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# Value Multiples

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# Value/Earnings and Value/Cashflow Ratios

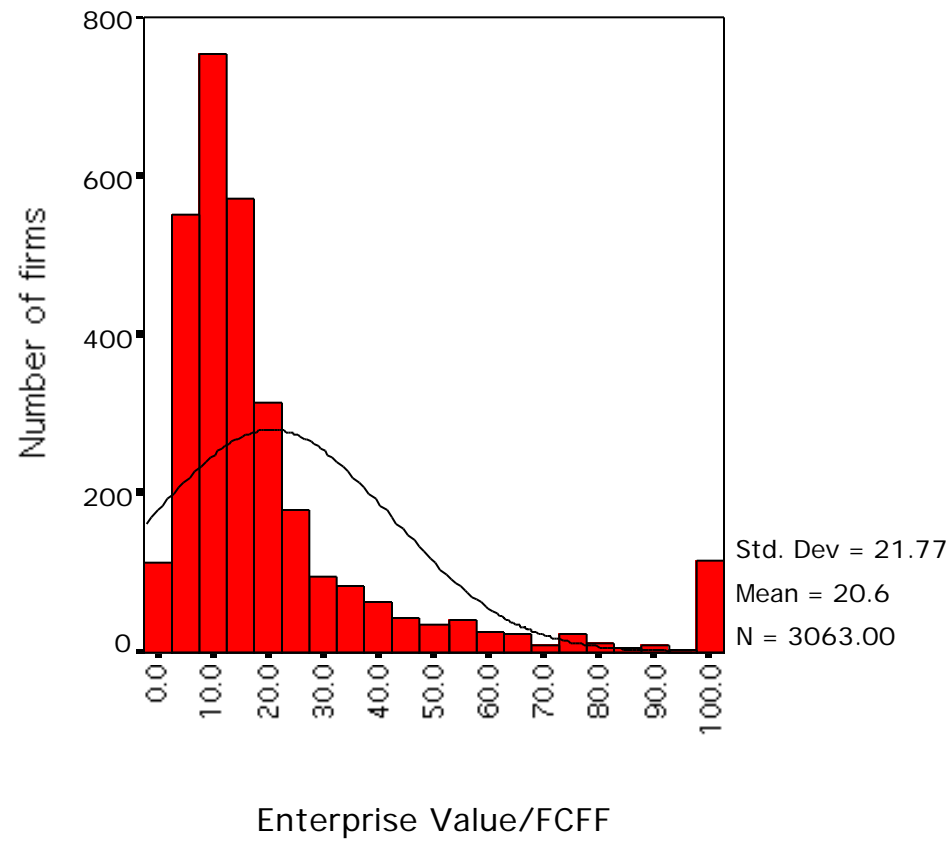
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- While Price earnings ratios look at the market value of equity relative to earnings to equity investors, Value earnings ratios look at the market value of the firm relative to operating earnings. Value to cash flow ratios modify the earnings number to make it a cash flow number.
- The form of value to cash flow ratios that has the closest parallels in DCF valuation is the value to Free Cash Flow to the Firm, which is defined as:

$$\text{Value/FCFF} = \frac{(\text{Market Value of Equity} + \text{Market Value of Debt-Cash})}{\text{EBIT} (1-t) - (\text{Cap Ex} - \text{Deprecn}) - \text{Chg in WC}}$$

- Consistency Tests:
  - If the numerator is net of cash (or if net debt is used, then the interest income from the cash should not be in denominator
  - The interest expenses added back to get to EBIT should correspond to the debt in the numerator. If only long term debt is considered, only long term interest should be added back.

# Value/FCFF Distribution



## Value of Firm/FCFF: Determinants

- Reverting back to a two-stage FCFF DCF model, we get:

$$V_0 = \frac{\text{FCFF}_0 (1+g) \left[ 1 - \frac{(1+g)^n}{(1+\text{WACC})^n} \right]}{\text{WACC} - g} + \frac{\text{FCFF}_0 (1+g)^n (1+g_n)}{(\text{WACC} - g_n)(1+\text{WACC})^n}$$

- $V_0$  = Value of the firm (today)
- $\text{FCFF}_0$  = Free Cashflow to the firm in current year
- $g$  = Expected growth rate in FCFF in extraordinary growth period (first  $n$  years)
- $\text{WACC}$  = Weighted average cost of capital
- $g_n$  = Expected growth rate in FCFF in stable growth period (after  $n$  years)

# Value Multiples

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- Dividing both sides by the FCFF yields,

$$\frac{V_0}{\text{FCFF}_0} = \frac{(1+g) \left[ 1 - \frac{(1+g)^n}{(1+WACC)^n} \right]}{WACC - g} + \frac{(1+g)^n (1+g_n)}{(WACC - g_n)(1+WACC)^n}$$

- The value/FCFF multiples is a function of
  - the cost of capital
  - the expected growth

## Alternatives to FCFF - EBIT and EBITDA

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- Most analysts find FCFF to complex or messy to use in multiples (partly because capital expenditures and working capital have to be estimated). They use modified versions of the multiple with the following alternative denominator:
  - after-tax operating income or  $EBIT(1-t)$
  - pre-tax operating income or EBIT
  - net operating income (NOI), a slightly modified version of operating income, where any non-operating expenses and income is removed from the EBIT
  - EBITDA, which is earnings before interest, taxes, depreciation and amortization.

# Value/FCFF Multiples and the Alternatives

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- Assume that you have computed the value of a firm, using discounted cash flow models. Rank the following multiples in the order of magnitude from lowest to highest?
  - Value/EBIT
  - Value/EBIT(1-t)
  - Value/FCFF
  - Value/EBITDA
- What assumption(s) would you need to make for the Value/EBIT(1-t) ratio to be equal to the Value/FCFF multiple?

## Illustration: Using Value/FCFF Approaches to value a firm: MCI Communications

- MCI Communications had earnings before interest and taxes of \$3356 million in 1994 (Its net income after taxes was \$855 million).
- It had capital expenditures of \$2500 million in 1994 and depreciation of \$1100 million; Working capital increased by \$250 million.
- It expects free cashflows to the firm to grow 15% a year for the next five years and 5% a year after that.
- The cost of capital is 10.50% for the next five years and 10% after that.
- The company faces a tax rate of 36%.

$$\frac{V_0}{\text{FCFF}_0} = \frac{(1.15) \left[ 1 - \frac{(1.15)^5}{(1.105)^5} \right]}{.105 - .15} + \frac{(1.15)^5 (1.05)}{(.10 - .05)(1.105)^5} = 31.28$$

# Multiple Magic

- In this case of MCI there is a big difference between the FCFF and short cut measures. For instance the following table illustrates the appropriate multiple using short cut measures, and the amount you would overpay by if you used the FCFF multiple.

Free Cash Flow to the Firm

= EBIT (1-t) - Net Cap Ex - Change in Working Capital

= 3356 (1 - 0.36) + 1100 - 2500 - 250 = \$ 498 million

	<i>\$ Value</i>	<i>Correct Multiple</i>
FCFF	\$498	31.28382355
EBIT (1-t)	\$2,148	7.251163362
EBIT	\$ 3,356	4.640744552
EBITDA	\$4,456	3.49513885

# Reasons for Increased Use of Value/EBITDA

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1. The multiple can be computed even for firms that are reporting net losses, since earnings before interest, taxes and depreciation are usually positive.
2. For firms in certain industries, such as cellular, which require a substantial investment in infrastructure and long gestation periods, this multiple seems to be more appropriate than the price/earnings ratio.
3. In leveraged buyouts, where the key factor is cash generated by the firm prior to all discretionary expenditures, the EBITDA is the measure of cash flows from operations that can be used to support debt payment at least in the short term.
4. By looking at cashflows prior to capital expenditures, it may provide a better estimate of “optimal value”, especially if the capital expenditures are unwise or earn substandard returns.
5. By looking at the value of the firm and cashflows to the firm it allows for comparisons across firms with different financial leverage.

# Value/EBITDA Multiple

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- The Classic Definition

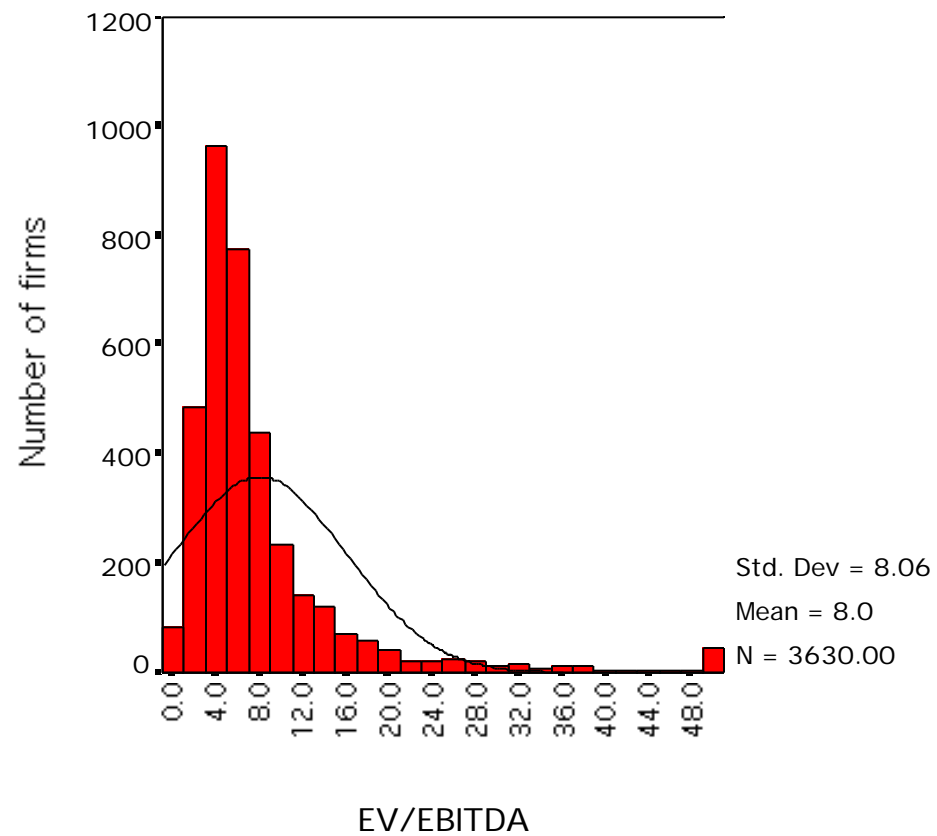
$$\frac{\text{Value}}{\text{EBITDA}} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt}}{\text{Earnings before Interest, Taxes and Depreciation}}$$

- The No-Cash Version

$$\frac{\text{Enterprise Value}}{\text{EBITDA}} = \frac{\text{Market Value of Equity} + \text{Market Value of Debt} - \text{Cash}}{\text{Earnings before Interest, Taxes and Depreciation}}$$

- When cash and marketable securities are netted out of value, none of the income from the cash and securities should be reflected in the denominator.

# Value/EBITDA Distribution



# The Determinants of Value/EBITDA Multiples: Linkage to DCF Valuation

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- Firm value can be written as:

$$V_0 = \frac{FCFF_1}{WACC - g}$$

- The numerator can be written as follows:

$$\begin{aligned} FCFF &= EBIT (1-t) - (Cex - Depr) - \text{Working Capital} \\ &= (EBITDA - Depr) (1-t) - (Cex - Depr) - \text{Working Capital} \\ &= EBITDA (1-t) + Depr (t) - Cex - \text{Working Capital} \end{aligned}$$

## From Firm Value to EBITDA Multiples

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- Now the Value of the firm can be rewritten as,

$$\text{Value} = \frac{\text{EBITDA} (1-t) + \text{Depr} (t) - \text{Cex} - \text{Working Capital}}{\text{WACC} - g}$$

- Dividing both sides of the equation by EBITDA,

$$\frac{\text{Value}}{\text{EBITDA}} = \frac{(1-t)}{\text{WACC}-g} + \frac{\text{Depr} (t)/\text{EBITDA}}{\text{WACC} - g} - \frac{\text{CEx}/\text{EBITDA}}{\text{WACC} - g} - \frac{\text{Working Capital}/\text{EBITDA}}{\text{WACC} - g}$$

# A Simple Example

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- Consider a firm with the following characteristics:
  - Tax Rate = 36%
  - Capital Expenditures/EBITDA = 30%
  - Depreciation/EBITDA = 20%
  - Cost of Capital = 10%
  - The firm has no working capital requirements
  - The firm is in stable growth and is expected to grow 5% a year forever.

## Calculating Value/EBITDA Multiple

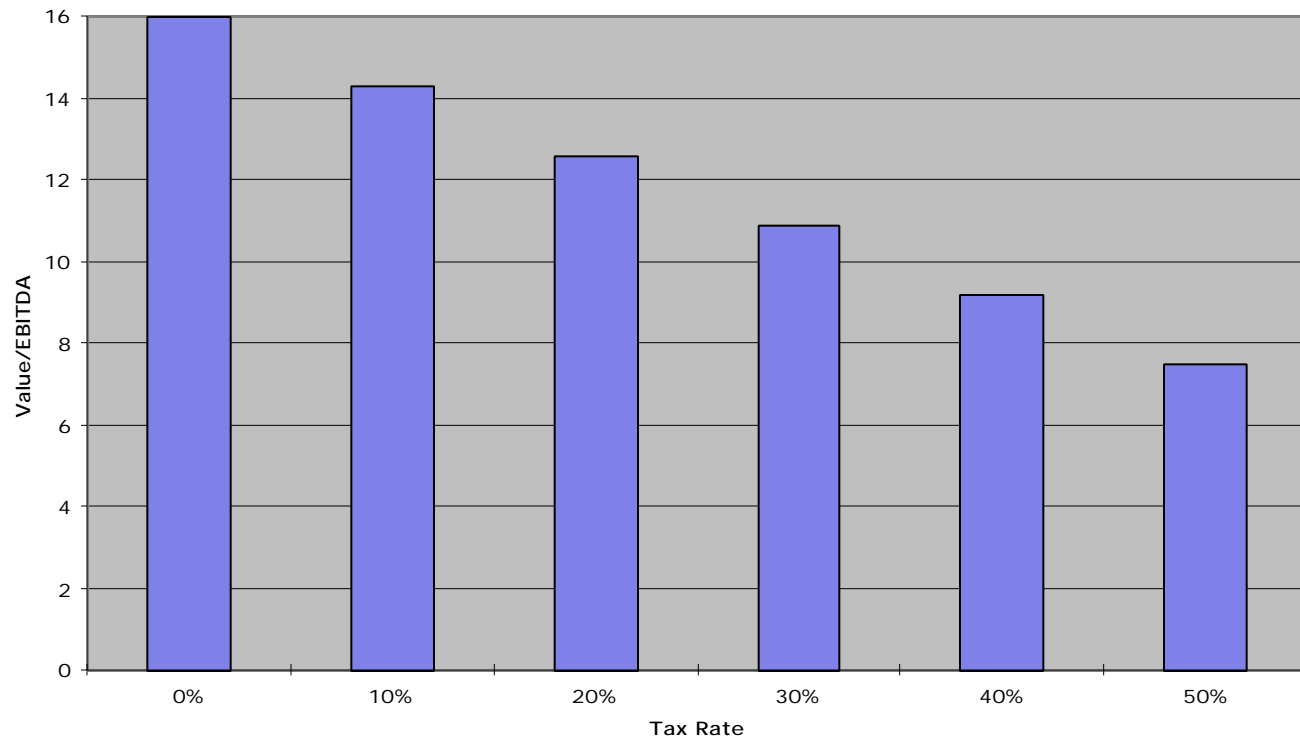
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- In this case, the Value/EBITDA multiple for this firm can be estimated as follows:

$$\frac{\text{Value}}{\text{EBITDA}} = \frac{(1-.36)}{.10-.05} + \frac{(0.2)(.36)}{.10-.05} - \frac{0.3}{.10-.05} - \frac{0}{.10-.05} = 8.24$$

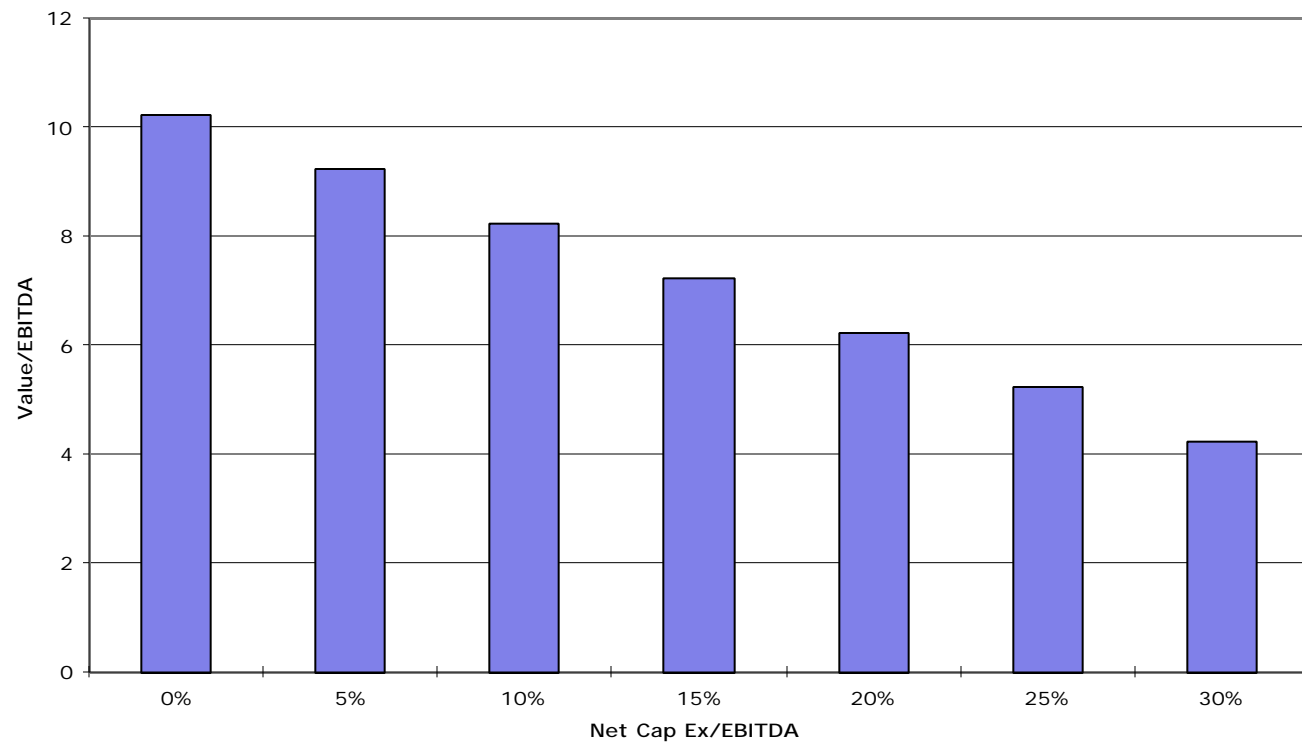
# Value/EBITDA Multiples and Taxes

VEBITDA Multiples and Tax Rates

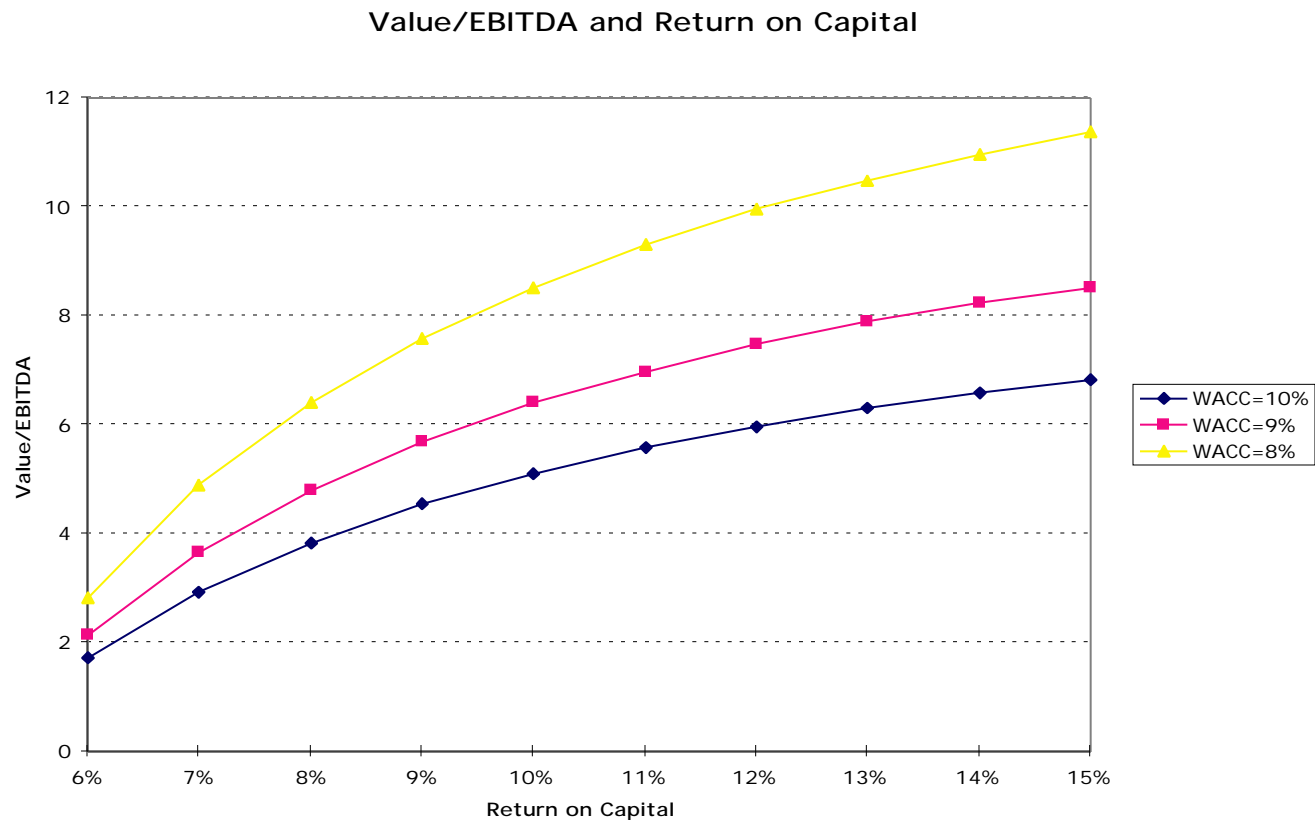


# Value/EBITDA and Net Cap Ex

Value/EBITDA and Net Cap Ex Ratios



# Value/EBITDA Multiples and Return on Capital



# Value/EBITDA Multiple: 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
Tramac 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
<b>Average</b>			<b>5.61</b>

# 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?

# Analyzing the Value/EBITDA Multiple

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- While low value/EBITDA multiples may be a symptom of undervaluation, a few questions need to be answered:
  - Is the operating income next year expected to be significantly lower than the EBITDA for the most recent period? (Price may have dropped)
  - Does the firm have significant capital expenditures coming up? (In the trucking business, the life of the trucking fleet would be a good indicator)
  - Does the firm have a much higher cost of capital than other firms in the sector?
  - Does the firm face a much higher tax rate than other firms in the sector?

# Value/EBITDA Multiples: Market

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- The multiple of value to EBITDA varies widely across firms in the market, depending upon:
  - how capital intensive the firm is (high capital intensity firms will tend to have lower value/EBITDA ratios), and how much reinvestment is needed to keep the business going and create growth
  - how high or low the cost of capital is (higher costs of capital will lead to lower Value/EBITDA multiples)
  - how high or low expected growth is in the sector (high growth sectors will tend to have higher Value/EBITDA multiples)

# US Market: Cross Sectional Regression

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.526 <sup>a</sup>	.277	.276	426.8390

a. Predictors: (Constant), Eff Tax Rate, ROC1, Expected Growth in EPS: next 5 y

Coefficients<sup>a,b</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7.221	.617		11.707	.000
	Expected Growth in EPS: next 5 y	.287	.016	.344	17.739	.000
	ROC1	11.123	.670	.319	16.610	.000
	Eff Tax Rate	-.110	.014	-.155	-7.917	.000

a. Dependent Variable: EV/EBITDA

b. Weighted Least Squares Regression - Weighted by Market Cap