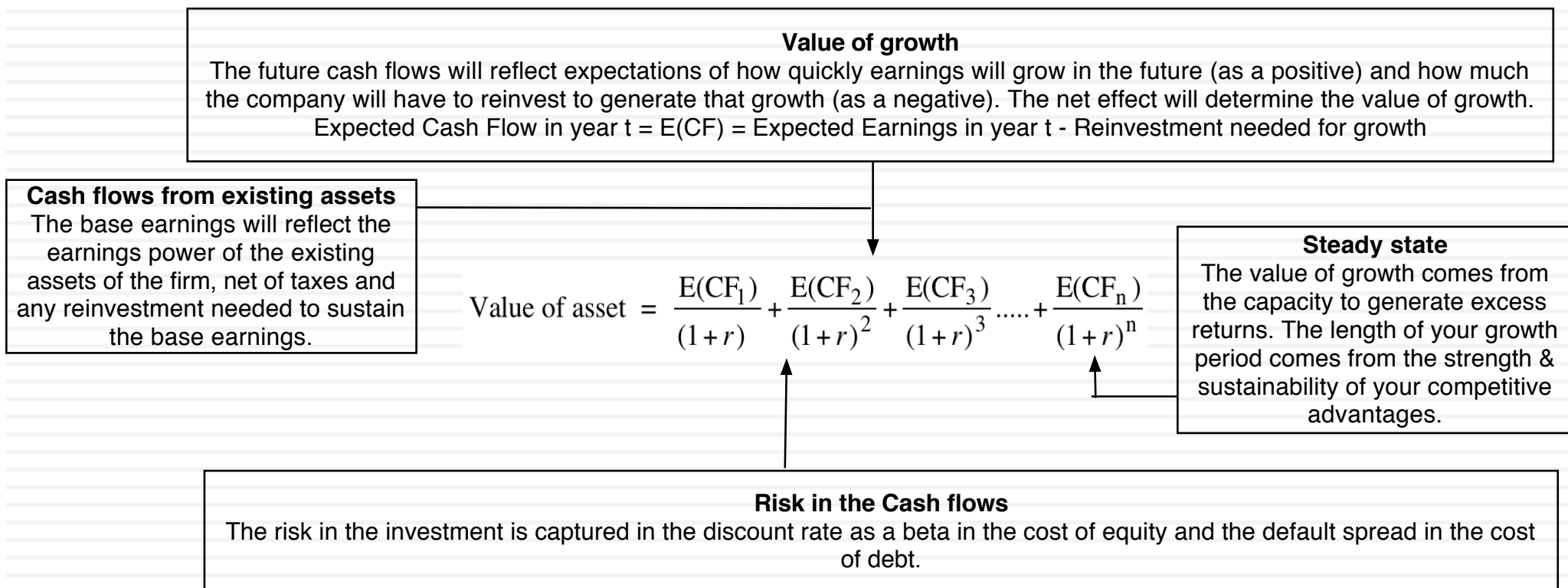
The drivers of value..

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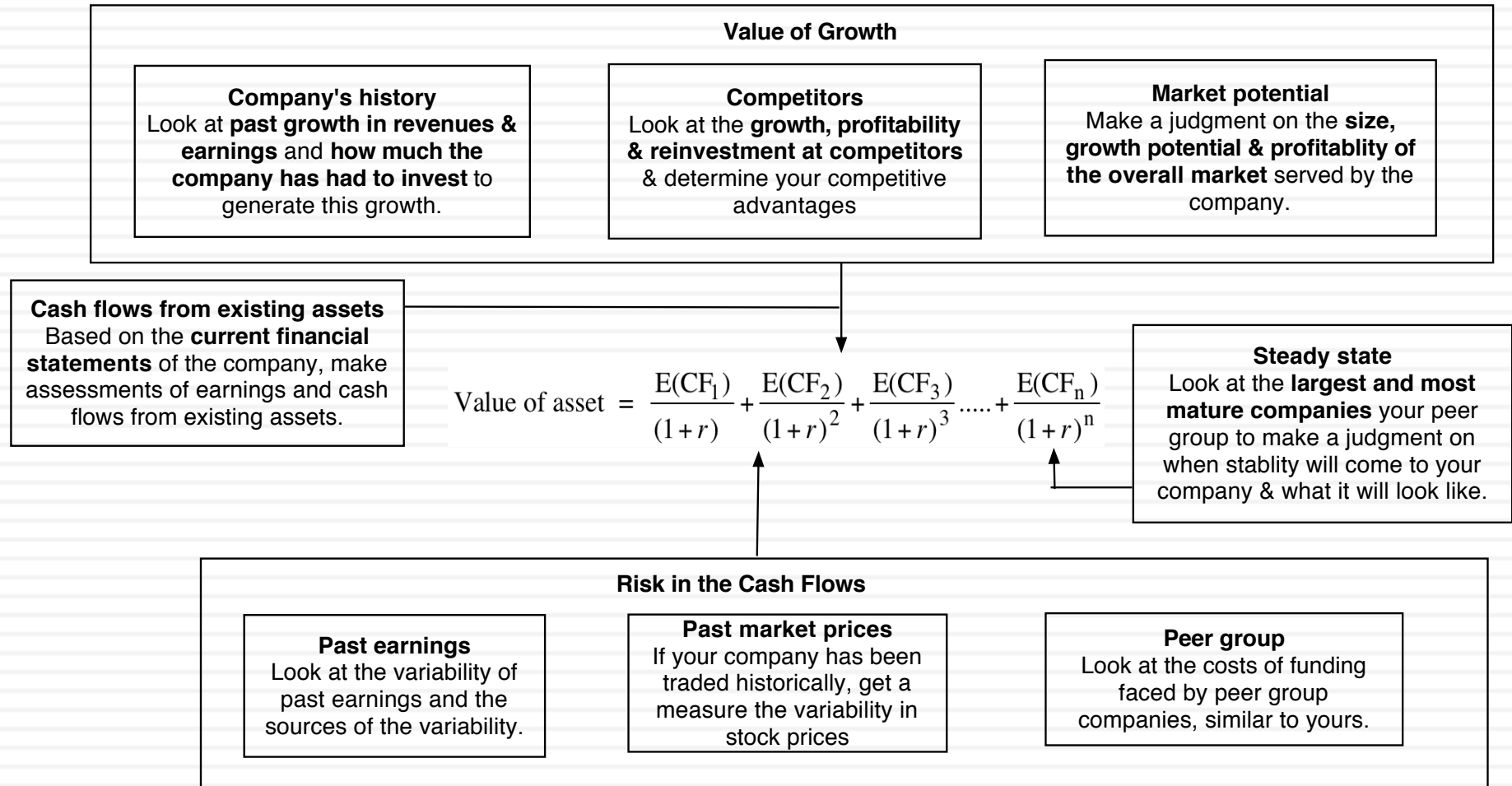
DCF as a tool for intrinsic valuation

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If your job is assessing value, here are you challenges...

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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		\$7.67
Invested Capital		\$955.00
Adjusted Operatng Margin		1.44%
Sales/ Invested Capital		0.56
Interest expenses	\$2.49	\$5.30

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

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%
Netflix	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%

		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)

Aswath Damodaran

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

3. Reinvest for growth

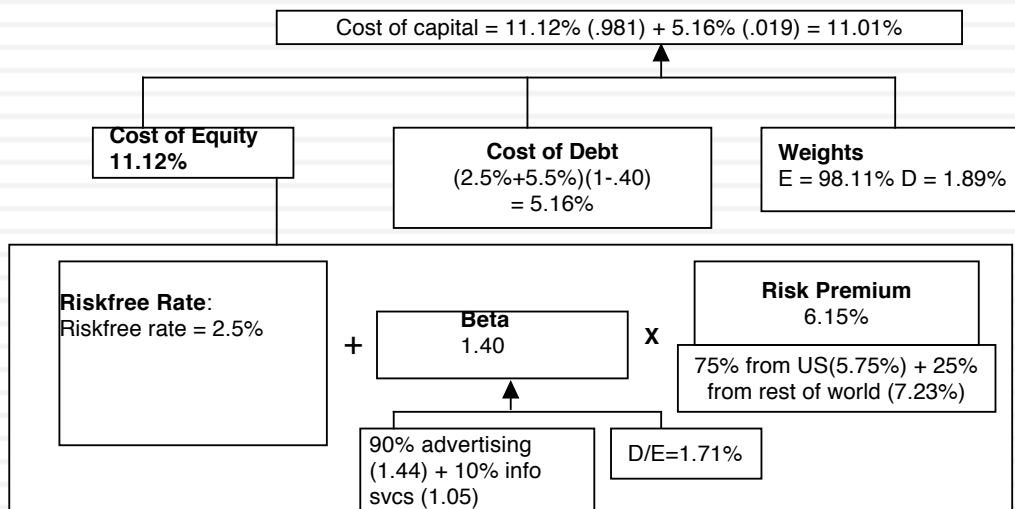
	Sales/ Invested Capital
Twitter (2013)	1.10
Advertising Companies	1.40
Social Media Companies	1.05

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

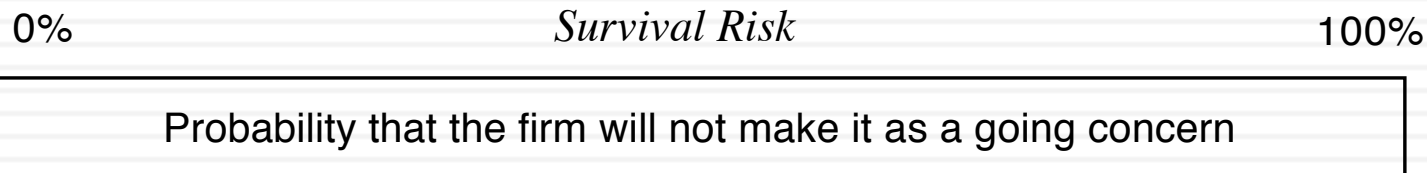
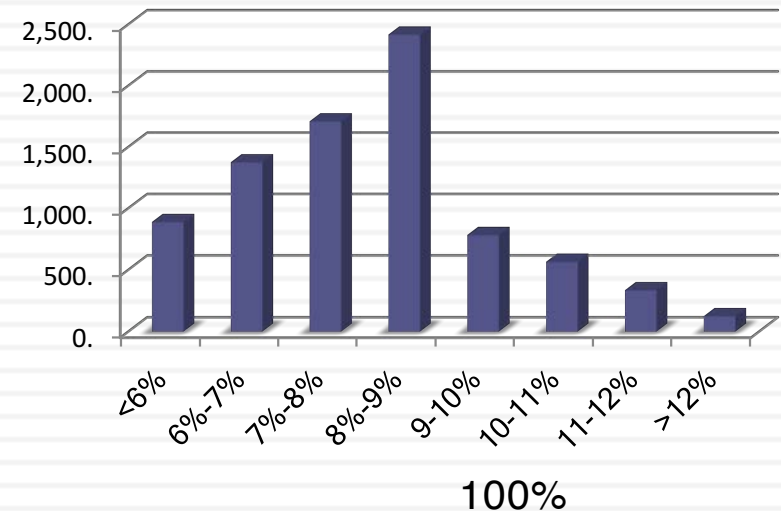
Sweating the small stuff: Risk and Required Return

Risk in the discount rate

My estimate for Twitter



Cost of Capital: US - Nov '13



*Certain to make it
as going concern*

*Certain
to fail*

*My assumption for
Twitter*

Starting numbers

	Last 10K	Trailing 12 month
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Twitter Pre-IPO Valuation: October 27, 2013

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
 $g = 2.5\%$; $\text{Beta} = 1.00$;
 Cost of capital = 8%
 $\text{ROC} = 12\%$;
 $\text{Reinvestment Rate} = 2.5\%/12\% = 20.83\%$

Terminal Value₁₀ = $1466 / (.08 - .025) = \$26,657$

		1	2	3	4	5	6	7	8	9	10
Operating assets	\$9,705	\$ 810	\$1,227	\$1,858	\$2,816	\$4,266	\$6,044	\$7,973	\$9,734	\$10,932	\$11,205
+ Cash	321	\$ 31	\$ 75	\$ 158	\$ 306	\$ 564	\$ 941	\$1,430	\$1,975	\$ 2,475	\$ 2,801
+ IPO Proceeds	1295	\$ 31	\$ 75	\$ 158	\$ 294	\$ 395	\$ 649	\$ 969	\$1,317	\$ 1,624	\$ 1,807
- Debt	214	\$ 183	\$ 278	\$ 421	\$ 638	\$ 967	\$1,186	\$1,285	\$1,175	\$ 798	\$ 182
Value of equity	11,106	FCFF									
- Options	713	\$(153)	\$(203)	\$(263)	\$(344)	\$(572)	\$(537)	\$(316)	\$ 143	\$ 826	\$ 1,625
Value in stock	10,394										
/ # of shares	582.46										
Value/share	\$17.84										

Terminal year (11)
 EBIT (1-t) \$ 1,852
 - Reinvestment \$ 386
 FCFF \$ 1,466

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

x

Risk Premium
6.15%

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

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

D/E=1.71%

Five simple suggestions for better intrinsic valuation

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1. Be honest about your biases/preconceptions: The biggest bogeyman in most valuations is that your preconceptions and biases will lead your choices. While you can never be unbiased, being aware of your biases is a start.
2. Keep it simple: Less is more in valuation. While it is easy to build bigger models and you have more access to data, parsimonious valuations often do a better job than complex ones.
3. Be flexible: For every rule in valuation, there are a hundred exceptions. You need to be pragmatic and flexible.
4. Have a narrative: A valuation without a story is just a collection of numbers. A good intrinsic valuation connects a story to numbers.
5. Face up to uncertainty: Uncertainty is a feature, not a bug. Make the best estimates you can, with the information you have, recognize that everyone else faces the same uncertainty. You don't have to be right, just less wrong than everyone else.

The determinants of price

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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

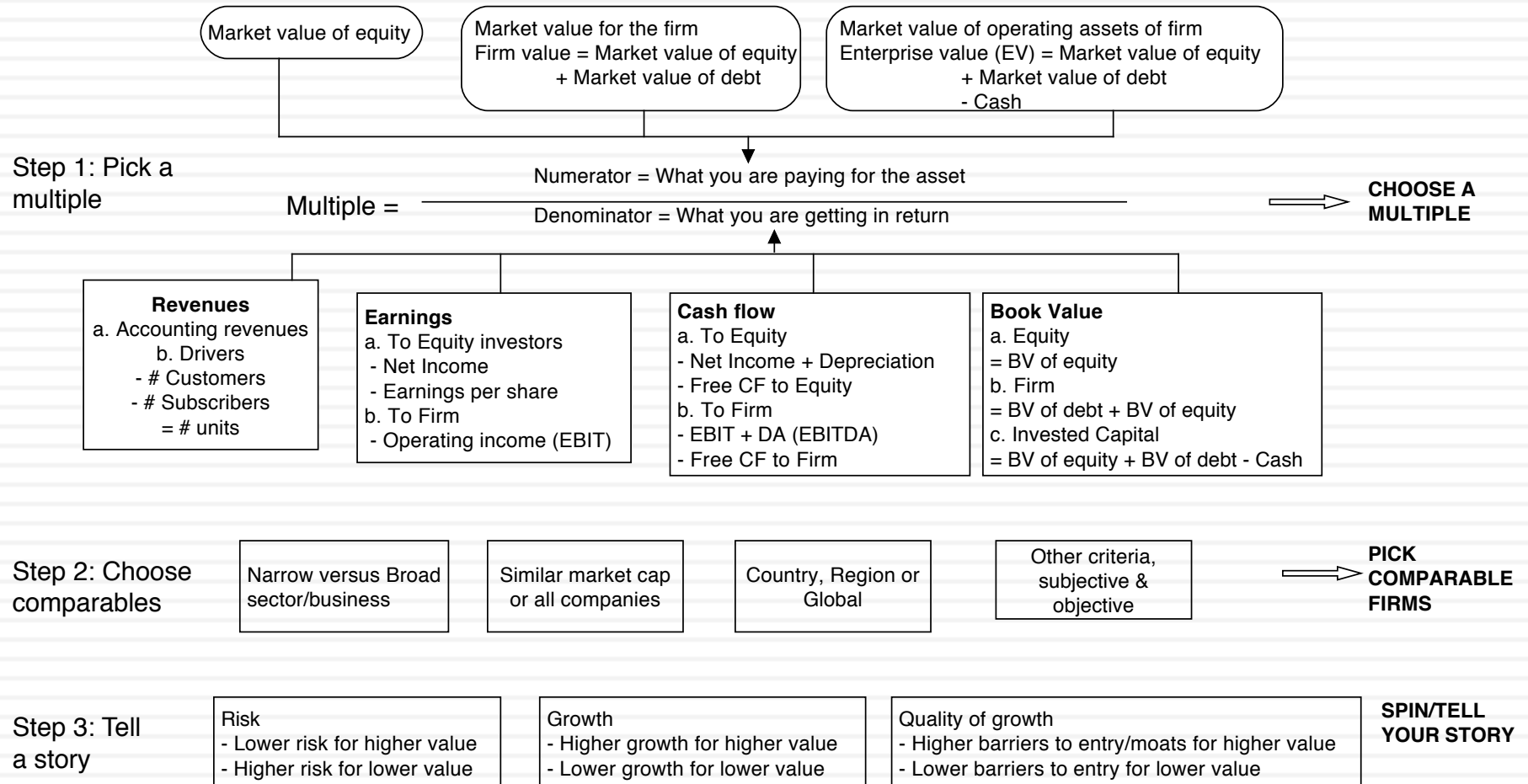
To the extent that pricing is about gauging what other investors will do, the price can be determined by the "herd".

Tools for Pricing: Technical Analysis & Charting

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A more general tool: 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.

1. Check the Multiple

- Is the multiple consistently defined?
 - ▣ The consistency principle: 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.
 - ▣ The cost of mismatching: Assets that are not cheap(expensive) will look cheap (expensive), because your mismatch will skew the numbers.
- Is the multiple uniformly estimated?
 - ▣ The uniformity rule: The variables used in defining the multiple should be estimated uniformly across assets in the “comparable firm” list.
 - ▣ The cost of ignoring this rule: You will be comparing non-comparable numbers and drawing all the wrong conclusions.

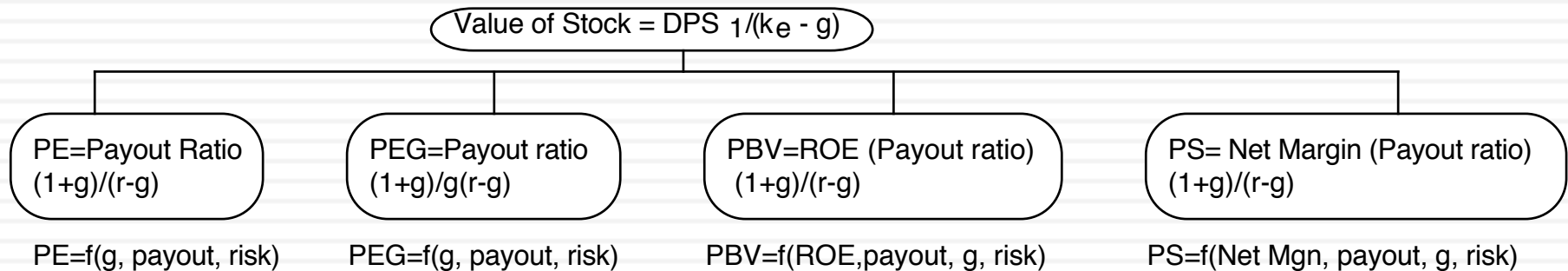
2. Play Moneyball: Let the numbers talk (not the analysts)

- 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?

3. Understand your “implicit” assumptions

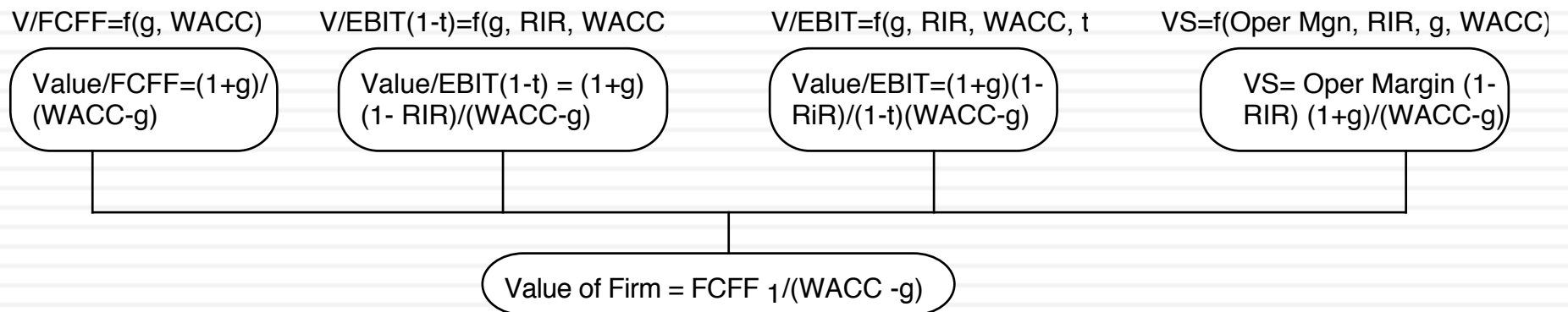
- What are the fundamentals that determine and drive these multiples?
 - ▣ Proposition 1: Embedded in every multiple are all of the variables that drive every discounted cash flow valuation - growth, risk and cash flow patterns.
 - ▣ In fact, using a simple discounted cash flow model and basic algebra 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 2: 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.

The Determinants of Multiples...



Equity Multiples

Firm Multiples



4. Define “comparable” broadly & control for differences

- 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.

Pricing Twitter- October 2013

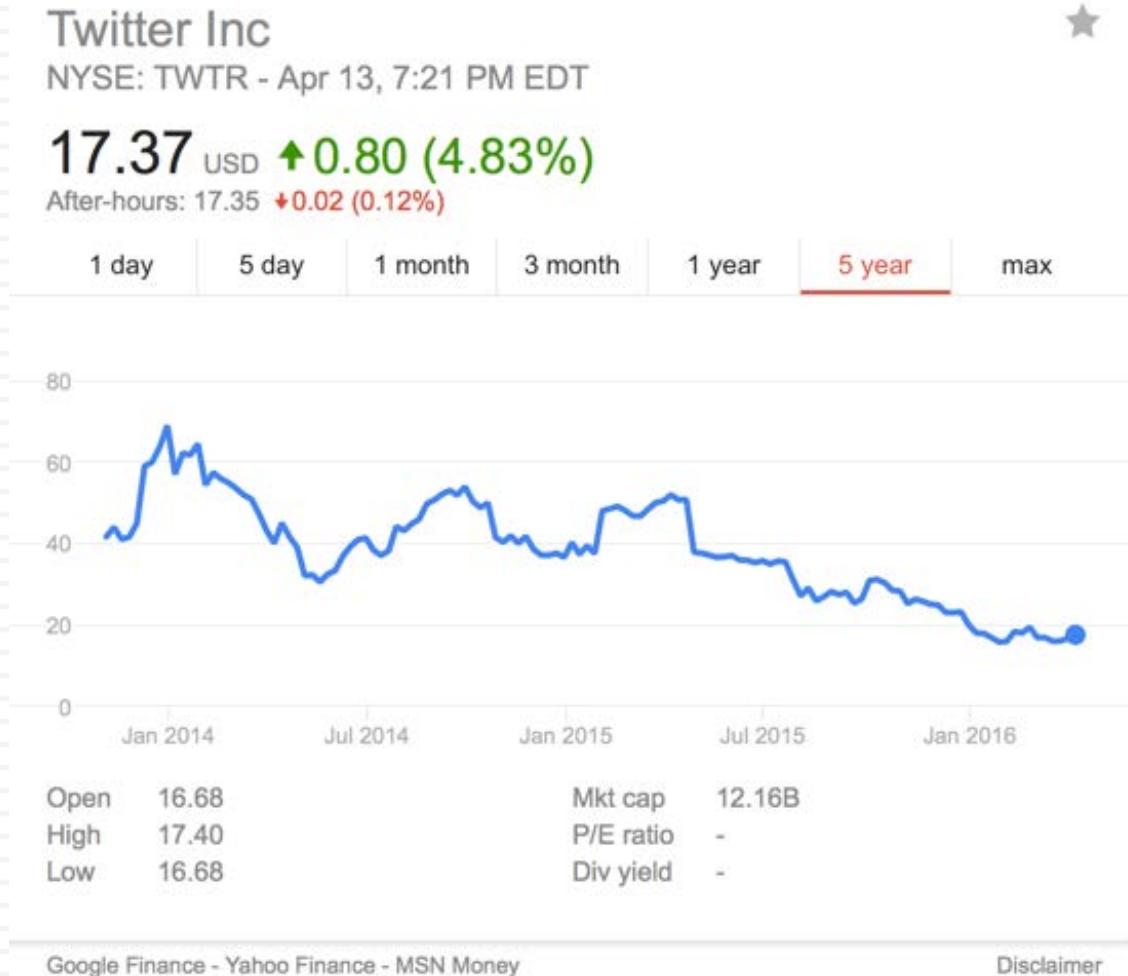
Just Facebook and LinkedIn							
Company	EV	Market Cap	EV/Sales	EV/EBITDA	PE	Market Cap/User	Market Cap/Employee
Facebook, Inc. (NasdaqGS:FB)	\$100,017.00	\$107,909.00	16.35	36.20	193.73	\$97.22	\$20.36
LinkedIn Corporation (NYSE:LNKD)	\$28,448.50	\$29,321.90	22.87	179.26	729.40	\$130.32	\$6.91
Facebook + LinkedIn	\$128,465.50	\$137,230.90	17.45	43.97	229.79	\$102.79	\$14.38
Social Media/Internet Medley							
Facebook, Inc. (NasdaqGS:FB)	\$100,017.00	\$107,909.00	16.35	36.20	193.73	\$97.22	\$20.36
Google Inc. (NasdaqGS:GOOG)	\$248,856.30	\$296,078.30	4.46	14.64	25.45	\$270.89	\$6.61
LinkedIn Corporation (NYSE:LNKD)	\$28,448.50	\$29,321.90	22.87	179.26	729.40	\$130.32	\$6.91
Netflix	\$13,959.00	\$14,539.00	3.54	81.20	304.80	\$403.86	\$7.11
OpenTable, Inc. (NasdaqGS:OPEN)	\$1,641.70	\$1,733.70	9.45	30.35	59.99	\$15.34	\$3.02
Pandora Media, Inc. (NYSE:P)	\$4,163.40	\$4,232.30	7.89	NA	NA	\$21.16	\$5.72
RetailMeNot	\$1,723.60	\$1,715.00	10.20	34.20	64.96	\$147.84	\$4.60
Trulia, Inc. (NYSE:TRLA)	\$1,647.39	\$1,853.10	17.75	NA	NA	\$59.02	\$3.57
Yelp, Inc. (NYSE:YELP)	\$4,006.10	\$4,102.90	22.42	NA	NA	\$41.03	\$2.67
Zillow, Inc. (NasdaqGS:Z)	\$3,419.80	\$3,589.50	22.48	NA	NA	\$78.20	\$5.22
Yahoo! Inc. (NasdaqGS:YHOO)	\$27,262.80	\$29,854.60	5.65	21.24	7.19	\$106.24	\$2.55
Groupon	\$5,857.00	\$7,039.00	2.42	44.04	NA	\$168.80	\$0.62
Travelzoo Inc. (NasdaqGS:TZOO)	\$347.20	\$421.10	2.23	12.81	23.39	\$16.20	\$0.95
Aggregate	\$441,349.79	\$502,389.40	5.82	20.43	30.76	\$151.57	\$5.96
Median			8.67	32.27	59.99	101.73	4.91
Average			10.97	47.44	159.96	121.98	5.42

*Twitter's value based on revenues = \$543 million * ?*

*Twitter's value based on # users = 237 million * ?*

The market price of Twitter

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Rules for the road: Relative valuation

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1. Be consistent: 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.
2. Play Moneyball: Look at the cross sectional distribution of a multiple and form judgments, based on the data, of what is cheap and what is expensive.
3. Make your implicit assumptions explicit: Multiples are standardized values, and as a consequence are driven by exactly the same variables that determine value – cash flows, growth and risk.
4. Control for differences (and go past story telling): No matter how carefully you control for differences across companies, there will still be residual differences on the fundamentals across the firms. You have to go beyond story telling and use the data to analyze how the market treats these differences.

What's your game?

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- The transactors
 - ▣ Traders: Oscar Wilde's definition of a cynic: "knows the price of everything, the value of nothing".
 - ▣ Salespeople: Caveat emptor!
 - ▣ Deal intermediaries: Get the deal done (even if it is not a good deal)!
- The muddled middle
 - ▣ Academic value: The cognitive dissonance of the "efficient market"
 - ▣ Accounting value: Rule maker, rule maker, make up your mind!
 - ▣ Legal value: The bane of the expert witness!
- The investors
 - ▣ Owners of businesses: Except if you want to run it for the long term.
 - ▣ Investors in companies: With faith and patience, you can take advantage of Mr. Market.
 - ▣ Long term consultants: You have to live with the consequences of the advice that you mete out to your clients.

In the investing world, there are three views of “the gap”

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	View of the gap	Investment Strategies
The Efficient Marketer	The gaps between price and value, if they do occur, are random.	Index funds
The “value” extremist	You view pricers as dilettantes who will move on to fad and fad. Eventually, the price will converge on value.	Buy and hold stocks where value > price
The pricing extremist	Value is only in the heads of the “eggheads”. Even if it exists (and it is questionable), price may never converge on value.	(1) Look for mispriced securities. (2) Get ahead of shifts in demand/momentum.

The pricer's dilemma..

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- No anchor: If you do not believe in intrinsic value and make no attempt to estimate it, you have no moorings when you invest. You will therefore be pushed back and forth as the price moves from high to low. In other words, everything becomes relative and you can lose perspective.
- Reactive: Without a core measure of value, your investment strategy will often be reactive rather than proactive.
- Crowds are fickle and tough to get a read on: The key to being successful as a pricer is to be able to read the crowd mood and to detect shifts in that mood early in the process. By their nature, crowds are tough to read and almost impossible to model systematically.

The valuer's dilemma

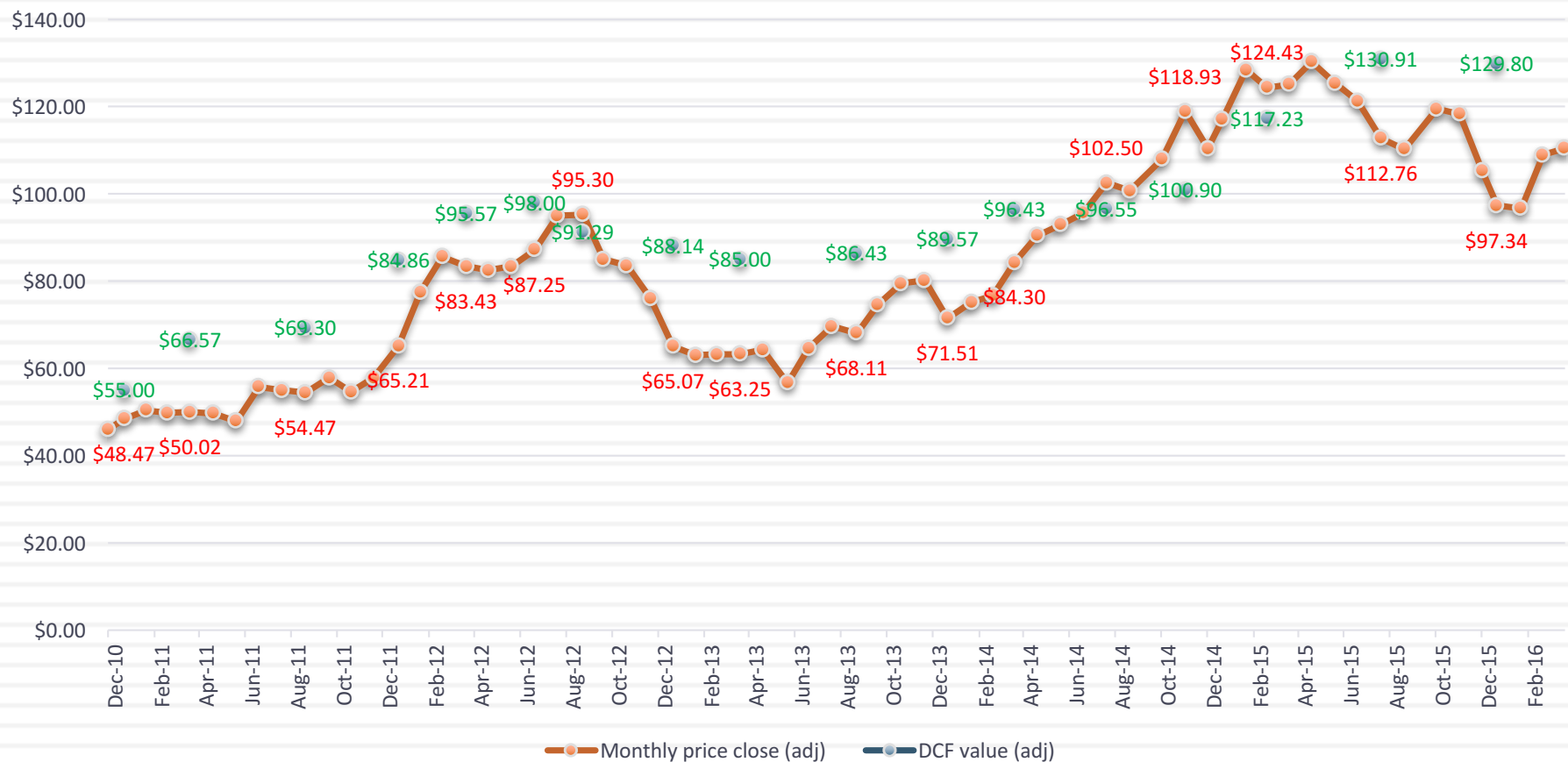
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- Uncertainty about the magnitude of the gap:
 - ▣ Margin of safety: Many value investors swear by the notion of the “margin of safety” as protection against risk/uncertainty.
 - ▣ Collect more information: Collecting more information about the company is viewed as one way to make your investment less risky.
 - ▣ Ask what if questions: Doing scenario analysis or what if analysis gives you a sense of whether you should invest.
 - ▣ Confront uncertainty: Face up to the uncertainty, bring it into the analysis and deal with the consequences.
- Uncertainty about gap closing: This is tougher and you can reduce your exposure to it by
 - ▣ Lengthening your time horizon
 - ▣ Providing or looking for a catalyst that will cause the gap to close.

The Righteous Win: Apple – Price versus Value (my estimates) from 2011 to 2016

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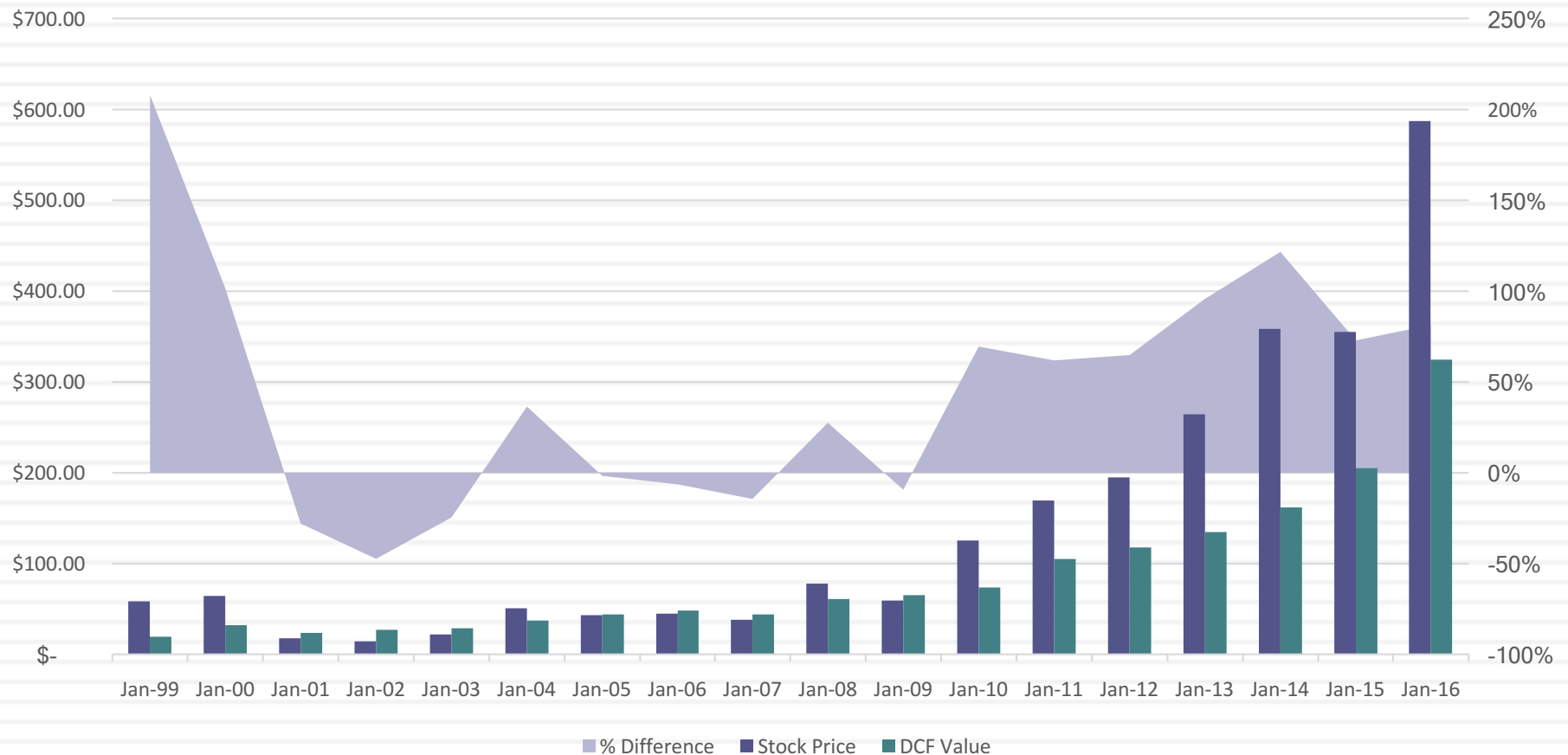
Apple: Stock Price versus DCF Value (My Estimates)



Where is the convergence? Amazon – Price versus Value

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Amazon: Price versus DCF value - 1999 to 2015



The choice is yours (and there is no right one)

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1. Play to your strengths: To be a successful investor, you have to know what makes you tick and pick the approach that best fits you.
2. Don't be delusional: If you are pricing an asset, don't get distracted too much by fundamentals and intrinsic value concerns. If you are valuing an asset, don't let the pricing process (mood & momentum) feed back into your valuation.
3. Stop being righteous: Stop labeling investors as good or bad, based on how they pick stocks, how long they hold them and which direction they bet (long or short).
4. Don't expect to be rewarded: The notion that if you do all the "right things", you will be rewarded is not only wrong but dangerous.



NUMBERS AND NARRATIVE: MODELING, STORY TELLING AND INVESTING

Aswath Damodaran

Are you a numbers person or a story person?

The side of the brain we tend to use more may determine our learning styles, not to mention instructors' teaching methods:

LEFT SIDE



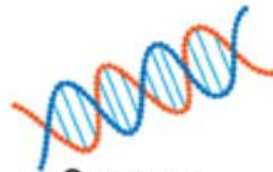
Linear

Processes information by taking pieces, lining them up, and arranging them in a logical order to draw conclusions.



Reality-based

Deals with reality the way it is. When affected by the environment, adjustment can be easily made.



Sequence

Processes information in order. This makes for easy daily planning and accomplishing tasks.

$$f(x) = \frac{x}{3} + 5$$

Symbolic

Processing symbols is no problem such as letters, words, and mathematical notation.

RIGHT SIDE



Holistic

Processes information by starting with the answer. It sees the big picture first, not the details.



Fantasy-oriented

Processes information based on what they think the answer is. Often they find the answer intuitively.



Random

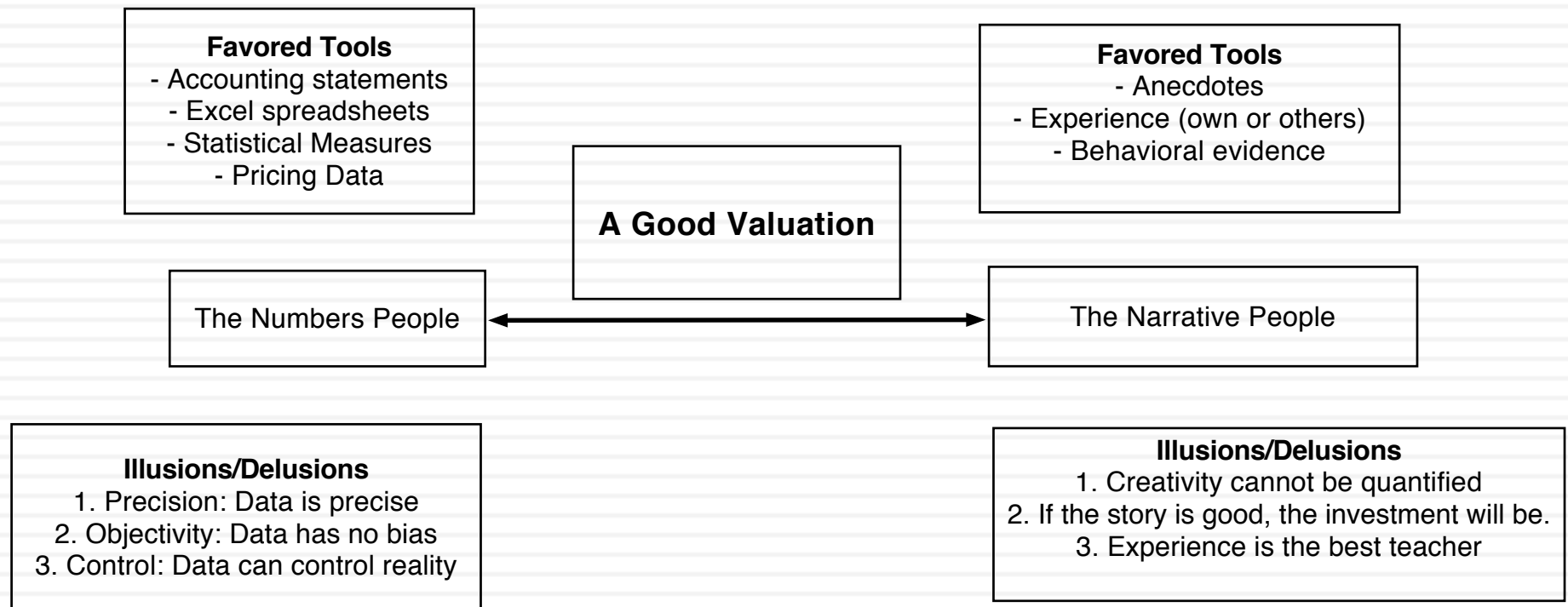
Processes information through random processing. Tasks are done randomly and in parts.



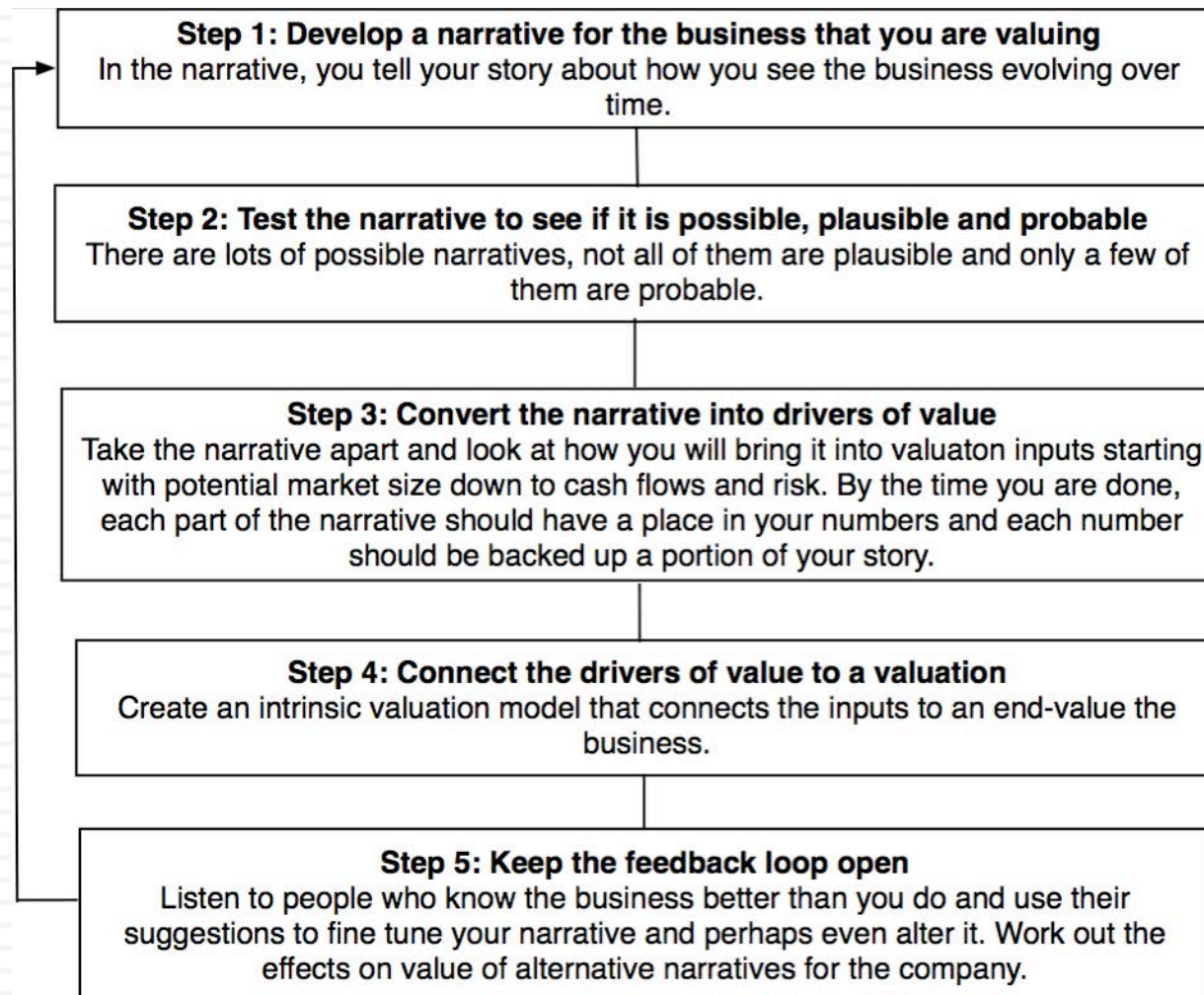
Concrete

Processing requires things to be concrete such as feeling, seeing, or touching the real object.

Bridging the Gap

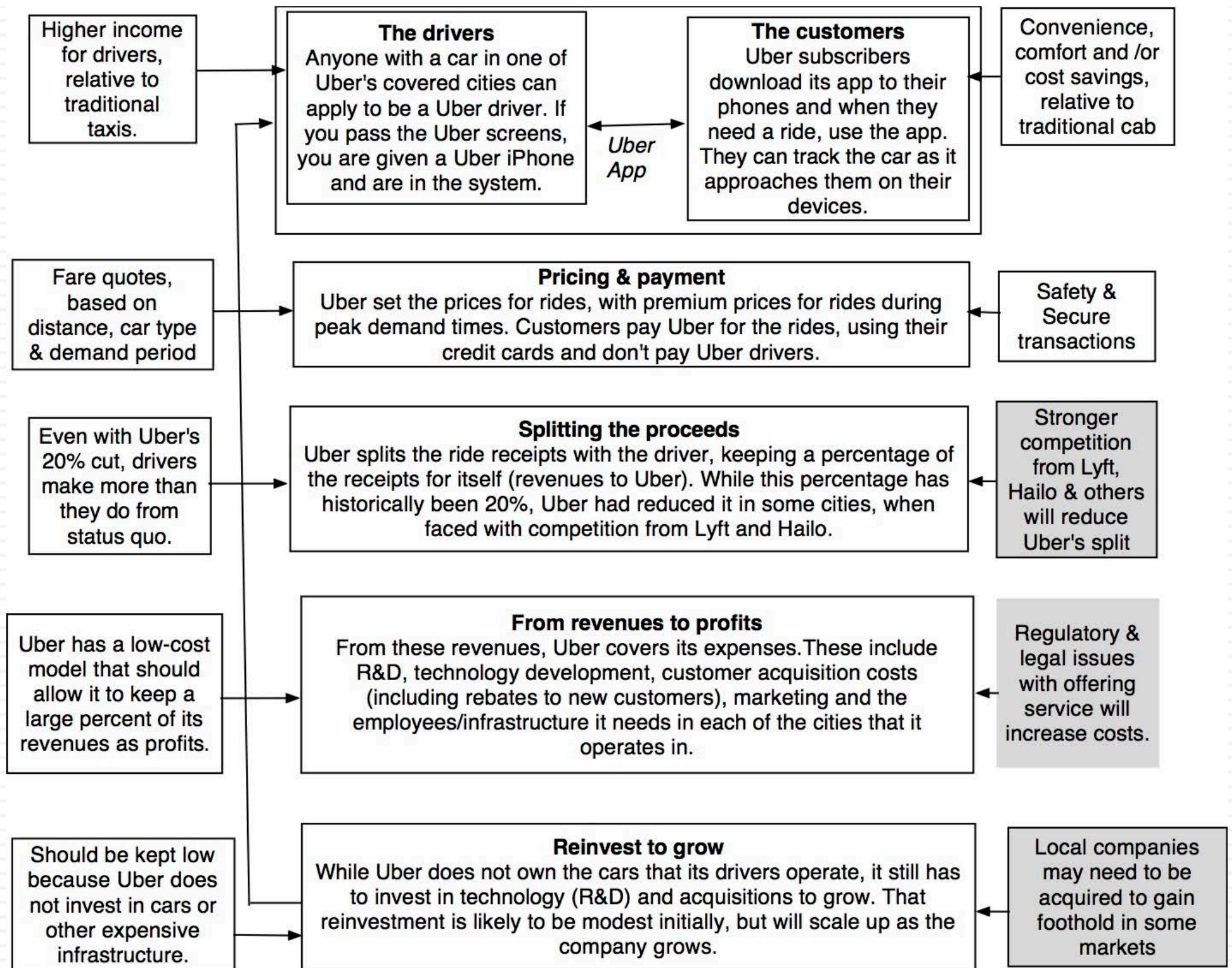


The Steps



Step 1: 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.



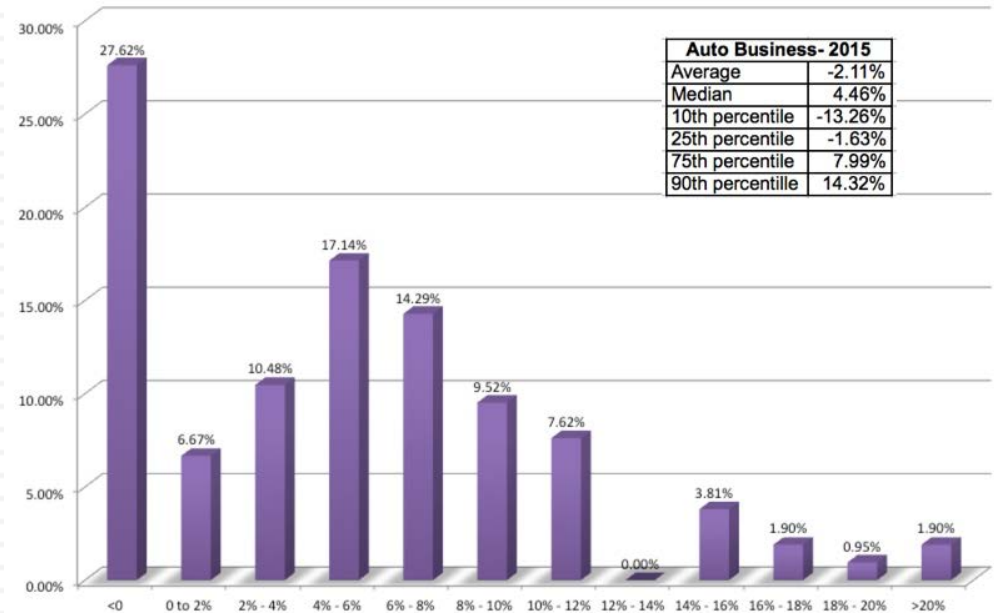
Low Growth

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%

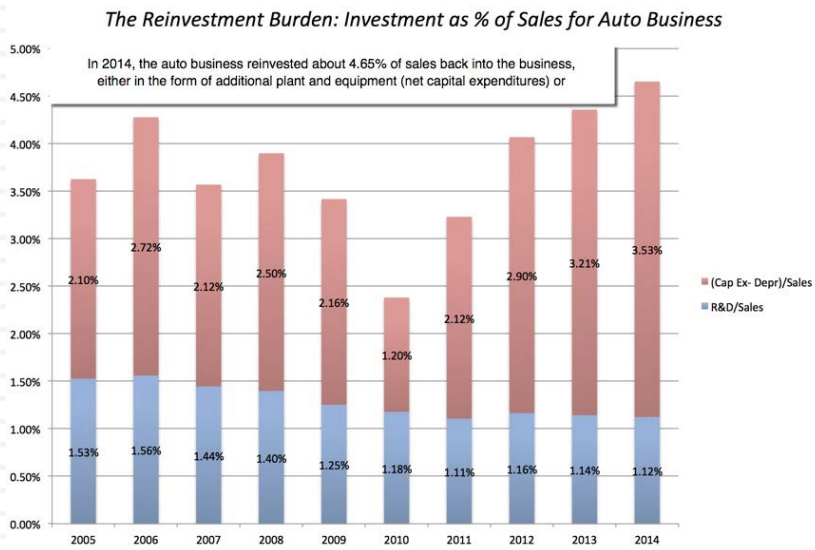
The Auto Business

Low Margins

The Automobile Business: Pre-tax Operating Margins in 2015



High & Increasing Reinvestment



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%

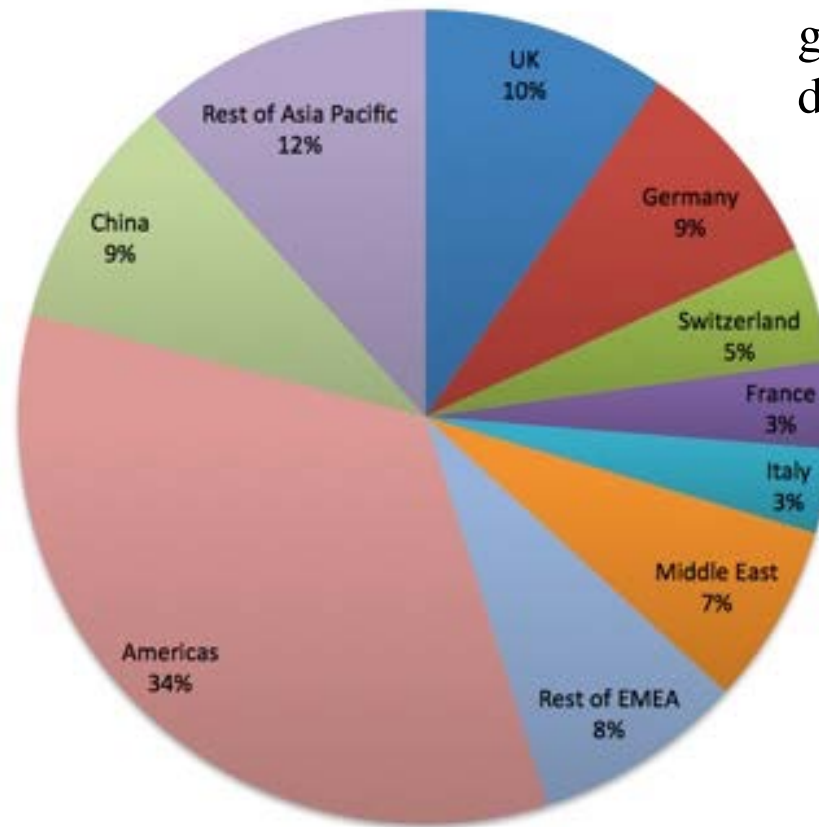
Only once in the last 10 years have auto companies collectively earned more than their cost of capital

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: Geographical Sales (2014)



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

Ferrari has not invested in new plants.

Step 2: 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

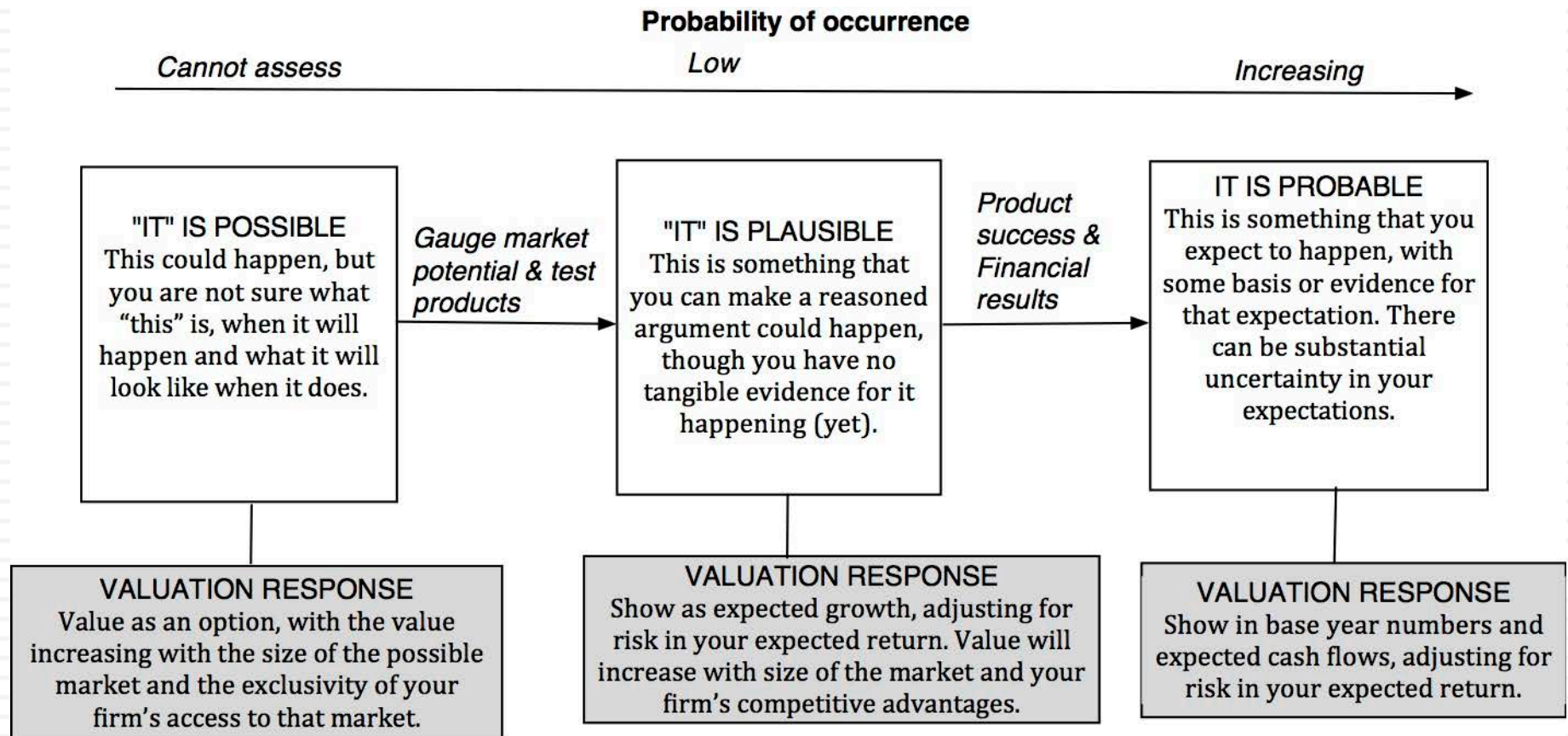
1. An urban car service business: I saw Uber primarily as a force in urban areas and only in the car service business.
2. Which would expand the business moderately (about 40% over ten years) by bringing in new users.
3. With local networking benefits: If Uber becomes large enough in any city, it will 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 3: Check the narrative against history, economic first principles & common sense

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The Impossible, The Implausible and the Improbable

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The Impossible

Bigger than the economy

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

Bigger than the total market

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

Profit margin > 100%

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

Depreciation without cap ex

Assuming that depreciation will exceed cap ex in perpetuity.

The Implausible

Growth without reinvestment

Assuming growth forever without reinvestment.

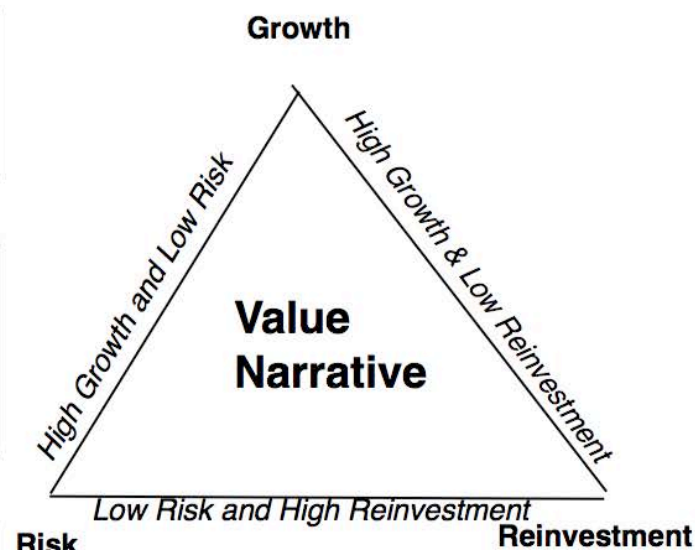
Profits without competition

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

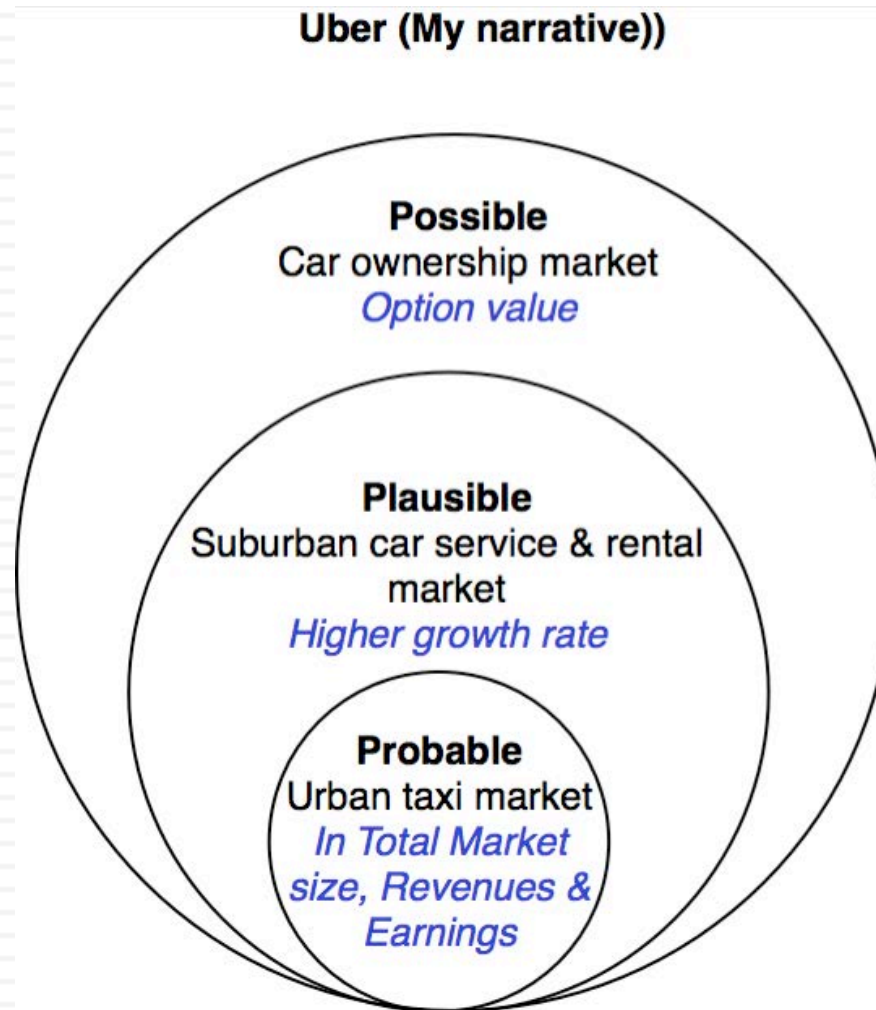
Returns without risk

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

The Improbable



Uber: Possible, Plausible and Probable



The Impossible: The Runaway Story

The Story



The Checks (?)

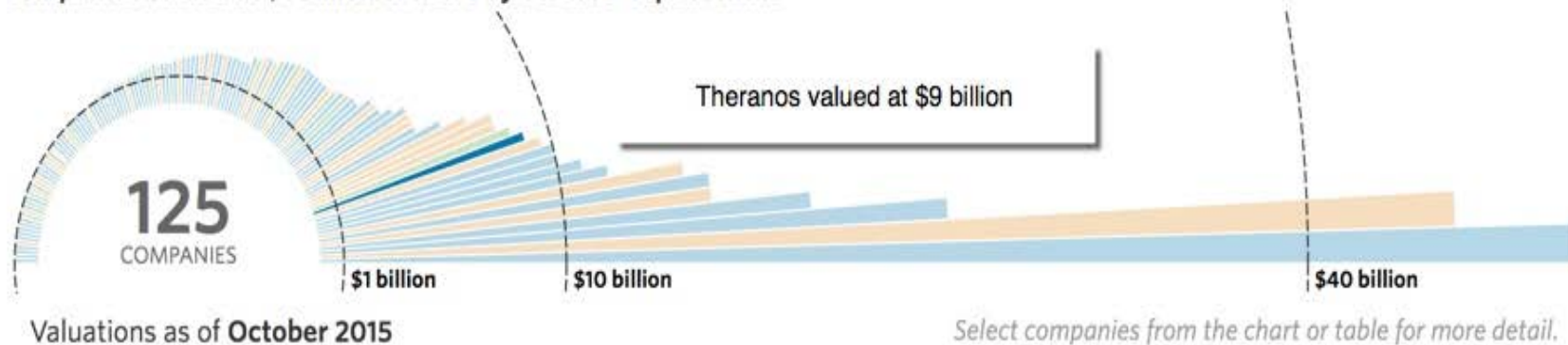
Board Member	Designation	Age
Henry Kissinger	Former Secretary of State	92
Bill Perry	Former Secretary of Defense	88
George Schultz	Former Secretary of State	94
Bill Frist	Former Senate Majority Leader	63
Sam Nunn	Former Senator	77
Gary Roughead	Former Navy Admiral	64
James Mattis	Former Marine Corps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

+

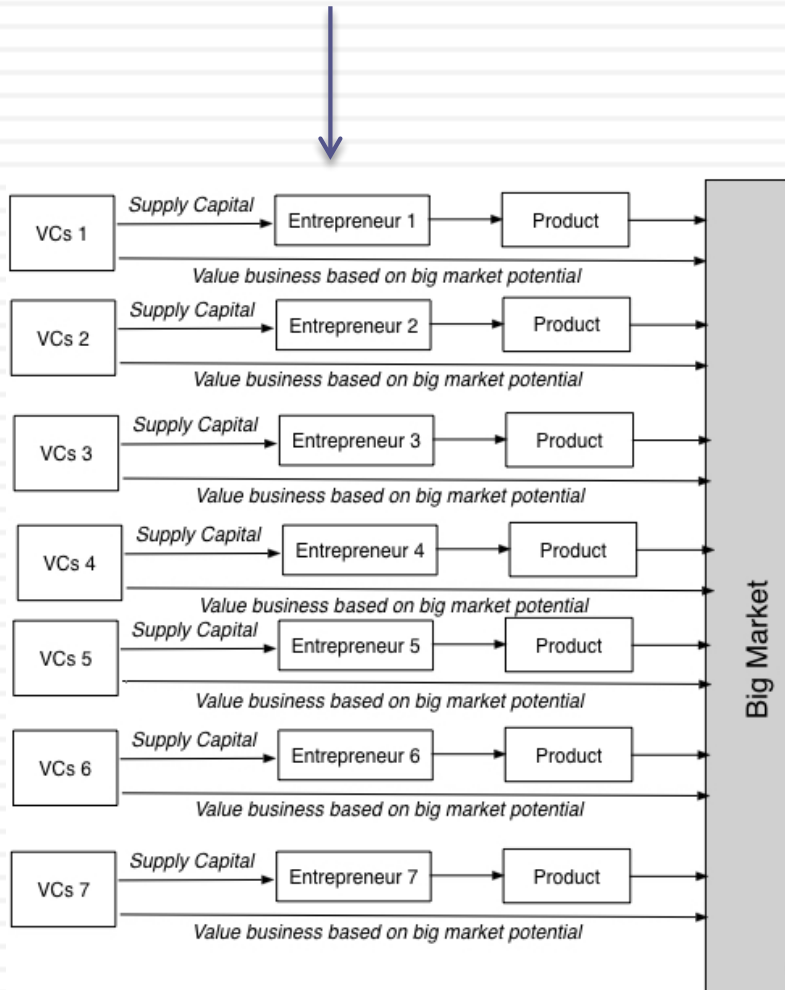
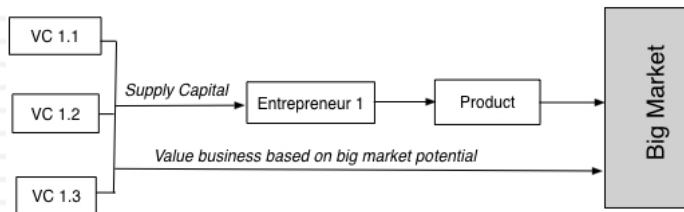
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Money

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



The Implausible: The Big Market Delusion

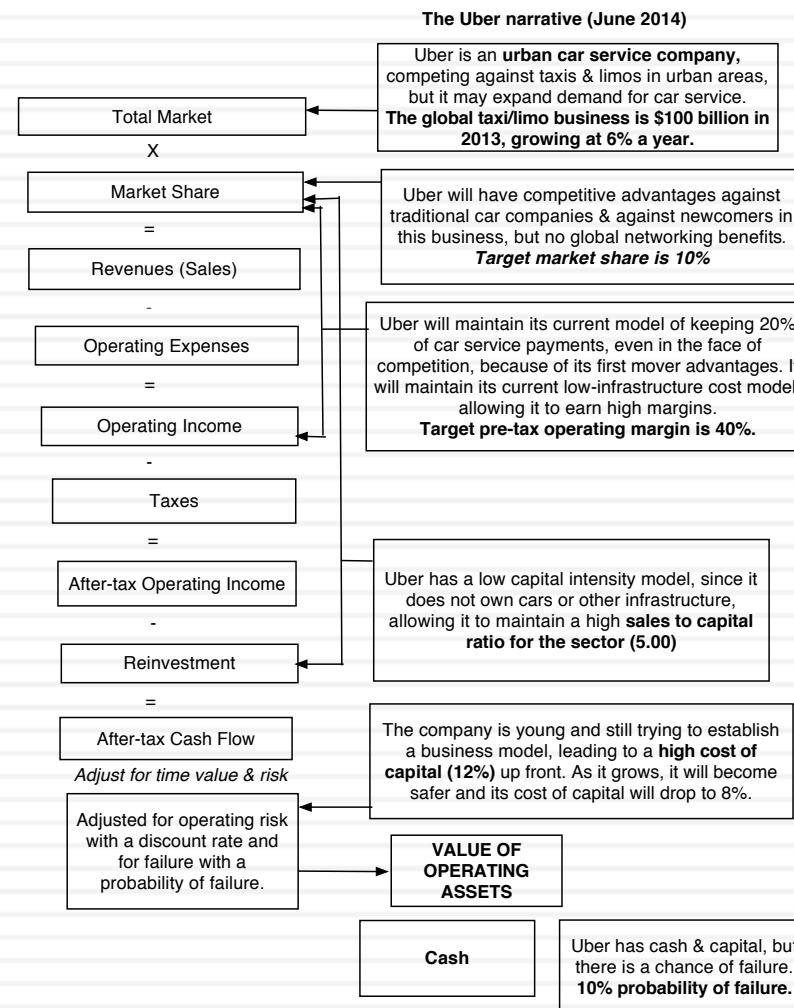


Company	Market Cap	Enterprise Value	Current Revenues	Breakeven Revenues (2025)	% from Online Advertising	Imputed Online Ad Revenue (2025)
Google	\$441,572.00	\$386,954.00	\$69,611.00	\$224,923.20	89.50%	\$201,306.26
Facebook	\$245,662.00	\$234,696.00	\$14,640.00	\$129,375.54	92.20%	\$119,284.25
Yahoo!	\$30,614.00	\$23,836.10	\$4,871.00	\$25,413.13	100.00%	\$25,413.13
LinkedIn	\$23,265.00	\$20,904.00	\$2,561.00	\$22,371.44	80.30%	\$17,964.26
Twitter	\$16,927.90	\$14,912.90	\$1,779.00	\$23,128.68	89.50%	\$20,700.17
Pandora	\$3,643.00	\$3,271.00	\$1,024.00	\$2,915.67	79.50%	\$2,317.96
Yelp	\$1,765.00	\$0.00	\$465.00	\$1,144.26	93.60%	\$1,071.02
Zillow	\$4,496.00	\$4,101.00	\$480.00	\$4,156.21	18.00%	\$748.12
Zynga	\$2,241.00	\$1,142.00	\$752.00	\$757.86	22.10%	\$167.49
Total US	\$770,185.90	\$689,817.00	\$96,183.00	\$434,185.98		\$388,972.66
Alibaba	\$184,362.00	\$173,871.00	\$12,598.00	\$111,414.06	60.00%	\$66,848.43
Tencent	\$154,366.00	\$151,554.00	\$13,969.00	\$63,730.36	10.50%	\$6,691.69
Baidu	\$49,991.00	\$44,864.00	\$9,172.00	\$30,999.49	98.90%	\$30,658.50
Sohu.com	\$18,240.00	\$17,411.00	\$1,857.00	\$16,973.01	53.70%	\$9,114.51
Naver	\$13,699.00	\$12,686.00	\$2,755.00	\$12,139.34	76.60%	\$9,298.74
Yandex	\$3,454.00	\$3,449.00	\$972.00	\$2,082.52	98.80%	\$2,057.52
Yahoo! Japan	\$23,188.00	\$18,988.00	\$3,591.00	\$5,707.61	69.40%	\$3,961.08
Sina	\$2,113.00	\$746.00	\$808.00	\$505.09	48.90%	\$246.99
Netease	\$14,566.00	\$11,257.00	\$2,388.00	\$840.00	11.90%	\$3,013.71
Mail.ru	\$3,492.00	\$3,768.00	\$636.00	\$1,676.47	35.00%	\$586.76
Mixi	\$3,095.00	\$2,661.00	\$1,229.00	\$777.02	96.00%	\$745.94
Kakaku	\$3,565.00	\$3,358.00	\$404.00	\$1,650.49	11.60%	\$191.46
Total non-US	\$474,131.00	\$444,613.00	\$50,379.00	\$248,495.46		\$133,415.32
Global Total	\$1,244,316.90	\$1,134,430.00	\$146,562.00	\$682,681.44		\$522,387.98

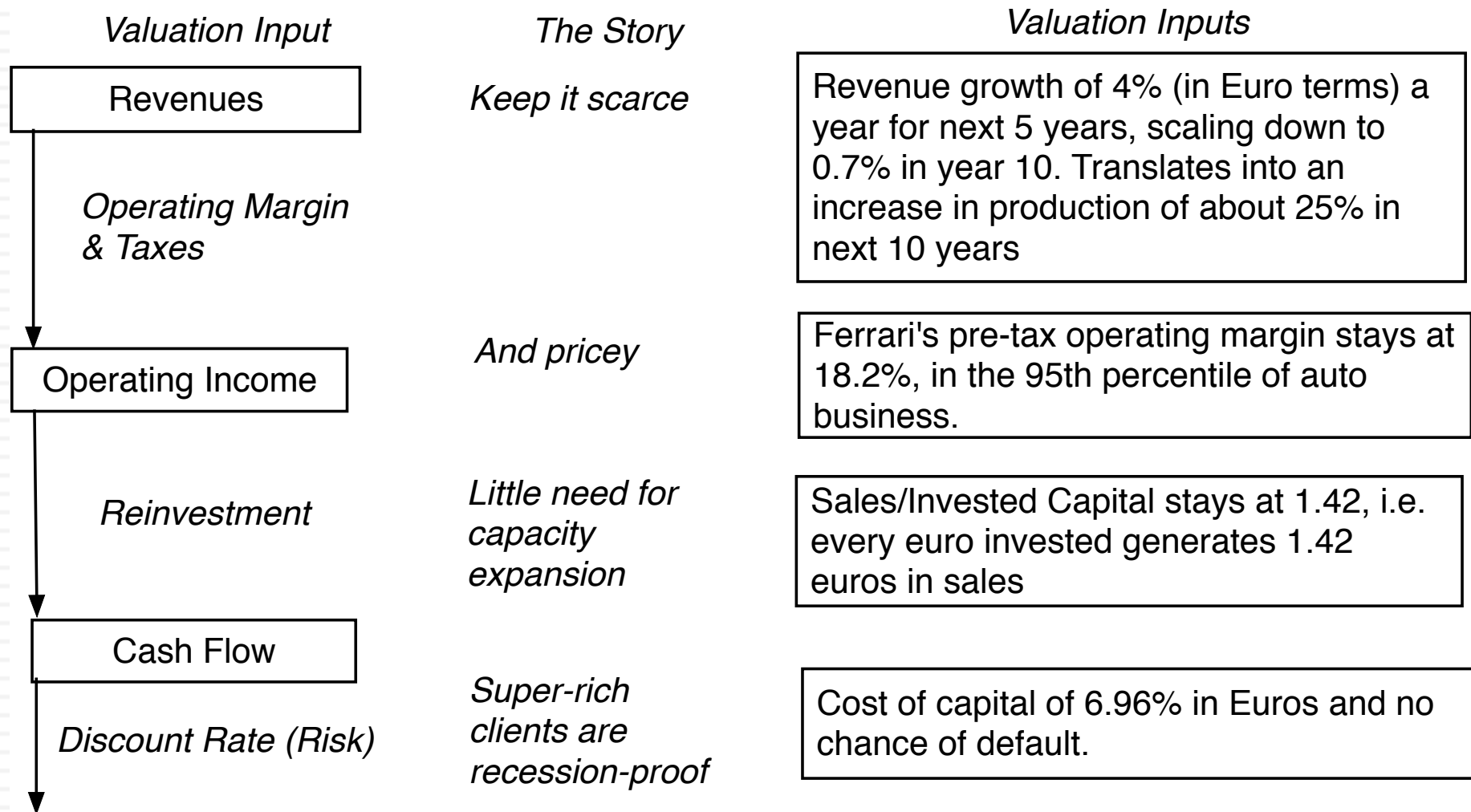
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	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028
Unit Volume	24,298	36,883	64,684	86,713	149,869	214,841	291,861	384,747	466,559	550,398	643,850	726,855	820,645	922,481	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%	59%	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	756	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%												

Step 4: Connect your narrative to key drivers of value



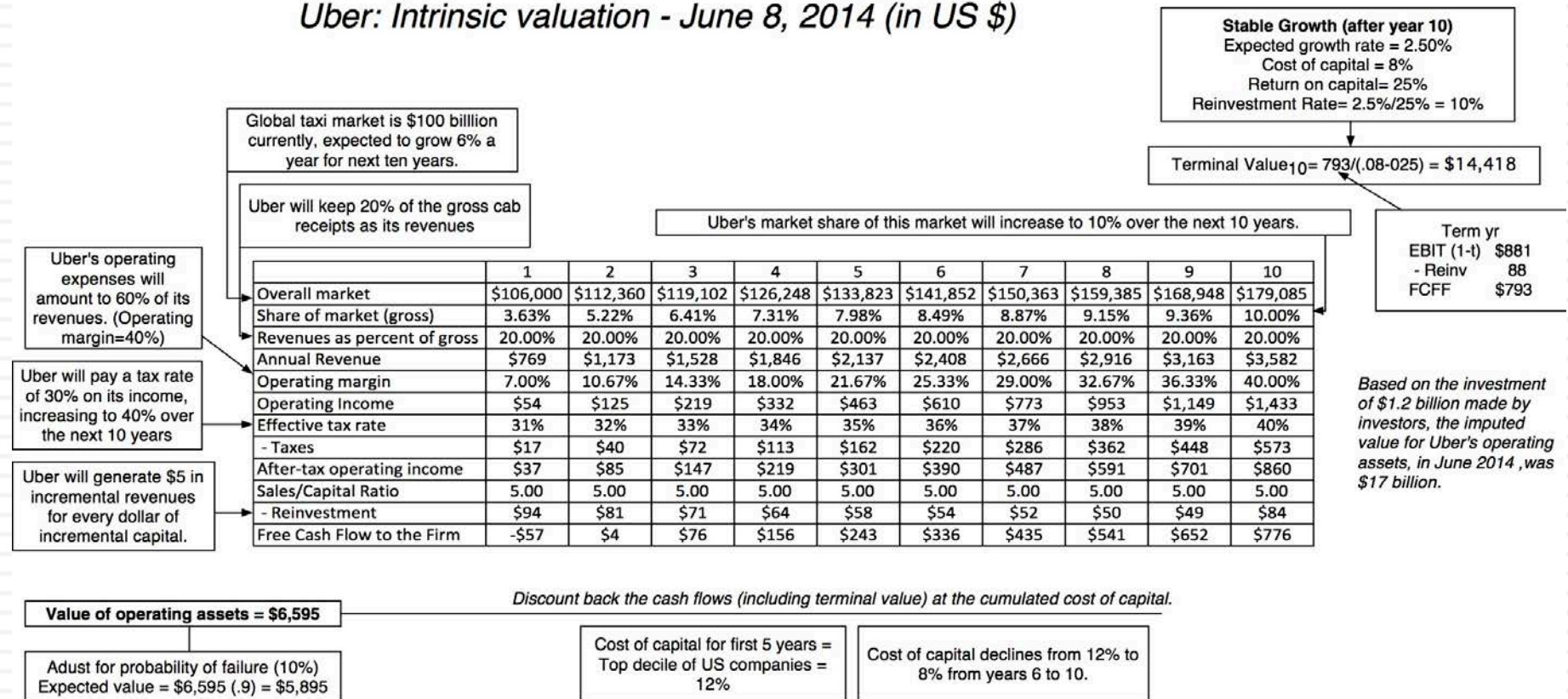
Ferrari: From story to numbers



Step 4: Value the company (Uber)

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



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 Uber Feedback Loop: Bill Gurley

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

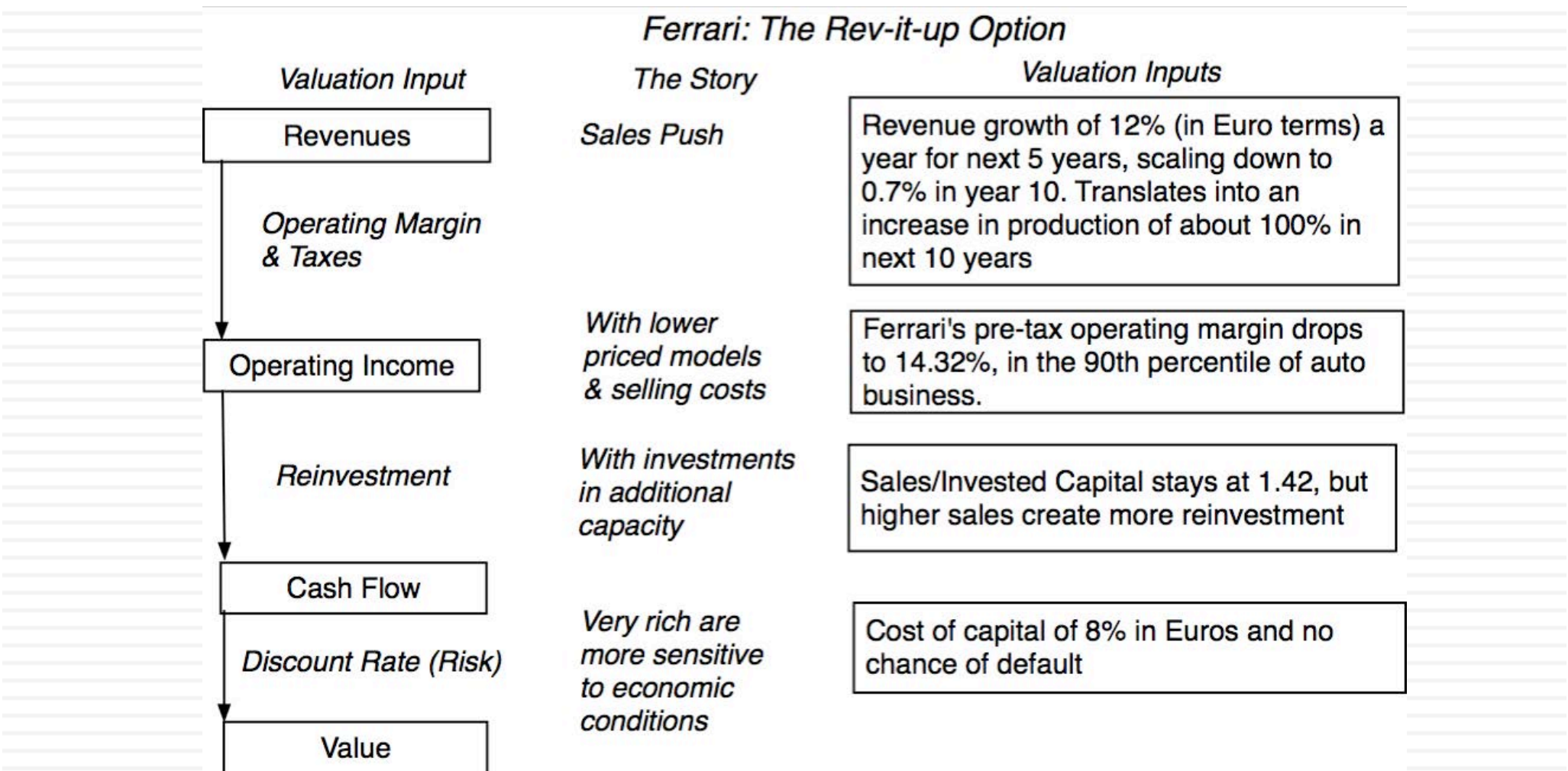
Valuing Bill Gurley's Uber narrative

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

Different narratives, Different Numbers

<i>Total Market</i>	<i>Growth Effect</i>	<i>Network Effect</i>	<i>Competitive Advantages</i>	<i>Value of Uber</i>
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

Response	Percentage
Yes, the current government is responsible	95%
No, the current government is not responsible	5%



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: If the world changes, your narrative has to change with it..

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Narrative Break/End	Narrative Shift	Narrative Change (Expansion or Contraction)
Events, external (legal, political or economic) or internal (management, competitive, default), that can cause the narrative to break or end.	Improvement or deterioration in initial business model, changing market size, market share and/or profitability.	Unexpected entry/success in a new market or unexpected exit/failure in an existing market.
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

<i>Input</i>	<i>June 2014</i>	<i>September 2015</i>	<i>Rationale</i>
Total Market	\$100 billion; Urban car service	\$230 billion; Logistics	Market is broader, bigger & more global than I thought it would be. <u>Uber's</u> 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 <u>decile</u> 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	

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

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

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



The End

“There is no real ending. It’s just the place
where you stop the story.”



LIVING WITH NOISE: INVESTING IN THE FACE OF UNCERTAINTY

Aswath Damodaran

<http://www.damodaran.com>

Uncertainty is a feature, not a bug.

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And we deal with uncertainty as humans always have...

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- Divine Intervention: Praying for intervention from a higher power is the oldest and most practiced risk management system of all.
- Paralysis & Denial: When faced with uncertainty, some of us get paralyzed. Accompanying the paralysis is the hope that if you close your eyes to it, the uncertainty will go away
- Mental short cuts (rules of thumb): Behavioral economists note that investors faced with uncertainty adopt mental short cuts that have no basis in reality. And here is the clincher. More intelligent people are more likely to be prone to this.
- Herding: When in doubt, it is safest to go with the crowd.. The herding instinct is deeply engrained and very difficult to fight.
- Outsourcing: Assuming that there are experts out there who have the answers does take a weight off your shoulders, even if those experts have no idea of what they are talking about.

Forecasting in the face of uncertainty. A test:

69

- 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%

But the payoff is greatest where there is the most uncertainty...

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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%

[Further changeability analysis »](#)

Weather forecast accuracy for Honolulu, Hawaii

Last Month		Last Year	
MeteoGroup	88.44%	MeteoGroup	88.50%
Persistence	81.80%	CustomWeather	85.87%
CustomWeather	78.23%	AccuWeather	81.82%
The Weather Channel	73.12%	The Weather Channel	81.56%
AccuWeather	69.89%	Persistence	80.44%
Weather Underground	62.10%	Weather Underground	67.07%
National Weather Service	48.39%	National Weather Service	59.90%
Foreca	44.35%	Foreca	57.52%
WeatherBug	32.26%	WeatherBug	37.09%

Weather changeability for Epping, North Dakota

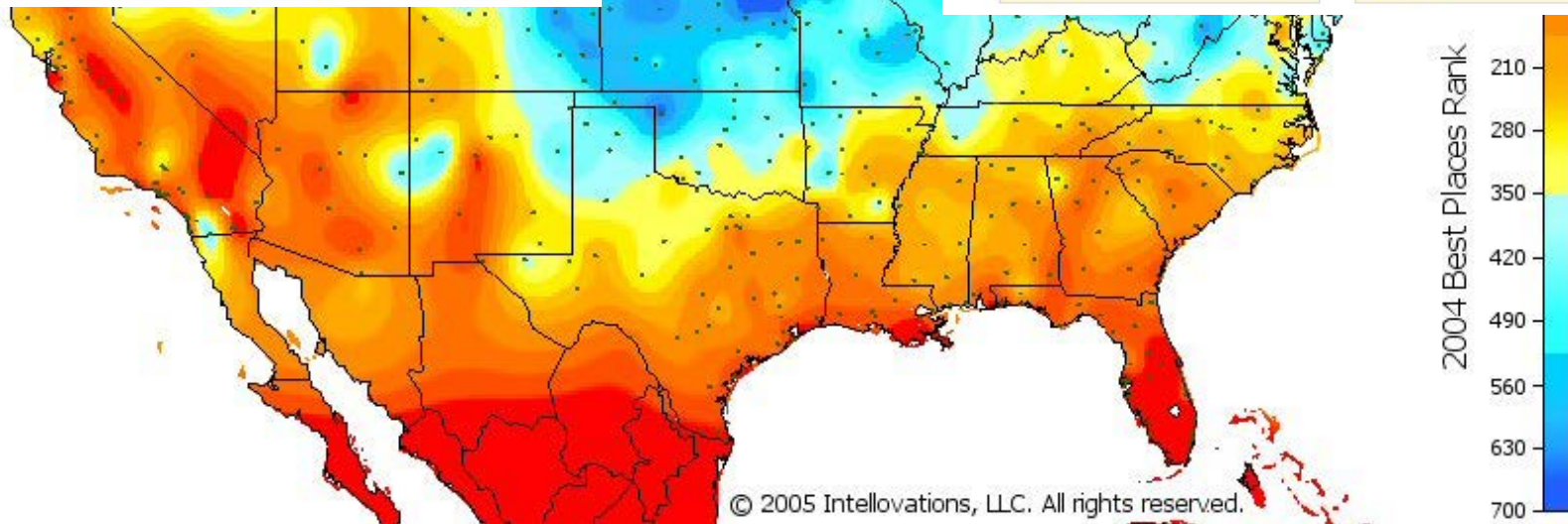
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Chance of precip day after a dry day	38%	20%

[Further changeability analysis »](#)

Weather forecast accuracy for Epping, North Dakota

Last Month		Last Year	
MeteoGroup	62.50%	MeteoGroup	66.97%
Foreca	61.61%	The Weather Channel	66.73%
The Weather Channel	61.31%	AccuWeather	64.86%
AccuWeather	60.42%	WeatherBug	64.80%
Weather Underground	56.85%	Foreca	62.75%
WeatherBug	56.17%	CustomWeather	62.70%
National Weather Service	54.76%	National Weather Service	62.64%
CustomWeather	54.46%	Weather Underground	61.38%
Persistence	38.01%	Persistence	44.09%



3M: A Pre-crisis valuation

Current Cashflow to Firm
 EBIT(1-t)= 5344 (1-.35)= 3474
 - Nt CpX= 350
 - Chg WC 691
 = FCFF 2433
 Reinvestment Rate = 1041/3474
 =29.97%
 Return on capital = 25.19%

Reinvestment Rate
30%

Expected Growth in EBIT (1-t)
 $.30 \times .25 = .075$
 7.5%

Return on Capital
25%

Stable Growth
 g = 3%; Beta = 1.10;
 Debt Ratio= 20%; Tax rate=35%
 Cost of capital = 6.76%
 ROC= 6.76%;
 Reinvestment Rate=3/6.76=44%

First 5 years

Terminal Value₅ = 2645 / (.0676 - .03) = 70,409

Op. Assets 60607
 + Cash: 3253
 - Debt 4920
 =Equity 58400

Year	1	2	3	4	5
EBIT (1-t)	\$3,734	\$4,014	\$4,279	\$4,485	\$4,619
- Reinvestment	\$1,120	\$1,204	\$1,312	\$1,435	\$1,540
= FCFF	\$2,614	\$2,810	\$2,967	\$3,049	\$3,079

Term Yr
 \$4,758
 \$2,113
 \$2,645

Value/Share \$ 83.55

Cost of capital = 8.32% (0.92) + 2.91% (0.08) = 7.88%

Cost of Equity
8.32%

Cost of Debt
 $(3.72\% + .75\%)(1 - .35)$
 = 2.91%

Weights
 E = 92% D = 8%

On September 12, 2008, 3M was trading at \$70/share

Riskfree Rate:
 Riskfree rate = 3.72%

+ **Beta** 1.15 x **Risk Premium** 4%

Unlevered Beta for Sectors: 1.09

D/E=8.8%

Tata Motors: April 2010

Current Cashflow to Firm

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

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

Reinvestment Rate
70%

Expected Growth
 from new inv.
 $.70 \times .1716 = 0.1201$

Return on Capital
17.16%

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

Terminal Value₅ = $23493 / (.1039 - .05) = \text{Rs } 435,686$

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

Value/Share Rs 614

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

45278
 21785
 23493

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

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

On April 1, 2010
 Tata Motors price = Rs 781

Cost of Equity
14.00%

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

Weights
 E = 74.7% D = 25.3%

Riskfree Rate:
 Rs Riskfree Rate = 5%

+

Beta
1.20

X

Mature market
 premium
 4.5%

+

Lambda
 0.80

X

Country Equity Risk
 Premium
 4.50%

X

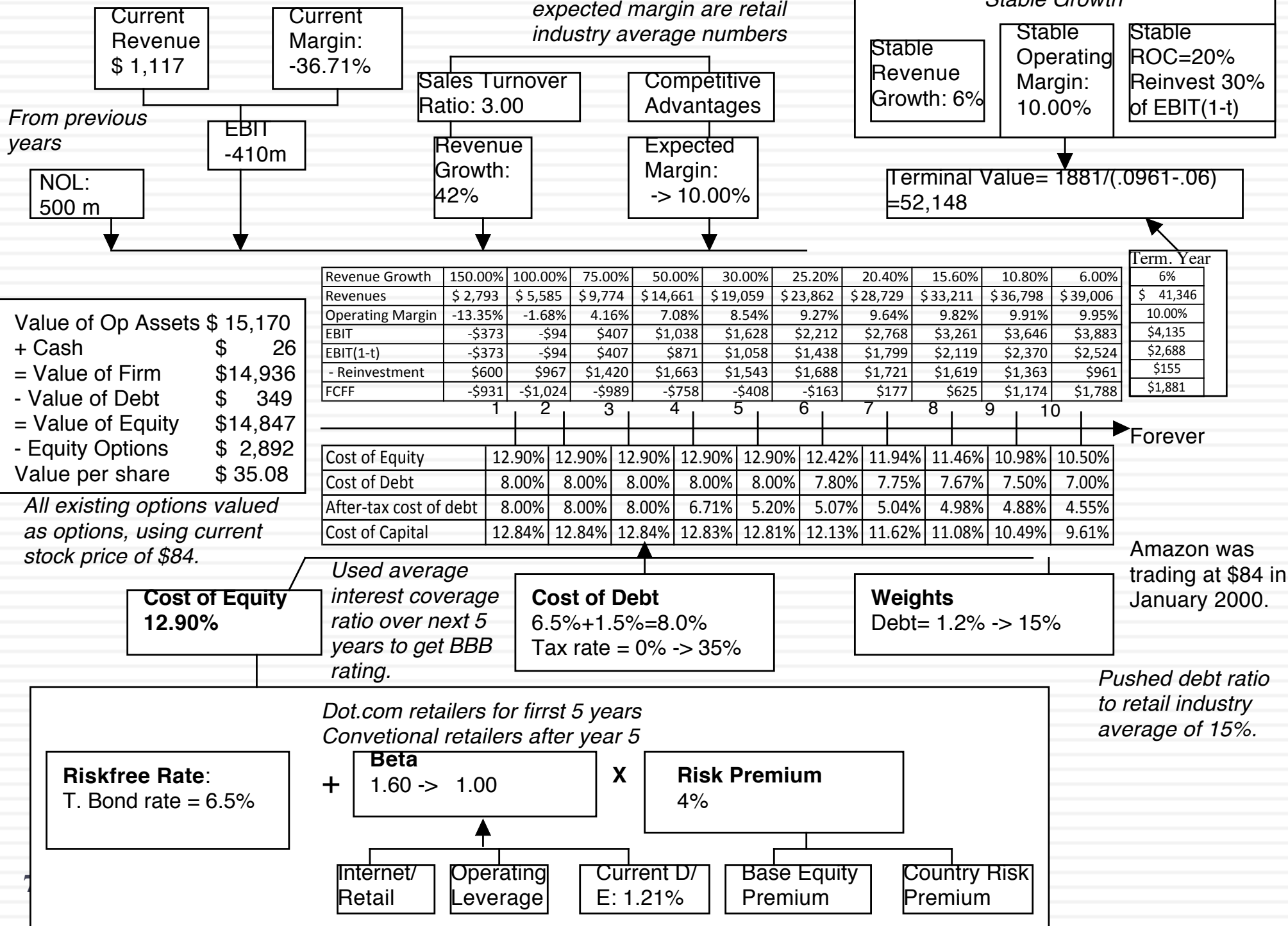
Country Default
 Spread
 3%

Rel Equity
 Mkt Vol
 1.50

Unlevered Beta for
Sectors: 1.04

Firm's D/E
Ratio: 33%

9a. Amazon in January 2000



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 Operating Margin		1.44%
Sales/ Invested Capital		0.56
Interest expenses	\$2.49	\$5.30

Twitter Pre-IPO Valuation: October 27, 2013

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
 $g = 2.5\%$; $\text{Beta} = 1.00$;
 Cost of capital = 8%
 $\text{ROC} = 12\%$;
 $\text{Reinvestment Rate} = 2.5\%/12\% = 20.83\%$

Terminal Value₁₀ = $1466 / (.08 - .025) = \$26,657$

		1	2	3	4	5	6	7	8	9	10
Operating assets	\$9,705	\$ 810	\$1,227	\$1,858	\$2,816	\$4,266	\$6,044	\$7,973	\$9,734	\$10,932	\$11,205
+ Cash	321	\$ 31	\$ 75	\$ 158	\$ 306	\$ 564	\$ 941	\$1,430	\$1,975	\$ 2,475	\$ 2,801
+ IPO Proceeds	1295	\$ 31	\$ 75	\$ 158	\$ 294	\$ 395	\$ 649	\$ 969	\$1,317	\$ 1,624	\$ 1,807
- Debt	214	\$ 183	\$ 278	\$ 421	\$ 638	\$ 967	\$1,186	\$1,285	\$1,175	\$ 798	\$ 182
Value of equity	11,106	FCFF									
- Options	713	\$(153)	\$(203)	\$(263)	\$(344)	\$(572)	\$(537)	\$(316)	\$ 143	\$ 826	\$ 1,625
Value in stock	10,394										
/ # of shares	582.46										
Value/share	\$17.84										

Terminal year (11)
 EBIT (1-t) \$ 1,852
 - Reinvestment \$ 386
 FCFF \$ 1,466

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

x

Risk Premium
6.15%

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

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

D/E=1.71%

The sources of uncertainty

- Estimation versus Economic uncertainty
 - ▣ Estimation uncertainty reflects the possibility that you could have the “wrong model” or estimated inputs incorrectly within this model.
 - ▣ Economic uncertainty comes the fact that markets and economies can change over time and that even the best models will fail to capture these unexpected changes.
- Micro uncertainty versus Macro uncertainty
 - ▣ Micro uncertainty refers to uncertainty about the potential market for a firm’s products, the competition it will face and the quality of its management team.
 - ▣ Macro uncertainty reflects the reality that your firm’s fortunes can be affected by changes in the macro economic environment.
- Discrete versus continuous uncertainty
 - ▣ Discrete risk: Risks that lie dormant for periods but show up at points in time. (Examples: A drug working its way through the FDA pipeline may fail at some stage of the approval process or a company in Venezuela may be nationalized)
 - ▣ Continuous risk: Risks changes in interest rates or economic growth occur continuously and affect value as they happen.

Assessing uncertainty...

- Rank the four firms in terms of uncertainty (least to most) in your estimate:

☐ 3M in 2007

☐ Tata Motors in 2010

☐ Amazon in 2000

☐ Twitter in 2013

- With each company, specify the type of uncertainty that you face:

Company	Estimation or Economic	Micro or Macro	Discrete or Continuous
3M (2007)			
Tata Motors (2010)			
Amazon (2000)			
Twitter (2013)			

Ten suggestions for dealing with uncertainty...

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1. Less is more (the rule on detail....) (Revenue & margin forecasts)
2. Build in internal checks on reasonableness... (reinvestment and ROC)
3. Use the offsetting principle (risk free rates & inflation at Tata Motors)
4. Draw on economic first principles (Terminal value at all the companies)
5. Use the “market” as a crutch (equity risk premiums, country risk premiums)
6. Use the law of large numbers (Beta for all companies)
7. Don't let the discount rate become the receptacle for all uncertainties.
8. Confront uncertainty, if you can
9. Don't look for precision
10. You can live with mistakes, but bias will kill you...

1. Less is more

- The principle of parsimony: When faced with uncertainty, go for less detail, rather than more. That may sound counterintuitive, but here is why it makes sense:
 - You have a better shot at estimating an aggregate number, rather than individual numbers (Examples: Forecast the operating margin rather than individual operating expenses, total working capital instead of individual working capital items)
 - Estimation requires information and trying to estimate individual items, in the absence of information, is not only frustrating but an exercise in futility.
- Auto pilot rules: The uncertainty you face will increase as you go forward in time (it is much more difficult to estimate year 5 than year 1). Thus, it is best to create simple algorithms that estimate year-specific numbers as you go further out in time.

The Amazon Forecasts

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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

Use “auto pilot” approaches to estimate future years

Principle of parsimony: Estimate fewer inputs when faced with uncertainty.

2. Build in “internal” checks for reasonableness...

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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%

Check total revenues, relative to the market that it serves...
Your market share obviously cannot exceed 100% but there may be tighter constraints.

Are the margins and imputed returns on capital ‘reasonable’ in the outer years?

3. Use consistency tests...

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- While you can not grade a valuation on “correctness” (since different analysts can make different assumptions about growth and risk), you can grade it on consistency.
- For a valuation to be consistent, your estimates of cash flows have to be consistent with your discount rate definition.
 - Equity versus Firm: If the cash flows being discounted are cash flows to equity, the appropriate discount rate is a cost of equity. If the cash flows are cash flows to the firm, the appropriate discount rate is the cost of capital.
 - Currency: The currency in which the cash flows are estimated should also be the currency in which the discount rate is estimated.
 - Nominal versus Real: If the cash flows being discounted are nominal cash flows (i.e., reflect expected inflation), the discount rate should be nominal

Tata Motors: In Rupees and US dollars

82

$$(1.125) * (1.01/1.04) - 1 = .0925$$

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

4. Draw on economic first principles and mathematical limits...

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- When doing valuation, you are free to make assumptions about how your company will evolve over time in the market that it operates, but you are not free to violate first principles in economics and mathematics.
- Put differently, there are assumptions in valuation that are either mathematically impossible or violate first laws of economics and cannot be ever justified.

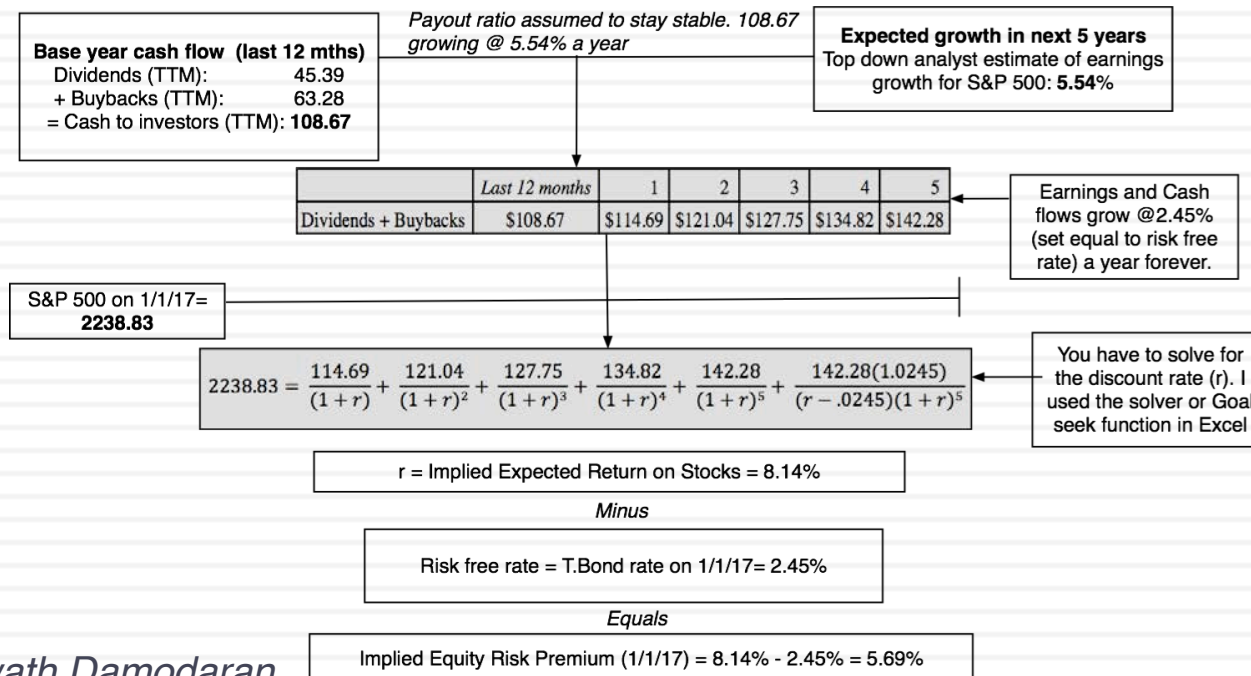
And the “excess return” effect...

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<i>Stable growth rate</i>	<i>3M</i>	<i>Tata Motors</i>	<i>Amazon</i>	<i>Twitter</i>
0%	\$70,409	435,686₹	\$26,390	\$23,111
1%	\$70,409	435,686₹	\$28,263	\$24,212
2%	\$70,409	435,686₹	\$30,595	\$25,679
3%	\$70,409	435,686₹	\$33,594	
4%		435,686₹	\$37,618	
5%		435,686₹	\$43,334	
			\$52,148	
Riskfree rate	3.72%	5%	6.60%	2.70%
ROIC	6.76%	10.39%	20%	12.00%
Cost of capital	6.76%	10.39%	9.61%	8.00%

5. Use the market as a crutch... ERP as an illustration

	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%		



Extending to country risk premium...

- Assume that the equity risk premium for the US and other mature equity markets is 5.8%.
- To estimate the additional risk premium for an emerging market, you can start with a country default spread, using one of two approaches:
 - ▣ Default spread, given the country's bond rating (estimated either by looking at a US\$ or Euro government bond issued by that country)
 - ▣ CDS spread for the country, from the market
- Adjusted for equity risk: The country equity risk premium is based upon the volatility of the market in question relative to U.S market.
 - ▣ Total equity risk premium = Default SpreadCountry* ($\sigma_{\text{Country Equity}} / \sigma_{\text{Country Bond}}$)
 - ▣ Standard Deviation in Bovespa = 30%
 - ▣ Standard Deviation in Brazilian government bond= 20%
 - ▣ Default spread for Brazil= 1.75%
 - ▣ Additional risk premium for Brazil = 1.75% (30/20) = 2.63%

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%			

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

Caribbean	13.81%	8.12%
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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%

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%

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%

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%

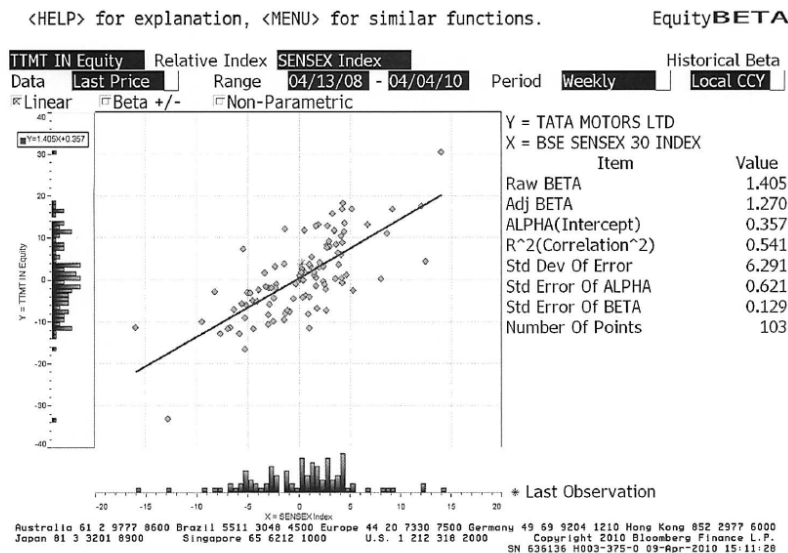
Bangladesh	10.81%	5.12%
Cambodia	13.51%	7.82%
China	6.55%	0.86%
Fiji	12.09%	6.40%
Hong Kong	6.26%	0.57%
India	8.81%	3.12%
Indonesia	8.81%	3.12%
Japan	6.69%	1.00%
Korea	6.39%	0.70%
Macao	6.55%	0.86%
Malaysia	7.40%	1.71%
Mauritius	7.95%	2.26%
Mongolia	16.34%	10.65%
Pakistan	14.93%	9.24%
Papua New Guinea	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

6. Draw on the law of large numbers...

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□ To estimate the beta for Tata Motors

■ Unlevered beta for automobile company = 0.98

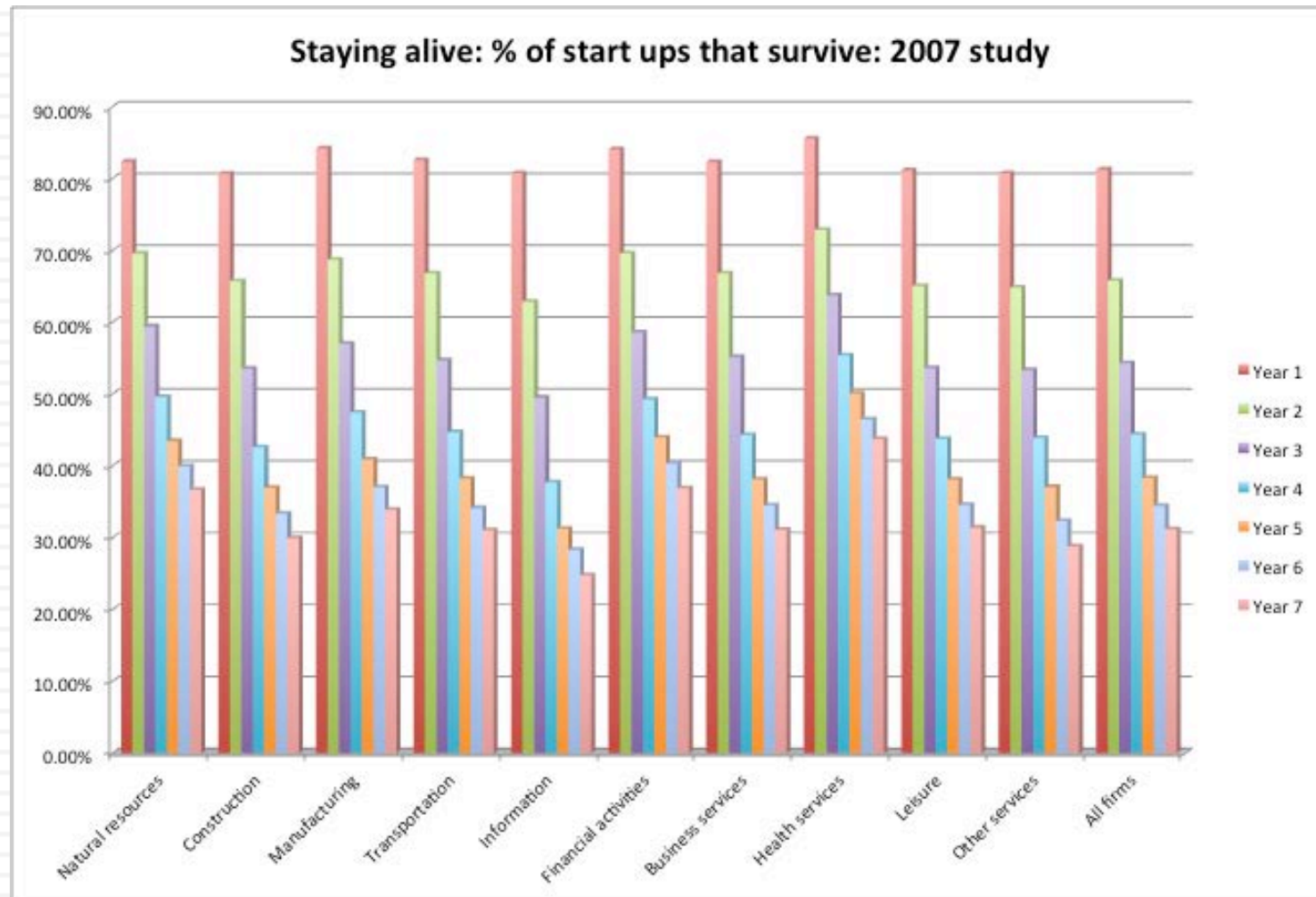
■ D/E ratio for Tata Motors = 33.87%

■ Marginal tax rate in India = 33.99%

■ Levered beta = $0.98 (1 + (1 - 0.3399)(0.3387)) = 1.20$

7. Don't let the discount rate become the receptacle for all your uncertainty...

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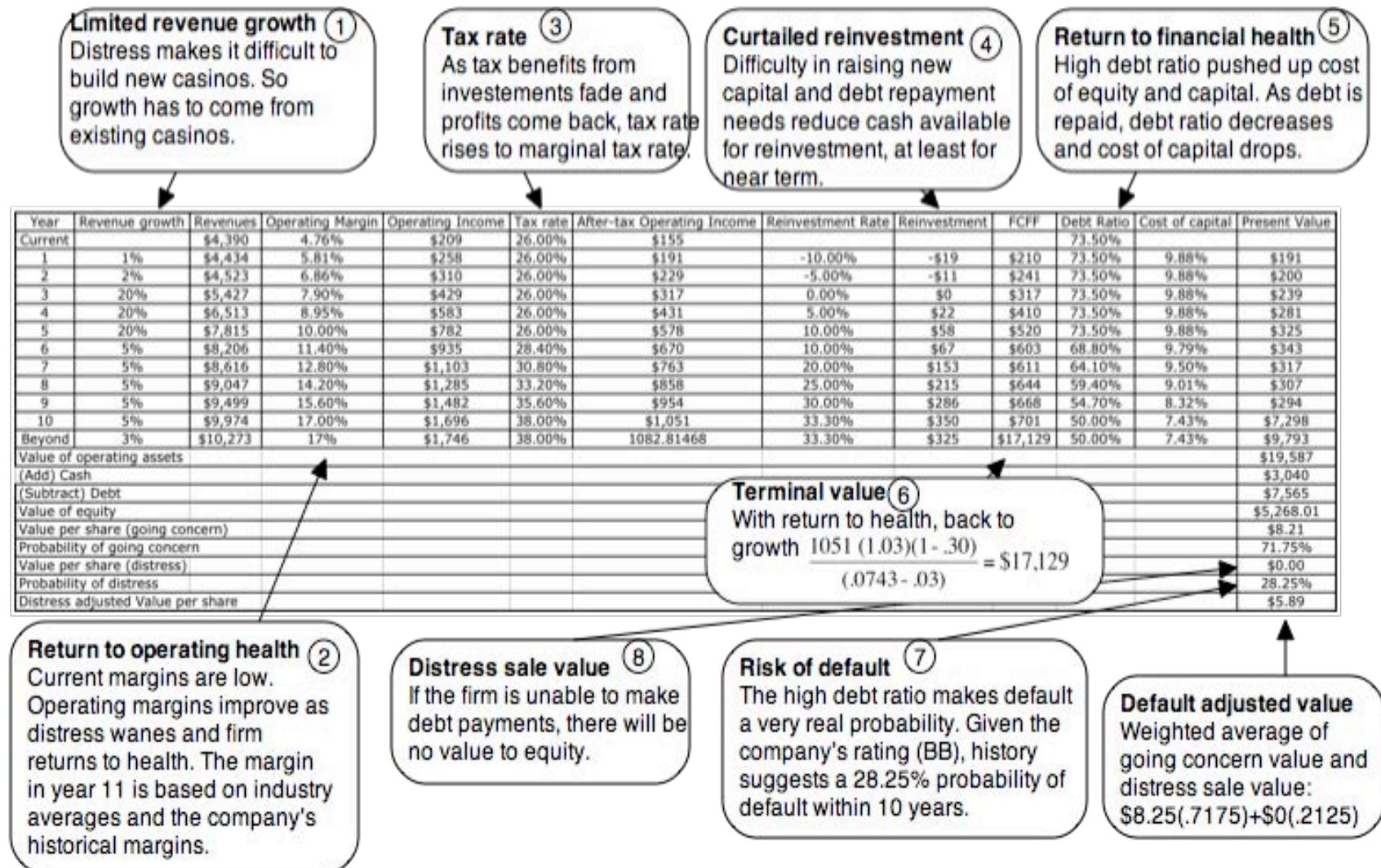
Contrasting ways of dealing with survival risk...

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- The Venture Capital approach: In the venture capital approach, you hike the “discount rate” well above what would be appropriate for a going concern and then use this “target” rate to discount your “exit value” (which is estimated using a multiple and forward earnings).
 - ▣ $\text{Value} = (\text{Forward Earnings in year } n * \text{Exit multiple}) / (1 + \text{target rate})^n$
- The decision tree approach:
 - ▣ Value the business as a “going concern”, with a rate of return appropriate for a “going concern”.
 - ▣ Estimate the probability of survival (and failure) and the value of the business in the event of failure.
 - ▣ $\text{Value} = \text{Going concern value} (\text{Probability of survival}) + \text{Liquidation value} (\text{Probability of failure})$

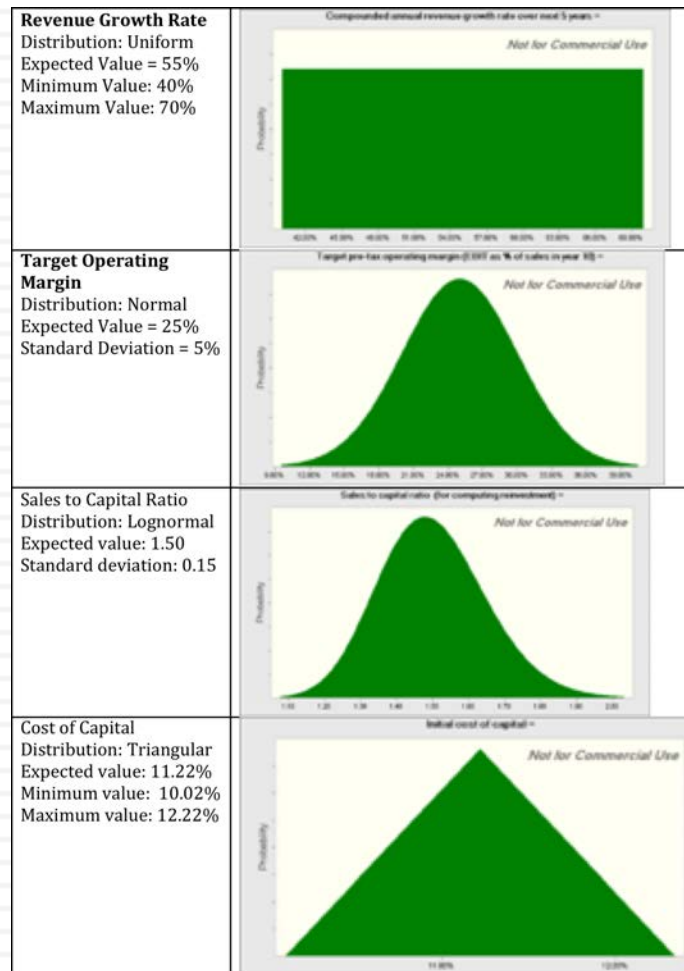
Exhibit 8.2: Valuing a Distressed firm: Las Vegas Sands in early 2009

Las Vegas Sands owns and operates the Venetian Casino and Sands Convention Center in Las Vegas and the Sands Macau Casino in Macau, China. While the revenues increased from \$1.75 billion in 2005 to \$4.39 billion in 2008 and it had two other casinos in development - it ran into significant financial trouble in the last quarter of 2008. Fears about whether the firm would be able to meet its debt obligations pushed down both stock prices (almost 90%) and bond prices (about 40%) in 2008.



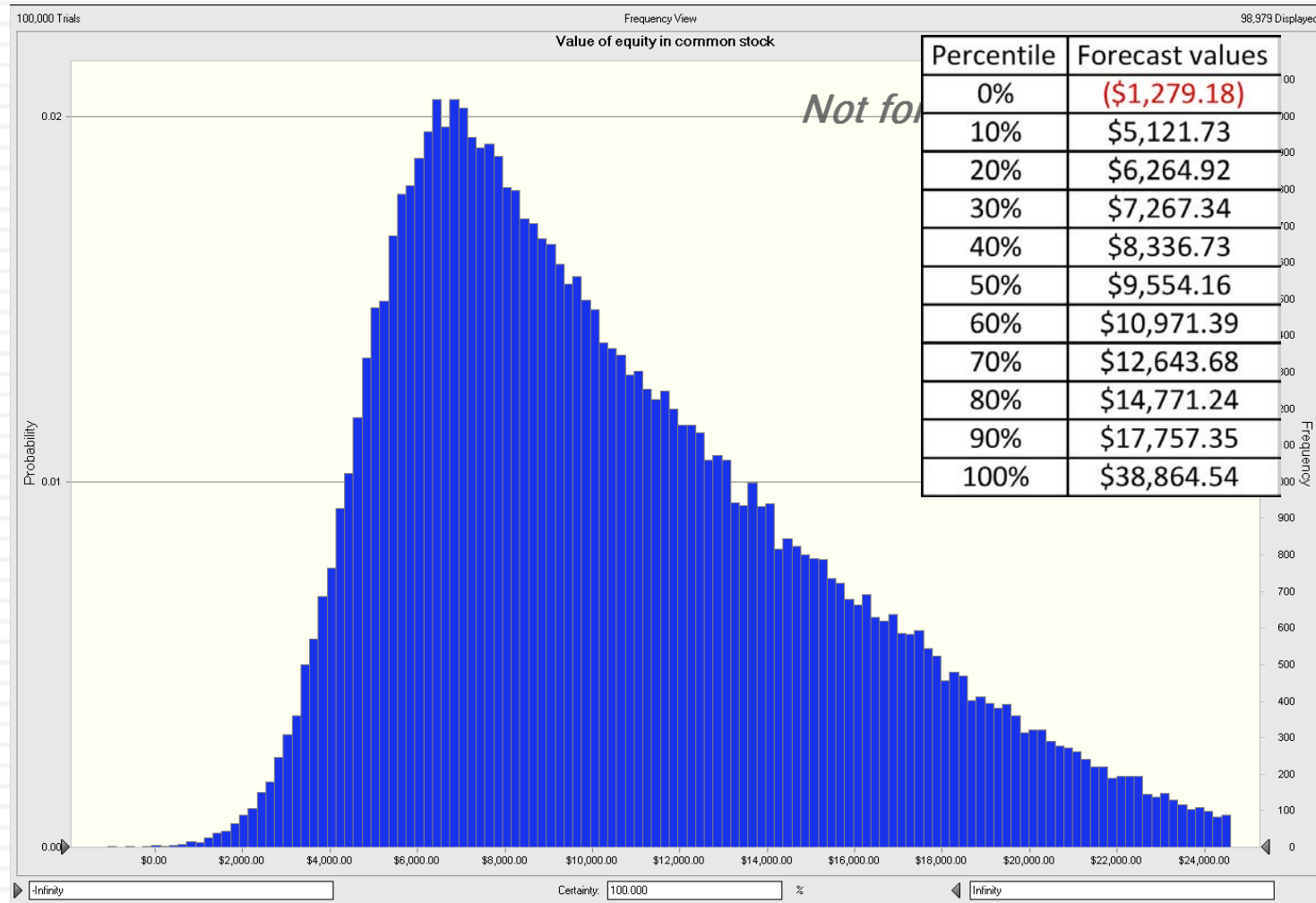
8. Confront uncertainty, if you can...

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With the consequences for equity value...

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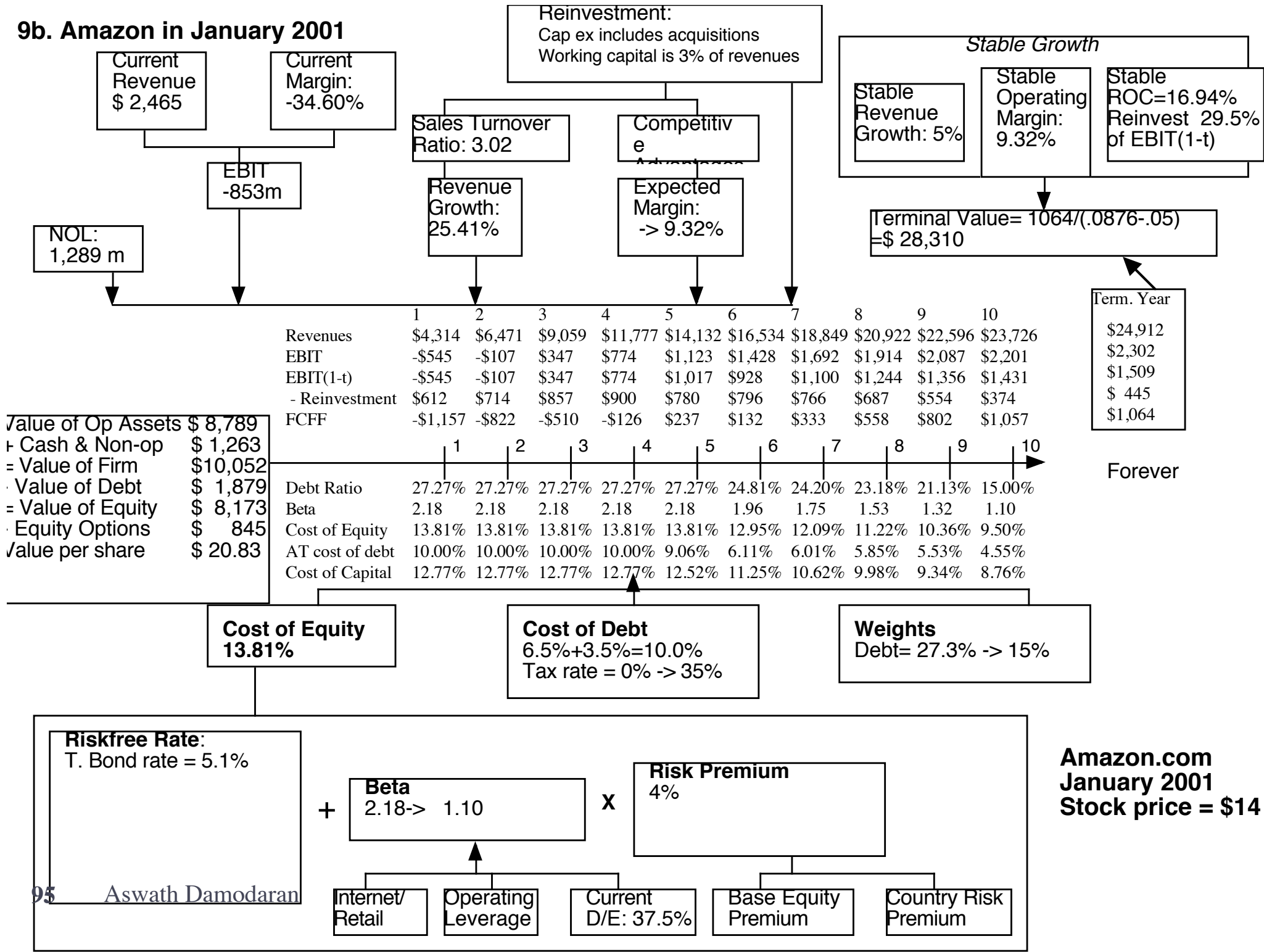


9. Don't look for precision..

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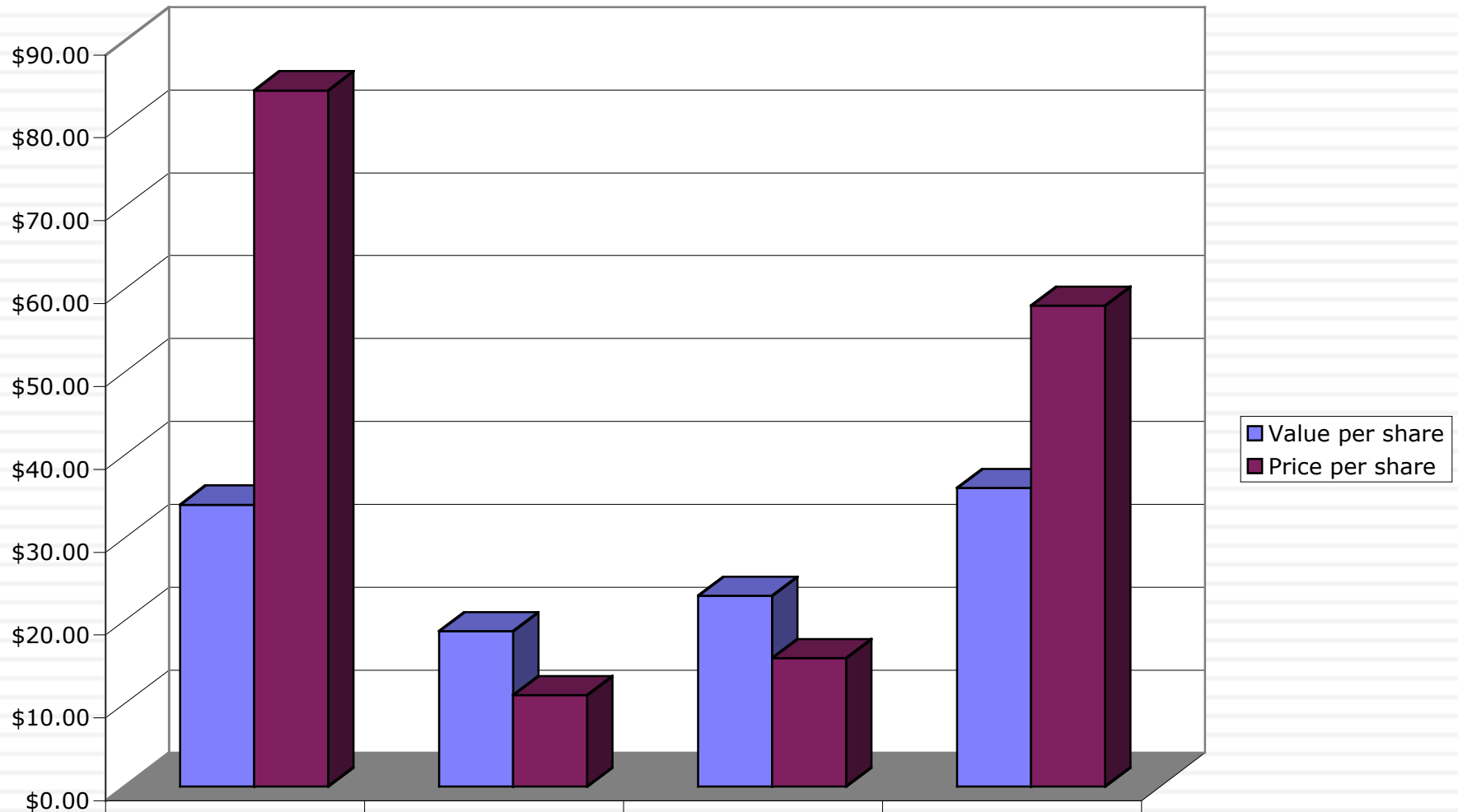
- No matter how careful you are in getting your inputs and how well structured your model is, your estimate of value will change both as new information comes out about the company, the business and the economy.
- As information comes out, you will have to adjust and adapt your model to reflect the information. Rather than be defensive about the resulting changes in value, recognize that this is the essence of risk.

9b. Amazon in January 2001



To illustrate: Your mistakes versus market mistakes..

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10. You can make mistakes, but try to keep bias out..

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- When you are wrong on individual company valuations, as you inevitably will be, recognize that while those mistakes may cause the value to be very different from the price for an individual company, the mistakes should average out across companies.
 - Put differently, if you are an investor, you have can make the “law of large numbers” work for you by diversifying across companies, with the degree of diversification increasing as uncertainty increases.
- If you are “biased” on individual company valuations, your mistakes will not average out, no matter how diversified you get.
- Bottom line: You are better off making large mistakes and being unbiased than making smaller mistakes, with bias.