4: More Statistics and a Larger Sample Price to Book versus ROE: Largest firms in the US: January 2010



Aswath Damodaran

Missing growth?



PBV, ROE and Risk: Large Cap US firms



Bringing it all together... Largest US stocks in January 2010

		Model S	ummary	
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.819 ^a	.670	.661	1.19253
a. Pre next	edictors: (Co 5 years, Re	onstant), ROE gression Beta	, Expected Grow	/th in EPS:

		Coeff	icients ^a			
Model		Unstandardize	d Coefficients	Standardized Coefficients		
		В	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 2019



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

Company Name		Value	E	BITDA	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 Svs.	\$	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	2,700.69	\$	366.99	7.	.36
Budget Group Inc	\$ '	1,247.30	\$	166.71	7.	.48
Caliber System	\$ 2	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	2.38
Coach USA Inc	\$	678.38	\$	51.76	13	3.11
US 1 Inds Inc.	\$	5.60	\$	(0.17)	1	A
Average					5.	61

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A Test on EBITDA

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 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: Pricing 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 1.41Predicted Price to Sales = 0.07 + 10.49 (0.0341) = 0.43

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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..

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<u>Whole Foods</u>: 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

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There is a new kid in town: January 2015



Aswath Damodaran PS = 0.557 + 0.085 Net Margin Whole Foods = 0.557 + 8.50 (0.0408) = 0.90At 1.35 times sales, Whole Foods is overvalued (again)

Example 7: Desperation Time Nothing's working!!! Internet Stocks in early 2000..



PS Ratios and Margins are not highly correlated

- Regressing PS ratios against current margins yields the following
 - PS = 81.36 7.54(Net Margin) R2 = 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%

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- 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)



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

						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	267.4
						Median	\$97.41	10.92	44.20	116.4

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	0.0812	0 0780	0.8052	0 0354	0.8452	1

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

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Pricing 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 2019

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PE Ratio: Standard Regression for US stocks -January 2019

		model Su	mmary ^{**}	
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.702 ^b	.493	.492	2563.28776

b. Predictors: (Constant), Payout Ratio (2019), Beta, Expected growth rate in EPS- Next 5 years The regression is run with growth and payout entered as absolute, i.e., 25% is entered as 25)

		Coeffic	ients ^{a,b,c}			
		Unstandardize	d Coefficients	Standardized Coefficients		
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	-12.699	1.934		-6.566	.000
	Expected growth rate in EPS- Next 5 years	1.402	.068	.439	20.530	.000
	Beta	10.533	1.747	.128	6.030	.000
	Payout Ratio (New)	.255	.008	.630	32.632	.000

a. Broad Group = United States

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b. Dependent Variable: Trailing PE

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

Problems with the regression methodology

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- 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. 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. In 2019, this would have yielded the following:

		coenner	ento			
		Unstandardize	d Coefficients	Standardized Coefficients		
Model		В	Std. Error	Beta	t	Sig.
1	Expected growth rate in EPS- Next 5 years	1.373	.069	.532	19.871	.000
	Beta	1.208	1.032	.033	1.171	.242
	Payout Ratio (New)	.235	.007	.485	32.225	.000

Coefficients^{a,b,c,d}

a. Broad Group = United States

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- b. Dependent Variable: Trailing PE
- c. Linear Regression through the Origin

Aswath

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

The Multicollinearity Problem

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Broad Group = United States

Correlations^a

		Trailing PE	Beta	Expected growth rate in EPS- Next 5 years	Payout ratio
Trailing PE	Pearson Correlation	1	.043*	.149**	.406**
	Sig. (2-tailed)		.022	.000	.000
	Ν	2895	2805	1492	1645
Beta	Pearson Correlation	.043*	1	.254**	168**
	Sig. (2-tailed)	.022		.000	.000
	Ν	2805	6329	1836	1621
Expected growth rate in	Pearson Correlation	.149**	.254**	1	272**
EPS- Next 5 years	Sig. (2-tailed)	.000	.000		.000
	Ν	1492	1836	1892	948
Payout ratio	Pearson Correlation	.406**	168**	272**	1
	Sig. (2-tailed)	.000	.000	.000	
	Ν	1645	1621	948	1646

*. Correlation is significant at the 0.05 level (2-tailed).

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

a. Broad Group = United States

Using the PE ratio regression

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- 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 = 1.208 (1.25) +0.235 (20)+1.373 (15) =26.8
- 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

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	Date	Market price of extra % growth	Implied ERP
	Jan 19	1.40	5.96%
	Jan 18	1.14	5.08%
	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%
laran	Jan-01	1.457	2.75%
	Jan-00	2.105	2.05%

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II. PEG Ratio versus the market PEG versus Growth

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PEG versus In(Expected Growth)



PEG Ratio Regression - US stocks January 2019

		Model Su	mmary ^a	
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.432 ^b	.187	.185	219.00577
a. Bro	oad Group	= United Stat	es	

 b. Predictors: (Constant), In(Exp Growth), Payout Ratio (New), Beta

Coefficients^{a,b,c}

		Unstandardize	d Coefficients	Standardized Coefficients		
Model		В	Std. Error	Beta	t	Sig.
1	(Constant)	1.861	.262		7.093	.000
	Beta	.217	.169	.039	1.284	.199
	Payout Ratio (New)	.015	.001	.439	16.798	.000
	In(Exp Growth)	030	.115	008	264	.791

a. Broad Group = United States

b. Dependent Variable: PEG

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

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Statistically insignificant?

- If a coefficient in a regression is statistically insignificant, all it is doing is adding noise to the regression prediction.
- Take the variable out of the regression, even if the fundamentals say it should matter. In pricing, it is the market that determines what matters.

Coefficients ^{a,b,c}						
		Unstandardized Coefficients		Standardized Coefficients		
Model	I	В	Std. Error	Beta	t	Sig.
1	(Constant)	1.820	.179		10.169	.000
	Beta	.189	.144	.034	1.316	.188
	Payout Ratio (New)	.015	.001	.438	17.075	.000

a. Broad Group = United States

b. Dependent Variable: PEG

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

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I. PE ratio regressions across markets – January 2019

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	Region	Regression – January 2019	R ²	
	US	$PE = 1.21 Beta + 23.50 Payout + 120.8 g_{EPS}$	49.3%	
	Europe	$PE = 11.10 - 1.98 Beta + 12.50 Payout + 33.30 g_{EPS}$	21.6%	
	Japan	$PE = 14.63 - 7.14 Beta + 10.5 Payout + 67.4 g_{EPS}$	25.4%	
	Emerging Markets	$PE = 14.38 - 3.33 Beta + 5.90 Payout + 54.8 g_{EPS}$	26.5%	
	Australia, NZ, Canada	$PE = 3.93 - 1.52 Beta + 15.1 Payout + 91.7 g_{EPS}$	30.0%	
	Global	$PE = 8.25 - 3.06 Beta + 1.70 Payout + 9.11 g_{EPS}$	32.6%	
	<u>g_{EPS}≡</u>	Expected Growth: Expected growth in EPS or Net Income: Next 5 years (c	lecimals)	
	Beta:	Regression or Bottom up Beta		
	Payo	ut ratio: Dividends/ Net income from most recent year. Set to zero, if net in	$come < 0_{03}$	
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II. Price to Book Ratio:Fundamentals hold in every market

Region	Regression – January 2018	\mathbf{R}^2				
US	$PBV = 1.93 + 0.61 Beta + 3.0 g_{EPS} + 4.7 ROE$	11.9%				
Europe	$PBV = 1.99 - 0.91 Beta + 3.3 g_{EPS} + 9.4 ROE$	39.6%				
Japan	$PBV = 1.27 - 0.97 Beta + 5.0 g_{EPS} + 8.1 ROE$	23.7%				
Emerging Markets	$PBV=0.91 - 0.43 Beta + 3.7 g_{EPS} + 9.9 ROE$	35.5%				
Australia, NZ, Canada	$PBV = 0.98 - 0.45 Beta + 6.5 g_{EPS} + 6.60 ROE$	37.4%				
Global	PBV= 2.00 - 0.58 Beta + 4.30 g_{EPS} + 7.30 ROE	23.0%				
<u>g_{EPS}=Exp</u>	g _{EPS} =Expected Growth: Expected growth in EPS/ Net Income: Next 5 years					
Beta: Reg	gression or Bottom up Beta					
Payout ra	tio: Dividends/ Net income from most recent year. Set to zero, if net income < 0	0				
ROE: Ne	t Income/ Book value of equity in most recent year.	94				

III. EV/EBITDA – January 2019

Region	Regression – January 2019	R squared
United States	EV/EBITDA= 15.76 – 13.1 DFR + 28.8 g - 3.70 Tax Rate	20.7%
Europe	EV/EBITDA= 14.25 – 4.40 DFR + 21.9 g - 12.10 Tax Rate	9.1%
Japan	EV/EBITDA= 8.13 – 4.5 DFR + 28.5 g - 0.20 Tax Rate	4.5%
Emerging Markets	EV/EBITDA= 16.55 – 9.5 DFR + 22.3 g - 16.7 Tax Rate	15.9%
Australia, NZ & Canada	EV/EBITDA= 13.51 – 4.80 DFR + 14.3 g - 9.60 Tax Rate	10.0%
Global	EV/EBITDA= 14.94 – 8.90 DFR + 24.0 g - 7.00 Tax Rate	13.7%
g = Expected F	Revenue Growth: Expected growth in revenues: Near term (2	2 or 5 years)
$\underline{DFR} = Debt R$	atio: Total Debt/ (Total Debt + Market value of equity)	(
Tax Rate: Effe	ctive tax rate in most recent year ROIC = Return on Capit	al

IV. EV/Sales Regressions across markets...

96-	Region	Regression – January 2019	R Squared
	United States	EV/Sales = 0.79 +-2.70 Tax Rate – 2.4 DFR + 6.9 g + 8.2 Op. Margin	24.7%
	Europe	EV/Sales = -0.15 + 2.10 Tax Rate +m4.70 DFR + 5.2 g + 6.6 Op. Margin	19.6%
	Japan	EV/Sales = -0.14 + 0.80 Tax Rate – 1.8 DFR + 4.2 g + 9.0 Op. Margin	21.3%
	Emerging Markets	EV/Sales = 2.93 - 3.80 Tax Rate + 0.70 DFR + 1.706 g + 3.9 Op. Margin	7.3%
	Australia, NZ & Canada	EV/Sales = 1.15 - 0.30 Tax Rate – 5.80 DFR + 3.4 g + 3.2 Op. Margin	16.8%
	Global	EV/Sales = 1.22 -1.40 Tax Rate – 2.10 DFR + 3.9 g + 6.2 Op. Margin	11.3%

<u>g =Expected Revenue Growth</u>: Expected growth in revenues: Near term (2 or 5 years) <u>ERP</u>: ERP for country in which company is incorporated <u>Tax Rate</u>: Effective tax rate in most recent year; <u>Operating Margin</u>: Operating Income/ Sales

V. EV/Invested Capital

Region	Regression – January 2019	R Squared
United States	EV/IC = 3.99– 3.70 DFR - 0.60 g + 5.2 ROIC	53.7%
Europe	EV/IC = 2.18– 1.90 DFR + 1.40 g + 7.0 ROIC	56.9%
Japan	EV/IC = 1.27– 1.10 DFR + 1.80 g + 8.6 ROIC	48.1%
Emerging Markets	EV/IC = 2.08– 2.20 DFR + 2.10 g + 4.5 ROIC	48.7%
Australia, NZ & Canada	EV/IC = 1.75– 1.30 DFR + 2.20 g + 6.6 ROIC	42.1%
Global	EV/IC = 1.22– 2.60 DFR + 0.50 g + 6.3 ROIC	49.8%

The Pricing Game: Choices

Measure	Choices	Considerations/ Questions
Value	Enterprise, Equity or Firm Value?	 Is this a financial service business? Are there big differences in leverage?
Scalar	Revenues, Earnings, Cash Flows or Book Value?	 How are you measuring value? Is the scaling number positive? How (and how much) do accounting choices affect the scaling measure?
Timing & Normalizing	Current, Trailing, Forward or Really Forward?	 Where are you in the life cycle? How much cyclicality is there in the number? Can you get forecasted values?
Comparable	What is your peer group? (Global or local? Similar size or all firms?)	 How much do companies share in common globally? Does company size affect business economics? How big a sample of firms do you need? How do you plan to control for differences?

Relative Valuation: Some closing propositions

- 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.

Reviewing: The Four Steps to Understanding Multiples

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?

- 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?

- 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?

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- 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?

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- 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

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- 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

- <u>The ubiquitous "market participant"</u>: Through FAS 157, accountants are asked to attach values to assets/liabilities that market participants would have been willing to pay/ receive.
- <u>Tilt towards relative value</u>: "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 titled 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

Division	Business	Revenues	EBITDA	Pre-tax Operating Income	Capital Expenditures	Depreciation	Total Assets
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

1	1		
		U	

Division	Business	EBITDA	EV/EBITDA for sector	Value of Business
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

ſ	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	\mathbb{R}^2
Refrigeration systems	EV/EBITDA	EV/EBITDA = 5.35 – 3.55 Tax Rate + 14.17 ROC	42%
Defense	EV/Revenues	EV/Revenues = 0.85 + 7.32 Pre-tax Operating Margin	47%
Construction	EV/EBITDA	EV/EBITDA = 3.17 - 2.87 Tax Rate + 14.66 ROC	36%
Security	EV/Capital	EV/Capital = 0.55 + 8.22 ROC	55%
Industrial Products	EV/Revenues	EV/Revenues = 0.51 + 6.13 Pre-tax Operating Margin	48%
Aircraft	EV/Capital	EV/Capital = 0.65 + 6.98 ROC	40%

United Technologies: Relative Valuation Sum of the Parts value

		Current						
		value for						
	Scaling	scaling		Operating	Tax		Estimated	
Division	Variable	variable	ROC	Margin	Rate	Predicted Multiple	Value	
						5.35 - 3.55 (.38) + 14.17		
Carrier	EBITDA	\$1,510	13.57%	8.81%	38%	(.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	
						3.17 - 2.87 (.38)+14.66		
Otis	EBITDA	\$2,680	35.71%	19.13%	38%	(.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 =							

United Technologies: DCF parts valuation Cost of capital, by business

	Unlevered	Debt/Equity	Levered	Cost of	After-tax cost	Debt to	Cost of
Division	Beta	Ratio	beta	equity	of debt	Capital	capital
Carrier	0.83	30.44%	0.97	9.32%	2.95%	23.33%	7.84%
Pratt &							
Whitney	0.81	30.44%	0.95	9.17%	2.95%	23.33%	7.72%
Otis	1.19	30.44%	1.39	12.07%	2.95%	23.33%	9.94%
UTC Fire &							
Security	0.65	30.44%	0.76	7.95%	2.95%	23.33%	6.78%
Hamilton							
Sundstrand	1.04	30.44%	1.22	10.93%	2.95%	23.33%	9.06%
Sikorsky	1.17	30.44%	1.37	11.92%	2.95%	23.33%	9.82%

United Technologies: DCF valuation Fundamentals, by business

	Total	Capital		Allocated	Operating income	Return on	Reinvestment
Division	Assets	Invested	Cap Ex	Reinvestment	after taxes	capital	Rate
Carrier	\$10,810	\$6,014	\$191	\$353	\$816	13.57%	43.28%
Pratt &							
Whitney	\$9,650	\$5,369	\$412	\$762	\$1,316	24.51%	57.90%
Otis	\$7,731	\$4,301	\$150	\$277	\$1,536	35.71%	18.06%
UTC Fire							
& Security	\$10,022	\$5,575	\$95	\$176	\$336	6.03%	52.27%
Hamilton							
Sundstrand	\$8,648	\$4,811	\$141	\$261	\$681	14.16%	38.26%
Sikorsky	\$3,985	\$2,217	\$165	\$305	\$296	13.37%	102.95%

United Technologies, DCF valuation Growth Choices

	Cost of	Return on	Reinvestment	Expected	Length of growth	Stable	Stable
Division	capital	capital	Rate	growth	period	growth rate	ROC
Carrier	7.84%	13.57%	43.28%	5.87%	5	3%	7.84%
Pratt &							
Whitney	7.72%	24.51%	57.90%	14.19%	5	3%	12.00%
Otis	9.94%	35.71%	18.06%	6.45%	5	3%	14.00%
UTC Fire							
& Security	6.78%	6.03%	52.27%	3.15%	0	3%	6.78%
Hamilton							
Sundstrand	9.06%	14.16%	38.26%	5.42%	5	3%	9.06%
Sikorsky	9.82%	13.37%	102.95%	13.76%	5	3%	9.82%

United Technologies, DCF valuation Values of the parts

	Cost of	PV of	PV of Terminal	Value of Operating
Business	capital	FCFF	Value	Assets
Carrier	7.84%	\$2,190	\$9,498	\$11,688
Pratt & Whitney	7.72%	\$3,310	\$27,989	\$31,299
Otis	9.94%	\$5,717	\$14,798	\$20,515
UTC Fire &				
Security	6.78%	\$0	\$4,953	\$4,953
Hamilton				
Sundstrand	9.06%	\$1,902	\$6,343	\$8,245
Sikorsky	9.82%	-\$49	\$3,598	\$3,550
Sum				\$80,250

United Technologies, DCF Sum of the Parts	valuation
Value of the parts	= \$80,250
Value of corporate expenses	
$= \frac{\text{Corporate Expenses}_{\text{Current}}(1-t)(1+g)}{(\text{Cost of capital}_{\text{Company}} - g)}$	$=\frac{408(138)(1.03)}{(.086803)}=$ \$4,587

Value of operating assets (sum of parts DCF) = \$75,663 Value of operating assets (sum of parts RV) = \$74,230 Value of operating assets (company DCF) = \$71,410 Enterprise value (based on market prices) = \$52,261

GE in 2018: The Parts

								ROIC: 2013-	
Business	Revenues- 2017	Revenue Growth in 2017	EBIT before G&A	EBIT after G&A	EBIT Margin	Invested Capital	ROIC in 2017	2017	Cost of capital
Power	\$ 36.00	-1.64%	\$ 2.80	\$ 1.69	4.68%	\$328.34	3.85%	9.28%	4.91%
Renewable Energy	\$ 10.30	14.44%	\$ 0.70	\$ 0.41	4.00%	\$49.91	6.19%	8.00%	6.88%
Oil & Gas	\$ 17.20	33.33%	\$ 0.20	\$ (0.31)	-1.78%	\$275.95	-0.83%	3.71%	8.82%
Aviation	\$ 27.40	4.18%	\$ 6.60	\$ 5.80	21.19%	\$192.73	22.59%	20.27%	8.52%
Healthcare	\$ 19.10	4.37%	\$ 3.40	\$ 2.86	15.00%	\$132.81	16.18%	15.07%	7.97%
Transportation	\$ 4.20	-10.64%	\$ 0.80	\$ 0.70	16.56%	\$20.73	25.17%	26.67%	7.49%
Lighting	\$ 2.00	-58.33%	\$ 0.10	\$ 0.03	1.59%	\$3.34	7.16%	9.66%	8.50%
Capital	\$ 9.10	-16.51%	\$ (6.80)	\$ (7.04)	-77.40%	\$723.38	-7.30%	-2.81%	3.64%
Total	\$ 125.30	1.29%	\$ 7.80	\$ 4.15	3.31%	\$1,727.18	1.80%	4.50%	6.23%

GE: Value of the Parts

					_						
		Average EPIT		Normalized EBIT							
	Povonuosin	Average EBIT	Normalized EPIT	(with corporate		Iormalized		POIC Next 5	Expected growth		
	Revenues In	wargin bejore	Normalizea EBIT	expenses				KUIC - WEXT 5	Expected growth		<i>(</i> 1 ·)
Business	2017	G&A, 2013-17	before G&A	allocated)		EBIT (1-t)	Cost of Capital	years	next 5 years	Valu	e of Business
Power	\$ 35,990.00	14.34%	\$ 5,161.92	\$ 4,061.80	\$	3,046.35	4.91%	9.28%	6.10%	\$	73,138.18
Renewable Energy	\$ 10,280.00	8.24%	\$ 847.46	\$ 532.70	\$	399.53	6.88%	8.00%	16.34%	\$	6,455.88
Oil & Gas	\$ 17,231.00	10.97%	\$ 1,890.80	\$ 1,365.19	\$	1,023.89	8.82%	3.71%	-0.13%	\$	11,924.66
Aviation	\$ 27,375.00	22.09%	\$ 6,046.58	\$ 5,209.28	\$	3,906.96	8.52%	20.27%	4.55%	\$	52,849.35
Healthcare	\$ 19,116.00	17.01%	\$ 3,251.87	\$ 2,668.20	\$	2,001.15	7.97%	15.07%	0.99%	\$	26,233.80
Transportation	\$ 4,178.00	20.71%	\$ 865.41	\$ 737.06	\$	552.80	7.49%	26.67%	-6.62%	\$	6,075.26
Lighting	\$ 1,987.00	5.24%	\$ 104.14	\$ 43.03	\$	32.27	8.50%	9.66%	-24.94%	\$	280.49
Total (non-capital)	\$ 116,157.00	15.35%	\$ 17,829.69	\$ 17,551.60	\$	13,163.70				\$	176,957.62
GE Capital Business	\$ 9,070.00	3.00%	\$ 272.10	\$ (5.98)	\$	(4.49)	6.23%	0.00%	-4.25%	\$	27,080.96
								Value	e of businesses	\$	204,038.59
									- GE Debt	\$	83,568.00
									- GE Capital Debt	\$	51,023.00
									Minority Interests	\$	17,723.00
									+ Cash	\$	43,299.00
									Value of equity	\$	95,023.59
									- Options	\$	218.94
							V	alue of equity	in common stock	\$	94,804.65
									Value per share	\$	10.92
					_						

GE: Pricing the Parts

			Norn	nalized EBIT,							
			using	average					Peer Group		
Business	Reve	enues in 2017	marg	gin (2013-17)	DA	in 2017	EB	ITDA	EV/EBITDA	Estin	nated Pricing
Power	\$	35,990.00	\$	4,061.80	\$:	L,358.00	\$5	5,419.80	10.55	\$	57,179
Renewable Energy	\$	10,280.00	\$	532.70	\$	259.00	\$	791.70	15.13	\$	11,978
Oil & Gas	\$	17,231.00	\$	1,365.19	\$:	L,026.00	\$2	2,391.19	12.15	\$	29,053
Aviation	\$	27,375.00	\$	5,209.28	\$	979.00	\$6	5,188.28	6.56	\$	40,595
Healthcare	\$	19,116.00	\$	2,668.20	\$	806.00	\$3	3,474.20	10.97	\$	38,112
Transportation	\$	4,178.00	\$	737.06	\$	135.00	\$	872.06	11.22	\$	9,785
Lighting	\$	1,987.00	\$	43.03	\$	86.00	\$	129.03	12.8	\$	1,652
Total (non-capital)	\$	116,157.00	\$	17,551.60						\$	188,353
GE Capital Business	\$	9,070.00	\$	(5.98)	\$2	2,343.00	\$2	2,337.02	10.13	\$	23,674
								Pricir	ng of Business	\$	212,027.44
									- GE Debt	\$	83,568.00
								- GE	Capital Debt	\$	51,023.00
								- Mino	rity Interests	\$	17,723.00
									+ Cash	\$	43,299.00
								Prici	ng of Equity	\$	103,012.44
									- Options		218.94
						Pricing	of E	quity in c	ommon stock	\$	102,793.50
						Est	ima	ting Prici	ng per share		\$11.84
n Damodaran											