

Suggested Problem Solutions
Investment Valuation – Damodaran

Lecture 6 – Relative Valuation

CHAPTER 17 – FUNDAMENTAL PRINCIPLES OF RELATIVE VALUATION

1.
 - a) The current P/E is based on earnings from the most recent financial year (which could end at different dates for different firms). The TTM P/E is based on earnings from the trailing twelve months. The forward P/E is based on analyst forecasts of next year's earnings.
 - b) The answer depends on whether you are under a growing earnings environment or a declining earnings environment. In boom times, with increasing earnings, you would expect the current P/E to give you the highest value. This results from the fact that current earnings (from the most recent financial year) will be lower than TTM earnings, which in turn will be lower than forecasted earnings. In periods of declining earnings, the forward PE will give you the highest value.
2.
 - a) The ratio is not consistently estimated, since the numerator looks at overall firm value but the denominator is a measure of equity earnings.
 - b) The ratio will be affected by difference in capital structure across firms. Firms with substantial leverage will have high values for this ratio, not because they are overvalued, but because of the inconsistency in measurement. Specifically, the earnings net of interest payments will be smaller for these firms.
3.
 - a) A skewed distribution is one in which there are more observations in one tail of the distribution than the other.
 - b) Multiples cannot be less than zero but can have very high positive values. This is because most multiples are viewed as non-meaningful if they are negative and, as a result, they are typically removed from the distribution.
 - c) As a consequence of the positive skewness, the mean will be pulled up by the outliers and will typically be higher than the median. An analyst comparing an individual firm to the average will conclude (incorrectly) that most of the firms are undervalued.
4. There are two consequences. One is that the distribution will be skewed and the mean will be pulled up by the positive outliers (as discussed above). The other is that you lose a fair number of firms in your sample, creating a potential bias in the sample.

CHAPTER 18 – EARNINGS MULTIPLES

6.

- a) The average P/E Ratio for the Industry equals 13.2 and the median P/E Ratio for the Industry equals 12.25. If the firms in this group are homogeneous, the average P/E ratio provides an estimate of how the market values earnings in this sector, given the expected growth potential and the risk in the sector. The average P/E ratio can be skewed by extreme values (usually high, since P/E cannot be less than zero). The median corrects for this by looking at the middle of the distribution (50% of firms are above the median and 50% are below).
- b) This statement is likely to be true only if Thiokol has the same growth prospects, risk profile, and ROE (and therefore payout ratio) as the typical firm in the industry. This does not appear to be the case here, as Thiokol appears to have lower growth potential and lower payout than the typical firm. The lower P/E ratio for Thiokol is likely to be a function of the firm's characteristics.
- c) The regression of P/E ratios on fundamentals yields the following:

$$P/E = -2.33 + 35.74(\text{Growth Rate}) + 11.97(\text{Beta}) + 2.90(\text{Payout Ratio}) \quad R^2 = 0.4068$$

Based on the regression coefficients and the characteristics of firms in the industry, we can calculate the predicted P/E ratios for these firms as follows:

	<i>Actual P/E</i>	<i>Predicted P/E</i>	<i>Difference</i>
Boeing	17.30	12.90	4.40
General Dynamics	15.50	17.90	-2.40
GM- Hughes	16.50	13.68	2.82
Grumman	11.40	12.07	-0.67
Lockheed Corp.	10.20	12.31	-2.11
Logicon	12.40	13.17	-0.77
Loral Corporation	13.30	13.21	0.09
Martin Marietta	11.00	11.34	-0.34
McDonnell Doug.	22.60	17.15	5.45
Northrop	9.50	14.82	-5.32
Raytheon	12.10	10.85	1.25
Rockwell	13.90	14.85	-0.95
Thiokol	8.70	11.44	-2.74
United Industrial	10.40	9.11	1.29

Negative numbers in the difference column indicate that the stock is undervalued. The problem with a regression like this one is that it has relatively few observations and is likely to be thrown off by a few extreme observations.

7.

a) Expected Growth Rate = 25%

$$\text{Unlevered Beta} = 1.15 / (1 + 0.6 * 0.25) = 1.00$$

$$\text{FCFE} = \text{Net Income} + \text{Depreciation} - \text{Capital Spending} = 10 + 5 - 12 = 3$$

$$\text{Estimated Dividend Payout Ratio} = 3/10 = 30\%$$

$$\text{Estimated P/E} = 18.69 + 0.0695(25) - 0.5082(1.00) - 0.4262(0.30) = 19.79$$

b) There are several concerns related to using this regression. First, the cross-sectional relationship between P/E ratio and the fundamentals may change over time. Second, the market might be overvaluing all stocks. Third, some of the fundamentals, such as growth rate or beta, might be estimated with error. In addition, we are assuming that private companies are valued like publicly traded stocks. In other words, we are not allowing for the potential diversification or illiquidity discounts that may be associated with private firms.

ADDITIONAL PROBLEM:

I also asked you to consider the following additional problem related to P/E Ratio Fundamentals:

1. Starting from the Gordon Growth Model (the Dividend Discount Model with constant growth), show how the P/E ratio is related to the fundamentals of the firm.

Using the Dividend Discount Model, we can show that :

$$P_0 = \frac{DPS_1}{K_e - g} = \frac{EPS_0(1+g)(PayoutRatio)}{K_e - g}$$

$$\frac{P_0}{EPS_0} = \frac{(1+g)\left(1 - \frac{g}{ROE}\right)}{K_e - g}$$

2. Based on your answer to (1), estimate the expected P/E ratio for a firm that has long-term expected growth of 6%, an ROE of 13%, and a cost of equity of 8.5%. If the company has a current P/E ratio of 19.5, would your analysis suggest that the company is over- or under-valued?

For the firm described above, this gives :

$$\frac{P_0}{EPS_0} = \frac{(1+g)\left(1 - \frac{g}{ROE}\right)}{K_e - g} = \frac{(1.06)\left(1 - \frac{.06}{.13}\right)}{.085 - .06} = \frac{.5708}{.025} = 22.83$$

Based on this analysis, we would conclude that the company is under-valued at a P/E ratio of 19.5.