EXPLANATORY FACTORS FOR MARKET MULTIPLES AND EXPECTED RETURNS

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ABSTRACT

Market multiples of the largest firms are most likely to reflect efficient pricing of stocks. For such firms, variations in market multiples should be largely explained by fundamental variables, and expected returns should be positively related to beta but not significantly related to other factors. This study shows that, for stocks in the Standard & Poor's 100 index, fundamental factors explain almost all of the variations in price/book and price/sales multiples but only 25% of variations in forward price/earnings multiples. Expected returns are positively related to beta, as postulated by the capital asset pricing model. However, contrary to the expectations of the capital asset pricing model and the weak and semi-strong forms of the efficient market hypothesis, expected returns are also significantly negatively related to prior returns and forward price/earnings multiples. These findings are surprising for a sample comprising the largest stocks.

JEL: G11, G12

KEYWORDS: Market multiples, expected returns, explanatory factors

INTRODUCTION

According to the capital asset pricing model (CAPM) developed by Sharpe (1964) and Lintner (1965), expected stock returns should be positively related to their systematic risk, measured by beta, which is the only factor that should influence expected returns. The semi-strong and weak forms of the efficient market hypothesis (EMH) postulated by Fama (1970) imply that stock returns should not be significantly related to fundamental or technical factors, which constitute public information that should have been incorporated into stock prices. Several studies have shown that stock returns are negatively related to market multiples, such as price/earnings (P/E), price/book (P/B), and price/sales (P/S), and not significantly related to beta. Other studies have indicated that stock returns are negatively related to long-term prior returns and positively related to short-term prior returns.

Empirical evidence that stock returns can be predicted with publicly available fundamental or technical factors challenges the validity of the EMH unless we assume that all such variables with predictive power represent risk measures. These findings do not, however, contradict the CAPM since actual stock returns, which are extremely volatile and often negative, cannot be reliable proxies for expected returns. Of course, factors that are significantly related to stock returns may influence expected returns. Empirical evidence indicates that expected stock returns are positively related to beta, as hypothesized by the CAPM, but they are also significantly related to other factors, namely market multiples and prior returns, contrary to the single-factor CAPM.

Market multiples represent current stock valuations relative to different accounting variables. If market multiples fully reflect firms' fundamentals, they should represent efficient pricing of stocks and shouldn't have any significant influence on expected stock returns. Market multiples of the largest firms, which are widely and closely followed by analysts and large investors, are most likely to reflect efficient pricing of stocks. For such firms, we would expect variations in market multiples to be largely explained by fundamental variables, and expected stock returns to be positively related to beta but not significantly related to other publicly available factors, such as market multiples or prior returns. This study

investigates the extent to which fundamental variables explain commonly used market multiples of firms in the Standard & Poor's (S&P) 100 index and examines whether the expected returns of their stocks are significantly related to beta, market multiples, and prior returns.

The remainder of the paper is organized as follows. The next section reviews the literature. The data and methodology are described in the following section. The fourth section presents the empirical results and the final section concludes the paper.

LITERATURE REVIEW

Some studies have examined the relations of market multiples with various fundamental factors. Whitbeck and Kisor (1963) reported that trailing price/earnings (P/E) is positively related to prospective dividend payout and growth in earnings per share, and negatively related to standard deviation of earnings per share. Malkiel and Cragg (1970) showed that forward P/E is directly related to the payout ratio and predicted long- and short-term growth rates of earnings per share, and inversely related to the predicted instability index of the future earnings stream. Harris and Marston (1994) indicated that price/book (P/B) is positively related to expected long-term growth in earnings per share and negatively related to beta. Fairfield (1994) showed that P/B is directly related to expected return on book value of equity, and P/E is directly related to expected growth in abnormal earnings. Senchak and Martin (1987) reported that firms with low price/sales (P/S) and low P/E tend to have low market value of equity.

Barbee, Jeong, and Mukherji (2008) showed that the component of P/S that has the most consistently negative relationship with returns is net profit margin. Researchers have shown that, contrary to the semi-strong form of the EMH, actual stock returns are significantly related to various market multiples. Basu (1977) documented higher returns for stocks with higher earnings/price ratios. Fama and French (1992) showed that stock returns are positively related to book/market but not significantly related to beta. Barbee, Mukherji and Raines (1996) found that stock returns are more strongly positively related to sales/price than to book/market ratio. Evidence has also been presented that, inconsistent with the weak form of the EMH, stock returns are related to prior stock returns. DeBondt and Thaler (1985) found that stock returns are inversely related to prior returns over 3- to 5-year periods. Jegadeesh and Titman (1993) showed that stock returns are positively related to prior returns over 3- to 12-month periods.

Since large investors, including institutions, commonly use analyst forecasts, the returns implied by consensus target prices of analysts may be used as a proxy for expected stock returns. A survey by Block (1999) revealed that financial analysts consider earnings far more important than book value for analyzing securities and 62% of them agree that low-P/E stocks tend to outperform the market. In addition, they consider a company's growth potential the most important determinant of its stock's P/E, risks being considered far less important. The most important factor influencing their stock recommendations is the current stock price relative to its historical trading range. Further, 63% of analysts strongly disagree with the EMH and only 31% consider the CAPM to be an important model of stock price behavior.

Some researchers have examined the factors influencing analysts' expected returns and projected gains. Brav, Lehavy, and Michaely (2005) indicated that expected returns based on Value Line's target prices during 1975-2001 are negatively related to 11-month prior returns and firm size, positively related to beta, and not significantly related to book/market. Jeong, Lee and Mukherji (2008) argued that a cross-sectional study in a recent period would reflect current analyst behavior better than multi-year studies. Their results showed that stock price gains projected by analysts for S&P 500 stocks in 2005 have strong negative relations with stock price changes in the previous year and price/earnings ratio, and positive relations with projected growth, and are moderately positively related to firm size and beta and negatively related to dividend yield. The empirical evidence summarized above suggests that market multiples are related to various fundamental factors and, as postulated by the CAPM, expected returns are positively related to

beta. However, inconsistent with the CAPM, expected returns are also significantly related to other factors, such as market multiples, prior returns, and firm size. For the largest firms represented by the S&P 100 index, stocks should be efficiently priced and expected returns should be positively related to beta. Whether expected returns are related to other factors besides beta, even for the largest firms, is an empirical question. Since there is only a moderate size effect for expected returns of S&P 500 firms, the larger S&P 100 firms are not expected to reflect a size effect. Consistent with this expectation, expected returns are not significantly related to firm size in our sample. Fama and French (2006) showed that international value premiums are as large for mega-cap stocks as for smaller stocks, and Jeong, Lee, and Mukherji (2009) showed that Dow stocks provided an earnings value premium during 1983-2007.

Expected returns may, therefore, reflect a value premium even for the largest stocks, especially if market multiples do not fully incorporate fundamental factors. The possible impact of prior returns on expected returns is an interesting issue. Since analysts generally set price targets for short periods of about a year, they may be influenced by the finding of Jegadeesh and Titman (1993) that stock returns are positively related to prior returns over 1-year periods. However, they studied a broad sample of NYSE and AMEX stocks, and their winner and loser stocks were smaller than average, which does not imply any momentum effect for the largest stocks. Curiously, Brav, Lehavy, and Michaely (2005) found that the expected returns of analysts are negatively related to 11-month prior returns, suggesting that analysts expect price reversals rather than momentum even for annual returns. Our results will show whether this belief of analysts, which contradicts the weak-form of the EMH, extends to the largest stocks, which may be expected to be efficiently priced.

DATA AND METHODOLOGY

We study stocks in the S&P 100 index, which comprises the largest and most established S&P 500 firms with exchange-listed options, representing 45% of the U.S. equity market capitalization. Since these stocks are widely followed by analysts and closely monitored by large investors, their market multiples are most likely to be based on efficient pricing reflecting fundamental factors and consensus analyst estimates for these stocks should be reliable proxies for expected returns. The data are obtained from Yahoo!Finance, which gets company data from Capital IQ, a division of Standard & Poor's, and analyst data from Thomson/First Call, which provides the target prices of sell-side analysts. Since these fundamental data are readily available, they should be reflected in the market multiples and expected returns based on analysts' consensus estimates. We obtain the data for all S&P 100 firms after all the companies are expected to have filed their 10K reports for 2010, on April 21, 2011, which was a Friday, providing us with a weekend to compile the data.

From the initial sample of 100 firms, we exclude 15 financial firms and 4 utility companies because some of the fundamental data of firms in these industries, such as price/sales, profit margin, and return on equity, are not comparable to those of other companies owing to the nature of their revenues, degree of leverage, and regulated activities. From the remaining 81 firms, we omit 9 firms that do not pay any dividend, because the payout ratio and projected growth are fundamental factors influencing the market multiples, and growth projections of non-dividend paying firms do not represent a steady state. Our final sample comprises 72 dividend-paying firms that are not in the financial or utilities industries.

According to the dividend discount model formulated by Gordon (1962), a company's stock price is the present value of a growing perpetuity, represented by the future dividends per share, which are assumed to grow at a constant rate, discounted by the cost of equity:

$$P_0 = \frac{D_1}{K_e - g} \qquad (1)$$

where P_0 is the current stock price, D_1 is the projected dividend per share, K_e is the cost of equity, and g is the constant dividend growth rate. As shown in Appendix 1, this model can be reformulated to derive the hypothesized relationships between different market multiples and various fundamental variables:

$$P/E_f = \frac{POR_p}{K_e - g} \tag{2}$$

$$P/S = \frac{POR_p \times PM_f}{K_e - g} \tag{3}$$

$$P/B = \frac{POR_p \times ROE_f}{K_e - g} \tag{4}$$

where P/E_f is the forward price/earnings multiple, POR_p is the projected payout ratio, P/S is the price/sales multiple, PM_f is the forward profit margin, P/B is the price/book multiple, ROE_f is the forward return on equity, and the other variables are as defined above. Equations 2 through 4 indicate that all the three market multiples should be positively related to the projected payout ratio and dividend growth rate, and negatively related to the cost of equity. In addition, we would expect positive relationships of P/S with the forward profit margin and P/B with the forward return on equity. To examine the relationships of these market multiples with fundamental variables, we use the forward P/E and trailing P/S and P/B because these multiples are commonly used by analysts, and are available from Yahoo!Finance, in these forms. A survey by Bruner, Eades, Harris, and Higgins (1998) revealed that 80% of leading financial advisors use the CAPM to estimate the cost of equity of firms. According to this model, a firm's cost of equity should be positively related to the beta of its stock:

$$K_e = R_f \times (R_m - R_f)\, \beta_e \tag{5}$$

where K_e is the cost of equity, R_f is the risk-free rate, R_m is the expected market return, and βe is the stock's beta. We use the stock's beta as a proxy for the firm's cost of equity since the other two parameters for estimating cost of equity (risk-free rate and expected market return) would be common to all firms. Further, analysts' estimated annual growth in earnings per share over the next five years is used as the proxy for the dividend growth rate, assuming that the payout ratio will be stable and dividends will grow at the same rate as earnings. The following ordinary least squares regression equations were estimated to identify the determinants of the market multiples:

$$P/E_f = \alpha + \beta_1 \times POR_p + \beta_2 \times \beta_e + \beta_3 \times g \tag{6}$$

$$P/S = \alpha + \beta_1 \times POR_p + \beta_2 \times PM_f + \beta_3 \times \beta_e + \beta_4 \times g \tag{7}$$

$$P/B = \alpha + \beta_1 \times POR_p + \beta_2 \times ROE_f + \beta_3 \times \beta_e + \beta_4 \times g \tag{8}$$

where α and β_i are the regression intercept and slopes, respectively, and the dependent and independent variables are as defined above. According to the CAPM, in an efficient market, the expected return on a stock should be equal to its cost of equity, implying that it should be positively related to its systematic risk, measured by beta, which is the only factor that explains differences in expected returns. We estimate the expected returns on stocks as:

$$E(R) = \frac{(P_t - P_0) + DY_p}{P_0} \tag{9}$$

where E(R) is the expected stock return, P_t is the analysts' mean target price, P_0 is the current stock price, and DY_p is the projected annual dividend yield. We investigate whether expected returns are significantly related to the stock's prior returns, beta, and the three market multiples. Since the survey by Block (1999) indicates that analyst expectations are strongly influenced by the current stock price relative to its historical trading range, we calculate the prior return as:

$$R_p = \frac{P_0 - P_l}{P_h - P_l} \tag{10}$$

where R_p is the prior return, P_0 is the current stock price, P_l is the 52-week low stock price, and P_h is the 52-week high stock price.

The following ordinary least squares regression equations were estimated to identify the determinants of the expected returns:

$$E(R) = \alpha + \beta_1 \times R_p + \beta_2 \times \beta_e + \beta_3 \times P/E_f \tag{11}$$

$$E(R) = \alpha + \beta_1 \times R_p + \beta_2 \times \beta_e + \beta_3 \times P/S \tag{12}$$

$$E(R) = \alpha + \beta_1 \times R_p + \beta_2 \times \beta_e + \beta_3 \times P/B \tag{13}$$

where α and β_i are the regression intercept and slopes, respectively, and the dependent and independent variables are as defined above.

RESULTS

The descriptive statistics in Table 1 show that the sample firms are very large, with a median $51.50 billion market value of equity. The mean expected return of 14.38% is more than twice the standard deviation, indicating that the estimates for the largest firms are not widely dispersed. The coefficients of variation of the market multiples show the lowest variability for P/E and the highest variability for P/B, with P/S in between. The median projected payout ratio of 28.18%, and projected growth of 12.70%, suggest that the sample firms are generally mature but still expected to grow at healthy rates. The mean and median betas are close to 1, as would be expected for a sample of the largest firms. The median forward profit margin of 13.04% and forward return on equity of 22.35% show that the sample firms are expected to earn sizable profits and provide high returns to shareholders. The median prior return of 87.85% indicates that the sample firms are generally trading close to the high end of their 52-week low-high range.

Table 1: Descriptive Statistics of Study Sample

	Maximum	Mean	Median	Minimum	Std. Devn.	Coeff. of Var.
Market Value of Equity ($B)	419.89	79.64	51.50	11.80	68.45	0.86
Expected Return	34.05%	14.38%	13.39%	-6.39%	6.89%	0.48
Forward Price/Earnings	23.94	12.86	12.87	7.19	3.06	0.24
Price/Sales	7.67	2.05	1.86	0.39	1.35	0.66
Price/Book	30.68	4.11	2.77	1.19	4.37	1.06
Projected Payout Ratio	87.73%	30.75%	28.18%	5.16%	17.55%	0.57
Projected Growth	21.50%	12.56%	12.70%	2.65%	3.75%	0.30
Beta	2.45	1.03	1.05	0.29	0.44	0.42
Forward Profit Margin	46.23%	16.23%	13.04%	2.03%	10.12%	0.62
Forward Return on Equity	226.34%	32.42%	22.35%	10.31%	32.18%	0.99
Prior Return	99.38%	76.37%	87.85%	0.65%	24.86%	0.33

Descriptive statistics of market multiples, expected returns, related explanatory factors, and sample sizes of the study sample of 72 stocks in the Standard & Poor's 100 index.

Panel A of Table 2 shows the correlations between the variables that are used to explain the market multiples and expected return. The projected payout ratio is negatively related to projected growth, logically suggesting that high-growth firms pay lower dividends so that they can finance their growth with retained earnings. Beta is positively related to projected growth and negatively related to the projected payout ratio, indicating greater systematic risk for high-growth firms that pay lower dividends. These significant correlations are all moderate, suggesting that multicollinearity among the explanatory variables should not be a severe problem in the multivariate regression models. The forward profit margin and forward return on equity are not significantly correlated with any of the other explanatory variables for the market multiples.

Table 2: Correlations between Explanatory Factors Used in Multivariate Regressions

Panel A. Explanatory Factors for Market Multiples				
	Projected Payout Ratio	Projected Growth	Beta	Forward Profit Margin
Projected Growth	-0.37**			
Beta	-0.43**	0.44**		
Forward Profit Margin	-0.04	-0.17	-0.15	
Forward Return on Equity	0.21	-0.08	-0.12	0.19
Panel B. Explanatory Factors for Expected Return				
	Forward Price/Earnings	**Price/Book**	**Price/Sales**	**Beta**
Price/Book	0.12			
Price/Sales	0.23*	0.21		
Beta	0.02	-0.11	-0.11	
Prior Return	0.22	0.07	0.14	0.24*

Correlations between explanatory factors used in multivariate regressions of market multiples and expected returns.
**, ** indicate significance at the 1 and 5 percent levels, respectively.*

The correlations among the explanatory factors for expected return in Panel B of Table 2 show that forward P/E is positively related to P/S, indicating that firms with a high valuation relative to sales also have a high valuation relative to projected earnings. Prior return is positively related to beta, showing that stocks with greater systematic risk earned higher prior return. Both these significant correlations are fairly weak, and there is no significant correlation among the other explanatory variables for expected return.

The multivariate regressions in Panel A of Table 3 demonstrate that, consistent with expectations, all the three market multiples are positively related to the projected payout ratio and projected growth. Further, P/S is positively related to forward profit margin and P/B is positively related to forward return on equity. None of the market multiples is significantly related to beta, indicating that valuation multiples do not reflect systematic risk. The t-statistics show that the forward return on equity has the greatest influence on P/B, and the forward profit margin has the strongest influence on P/S. The projected payout ratio and projected growth have more or less equal influences for all the three market multiples. The adjusted R-square is a moderate 25% for forward P/E, but very high for P/S (88%) and P/B (97%). These results indicate that P/S and P/B are primarily influenced by the profitability measures associated with these market multiples, and models combining the relevant profitability measures with the projected payout ratio and projected growth explain almost all of the variations in these market multiples. The fundamental variables associated with forward P/E, however, explain a much lower proportion of its variability since there is no profitability measure associated with this multiple. Although not reported in Table 2, forward P/E is not significantly correlated with either forward profit margin or forward return on equity. Further, using trailing P/E instead of forward P/E as the dependent variable in the multivariate regression produces a much weaker result: the adjusted R-square is only 5% and none of the three variables has a significant t-statistic.

Table 3: Multivariate Regressions of Market Multiples and Expected Returns

Panel A. Regressions of Market Multiples			
	Forward Price/Earnings	**Price/Sales**	**Price/Book**
Intercept	7.83**	-1.60**	-2.15**
(T-statistic)	(5.22)	(-4.79)	(-4.74)
Projected Payout Ratio	4.52*	1.62**	2.06**
(T-statistic)	(2.44)	(4.42)	(3.63)
Projected Growth	32.86**	8.17**	11.59**
(T-statistic)	(3.53)	(4.72)	(4.41)
Beta	-0.91	0.05	-0.10
(T-statistic)	(-1.1)	(0.34)	(-0.44)
Forward Profit Margin		12.77**	
(T-statistic)		(22.39)	
Forward Return on Equity			13.19**
(T-statistic)			(48.17)
Adjusted R-square	0.25	0.88	0.97
Panel B. Regressions of Expected Return			
	Forward P/E Model	**P/S Model**	**P/B Model**
Intercept	0.29**	0.20**	0.21**
(T-statistic)	(9.32)	(7.74)	(8.13)
Prior Return	-0.13**	-0.16**	-0.16**
(T-statistic)	(-5.14)	(-5.52)	(-5.52)
Beta	0.05**	0.06**	0.06**
(T-statistic)	(3.72)	(3.47)	(3.42)
Forward Price/Earnings	-0.01**		
(T-statistic)	(-3.94)		
Price/Sales		0.00	
(T-statistic)		(0.23)	
Price/Book			-0.00
(T-statistic)			(-0.18)
Adjusted R-square	0.44	0.32	0.32

The ordinary least squares regression equations estimated to identify the determinants of the market multiples in Panel A are:
$P/E_f = \alpha + \beta_1 \times POR_p + \beta_2 \times \beta_e + \beta_3 \times g$, $P/S = \alpha + \beta_1 \times POR_p + \beta_2 \times PM_f + \beta_3 \times \beta_e + \beta_4 \times g$, *and*
$P/B = \alpha + \beta_1 \times POR_p + \beta_2 \times ROE_f + \beta_3 \times \beta_e + \beta_4 \times g$.
The ordinary least squares regression equations estimated to identify the determinants of the expected returns in Panel B are:
$E(R) = \alpha + \beta_1 \times R_p + \beta_2 \times \beta_e + \beta_3 \times P/E_f$, $E(R) = \alpha + \beta_1 \times R_p + \beta_2 \times \beta_e + \beta_3 \times P/S$, *and*
$E(R) = \alpha + \beta_1 \times R_p + \beta_2 \times \beta_e + \beta_3 \times P/B$
**, ** indicate significance at the 1 and 5 percent levels, respectively.*

In Panel B of Table 3 we examine three models for expected return, combining the three market multiples separately with prior return and beta. Consistent with the results of earlier studies, expected return is negatively related to prior return and positively related to beta in all the three models. The t-statistics indicate that prior return has a greater influence than beta in all the models. Expected return is also negatively related to forward P/E but not significantly related to either P/S or P/B. The P/E model has the highest adjusted R-square of 44%, while the other two models both have adjusted R-square of 32%. These results suggest that expected returns are higher for stocks that are trading at the lower end of their trading ranges, are priced low relative to forward earnings, and have greater systematic risk. The expectation of price reversal, reflected in expected returns, is consistent with the stated belief of analysts. The significant influence of forward P/E, in contrast to the lack of explanatory power of the other two multiples, may be due to the fact that, unlike the other two multiples, it is a forward estimate, and as Panel A showed, it is not as well-explained by fundamental variables as the other two multiples, suggesting that valuations represented by forward P/E may be relatively less efficient. The positive relationship of expected return with beta is consistent with the CAPM, but the significant influences of prior return and forward P/E on expected return are inconsistent with the CAPM as well as with the weak and semi-strong forms of the EMH. These findings are surprising for a sample comprising the largest stocks.

Table 4: Differences between Portfolios with Low and High Values of Explanatory Factors

	Mean Value	Difference in Means	T-stat-istic	Mean Expected Return	Difference in Means	T-stat-istic
Low Beta	0.70			14.26%		
High Beta	1.36	-0.66**	-10.11	14.49%	-0.23	-0.14
Low Price/Earnings	10.59			16.19%		
High Price/Earnings	15.13	-4.54**	-9.41	12.57%	3.62%*	2.29
Low Prior Return	58.56%			16.52%		
High Prior Return	94.19%	-35.63%**	-8.72	12.24%	4.28%**	2.75

Differences between explanatory factors and expected returns of portfolios with low and high values of significant explanatory factors.
**, ** indicate significance at the 1 and 5 percent levels, respectively.*

In Table 4 we investigate the practical significance of our results by examining whether expected returns are significantly different for stocks high and low values of the variables with significant explanatory power in the multivariate regressions. We divide our sample of 72 stocks into two equal groups with values above and below the median for each variable. The sample stocks with low beta, forward P/E, and prior return have significantly lower values of these variables than the firms with high values of these variables. Expected returns are 4.28% higher for stocks with low prior return compared to those with high prior return, and 3.62% higher for stocks with low forward P/E relative to stocks with high forward P/E; these differences are significant at 5% and 1% levels, respectively. There is no significant difference between the expected returns of stocks with high and low betas. In conjunction with the findings in Table 3, these results indicate that expected returns are higher for stocks with lower prior return and lower forward P/E. Controlling for these two primary explanatory factors, expected returns are also positively related to beta. These results are consistent with the findings reported in the literature review that very few analysts consider the CAPM to be an important model of stock price behavior, most of them strongly disagree with the EMH and agree that low-P/E stocks tend to outperform the market, and the most important factor influencing their stock recommendations is the current stock price relative to its historical trading range.

CONCLUSION

Market multiples of the largest firms are most likely to reflect efficient pricing of stocks. For such firms, variations in market multiples should be largely explained by fundamental variables, and expected returns should be positively related to beta but not significantly related to other factors. This study shows that, for stocks in the Standard & Poor's 100 index, fundamental factors explain almost all of the variations in P/B and P/S multiples but only 25% of variations in forward P/E multiples. Expected returns are positively related to beta, as postulated by the capital asset pricing model. However, contrary to the expectations of the CAPM and the weak and semi-strong forms of the EMH, expected returns are also significantly negatively related to prior returns and forward price/earnings multiples. These findings are surprising for a sample comprising the largest stocks.

The focus of this study and availability of data imposed some limitations that must be considered in interpreting the results. The study covered the largest U.S. stocks and examined three popular market multiples in a recent period. Studies of a broader cross-section of stocks, including other market multiples, in other countries or periods, may yield different results. We leave it to future researchers to explore these possibilities.

APPENDIX

According to the dividend discount model developed by Gordon (1962):

$$P_0 = \frac{D_1}{K_e - g} \quad (1)$$

where P_0 is the current stock price, D_1 is the projected dividend per share, K_e is the cost of equity, and g is the dividend growth rate.

This model can be reformulated to express different market multiples in terms of various fundamental variables:

$$P_0/E_1 = \frac{D_1 / E_1}{K_e - g} \quad (2)$$

$$P/E_f = \frac{POR_p}{K_e - g} \quad (3)$$

$$P_0/S_0 = \frac{D_1/E_1 \times E_1/S_0}{K_e - g} \quad (4)$$

$$P/S = \frac{POR_p \times PM_f}{K_e - g} \quad (5)$$

$$P_0/B_0 = \frac{D_1/E_1 \times E_1/B_0}{K_e - g} \quad (6)$$

$$P/B = \frac{POR_p \times ROE_f}{K_e - g} \quad (7)$$

where E_1 is the projected earnings per share, P/E_f is the forward price/earnings multiple, POR_p is the projected payout ratio, S_0 is the current sales per share, P/S is the price/sales multiple, PM_f is the forward profit margin, B_0 is the current return on book equity, P/B is the price/book multiple, ROE_f is the forward return on equity, and the other variables are as defined above.

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