IN SEARCH OF BUBBLES: A FOOL'S ERRAND OR PRUDENT PROTECTION?

May 2015

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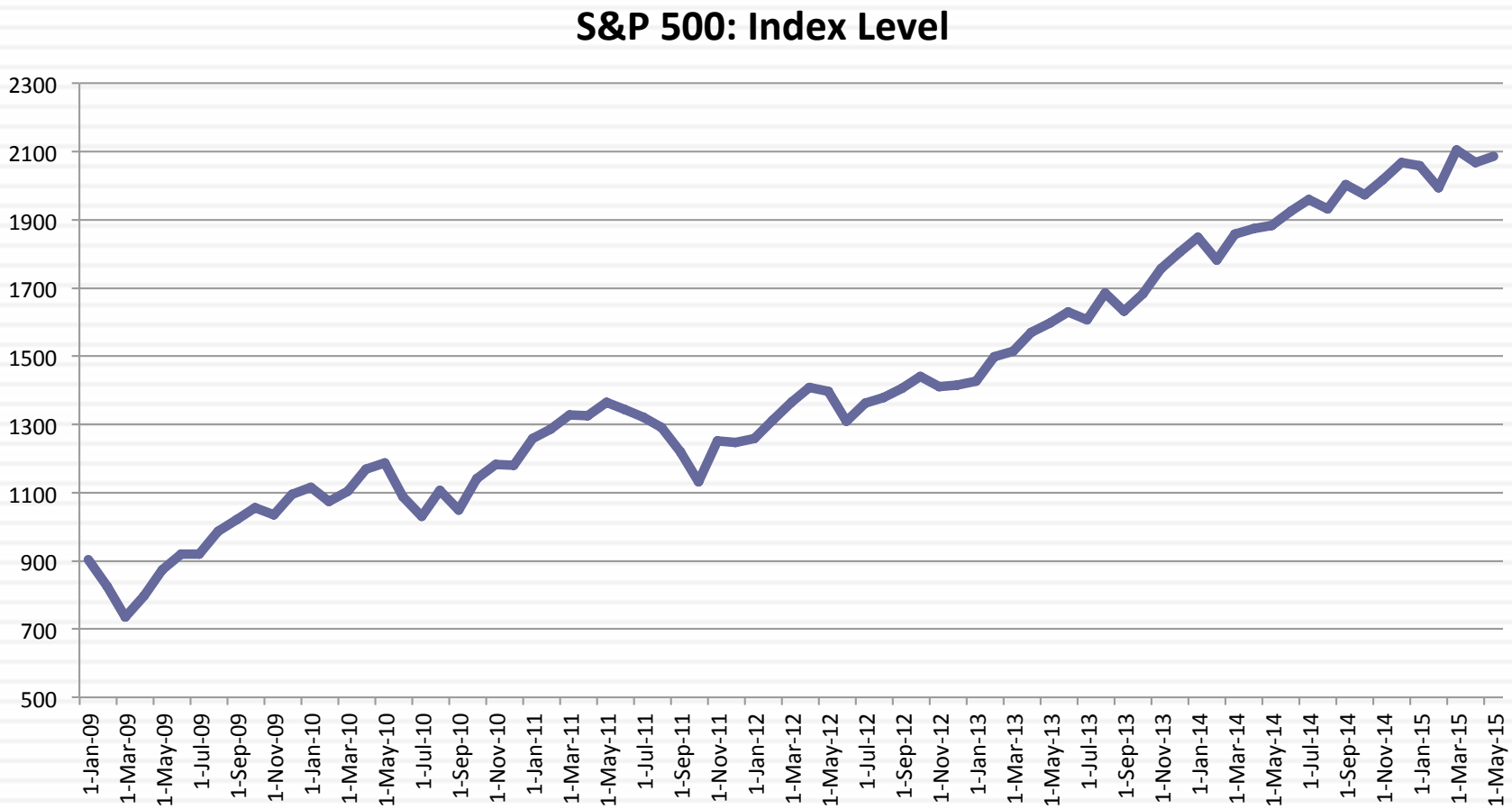
Bubble, bubble, toil & trouble

- It is tempting to attribute anything that we cannot understand in markets to irrationality or craziness on the part of others. It is both lazy and dangerous to jump too quickly onto the bubble bandwagon.
- When we describe the market or a segment of it as being in a bubble, we then give ourselves a pass at having to struggle with explaining how assets are being priced in that segment. After all, who can explain craziness?
- By not trying to understand how investors are pricing assets (no matter how high that price is), we also then lose the opportunity to take advantage of mispricing, if it occurs on the part of the market, or misvaluation, if it occurs in our assessments of value.

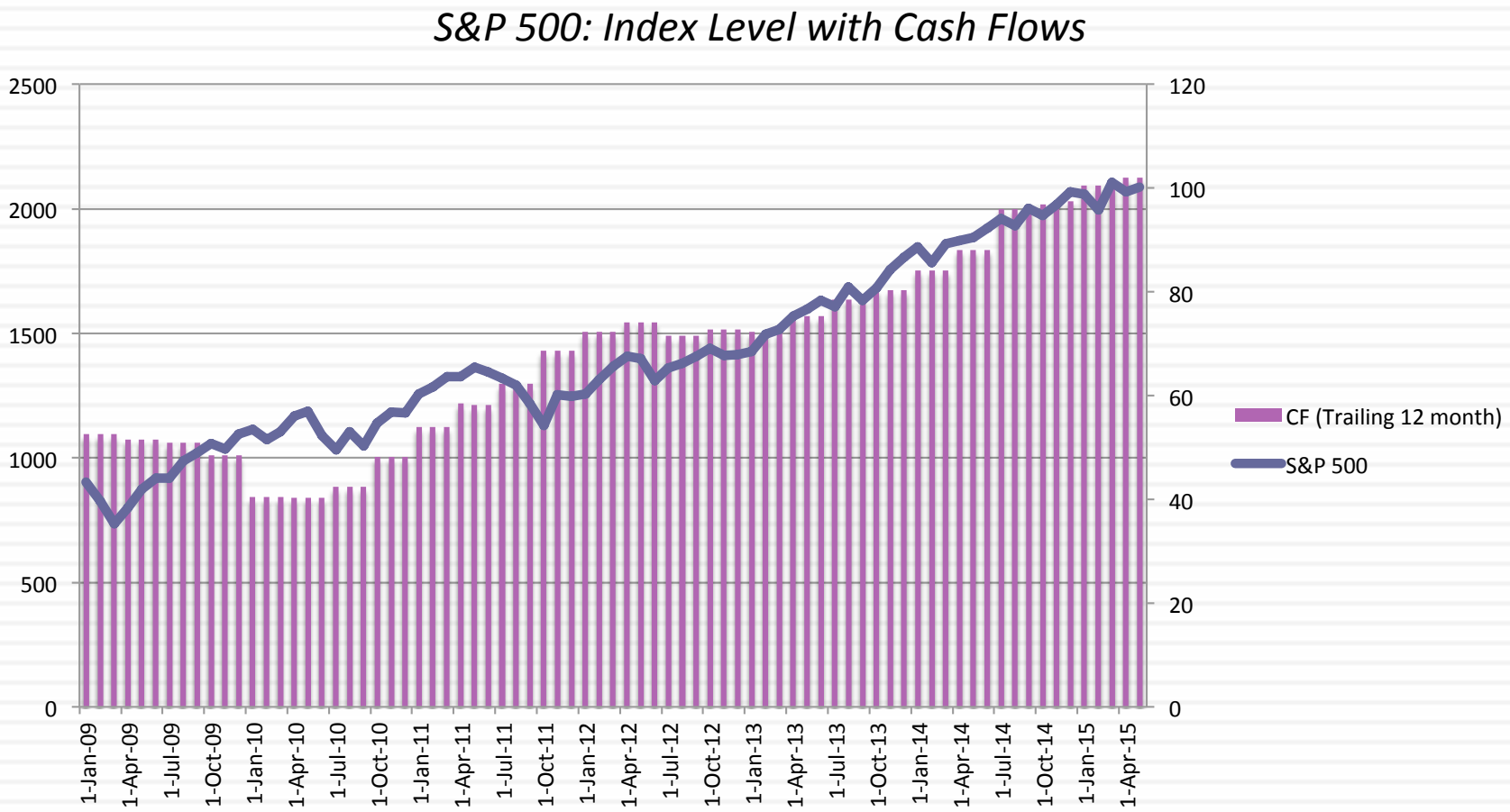
There is a bubble machine.. With lots of people in it..

1. Doomsday bubblers, who constantly warn us (often for decades) that we are in bubble territory.
2. Kneejerk bubblers come out of the woodwork after extended up movements in the stock market.
3. Freudian bubblers use psychological and behavioral clues to detect bubbles.
4. Conspiratorial bubblers believe that there are secretive groups (Illuminati, the Fed, banks, hedge funds) that create bubbles to make money off them.
5. Righteous bubblers argue that if investors are having too much fun, there has to be a punishment awaiting them in the form of a crash.
6. Rational bubblers use market metrics that are intuitive and widely used (PE ratios, for instance) to make a case for bubbles.

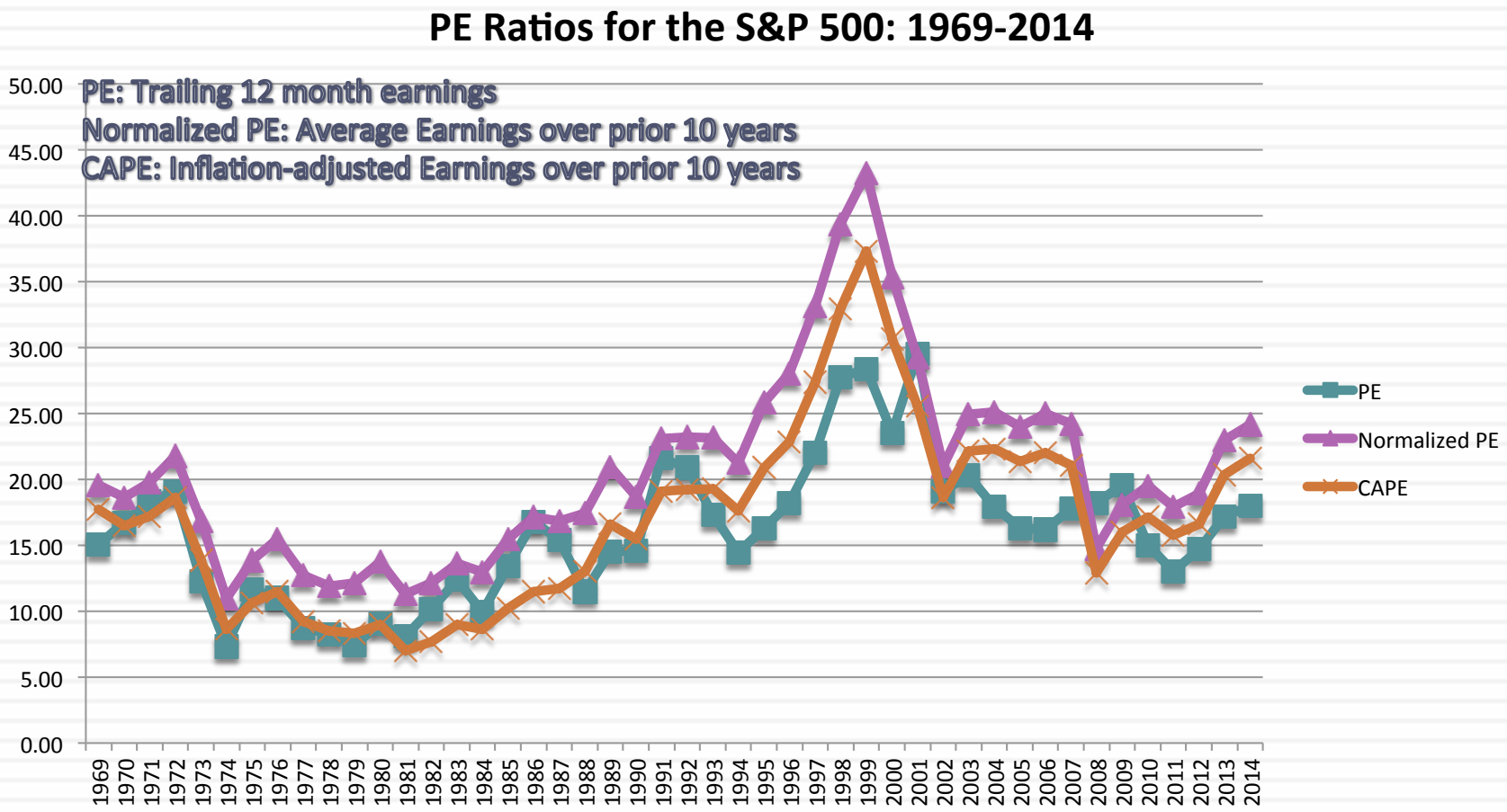
Rising Prices = Bubble?



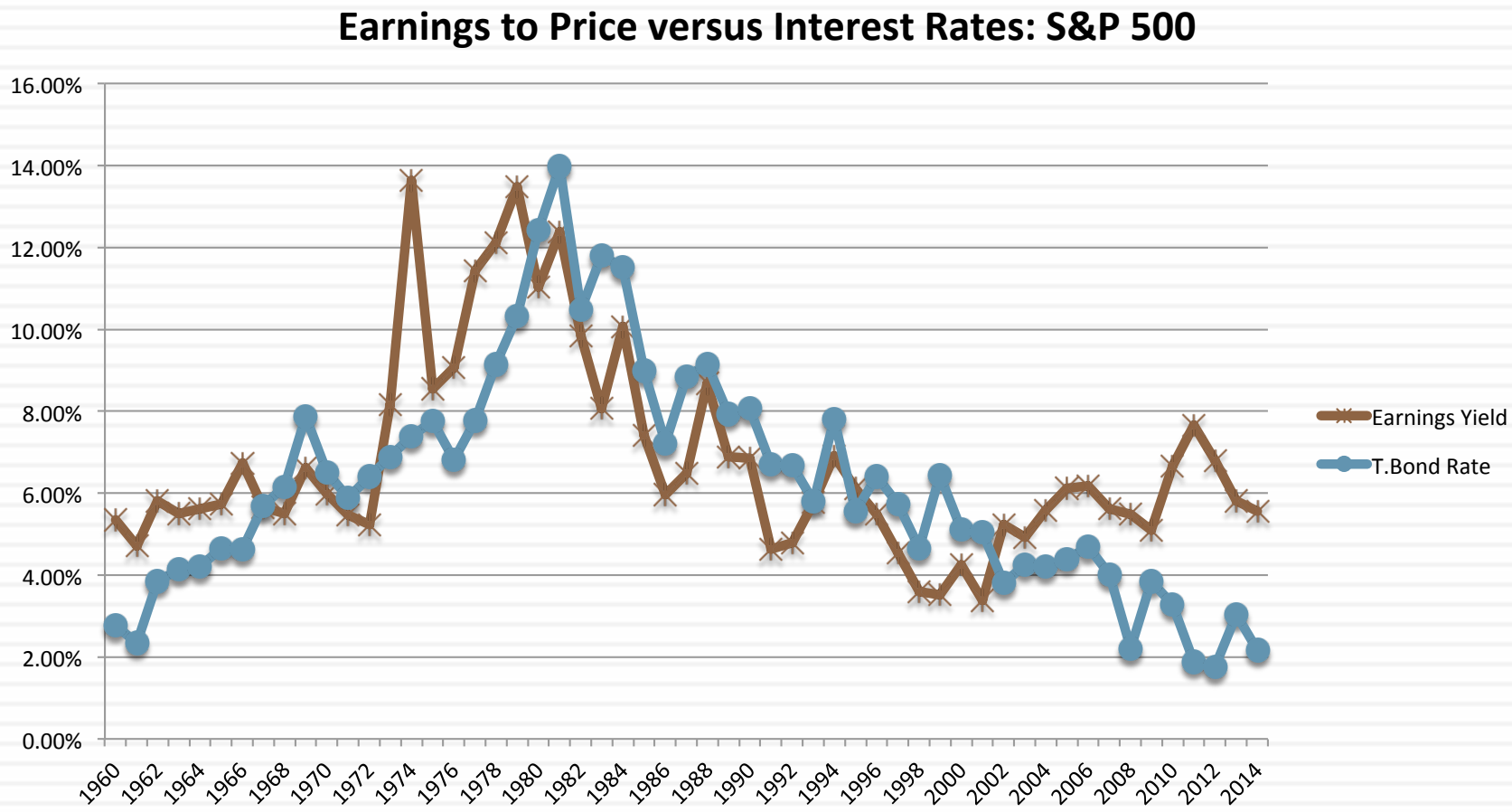
The S&P 500: Price and Cash Flow



Rising PE ratios = Bubble?

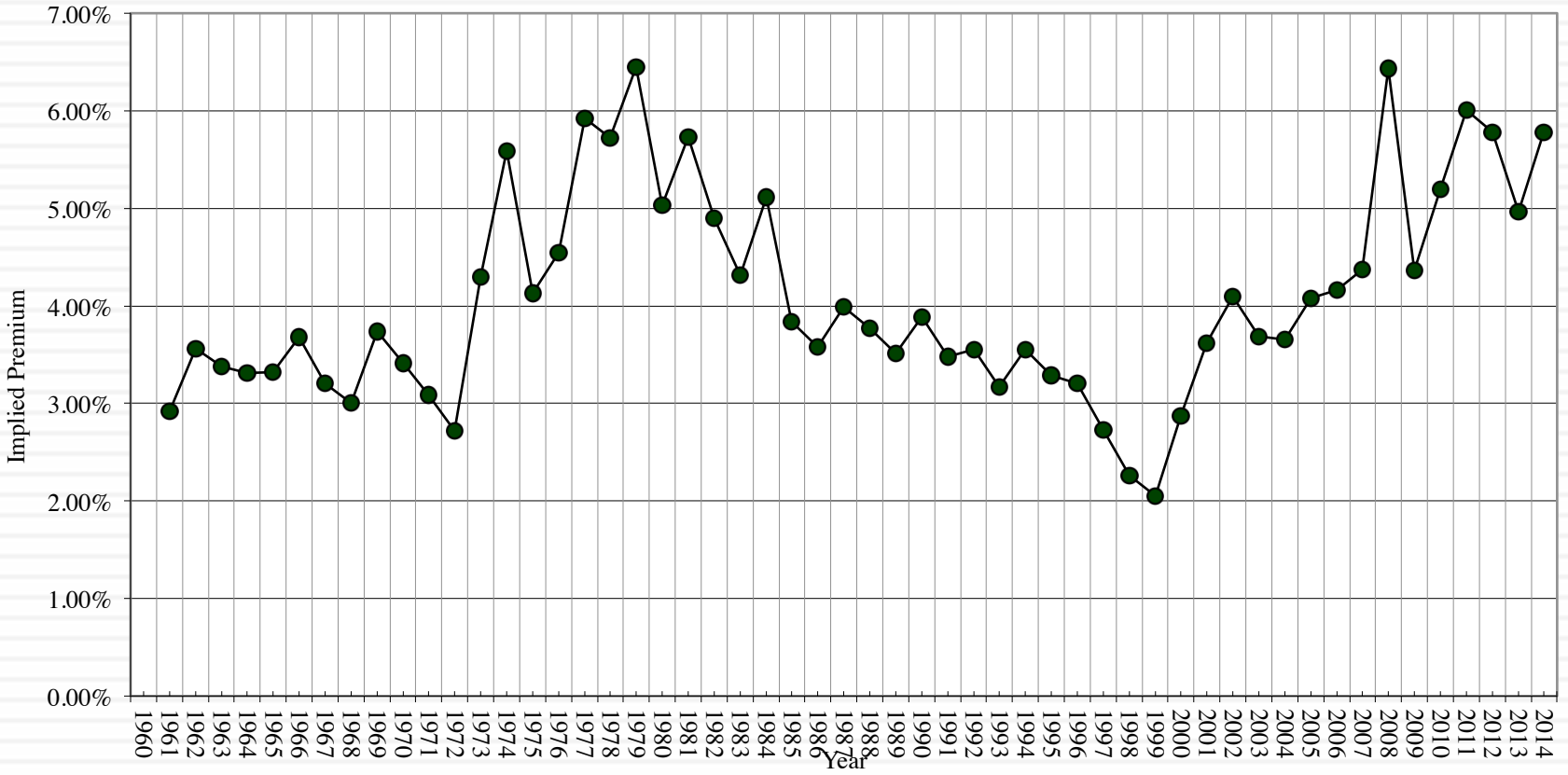


EP Ratios and Interest Rates

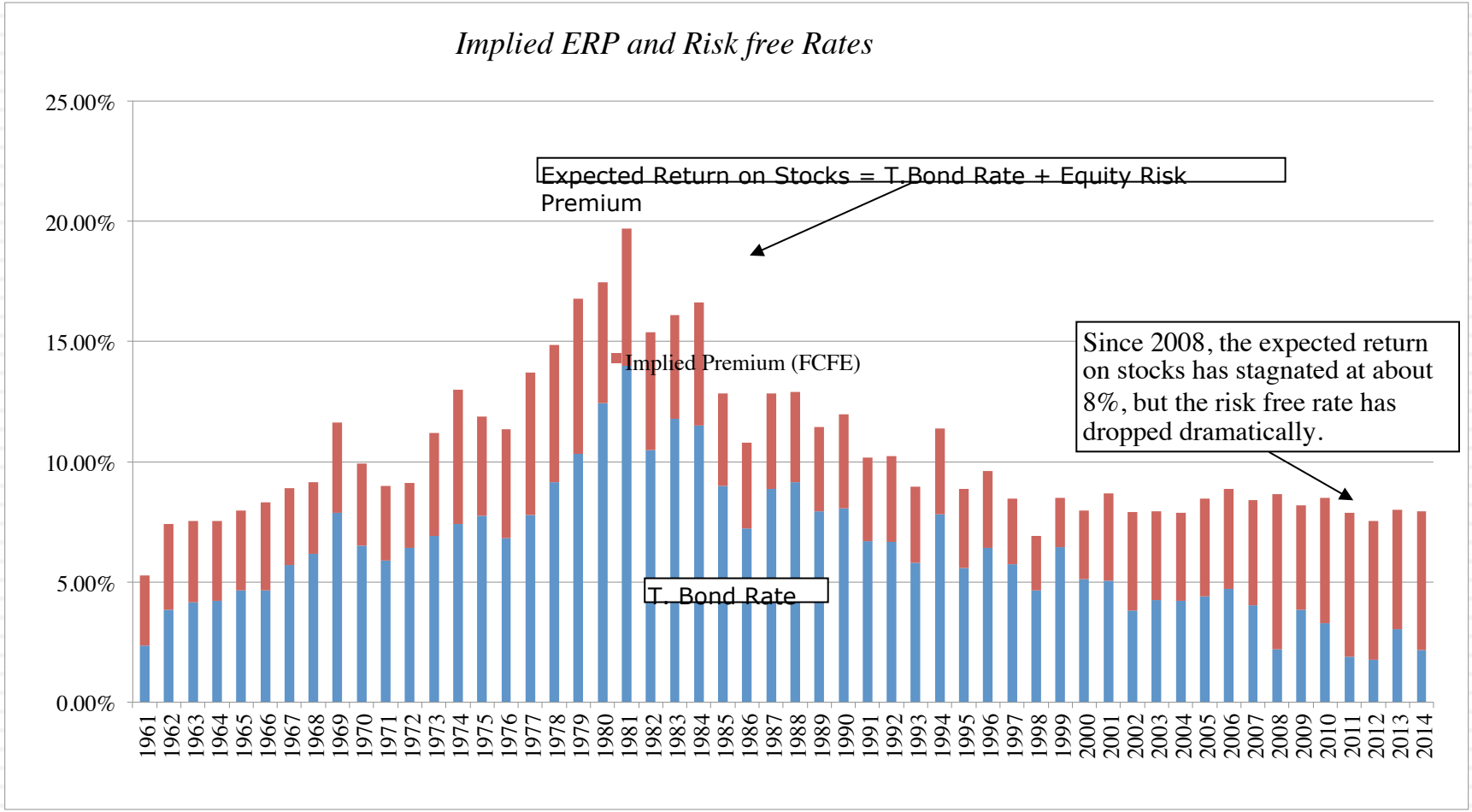


A Composite Measure of Equity Prices: The ERP

Implied Premium for US Equity Market: 1960-2014



If there is a bubble, which market is it in?



SETTING THE TABLE: PRICE VERSUS VALUE

Price versus Value: The Set up

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

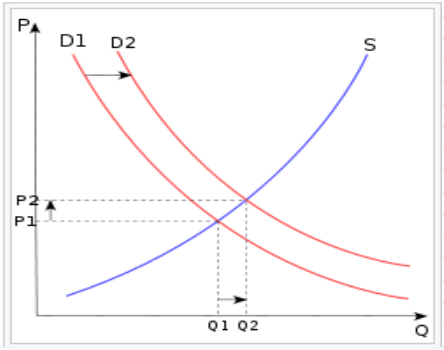
INTRINSIC VALUE

Value

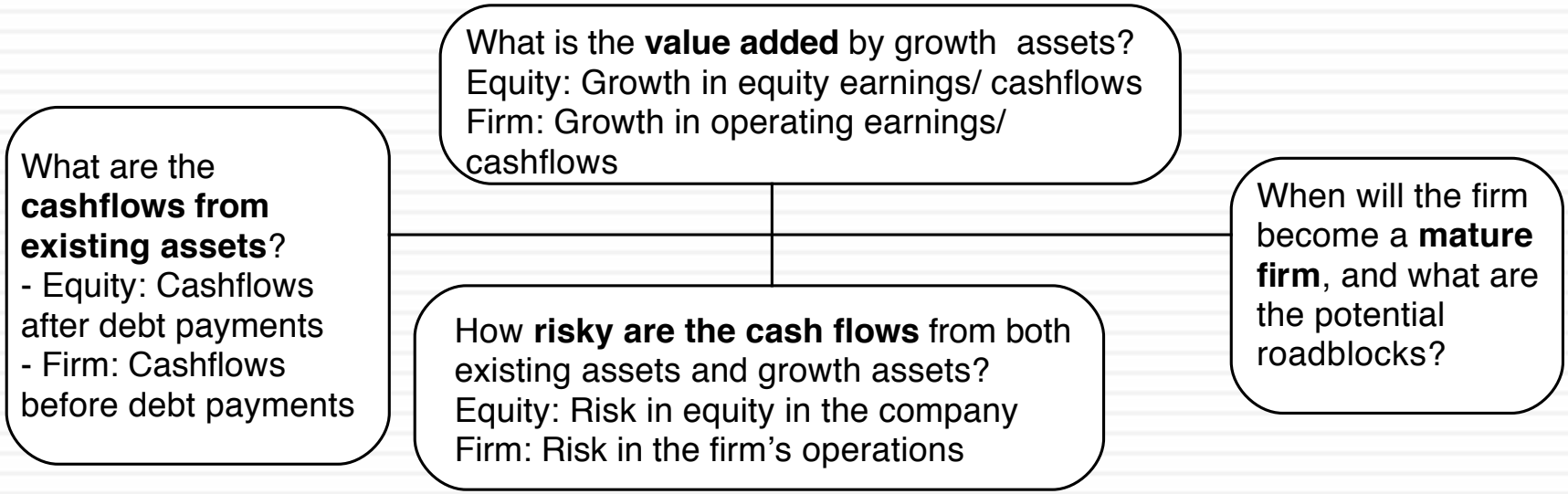
THE GAP
Is there one?
If so, will it close?
If it will close, what will cause it to close?

Price

PRICE



Value: The Determinants



Value: The Tools (DCF)

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.

Value Changes: The Framework

Company-specific	1. Company: The most obvious source of information is the company itself, with earnings reports being the most frequently used vehicle for delivery of that information. 2. Outsiders: Some company-specific information is unearthed by investors and analysts in the course of doing research on the company, without accessing either company insiders or proprietary corporate data.
Sector-wide	1. Other companies in the sector: Earnings and investment announcements by other companies in the sector can be used to reassess investor expectations of market potential and profitability. 2. Sector research: There are sector experts and consultants whose job it is to collect information about the overall sector and analyze it, with the intent of assessing sector trends and prospects.
Macro economic	1. Government: The biggest source of macroeconomic data (interest rates, inflation, economic growth) is the government through its many institutions. 2. Private entities: There are private entities that also generate macroeconomic data that markets react to. In the US, for instance ADP (a publicly traded company) produces a monthly national employment report and the Conference Board reports a composite index of leading economic indicators.

Pricing: Determinants

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

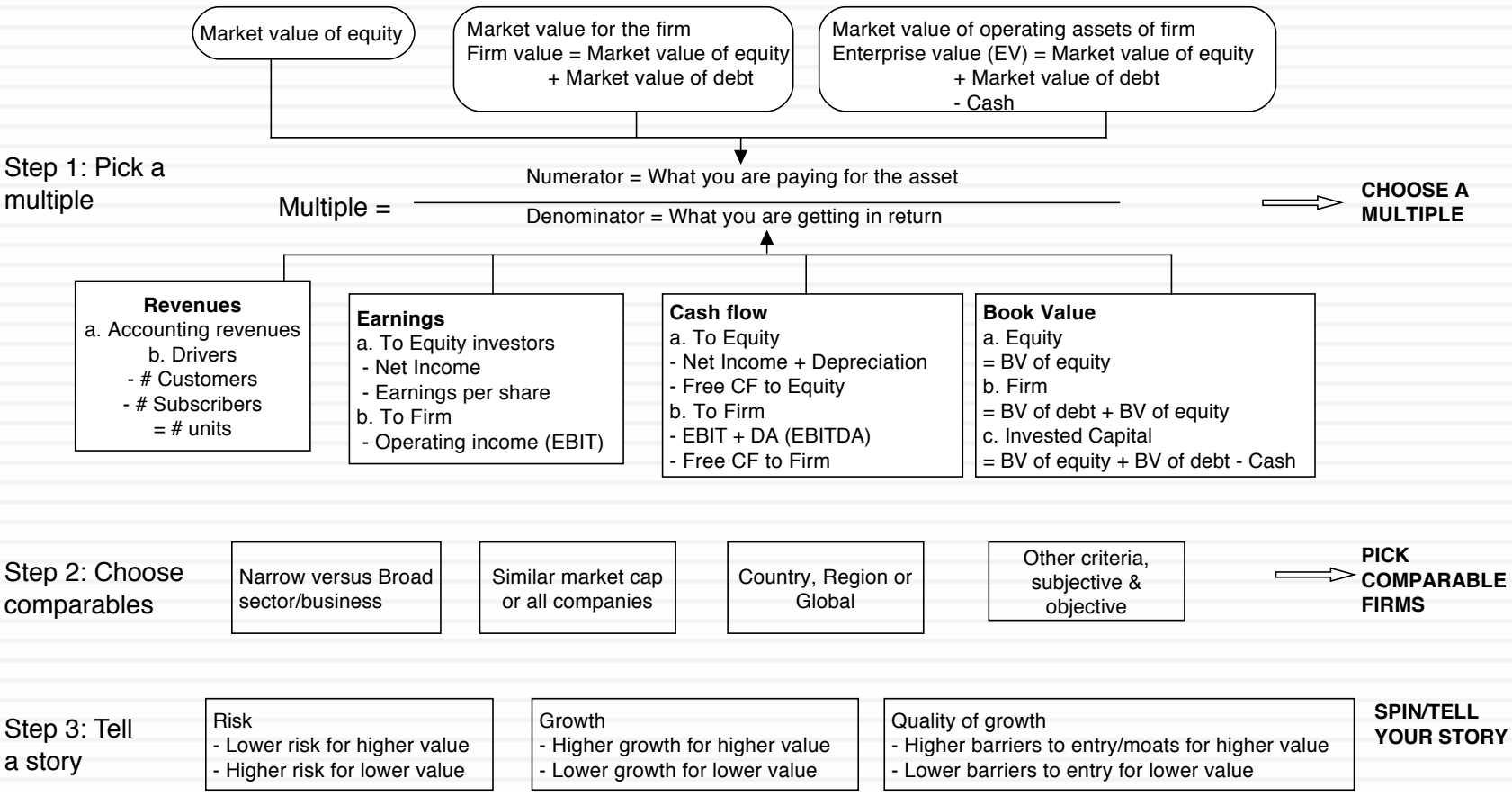
Incremental information
Since you make money on price changes, not price levels, the focus is on incremental information (news stories, rumors, gossip) and how it measures up, relative to expectations

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

Pricing: The tools

- If your job is pricing or you are a trader, your success or failure will rest in large part on gauging mood/ momentum, adjusting for illiquidity and looking at incremental information.
- The tools you bring in to make these assessments are therefore different from the ones you bring into the valuation game. They can include:
  - Charts and technical indicators
  - Preferential access (legal or illegal) to incremental information
  - Liquidity games (short squeezes)
  - Pricing metrics (multiples/comparables)

The Pricing Choices



A Market in Equilibrium

What would happen if everyone in the market was an investor and there were no traders?

If price moves above value, investors sell short on over priced assets and push prices down towards the value

Traders look for and trade on incremental information, thus ensuring is reflected in prices quickly.

Value

Price

If price moves below value, investors step in and buy under valued companies and push the price towards the value

Traders provide liquidity for investors and reduce transactions costs.

What would happen if everyone in the market was a trader and there were no investors?

TWITTER: PRICE VERSUS VALUE IN NOVEMBER 2013

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

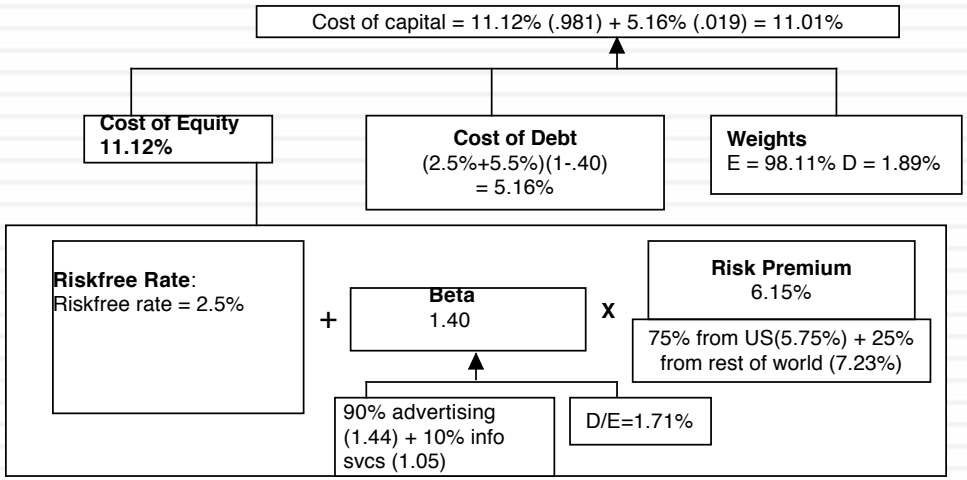
	Sales/ Invested Capital
Twitter (2013)	1.10
Advertising Companies	1.40
Social Media Companies	1.05

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

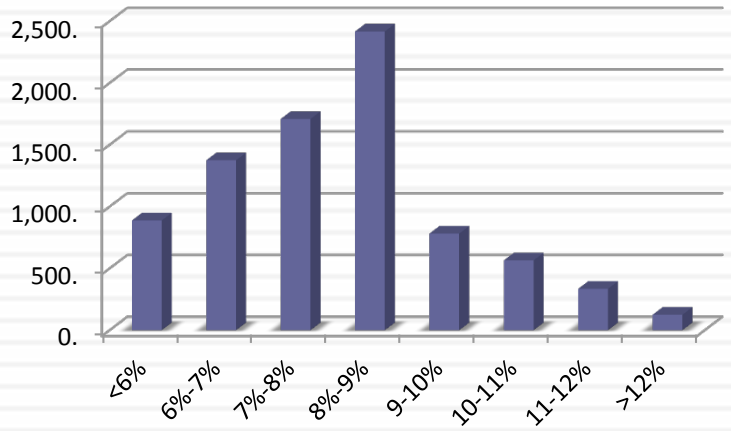
Sweating the small stuff: Risk and Required Return

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

Starting numbers

Twitter Valuation after first earnings report: February 8, 2014

	2013	2012
Revenues	$664.9	$316.9
Operating Income	-$635.8	-$77.1
Adjusted Operating Income	-$147.0	-$7.7
Invested Capital	$1,816.0	
Adjusted Operating Margin	-$0.2	
Sales/Invested Capital	$0.8	

Revenue growth of 50% a year for 5 years, tapering down to 2.75% 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 = 2.75%;
Cost of capital = 8%
ROC= **12**%;
Reinvestment Rate=2.75%/12% =22.92%

Terminal Value$_{10}$= 1666/(.08-.025) = $31,741

	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Revenues	$ 997	$1,496	$2,244	$3,366	$ 5,049	$7,096	$9,303	$11,318	$12,698	$13,048
Operating Income	$(174)	$ (190)	$ (179)	$ (110)	$ 73	$ 437	$1,011	$ 1,763	$ 2,576	$ 3,262
Operating Income after-tax	$(174)	$ (190)	$ (179)	$ (110)	$ 73	$ 437	$1,011	$ 1,234	$ 1,690	$ 2,104
Reinvestment	$ 222	$ 332	$ 499	$ 748	$ 1,122	$1,365	$1,471	$ 1,343	$ 921	$ 233
FCFF	$(395)	$ (522)	$ (678)	$ (858)	$(1,049)	$ (928)	$ (460)	$ (109)	$ 770	$ 1,871

Terminal year (11)

EBIT (1-t)	$ 2,162
- Reinvestment	$ 495
FCFF	$ 1,666

Operating assets	$11,767
+ Cash	2,234
- Debt	397
Value of equity	13,604
- Options	2,183
Value in stock	11,421
/ # of shares	582.46
Value/share	$**19.61**

Cost of capital = 8.72% (.987) + 3.87% (.013) = 8.66%

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

Cost of Equity
8.72%

Cost of Debt
(2.5%+3.5%)(1-.355)
= 3.87%

Weights
E = 98.7% D = 1.3%

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.12

x

Risk Premium
5.35%

75% from US(5.00%) + 25% from rest of world (6.93%)

92% advertising (1.13) + 8% info svcs (1.02)

D/E=1.29%

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

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

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

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%)

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.

Use the "market metric" and "market price"

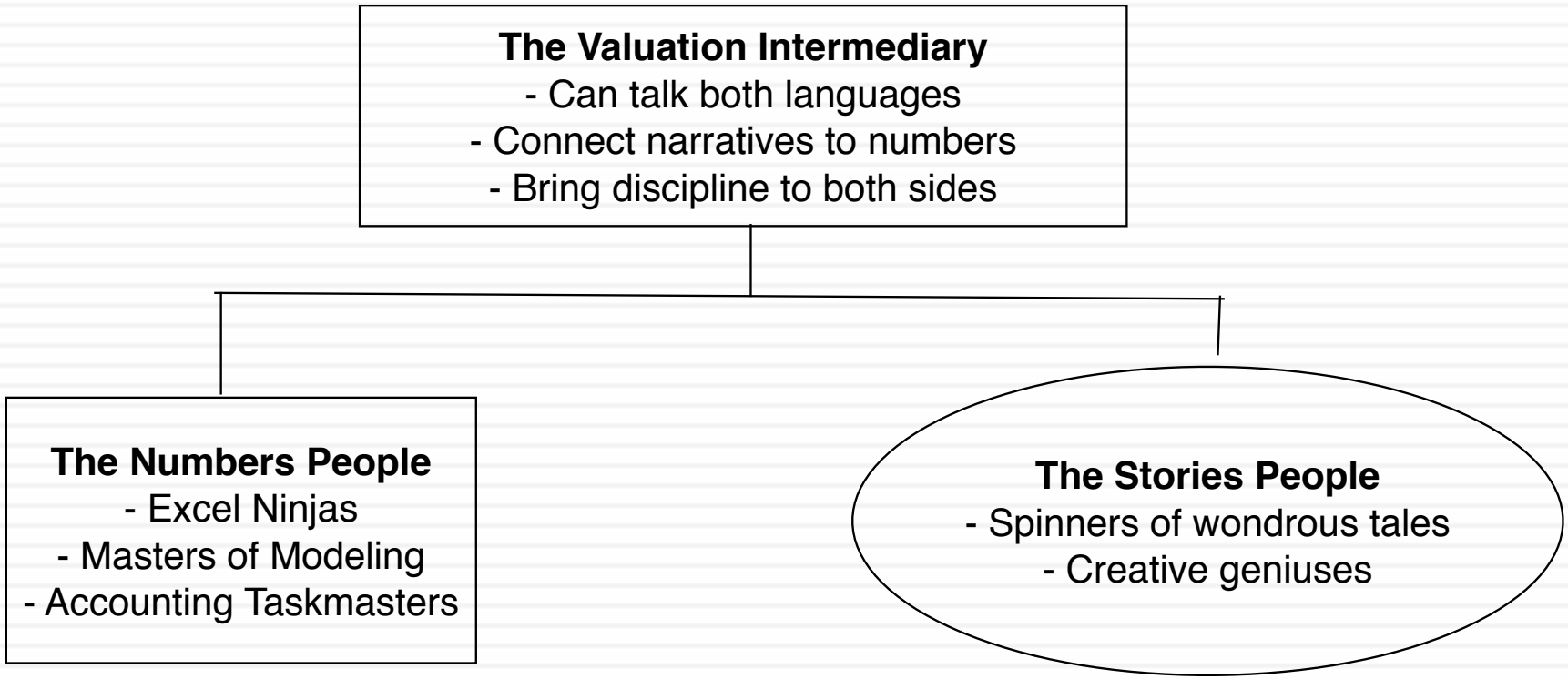
- The most important variable, in late 2013, in determining market value and price in this sector (social media, ill defined as that is) is the number of users that a company has.
- Looking at comparable firms, it looks like the market is paying about $100/user in valuing social media companies, with 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

THE MAKING OF A BUBBLE: THE PRICE VALUE GAP

The Gap

- In an efficient market, where investors and traders are in balance, there should no systematic gap between price and value. On average, every asset will be correctly priced.
- If the balance between investors and traders is altered, the game can go off sync and the price can wander away from the value by large amounts and for extended periods.

The Narrative versus Numbers Set up



All numbers, all the time..

- The illusion of precision: If you use numbers, you are being more precise than when you don't, and the more numbers you use, the more precise you become.
- The illusion of "no bias": Numbers don't lie and data does not have an agenda. Thus, analysts who use numbers are more likely to be unbiased.
- The illusion of control: If you put a number on something (your cash flows, expected growth rate, risk etc.), you can control it better.

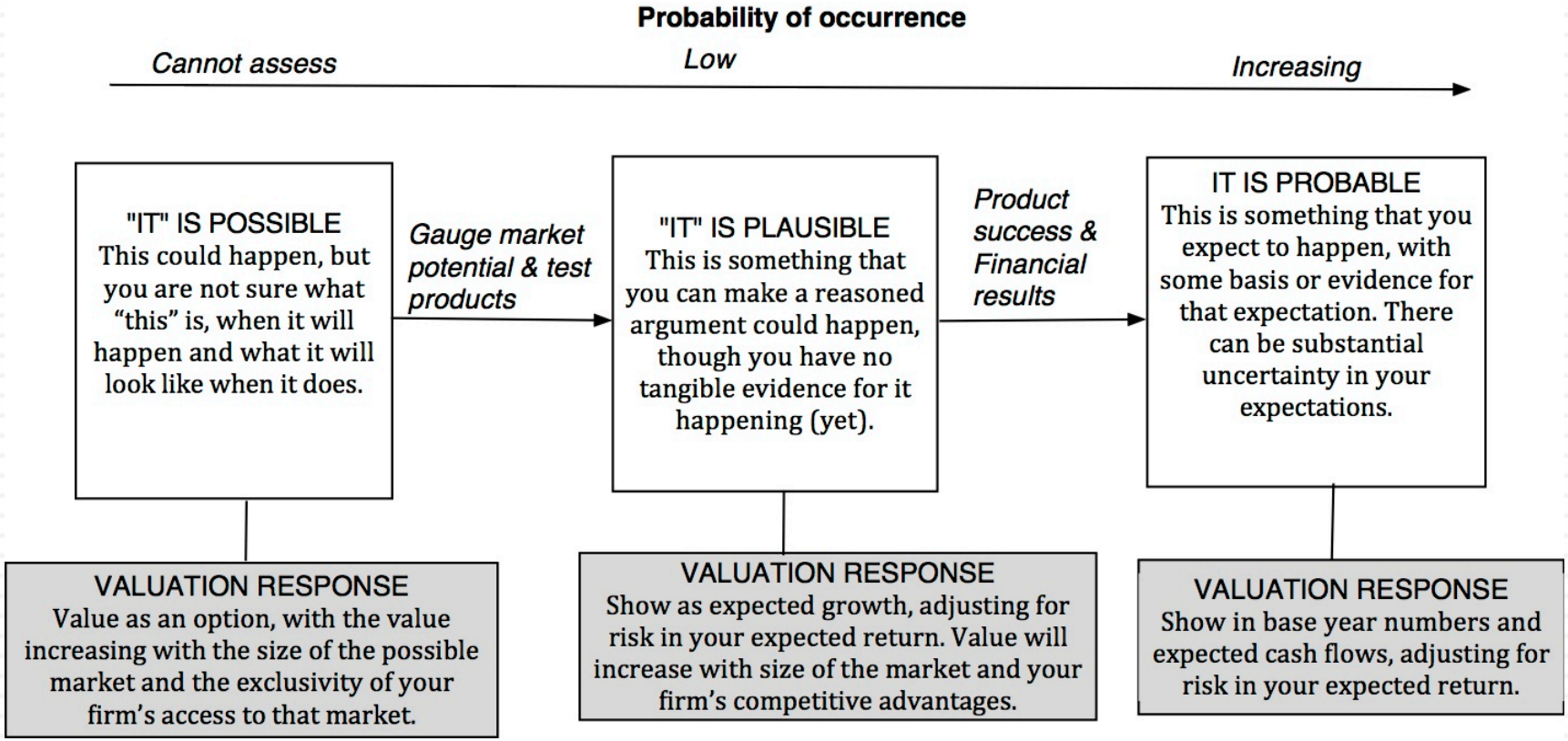
All narrative, all the time..

- Fantasyland & Fairy tales: A narrative-based valuation, which has little, if any, numbers to back it up, can very quickly veer away from reality into fantasy.
- The Echo Chamber: If your circle is filled with people who are also unconstrained story tellers, not only do you feed on each other, but the stories tend to get more and more fantastic.
- No measurement mechanism or feedback look: If you don't use numbers in any meaningful way to sell an investment, you have no way of measuring whether your narrative is holding up and what you might need to do to set it right, if it is not.

1. An Imbalanced Game – Everyone is pricing, no one is valuing..

- The uncertainty chasm: Investors tend to go where it is easiest for them to value assets, where history is a good predictor of the future and where uncertainty is easily measured and brought into value. They tend to steer away from sectors where there is substantial uncertainty about the future.
- Trading restrictions: Markets are structured, for the most part, to make it easier to invest in undervalued assets than overvalued ones. So investors tend to be scarcer in markets where price has wandered much higher than value.
- *Implication 1: Bubbles are more likely in young sectors, where there is little history.*
- *Implication 2: Bubbles are more likely to occur during periods of substantial macroeconomic uncertainty.*
- *Implication 3: Bubbles are more likely on the upside than on the downside, since it is more difficult to invest based upon a upside bubble.*

2. The Fairy Tale Effect



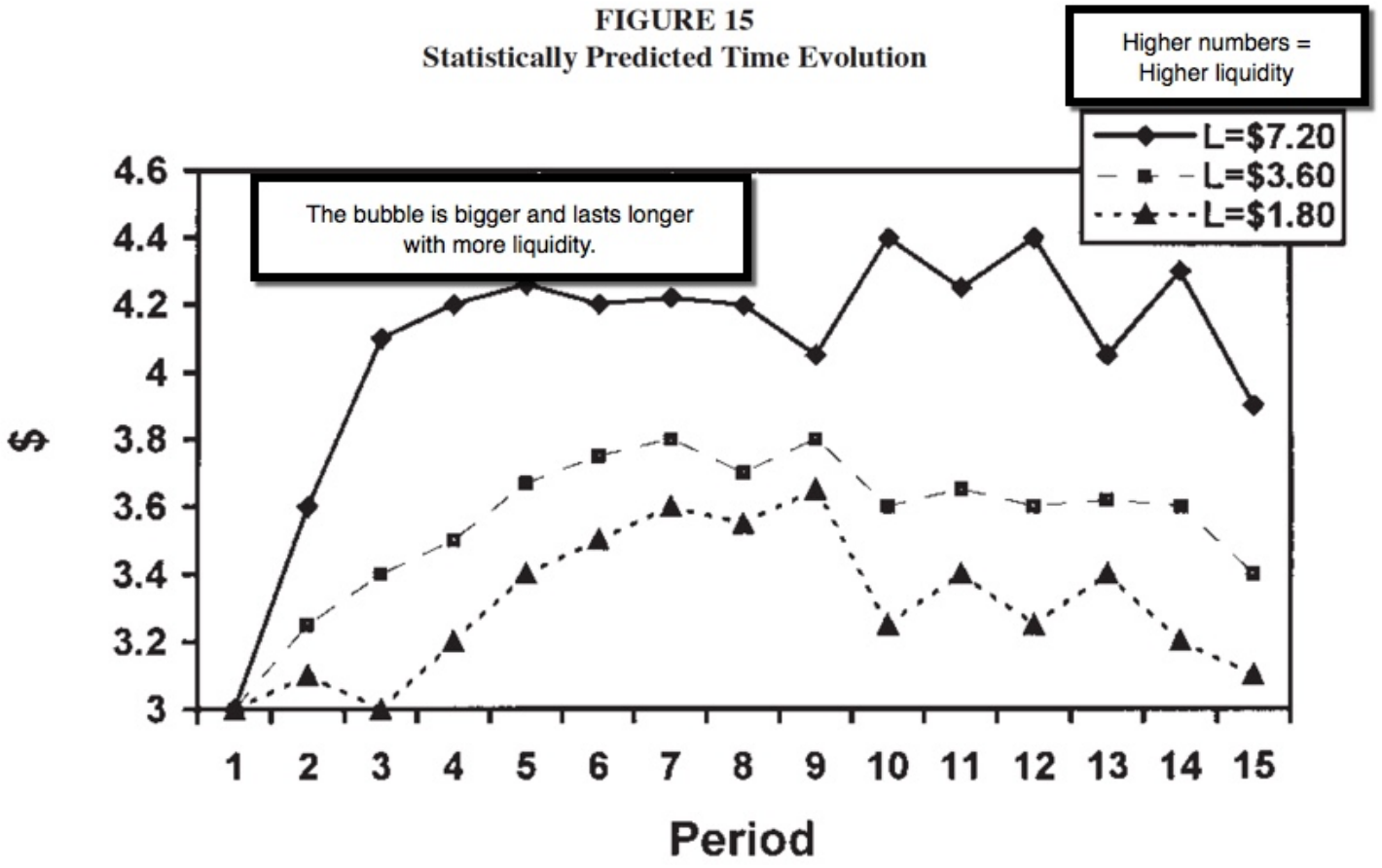
3. Intermediate Pricing Metrics

- A common feature of bubbles is that prices are based upon non-fundamental measures (users, app downloads) that are assumed to be correlated with fundamentals, with no real proof of the correlation.
- Companies then tailor their business to deliver on these non-fundamental measures, even if that costs them long term earnings, cash flows and value.
- Since prices are self-referencing (based on what others are paying), you can climb the pricing ladder, with high prices for an asset being justified by others paying higher prices for earlier transactions.

4. The Macro Delusion

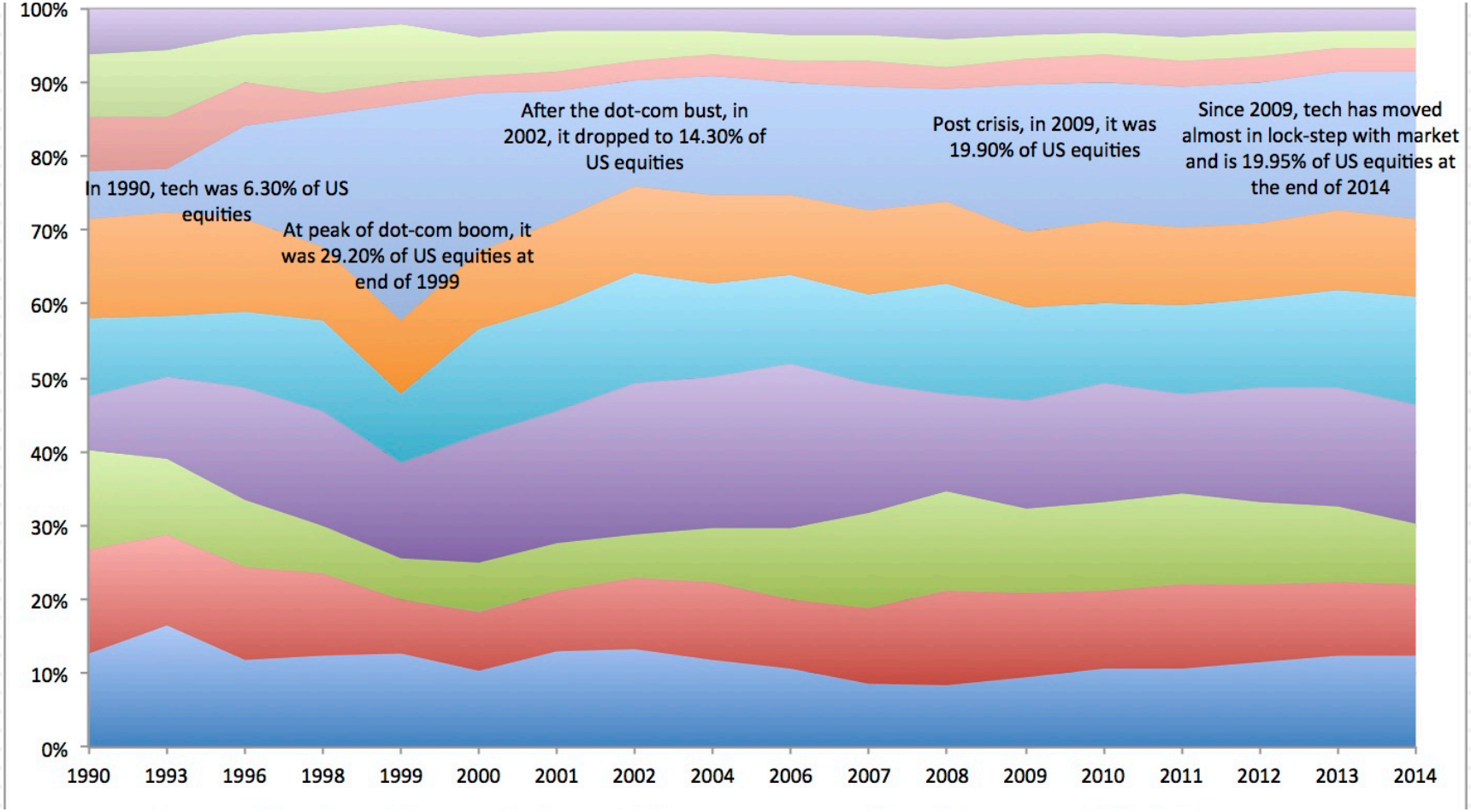
Company	*Market Capitalization*	*Enterprise Value*	*Current Revenues*	*Breakeven Revenues (2023)*	*% from Online Ads (2012)*	*Imputed Online Ad Revenue (2023)*	*Cost of capital*	*Target margin*
Google	$291,586.00	$240,579.00	$56,594.00	$168,336.00	87.07%	$146,570.16	10%	22.49%
Facebook	$119,769.00	$111,684.00	$6,118.00	$90,959.00	84.08%	$76,478.33	10%	29.99%
Yahoo!	$34,688.00	$29,955.00	$4,823.00	$17,695.00	100%	$17,695.00	10%	25.00%
Linkedin	$27,044.00	$26,171.00	$1,244.00	$32,110.00	80.41%	$25,819.65	10%	25.00%
Twitter (Est)	$12,000.00	$11,000.00	$448.00	$7,846.00	90.00%	$7,061.40	10%	25.00%
Pandora	$4,833.00	$4,774.00	$528.00	$3,085.00	87.84%	$2,709.86	10%	25.00%
Yelp	$4,422.00	$4,325.00	$179.00	$2,825.00	94.31%	$2,664.26	10%	25.00%
Zillow	$3,192.00	$3,060.00	$152.00	$1,984.00	25.83%	$512.47	10%	25.00%
AOL	$2,586.00	$2,208.00	$2,211.00	$10,055.00	64.72%	$6,507.60	10%	9.32%
Retailmenot	$1,718.00	$1,644.00	$169.00	$1,605.00	100%	$1,605.00	10%	25.00%
OpenTable	$1,597.00	$1,505.00	$173.77	$1,361.38	74.22%	$1,010.42	10%	25.00%
US based	**$503,435.00**	**$436,905.00**	**$72,639.77**	**$337,861.38**	**$8.88**	**$288,634.13**		
Baidu	$53,589.00	$49,961.00	$4,182.00	$15,526.00	99.73%	$15,484.08	10%	25.00%
Sohu.com	$3,166.00	$2,540.00	$1,231.00	$1,338.00	36.33%	$486.10	10%	21.45%
Naver	$17,843.00	$17,595.00	$133.00	$11,227.00	62.94%	$7,066.27	10%	25.00%
Yandex	$12,654.00	$11,872.00	$1,065.00	$7,684.00	98%	$7,505.73	10%	25.00%
Global	**$590,687.00**	**$518,873.00**	**$79,250.77**	**$373,636.38**	**$11.85**	**$319,176.31**		

5. Liquidity (and information)



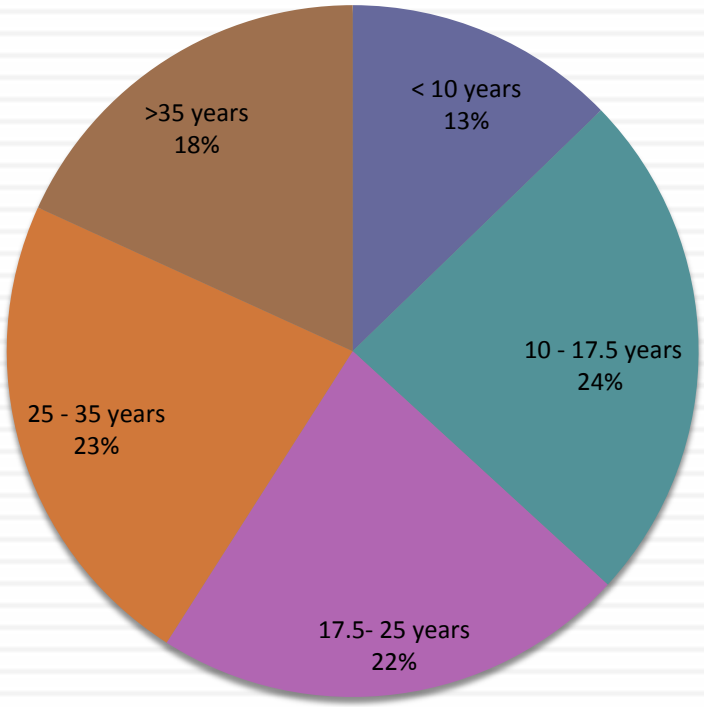
THE "TECH" BUBBLE: IS THERE ONE?

The tech sector is not a side player (any more)



It is aging..

US Technology Companies: By Age (since founding date) in 2015



And the pricing varies across age..

Age of the firm (in years)	Number of firms	EV/Sales	EV/EBITDA	EV/EBITDAR&D	EV/EBIT	EV/Invested Capital	PE	Non-cash PE	PBV
< 10 years	239	4.34	37.61	19.65	107.74	3.13	NA	NA	3.88
10 - 17.5 years	451	6.26	27.37	16.75	33.53	3.80	55.51	56.20	3.59
17.5- 25 years	417	3.26	18.24	10.02	29.06	1.92	29.31	26.74	1.96
25 - 35 years	427	3.34	14.50	9.24	19.46	2.26	24.87	25.31	2.36
>35 years	341	2.44	10.44	8.20	13.21	2.81	17.75	17.24	3.08

Comparing to the rest of the market on Pricing

	PE	Non-cash PE	PBV	EV/Sales	EV/EBITDA	EV/EBITDAR&D
Young tech (<10 years)	NA	NA	3.88	4.34	37.61	19.65
Old tech (> 35 years)	17.75	17.24	3.08	2.44	10.44	8.20
All tech	23.67	23.14	2.97	3.12	13.55	9.87
Young non-tech	115.26	109.95	2.41	3.36	22.53	19.35
Old non-tech	18.57	15.48	2.26	2.42	17.23	15.94
All non-tech	21.80	18.92	2.40	2.40	16.62	15.35

1. On profitability

	% of companies making profits	EBITDA Margin	Operating Margin	Net Margin	ROIC	ROE
Young tech (<10 years)	8.76%	11.55%	4.03%	-3.64%	2.43%	-5.20%
Old tech (> 35 years)	64.06%	23.34%	18.44%	12.95%	16.06%	23.51%
All tech	39.81%	23.02%	17.64%	12.38%	12.02%	16.98%
Young non-tech	29.17%	14.91%	9.84%	2.19%	3.68%	2.81%
Old non-tech	83.54%	14.02%	9.96%	7.40%	4.39%	12.79%
All non-tech	57.65%	14.44%	9.98%	6.69%	4.74%	11.65%

2. On Growth

	Growth Rate in revenues - Last 3 years	*Growth Rate in EBITDA - Last 3 years*	*Growth Rate in Net Income - Last 3 years*	*LT Expected Growth Rate in EPS*
Young tech (<10 years)	33.20%	13.25%	15.73%	25.32%
Old tech (> 35 years)	1.11%	1.16%	1.44%	13.72%
All tech	11.81%	10.46%	8.10%	17.59%
Young non-tech	67.73%	25.72%	34.61%	17.72%
Old non-tech	6.66%	9.82%	14.55%	12.08%
All non-tech	16.21%	13.29%	16.78%	14.06%

3. On Risk

	Standard Deviation in Stock Price	*Debt Ratio (Market)*	*Debt Ratio (Book)*	*Debt/EBITDA*
Young tech (<10 years)	172.14%	16.36%	42.87%	6.38
Old tech (> 35 years)	16.21%	11.30%	27.37%	1.17
All tech	58.61%	10.08%	24.00%	1.33
Young non-tech	46.18%	42.38%	64.33%	9.85
Old non-tech	42.87%	48.48%	68.77%	9.07
All non-tech	69.14%	44.64%	66.68%	7.92

4. On Cash Return

	Dividend Yield	Cash Return Yield	Dividends/ Earnings	Net Cash Returned	FCFE	Cash/Firm Value
Young tech (<10 years)	0.32%	-0.61%	NA	-$ 552	-$ 2,660	7.62%
Old tech (> 35 years)	1.67%	5.87%	29.65%	$ 145,315	$ 64,783	5.39%
All tech	1.12%	3.91%	26.85%	$ 184,841	$ 63,638	5.60%
Young non-tech	2.10%	-2.85%	195.64%	-$ 14,725	-$ 28,724	4.57%
Old non-tech	1.03%	2.49%	19.37%	$ 338,003	$ 405,664	10.17%
All non-tech	1.77%	2.14%	24.09%	$ 406,994	$ 505,631	8.79%

Bottom line

1. Truth in labeling: We are too quick in labeling companies as tech companies and both companies and investors are complicit.
2. Age classes: Tech can no longer be used as a proxy for growth, as the sector ages. We have to be specific about what segment of tech we are referring to when we talk about tech stocks.
3. Life cycle dynamics: It is entirely possible that it is the life cycle that is driving pricing, rather than whether a company is a tech or a non-tech company.

THE INVESTOR RESPONSE TO REAL & IMAGINED BUBBLES

In the investing world, there are three views of "the gap"

	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 and hope that the gap closes.
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.

1. Play the pricing game

- You believe that the price is the only real number that you can act on and that no one knows what the value of an asset is and estimating it is of little use.
- You try to guess which direction the price will move in the next period(s) and trade ahead of the movement. To win the game, you have to be right more often than wrong about direction and to exit before the winds shifts.
- The plus of the strategy is that you will be able to collect the winnings from momentum but the minus is that if you fail in detecting the momentum shift, you could lose it all and more.

2. Avoid the over priced asset class

- Sell the asset class (or sector) that you believe is over priced and put your money in what you perceive to be under priced asset classes (or sectors). If you cannot find any under priced assets, hold cash.
  - The benefit is that you save yourself the "money that you would have lost" in the event of a crash in the sector.
  - The cost is that that money have to be invested in something other than the asset class that you believe is over valued.
- The net effect of this strategy will depend on how much of a correction you see occurring, how imminent you think the correction is and how certain you feel about both.

3. Attack the bubble

- In this strategy, you try to make money off the bubble bursting (as opposed to protecting yourself from losing money, if it happens).
- Consequently, you will sell short asset classes (or sectors) that you believe are over valued and buy asset classes (or sectors) that you believe are under valued.
- The question of whether you will win or lose with this strategy will be determined by the same factors that drive the last one (avoiding over priced asset classes) but with magnified consequences.

4. Do nothing

- Though it may seem like denial, a final option is to ignore the bubble, even if you believe one exists and make your investment decisions based on your risk aversion coefficients and the relative pricing of different asset classes.
- As an investor, this will require you to value assets, based on how the market is pricing asset classes today and to buy under valued assets (even if you believe that the asset class that it belongs to is over valued).

The trade off in numbers: A market bubble?

		Market correction = 20%				Market correction = 40%			
		Number of years before correction				Number of years before correction			
		0.00	1.00	2.00	3.00	0.00	1.00	2.00	3.00
Probability of correction	20%	4.00%	-5.90%	-10.47%	-18.62%	8.00%	1.41%	-5.72%	-13.44%
	40%	8.00%	1.11%	-6.37%	-14.49%	16.00%	9.83%	3.14%	-4.13%
	60%	12.00%	5.18%	-2.26%	-10.36%	24.00%	18.26%	12.00%	5.18%
	80%	16.00%	9.24%	1.85%	-6.23%	32.00%	26.68%	20.86%	14.49%
	100%	20.00%	13.30%	5.95%	-2.09%	40.00%	35.10%	29.72%	23.81%

Uncertainty makes forecasting difficult..

- 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 increases the payoff..

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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°
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Further changeability analysis »

Weather forecast accuracy for Honolulu, Hawaii

Last Month	
MeteoGroup	**88.44%**
Persistence	**81.80%**
CustomWeather	**78.23%**
The Weather Channel	73.12%
AccuWeather	69.89%
Weather Underground	62.10%
National Weather Service	48.39%
Foreca	44.35%
WeatherBug	32.26%

Last Year	
MeteoGroup	**88.50%**
CustomWeather	**85.87%**
AccuWeather	**81.82%**
The Weather Channel	81.56%
Persistence	80.44%
Weather Underground	67.07%
National Weather Service	59.90%
Foreca	57.52%
WeatherBug	37.09%

Weather changeability for Epping, North Dakota

Temperature	Last Month	Last Year
Average change in high temperature day-to-day	8.5°	7.7°
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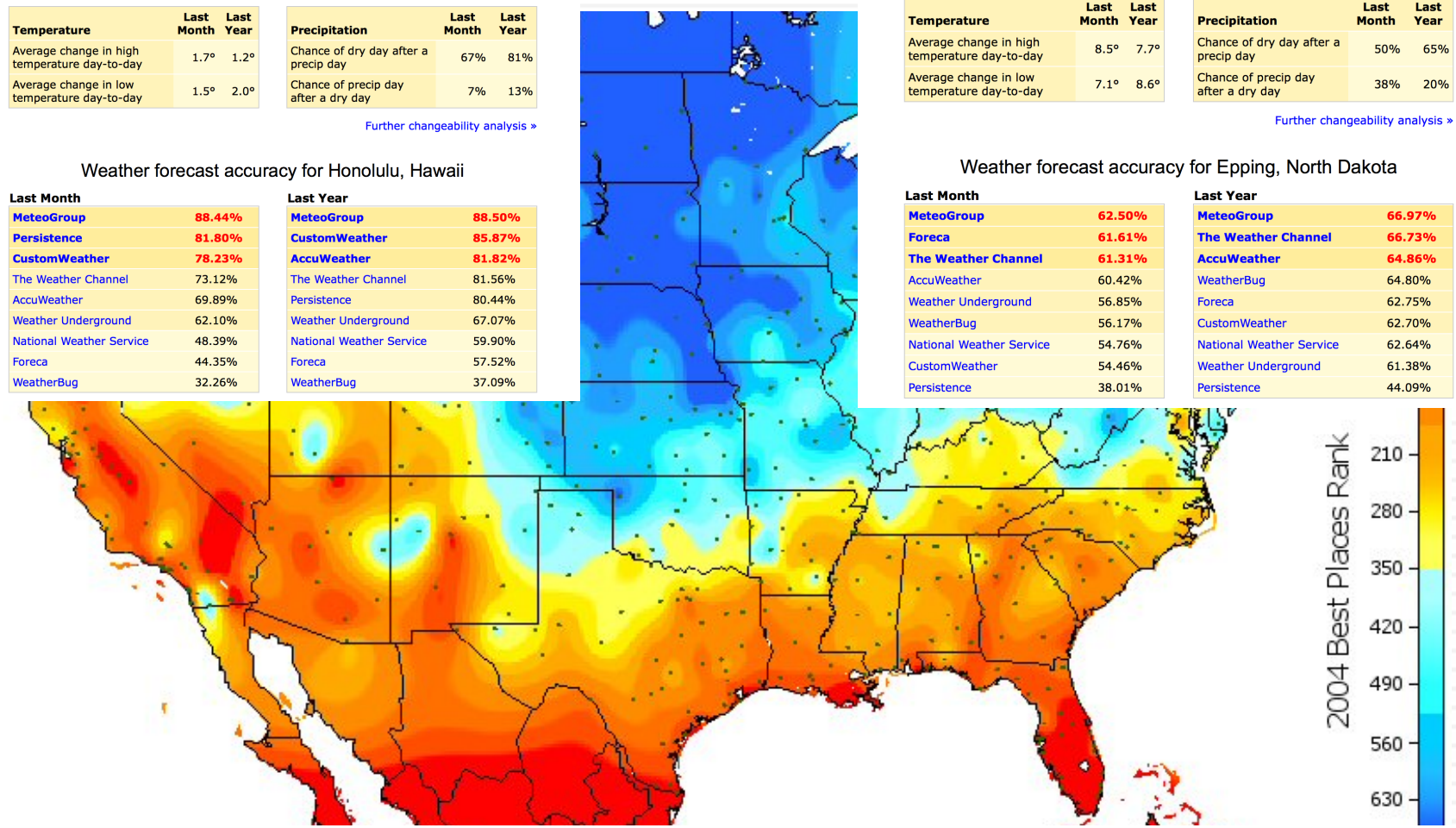
Precipitation	Last Month	Last Year
Chance of dry day after a precip day	50%	65%
Chance of precip day after a dry day	38%	20%

Further changeability analysis »

Weather forecast accuracy for Epping, North Dakota

Last Month	
MeteoGroup	**62.50%**
Foreca	**61.61%**
The Weather Channel	**61.31%**
AccuWeather	60.42%
Weather Underground	56.85%
WeatherBug	56.17%
National Weather Service	54.76%
CustomWeather	54.46%
Persistence	38.01%

Last Year	
MeteoGroup	**66.97%**
The Weather Channel	**66.73%**
AccuWeather	**64.86%**
WeatherBug	64.80%
Foreca	62.75%
CustomWeather	62.70%
National Weather Service	62.64%
Weather Underground	61.38%
Persistence	44.09%



The End Game

1. Distinguishing a bubble from a blunder is really difficult to do. It is true that a bubble eventually bursts and when it does, the price crashes, but not all price crashes are indications of prior bubbles.
2. Bubbles are part of markets. They cannot be legislated away or regulated out of existence.
3. Bubbles are good. A world run by actuaries would be both boring and backwards.