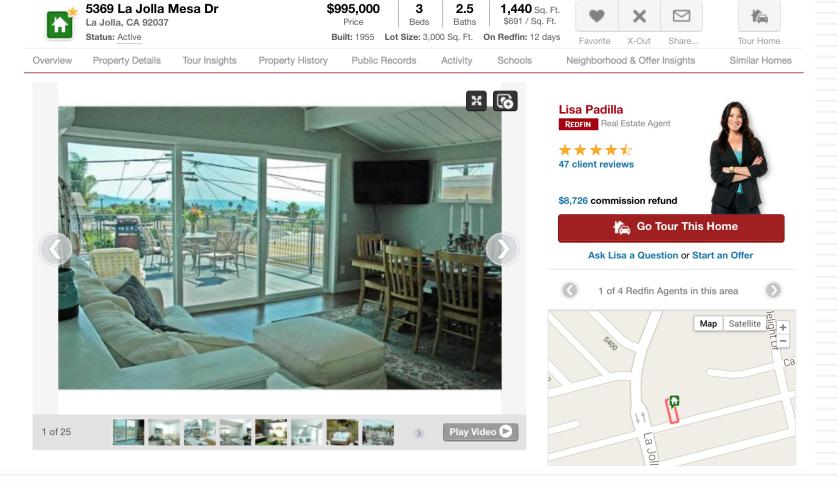
PRICE AND VALUE: DISCERNING THE DIFFERENCE

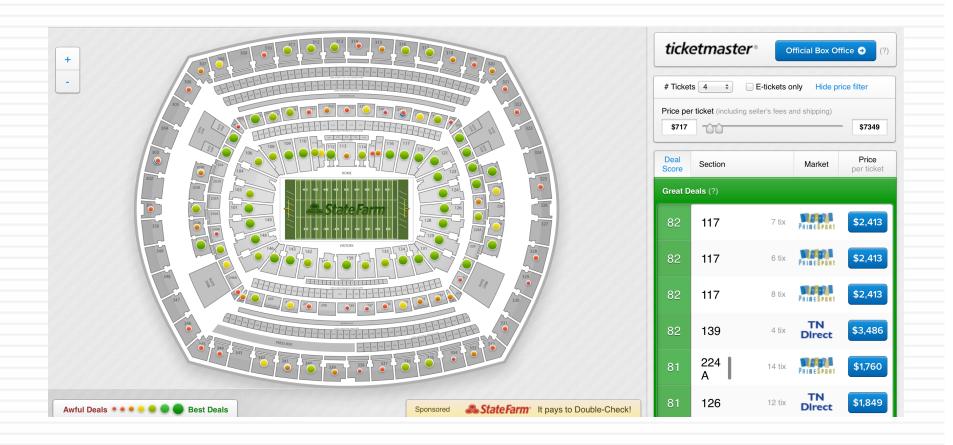
May 2014 Aswath Damodaran

Test 1: Are you pricing or valuing?

2



3



Test 3: Are you pricing or valuing?

4

Europe

Switzerland

Biotechnology

Biotechnology

Reuters	Bloomberg	Exchange	
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

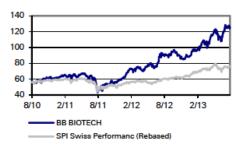
Over the past two years, BB Biotech shares have roughly tripled, which could tempt investors to take profits. However, this performance has been well backed by a deserved revival of the biotech industry, encouraging fundamental news, M&A, and increased money flow into health care stocks. In addition, 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 Ruy on RB Riotech shares.



Price/price relative



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

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

Value today $= 200/1.5^3$

 $= 200/1.5^{\circ}$ = \$59.26 m Discount back at target rate of return on 50%

Test 5: Are you pricing or valuing?

\$1,132.81

	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				

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Value of equity

Test 6: Are you pricing or valuing?

- You are an accountant, given the onerous and massive responsibility of restating the assets on a balance sheet to "fair value".
- 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</u> the asset or owes the <u>liability</u>.
- Therefore, the definition focuses on the price that 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)."

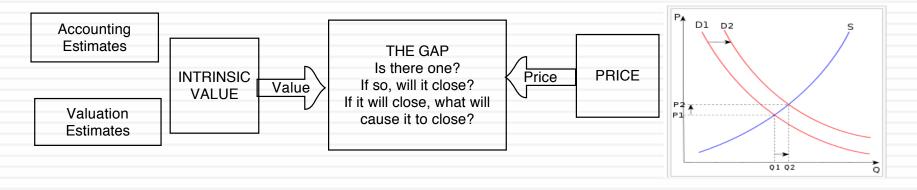
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Drivers of intrinsic value

- Cashflows from existing assets
- Growth in cash flows
- Quality of Growth

Drivers of price

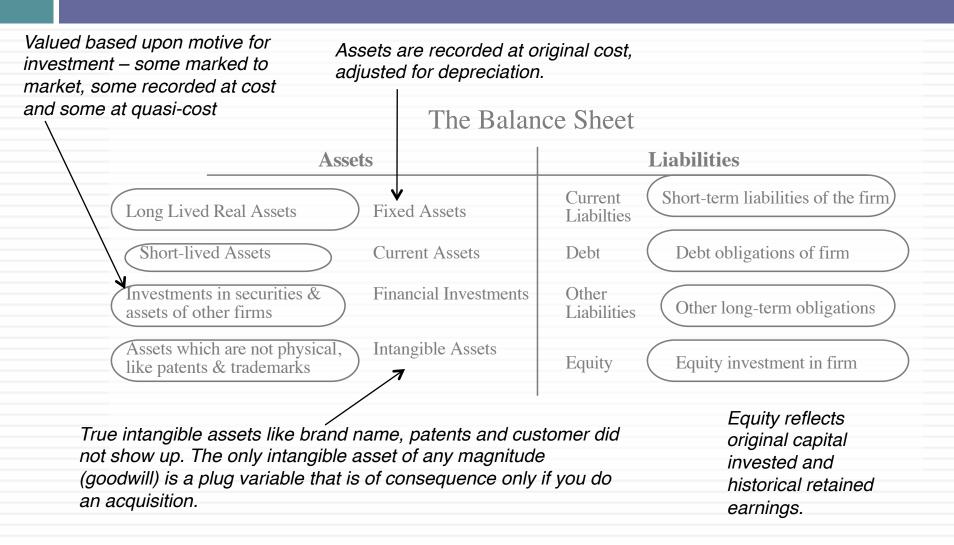
- Market moods & momentum
- Surface stories about fundamentals



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8

The traditional accounting balance sheet...



The intrinsic value balance sheet

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

A	SS	e	ts

Existing Investments
Generate cashflows today
Includes long lived (fixed) and
short-lived(working
capital) assets

Expected Value that will be created by future investments

Assets in Place

Growth Assets

Liabilities

Fixed Claim on cash flows
Little or No role in management
Fixed Maturity
Tax Deductible

Equity

Debt

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.

The "Market Price" balance sheet

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)

A Market Value Balance Sheet Liabilities **Assets** Borrowed money **Existing Investments** Investments already Debt Generate cashflows today made Owner's funds Expected Value that will be Equity Investments yet to created by future investments be made Should equate to market value of equity, if publicly traded.

Twitter: The Contrast in November 2013

12

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			

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.
- 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.

What are the cashflows from existing assets?

- Equity: Cashflows after debt payments
- Firm: Cashflows before debt payments

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

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?

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.

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

Steady state

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

Risk in the Cash flows

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

1. Cash Flows

17	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.
A	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.

Will vary across currencies and across time.



Beta

Relative measure of risk added to a diversified portfolio.

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

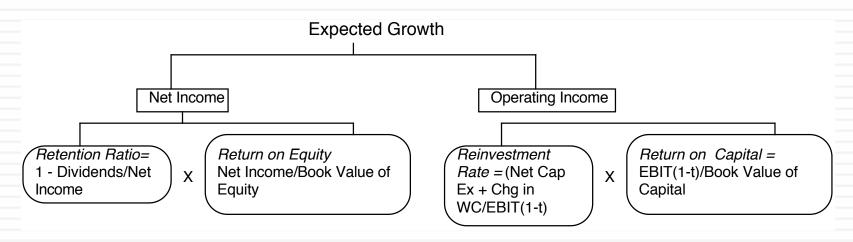


Equity Risk Premium

Premium investors demand over and above the risk free rate for investing in equities as a class.

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

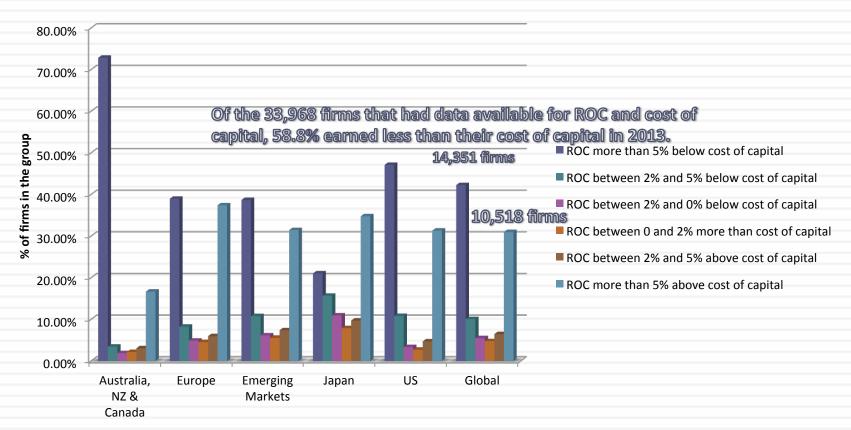
3. Expected Growth



- Quality growth is rare 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.
- The larger you get, the more difficult it becomes to maintain quality growth.
- □ You can grow while destroying value at the same time.

And its value...

ROIC versus Cost of Capital: A Global Assessment for 2013



4. The Terminal Value

Are you reinvesting enough to sustain your stable growth rate? Move towards a Reinv Rate = g/ROC marginal tax rate Is the ROC that of a stable company? EBIT_{n+1} (1 - tax rate) (1 - Reinvestment Rate) Terminal Value_n = Cost of capital - Expected growth rate This is a mature This growth rate should be less company. Its cost of than the nominal growth rate of capital should reflect the economy that.

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.

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

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

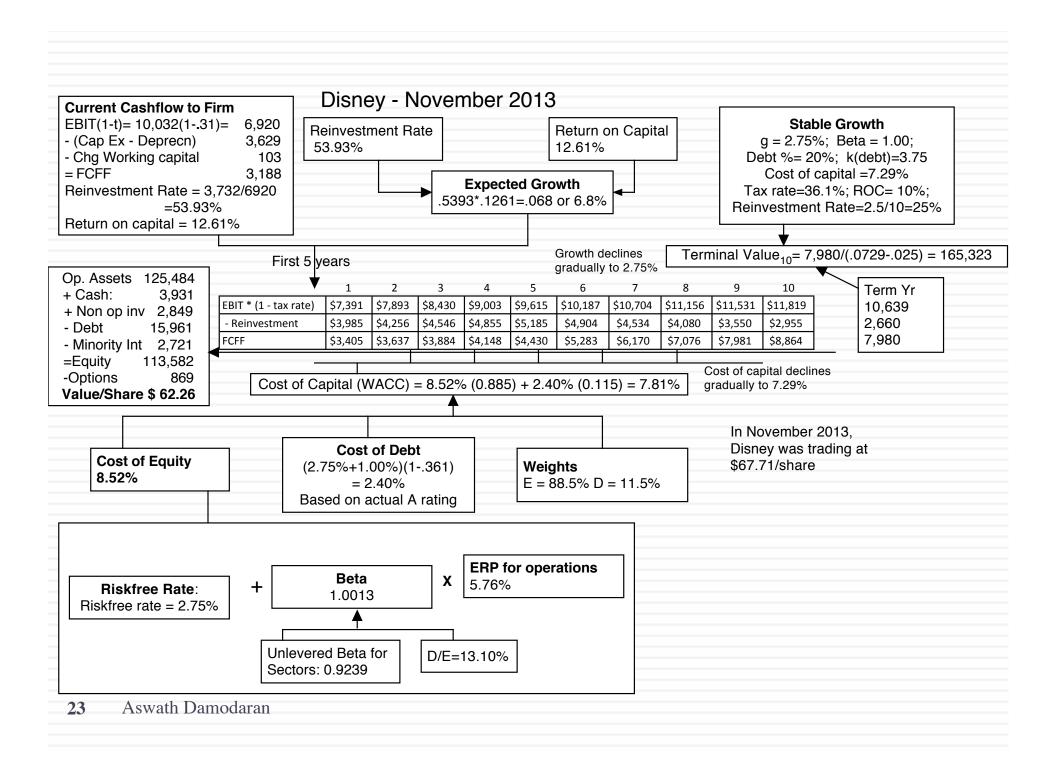
Look at the variability of past earnings and the sources of the variability.

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.



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?

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

What is the value of equity in the firm?

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

Limited historical data on earnings, and no market prices for securities makes it difficult to assess risk. When will the firm become a mature fiirm, and what are the potential roadblocks?

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

	20	2011 2012 2013		2012		13
	%	\$	%	\$	%	\$
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%	2.00% 2.50% 3.00% 3.50% 4.00										
Online	20%	\$124.78	\$131.03	\$137.56	\$144.39	\$151.52							
advertising	25%	\$155.97	\$163.79	\$171.95	\$180.49	\$189.40							
share of	30%	\$187.16	\$196.54	\$206.34	\$216.58	\$227.28							
market	35%	\$218.36	\$229.30	\$240.74	\$252.68	\$265.16							
market	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

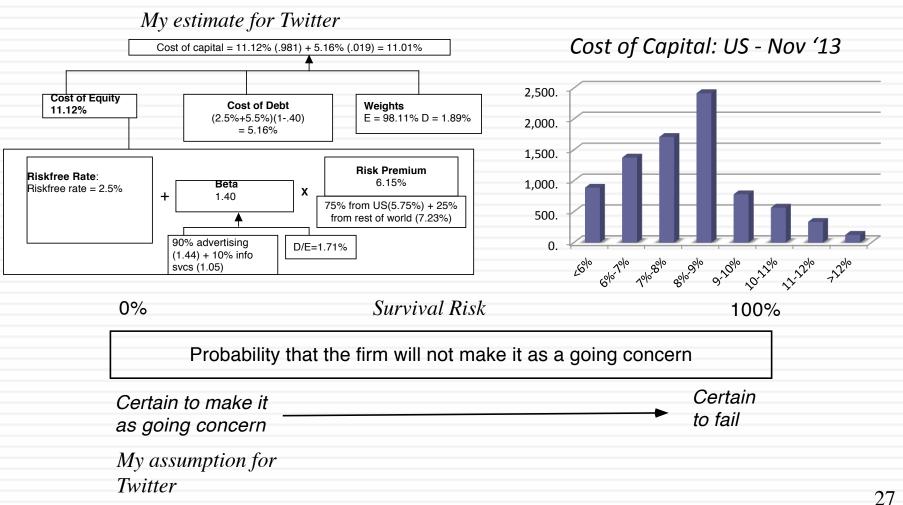
3. Reinvest for growth

Sales/ Invested Ca					
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





Starting numbers

Twitter Pre-IPO Valuation: October 27, 2013

		Trailing 12
	Last 10K	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

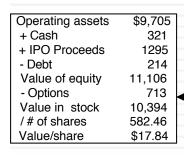
Pre-tax operating margin increases to 25% over the next 10 years

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 Value₁₀= 1466/(.08-.025) = \$26,657

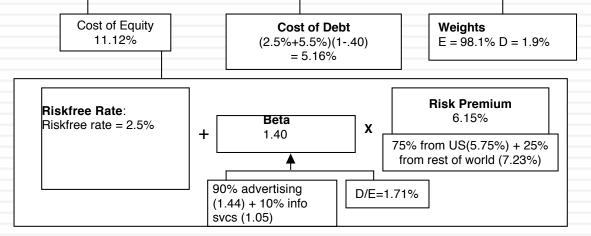


	1	2	3	4	5	6	7	8	9	10
Revenues	\$ 810	\$1,227	\$1,858	\$2,816	\$4,266	\$6,044	\$7,973	\$9,734	\$10,932	\$11,205
Operating Income	\$ 31	\$ 75	\$ 158	\$ 306	\$ 564	\$ 941	\$1,430	\$1,975	\$ 2,475	\$ 2,801
Operating Income after tax	\$ 31	\$ 75	\$ 158	\$ 294	\$ 395	\$ 649	\$ 969	\$1,317	\$ 1,624	\$ 1,807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

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

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

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



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	

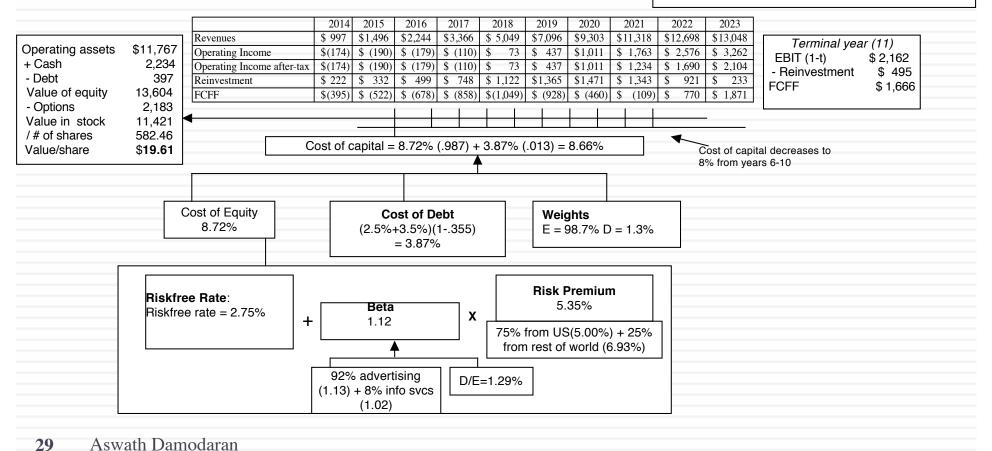
Revenue growth of 50% a year for 5 years, tapering down to 2.75% in year 10

Pre-tax operating margin increases to 25% over the next 10 years Sales to capital ratio of 1.50 for incremental sales

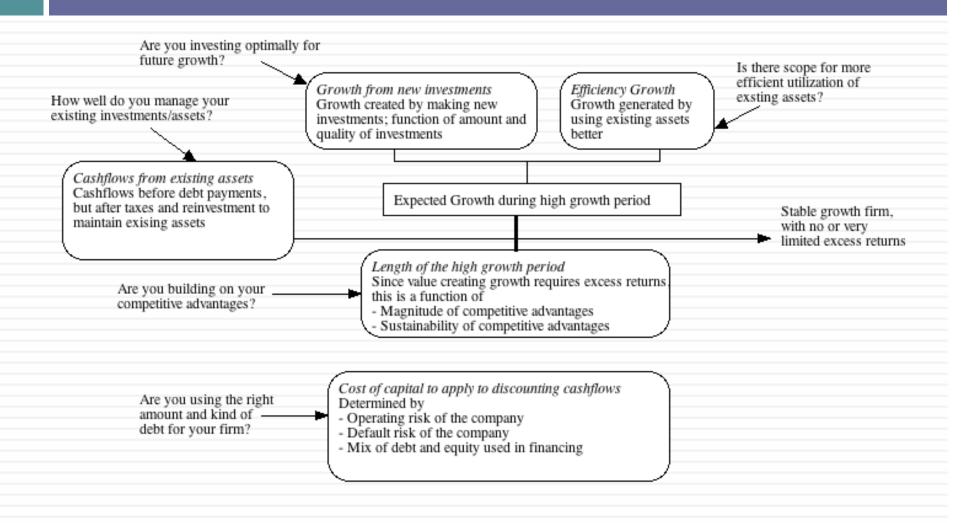
Stable Growth

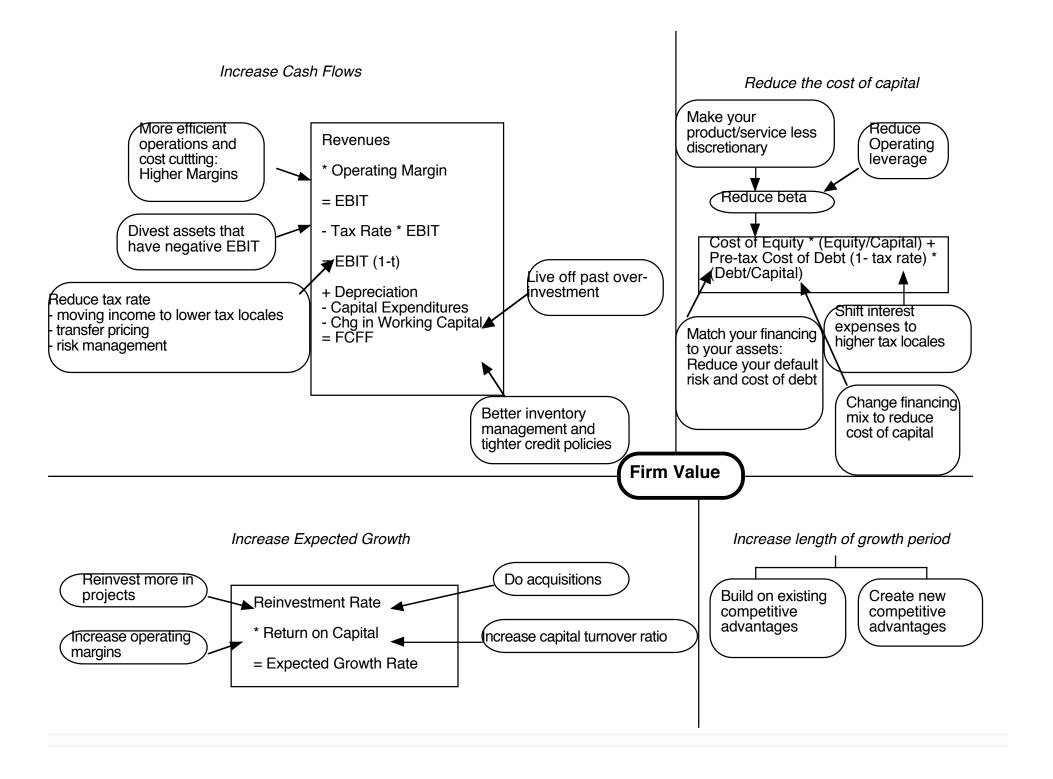
g = 2.75%; Cost of capital = 8% ROC= **12**%; Reinvestment Rate=2.75%/12% =22.92%

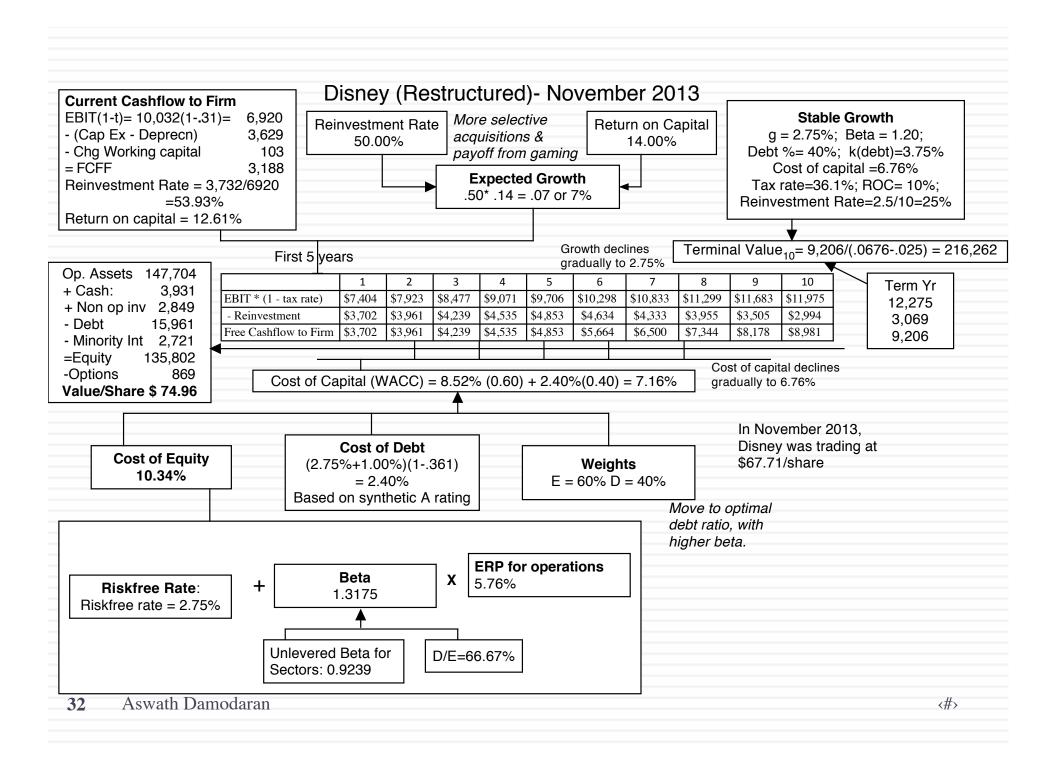
Terminal Value₁₀= 1666/(.08-.025) = \$31,741



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







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.

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	

8,152

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

+

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

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

Sales to capital ratio of 1.41 for incremental sales

Used US equity risk premium

D/E=2.64%

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

Cost of capital decreases to

8% from years 6-10

\$12.174 \$2,259 \$3,840 \$6,528 \$11,097 \$18,866 | \$29,534 | \$42,263 \$54,794 \$63,671 \$65,422 Operating assets Revenues 202 \$1,879 \$3,001 \$5,082 \$5,316 EBIT (1-t) -\$5 \$45 \$170 \$445 \$1.024 \$4,186 579 - Reinvestment \$660 \$1,121 \$1,906 \$3,241 \$5,509 \$7,566 \$9.028 \$8,887 \$6,296 \$1,242 Value of equity 11,797 = FCFF -\$1,214 \$4,074 -\$665 -\$1,076 | -\$1,737 | -\$2,795 -\$4,485 -\$5,687 -\$6,027 -\$4,701 3.645

Terminal year (11) EBIT (1-t) \$ 5.462 - Reinvestment \$1,877 **FCFF** \$3,584

121.45 Cost of capital = 10.18% (.974) + 4.55% (.026) = 10.03%\$67.12 Cost of Equity Cost of Debt Weights 11.12% (2.75%+4.25%)(1-.35) E = 97.4% D = 2.6%= 5.16% **Risk Premium** Riskfree Rate: 5.80% Beta Riskfree rate = 2.75%X

1.26

60% autos (1.11) +

40% technology (1.39)

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

+ Cash

- Debt

- Options

Value in stock

/# of shares

Value/share



Starting numbers

30

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

	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%	

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 Value₁₀= 4,182/(.08-.0275) = \$79,664

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

Operating assets \$16,636 + Cash 846 739 - Debt Value of equity 16.742 - Options 4,381 Value in stock 12,362 / # of shares 123.19 Value/share \$100.35

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

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 Equity 8.87% Cost of Debt Weights (2.75%+3.25%)(1-.35)E = 97.34% D = 2.66% = 3.90%Riskfree Rate: Riskfree rate = 2.75%**Risk Premium** 5.00% Beta X + 1.22 Used US equity risk premium 70% autos (1.14) + Lower ERP for D/E=2.73% Changed business mix market 30% technology (1.29)

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

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

Three simple suggestions to make you better at estimating intrinsic value!

- Be honest about your biases/preconceptions: The biggest bogeyman in most valuations is that your preconceptions and biases will lead your choices. While you can never be unbiased, being aware of your biases can help.
- Keep it simple: Less is more in valuation. While it is easy to build bigger models and you have more access to data, parsimonious valuations often do a better job than complex ones.
- Face up to uncertainty: Uncertainty is a feature, not a bug. Make the best estimates you can, with the information you have, recognize that everyone else faces the same uncertainty and understand that you don't have to be right, just less wrong than everyone else.

PRICING IT'S DEMAND AND SUPPLY

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

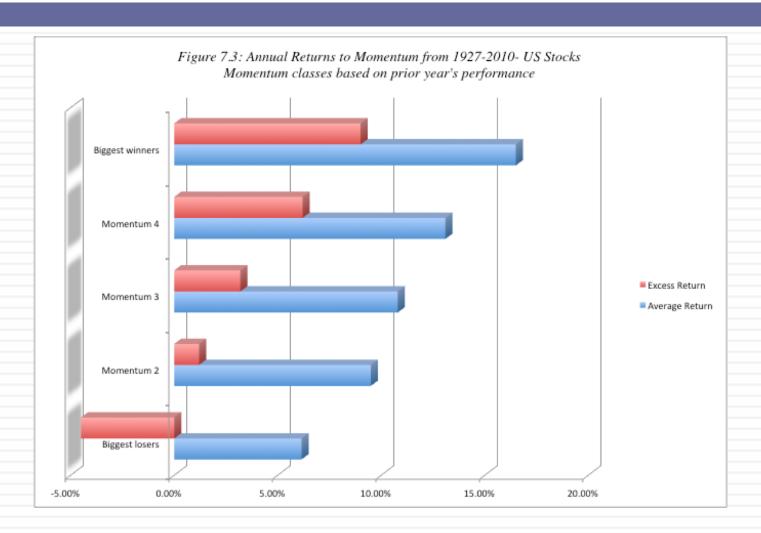
Incremental information

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

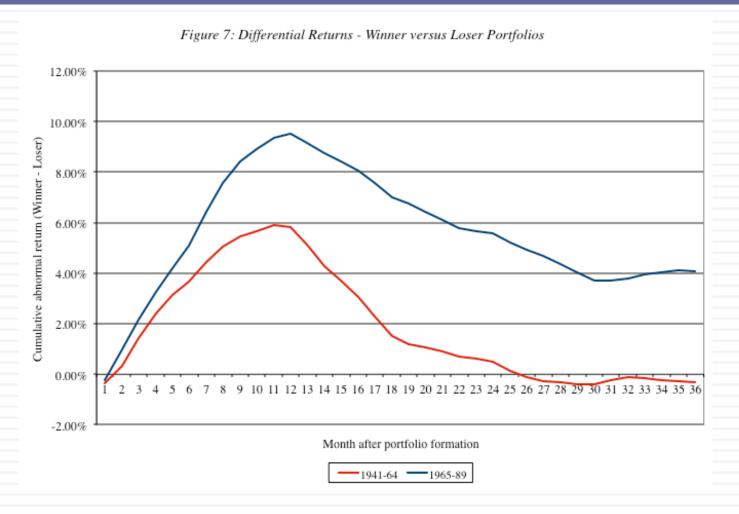
Group Think

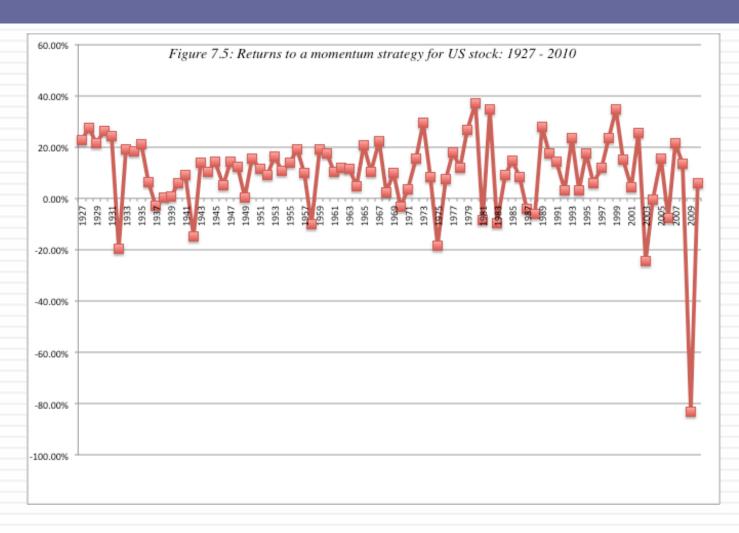
To the extent that pricing is about gauging what other investors will do, the price can be determined by the "herd".

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With inflection points





Used a computer algorithm & 9.7 million tweets to see if you can predict movements in the

Dow 30. Find 87% correlation

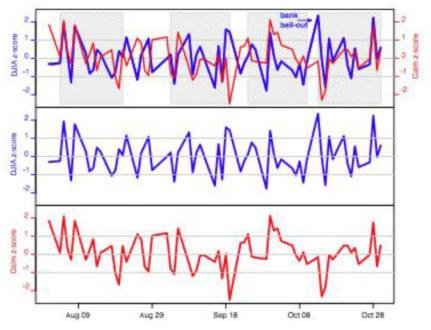
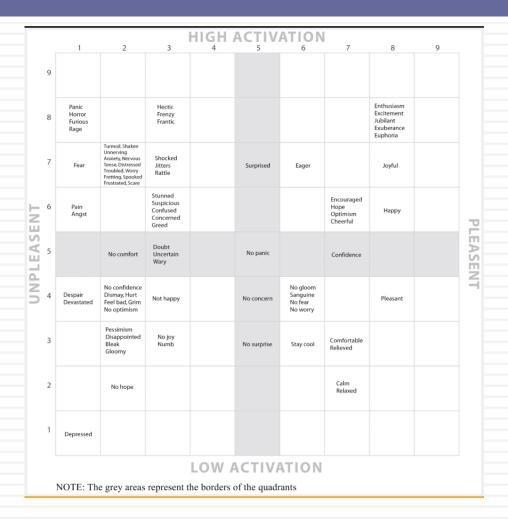


Fig. 3. A panel of three graphs. The top graph shows the overlap of the day-to-day difference of DJIA values (blue: \mathbb{Z}_{D_t}) with the GPOMS' Calm time series (red: \mathbb{Z}_{X_t}) that has been lagged by 3 days. Where the two graphs overlap the Calm time series predict changes in the DJIA 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.



Aswath Damodaran

And pricing consequences...

	Prior Day Closing Price Control		Pleasant Mood Univariate		Unpleasant Mood Univariate		Full Multivariate Model	
	^		^		^		^	
	В	T-value	В	T-value	В	T-value	В	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.

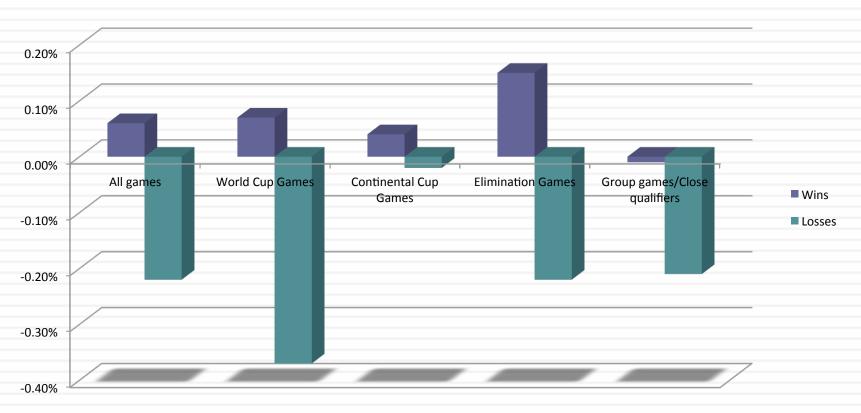
*p<.05.

**p<.01.

All analyses include ARIMA(3,0,3) terms. doi:10.1371/journal.pone.0072031.t003

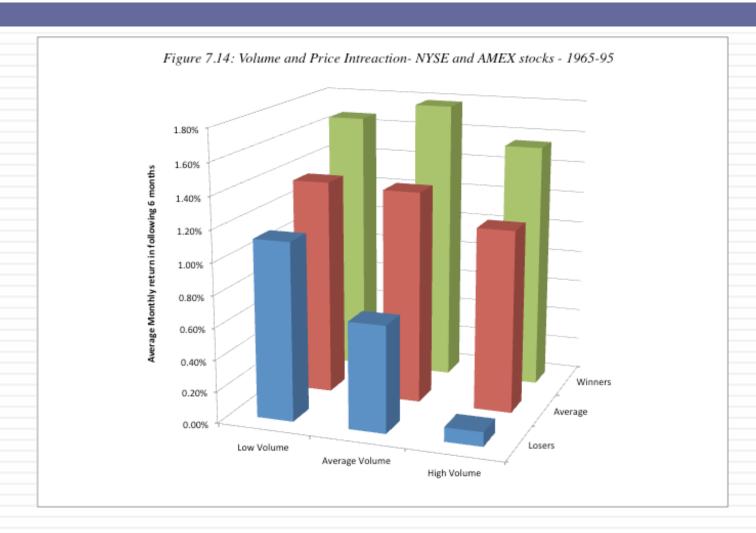
Another mood experiment: The market and sporting outcomes

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

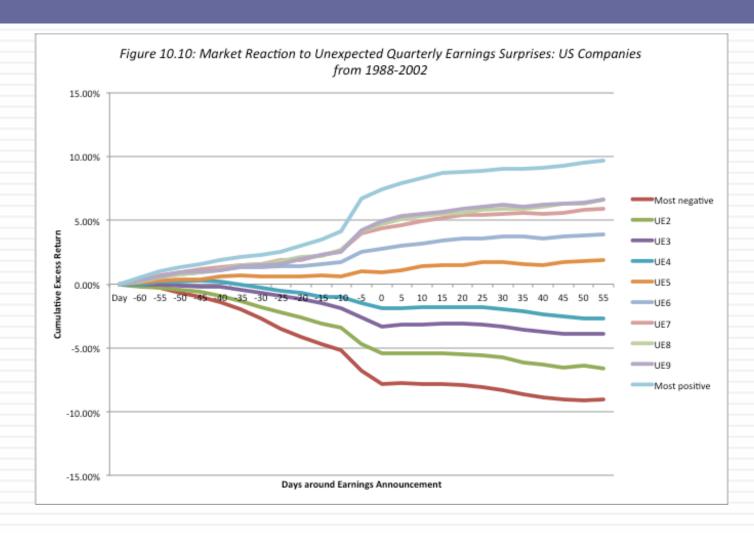


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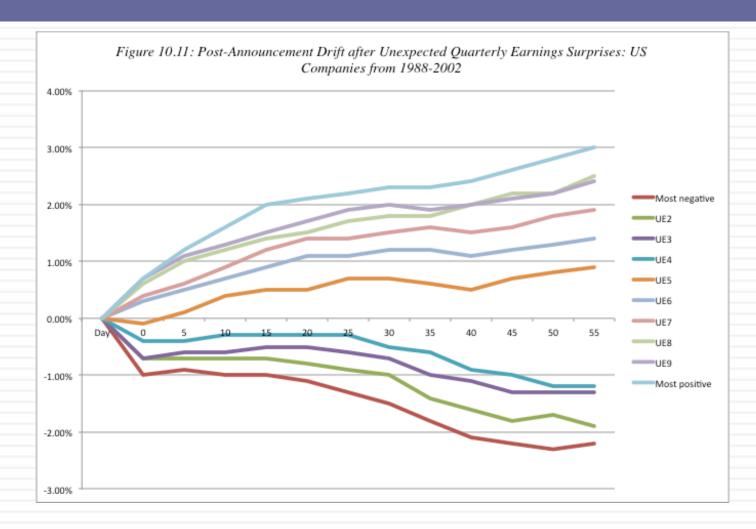
2. Liquidity & Volume



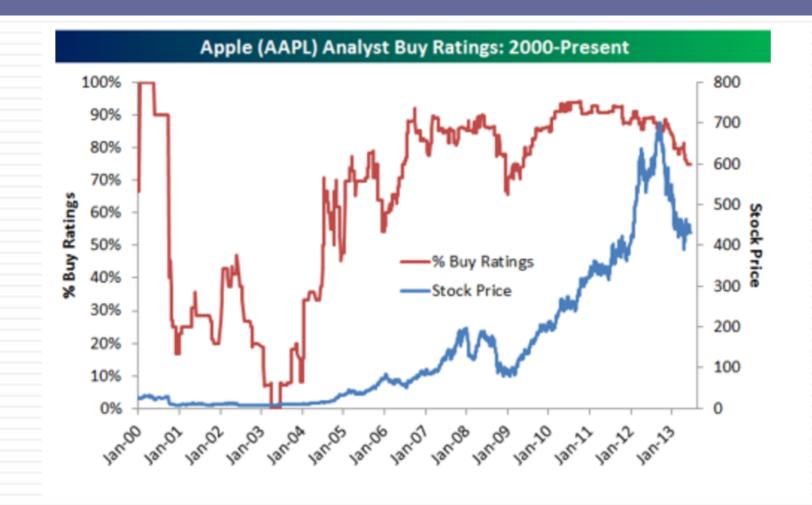
3. Incremental Information: Earnings Reports



And the post-announcement drift



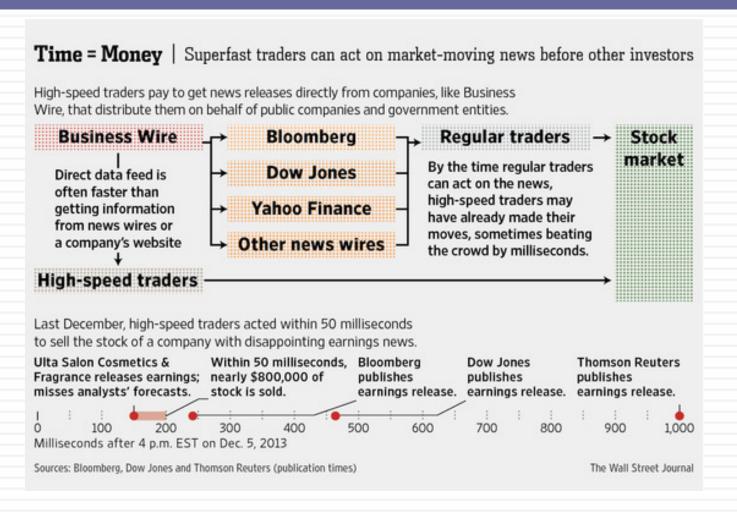
4. The Herd Mentality



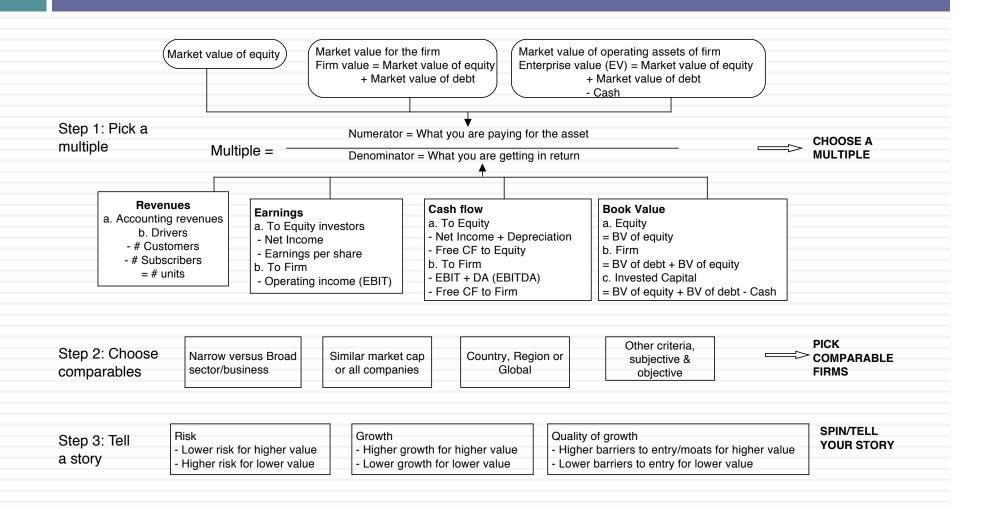
Tools for Pricing: Technical Analysis & Charting



And time is of the essence



A more general tool: Multiples and Comparable Transactions



Pricing Twitter: Start with the "comparables"

						Number of				
		Enterprise				users				
Company	Market Cap	value	Revenues	EBITDA	Net Income	(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

To be a better pricer, here are four suggestions

- Check your multiple or consistency/uniformity
 - In use, the same multiple can be defined in different ways by different users. When comparing and using multiples, estimated by someone else, it is critical that we understand how the multiples have been estimated
- Look at all the data, not just the key statistics
 - Too many people who use a multiple have no idea what its cross sectional distribution is. If you do not know what the cross sectional distribution of a multiple is, it is difficult to look at a number and pass judgment on whether it is too high or low.
- Don't forget the fundamentals ultimately matter
 - It is critical that we understand the fundamentals that drive each multiple, and the nature of the relationship between the multiple and each variable.
- Don't define comparables based only on sector
 - Defining the comparable universe and controlling for differences is far more difficult in practice than it is in theory.

1. Check the Multiple

- Is the multiple consistently defined?
 - The consistency principle: Both the value (the numerator) and the standardizing variable (the denominator) should be to the same claimholders in the firm. In other words, the value of equity should be divided by equity earnings or equity book value, and firm value should be divided by firm earnings or book value.
 - The cost of mismatching: Assets that are not cheap(expensive) will look cheap (expensive), because your mismatch will skew the numbers.
- Is the multiple uniformly estimated?
 - The uniformity rule: The variables used in defining the multiple should be estimated uniformly across assets in the "comparable firm" list.
 - The cost of ignoring this rule: You will be comparing non-comparable numbers and drawing all the wrong conclusions.

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)

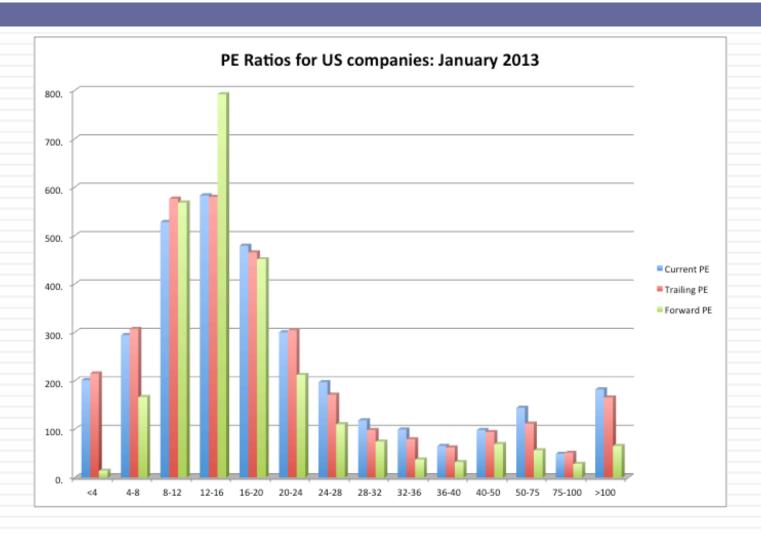
Forecasted EPS in future year

- 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?

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?

Multiples have skewed distributions...



Making statistics "dicey"

	Current PE	Trailing PE	Forward PE
Total number of firms	7871	7871	7871
Number of firms with PE	3337	3278	2674
Average	83.86	43.88	24.45
Median	16.38	15.79	14.87
Maximum	50,463.64	8,840.31	3,192.76
Standard Deviation	1,299.9	250.87	83.5
Standard Error	22.5	4.38	1.61
Skewness	34.26	22.02	28.92
Kurtosis	1,250.28	620.81	995.61
25th Percentile	10.56	10.17	11.52
75th Percentile	26.15	24.15	20.2

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.

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

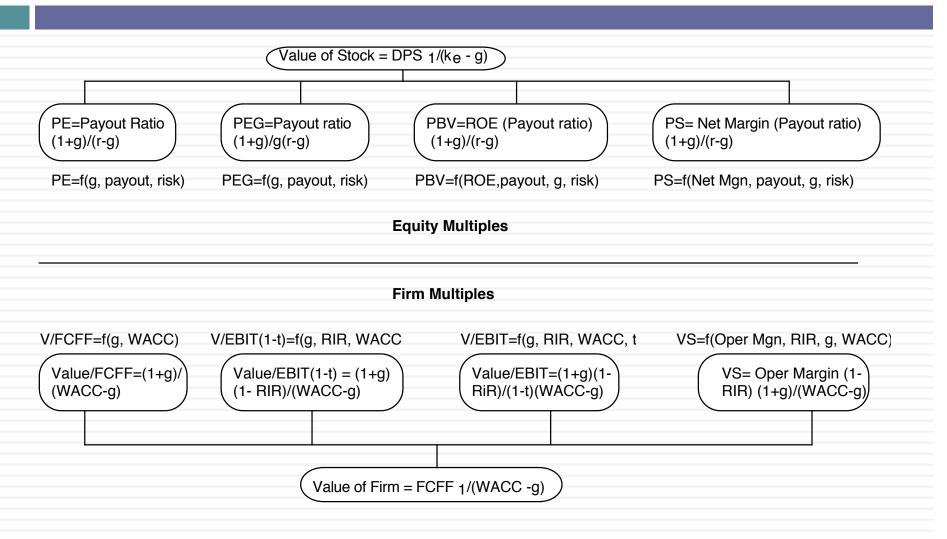
Firm Multiple

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

The Determinants of Multiples...

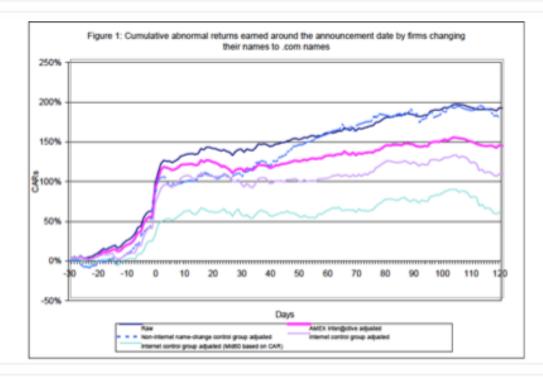


4. Define "comparable" broadly & control for differences

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

If your job is price enhancement....

The market gives...



And takes away....



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.

Aswath Damodaran

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

A fair price for gold? How about value?

7(



And for Bitcoins?

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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.

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.

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.

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.
- <u>Key skill</u>: Be able to gauge market mood/momentum shifts earlier than the rest of the market.
- <u>Time Horizon:</u> 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)

And here are your dilemmas..

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

To be a pure valuer

- Philosophy: Every asset has a fair or true value. You can estimate that value, albeit with error, and price has to converge on value (eventually).
- To play the game: 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.
- Key skill(s): Be able to "value" assets, given uncertainty.
- <u>Time Horizon</u>: As long as it takes for market to correct their mistakes.
- Key personality traits: (a) Faith in "value" (b) Patience (c) immunity from peer pressure.
- Added Bonus: Can provide the catalyst that can move price to value.

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.

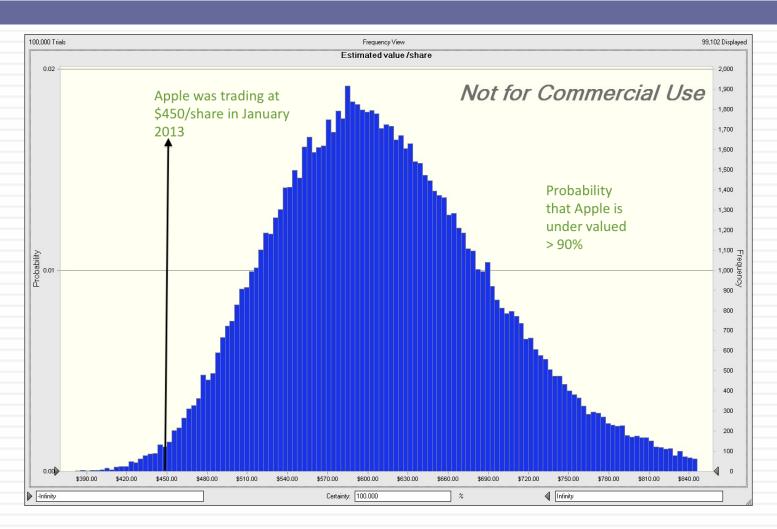
A case study: Apple in early 2013

- 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%

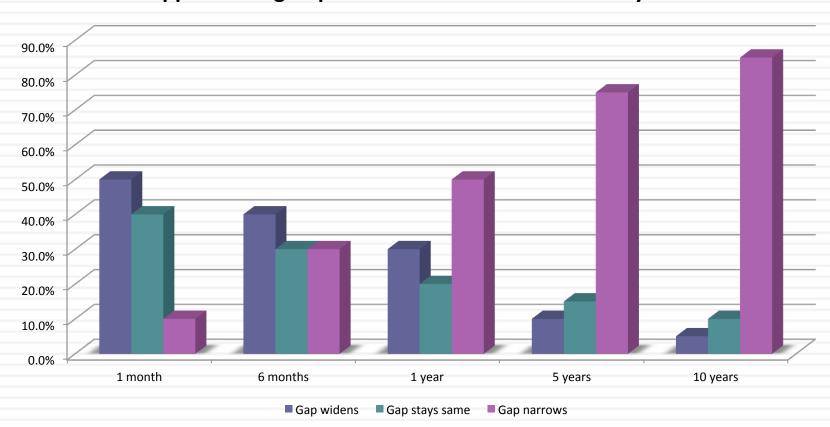
Apple: Visualizing uncertainty A simulation of value in January 2013

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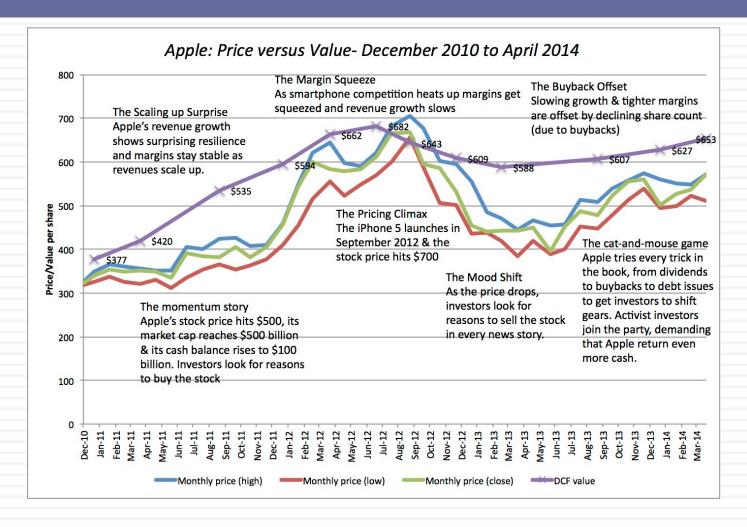


Gap and Time Horizon: My estimates for Apple in January 2013

Apple: Pricing Gap versus Time Horizon in January 2013



Watch the Gap! Apple updated through April 2014



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	
Average change in high temperature day-to-day	1.7°	1.2°
Average change in low temperature day-to-day	1.5°	2.0°

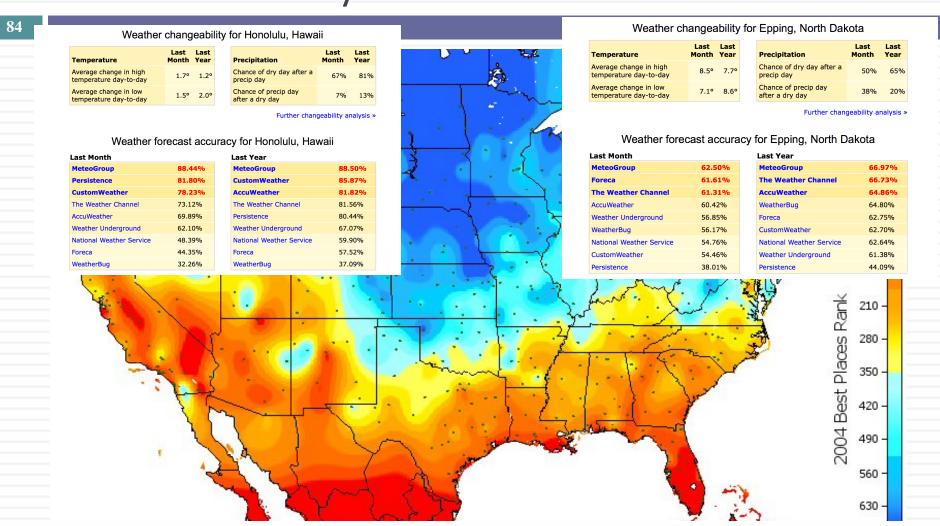
Precipitation	Last Month	Last Year
Chance of dry day after a precip day	67%	81%
Chance of precip day after a dry day	7%	13%

Weather changeability for Epping, North Dakota

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

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

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



Three rules for the road

- Do your job: 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.
- Don't be delusional: If you are pricing an asset, don't get distracted too much by fundamentals and intrinsic value concerns. If you are valuing an asset, don't let the pricing process (mood & momentum) feed back into your valuation.
- Play to your strengths: To be a successful investor, you have to know what makes you tick and pick the approach that best fits you.