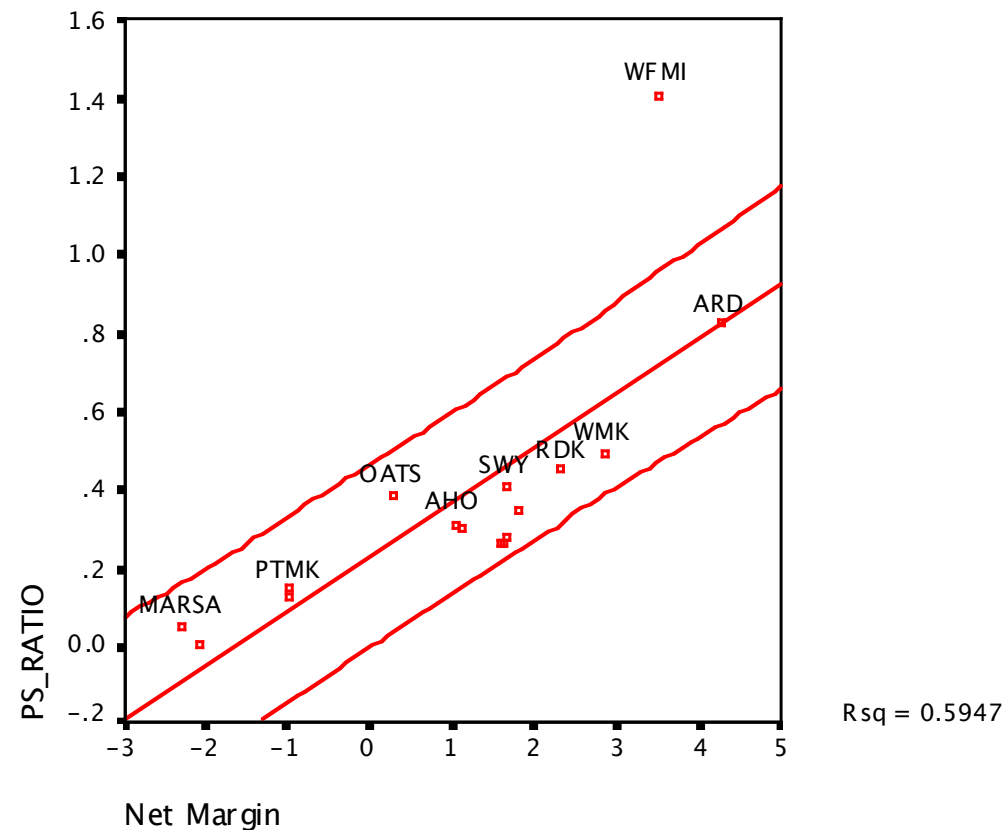


## Example 6: Relative valuation across time

### Price to Sales Multiples: Grocery Stores - US in January 2007

74

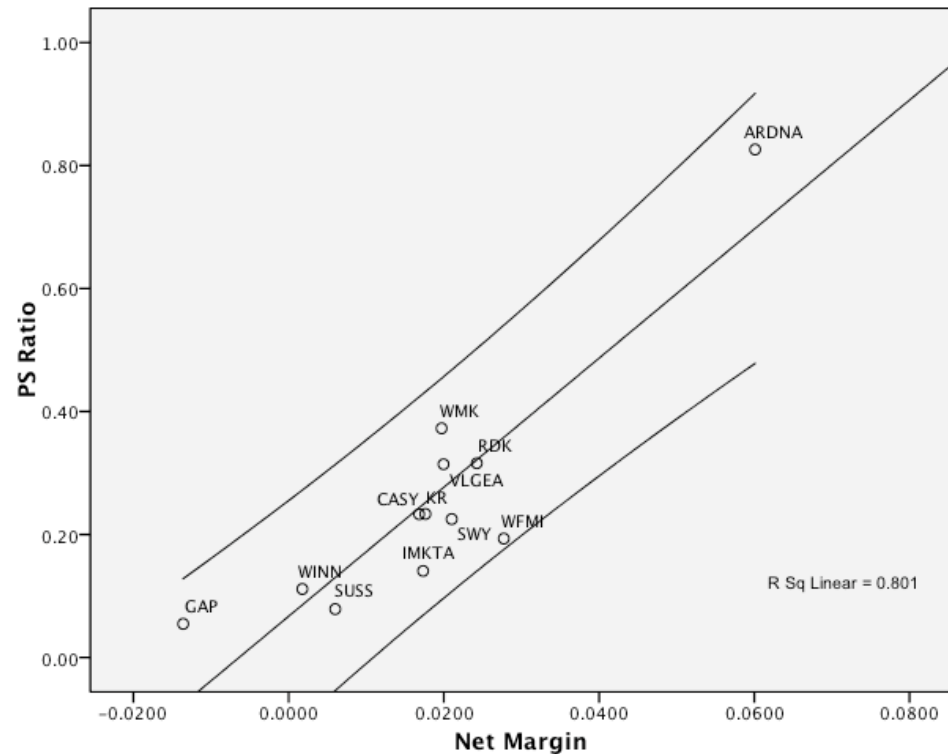


Whole Foods: In 2007: Net Margin was 3.41% and Price/ Sales ratio was 1.41

$$\text{Predicted Price to Sales} = 0.07 + 10.49 (0.0341) = 0.43$$

# Reversion to normalcy: Grocery Stores - US in January 2009

75

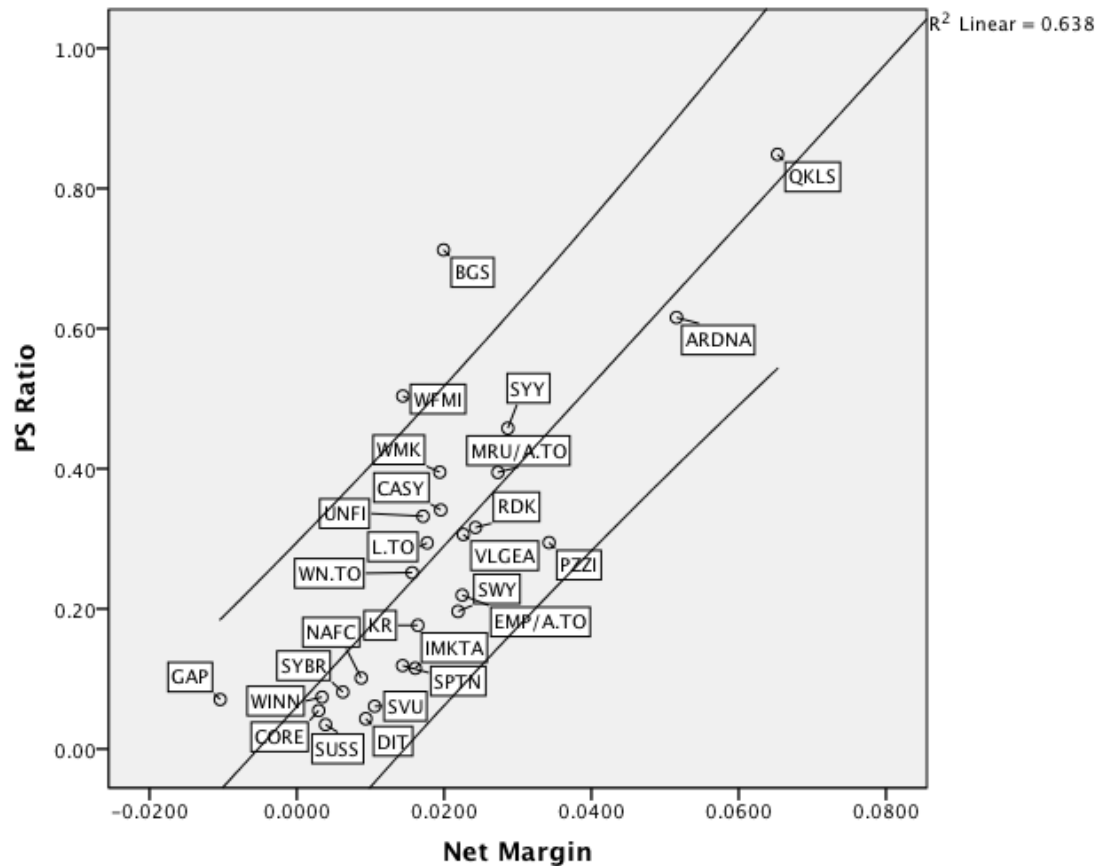


Whole Foods: In 2009, Net Margin had dropped to 2.77% and Price to Sales ratio was down to 0.31.

$$\text{Predicted Price to Sales} = 0.07 + 10.49 (.0277) = 0.36$$

# And again in 2010..

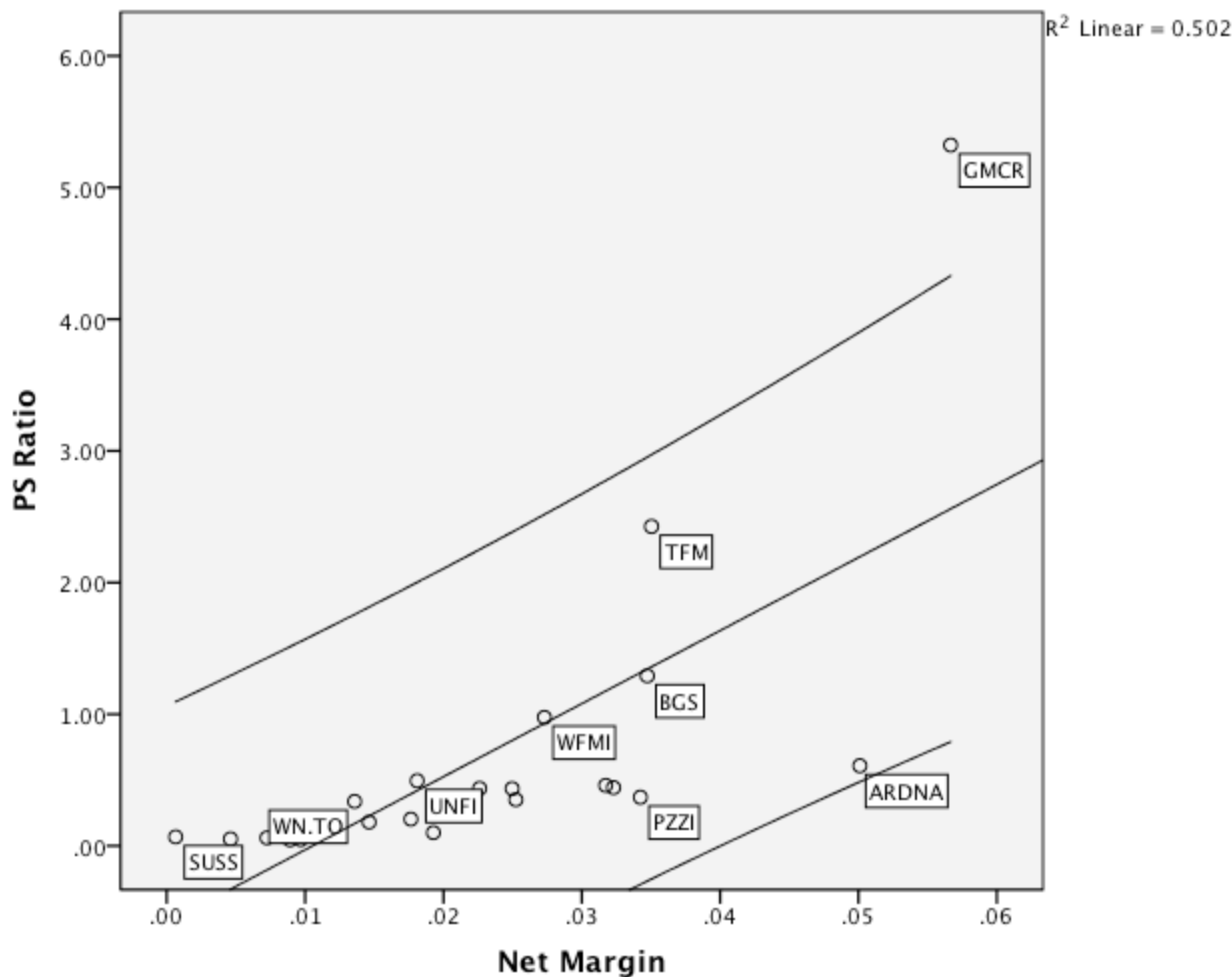
76



Whole Foods: In 2010, Net Margin had dropped to 1.44% and Price to Sales ratio increased to 0.50.  
Predicted Price to Sales =  $0.06 + 11.43 (.0144) = 0.22$

# Here is 2011...

77



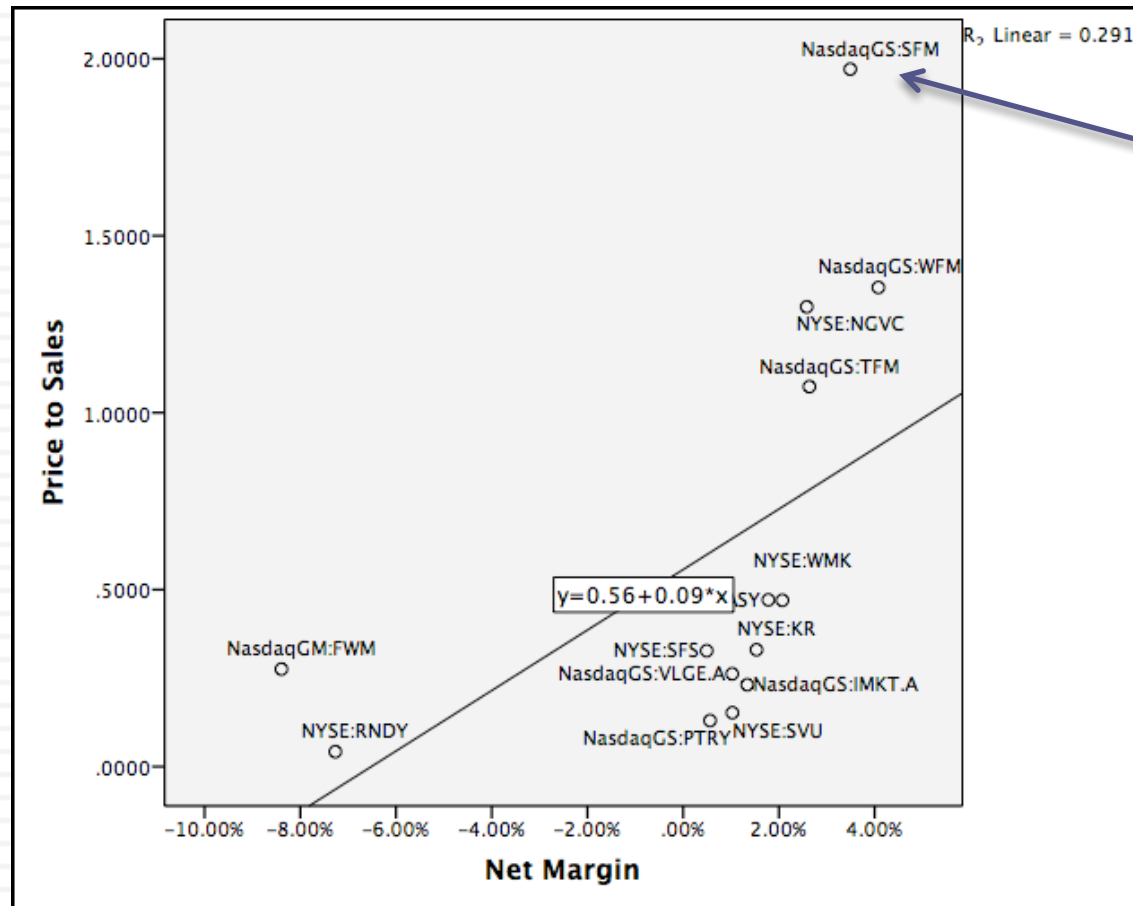
PS Ratio =  $-0.585 + 55.50 (\text{Net Margin})$   $R^2 = 48.2\%$

PS Ratio for WFM =  $-0.585 + 55.50 (.0273) = 0.93$

At a PS ratio of 0.98, WFM is slightly over valued.

# Grocery Stores: January 2015

78



There is a new star in town (Sprouts)

$$PS = 0.557 + 0.085 \text{ Net Margin}$$

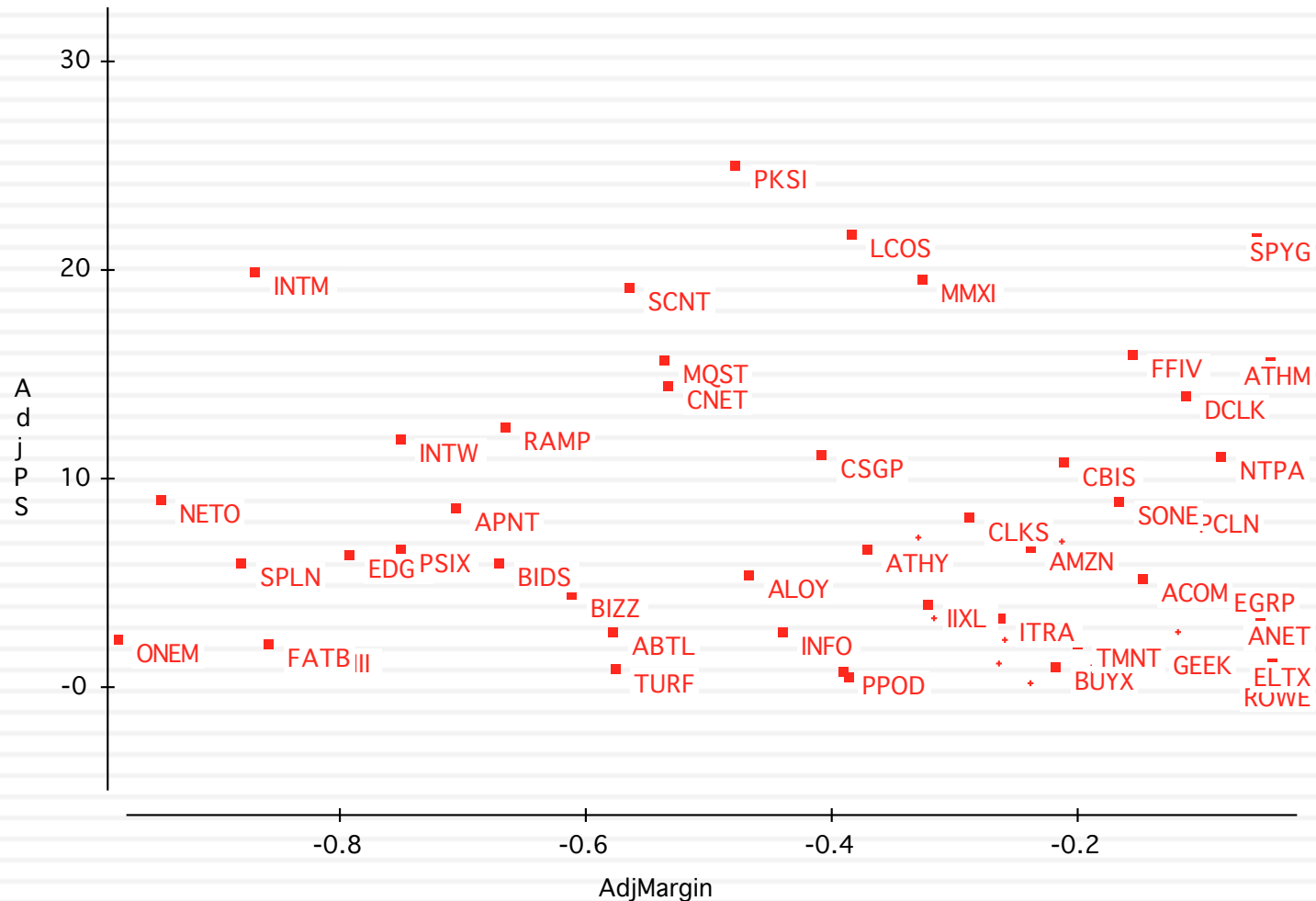
$$\text{Whole Foods} = 0.557 + 8.50 (0.0408) = 0.90$$

At 1.35 times sales, Whole Foods is overvalued (again)

## Example 7: Desperation Time

Nothing's working!!! Internet Stocks in early 2000..

79



# PS Ratios and Margins are not highly correlated

80

- Regressing PS ratios against current margins yields the following
$$PS = 81.36 - 7.54(\text{Net Margin}) \quad R^2 = 0.04$$

(0.49)
- This is not surprising. These firms are priced based upon expected margins, rather than current margins.

# Solution 1: Use proxies for survival and growth: Amazon in early 2000

81

- Hypothesizing that firms with higher revenue growth and higher cash balances should have a greater chance of surviving and becoming profitable, we ran the following regression: (The level of revenues was used to control for size)

$$PS = 30.61 - 2.77 \ln(\text{Rev}) + 6.42 (\text{Rev Growth}) + 5.11 (\text{Cash/Rev})$$

(0.66)                      (2.63)                      (3.49)

R squared = 31.8%

- Predicted PS =  $30.61 - 2.77(7.1039) + 6.42(1.9946) + 5.11(.3069) = 30.42$
- Actual PS = 25.63

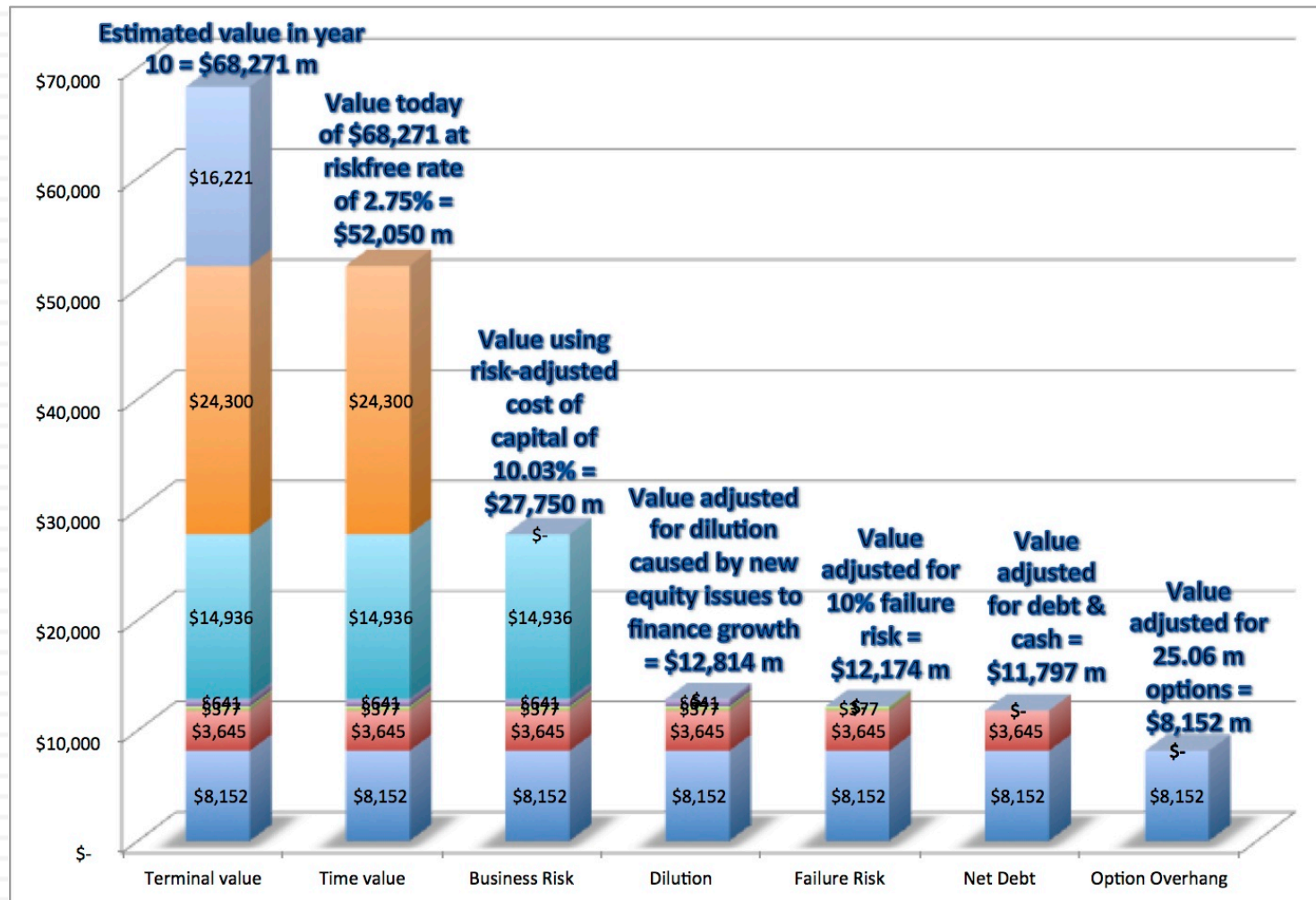
Stock is undervalued, relative to other internet stocks.



# Solution 2: Use forward multiples

## Watch out for bumps in the road (Tesla)

82



# Solution 3: Let the market tell you what matters.. Social media in October 2013

83

<i>Company</i>	<i>Market Cap</i>	<i>Enterprise value</i>	<i>Revenues</i>	<i>EBITDA</i>	<i>Net Income</i>	<i>Number of users (millions)</i>	<i>EV/User</i>	<i>EV/Revenue</i>	<i>EV/EBITDA</i>	<i>PE</i>
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
<b>Average</b>							\$130.01	11.32	350.80	267.44
<b>Median</b>							\$97.41	10.92	44.20	116.47

# Read the tea leaves: See what the market cares about

84

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

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

# Relative valuation across the entire market: Why not?

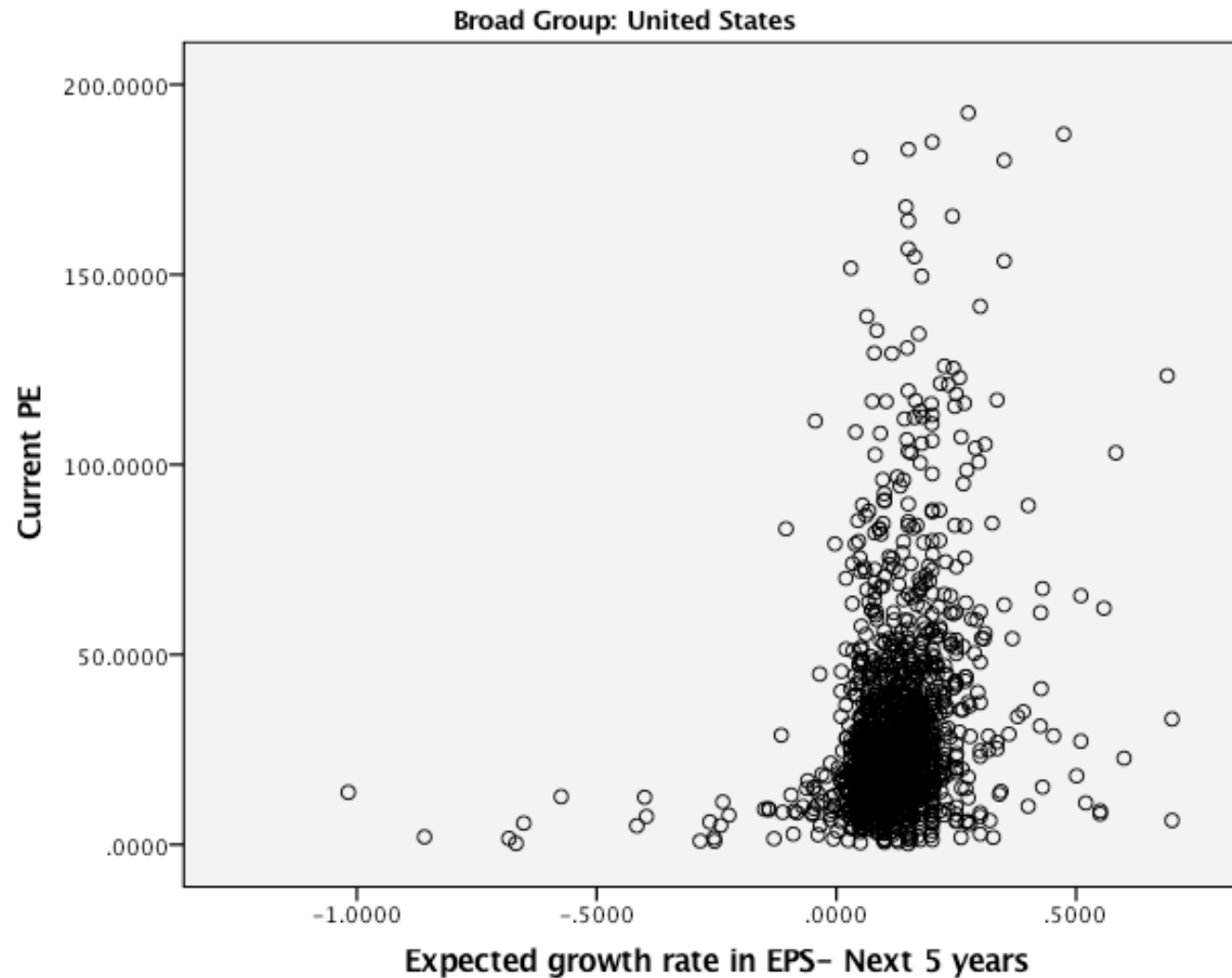
85

- In contrast to the 'comparable firm' approach, the information in the entire cross-section of firms can be used to predict PE ratios.
- The simplest way of summarizing this information is with a multiple regression, with the PE ratio as the dependent variable, and proxies for risk, growth and payout forming the independent variables.

# I. PE Ratio versus the market

## PE versus Expected EPS Growth: January 2016

86



# PE Ratio: Standard Regression for US stocks - January 2016

87

**Model Summary<sup>a,c,d</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.637 <sup>b</sup>	.406	.405	1134.38185

a. Broad Group = United States

b. Predictors: (Constant), Beta, Expected growth rate in EPS- Next 5 years, Payout ratio

The regression is run with growth and payout entered as decimals, i.e., 25% is entered as 0.25)

**Coefficients<sup>a,b,c</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.759	1.313		6.673	.000
	Expected growth rate in EPS- Next 5 years	75.241	5.170	.363	14.555	.000
	Payout ratio	19.730	.883	.593	22.347	.000
	Beta	-4.079	.848	-.124	-4.810	.000

a. Broad Group = United States

b. Dependent Variable: Trailing PE

c. Weighted Least Squares Regression - Weighted by Market Cap (in US \$)

# Problems with the regression methodology

88

- The basic regression assumes a linear relationship between PE ratios and the financial proxies, and that might not be appropriate.
- The basic relationship between PE ratios and financial variables itself might not be stable, and if it shifts from year to year, the predictions from the model may not be reliable.
- The independent variables are correlated with each other. For example, high growth firms tend to have high risk. This multi-collinearity makes the coefficients of the regressions unreliable and may explain the large changes in these coefficients from period to period.

# The Multicollinearity Problem

89

Correlations <sup>a</sup>					
		Trailing PE	Expected growth rate in EPS- Next 5 years	Payout ratio	Beta
Trailing PE	Pearson Correlation	1	.168**	.295**	.018
	Sig. (2-tailed)		.000	.000	.328
	N	3140	1768	1724	3022
Expected growth rate in EPS- Next 5 years	Pearson Correlation	.168**	1	-.215**	.022
	Sig. (2-tailed)	.000		.000	.286
	N	1768	2400	1076	2308
Payout ratio	Pearson Correlation	.295**	-.215**	1	-.058*
	Sig. (2-tailed)	.000	.000		.016
	N	1724	1076	1727	1700
Beta	Pearson Correlation	.018	.022	-.058*	1
	Sig. (2-tailed)	.328	.286	.016	
	N	3022	2308	1700	6662

\*\*. Correlation is significant at the 0.01 level (2-tailed).  
 \*. Correlation is significant at the 0.05 level (2-tailed).  
 a. Broad Group = United States



# Using the PE ratio regression

90

- Assume that you were given the following information for Disney. The firm has an expected growth rate of 15%, a beta of 1.25 and a 20% dividend payout ratio. Based upon the regression, estimate the predicted PE ratio for Disney.
  - ▣ Predicted PE =  $8.76 - 4.08 \text{ Beta} + 75.24 \text{ Growth} + 19.73 \text{ (Payout)}$
- Disney is actually trading at 20 times earnings. What does the predicted PE tell you?
- Assume now that you value Disney against just its peer group. Will you come to the same valuation judgment as you did when you looked at it relative to the market? Why or why not?

# The value of growth

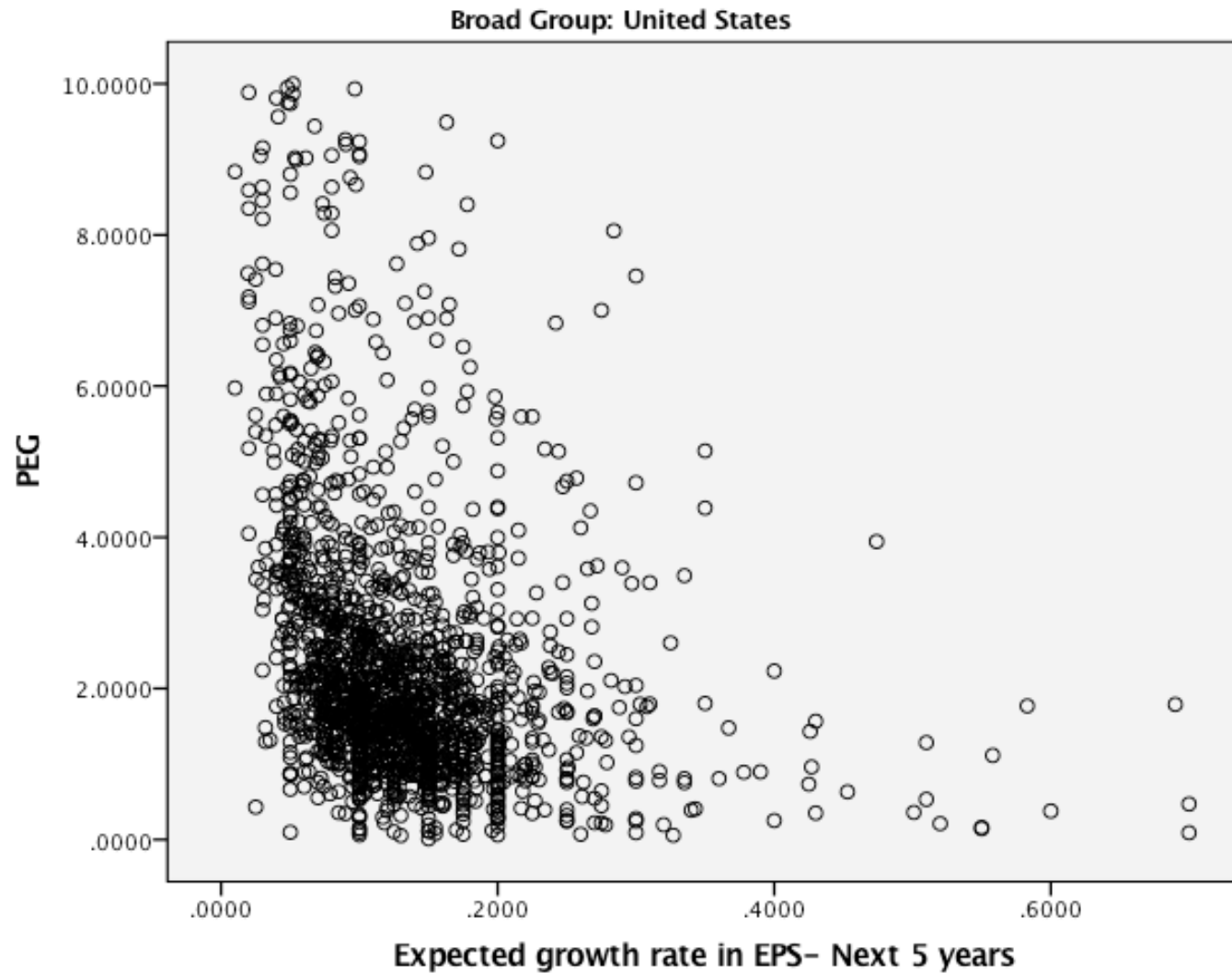
91

Date	Market price of extra % growth	Implied ERP
Jan-16	0.75	6.12%
Jan-15	0.99	5.78%
Jan-14	1.49	4.96%
Jan-13	0.577	5.78%
Jan-12	0.408	6.04%
Jan-11	0.836	5.20%
Jan-10	0.55	4.36%
Jan-09	0.78	6.43%
Jan-08	1.427	4.37%
Jan-07	1.178	4.16%
Jan-06	1.131	4.07%
Jan-05	0.914	3.65%
Jan-04	0.812	3.69%
Jan-03	2.621	4.10%
Jan-02	1.003	3.62%
Jan-01	1.457	2.75%
Jan-00	2.105	2.05%

## II. PEG Ratio versus the market

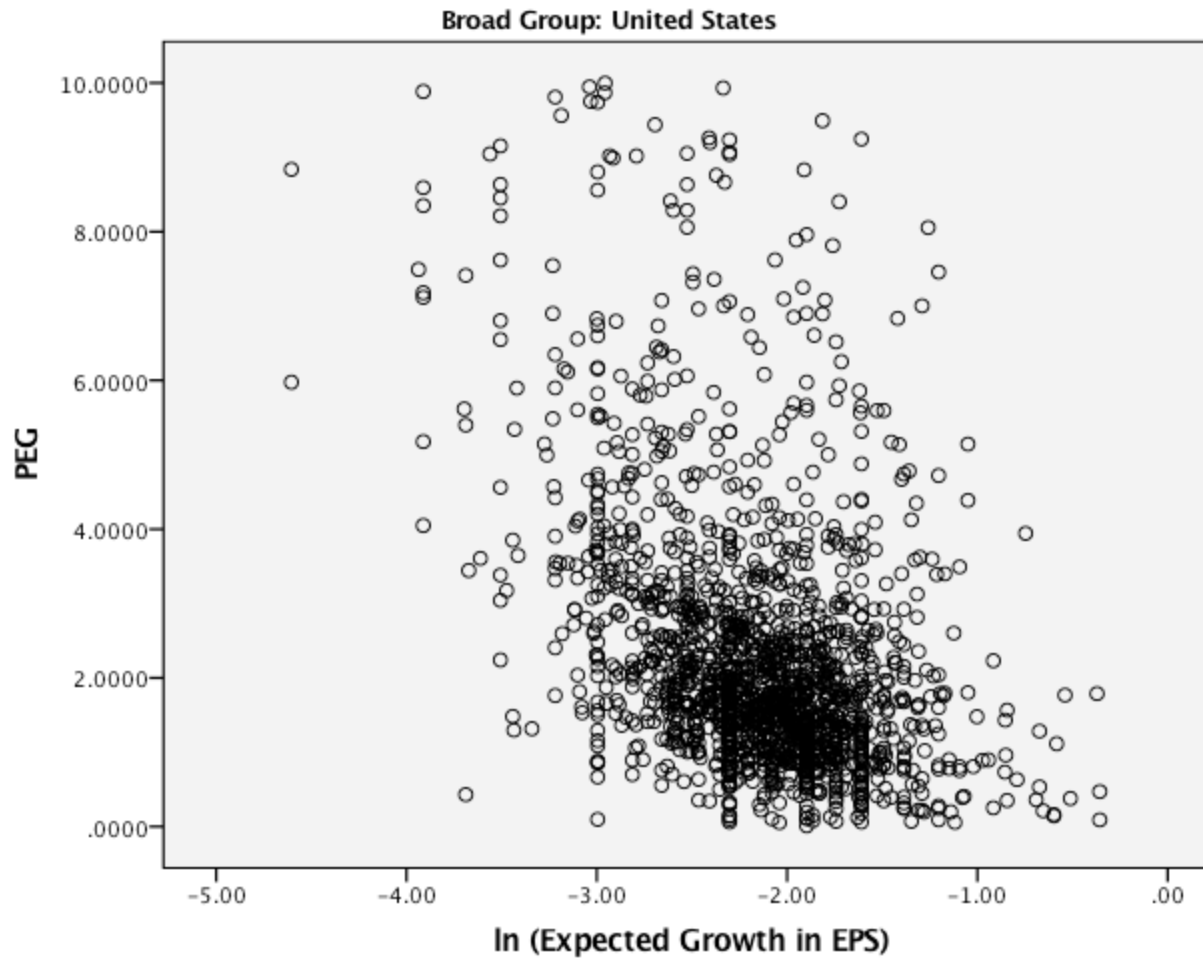
### PEG versus Growth

92



# PEG versus $\ln(\text{Expected Growth})$

93



# PEG Ratio Regression - US stocks

## January 2016

94

**Model Summary<sup>a,c,d</sup>**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.717 <sup>b</sup>	.514	.513	133.686530

a. Broad Group = United States

b. Predictors: (Constant), ln (Expected Growth in EPS), Payout ratio, Beta

c. Dependent Variable: PEG

d. Weighted Least Squares Regression - Weighted by Market

**Coefficients<sup>a,b,c</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.580	.265		-2.187	.029
	Payout ratio	1.848	.109	.420	16.980	.000
	Beta	-.675	.106	-.159	-6.361	.000
	ln (Expected Growth in EPS)	-1.248	.087	-.348	-14.427	.000

a. Broad Group = United States

b. Dependent Variable: PEG

c. Weighted Least Squares Regression - Weighted by Market Cap (in US \$)

# Negative intercepts...and problem forecasts..

95

- When the intercept in a multiples regression is negative, there is the possibility that forecasted values can be negative as well. One way (albeit imperfect) is to re-run the regression without an intercept.

Coefficients<sup>a,b,c</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	ln (Expected Growth in EPS)	-1.277	.052	-1.008	-24.640	.000
	Beta	-.878	.083	-.355	-10.614	.000
	Payout ratio	1.027	.118	.215	8.731	.000

a. Broad Group = United States

b. Dependent Variable: PEG

c. Linear Regression through the Origin

# I. PE ratio regressions across markets – January 2016

96

Region	Regression – January 2016	R <sup>2</sup>
US	$PE = 8.76 + 75.24 g_{EPS} + 19.73 \text{ Payout} - 4.08 \text{ Beta}$	40.5%
Europe	$PE = 13.43 + 54.46 g_{EPS} + 17.63 \text{ Payout} - 4.16 \text{ Beta}$	24.7%
Japan	$PE = 20.10 + 26.46 g_{EPS} + 24.87 \text{ Payout} - 7.60 \text{ Beta}$	28.4%
Emerging Markets	$PE = 15.13 + 40.99 g_{EPS} + 9.03 \text{ Payout} - 2.14 \text{ Beta}$	11.5%
Australia, NZ, Canada	$PE = 7.31 + 73.42 g_{EPS} + 13.94 \text{ Payout} - 3.73 \text{ Beta}$	26.8%
Global	$PE = 12.51 + 87.48 g_{EPS} + 11.48 \text{ Payout} - 3.96 \text{ Beta}$	27.5%

g<sub>EPS</sub>=Expected Growth: Expected growth in EPS or Net Income: Next 5 years

Beta: Regression or Bottom up Beta

Payout ratio: Dividends/ Net income from most recent year. Set to zero, if net income < 0

## II. Price to Book Ratio: Fundamentals hold in every market

97

Region	Regression – January 2016	R <sup>2</sup>
US	$PBV = -1.68 + 14.59 g_{EPS} - 0.99 \text{ Beta} + 3.79 \text{ Payout} + 19.58 \text{ ROE}$	50.2%
Europe	$PBV = 2.66 + 6.30 g_{EPS} - 1.40 \text{ Beta} + 9.39 \text{ ROE} + 1.80 \text{ Payout}$	40.6%
Japan	$PBV = 2.01 + 2.15 g_{EPS} - 1.18 \text{ Beta} + 0.97 \text{ Payout} + 8.28 \text{ ROE}$	29.1%
Emerging Markets	$PBV = -0.43 + 2.71 g_{EPS} - 0.74 \text{ Beta} + 2.48 \text{ Payout} + 18.91 \text{ ROE}$	34.1%
Australia, NZ, Canada	$PBV = -1.20 + 8.97 g_{EPS} - 0.69 \text{ Beta} + 1.01 \text{ Payout} + 21.90 \text{ ROE}$	55.4%
Global	$PBV = 0.22 + 5.41 g_{EPS} - 0.95 \text{ Beta} + 2.68 \text{ Payout} + 16.09 \text{ ROE}$	43.1%

g<sub>EPS</sub>=Expected Growth: Expected growth in EPS/ Net Income: Next 5 years

Beta: Regression or Bottom up Beta

Payout ratio: Dividends/ Net income from most recent year. Set to zero, if net income < 0

ROE: Net Income/ Book value of equity in most recent year.



### III. EV/EBITDA – January 2016

98

Region	Regression – January 2016	R squared
United States	EV/EBITDA= 19.54 + 3.64 g - 1.97 WACC – 12.71 DFR – 3.30 Tax Rate	2.3%
Europe	EV/EBITDA= 17.28 + 18.82 g - 17.94 WACC – 7.55 DFR – 9.10 Tax Rate	9.0%
Japan	EEV/EBITDA= 22.49 + 1.75 g - 79.45 WACC – 6.03 DFR – 19.00 Tax Rate	%
Emerging Markets	EV/EBITDA= 50.71 + 9.57 g - 212.55 WACC – 18.27 DFR – 21.40 Tax Rate	5.9%
Australia, NZ & Canada	EV/EBITDA= 25.86+ 10.10 g - 162.14 WACC – 1.41 DFR – 10.50 Tax Rate	8.6%
Global	EV/EBITDA= 27.42 + 6.90 g -55.15 WACC – 12.03 DFR – 16.20 Tax Rate	3.7%

g = Expected Revenue Growth: Expected growth in revenues: Near term (2 or 5 years)

DFR = Debt Ratio : Total Debt/ (Total Debt + Market value of equity)

Tax Rate: Effective tax rate in most recent year      WACC = Cost of capital (in US\$)

## IV. EV/Sales Regressions across markets...

99

Region	Regression – January 2016	R Squared
United States	EV/Sales = 7.42 + 2.47 g+ 2.96 Operating Margin – 2.20 DFR- 9.90 Tax rate	10.1%
Europe	EV/Sales = -0.89 + 9.81 g+ 14.63 Operating Margin + 14.91 DFR- 6.10 Tax rate	31.4%
Japan	EV/Sales = 2.02 - 0.48 g+ 8.73 Operating Margin +2.50 DFR- 5.00 Tax rate	13.6%
Emerging Markets	EV/Sales = 5.66 + 5.05 g+ 7.86 Operating Margin -0.55 DFR- 9.80 Tax rate	14.3%
Australia, NZ & Canada	EV/Sales = -0.35 + 12.03 g+ 5.34 Operating Margin + 13.95 DFR- 2.60 Tax rate	36.3%
Global	EV/Sales =4.73+ 3.53 g+ 6.92 Op. Margin + 3.83 DFR- 9.20 Tax rate	11.5%

g =Expected Revenue Growth: Expected growth in revenues: Near term (2 or 5 years)

ERP: ERP for country in which company is incorporated

Tax Rate: Effective tax rate in most recent year; Operating Margin: Operating Income/ Sales <sup>99</sup>

# Relative Valuation: Some closing propositions

100

- Proposition 1: In a relative valuation, all that you are concluding is that a stock is under or over valued, relative to your comparable group.
  - Your relative valuation judgment can be right and your stock can be hopelessly over valued at the same time.
- Proposition 2: In asset valuation, there are no similar assets. Every asset is unique.
  - If you do not control for fundamental differences in risk, cash flows and growth across firms when comparing how they are priced, your valuation conclusions will reflect your flawed judgments rather than market misvaluations.
- Bottom line: Relative valuation is pricing, not valuation.

# Choosing Between the Multiples

101

- As presented in this section, there are dozens of multiples that can be potentially used to value an individual firm.
- In addition, relative valuation can be relative to a sector (or comparable firms) or to the entire market (using the regressions, for instance)
- Since there can be only one final estimate of value, there are three choices at this stage:
  - Use a simple average of the valuations obtained using a number of different multiples
  - Use a weighted average of the valuations obtained using a number of different multiples
  - Choose one of the multiples and base your valuation on that multiple

# Picking one Multiple

102

- This is usually the best way to approach this issue. While a range of values can be obtained from a number of multiples, the “best estimate” value is obtained using one multiple.
- The multiple that is used can be chosen in one of two ways:
  - Use the multiple that best fits your objective. Thus, if you want the company to be undervalued, you pick the multiple that yields the highest value.
  - Use the multiple that has the highest R-squared in the sector when regressed against fundamentals. Thus, if you have tried PE, PBV, PS, etc. and run regressions of these multiples against fundamentals, use the multiple that works best at explaining differences across firms in that sector.
  - Use the multiple that seems to make the most sense for that sector, given how value is measured and created.

# A More Intuitive Approach

103

- Managers in every sector tend to focus on specific variables when analyzing strategy and performance. The multiple used will generally reflect this focus. Consider three examples.
  - In retailing: The focus is usually on same store sales (turnover) and profit margins. Not surprisingly, the revenue multiple is most common in this sector.
  - In financial services: The emphasis is usually on return on equity. Book Equity is often viewed as a scarce resource, since capital ratios are based upon it. Price to book ratios dominate.
  - In technology: Growth is usually the dominant theme. PEG ratios were invented in this sector.

# Conventional usage...

104

Sector	Multiple Used	Rationale
Cyclical Manufacturing	PE, Relative PE	Often with normalized earnings
Growth firms	PEG ratio	Big differences in growth rates
Young growth firms w/ losses	Revenue Multiples	What choice do you have?
Infrastructure	EV/EBITDA	Early losses, big DA
REIT	P/CFE (where CFE = Net income + Depreciation)	Big depreciation charges on real estate
Financial Services	Price/ Book equity	Marked to market?
Retailing	Revenue multiples	Margins equalize sooner or later

# Relative versus Intrinsic Value

105


- If you do intrinsic value right, you will bring in a company's risk, cash flow and growth characteristics into the inputs, preserve internal consistency and derive intrinsic value. If you do relative value right, you will find the right set of comparables, control well for differences in risk, cash flow and growth characteristics. Assume you value the same company doing both DCF and relative valuation correctly, should you get the same value?
  - ▣ Yes
  - ▣ No
- If not, how would you explain the difference?
- If the numbers are different, which value would you use?
  - ▣ Intrinsic value
  - ▣ Relative value
  - ▣ A composite of the two values
  - ▣ The higher of the two values
  - ▣ The lower of the two values
  - ▣ Depends on what my valuation “mission” is.



# Reviewing: The Four Steps to Understanding Multiples

106

- Define the multiple
  - ▣ Check for consistency
  - ▣ Make sure that they are estimated uniformly
- Describe the multiple
  - ▣ Multiples have skewed distributions: The averages are seldom good indicators of typical multiples
  - ▣ Check for bias, if the multiple cannot be estimated
- Analyze the multiple
  - ▣ Identify the companion variable that drives the multiple
  - ▣ Examine the nature of the relationship
- Apply the multiple



## A DETOUR: ASSET BASED VALUATION

Value assets, not cash flows?

# What is asset based valuation?

108

- In intrinsic valuation, you value a business based upon the cash flows you expect that business to generate over time.
- In relative valuation, you value a business based upon how similar businesses are priced.
- In asset based valuation, you value a business by valuing its individual assets. These individual assets can be tangible or intangible.

# Why would you do asset based valuation?

109

- Liquidation: If you are liquidating a business by selling its assets piece meal, rather than as a composite business, you would like to estimate what you will get from each asset or asset class individually.
- Accounting mission: As both US and international accounting standards have turned to “fair value” accounting, accountants have been called upon to redo balance sheet to reflect the assets at their fair rather than book value.
- Sum of the parts: If a business is made up of individual divisions or assets, you may want to value these parts individually for one of two groups:
  - Potential acquirers may want to do this, as a precursor to restructuring the business.
  - Investors may be interested because a business that is selling for less than the sum of its parts may be “cheap”.

# How do you do asset based valuation?

110

- Intrinsic value: Estimate the expected cash flows on each asset or asset class, discount back at a risk adjusted discount rate and arrive at an intrinsic value for each asset.
- Relative value: Look for similar assets that have sold in the recent past and estimate a value for each asset in the business.
- Accounting value: You could use the book value of the asset as a proxy for the estimated value of the asset.

# When is asset-based valuation easiest to do?

111

- Separable assets: If a company is a collection of separable assets (a set of real estate holdings, a holding company of different independent businesses), asset-based valuation is easier to do. If the assets are interrelated or difficult to separate, asset-based valuation becomes problematic. Thus, while real estate or a long term licensing/franchising contract may be easily valued, brand name (which cuts across assets) is more difficult to value separately.
- Stand alone earnings/ cash flows: An asset is much simpler to value if you can trace its earnings/cash flows to it. It is much more difficult to value when the business generates earnings, but the role of individual assets in generating these earnings cannot be isolated.
- Active market for similar assets: If you plan to do a relative valuation, it is easier if you can find an active market for “similar” assets which you can draw on for transactions prices.

# I. Liquidation Valuation

112

- In liquidation valuation, you are trying to assess how much you would get from selling the assets of the business today, rather than the business as a going concern.
- Consequently, it makes more sense to price those assets (i.e., do relative valuation) than it is to value them (do intrinsic valuation). For assets that are separable and traded (example: real estate), pricing is easy to do. For assets that are not, you often see book value used either as a proxy for liquidation value or as a basis for estimating liquidation value.
- To the extent that the liquidation is urgent, you may attach a discount to the estimated value.

## II. Accounting Valuation: Glimmers from FAS 157

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- The ubiquitous “market participant”: Through FAS 157, accountants are asked to attach values to assets/liabilities that market participants would have been willing to pay/ receive.
- Tilt towards relative value: “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).” The hierarchy puts “market prices”, if available for an asset, at the top with intrinsic value being accepted only if market prices are not accessible.
- Split mission: While accounting fair value is tilted towards relative valuation, accountants are also required to back their relative valuations with intrinsic valuations. Often, this leads to reverse engineering, where accountants arrive at values first and develop valuations later.



# III. Sum of the parts valuation

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- You can value a company in pieces, using either relative or intrinsic valuation. Which one you use will depend on who you are and your motives for doing the sum of the parts valuation.
- If you are long term, passive investor in the company, your intent may be to find market mistakes that you hope will get corrected over time. If that is the case, you should do an intrinsic valuation of the individual assets.
- If you are an activist investor that plans to acquire the company or push for change, you should be more focused on relative valuation, since your intent is to get the company to split up and gain the increase in value.

Let's try this

## United Technologies: Raw Data - 2009

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<i>Division</i>	<i>Business</i>	<i>Revenues</i>	<i>EBITDA</i>	<i>Pre-tax Operating Income</i>	<i>Capital Expenditures</i>	<i>Depreciation</i>	<i>Total Assets</i>
Carrier	Refrigeration systems	\$14,944	\$1,510	\$1,316	\$191	\$194	\$10,810
Pratt & Whitney	Defense	\$12,965	\$2,490	\$2,122	\$412	\$368	\$9,650
Otis	Construction	\$12,949	\$2,680	\$2,477	\$150	\$203	\$7,731
UTC Fire & Security	Security	\$6,462	\$780	\$542	\$95	\$238	\$10,022
Hamilton Sundstrand	Manufacturing	\$6,207	\$1,277	\$1,099	\$141	\$178	\$8,648
Sikorsky	Aircraft	\$5,368	\$540	\$478	\$165	\$62	\$3,985

The company also had corporate expenses, unallocated to the divisions of \$408 million in the most recent year.

# United Technologies: Relative Valuation

## Median Multiples

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<i>Division</i>	<i>Business</i>	<i>EBITDA</i>	<i>EV/EBITDA for sector</i>	<i>Value of Business</i>
Carrier	Refrigeration systems	\$1,510	5.25	\$7,928
Pratt & Whitney	Defense	\$2,490	8.00	\$19,920
Otis	Construction	\$2,680	6.00	\$16,080
UTC Fire & Security	Security	\$780	7.50	\$5,850
Hamilton Sundstrand	Industrial Products	\$1,277	5.50	\$7,024
Sikorsky	Aircraft	\$540	9.00	\$4,860
Sum of the parts value for business =				\$61,661

# United Technologies: Relative Valuation Plus Scaling variable & Choice of Multiples

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Division	Business	Revenues	EBITDA	Operating Income	Capital Invested
Carrier	Refrigeration systems	\$14,944	\$1,510	\$1,316	\$6,014
Pratt & Whitney	Defense	\$12,965	\$2,490	\$2,122	\$5,369
Otis	Construction	\$12,949	\$2,680	\$2,477	\$4,301
UTC Fire & Security	Security	\$6,462	\$780	\$542	\$5,575
Hamilton Sundstrand	Industrial Products	\$6,207	\$1,277	\$1,099	\$4,811
Sikorsky	Aircraft	\$5,368	\$540	\$478	\$2,217
Total		\$58,895	\$9,277	\$8,034	\$28,287

Business	Best Multiple	Regression	R <sup>2</sup>
Refrigeration systems	EV/EBITDA	$EV/EBITDA = 5.35 - 3.55 \text{ Tax Rate} + 14.17 \text{ ROC}$	42%
Defense	EV/Revenues	$EV/Revenues = 0.85 + 7.32 \text{ Pre-tax Operating Margin}$	47%
Construction	EV/EBITDA	$EV/EBITDA = 3.17 - 2.87 \text{ Tax Rate} + 14.66 \text{ ROC}$	36%
Security	EV/Capital	$EV/ \text{Capital} = 0.55 + 8.22 \text{ ROC}$	55%
Industrial Products	EV/Revenues	$EV/Revenues = 0.51 + 6.13 \text{ Pre-tax Operating Margin}$	48%
Aircraft	EV/Capital	$EV/ \text{Capital} = 0.65 + 6.98 \text{ ROC}$	40%

# United Technologies: Relative Valuation

## Sum of the Parts value

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Division	Scaling Variable	Current value for scaling variable	ROC	Operating Margin	Tax Rate	Predicted Multiple	Estimated Value
Carrier	EBITDA	\$1,510	13.57%	8.81%	38%	$5.35 - 3.55 (.38) + 14.17 (.1357) = 5.92$	\$8,944.47
Pratt & Whitney	Revenues	\$12,965	24.51%	16.37%	38%	$0.85 + 7.32 (.1637) = 2.05$	\$26,553.29
Otis	EBITDA	\$2,680	35.71%	19.13%	38%	$3.17 - 2.87 (.38) + 14.66 (.3571) = 7.31$	\$19,601.70
UTC Fire & Security	Capital	\$5,575	6.03%	8.39%	38%	$0.55 + 8.22 (.0603) = 1.05$	\$5,828.76
Hamilton Sundstrand	Revenues	\$6,207	14.16%	17.71%	38%	$0.51 + 6.13 (.1771) = 1.59$	\$9,902.44
Sikorsky	Capital	\$2,217	13.37%	8.90%	38%	$0.65 + 6.98 (.1337) = 1.58$	\$3,509.61
Sum of the parts value for operating assets =							\$74,230.37