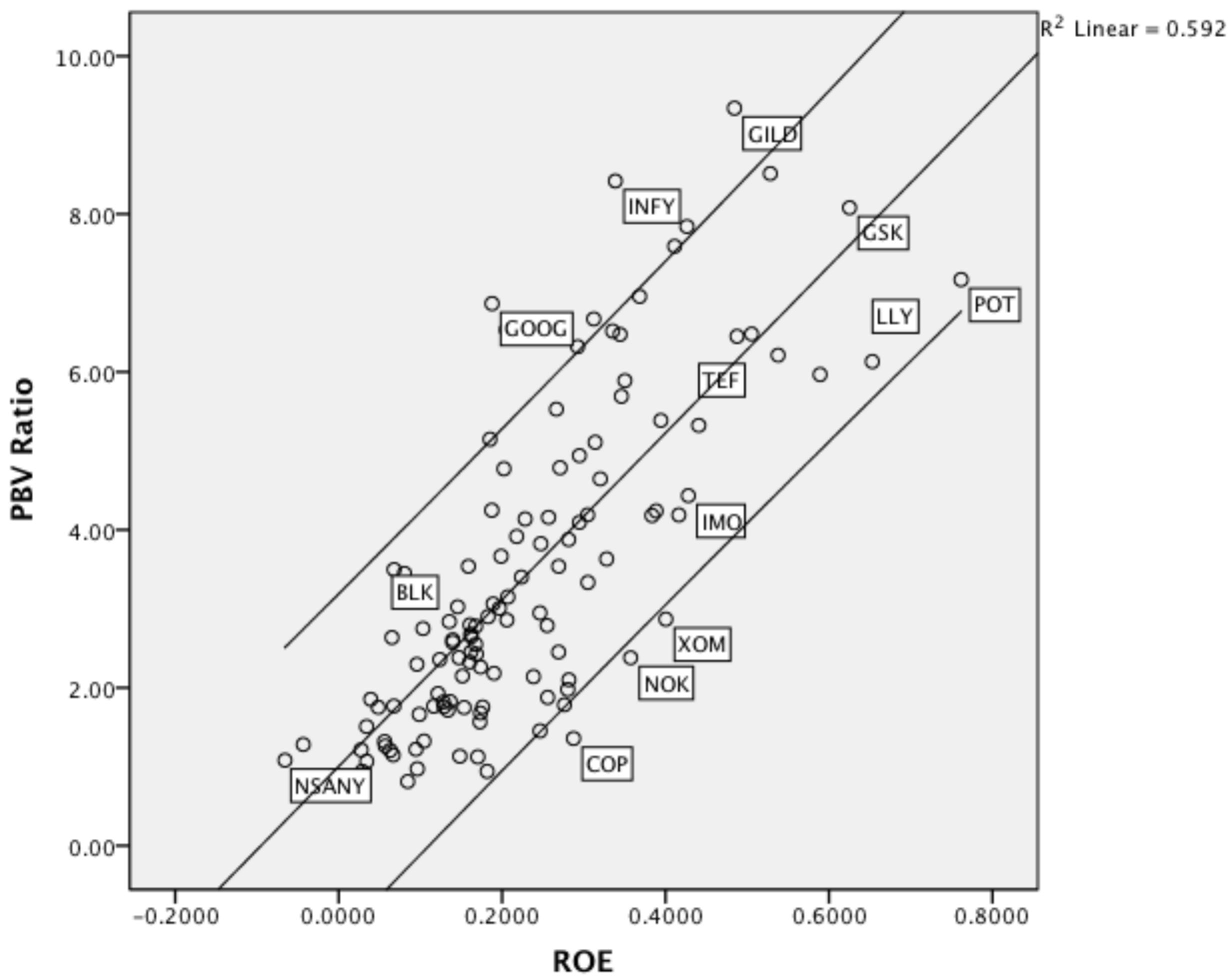
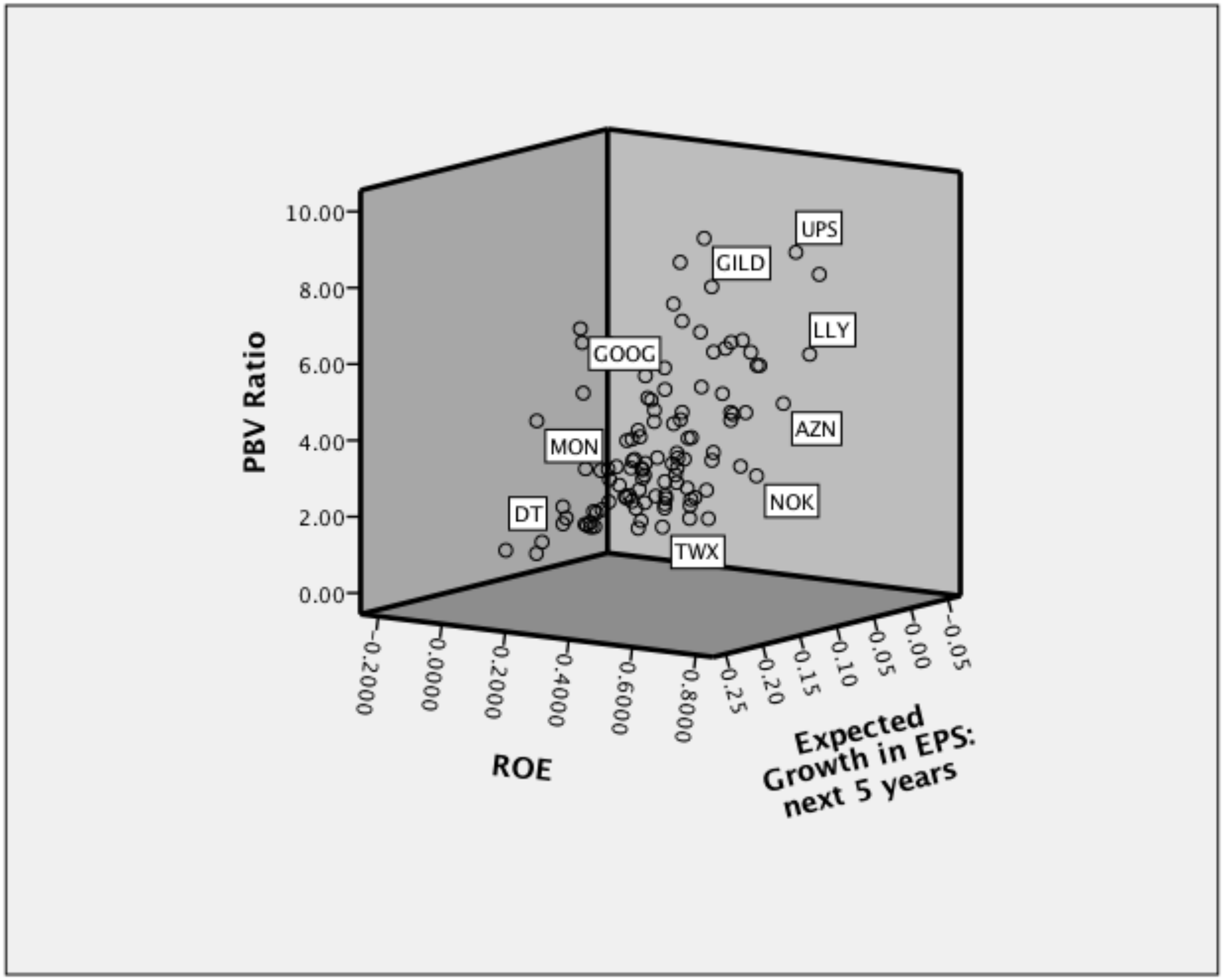
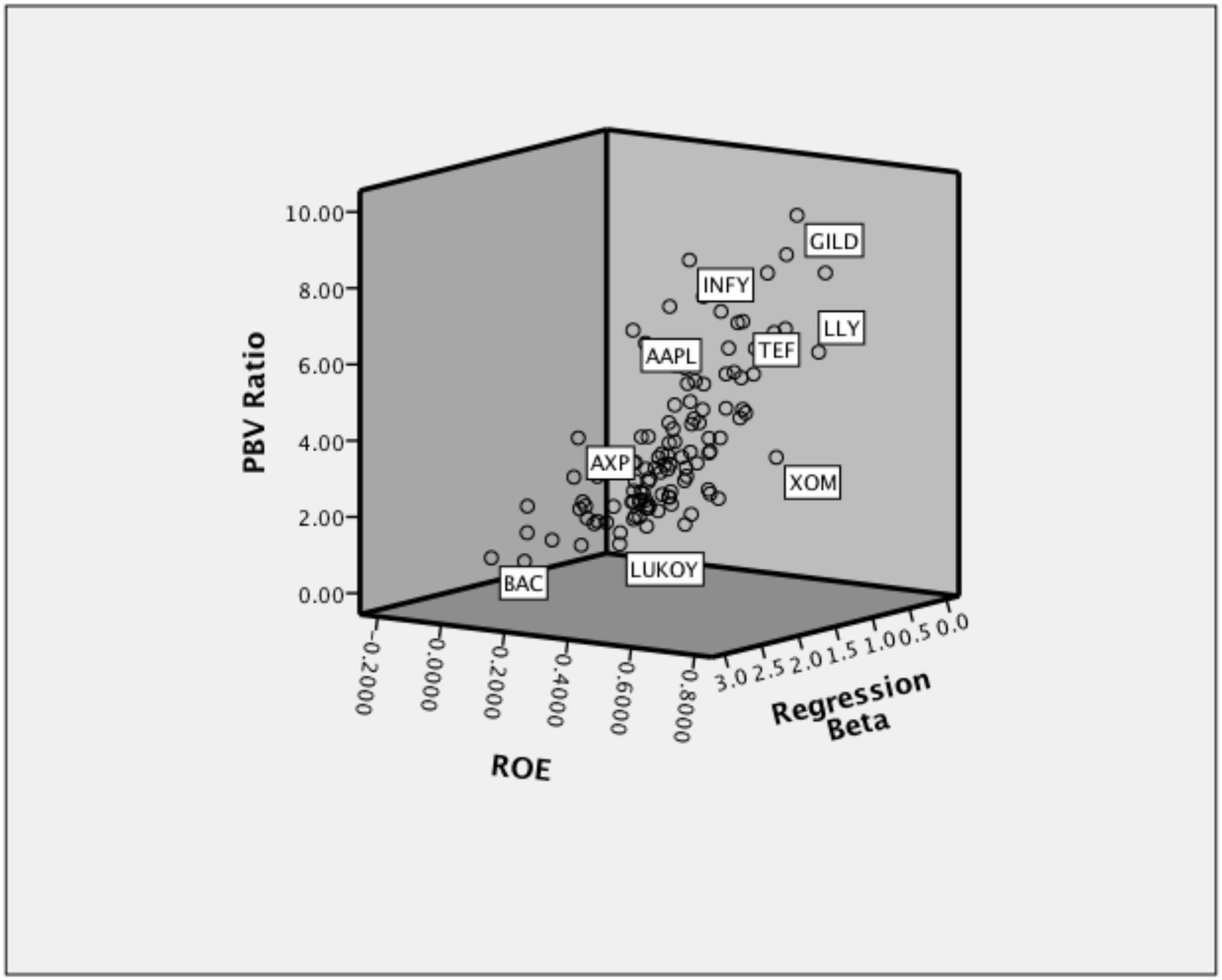
Example 4: A larger sample
Price to Book versus ROE: Largest firms in the US: January 2010



Missing growth?



PBV, ROE and Risk: Large Cap US firms



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Bringing it all together… Largest US stocks in January 2010

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819[a]	.670	.661	1.19253

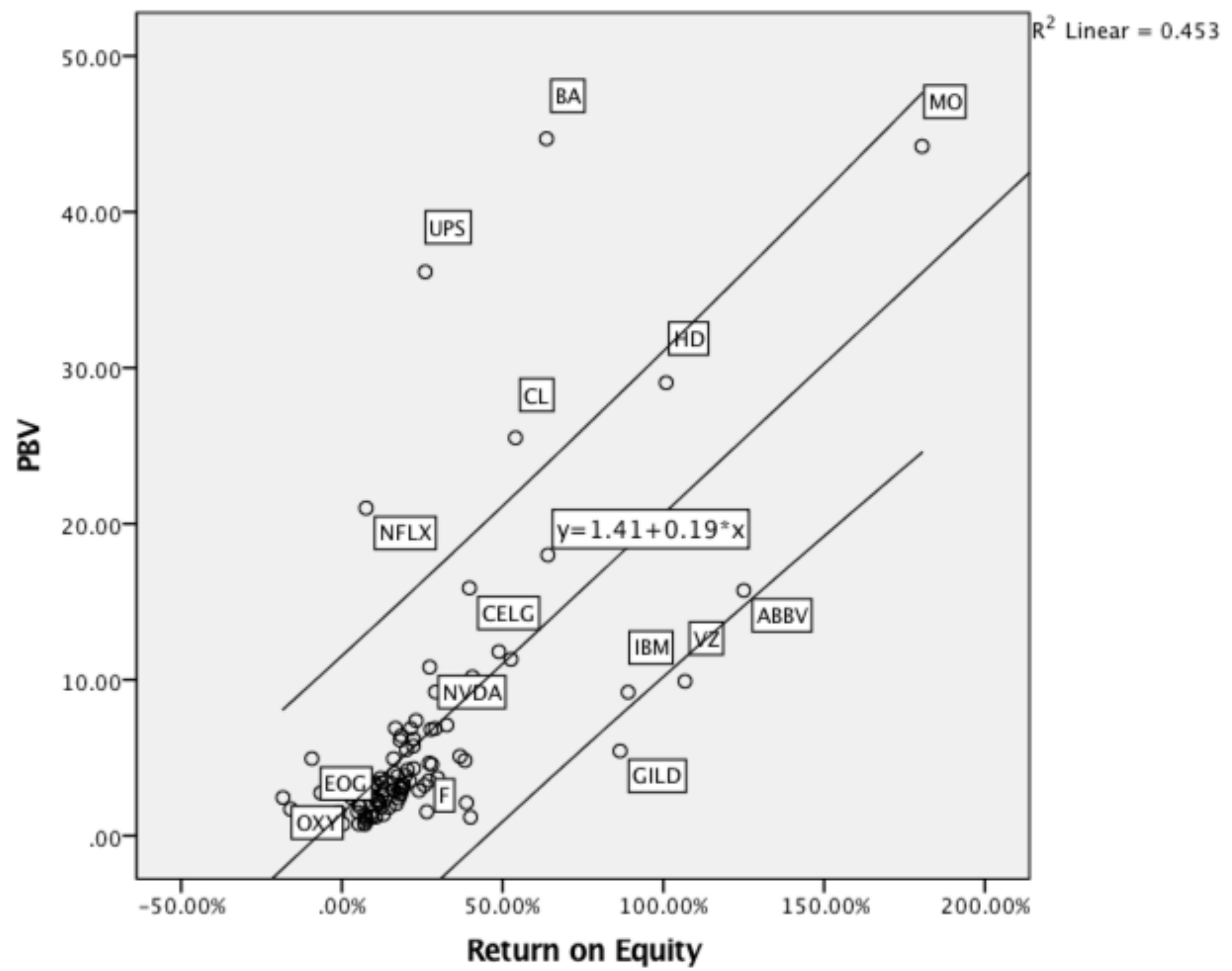
a. Predictors: (Constant), ROE, Expected Growth in EPS: next 5 years, Regression Beta

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.406	.424		.958	.340
	Regression Beta	-.065	.253	-.015	-.256	.799
	Expected Growth in EPS: next 5 years	9.340	2.366	.228	3.947	.000
	ROE	10.546	.771	.777	13.672	.000

a. Dependent Variable: PBV Ratio

Updated PBV Ratios – Largest Market Cap US companies Updated to January 2017



Example 5: Overlooked fundamentals? EV/EBITDA Multiple for Trucking Companies

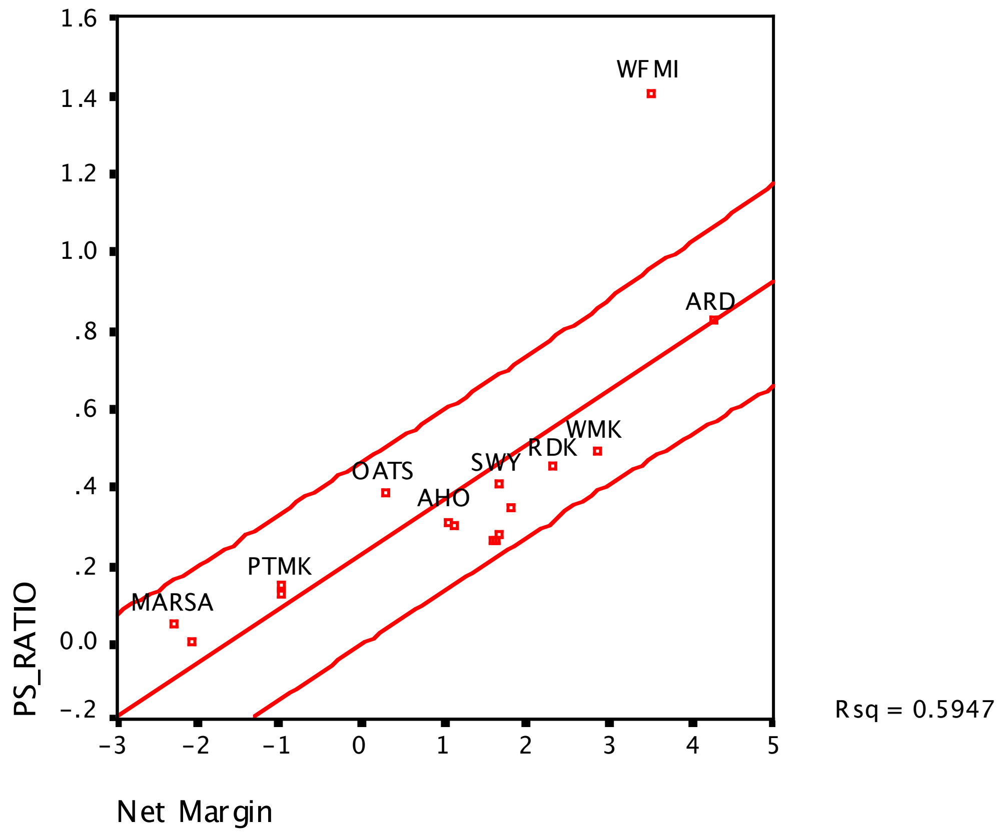
Company Name	Value	EBITDA	Value/EBITDA
KLLM Trans. Svcs.	$ 114.32	$ 48.81	2.34
Ryder System	$ 5,158.04	$ 1,838.26	2.81
Rollins Truck Leasing	$ 1,368.35	$ 447.67	3.06
Cannon Express Inc.	$ 83.57	$ 27.05	3.09
Hunt (J.B.)	$ 982.67	$ 310.22	3.17
Yellow Corp.	$ 931.47	$ 292.82	3.18
Roadway Express	$ 554.96	$ 169.38	3.28
Marten Transport Ltd.	$ 116.93	$ 35.62	3.28
Kenan Transport Co.	$ 67.66	$ 19.44	3.48
M.S. Carriers	$ 344.93	$ 97.85	3.53
Old Dominion Freight	$ 170.42	$ 45.13	3.78
Trimac Ltd	$ 661.18	$ 174.28	3.79
Matlack Systems	$ 112.42	$ 28.94	3.88
XTRA Corp.	$ 1,708.57	$ 427.30	4.00
Covenant Transport Inc	$ 259.16	$ 64.35	4.03
Builders Transport	$ 221.09	$ 51.44	4.30
Werner Enterprises	$ 844.39	$ 196.15	4.30
Landstar Sys.	$ 422.79	$ 95.20	4.44
AMERCO	$ 1,632.30	$ 345.78	4.72
USA Truck	$ 141.77	$ 29.93	4.74
Frozen Food Express	$ 164.17	$ 34.10	4.81
Arnold Inds.	$ 472.27	$ 96.88	4.87
Greyhound Lines Inc.	$ 437.71	$ 89.61	4.88
USFreightways	$ 983.86	$ 198.91	4.95
Golden Eagle Group Inc.	$ 12.50	$ 2.33	5.37
Arkansas Best	$ 578.78	$ 107.15	5.40
Airlease Ltd.	$ 73.64	$ 13.48	5.46
Celadon Group	$ 182.30	$ 32.72	5.57
Amer. Freightways	$ 716.15	$ 120.94	5.92
Transfinancial Holdings	$ 56.92	$ 8.79	6.47
Vitran Corp. 'A'	$ 140.68	$ 21.51	6.54
Interpool Inc.	$ 1,002.20	$ 151.18	6.63
Intrenet Inc.	$ 70.23	$ 10.38	6.77
Swift Transportation	$ 835.58	$ 121.34	6.89
Landair Services	$ 212.95	$ 30.38	7.01
CNF Transportation	$ 2,700.69	$ 366.99	7.36
Budget Group Inc	$ 1,247.30	$ 166.71	7.48
Caliber System	$ 2,514.99	$ 333.13	7.55
Knight Transportation Inc	$ 269.01	$ 28.20	9.54
Heartland Express	$ 727.50	$ 64.62	11.26
Greyhound CDA Transn Corp	$ 83.25	$ 6.99	11.91
Mark VII	$ 160.45	$ 12.96	12.38
Coach USA Inc	$ 678.38	$ 51.76	13.11
US 1 Inds Inc.	$ 5.60	$ (0.17)	NA
Average			**5.61**

A Test on EBITDA

- Ryder System looks very cheap on a Value/EBITDA multiple basis, relative to the rest of the sector. What explanation (other than misvaluation) might there be for this difference?

- What general lessons would you draw from this on the EV/EBITDA multiples for infrastructure companies as their infrastructure ages?

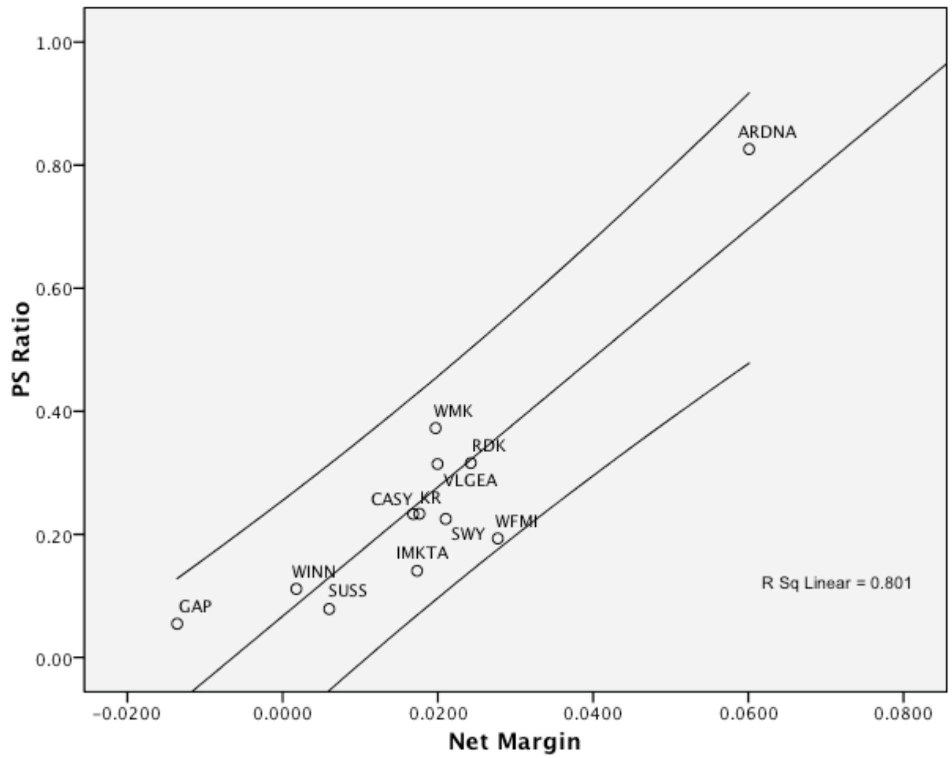
Example 6: Relative valuation across time
Price to Sales Multiples: Grocery Stores - US in January 2007



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

Predicted Price to Sales = 0.07 + 10.49 (0.0341) = 0.43

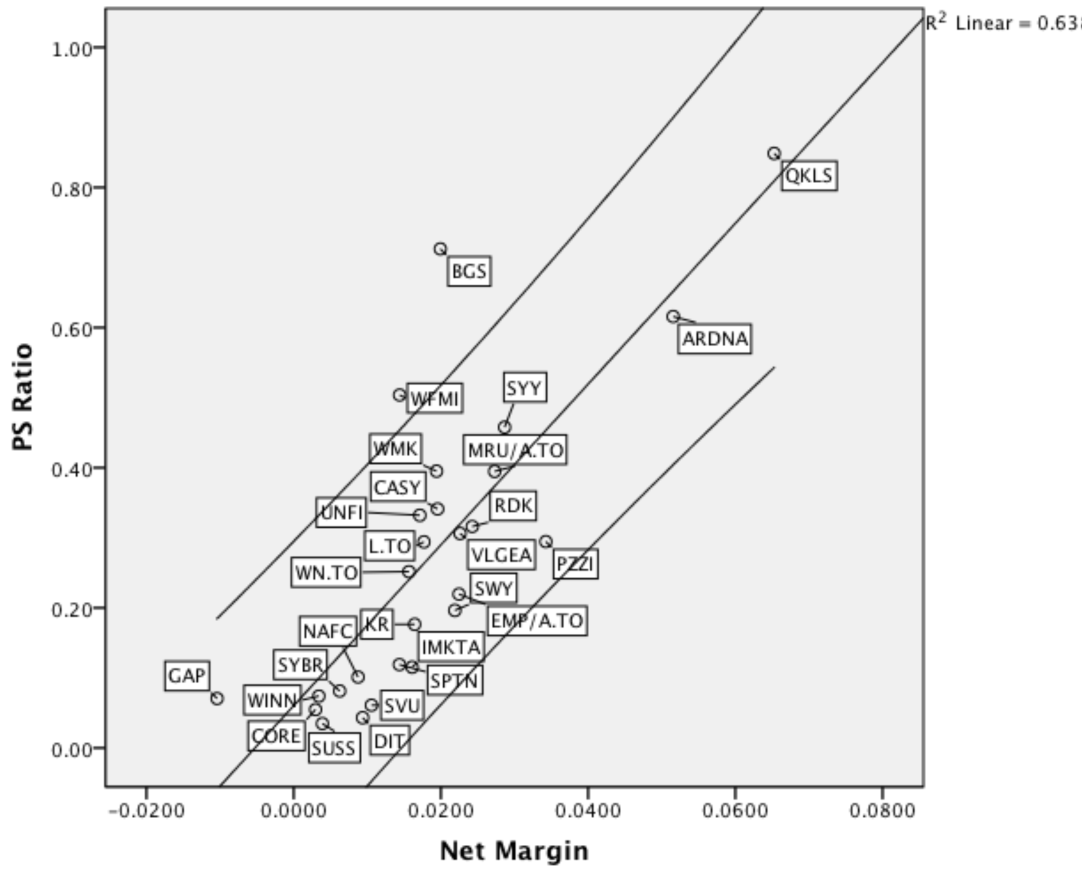
What a difference two years can make: Grocery Stores - US in January 2009



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

Predicted Price to Sales = 0.07 + 10.49 (.0277) = 0.36

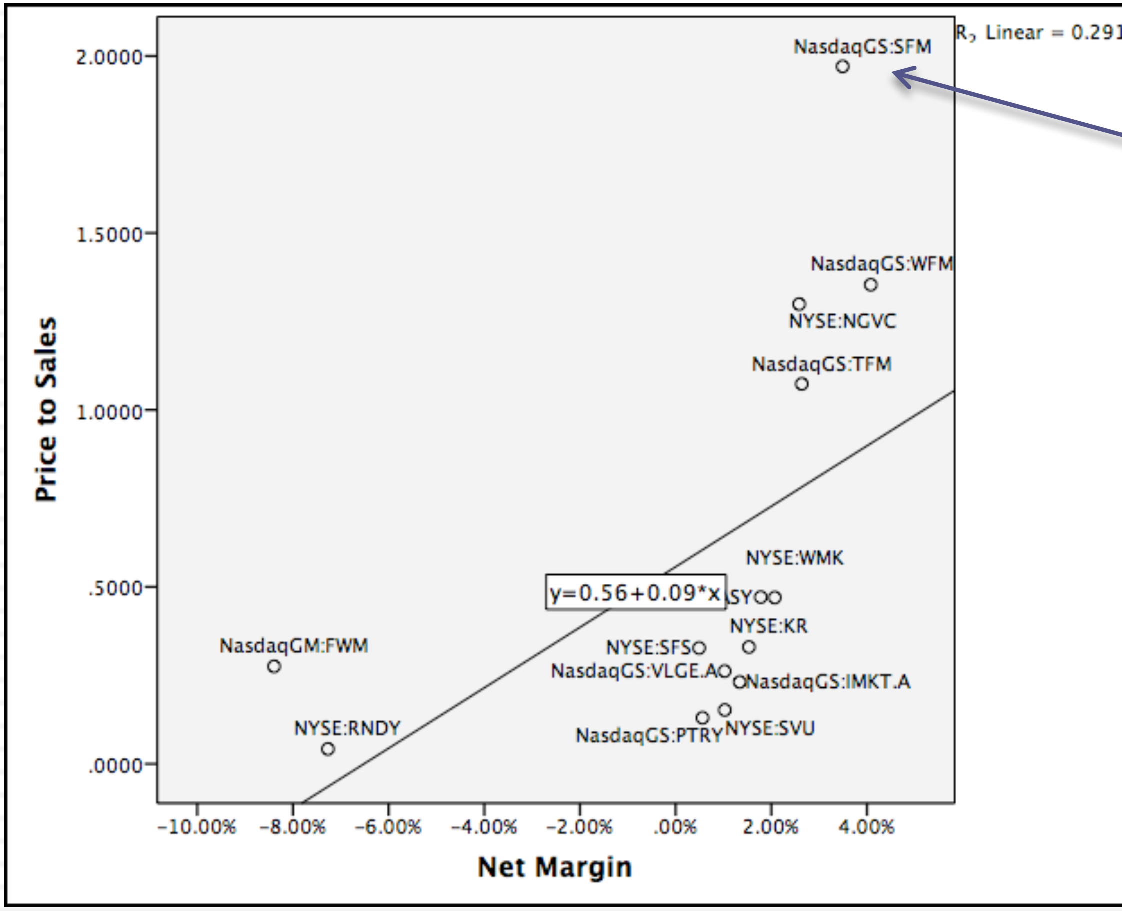
Steady State? In 2010..



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

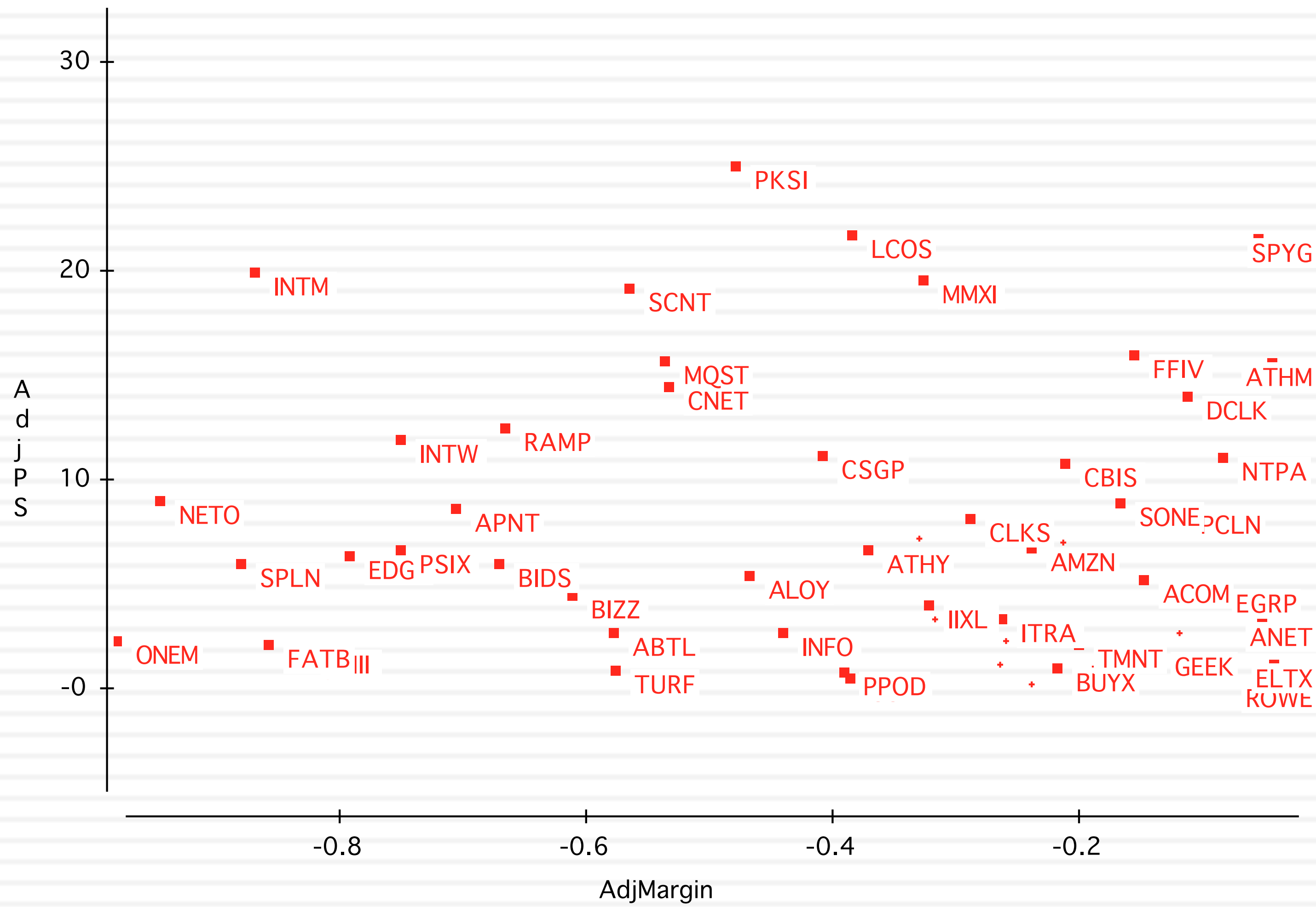
There is a new kid in town: January 2015



There is a new star in town (Sprouts)

PS = 0.557 + 0.085 Net Margin
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..



Aswath Damodaran

PS Ratios and Margins are not highly correlated

- Regressing PS ratios against current margins yields the following

  PS = 81.36 - 7.54(Net Margin) 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

- 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(Rev) + 6.42 (Rev Growth) + 5.11 (Cash/Rev)

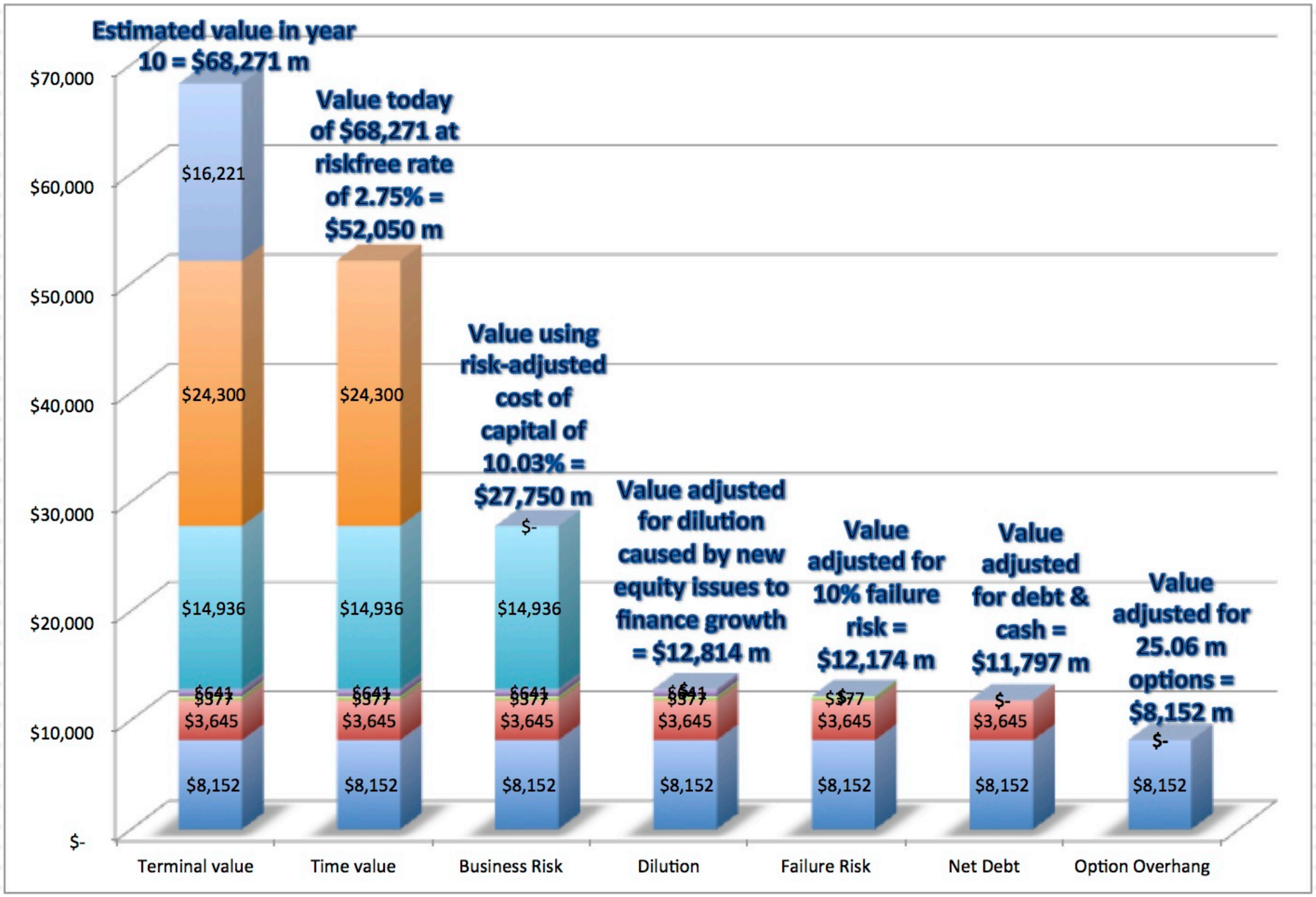
(0.66) (2.63) (3.49)

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)



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

Company	*Market Cap*	*Enterprise value*	*Revenues*	*EBITDA*	*Net Income*	*Number of users (millions)*	*EV/User*	*EV/Revenue*	*EV/EBITDA*	*PE*
Facebook	$173,540.00	$160,090.00	$7,870.00	$3,930.00	$1,490.00	1230.00	$130.15	20.34	40.74	116.47
Linkedin	$23,530.00	$19,980.00	$1,530.00	$182.00	$27.00	277.00	$72.13	13.06	109.78	871.48
Pandora	$7,320.00	$7,150.00	$655.00	-$18.00	-$29.00	73.40	$97.41	10.92	NA	NA
Groupon	$6,690.00	$5,880.00	$2,440.00	$125.00	-$95.00	43.00	$136.74	2.41	47.04	NA
Netflix	$25,900.00	$25,380.00	$4,370.00	$277.00	$112.00	44.00	$576.82	5.81	91.62	231.25
Yelp	$6,200.00	$5,790.00	$233.00	$2.40	-$10.00	120.00	$48.25	24.85	2412.50	NA
Open Table	$1,720.00	$1,500.00	$190.00	$63.00	$33.00	14.00	$107.14	7.89	23.81	52.12
Zynga	$4,200.00	$2,930.00	$873.00	$74.00	-$37.00	27.00	$108.52	3.36	39.59	NA
Zillow	$3,070.00	$2,860.00	$197.00	-$13.00	-$12.45	*34.50*	$82.90	14.52	NA	NA
Trulia	$1,140.00	$1,120.00	$144.00	-$6.00	-$18.00	*54.40*	$20.59	7.78	NA	NA
Tripadvisor	$13,510.00	$12,860.00	$945.00	$311.00	$205.00	*260.00*	$49.46	13.61	41.35	65.90
						Average	$130.01	11.32	350.80	267.44
						Median	$97.41	10.92	44.20	116.47

Read the tea leaves: See what the market cares about

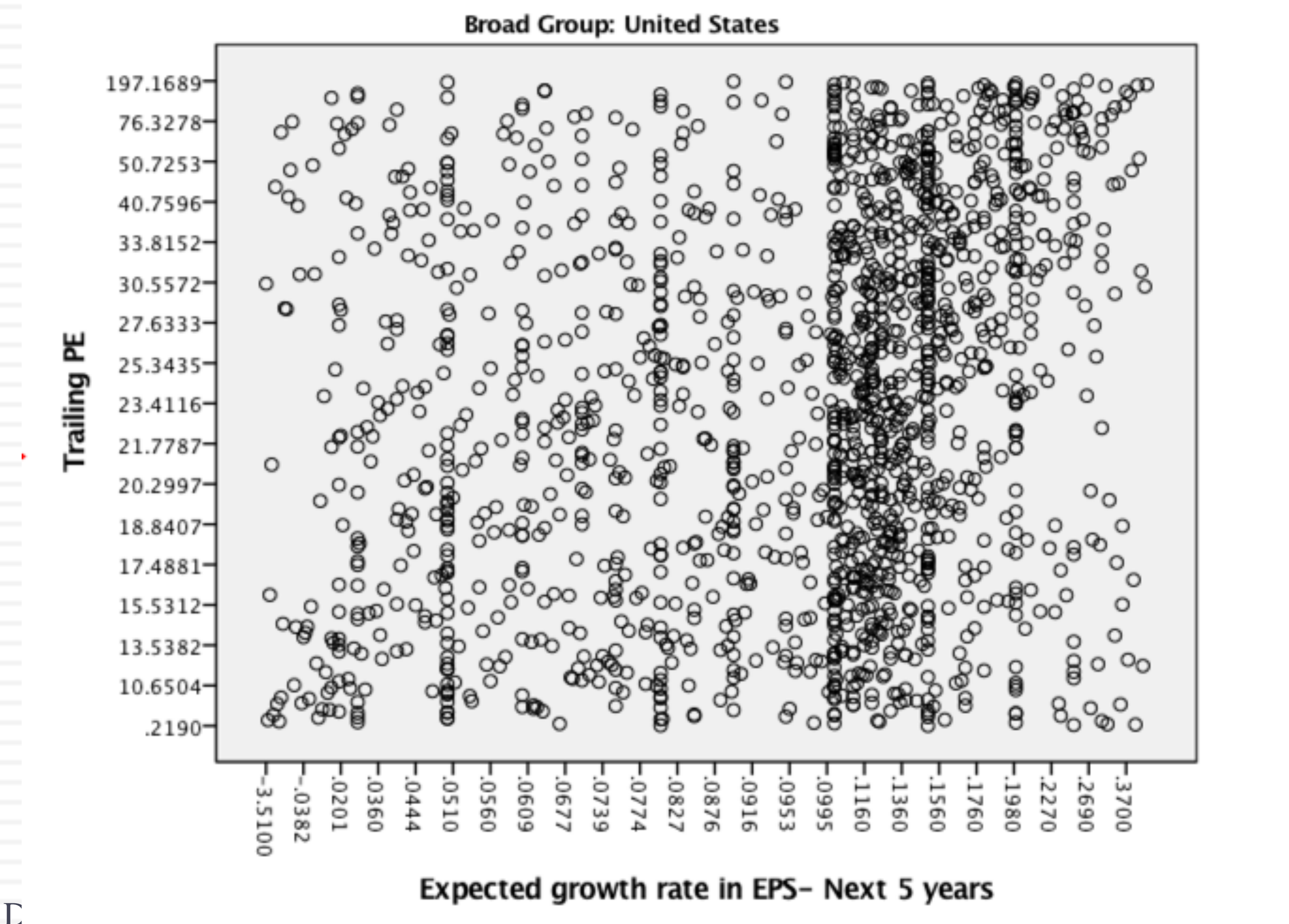
	Market Cap	Enterprise value	Revenues	EBITDA	Net Income	Number of users (millions)
Market Cap	1.					
Enterprise value	0.9998	1.				
Revenues	0.8933	0.8966	1.			
EBITDA	0.9709	0.9701	0.8869	1.		
Net Income	0.8978	0.8971	0.8466	0.9716	1.	
Number of users (millions)	0.9812	0.9789	0.8053	0.9354	0.8453	1.

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?

- 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 2017



PE Ratio: Standard Regression for US stocks - January 2017

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.653[b]	.427	.426	2275.70504

a. Broad Group = United States

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

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

Coefficients[a,b,c]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	-3.945	1.838		-2.146	.032
	Beta	3.527	1.607	.043	2.194	.028
	Expected growth rate in EPS– Next 5 years	174.025	5.490	.633	31.699	.000
	Payout Ratio	20.584	1.045	.399	19.692	.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

- 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 Negative Intercept Problem

When the intercept in a multiple 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[a,b,c,d]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	Beta	.621	.868	.016	.716	.474
	Expected growth rate in EPS- Next 5 years	170.547	5.251	.644	32.477	.000
	Payout Ratio	19.431	.898	.351	21.647	.000

a. Broad Group = United States

b. Dependent Variable: Trailing PE

c. Linear Regression through the Origin

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

The Multicollinearity Problem

Correlations[a]

		Trailing PE	Beta	Expected growth rate in EPS– Next 5 years	Payout Ratio
Trailing PE	Pearson Correlation	1	.076**	.168**	.155**
	Sig. (2-tailed)		.000	.000	.000
	N	2998	2905	1614	2975
Beta	Pearson Correlation	.076**	1	.036	-.029
	Sig. (2-tailed)	.000		.095	.114
	N	2905	6535	2171	2939
Expected growth rate in EPS– Next 5 years	Pearson Correlation	.168**	.036	1	-.105**
	Sig. (2-tailed)	.000	.095		.000
	N	1614	2171	2223	1633
Payout Ratio	Pearson Correlation	.155**	-.029	-.105**	1
	Sig. (2-tailed)	.000	.114	.000	
	N	2975	2939	1633	3039

**. Correlation is significant at the 0.01 level (2-tailed).

a. Broad Group = United States

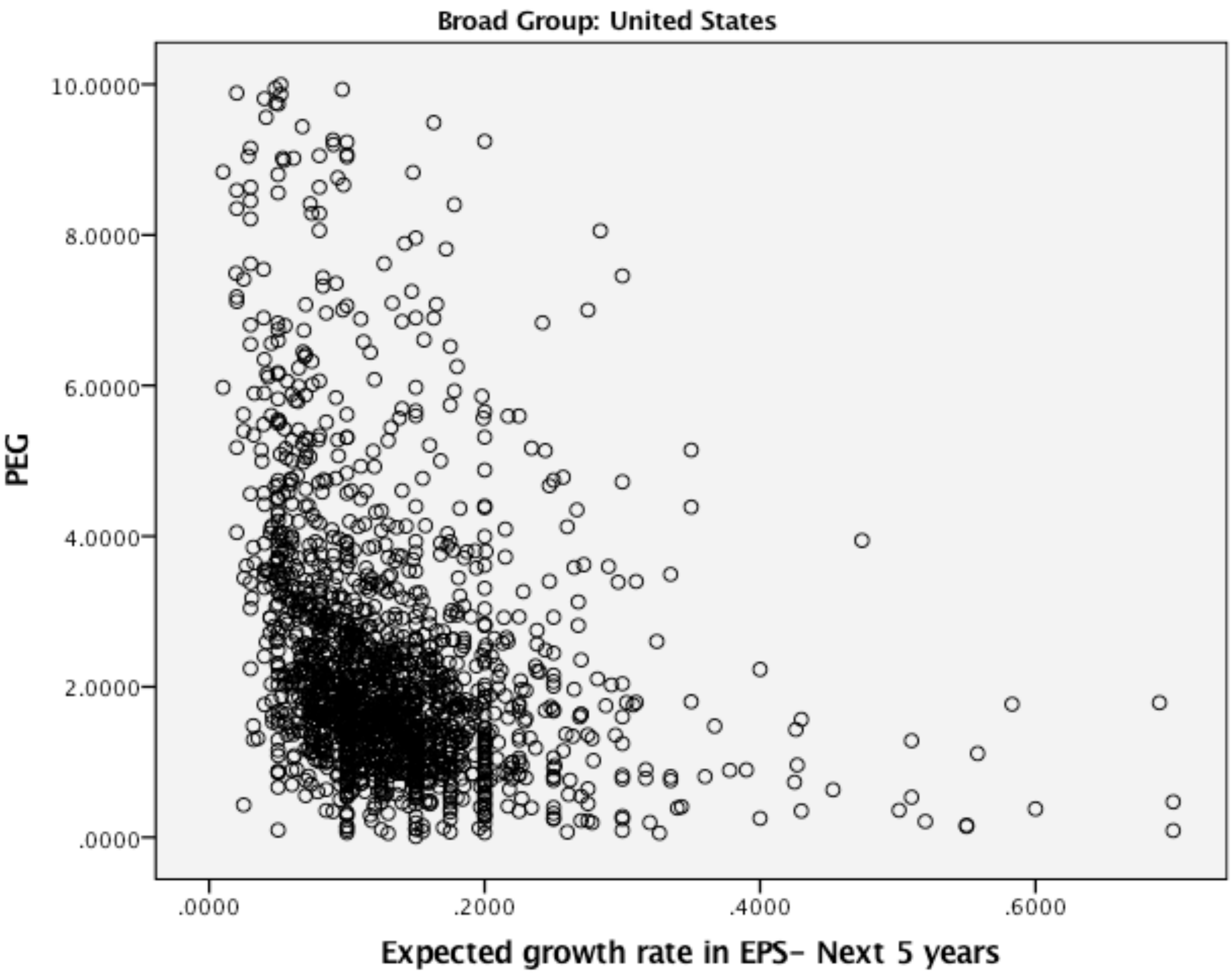
Using the PE ratio regression

- 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 = 0.62 Beta + 170.55 Growth + 19.43 (Payout) = 30.24
- Disney is actually trading at 25 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?

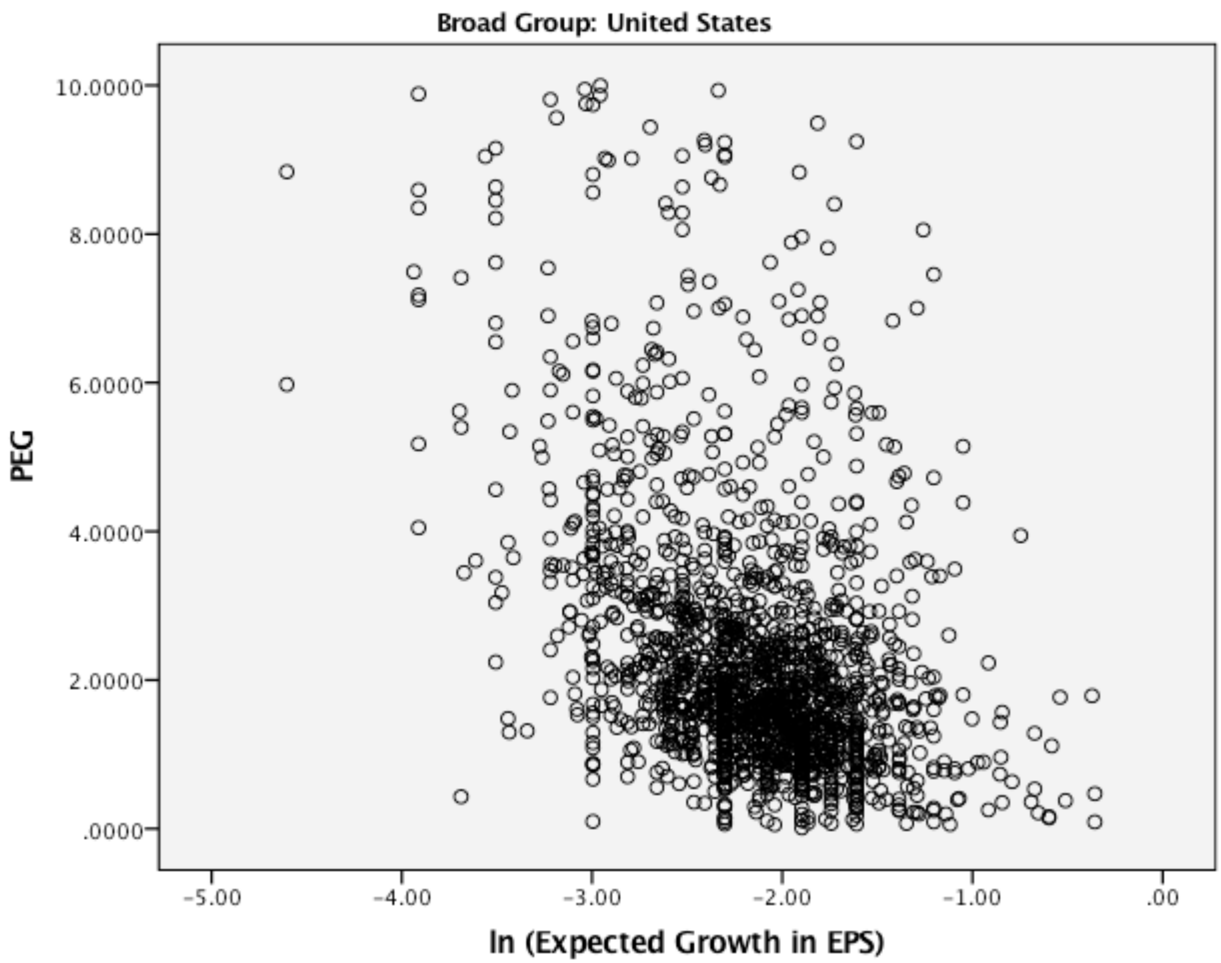
The value of growth

Date	Market price of extra % growth	Implied ERP
Jan 17	1.71	5.69%
Jan-16	0.75	6.12%
Jan-15	0.99	5.78%
Jan-14	1.49	4.96%
Jan-13	0.58	5.78%
Jan-12	0.41	6.04%
Jan-11	0.84	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



PEG versus ln(Expected Growth)



PEG Ratio Regression - US stocks January 2017

Model Summary[a]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.443[b]	.197	.195	169.845222

a. Broad Group = United States

b. Predictors: (Constant), Ln(Expected Growth), Beta, Payout Ratio

Coefficients[a,b,c]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.495	.238		2.080	.038
	Beta	-.601	.123	-.121	-4.869	.000
	Payout Ratio	.509	.088	.145	5.801	.000
	Ln(Expected Growth)	-1.088	.079	-.340	-13.706	.000

a. Broad Group = United States

b. Dependent Variable: PEG

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

I. PE ratio regressions across markets – January 2017

Region	Regression – January 2017	R^2
US	PE = 170.55 g_{EPS} + 19.43 Payout – 0.62 Beta	42.6%
Europe	PE = 13.89 + 21.42g_{EPS} + 14.90 Payout – 2.44 Beta	25.1%
Japan	PE = 5.82+ 46.38 g_{EPS} + 28.73 Payout – 1.52 Beta	32.7%
Emerging Markets	PE = 14.59 + 20.23 g_{EPS} + 10.88 Payout – 1.07 Beta	12.2%
Australia, NZ, Canada	PE = 8.85 + 52.08 g_{EPS} + 14.64 Payout (Beta not significant)	17.1%
Global	PE = 15.21 + 48.98 g_{EPS} + 14.01 Payout – 2.52 Beta	18.2%

g_{EPS}=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

Region	Regression – January 2017	R^2
US	PBV= -1.59 + 7.32 g_{EPS} – 0.64 Beta + 0.24 Payout + 9.69 ROE	43.6%
Europe	PBV = 1.60 + 0.85 g_{EPS} – 1.40 Beta + 0.79 Payout + 12.49 ROE	58.6%
Japan	PBV= 1.03 + 3.11 g_{EPS} – 0.64 Beta + 0.77 Payout + 6.33 ROE	33.9%
Emerging Markets	PBV= -0.44 + 1.27 g_{EPS} - 0.20 Beta + 0.31 Payout + 11.90 ROE	41.8%
Australia, NZ, Canada	PBV= 1.08 + 2.03 g_{EPS} - 0.66 Beta + 0.15 Payout + 9.75 ROE	49.0%
Global	PBV= 1.43 + 1.90 g_{EPS} - 0.57 Beta + 0.42 Payout +10.95 ROE	45.2%

g_{EPS}=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 2017

Region	Regression – January 2017	R squared
United States	EV/EBITDA= 32.54 + 6.30 g - 27.76 ROIC – 30.10 DFR – 18.10 Tax Rate	10.2%
Europe	EV/EBITDA= 17.53 +6.40 g - 5.65 ROIC – 10.40 DFR – 64.00 Tax Rate	3.3%
Japan	EV/EBITDA= 5.75 + 2.34 g - 1.47 ROIC – 38.00 DFR – 13.40 Tax Rate	13.8%
Emerging Markets	EV/EBITDA= 37.27 + 9.04 g -55.58 ROIC – 22.30 DFR – 19.40 Tax Rate	6.0%
Australia, NZ & Canada	EV/EBITDA= 12.63+ 11.94 g - 7.14 ROIC – 6.9 DFR – 4.20 Tax Rate	5.5%
Global	EV/EBITDA= 26.58 + 4.98 g - 25.01 ROIC – 12.80 DFR – 14.40 Tax Rate	4.5%

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   ROIC = Return on Capital

IV. EV/Sales Regressions across markets…

Region	Regression – January 2017	R Squared
United States	EV/Sales = 5.05 + 26.70 g+ 1.85 Operating Margin – 6.80 DFR	34.9%
Europe	EV/Sales = 4.46 -10.90 g+ 0.47 Operating Margin - 5.20 DFR	36.1%
Japan	EV/Sales = 2.13 + 39.3 g+ 4.12 Operating Margin – 2.40 DFR	34.7%
Emerging Markets	EV/Sales = 3.38 + 9.61 g+ 1.08 Operating Margin -4.70 DFR	39.3%
Australia, NZ & Canada	EV/Sales = -0.35 + 12.03 g+ 5.34 Operating Margin + 13.95 DFR	36.3%
Global	EV/Sales =4.09+ 16.80 g+ 1.86 Op. Margin - 5.10 DFR	33.5%

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