An Idiosyncratic Explanation of Earnings-Price Ratio based on Financial Statement Analysis

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Abstract

The earnings-price (E/P) ratio or alternatively the price-earnings (P/E) ratio measures the market value of a company relative to its earnings. Firms with same level of earnings, having similar size, and belonging to same industry may have differences in their E/P ratios. Because market price shows investors' expectations about future earnings as compared to current earnings. Anderson & Brooks (2006) identified four basic variables that contribute to the explanation of E/P ratio, i.e. the year in which the E/P ratio is calculated, the size of the firm, the industry to which firm belongs, and firm specific characteristics. Subsequent to the findings of Anderson & Brooks (2006), this study attempts to identify financial ratios that can be helpful in the prediction of E/P ratio. Data of 37 companies have been taken from the same industry (i.e., Engineering), in the same year (2009), and controlling for size (by using natural log of total assets). The 36 different simple linear regression models are developed to analyze the individual factors affecting E/P ratio. Furthermore, a final regression model is prepared that simultaneously regressed the variables found significant individually. On the basis of R^2 of 0.86 in the final model it is concluded that variation in E/P ratios among corporations are mostly explained by financial statements analysis. The study contributes to existing literature by giving insight on usefulness of financial statement analysis in formation of investors' perception about firms' value (i.e. E/P ratio). Precisely, the study serves as guide for the estimation and evaluation of firms' future cash flow and earnings potential.

Key words: Earnings-price ratio, Financial Statement Analysis, idiosyncratic effects.

1. Introduction

The earnings-price (E/P) ratio or alternatively the price-earnings (P/E) ratio measures the market value of a company relative to its earnings. This ratio expresses the relationship between the market price of a share of common stock and that stock's current earnings per share. Investors view the P/E ratio as a gauge of future earning power of the firm. Companies having high growth opportunities generally have high P/E ratios; firms with low growth tend to have lower P/E ratios. Firms with same level of earnings, having similar size, and belonging to same industry may have differences in their E/P ratios. Pratt (2001) discovered that these differences may appear among firms in their P/E ratios because of investors' expectations about future earnings. "The larger the optimism that investors are adding to firms' earnings, the larger is its P/E ratio" (Pratt, 2001, 44). Thus, market price shows investors' expectations about future earnings as compared to current earnings. If market is pessimistic about future earnings, current share price decreases resulting in higher E/P ratio.

The value of a company is determined by its future cash flow. However, some researchers believe that current earnings are more useful in estimating future earnings than current cash flow as evidenced by (Watts and Zimmerman, 1999; Beaver and Dukes, 1973). Several studies have been made to find out the earnings forecast of listed companies during the past decades because earnings forecast have become a significant tool for stock valuation in the stock market and an imperative instrument in risk management and budget control for decision makers of a firm. Similarly, numerous studies have been conducted to investigate the future earnings with the help of firm specific information i.e., financial statement analysis variables (Ou and Penman, 1989; Ball and Brown, 1968; Skogsvik, 2008; Chong and Kim, 2001; Setiono and Strong, 1998; Jordon at el, 2009). Published financial statements are a principal source of firm-specific information concerning the result of a firm's wealth creating activities (i.e., sales, production, investment and financing activities). These financial statements present extensive and low-cost information that assists external monitoring by outside stakeholders such as shareholders and banks, and provide a foundation for various contractual arrangements such as private lending agreements and employment contracts.

Furthermore, financial statements supply additional line item information that presents an explanation on the earnings as an indicator of future earnings. The current study tests several financial statements variables to affirm whether these variables depict helpful information in explaining the differences in firms' stock values comparing to their current earnings. Following Jordan et al. (2009) this study attempts to identify specifically those financial ratios which can be helpful in predicting E/P ratio. For this purpose data of all of the 37 companies have been taken from the same industry (i.e Engineering), in the same year (2009), and controlling for size (by using natural log of total assets). The 48 different simple linear regression models have been developed to analyze the determinants of E/P ratio. Furthermore, a final regression model have been prepared that regressed simultaneously the variables, found significant individually. On the basis of final model study attempted to predict E/P ratio.

2. Literature Review

Research on earnings forecast started with the view of Lintner and Glauber (1967) and Ball and Watts (1972) who took the current earnings as the foundation for predicting earnings of the next period. Similarly, several classical growth studies have stated that earnings changes over time appear to be randomly distributed (Little, 1962; Rayner and Little, 1966; Brealey, 1967; Lintner and Glauber, 1967). However, Fuller, at el. (1992) stated that earnings changes in the U.S. market are not randomly distributed. By using E/P ratio as market's implicit forecast of future earnings variability they found that high E/P stocks are found to have higher future earnings growth. Following them Allen at el. (1998) undertaken the same study in the Australian market and found their results consistent with Fuller at el. (1992). Ou and Penmen (1989) highlighted the details that can be useful in identifying the factors helpful in predicting the variation among firm's P/E ratios. They established LOGIT models to predict year ahead earnings variability (i.e., a binary variable) by using various financial statement variables, grouped as (profitability, liquidity, turnover, and leverage). They found that subsequent earnings can be predicted by financial statement variables significantly and these variables play a vital role in forecasting future earnings changes and stock returns. Likewise, deviation amongst firm's P/E ratios could be predicted with these same performance tools.

After Ou and Penmaen (1989), Jordon at. el., (2009) used 25 different financial statement analysis variables to test which financial statement analysis measure gives useful information in explaining the variation among firms' E/P ratios. They developed simple regression model for each independent variable regressed on the E/P ratio. Their independent variables consist of a variety of traditional performance tools categorized as (leverage, profitability, turnover, and liquidity, and other). Additionally, independent variables, which were found statistically significant, were combined to regress simultaneously in a final regression model on the dependant variable (i.e., E/P ratio). Their results, which were supported by an F ratio of 27.29 (p-level =.0000) and a strong R^2 of .616 suggest that a greater part of the variations in E/P ratios among companies is explained by traditional financial statement ratios. In the same way, Anderson and Brooks (2006) proposed a modified P/E ratio that decomposes the factors those are outside to the firm. According to them, there are four outside factors which effect firms' P/E ratio. First is the year. As the confidence of investor changes from year by year the average market P/E increases. Second is the industry in which firms operates. Industries vary in terms of growth rates and earnings. Higher P/E ratio is found in the Industries enjoying faster long-term earnings growth rates and alternatively lower P/E ratio is evidenced in the mature or declining industries. Third is the size of the firm. Size of the firm is found to be positively related to firms' P/E ratio.

Large firms are seemed to have higher P/E ratio whereas a lower P/E ratio is found in small firms. Fourth factor, identified by Anderson and Brookes (2006), is the idiosyncratic effect (i.e., issues specifically related to any firm). Another study, based on long term P/E ratio, conducted by Anderson and Brooks (2006a) suggested that a P/E calculated from multiple years of earnings is a better predictor of returns than the traditional one-year P/E. They found that an eight year average is twice as effective. Beaver and Morse (1978) and Penman (1996) stated that P/E ratios, while positively related to future earnings growth, are also negatively related to current earnings growth, representing empirically that unsustainable current earnings affect the P/E ratio. Hyodo (2001) analyzed the disparity between Japanese and US price-earnings ratios and found that accounting differences can explain a significant part but not all differences between Japanese and US price-earnings ratios. From Korea market, CHUNG and KIM (2001) evaluated the usefulness of a structured, programmable financial statement analysis for investment decisions. For that, they developed a firm valuation model which links a firm's market value with fundamental variables, such as, the ability of a firm to generate cash flows, growth potentials, and risk. Their findings reveal that one can construct a profitable trading strategy by directly predicting intrinsic values through a structured financial statement analysis. Chan et al., (1991) investigated the relationship between cross-sectional differences in returns on Japanese stocks and affect of four variables i.e., size, earnings yield, book to market ratio, and cash flow yield.

They found that a considerable relationship between these variables and expected returns in the Japanese market. In addition, book to market ratio and cash flow yield found to be the most significant positive effect on expected returns. An analogous study, focusing European market, is carried out by Giner and Revert (2003) who analyzed the cross-national differences in the predictive ability of financial data (accounting and market data) for future earnings in four representative European countries (France, Germany, Spain and UK) in order to confirm whether the institutional and accounting differences among them result in the inter-country differences in the predictive value of financial information. Their results confirm that there are indeed differences in the predictive ability of both accounting and market data across European countries, which is an indirect test of economic consequences of different accounting measurement rules. Nissim and Penman (2005) analyzed a structured financial statement analysis that helps in forecasting and valuation of profitability of growth. They used financial statements analysis to forecast forecasting future residual earnings, free cash flows and dividends.

They concluded that overall feature of the accounting data is central tendency-- convergence of drivers to a common level in the cross section--which bodes well for calculating continuing values with standard valuation techniques. Preceding discussion draws attention to the importance of several institutional characteristics which play a vital role in determination of E/P ratio and points to the benefits of studying forecasting techniques using financial statements analysis variables in diverse institutional environments. So far, massive work have been done on the determination of those idiosyncratic effects (i.e., firm specific effects) which explain the earnings-price ratio around the globe (Ou and Penman, 1989; Ball and Brown, 1968; Skogsvik, 2008; Setiono and Strong, 1998; Jordon at el, 2009), but no one (up to the author's information) have conducted this investigation in the context of Pakistan. So this study, which is conducted specifically on the engineering sector of Pakistan is a pioneering effort and opens the door to the future researchers.

3. Data and Methodology

Findings of Ou and Penman (1989), Anderson and Brooks (2006), and Jordon at. el., (2009) became the basis in designing the methodology of this study. Specifically, the core purpose of this study is to identify the idiosyncratic effects – as discovered by Anderson & Brooks (2006) – that are useful in explaining the variation in firms' E/P ratios. These idiosyncratic effects can be tools of financial statement analysis as evidenced by (Ou and Penman 1989; Jordon at. el., 2009). So following (Ou and Penman 1989; Jordon at. el., 2009) current study uses these financial statement analysis tools to test whether these variables depict helpful information in explaining the differences in firms' E/P ratioTo analyse specifically the idiosyncratic effects, data is collected for 37 companies belonging to same sector (i.e Engineering), in the same year (2009), and controlling for size (by using natural log of total assets). Following Bensoussan et al., (1995) and Ganugi et al., (2005) natural log of total assets is used – instead of total assets – as a measure of size, as natural log normalizes the data. The engineering sector of Pakistan is considered to be most stable sector of the economy with strong earnings potential and mature market. Natural log of total assets is used – instead of total assets – as a measure, because natural log normalizes the data without disturbing the nature of relationship among firms while total assets always non-normally distributed.

In order to identify those performance measures that can be helpful in explaining idiosyncratic effects on P/E ratio; ordinary least square (OLS) regression model is used. E/P ratio is the dependant variable in our model instead of P/E ratio, because of the reason that it contains desirable statistical properties as explained by Latane et al., (1969), Keim, (1990), Anderson & Brooks, (2006), and Jordon et al., (2009). Specifically, using E/P ratio stocks of all the companies can be studied, including those with negative earnings (Allen et al. 1998). That is, firms with negative earnings come up with lowest E/P ratios on the contrary P/E ratio does not allow the study of stocks with negative earnings, that is it results as undefined when divided by a negative number. So, it results in lesser degrees of freedom as well as a sample which may be not a true representative of the actual population when P/E ratio is used, because one has to drop companies with negative earnings. Other advantage of using E/P ratio over P/E ratio is that P/E ratio become larger and larger as earnings approaches to zero but E/P ratio does not create any problem of that sort.

For the calculation of E/P ratio each company's EPS ratio for 2009 has been taken and divided by the market price after three months of year end date. The reason behind taking the three month forward lag value of market price is to allow the public availability of financial information and incorporation of the same in market price (Banz & Breen, 1986; Keim, 1990; Allen et al., 1998; Jordon at. el., 2009). Data for 37 companies belonging to engineering sector has been collected from individual financial statements of the firms for the years 2007, 2008, and 2009. The performance measures used as explanatory variables represent intense utilization of financial statement information (e.g. see Gibson 2010) include static (e.g. net profit margin) as well as fluid measurement instruments (e.g. % change in net profit margin).

Originally 36 different independent variables are regressed with E/P ratio, the initial chunk of variables is presented in table 1. Overall 36 different simple linear regression models were developed one for each independent variable to analyze the effect of that variable in determination of E/P ratio. Furthermore, a final regression model was prepared that simultaneously regress the variables found significant individually. Finally, Pearson's pair correlation has been performed to check for multicolinearity among independent variables of final model.

4. Results and Discussion

The results of the study are organized in tabular form and Table 1 depicts the simple regression results of 36 independent variables regressed separately on the dependant variable i.e., E/P ratio for each model. Findings suggest that only 5 independent variables (i.e., financial ratios) are found to be statistically significant with alpha range of (.o1) to (.1). These five financial ratios, which keep a significant relation, are *net profit margin, growth, Return on Investments, Current Assets and total assets turnover.*

The first significant variable is *NET PROFIT MARGIN,* which is computed by dividing net income by net sales. That is calculated as:

$$Net\ Profit\ Margin = \frac{Net\ Income}{Net\ Sales}$$

If a company reports that it earned 6% last year, this statistic usually means that profit was 6% of sales. This ratio gives a measure of net income dollars generated by each dollar of sales. While it is desirable for this ratio to be high, competitive forces within an industry, economic conditions, use of debt financing, and operating characteristics such as high fixed costs will cause the net profit margin to vary between and within industries. This ratio represents a static calculation of a company's capability to produce earnings in the current period as opposite to a fluid measure which calculate change in that capability. In addition, this ratio demonstrates the extent to which company is able to control expenses. According to the results, relationship between net profit margin and E/P ratio is positive at significant level and this positive relationship is appear to be logical. Naturally, the higher the 2009 profit margin, the higher the company is efficient at controlling costs and lower cost tends to produce higher current earnings. Thus, with current year's earnings as a numerator in the E/P ratio, the positive relationship with the net profit margin is expected.

The second variable, that is found to be the significant, is Growth that is calculated as percentage change in assets:

$$Growth = \frac{Total\ Assets\ 2009 - Total\ Assets\ 2008}{Total\ Assets\ 2008} \times 100$$

According to results, financial ratio i.e., Growth, contains a week positive relationship with E/P ratio at p-value of .047 at 5% significance level that means growth of the firm and E/P ratio go parallel, if the assets of the firm are been increasing in a given time period a positive effect on earnings-price ratio is found. Moreover, investments by the firm in assets results in greater earnings and in effect a higher E/P ratio is envisaged.

Another variable that is found to have significant positive relationship with E/P ratio is Return on Investments. ROI is defined as:

$$Return\ on\ Investment = \frac{EBIT}{Owner's Equity + Longterm\ Liabilities}$$

The p-value of .08 and an R2 of .08 define a week relationship between ROI and E/P ratio and explain only 8% to the dependant variable. Profitable investments by the firm yield higher return on investments which increases the earnings of the firm and a higher E/P ratio is obtained.

Fourth significant variable is *CURRENT RATIO*. Current ratio is defined as the total currents assets divided by total current liabilities of the firm.

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities}$$

This ratio is mainly used to give an idea of the company's ability to pay back its short-term liabilities (debt and payables) with its short-term assets (cash, inventory, receivables). At the same time, current ratio can give a sense of the efficiency of a company's operating cycle or its ability to turn its product into cash. A week positive relationship of .099 p-values explains only 7% to the dependant variable, i.e., a higher current ratio results in higher E/P ratio as this ratio contributes considerable proportion in profitability.

However, at the significance level of .1, *TOTAL ASSETS TURNOVER* is found to have statistically significant value. This ratio is calculated as:

$$Total\ Assets\ Turnover = \frac{Net\ Sales}{Total\ Assets}$$

Total assets turnover is a financial ratio that measures the efficiency of a company's use of its assets in generating sales revenue or sales income to the company. The results of the study reveal that there is significant positive relationship between total assets turnover and E/P ratio at p-value of 0.048. This relationship depicts that if the company is efficient enough in using its assets in generating sales a higher turnover will result and naturally higher sales volume with efficient use of assets will cause the costs to reduce so a higher net income is expected. Thus, a higher E/P ratio is anticipated with this higher net income. However, value of R^2 shows a week relationship between them. In order to collectively analyze the impact of independent variables found significant individually, all the five variables regressed simultaneously with E/P ratio in the final regression model. According to the findings of Anderson and Brooks (2006), and Jordan et al. (2009) size is one of the four factors reasons that have an impact on P/E ratio (i.e. size, industry, year, and idiosyncratic effects). So, in order to control entity size, a sixth independent variable is also included in the final model that is Natural log of Total Assets. Thus, analysis now concentrates on the company specific factors (i.e. idiosyncratic effects) ones we have controlled for other three factors. The results of final regression model are presented in table 2.

Only two of the five independent variables found significant in the final regression model, which is Net profit margin with p-value of .000, and Growth in Total assets with p-value of .08. Rests of the three independent variables (i.e. return on investments, total assets turnover and current ratio) become insignificant in the final model as expected. Because all of them have very weak relationships with E/P ratio in first regression models i.e. return on investment that was significant individually with p-value of .08 and explaining only 8% of the variation in P/E ratio, total assets turnover that was significant individually with p-value of .04 and explaining only 10.5% of the variation in P/E ratio, and current ratio that was significant individually with p-value of .099 and explaining only 7% of the variation in P/E ratio.

The results of the final regression model are very important for the reason that it shows both of the independent variables found significant (i.e. Net Profit Margin and Growth in Total Assets) contribute some sort of unique information for the explanation of variation in the E/P ratio. Additionally, signs of the coefficients for these two variables in the final model are positive for Net profit margin (as in the first model) and negative for the growth in total assets (positive in first model). This change in the sign of coefficient shows that when combined with other independent variables growth rate have inverse relation with E/P ratio. This appears to be logical form the prospective that growth companies have higher share prices and as the denominator in E/P ratio increases the E/P ratio decreases, but not necessarily. Growth in total assets is also contribute to the higher level of earnings given that growth occurs in firms operating assets and must not cause operating inefficiencies. The impact of growth on E/P ratio depends on the extent to which it affects both price and earnings; finally, an inverse relationship is evident of the fact that growth has a higher impact in price of the stock as compared to earrings.

Finally, Pearson's paired correlation matrix is performed on the independent variables of the final regression model to check for the multicollinearity and results are presented in table 3. There is always some degree of collinearity expected among explanatory variables, but unless correlation coefficient come up to an absolute value of .7, it does not create any sort of problems (Horngren et al. 1997). Table 3 shows that the strongest correlation coefficient is between net profit margin and growth of total assets of .47. Thus, the final regression model is free from any sort of unnecessary multicollinerity. Finally, on the basis of results presented on table 2, it is concluded that conventional financial statement performance measures can be very useful for the explanation of variations in firms'' E/P ratio. This final conclusion is strongly supported by an R-square of .858 and a F ratio of 37.44 (p-level = .0000) as presented in table 2 and absence of multicollinerity as inferred from table 3.

5. Conclusion

The current study analyses several financial statements variables to confirm whether these variables represent useful information in explaining the deviations in firms' stock values comparing to their current earnings. Jordan et al. (2009) and Ou and Penmen (1989) found that a larger proportion of the variation in E/P ratios among companies is explained by traditional financial statement ratios. Findings of Ou and Penmen (1989) and Jordan et al. (2009) proved to be the basis of this study in explaining the significant proportion (approximately 86%) of the variation in E/P ratios of corporations with the help of defined financial ratios. In developing the model the data of all of the 37 companies have been taken from the same industry (i.e., Engineering), in the same year (2009), and controlling for size (by using natural log of total assets); therefore, variables found significant in this study might not be appropriate if any other industry or year had been taken or if the size of the firm had been calculated by any other technique. For example, if the textile sector was observed rather than engineering, some other independent variables might have been found appropriate.

This study attempts to explain more specifically the extent to which financial statements analysis yields useful information for explaining the differences in perception of the market in estimating value of a firm, rather to specify the particular determinants which explain the E/P ratio. Results of the study unfold the perception process of individuals in valuing stock of the firm relative to its earnings and indicate those variables which play a vital role in examining a firm's ability to generate earnings and cash flows of the subsequent periods.

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Table 1: Simple regression Models for variables regressed individually on E/P Ratio				
	Sign of Coefficients	***t Stat***	***P-value***	**R Square**
Net profit margin	+	14.4263	0.0000	0.86
% Change in Net Profit Margin	-	-0.6134	0.5436	0.01
% Change in Sales Growth	-	-1.3388	0.1893	0.05
Debt equity ratio	+	0.5922	0.5575	0.01
% Change in Debt Equity Ratio	+	0.7163	0.4785	0.01
ROI	+	1.7447	0.0898	0.08
% Change in Inventory Turnover	-	-0.5816	0.5645	0.01
Inventory Turnover	+	0.5086	0.6142	0.01
% Change in Inventory Turnover	+	0.4163	0.6798	0.00
Total Assets Turnover	+	2.0453	0.0484	0.11
% change in total assets turnover	+	1.1529	0.2568	0.04
A/C receivable turnover	+	0.3642	0.7179	0.00
% change in A/C Receivable turnover	+	0.1798	0.8583	0.00
Current Ratio	+	1.6930	0.0993	0.08
% change in Current ratio	+	1.6239	0.1134	0.07
Quick Ratio	+	1.5090	0.1403	0.06
% change in quick ratio	+	1.5486	0.1305	0.06
Sales To Working Capital	+	0.5467	0.5881	0.01
% change in sale to working capital	+	0.0939	0.9257	0.00
Dividend Per share	+	0.7270	0.4721	0.01
% change in dividend per share	+	0.0506	0.9600	0.00
Total Assets per share	+	0.6070	0.5478	0.01
% change in total assets per share	+	1.6404	0.1099	0.07
Cash flow per share	+	1.3616	0.1820	0.05
% change in cash flow per share	+	0.9969	0.3256	0.03
Retained earnings to owner's equity	-	-0.4664	0.6438	0.01
% change in Retained earnings to owner's equity	-	-1.0276	0.3112	0.03
Retention Ratio	-	-1.2343	0.2253	0.04
% change in retention ratio	-	-0.1522	0.8799	0.00
Payout Ratio	+	1.2343	0.2253	0.04
% Change in payout ratio	+	0.4031	0.6893	0.00
Growth Rate	+	2.0518	0.0477	0.11
% Change in EPS	-	-0.1410	0.8886	0.00
Times Interest Earned	+	0.5437	0.5901	0.01
% Change in times Interest earned	-	-0.9286	0.3595	0.02
Natural Log of Total Assets	+	0.3753	0.7097	0.00

Table 2: Final regression Models Results				
Variables	***Coefficients***	***Standard Error***	***t Stat***	***P-value***
Intercept	1.6177	1.0310	1.5691	0.1271
Net profit margin	0.0651	0.0049	13.1594	0.0000
ROI	-0.0783	0.1454	-0.5385	0.5942
Total Assets Turnover	0.0013	0.2893	0.0045	0.9964
Growth Rate	-0.8210	0.4670	-1.7580	0.0889
Current Ratio	-0.0011	0.0017	-0.6433	0.5249
Natural Log of Total Assets	-0.1912	0.1351	-1.4146	0.1675
F-static = 37.44 (p-value = .0000), R-square = .858				

Table 3: Pearson's Paired Correlation Matrix for independent variables of final model						
Variables	***Net profit margin***	***ROI***	***Total Assets Turnover***	***Growth Rate***	***Current Ratio***	***Natural Log of Total Assets***
Net profit margin	1.00					
ROI	0.36	1.00				
Total Assets Turnover	0.43	0.27	1.00			
Growth Rate	0.47	0.36	0.45	1.00		
Current Ratio	0.34	0.17	0.31	0.10	1.00	
Natural Log of Total Assets	0.16	-0.06	0.30	0.03	0.13	1.00