PRICE AND VALUE: DISCERNING THE DIFFERENCE

May 2014

Aswath Damodaran

Test 1: Are you pricing or valuing?

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Test 2: Are you pricing or valuing?

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Test 3: Are you pricing or valuing?

Europe
Switzerland

Biotechnology
Biotechnology

	Reuters	Bloomberg	Exchange	Ticker
	BION.S	BION SW	SWX	BION

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

Strong sector and stock-picking continue

Impressive performance

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

Biotech industry remains attractive

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

Key changes

Target Price	106.50 to 164.50 ↑	54.5%

Source: Deutsche Bank

Price/price relative

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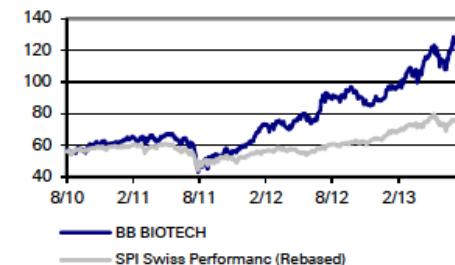
Performance (%)	1m	3m	12m
Absolute	-1.4	5.4	37.4

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Test 4: Are you pricing or valuing?

A Venture Capital "Valuation"

Today

Young software company
Revenues = $2 m
Earnings (Loss) = -$1 m

Exit Year (Year 3)

Estimated revenues = $50 m
Estimated earnings = $10 million
Exit Earnings Multiple = 20
Estimated Exit Value = $10 * 20 = $200 m

Discount back at target rate of return on 50%

Value today

$= 200/1.5^3$

$= $59.26 m$

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Test 5: Are you pricing or valuing?

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

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Test 6: Are you pricing or valuing?

- In FAS 157, here is what it says: "The exchange price is the price in an <u>orderly transaction between market participants</u> to sell the asset or transfer ... The transaction to sell the asset or transfer the liability is a hypothetical transaction at the measurement date, considered from the <u>perspective of a market participant that holds the asset or owes the liability</u>. Therefore, the definition focuses on the price that <u>would be received to sell the asset or paid to transfer the liability (an exit price), not the price that would be paid to acquire the asset or received to assume the liability (an entry price)</u>."

- If you are an accountant, given the task of putting FAS 157 into practice, are you being asked to

  a. Value the assets/liabilities on a balance sheet
  b. Price the assets/liabilities on a balance sheet

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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

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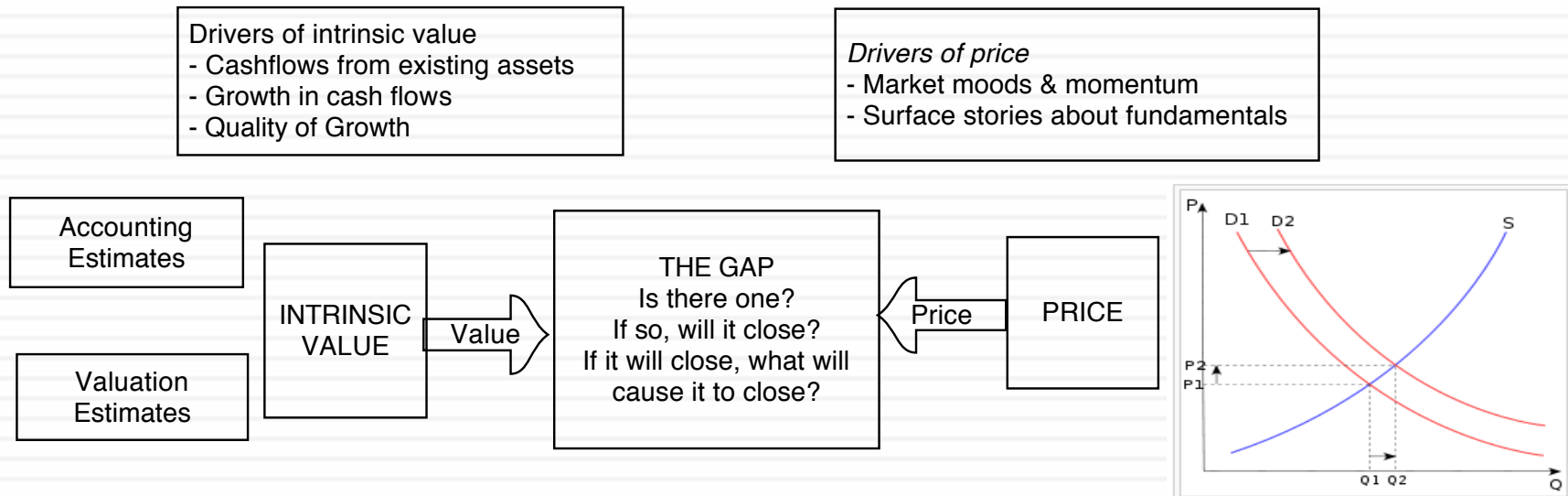
Price versus Value: Let's test your priors on the gap

- Let's start with the proposition that the value of an asset is based on its fundamentals, and that intrinsic value is the tool that you use to estimate that value and that the price of the asset is based on demand/ supply and that multiples/comparables are what you use to estimate price. Assume that you do both well. Would you expect the price = value?
  a. Yes, at least, on average
  b. No

Price versus Value: Your priors on the direction

☐ If you believe that there is a gap between price and value, which of the following do you think is the most likely direction?

    a. Price will be greater than value, because intrinsic valuation is inherently conservative

    b. Value will be greater than price, because markets don't capture the intangibles

    c. Either can happen, depending on..

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The traditional accounting balance sheet…

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

Assets are recorded at original cost, adjusted for depreciation.

The Balance Sheet

Assets		Liabilities	
Long Lived Real Assets	Fixed Assets	Current Liabilties	Short-term liabilities of the firm
Short-lived Assets	Current Assets	Debt	Debt obligations of firm
Investments in securities & assets of other firms	Financial Investments	Other Liabilities	Other long-term obligations
Assets which are not physical, like patents & trademarks	Intangible Assets	Equity	Equity investment in firm

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

Equity reflects original capital invested and historical retained earnings.

The intrinsic value balance sheet

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

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

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

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

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The "Market Price" balance sheet

A Market Value Balance Sheet

Assets		Liabilities	
Existing Investments Generate cashflows today	Investments already made	Debt	Borrowed money
Expected Value that will be created by future investments	Investments yet to be made	Equity	Owner's funds

Assets recorded at market value, i.e, what investors will be willing to pay for the assets today (rather than original cost or intrinsic value)
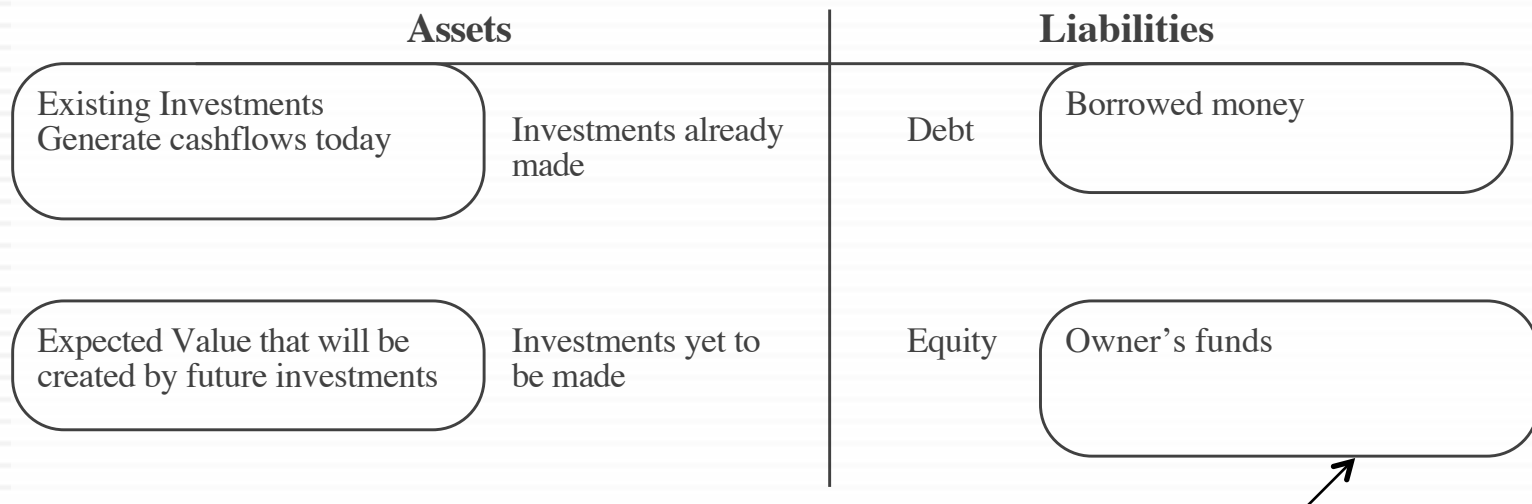
Should equate to market value of equity, if publicly traded.

Twitter: The Contrast in November 2013

Accounting Balance Sheet

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

Intrinsic Value Balance Sheet (post-IPO)

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

Market Price Balance Sheet (post-IPO)

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

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INTRINSIC VALUATION
CASH FLOWS, GROWTH & RISK

Intrinsic value is simple: We choose to make it complex

For cash flow generating assets, the intrinsic value will be a function of the magnitude of the expected cash flows on the asset over its lifetime and the uncertainty about receiving those cash flows.

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.

4. *The VALUE IS NOT PRICE Proposition*: The value of an asset may be very different from its price.

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The determinants of value

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

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

How **risky are the cash flows** from both existing assets and growth assets?
Equity: Risk in equity in the company
Firm: Risk in the firm's operations

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

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DCF as a tool for intrinsic valuation

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

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

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.

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

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.

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1. Cash Flows

To get to cash flow	Here is why
Operating Earnings	This is the earnings before interest & taxes you generate from your existing assets. Operating Earnings = Revenues * Operating Margin Measures the operating efficiency of your assets & can be grown either by growing revenues and/or improving margins.
(minus) Taxes	These are the taxes you would pay on your operating income and are a function of the tax code under which you operate & your fidelity to that code.
(minus) Reinvestment	Reinvestment is designed to generate future growth and can be in long term and short term assets. Higher growth usually requires more reinvestment, and the efficiency of growth is a function of how much growth you can get for your reinvestment.
Free Cash Flow to the Firm	This is a pre-debt cash flow that will be shared by lenders (as interest & principal payments) and by equity investors (as dividends & buybacks).

2. Discount rates

Expected Return on a Risky Investment = Cost of Equity

=

| **Risk free Rate** Rate of return on a long term, default free bond. | **+** | **Beta** Relative measure of risk added to a diversified portfolio. | **X** | **Equity Risk Premium** Premium investors demand over and above the risk free rate for investing in equities as a class. |

Will vary across currencies and across time.

Determined by the business or businesses that you operate in, with more exposure to macro economic risk translating into a higher beta.

Function of the countries that you do business in and how much value you derive from each country.

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3. Expected Growth

Expected Growth

Net Income   Operating Income

| Retention Ratio= 1 - Dividends/Net Income | X | Return on Equity Net Income/Book Value of Equity | | Reinvestment Rate = (Net Cap Ex + Chg in WC/EBIT(1-t) | X | Return on Capital = EBIT(1-t)/Book Value of Capital |
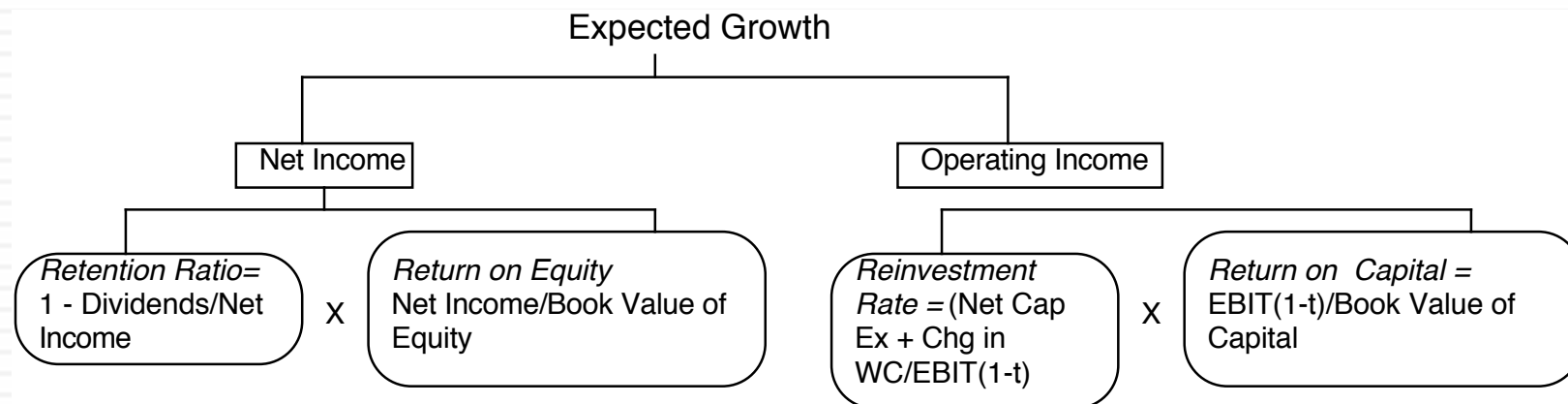
- ☐ <u>Quality growth is rare</u> and requires that a firm be able to reinvest a lot and reinvest well (earnings more than your cost of capital) at the same time.
- ☐ <u>The larger you get</u>, the more difficult it becomes to maintain quality growth.
- ☐ You can <u>grow while destroying value</u> at the same time.

And its value…

ROIC versus Cost of Capital: A Global Assessment for 2013

Of the 33,968 firms that had data available for ROC and cost of capital, 58.8% earned less than their cost of capital in 2013.

14,351 firms

10,518 firms

Legend:
- ROC more than 5% below cost of capital
- ROC between 2% and 5% below cost of capital
- ROC between 2% and 0% below cost of capital
- ROC between 0 and 2% more than cost of capital
- ROC between 2% and 5% above cost of capital
- ROC more than 5% above cost of capital

Y-axis: % of firms in the group

X-axis: Australia, NZ & Canada; Europe; Emerging Markets; Japan; US; Global

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4. The Terminal Value

Move towards a marginal tax rate

Are you reinvesting enough to sustain your stable growth rate?
Reinv Rate = g/ ROC
Is the ROC that of a stable company?

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

This is a mature company. Its cost of capital should reflect that.

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

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If your job is assessing value, here are your challenges…

Value of Growth

Company's history
Look at **past growth in revenues & earnings** and **how much the company has had to invest** to generate this growth.

Competitors
Look at the **growth, profitability & reinvestment at competitors** & determine your competitive advantages

Market potential
Make a judgment on the **size, growth potential & profitablity of the overall market** served by the company.

Cash flows from existing assets
Based on the **current financial statements** of the company, make assessments of earnings and cash flows from existing assets.

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

Steady state
Look at the **largest and most mature companies in** your peer group to make a judgment on when stablity will come to your company & what it will look like.

Risk in the Cash Flows

Past earnings
Look at the variability of past earnings and the sources of the variability.

Past market prices
If your company has been traded historically, get a measure of the variability in stock prices

Peer group
Look at the costs of funding faced by peer group companies, similar to yours.

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Disney - November 2013

Current Cashflow to Firm
EBIT(1-t)= 10,032(1-.31)=   6,920
- (Cap Ex - Deprecn)   3,629
- Chg Working capital   103
= FCFF   3,188
Reinvestment Rate = 3,732/6920
              =53.93%
Return on capital = 12.61%

Reinvestment Rate
53.93%

Return on Capital
12.61%

Stable Growth
g = 2.5%; Beta = 1.00;
Debt %= 20%; k(debt)=3.75
Cost of capital =7.29%
Tax rate=36.1%; ROC= 10%;
Reinvestment Rate=2.5/10=25%

Expected Growth
.5393*.1261=.068 or 6.8%

Growth declines
gradually to 2.75%

Terminal Value$_{10}$= 9,086/(.0729-.025) = 189,738

First 5 years

Op. Assets   125,484
+ Cash: 3,931
+ Non op inv   2,849
- Debt   15,961
- Minority Int   2,721
=Equity   113,582
-Options   869
Value/Share $ 62.26

	1	2	3	4	5	6	7	8	9	10
EBIT * (1 - tax rate)	$7,391	$7,893	$8,430	$9,003	$9,615	$10,187	$10,704	$11,156	$11,531	$11,819
- Reinvestment	$3,985	$4,256	$4,546	$4,855	$5,185	$4,904	$4,534	$4,080	$3,550	$2,955
FCFF	$3,405	$3,637	$3,884	$4,148	$4,430	$5,283	$6,170	$7,076	$7,981	$8,864

Term Yr
12,114
3,029
9,086

Cost of capital declines
gradually to 7.29%

Cost of Capital (WACC) = 8.52% (0.885) + 2.40% (0.115) = 7.81%

In November 2013,
Disney was trading at
$67.71/share

Cost of Equity
8.52%

Cost of Debt
(2.75%+1.00%)(1-.361)
= 2.40%
Based on actual A rating

Weights
E = 88.5% D = 11.5%

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.0013

X

ERP for operations
5.76%

Unlevered Beta for
Sectors: 0.9239

D/E=13.10%
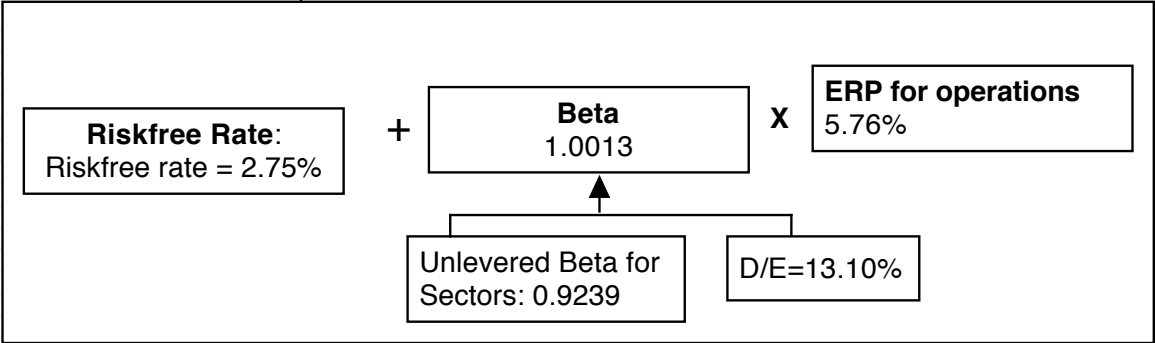
So, how about a young start-up company?

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

Making judgments on revenues/ profits difficult because you cannot draw on history. If you have no product/service, it is difficult to gauge market potential or profitability. The company's entire value lies in future growth but you have little to base your estimate on.

Cash flows from existing assets non-existent or negative.

What is the value added by growth assets?

What are the cashflows from existing assets?

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

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

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

What is the value of equity in the firm?

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

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

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)

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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

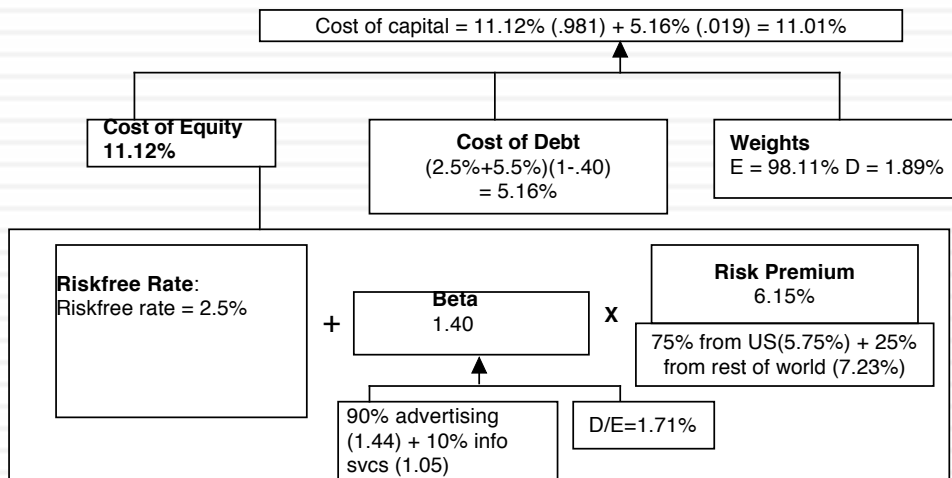## 3. Reinvest for growth

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

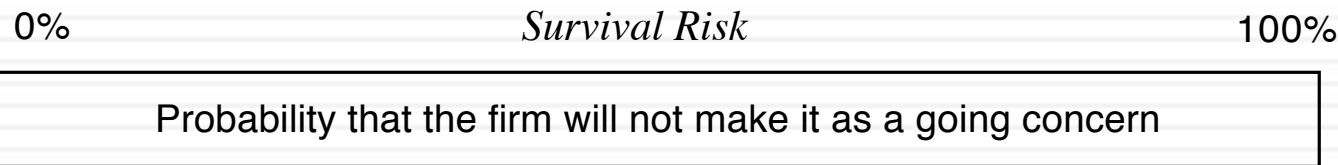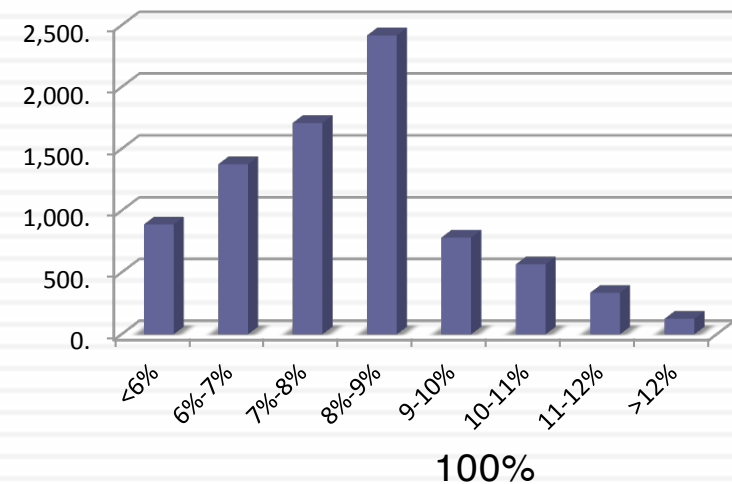My estimate for Twitter: Sales/Capital will be 1.50 for next 10 years

Sweating the small stuff: Risk and Required Return

Risk in the discount rate

My estimate for Twitter

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

Cost of Equity **11.12%**	**Cost of Debt** (2.5%+5.5%)(1-.40) = 5.16%	**Weights** E = 98.11% D = 1.89%

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%

Cost of Capital: US - Nov '13

2,500.	
2,000.	
1,500.	
1,000.	
500.	
0.	

<6% 6%-7% 7%-8% 8%-9% 9-10% 10-11% 11-12% >12%

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

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Twitter Pre-IPO Valuation: October 27, 2013

Starting numbers

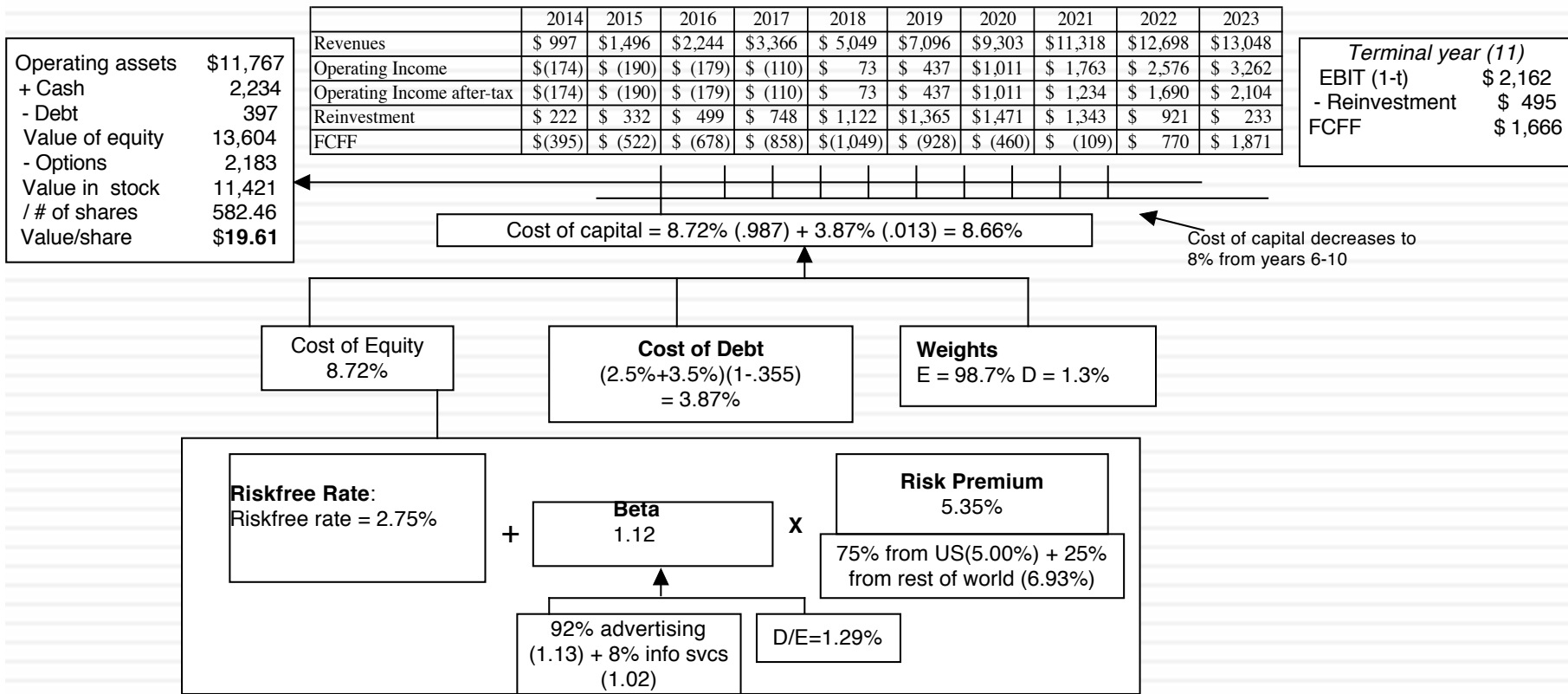|	Last 10K	Trailing 12 month
Revenues	$316.93	$534.46
Operating income	-$77.06	-$134.91
Adjusted Operating Income		$7.67
Invested Capital		$955.00
Adjusted Operatng Margin		1.44%
Sales/ Invested Capital		0.56
Interest expenses	$2.49	$5.30

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

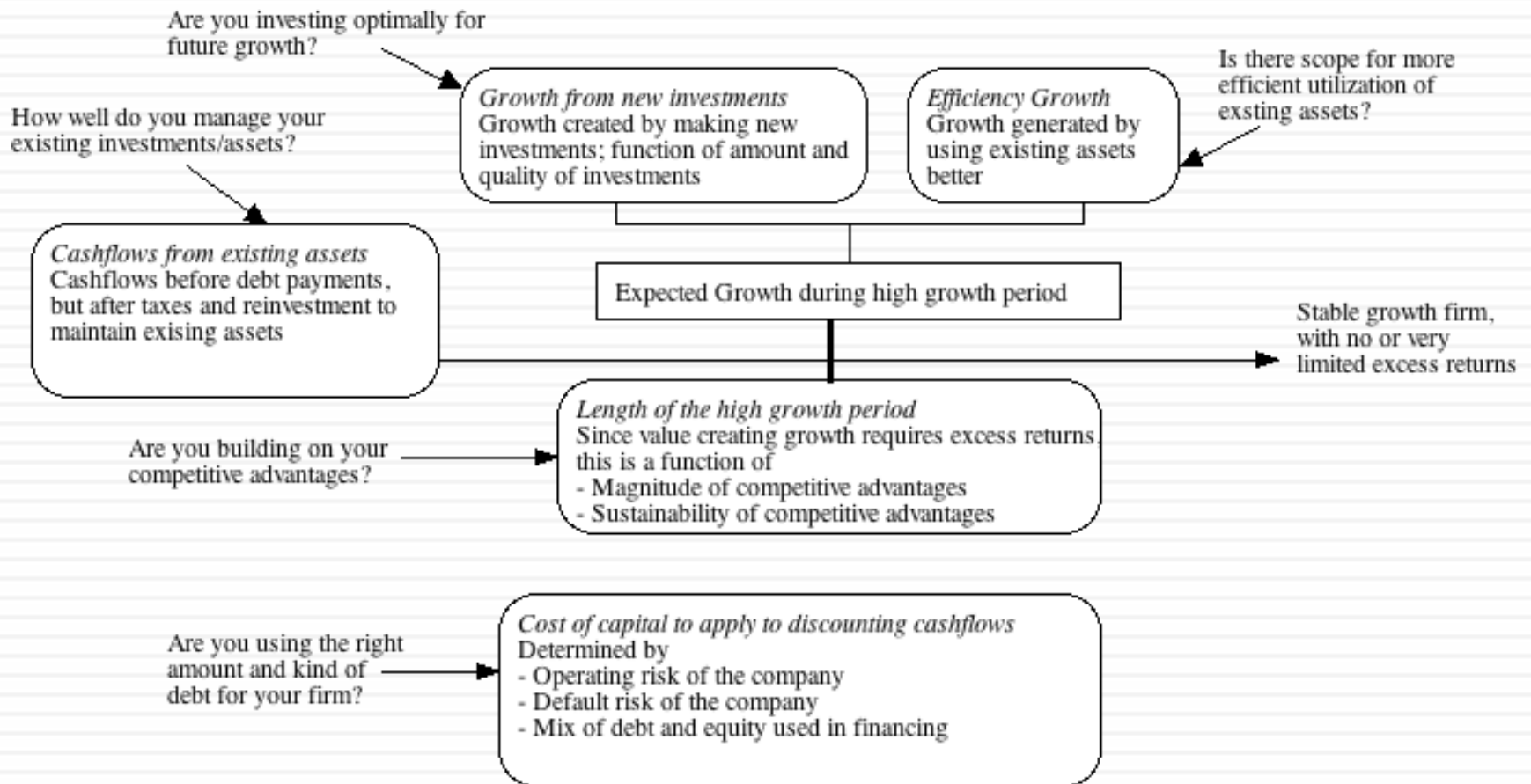**Pre-tax operating margin** increases to 25% over the next 10 years

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

	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

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

Terminal year (11)

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

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%

Twitter Valuation after first earnings report: February 8, 2014

Starting numbers

	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

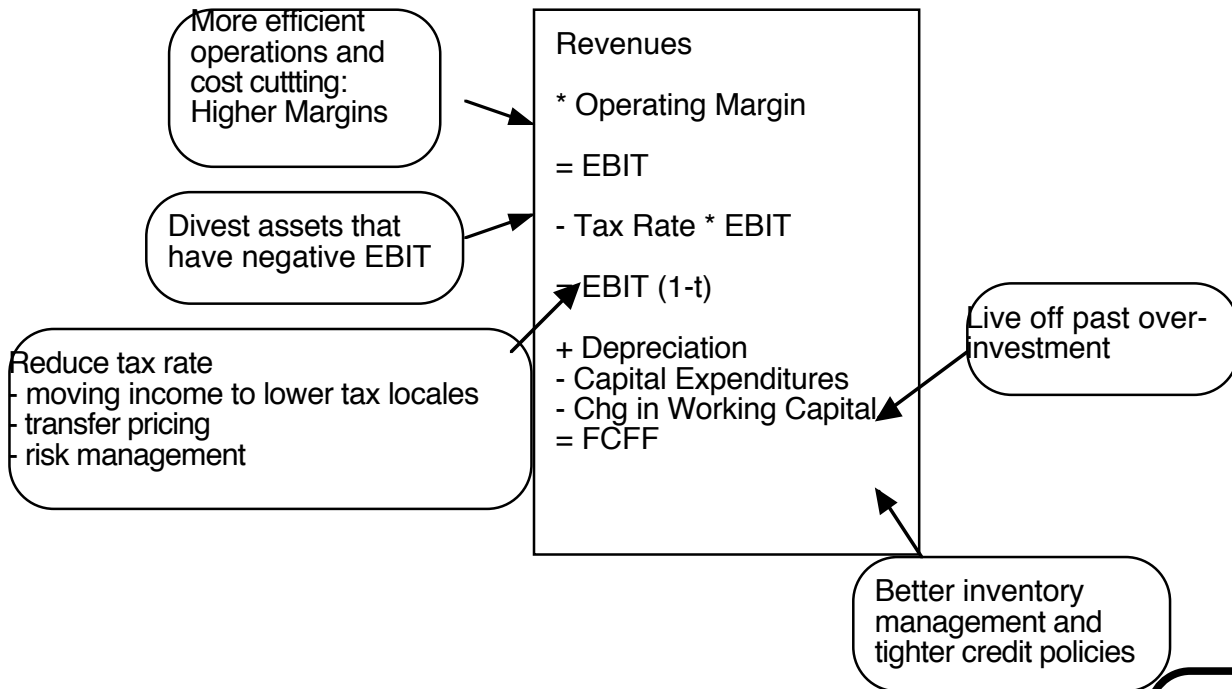| **Stable Growth** g = 2.75%; Cost of capital = 8% ROC= **12**%; Reinvestment Rate=2.75%/12% =22.92% |
|---|

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

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**

Terminal year (11)

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

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%

31   Aswath Damodaran

If your job is enhancing value, it's got to come from changing the fundamentals

Are you investing optimally for future growth?

How well do you manage your existing investments/assets?

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

Efficiency Growth
Growth generated by using existing assets better

Is there scope for more efficient utilization of exsting assets?

Cashflows from existing assets
Cashflows before debt payments, but after taxes and reinvestment to maintain exising assets

Expected Growth during high growth period

Stable growth firm, with no or very limited excess returns

Are you building on your competitive advantages?

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

Are you using the right amount and kind of debt for your firm?

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

More efficient operations and cost cuttting: Higher Margins

Divest assets that have negative EBIT

Reduce tax rate
- *moving income to lower tax locales*
- *transfer pricing*
- *risk management*

Revenues

* Operating Margin

= EBIT

- Tax Rate * EBIT

EBIT (1-t)

+ Depreciation
- Capital Expenditures
- Chg in Working Capital
= FCFF

Live off past over-investment

Better inventory management and tighter credit policies

Make your product/service less discretionary

Reduce Operating leverage

Reduce beta

Cost of Equity * (Equity/Capital) + Pre-tax Cost of Debt (1- tax rate) * (Debt/Capital)

Match your financing to your assets: Reduce your default risk and cost of debt

Shift interest expenses to higher tax locales

Change financing mix to reduce cost of capital

Firm Value

Reinvest more in projects

Increase operating margins

Do acquisitions

Increase capital turnover ratio

Reinvestment Rate

* Return on Capital

= Expected Growth Rate

Build on existing competitive advantages

Create new competitive advantages

Disney (Restructured)- November 2013

Current Cashflow to Firm
EBIT(1-t)= 10,032(1-.31)= 6,920
- (Cap Ex - Deprecn) 3,629
- Chg Working capital 103
= FCFF 3,188
Reinvestment Rate = 3,732/6920
=53.93%
Return on capital = 12.61%

Reinvestment Rate
50.00%

More selective acquisitions & payoff from gaming

Return on Capital
14.00%

Stable Growth
g = 2.75%; Beta = 1.20;
Debt %= 40%; k(debt)=3.75%
Cost of capital =6.76%
Tax rate=36.1%; ROC= 10%;
Reinvestment Rate=2.5/10=25%

Expected Growth
.50* .14 = .07 or 7%

Growth declines gradually to 2.75%

Terminal Value$_{10}$= 9,206/(.0676-.025) = 216,262

First 5 years

Op. Assets 147,704
+ Cash: 3,931
+ Non op inv 2,849
- Debt 15,961
- Minority Int 2,721
=Equity 135,802
-Options 869
Value/Share $ 74.96

	1	2	3	4	5	6	7	8	9	10
EBIT * (1 - tax rate)	$7,404	$7,923	$8,477	$9,071	$9,706	$10,298	$10,833	$11,299	$11,683	$11,975
- Reinvestment	$3,702	$3,961	$4,239	$4,535	$4,853	$4,634	$4,333	$3,955	$3,505	$2,994
Free Cashflow to Firm	$3,702	$3,961	$4,239	$4,535	$4,853	$5,664	$6,500	$7,344	$8,178	$8,981

Term Yr
12,275
3,069
9,206

Cost of Capital (WACC) = 8.52% (0.60) + 2.40%(0.40) = 7.16%

Cost of capital declines gradually to 6.76%

Cost of Equity
10.34%

Cost of Debt
(2.75%+1.00%)(1-.361)
= 2.40%
Based on synthetic A rating

Weights
E = 60% D = 40%

In November 2013, Disney was trading at $67.71/share

Move to optimal debt ratio, with higher beta.

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.3175

X

ERP for operations
5.76%

Unlevered Beta for Sectors: 0.9239

D/E=66.67%
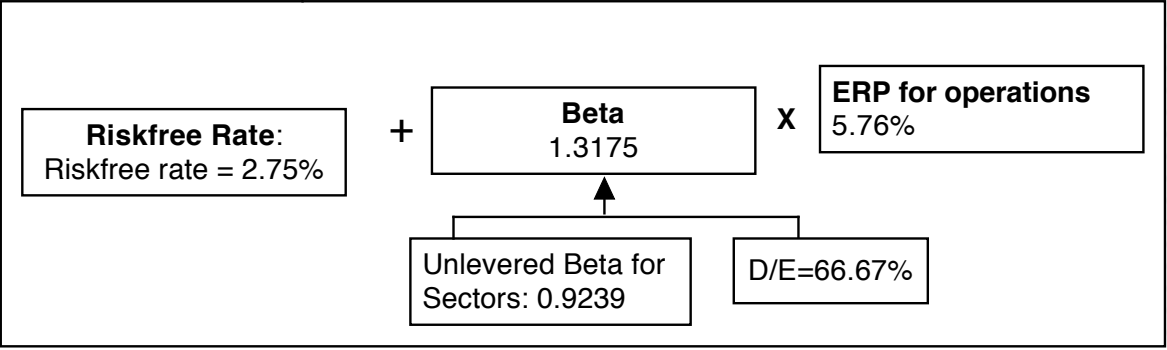
And intrinsic value can change a lot, especially for young companies & in market crisis

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.

Aswath Damodaran

My first try: Tesla Valuation: September/October 2013

Starting numbers

	Last 12 months	Prior year
Revenues	1329	413
Operating Income	-217	394
Adj. Operating Income	$ (22.00)	
Invested Capital	1006	
Adj. Operating Margin	-1.66%	
Sales/Capital Ratio	1.32	

Revenue growth of 70% a year for 5 years, tapering down to 2.75% in year 10

Pre-tax operating margin increases to 12.5 % over the next 10 years

Sales to capital ratio of **1.41** for incremental sales

Stable Growth
g = 2.75%; Beta = 1.00;
Cost of capital = 8%
ROC= 8%;
Reinvestment Rate=2.75%/8% = 34.38%

Terminal Value$_{10}$= 3,584/(.08-.0275) = $68,271

PV adjusted for 10% chance of failure and proceeds = 50% of estimated value, if that happens.

Operating assets	$12,174
+ Cash	202
- Debt	579
Value of equity	11,797
- Options	3,645
Value in stock	8,152
/ # of shares	121.45
Value/share	$67.12

	1	2	3	4	5	6	7	8	9	10
Revenues	$2,259	$3,840	$6,528	$11,097	$18,866	$29,534	$42,263	$54,794	$63,671	$65,422
EBIT (1-t)	-$5	$45	$170	$445	$1,024	$1,879	$3,001	$4,186	$5,082	$5,316
- Reinvestment	$660	$1,121	$1,906	$3,241	$5,509	$7,566	$9,028	$8,887	$6,296	$1,242
= FCFF	-$665	-$1,076	-$1,737	-$2,795	-$4,485	-$5,687	-$6,027	-$4,701	-$1,214	$4,074

Terminal year (11)

EBIT (1-t)	$ 5.462
- Reinvestment	$1,877
FCFF	$ 3,584

Cost of capital = 10.18% (.974) + 4.55% (.026) = 10.03%

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

Stock was trading at $170/share at the time of the valuation.

Cost of Equity
11.12%

Cost of Debt
(2.75%+4.25%)(1-.35)
= 5.16%

Weights
E = 97.4% D = 2.6%

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.26

X

Risk Premium
5.80%

Used US equity risk premium

60% autos (1.11) + 40% technology (1.39)

D/E=2.64%
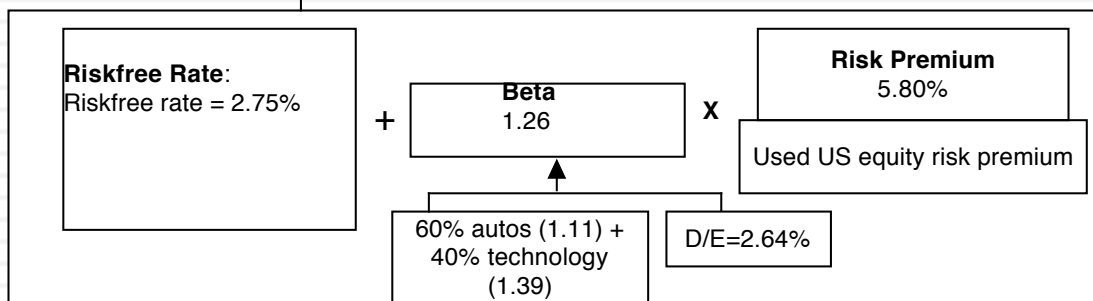
An update: Tesla Valuation: March 2014

Starting numbers

	2013	2012
Revenues	$ 2,013.50	$ 413.30
Operating income or EBIT	$ (61.28)	$ (395.46)
Adjusted Operating income	-16.83	
Invested Capital	$1,015	
Adjusted Operating margin	-0.84%	

End revenues $14 billion higher & margins slightly lower due to entering battery market

Revenue growth of 65% a year for 5 years, tapering down to 2.75% in year 10

Pre-tax operating margin increases to 12% over the next 10 years

Sales to capital ratio of **1.55** for incremental sales

Stable Growth
g = 2.75%; Beta = 1.00;
Cost of capital = 8%
ROC= 8%;
Reinvestment Rate=2.75%/8% = 34.38%

Terminal Value$_{10}$= 4,182/(.08-.0275) = $79,664

Assumed no chance of failure, because of improved access to capital

Operating assets	$16,636
+ Cash	846
- Debt	739
Value of equity	16,742
- Options	4,381
Value in stock	12,362
/ # of shares	123.19
Value/share	$100.35

Year	1	2	3	4	5	6	7	8	9	10
Revenues	$3,322	$ 5,482	$ 9,045	$14,924	$24,625	$37,565	$52,629	$67,180	$77,392	$79,520
EBIT (1-t)	$ 7	$ 84	$ 254	$ 403	$ 874	$ 1,652	$ 2,762	$ 4,097	$ 5,378	$ 6,203
- Reinvestment	$ 844	$ 1,393	$ 2,299	$ 3,793	$ 6,258	$ 8,349	$ 9,718	$ 9,388	$ 6,588	$ 1,373
FCFF	$ (837)	$(1,309)	$(2,044)	$ (3,390)	$ (5,385)	$ (6,696)	$ (6,956)	$ (5,291)	$ (1,210)	$ 4,829
Invested Capital	$1,889	$ 3,282	$ 5,581	$ 9,374	$15,632	$23,981	$33,699	$43,088	$49,676	$51,049
ROIC	0.40%	2.56%	4.56%	4.29%	5.59%	6.89%	8.20%	9.51%	10.83%	12.15%

Terminal year (11)
EBIT (1-t)	$ 6,373
- Reinvestment	$2,191
FCFF	$4,182

Cost of capital = 8.87% (.9734) + 3.90% (.0266) = 8.74%

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

Cost of Equity
8.87%

Cost of Debt
(2.75%+3.25%)(1-.35)
= 3.90%

Weights
E = 97.34% D = 2.66%

Stock was trading at $170/ share at the time of the valuation.

Riskfree Rate:
Riskfree rate = 2.75%

+

Beta
1.22

X

Risk Premium
5.00%

Used US equity risk premium

Changed business mix

70% autos (1.14) + 30% technology (1.29)

D/E=2.73%

Lower ERP for market
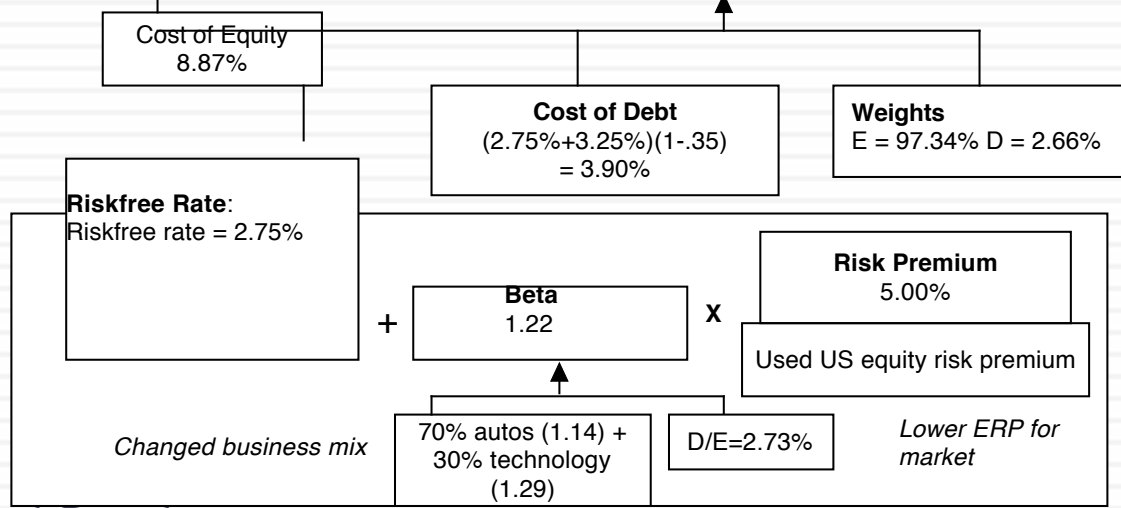
Three simple suggestions to make you better at estimating intrinsic value!

1. <u>Be honest about your biases/preconceptions</u>: 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 can help.

2. <u>Keep it simple</u>: 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. <u>Face up to uncertainty</u>: 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 and understand that you don't have to be right, just less wrong than everyone else.

Aswath Damodaran

PRICING
IT'S DEMAND AND SUPPLY

The determinants of price

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

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

The Market Price

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

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

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1a. The Momentum Game

Figure 7.3: Annual Returns to Momentum from 1927-2010- US Stocks
Momentum classes based on prior year's performance

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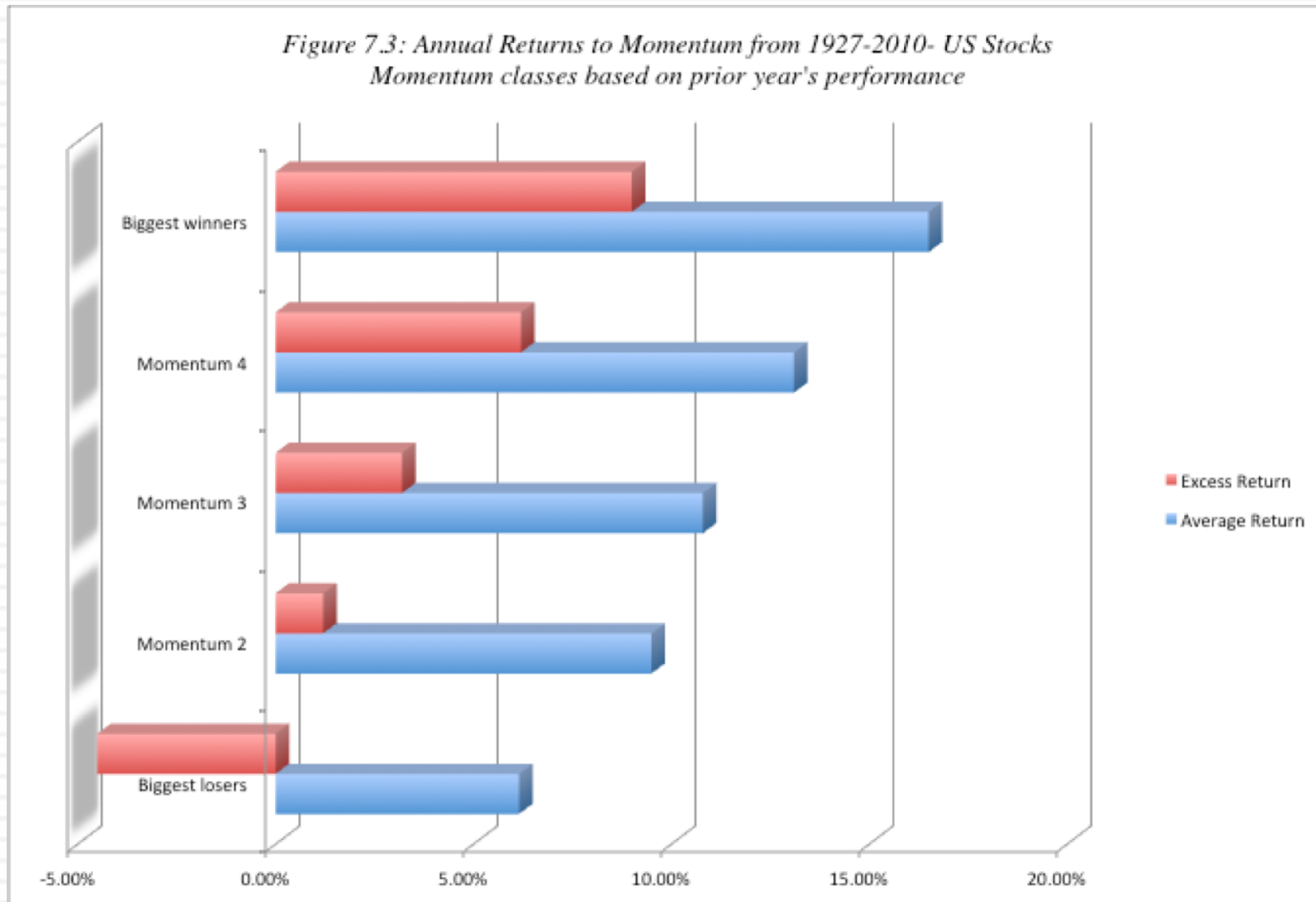
With inflection points

Figure 7: Differential Returns - Winner versus Loser Portfolios

Aswath Damodaran
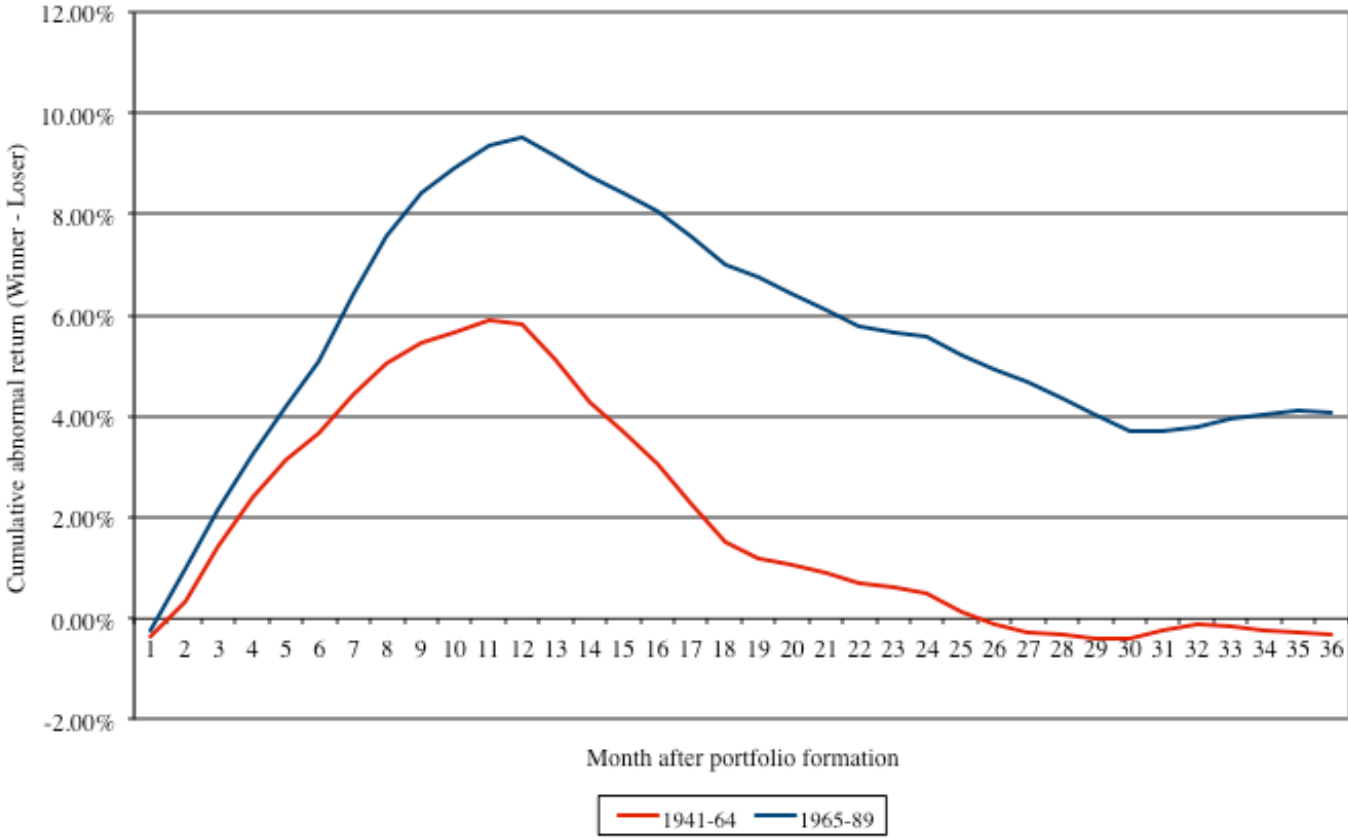
The momentum game works, until it does not…

Figure 7.5: Returns to a momentum strategy for US stock: 1927 - 2010

Aswath Damodaran
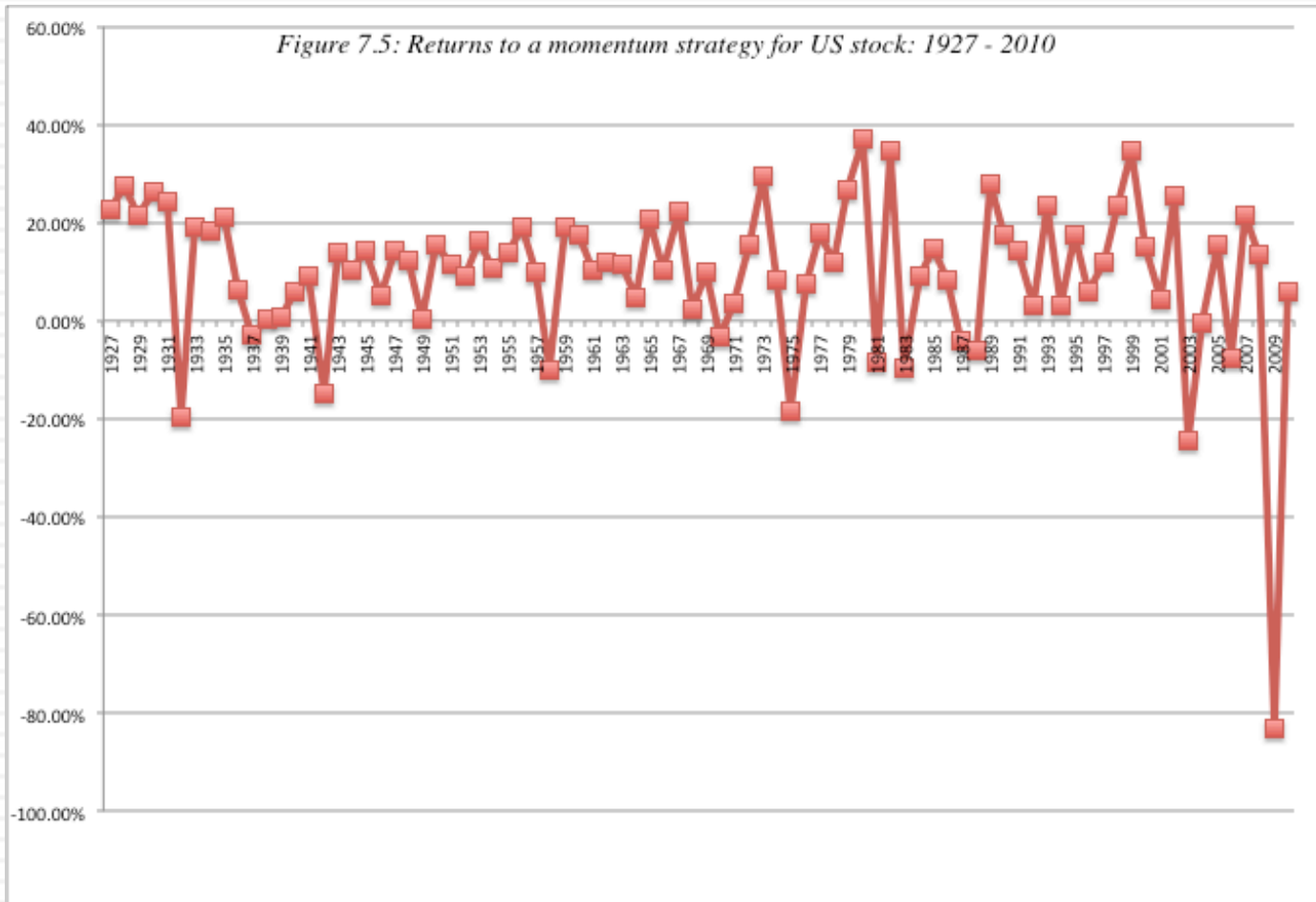
1b. Mood matters

Used a computer algorithm & 9.7 million tweets to see if you can predict movements in the Dow 30. Find 87% correlation
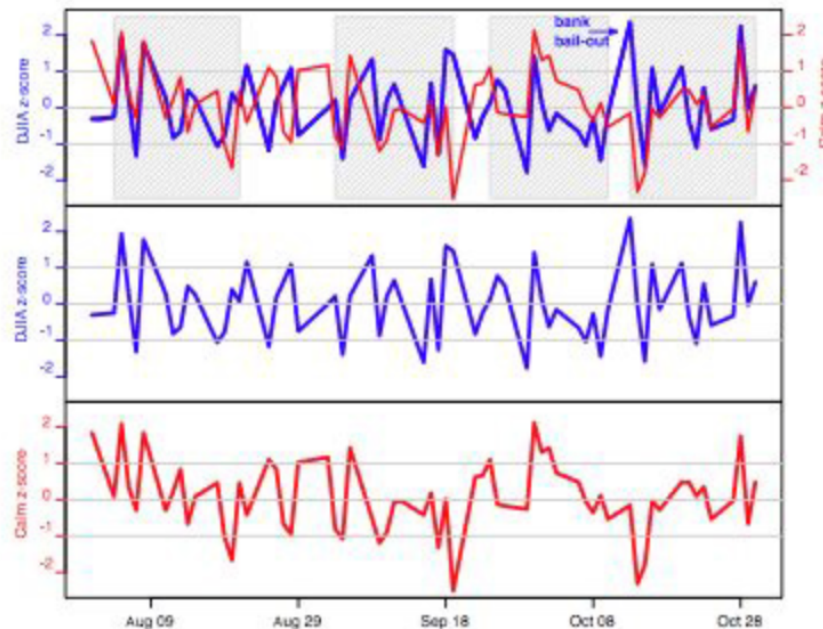
Fig. 3.   A panel of three graphs. The top graph shows the overlap of the day-to-day difference of DJIA values (blue: $\mathbb{Z}_{D_t}$) with the GPOMS' Calm time series (red: $\mathbb{Z}_{X_t}$) that has been lagged by 3 days. Where the two graphs overlap the Calm time series predict changes in the DJIA closing values that occur 3 days later. Areas of significant congruence are marked by gray areas. The middle and bottom graphs show the separate DJIA and GPOMS' Calm time series.

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Mood inducing words

NOTE: The grey areas represent the borders of the quadrants

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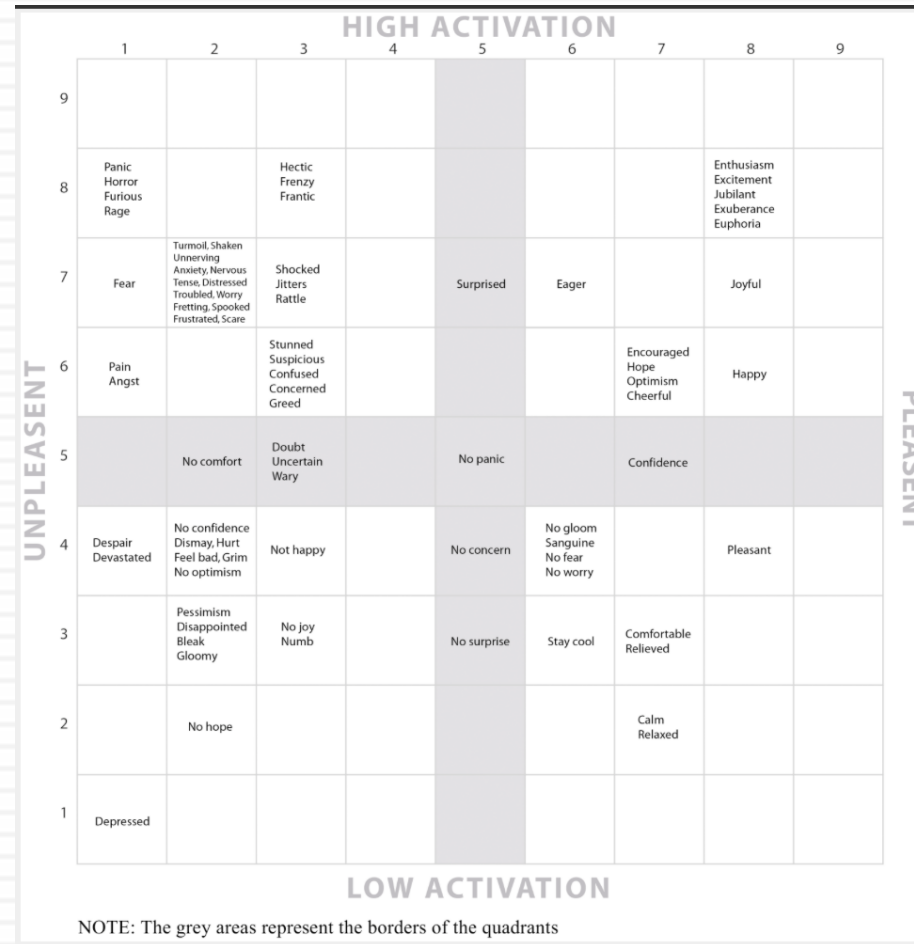
And pricing consequences…

	Prior Day Closing Price Control		Pleasant Mood Univariate		Unpleasant Mood Univariate		Full Multivariate Model	
	B	T-value	B	T-value	B	T-value	B	T-value
Market								
Prior day closing price	−.001	−.61	−.002	−2.14*	.0008	4.47**	−.0003	−.20
Mood								
Pleasant mood			196.46	3.72**			345.49	6.45**
Unpleasant mood					−194.77	−6.25**	−235.72	−6.65**
Variance of dependent variable			13378		13378		13378	
Residual variance			12730		12634		11018	
% of Variance Modeled			4.84%		5.56%		17.64%	

Notes. N = 251 days of NASDAQ price data.
*p<.05.
**p<.01.
All analyses include ARIMA(3,0,3) terms.
doi:10.1371/journal.pone.0072031.t003

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Word Search and Value Consequences
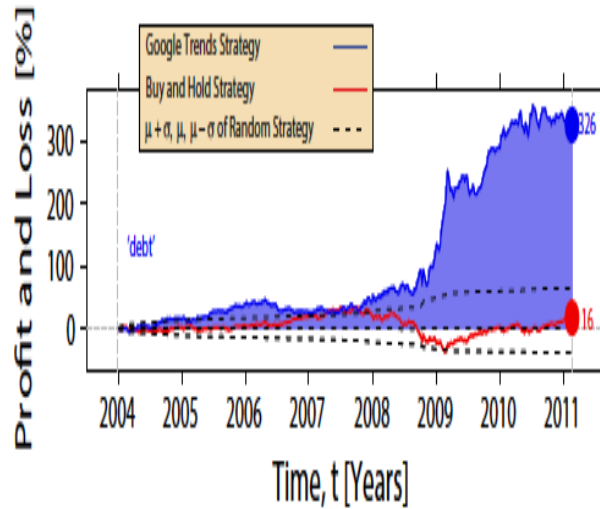
Figure 2 | Cumulative performance of an investment strategy based on *Google Trends* data. Profit and loss for an investment strategy based on the volume of the search term *debt*, the best performing keyword in our analysis, with *Δt* = 3 weeks, plotted as a function of time (*blue line*). This is compared to the "buy and hold" strategy (*red line*) and the standard deviation of 10,000 simulations using a purely random investment strategy (*dashed lines*). The *Google Trends* strategy using the search volume of the term *debt* would have yielded a profit of 326%.

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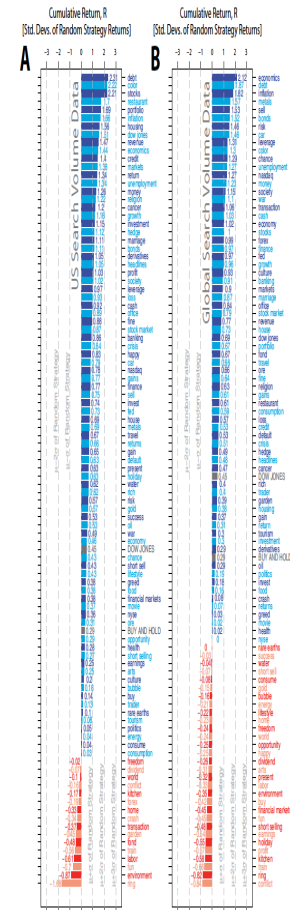
Another mood experiment: The market and sporting outcomes

Abnormal Stock Returns and Soccer Game Outcomes: Top Seven Soccer Nations

Aswath Damodaran

48
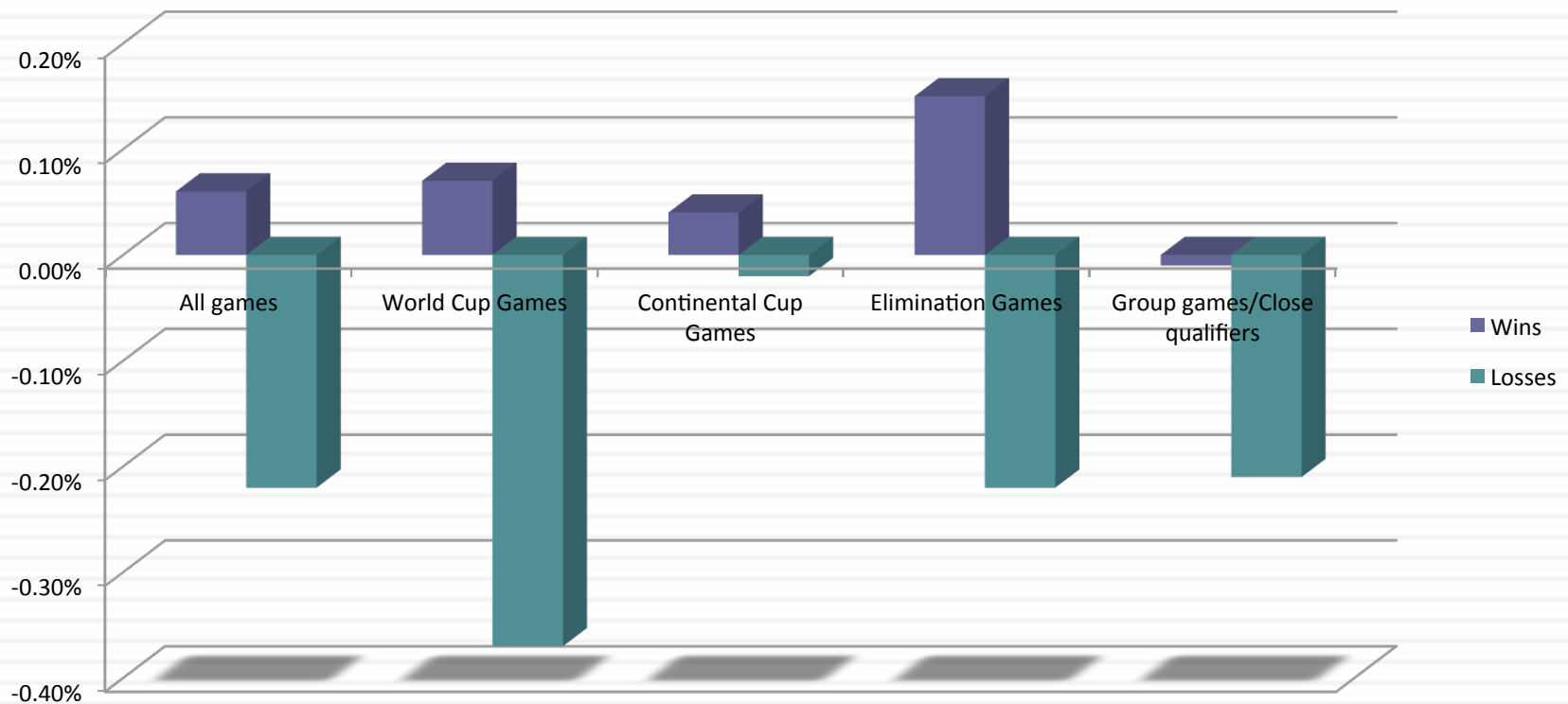
2. Liquidity & Volume

Aswath Damodaran
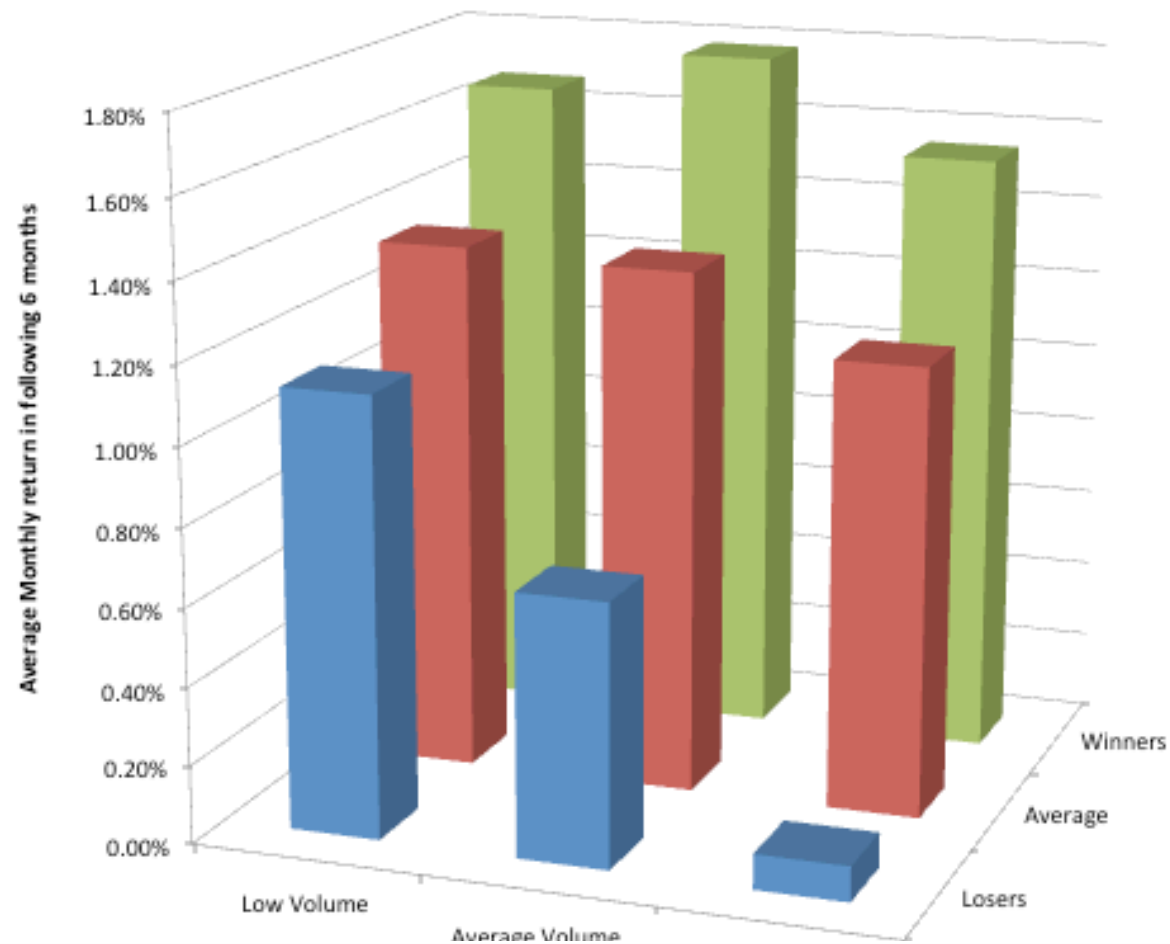
If you are pricing, illiquidity has to be explicitly factored in..

- If you are pricing an illiquid asset, relative to another similar liquid asset, you should attach a lower price to it. The extent of the discount has to be based on what the market is charging for illiquidity.

- When the price of liquidity rises in a market (as it does during market crises), and your job is pricing, you should adjust your pricing to reflect that illiquidity.

- The question of whether the illiquidity discount is fair or unfair, rational or irrational is none of your concern.

Aswath Damodaran

3. Incremental Information

- Prices react to information announcements, and usually in response to how the reports measure up to expectations.

- In some cases, the information contained in the report may have little or even no relevance for value but prices can react disproportionately (relative to how much or how little the value has changed).

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Looking at earnings reports

Figure 10.10: Market Reaction to Unexpected Quarterly Earnings Surprises: US Companies from 1988-2002

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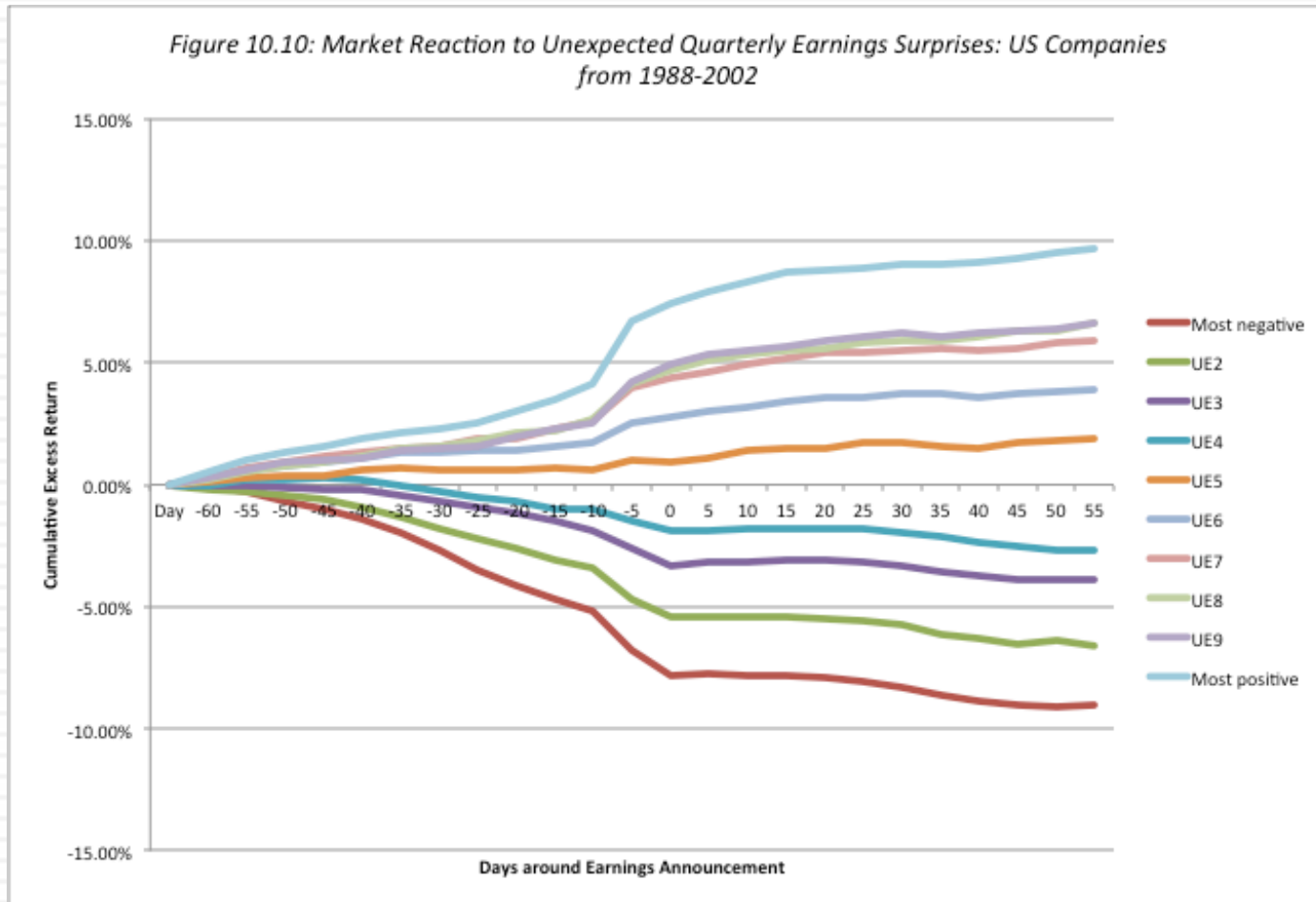
And the post-announcement drift

Figure 10.11: Post-Announcement Drift after Unexpected Quarterly Earnings Surprises: US Companies from 1988-2002

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4. The Herd Mentality

Apple (AAPL) Analyst Buy Ratings: 2000-Present

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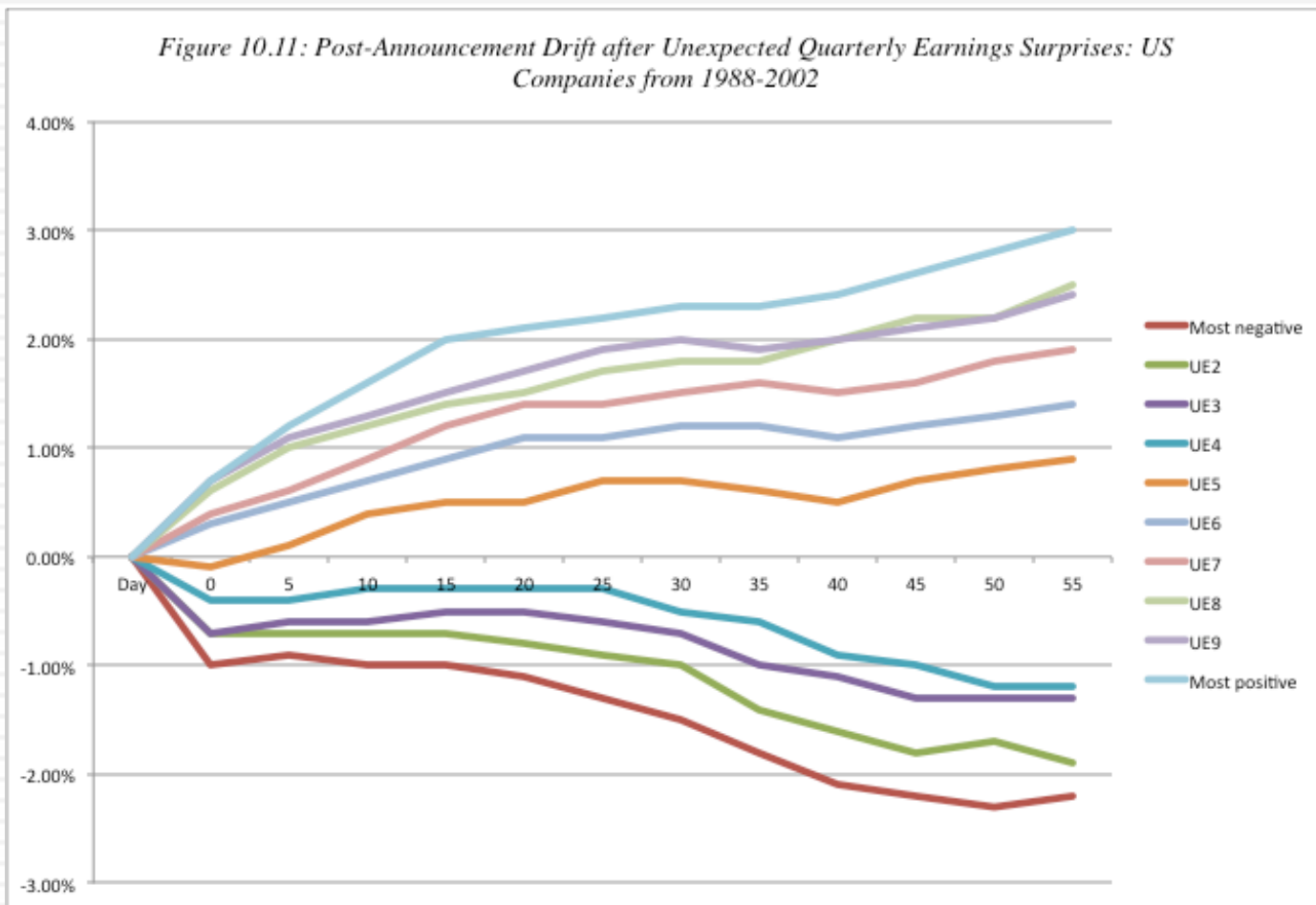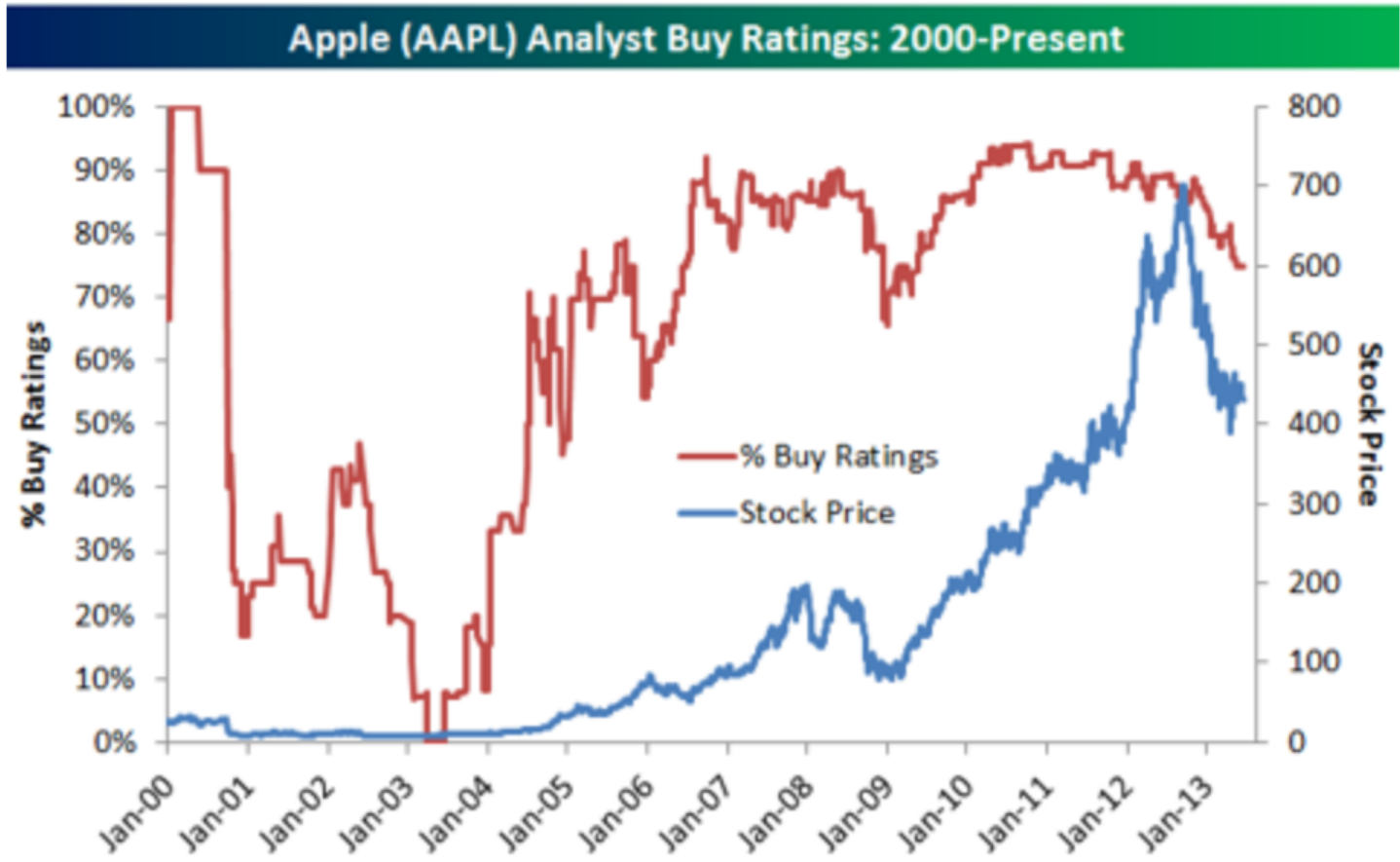
The Pricing Tool Box

- 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)

1. Technical Analysis & Charting: It's not (always) mumbo jumbo

Aswath Damodaran

2. Access to incremental information

Time = Money | Superfast traders can act on market-moving news before other investors

High-speed traders pay to get news releases directly from companies, like Business Wire, that distribute them on behalf of public companies and government entities.
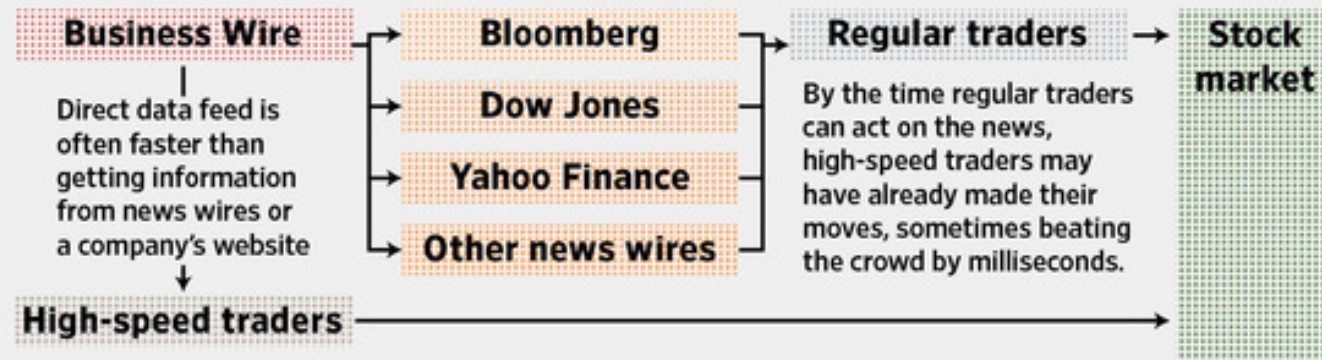
Last December, high-speed traders acted within 50 milliseconds to sell the stock of a company with disappointing earnings news.

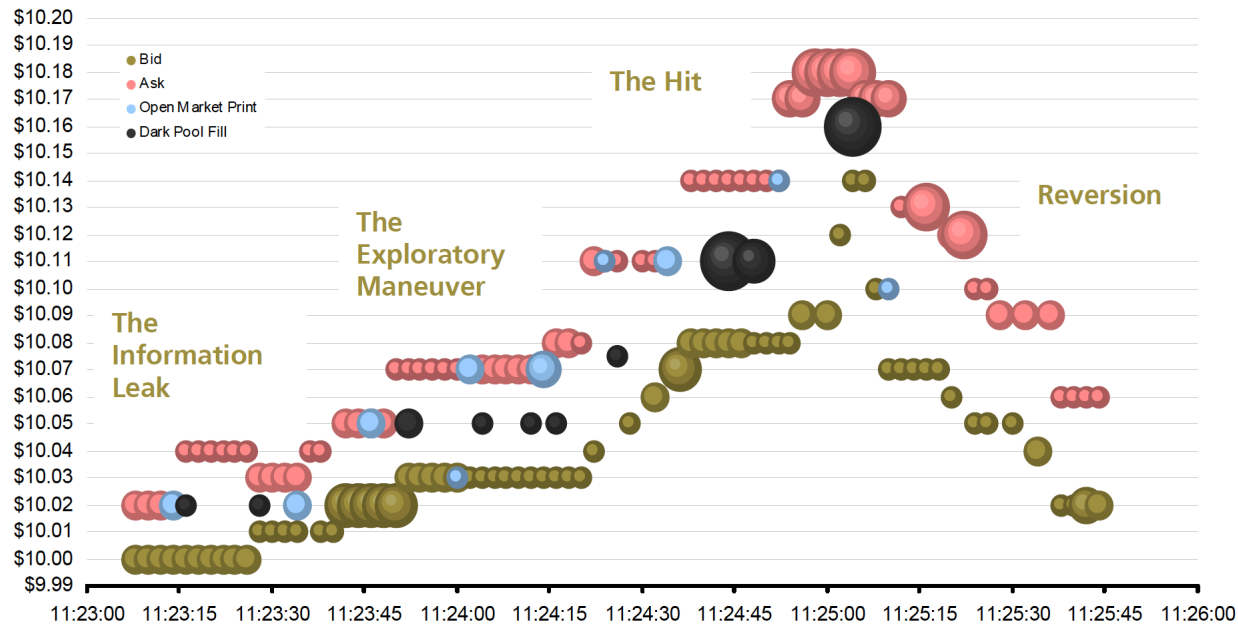Milliseconds after 4 p.m. EST on Dec. 5, 2013
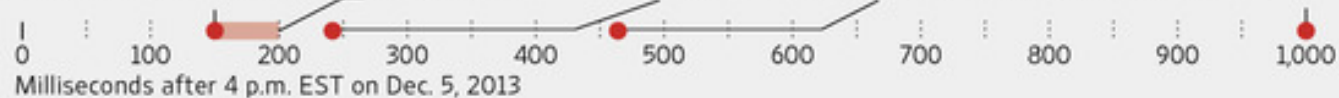
Sources: Bloomberg, Dow Jones and Thomson Reuters (publication times)

The Wall Street Journal

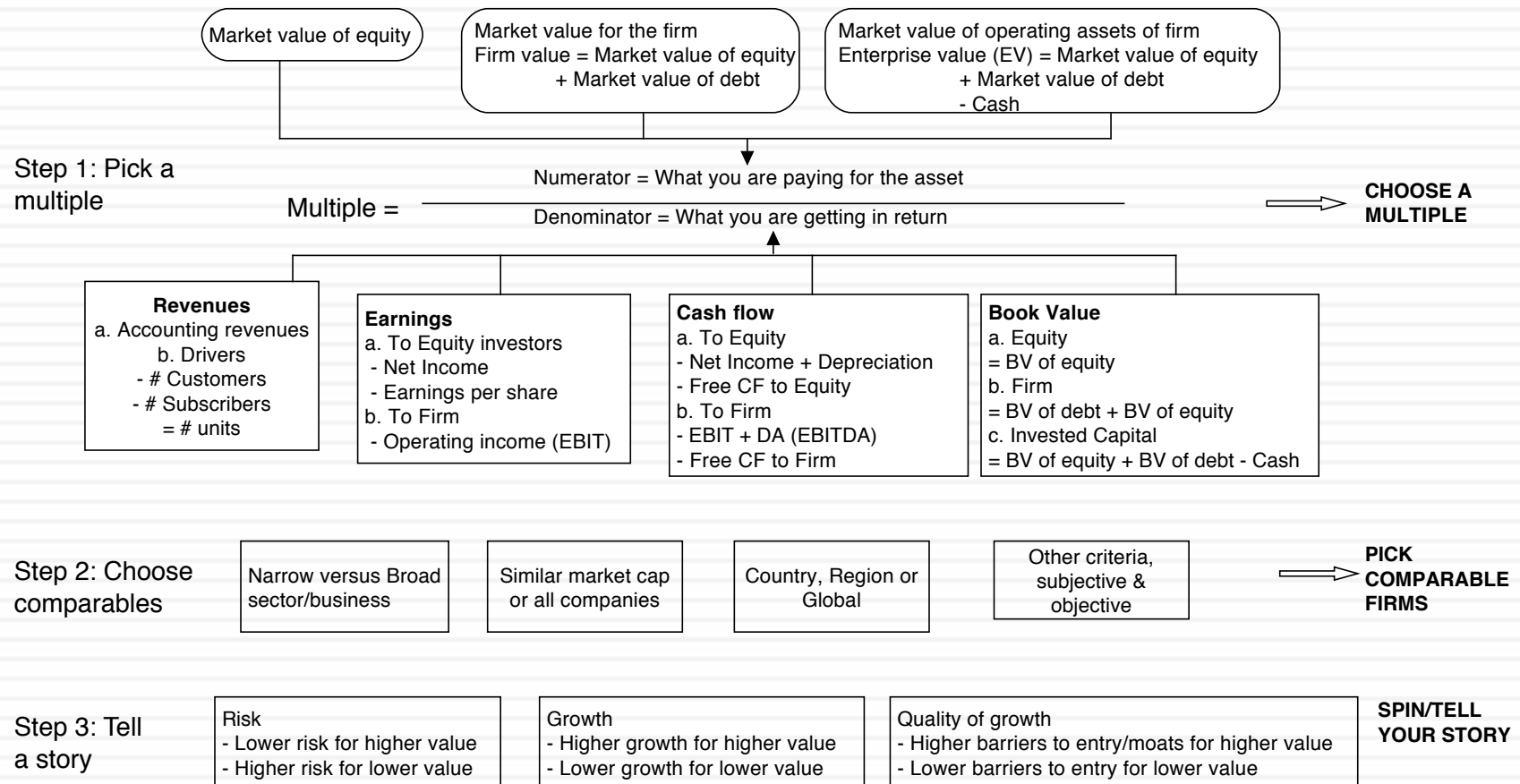Aswath Damodaran

3. The Liquidity Game: Playing volume games

How gaming happens: 1) **The Information Leak (Fishing)**- By selling a few small lots, a gamer determines that a passive buyer has placed a standing order in a stock 2) **The Exploratory Maneuver** - The gamer buys the stock rapidly in the displayed market and succeeds in moving the stock up. 3) **The Hit** – After moving the stock, the gamer sends a large sell order to the dark pool and sells at substantially higher prices than the price he started buying at in the displayed market. 4) **The Reversion** – In less then two minutes it is all over. Prices revert as the gamer stops supporting the market.

Aswath Damodaran

4. Multiples and Comparable Transactions

Market value of equity

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

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

Step 1: Pick a multiple

Numerator = What you are paying for the asset

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

⟹ **CHOOSE A MULTIPLE**

Revenues	**Earnings**	**Cash flow**	**Book Value**

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

Step 2: Choose comparables

Narrow versus Broad sector/business	Similar market cap or all companies	Country, Region or Global	Other criteria, subjective & objective

⟹ **PICK COMPARABLE FIRMS**

Step 3: Tell a story

Risk - Lower risk for higher value - Higher risk for lower value	Growth - Higher growth for higher value - Lower growth for lower value	Quality of growth - Higher barriers to entry/moats for higher value - Lower barriers to entry for lower value

SPIN/TELL YOUR STORY

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

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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.

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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

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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.

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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.

Let's try these definitional rules: PE ratio

PE = Market Price per Share / Earnings per Share

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

Price: is usually the current price

               is sometimes the average price for the year

EPS: EPS in most recent financial year

               EPS in trailing 12 months (Trailing PE)

               Forecasted EPS in next year (Forward PE)

               Forecasted EPS in future year

☐ Even though PE ratios are consistent at their most general level, there are sub-level consistency tests that you have to meet including:

   ❑ Should you use primary, diluted or partially diluted earnings per share?

   ❑ What do you do about cash balances at companies and the effects they have on market capitalization and earnings?

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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?

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Multiples have skewed distributions…

PE Ratios for US stocks: January 2014

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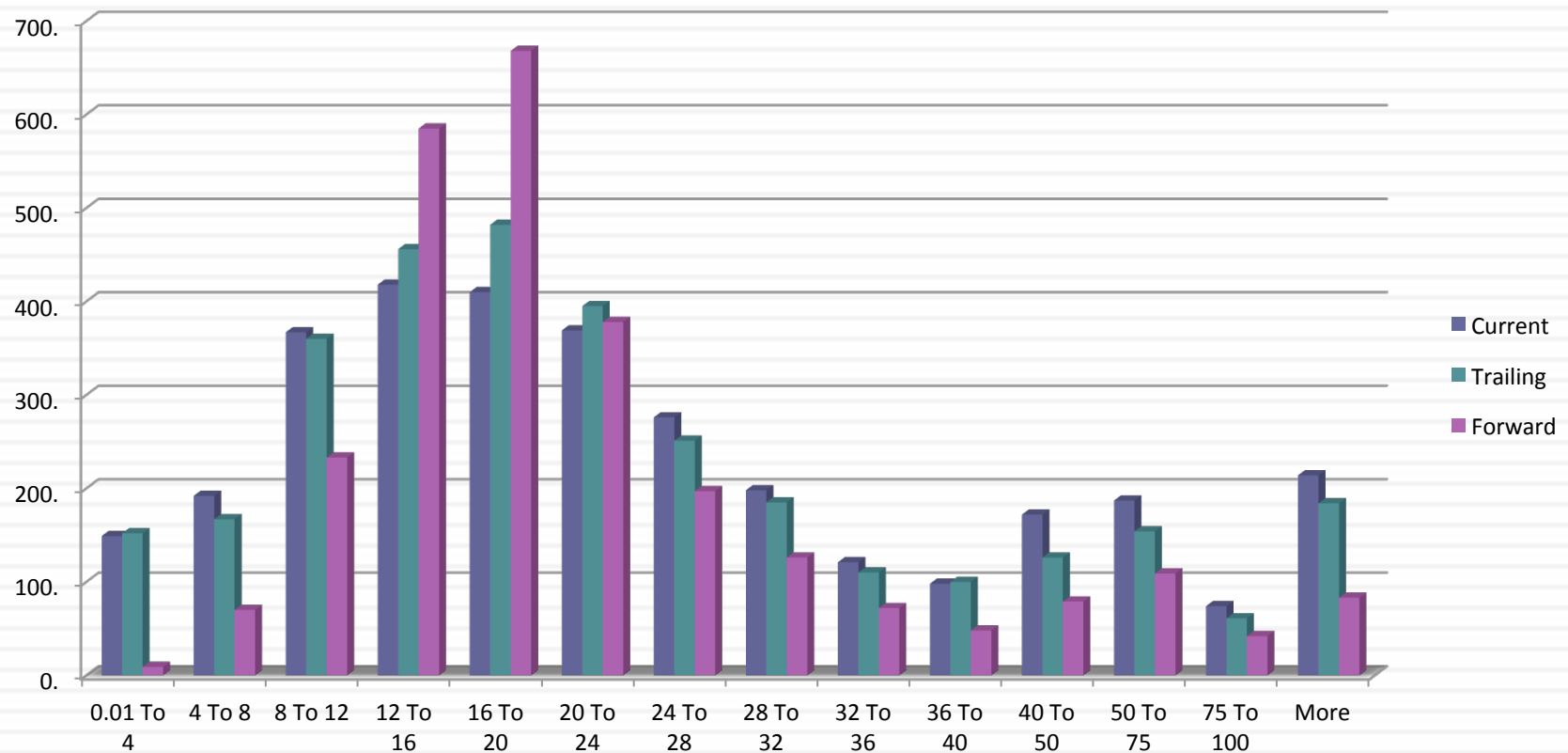
Making statistics "dicey"

	Current PE	Trailing PE	Forward PE
Number of firms	7766	7766	7766
Number with PE	3248	3186	2699
Average	52.13	50.14	38.62
Median	20.78	19.75	18.54
Minimum	0.25	0.4	0.52
Maximum	7,117.43	7,117.43	16,820.
Standard deviation	242.03	249.64	349.38
Standard error	4.25	4.42	6.72
Skewness	18.29	17.62	42.99
25th percentile	13.004	12.97	14.7
75th percentile	33.66	30.47	25.13

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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.

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PE Ratio: Understanding the Fundamentals

Equity Multiple or Firm Multiple

Equity Multiple

1. Start with an equity DCF model (a dividend or FCFE model)

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

$$P_0 = \frac{FCFE_1}{\text{Cost of equity} - g_n}$$

2. Isolate the denominator of the multiple in the model
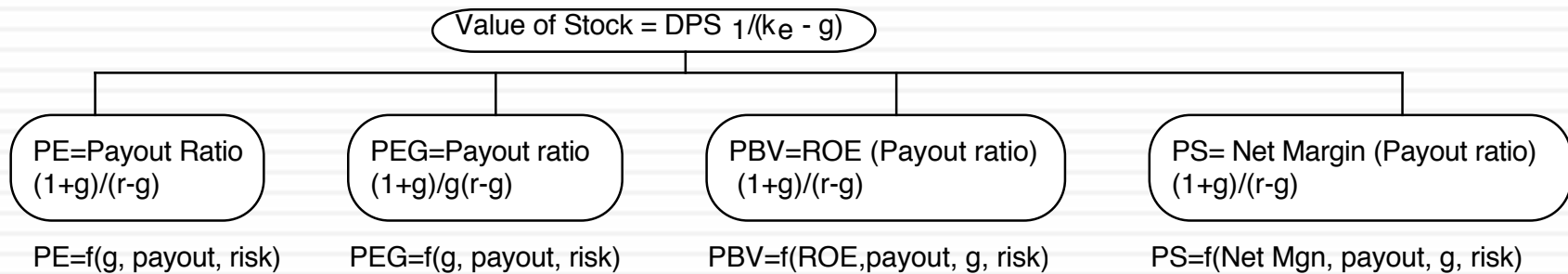3. Do the algebra to arrive at the equation for the multiple

Firm Multiple

1. Start with a firm DCF model (a FCFF model)
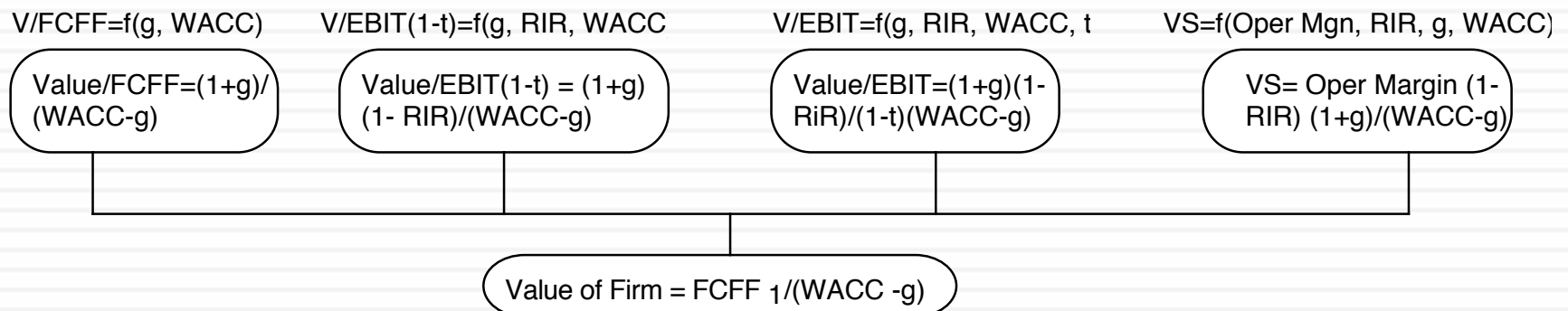
$$EV_0 = \frac{FCFF_1}{\text{Cost of capital} - g_n}$$

2. Isolate the denominator of the multiple in the model
3. Do the algebra to arrive at the equation for the multiple

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The Determinants of Multiples...

$$\text{Value of Stock} = DPS_1/(k_e - g)$$

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

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

Equity Multiples

_____

Firm Multiples

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

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

$$\text{Value of Firm} = FCFF_1/(WACC - g)$$

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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.

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If your job is price enhancement….

The market gives…   *And takes away….*

Figure 1: Cumulative abnormal returns earned around the announcement date by firms changing their names to .com names

NAME THAT STOCK

New Markets, New Names
In the bull market, adding dot-com to a company name made a stock soar. Lately those zippy new monikers are disappearing.

New Name, Higher Price
But the stocks still get a bounce when dot-com goes away. Chart shows returns in the days before and after the name change.

Sources: Thomson Datastream; P. Raghavendra Rau, Michael J. Cooper, Igor Osobov, Purdue Univ.; Ajay Khorana, Virginia Univ.; Ajay Patel, Wake Forest Univ.

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PRICE OR VALUE
WHAT SHOULD YOU DO?

What's your game?

- 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.

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Sometimes, you don't have a choice..

At $142.4 Million, Triptych Is the Most Expensive Artwork Ever Sold at an Auction

2013 Estate of Francis Bacon/Artists Rights Society (ARS), New York/DACS, London

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A fair price for gold? How about value?

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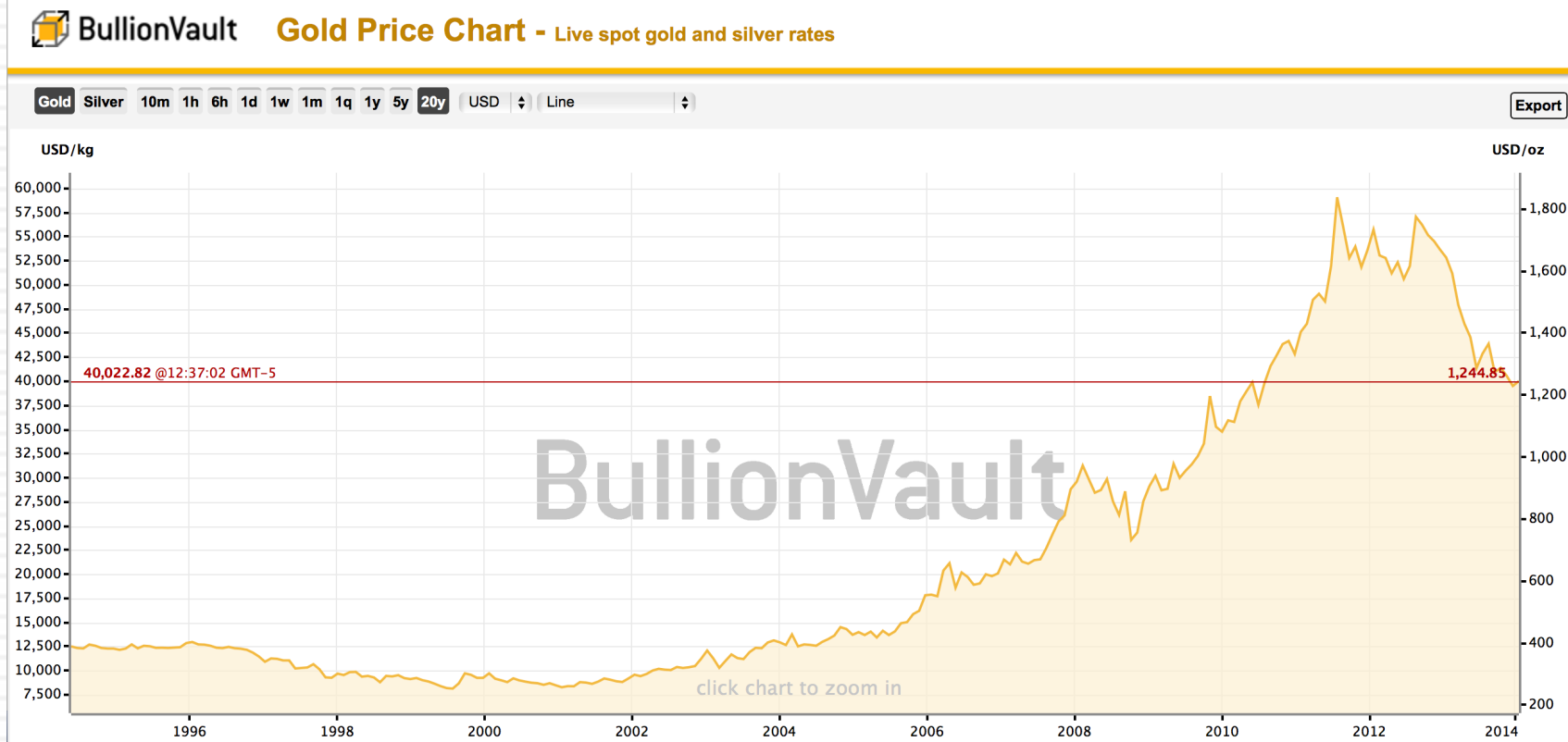
And for Bitcoins?

Bitcoin Price Index Chart

Closing Price ▼

Zoom 1h 12h 1d 1w 1m 3m 1y All From Jul 18, 2010 To Jan 30, 2014

Saturday, Mar 19, 2011
BPI (USD): **0.76**

CoinDesk BPI in effect

www.coindesk.com

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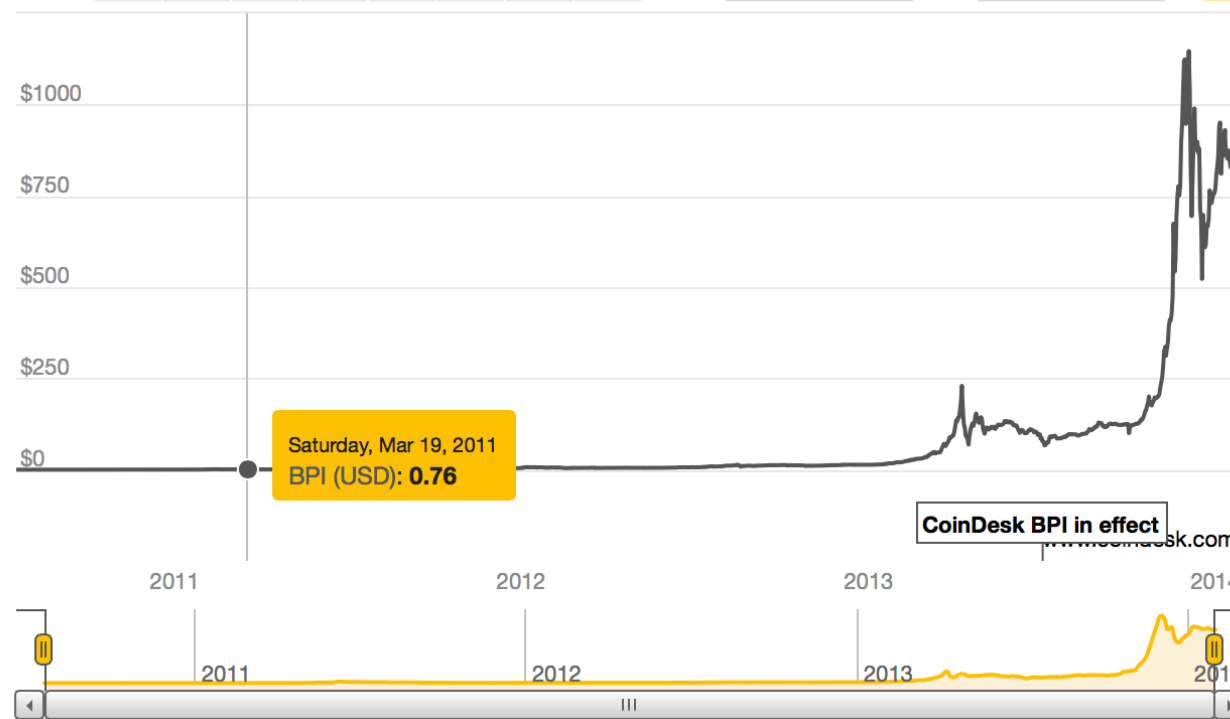
In the muddled middle, what you get is neither price nor value, but mush..

- The "fair value accounting" oxymoron: Fair value accounting requires accountants to value assets based upon what "market participants" will pay for those assets in arms length transactions today.

- Legal Valuation: In courts, experts witnesses are generally asked to opine on the values of assets, often in the abstract. It is unclear whether they are being asked to price assets or value assets, and that allows them to stake extreme positions (depending on which side is paying them).

- Academic valuation: Much of what passes for asset pricing in finance is exactly that: pricing.

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The Gap

Tools for intrinsic analysis
- Discounted Cashflow Valuation (DCF)
- Intrinsic multiples
- Book value based approaches
- Excess Return Models

Tools for "the gap"
- Behavioral finance
- Price catalysts

Tools for pricing
- Multiples and comparables
- Charting and technical indicators
- Pseudo DCF
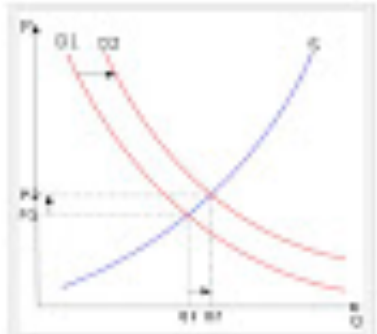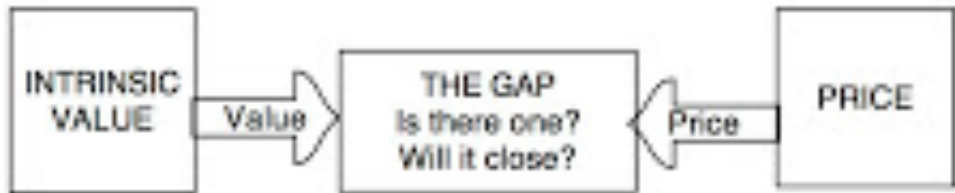
INTRINSIC VALUE → Value → THE GAP Is there one? Will it close? ← Price ← PRICE

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

Drivers of "the gap"
- Information
- Liquidity
- Corporate governance

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

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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.

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If you believe in efficient markets, there is no contradiction

□ If you believe that markets are efficient, you are not arguing that there will never be gaps between price and value, but that if there are gaps, they are random and cannot be exploited by investors.

□ If you buy into this notion, it is indeed appropriate to use price and value as interchangeable, since the market price is your best estimate of the value.

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If you are a pure pricer (trader)

- Philosophy: The price is the only real number that you can act on. No one knows what the value of an asset is and estimating it is of little use.

- To play the game: 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 shift.

- Key skill: Be able to gauge market mood/momentum shifts earlier than the rest of the market.

- Time Horizon: Can be very short term (minutes) to mildly short term (weeks, months).

- Key personality traits: (a) Market amnesia, (b) Quick acting (c) Gambling instincts.

- Added Bonus: Capacity to move prices (with lots of money and lots of followers)

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And here are your dilemmas..

- □ <u>No anchor</u>: 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.

- □ <u>Reactive</u>: Without a core measure of value, your investment strategy will often be reactive rather than proactive.

- □ <u>Crowds are fickle and tough to get a read on</u>: 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.

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To be a pure valuer

- ➤ <u>Philosophy</u>: Every asset has a fair or true value. You can estimate that value, albeit with error, and price has to converge on value (eventually).

- ➤ <u>To play the game</u>: You try to estimate the value of an asset, and if it is under(over) value, you buy (sell) the asset. To win the game, you have to be right about value (for the most part) and the market price has to move to that value.

- ➤ <u>Key skill(s)</u>: Be able to "value" assets, given uncertainty.

- ➤ <u>Time Horizon</u>: As long as it takes for market to correct their mistakes.

- ➤ <u>Key personality traits</u>: (a) Faith in "value" (b) Patience (c) immunity from peer pressure.

- ➤ <u>Added Bonus</u>: Can provide the catalyst that can move price to value.

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And your dilemma...

- 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.

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A case study: Apple in early 2013

□ Starting in September 2012, when the stock peaked at $700, the pricing mood turned sour at the company with the stock dropping to $450 by the end of January 2013.

□ In January 2013, I valued the company at about $600/share, and suggested that it was significantly under valued.

□ I also argued that investors were pricing the stock to deliver no growth and have rapidly declining margins and were then punishing the stock for delivering some growth and slowly declining margins.

	Last year	Q2 2013	My estimate	Breakeven
Revenue Growth Rate	44.58%	11.28%	5.00%	-5.00%
Operating Margin	35.30%	28.80%	25.00%	12.00%
Cost of capital	12.49%	11.29%	11.29%	21.00%

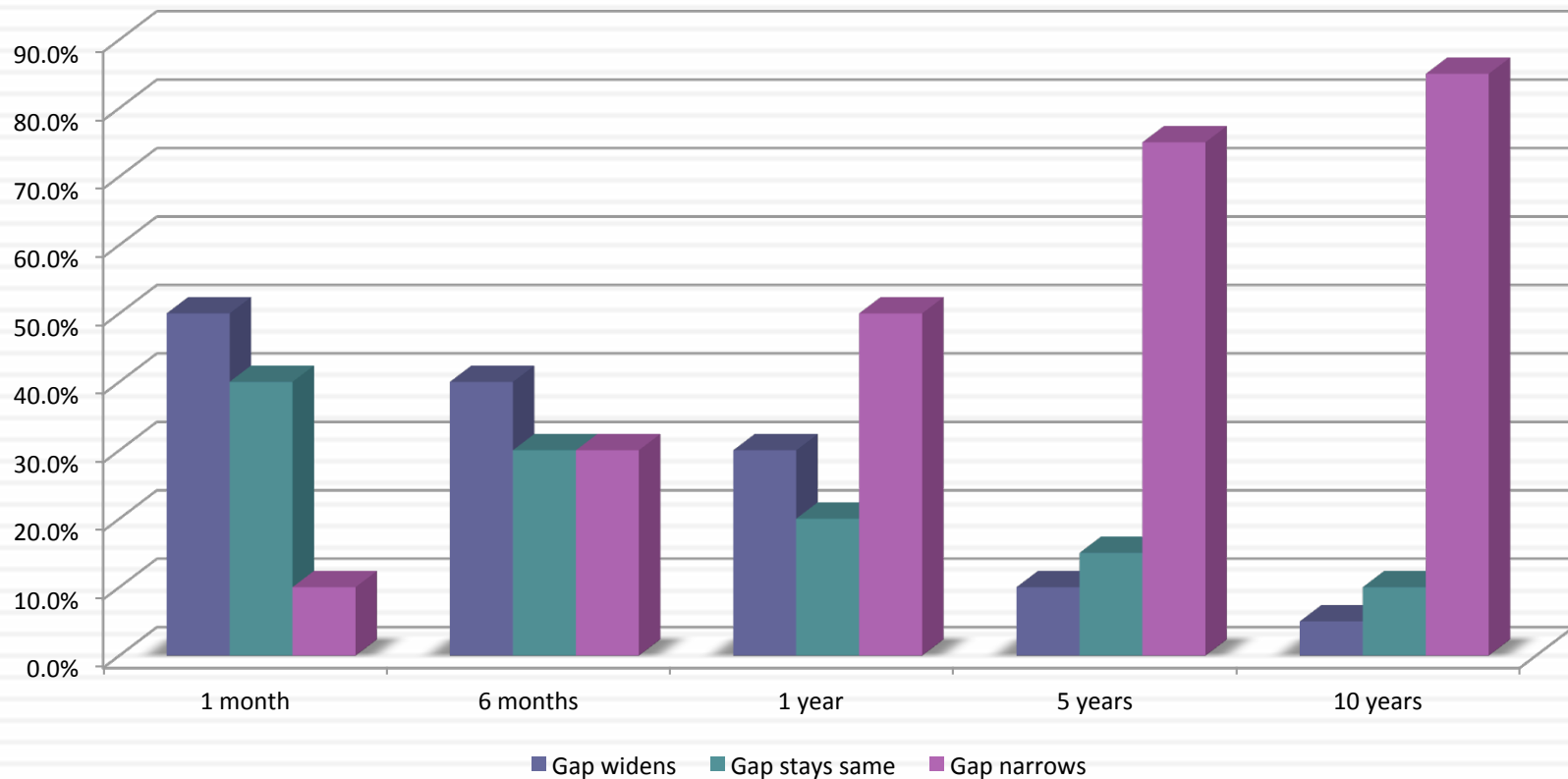Aswath Damodaran

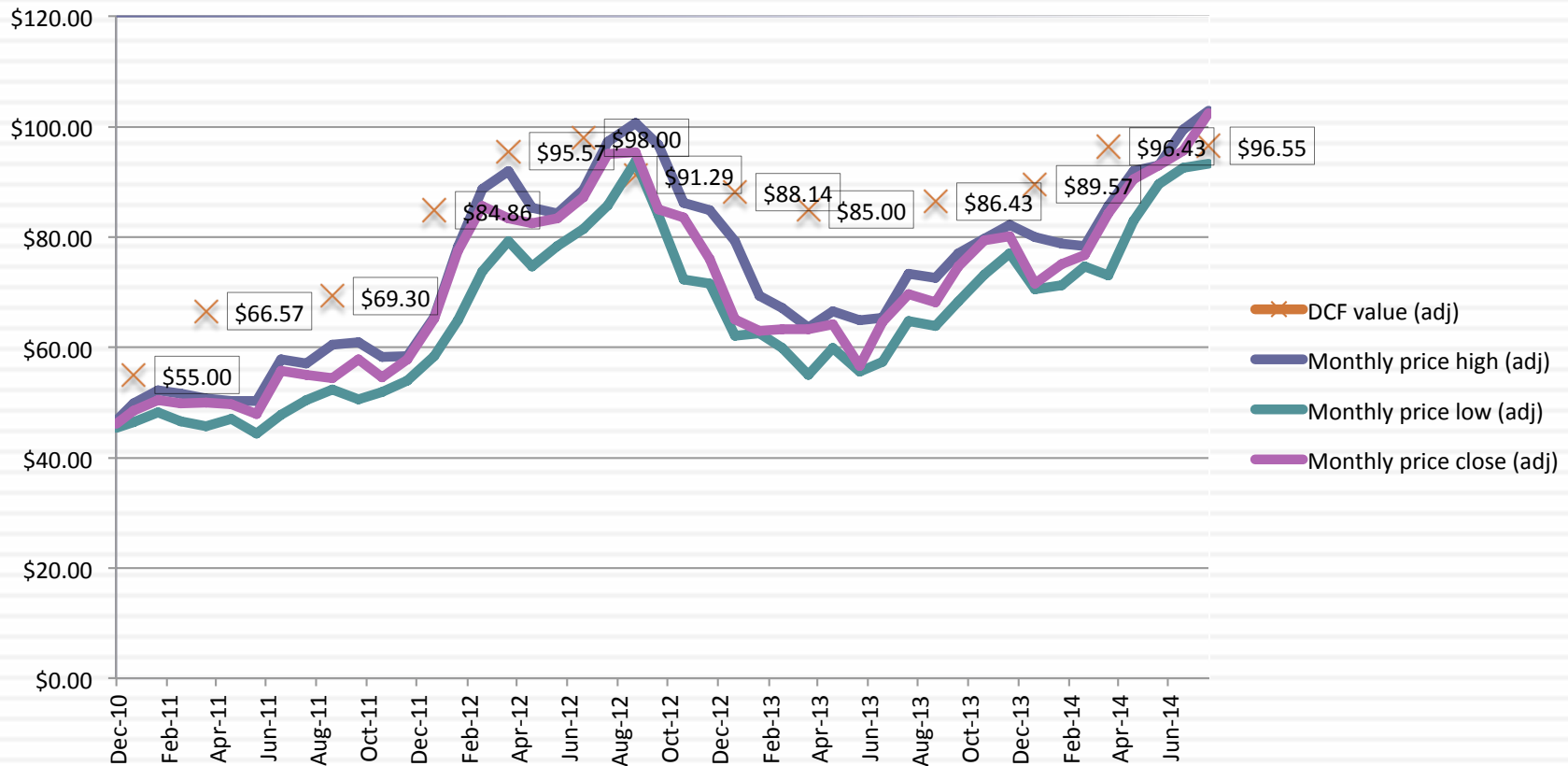# Apple: Visualizing uncertainty
A simulation of value in January 2013

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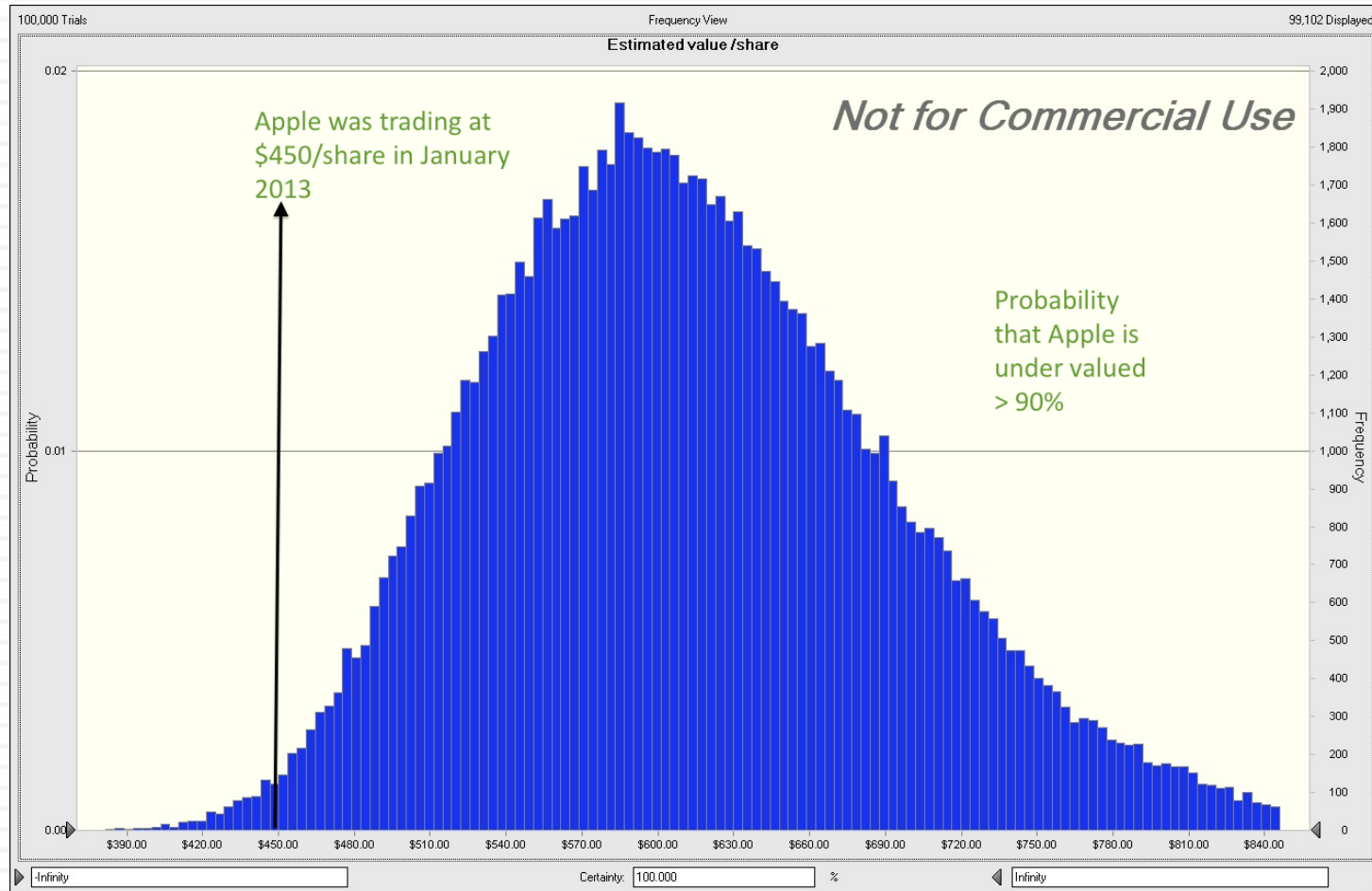
Gap and Time Horizon: My estimates for Apple in January 2013

Apple: Pricing Gap versus Time Horizon in January 2013

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Watch the Gap! Apple updated through September 2014

Apple: Price and Value - 2010 to 2014

Legend:
- DCF value (adj)
- Monthly price high (adj)
- Monthly price low (adj)
- Monthly price close (adj)

DCF value markers: $55.00, $66.57, $69.30, $84.86, $95.57, $98.00, $91.29, $88.14, $85.00, $86.43, $89.57, $96.43, $96.55

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And the uncertainty is greater in some assets (stocks) than others

□ 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%

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

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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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

Temperature	Last Month	Last Year
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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%

2004 Best Places Rank

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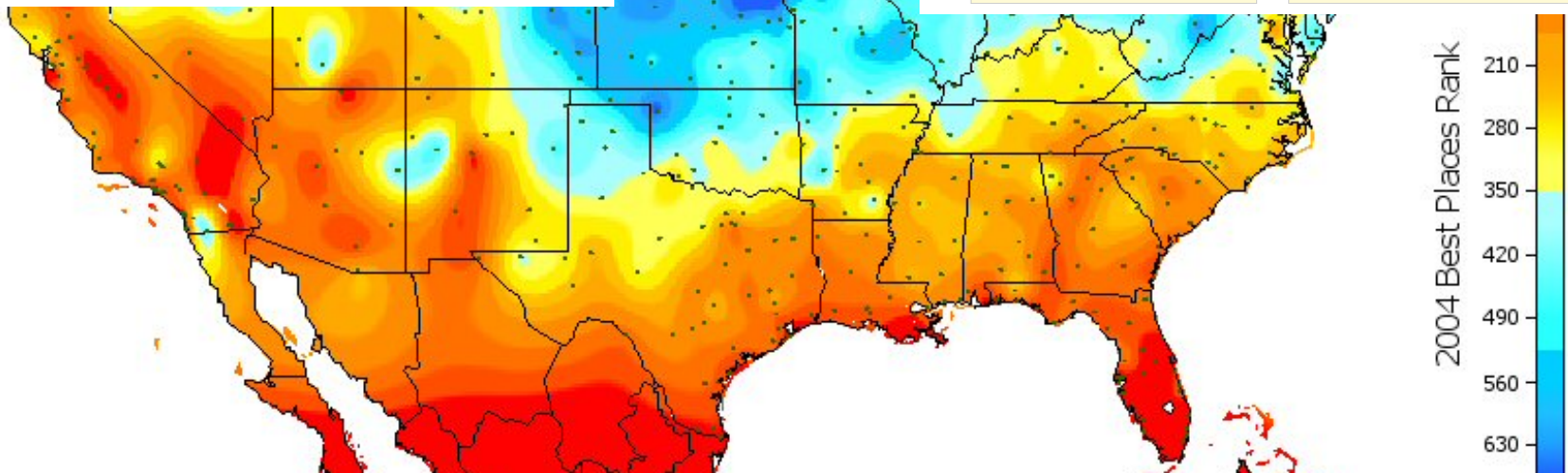
Three rules for the road

1. <u>Do your job</u>: There is no right or wrong way to put a number on an asset. If your job is to price it, that is exactly what you should do. If it is to value it, go for an intrinsic value approach.

2. <u>Don't be delusional</u>: 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. <u>Play to your strengths</u>: To be a successful investor, you have to know what makes you tick and pick the approach that best fits you.

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