Price to Earnings and Price to Book Ratios as Determinants of Stock Return: The Case of Financial Institutions Listed in Bahrain Bourse

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Abstract:

Price in relation to Earnings ratio (PE Ratio) and Book Value (PB Ratio) parameters have received considerable attention in predicting stock returns. However, there have been varying results of the predictive power of PE and PB Ratio to stock returns especially when different market conditions have been considered.

This study was conducted to determine if PE and PB ratios can be used as predictors for stock market returns among financial institutions listed in Bahrain Stock Exchange. It utilized an analytical research design which made use of panel data analysis. Total samples of 19 financial institutions were included study with financial data covering the periods 2015 to 2018. The study found that both PE and PB ratio significantly predicts stock returns of financial institutions stocks in Bahrain at 0.05 level of significance. Both ratios have positive coefficients suggesting a positive association with stock returns. Finally, the study also concludes that loading PE and PB as predictor of stock returns would only generate estimate parameters that can only show cross and time fixed effects. Thus, individual time invariant variables or company and industry specific factors do not play a role in the ability of PE and PB ratios in predicting stock returns.

Keywords: emerging market; PB ratio; PE ratio; stock returns; financial institutions.

JEL classification: G17; G21.

Introduction

The concept of stock valuation has undeniably become the center of most major risk and return parameters in Finance and Economics. Price in relation to Earnings ratio (PE Ratio) and Book Value (PB Ratio) parameters have received considerable attention in predicting stock returns. Shafana, Rimziya, and Jariya, (2013) noted that PE Ratio gained acceptance among security analysts and investors due to it being easy to calculate and understand. On the other hand, the logic of PB ratio lies on the idea that some stocks are undervalued, thus, it is perceived that these stocks are good for investment considering that the prices will eventually go up as the market realizes its intrinsic value.

The unique characteristics of Bahrain Stock Market, like being relatively less averse as noted by Al-Ajmi (2008), provides an interesting locale for two of the most well debated indicators of stock return – PE and PB ratios. In fact, several conflicting results have arisen especially when studies are conducted in developed and emerging markets like that of Saudi Arabia where the mentioned two ratio were found weak in predicting stock returns relative to other developed markets (Umar 2008). These confounding ideas and findings have motivated an exploration of the predictive power of PE and PB ratio in the stock market of Bahrain. This study intends to

determine if basic market price ratios can be used as predictors for stock market returns among financial institutions listed in the Bahrain Bourse.

1. Research Background

Throughout the existence of organized equity markets, economist and financial analyst have explored several valuation techniques to explain market behaviors and stock return patterns in general (Ping-fu and Kwai-yee 2016). The Price in relation to Earnings ratio (PE Ratio) and Book Value (PB Ratio) parameters were widely used by analysts and investors for stock selection. PE ratio advocates suggest that investors should purchase stocks with low PE ratio as these stocks are perceived to be lower in price thus promising a higher expected return in succeeding periods. On the other hand, the logic of PB ratio lies on the idea that some stocks are undervalued. These stocks are good for investment considering that the prices will eventually go up as the market realizes its intrinsic value. The general rule therefore is to invest on low PB stocks that are undervalued and avoid buying High PB stocks as they are often overvalued.

These ideas however have not gone without criticism. A vast number of researchers have proven, for example, that Low PE ratio strategies do not relate to higher stock earnings. In the case of PB ratio, several studies have also shown that Low PB ratios do not correlate to higher sock returns that are controlled in terms of value or growth (Kheradyar and Ibrahim 2011).

Interestingly, a careful review of the literature would reveal three important themes. First, the results supporting or disproving both PB Ratio and PE ratio as feasible predictors vary from market to market. In fact, studies comparing developed markets and those economies considered to be developing tend be different.

Secondly, timing of data gathering is also seen as an important consideration in the varying results. It is observed that stock returns realized during periods of crisis tend to exhibit different behaviors compared to periods that are usually considered stable. Finally, the regulations operating in the market, like ownership structures, tend to result to different opinions in the predictive power of PB and PE ratio.

The Arbitrage Pricing Theory (APT) which was first introduced by Ross in 1976. APT argues that assets are not only driven by general factors such as the movement of the market, but that industry or business characteristics also have a significant impact on returns (Rossi 2016). In fact, an earlier study by Krause (2001) cited that the APT allows for the inclusion of other risk sources other than market risk which may include but not limited to factors specific to the industry or firm.

Modern theories in academic finance literature are based on the idea that markets are primarily rational. In retrospect, the first model of market rationality is the Capital Asset Pricing (CAPM) which was greatly attributed to Sharpe (1964) and Lintner (1965) and marked the birth of the theory of asset pricing. The CAPM builds on Markowitz's (1952) model of choice of portfolios. In this model, an investor selects a portfolio at the time of $t - 1$ and a stochastic return at the time of t. On this basis, investors choose portfolios that are' mean-variance efficient. Thus, they select portfolios that minimize the variance in the return of the portfolio, as the expected return maximizes the expected return given the variation.

The portfolio model offers an algebraic condition for asset weights in portfolios that are efficient in mean variance. Rossi (2016) explains that the CAPM transforms this algebraic statement into a testable forecast of the relationship between risk and expected return by identifying a portfolio that is efficient to clear the market for all assets. However, series of studies have disproved that market beta captures all risk associated with an investment like those of Fama and French in 1992. This led to the development of other models that allow for more general risk factors and dynamic constructs which are generally known as arbitrage pricing models of which some include basic market price ratios that utilizes price over Earnings and Price over Book Value.

1.1. Price to Earnings Ratio (PE)

A pioneer of the linking PE to investment performance was Basu in 1997. Eventually, Beaver and Morse reported in 1978 that the discrepancy of returns in the investment can be explained by accounting process variation. They observed that there is an inverse relation between PE ratio and stock return. This was further explained by Cook and Rozeff in 1984 when they investigated the implied standard deviation (ISD) on option data using the modern finance model called Black-Scholes. They reported that the ISD was not normal and was in fact symmetrical.

In addition, Ghaeli (2017) noted that the ISD was significantly different from the daily average ISD based on the last daily observation. One plausible explanation for this phenomenon is that it offsets the additional risk of shares. As the PE decreases, the CAPM beta does not increase, so the risk must be in other risk measures (Modares, Abedi and Mirshams 2008).

The PE ratio is therefore one of the most popular financial ratios to the forecast of stock returns used today by many watchers of the stock market. Robin and colleagues (2015) observed that the Price - Earnings (PE) ratio has traditionally been seen in finance as a tool to compare the growth of a company with the performance of the industry or sector to which the company belongs. In fact, the use of this ratio to predict stock returns was further popularized by Shiller in 1996, suggesting that the PE ratio is one of the most powerful ratios for forecasting returns.

1.2. Price to Book Ratio

On the other hand, PB focuses on the equity of the company and is the internal factor of the company. PB is defined as the stock market price divided by its book value (BV). PB also indicates the extent to which the company can create value for the company. Companies that generally go well have PB above 1, which shows that the market value exceeds its book value. The higher the return, the higher the PB stocks, which will increase the company's revenue and increase the ability of the company to distribute dividends (Gitman, Juchau and Flanagan 2015).

The strength of PB to predict stock returns has been primarily motivated by the works of Fama and French in 1992. The logic is that PB is a benchmark for the reasonableness of the share price on the primary or the initial return chances. If the stock price position is below its book value, the stock price tends to be at least equivalent to its book value. This means that the stock price is more likely to rise. The greater the value of PB, therefore, the lower the returns to be received by investors. The predictive power of PB was recognized by Pontiff and Schall (1998) to the apparent relationship between book value and future earnings.

2. Research Methods

The varying results of the relationship between PE and PB Ratio to stock returns and the shortcoming of previous research motivated the authors to propose this study. Considering the mentioned themes, the researchers intend to conduct the study in the Kingdom of Bahrain considering the unique policy structure of its stock market. The study hypothesizes that Price to Earnings Ratio and Price to Book Ratio do not significantly predict the stock returns of financial institutions listed in Bahrain Bourse. It hopefully sheds light to how market behaviors in Bahrain react to PB and PE as viable loading factors to models that will be useful for both stock market practitioners and stock market regulators.

The study utilized an analytical research design which is intended to make use of panel data analysis on currently available information to achieve appropriate assessment of the effect of the explanatory variable, in this case is the Price to Book and Price to Earnings Ratio, to the stock return of the company.

The decision to use panel data was based on the intention to see whether unobservable variables and time variant variables can affect the model prediction (Gelman and Hill 2006) and thus possibly account for individual heterogeneity. In the case of this study, such variables could be company specific characteristics.

The total sample consists of 19 companies that are part of the financial sector (Commercial Banks, Investment, and Insurance). The study included data from 2015 to 2018. The researcher decided to utilize the companies in the financial sector for two main reasons. First, the financial sector is the largest non-oil contributor to Bahrain's real GDP at 16.5% as of 2018 (Bahrain Economic Development Board 2019). This would put more value on efforts to understand its financial characteristics.

Second, Bahrain is the GCC's longest established financial center with 40 years of experience. A study on how this sector behaves in the financial market is vital in understanding the characteristics of a unique type of financial market in terms of regulation and market conditions.

The study involved two independent variables; Price to Book (PB) ratio and Price to Earnings (PE) ratio. All variables were based on yearly end of the year values. Each ratio will be computed using the equation below:

$$PB = \frac{\text{Market Capitalization}}{\text{Total Book Value}} \tag{1}$$

$$PE = \frac{\text{Stock Price}}{\text{Earnings Per Share}} \tag{2}$$

On the other hand, the stock returns (R) was computed as follows:

$$Return_1 = P_t / P_{t-1} \tag{3}$$

$$Return_2 = P_t - P_{t-1} / P_{t-1} \tag{4}$$

Return$_3$ = Sqrt (P$_t$ / P$_{t-1}$) (5)

For this study, Return$_3$ was used as effect variable to assure that the dependent variable will be normally distributed. Tabachnick and Fidell (2007) noted that data transformation applying mathematical function, like square root, fulfills the assumptions of conducting parametric tests by aligning the distribution of the data.

The study employs an ex-post facto analysis covering the periods 2011 to 2018. To check simultaneously both cross sectional and time series, the data was be analyzed using panel data regression model. Both loading factors, PB and PE, was loaded to the data regression model as follows:

$$R_{it} = \beta_{i0} + \beta_1 PB_{it} + \beta_2 PE_{it} + \nu_{it}$$ (6)

Data was processed using R Studio. Computation of mean, median, standard deviation, minimum, and maximum will be used to describe the variables of the study. Prior to the fitting of the model, a series of diagnostic tests were used to check if the assumptions of Linear Models will hold. This was done using visual plots, Correlation test, Breusch-Pagan test, and Durbin Watson Test.

To test the model, the treatment went through two stages. First, Hausman Test was conducted to decide whether to use random effect or fixed effect model. If the Hausman Test is significant, fixed effects model will be utilized. The Hausman Test statistics is:

$$H = (b_1 - b_0)' \left(\mathrm{Var}(b_0) - \mathrm{Var}(b_1) \right)^\dagger (b_1 - b_0),$$ (7)

Finally, the panel data regression model was used to estimate the coefficients. The significant values determined effect and power of each loading factor. Also, determination coefficient of the panel data regression model evaluated the explanatory and predictive power of PB and PE as predictors for stock return.

This study intends to determine if basic market price ratios, PB and PE can be used as predictors for stock returns among Financial Institutions listed in in the Bahrain Stock Exchange. The results of the study are presented below with the corresponding analysis after.

Table 1. Descriptive statistics of the variables

Variable	X	SD	MIN	MD	MAX
PE	10.55	3.148	7.036	9.104	12.23
PB	0.816	0.301	0.206	0.464	0.992
Return$_1$*	0.965	0.334	0.595	0.934	1.634
Return$_2$**	0.035	0.025	-0.638	0.066	0.404
Return$_3$***	0.965	0.191	0.595	0.934	1.638

Note: *Return$_1$ = P$_0$/ P$_1$; **Return$_2$ = (P$_0$/ P$_1$) – 1; ***Sqrt Return$_1$

Table 1 shows the descriptive statistics of both the dependent and the explanatory variable. In terms of Price to Earnings, the mean ratio of financial institutions listed in Bahrain Bourse is 10.55 suggesting that the market is willing to invest BD10.55 for every BD 1.00 of earnings for stocks in the financial sector. Compared to the over-all PE ratio of Bahrain for the covered periods (9.24), the financial sector has relatively higher PE ratio proving its value in terms of its contribution to the over-all market confidence. The standard deviation, the minimum and maximum values suggest a partially high degree of variation among PE multiples.

Ghaeli (2017) cited that high PE ratios are normally associated with investors' enthusiasm in anticipation of higher earnings growth within the succeeding years. However, French and Poterba (1991) hinted that a relatively high PE ratio does not signify a long-term bull condition or the opposite signaling a long-term bearish market. On the other hand, the financial sectors' mean PB ratio (x = 0.816, SD = 0.301) performs almost at par with the over-all PB of Bahrain (0.86) during the covered periods. This would mean that over-all, market participants in Bahrain bourse associate almost the same value to financial institution stocks with other stocks issued by companies from different sectors. Put differently, the financial sector's stocks are neither undervalued nor overvalued relative to the general basket of stocks. Majid (2016) observed that investors uses PB ratio to identify overvalued and undervalued stocks.

Furthermore, Table 1 also shows the average return of the financial sector stocks using three conventional methods. The first value denoted, *Return$_1$*, computes the weight or the percentage of the previous stock price (P$_0$) relative to the stock price one period after (P$_1$). The second value (*Return$_2$*) is derived by dividing the percentage change by the original value period to period. The second computation standardizes the previous value of return by factoring the magnitude of change relative to the original stock price. By doing so, this method provides a

direction of change with negative values indicating decline of price relative to the previous year. Finally, the last derivation of return (*Return$_3$*) is a geometric transformation of *Return$_1$* for the purpose of making sure that the dependent variable of the study, stock return, is normally distributed. Thus, the last derivation of Return was used in the panel data analysis. Tabachnick and Fidell (2007) noted that data transformation applying mathematical function, like square root, fulfills the assumptions of conducting parametric tests by aligning the distribution of the data.

Looking at *Return$_2$,* the return of the financial sector's return over the covered period was 3.5% (*SD*=0.025). It should be noted that this calculation of return only includes capital gain and is not adjusted for dividends. Average % change in value, *Return$_1$,* is 96.5% (*SD*=0.334) suggesting a volatile price condition. Majid (2016) noted historical data or realized such as the ones presented are very useful in determining future returns and risks. If so, the characteristics of returns observed in the identified sector, could signal consistent information for valuation and security analysis purposes.
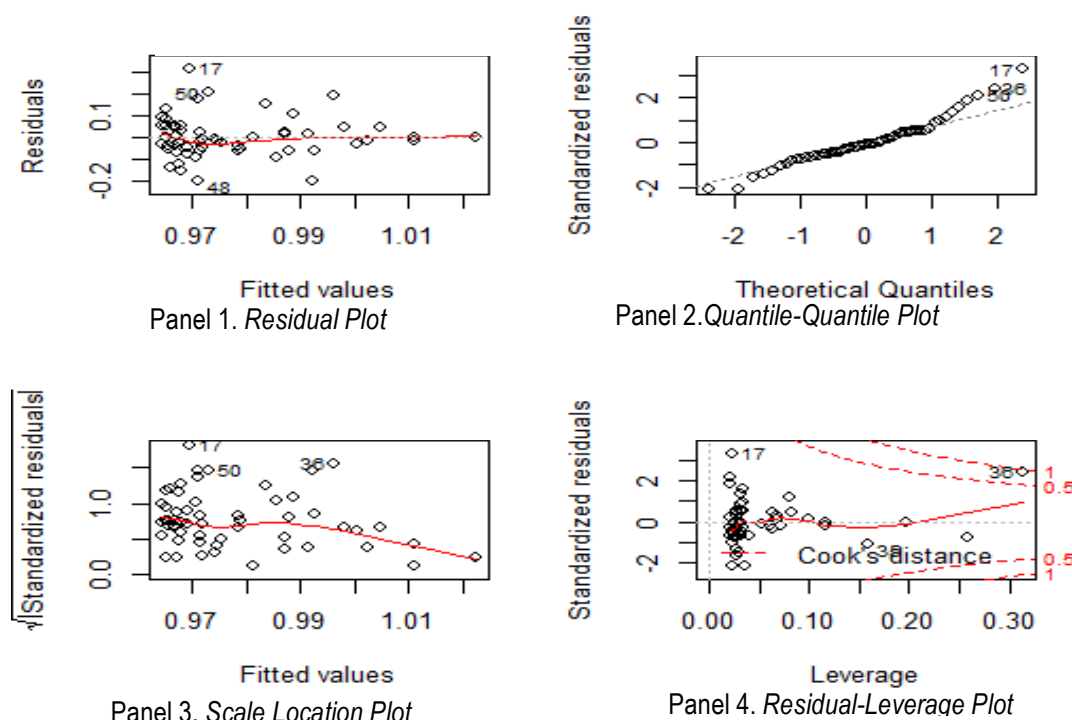
Table 2. Summary of Correlation for Return, PE, and PB

	Return	PE	PB
Return	-	0.126 *(0.351)*	0.110 *(0.416)*
PE	0.126 *(0.351)*	-	0.238 *(0.075)*
PB	0.110 *(0.416)*	0.238 *(0.075)*	-

Table 2 shows the correlation values and the significance of correlation, in parenthesis, among variables used in the study. As what can be gleaned from the table, no significant correlation is observed among variables used. This would mean that a multicollinearity problem, usually encountered with panel data analysis is not in effect in the data analyzed.

Prior to the fitting of the model, a series of diagnostic tests where done to check for autocorrelations and basic regression assumptions to see whether panel data analysis will be appropriate.

Figure 1. Diagnostic plots for panel regression assumptions

Panel 1. *Residual Plot*

Panel 2. *Quantile-Quantile Plot*

Panel 3. *Scale Location Plot*

Panel 4. *Residual-Leverage Plot*

A test for homoscedasticity was done both thru visual plots and Breusch-Pagan test to verify if the variations of observations around the regression line are constants. Figure 1 shows the necessary diagnostic plots for this purpose. Panel 1 shows the residual plot where the fitted values (expected values) are plotted in the X axis while the residuals are plotted in the Y axis. As what can be observed, the linearity assumption is partly met as there are no patterns exhibited across points and the LOWESS line (red) is fairly flat. In addition, the QQ plots in panel 2 which shows the comparison between the ordered observed residuals in the y axis and the ordered theoretical residuals are presented. As what can be gleaned from the graph, the residuals roughly follow

a diagonal line suggesting that these error points are normally distributed. This is supported by the scale-location plot in panel 3 suggesting that the variances across points are fairly equally distributed.

Moreover, the residual-leverage plot in Panel 4 shows some extreme outliers from the data set. The graph shows that there is a presence of highly influential outlier lying slightly above the Cook's distance line (labeled data 17, 36, 38). This is usually expected from a big data set.

Furthermore, the Breusch-Pagan test was conducted to confirm if the model used in the study is in fact homoscedastic. The computed BP value is 1.0685 (p=0.5861) suggesting that there is not enough evidence to reject the hypothesis that the errors terms are the same across all value of the independent variables used in the model. In summary, both diagnostic graphs and Breusch-Pagan test confirmed that the model assumptions do hold – it is linear, normally distributed, and homoscedastic.

In terms of autocorrelation, the Durbin Watson Test was conducted to see if the error terms are correlated with each other. The test yielded a value of 2.0953 (p = 0.574) suggesting that there is no correlation among residuals and thus they are independent from each other. This is a good thing as it would suggest that assumptions and the estimators based on the Least Squares methods in fact will hold.

To decide between fixed effects model and random effects, Haussmann test was conducted. The test assumes a null hypothesis that the model shows random effects. The computed value was significant, x^2 =6.8231 (p=0.03774) suggesting that the computed model exhibits fixed effects. This would mean that the model's estimated parameters are consistent and possibly efficient and thus the model can only show cross and time fixed effects (Jaba *et al.* 2016).

Table 3. fixed effect model analysis summary for PB and PE ratios predicting stock return (N=57*)*

	Estimate	Std. Error	t-value	Pr(>|t|)
PE	0.031664	0.013063	2.4239	0.02051*
PB	0.186493	0.079380	2.3494	0.02441*
R-Squared	0.19199			
Adj. R-Squared	-0.25691			
F (2,36)	4.27684*			
p-value	0.021555			

*Note: * significant at 0.05*

Table 3 shows the fixed effect summary for the explanatory variables, PE and PB to Stock Return. The computed F value 4.27684 is significant at 0.05 (p=0.021555). In fact, the *R* value suggests that 19.19% of the variation in Stock Return can be explained by the independent variables (Price to Book and Price to Earnings Ratio). Despite being significant, the small r-squared value resulted to a negative value in adjusted r.

Looking at the individual loading factors, PE ratio was found to be significant at 0.05. Thus, there is enough evidence to reject null hypothesis 1. Price to Earnings Ratio significantly predicts stock returns. The coefficient is 0.031 (p = 0.02051) implying that one unit increase in PE ratio results to around 0.031 decrease in stock returns while all other variables are held constant. These findings support the studies of Lewellen (2003), Bora and Ag (2014), Yezegel (2015), DeHaan and colleagues (2015) suggesting that PE ratio is a strong predictor of stock return. However, the positive relationship of PE ratio and stock return, as indicted by the positive coefficient, tend to negate of the value investing strategy which suggests that stocks with low PE ratio tend to earn higher stock returns (Troung 2009, Perez 2017). However, the result is consistent with the findings of Sharif, Purohit, and Pillai (2015) in the same stock market. They found that in the case of Bahrain Stock Market, PE ratio and Stock return are positively associated. Similar observation was also derived by an earlier study of Arslan and others (2014) in Korean Stock Exchange. They found that PE ratio, among others, had substantial positive effect of stock prices.

On the other hand, it can be observed from the same table that PB ratio was also found to have a significant predictive power on stock return at 0.05 level of significance (p=0.02441). Thus, Price to Book Ratio does significantly predict stock returns. The positive coefficient suggests that, ceteris paribus, one-unit increase in PB results to around 0.186 change in the return of the stock.

This observed positive effect is consistent with the findings of Okafor and Mgbame (2011), Westerlund and colleagues (2015), and Hoang and others (2015) showing that high PB ratio is associated with high stock returns.

Conclusion

Based on the findings of the study, the researchers have arrived with the following conclusions.

Firstly, the study concludes that PE ratio significantly predicts stock returns among publicly listed financial institutions stocks in Bahrain. However, unlike the observations of Troung (2009) and Perez (2017), the influence of PE ratio to stock return is inversed. Thus, the concept of value investing, meaning buying stocks with lower PE ratio is not supported by the study. These phenomena are not isolated, however, as a previous study conducted by Sharif, Purohit and Pillai (2015) in Bahrain Stock Market also revealed the same positive association. Such observation may signal a vital difference in using PE ratio in predicting stock returns in a financial market like Bahrain. Two possible factors provided by Damodaran (2007) could largely explain the differing result of association. One, accounting earnings are susceptible to manipulation. Such instance may distort the value of the PE ratio for the companies covered in the study. Two, consistent with the efficient market hypothesis, tax structure implemented in Bahrain pertaining to financial instruments may affect how investors price the securities under investigation.

Secondly, the study also concludes that PB ratio significantly predicts stock returns among publicly listed financial institutions stocks in Bahrain. Consistent with observations such of Gitman, Juchau and Flanagan (2015), higher PB stocks signifies the company's ability increase its revenue and increase the ability of the company to distribute dividends making it possible to generate greater future returns.

Finally, there is evidence to support that loading PE and PB as predictor of stock returns would generate estimate parameters that can only show cross and time fixed effects. Thus, individual time invariant variables or company and industry specific factors do not play a role in the ability of PE and PB ratios in predicting stock returns.

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