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VALUE OF FINANCIAL RATIOS IN PREDICTING STOCK RETUNS: A STUDY ON BORSA ISTANBUL (BIST)

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ABSTRACT

Purpose- This paper investigates whether financial ratios can predict stock returns for the period between from 2004: II and 2014: IV in the Borsa Istanbul (BIST). For this purpose, four financial raitos have been used that include price to book ratio (P/B), price to earning ratio (P/E), dividend per share (DPS) and firm sizes are selected.
Methodology- This study applies panel data analysis which is an important predictive regression tools for predicting stock returns.
Findings- The results disclose that the financial ratios can predict stock return.
Conclusion- From financial ratios, firm size has a higher predictive power than dividend per share and price to book ratio respectively. However, there is no significant relationship between price to earning ratio and for stock returns.

Keywords: Financial ratios, stock returns, panel data models, BIST.
JEL Codes: G12, G17, C33

1. INTRODUCTION

One of the main purposes of stock markets was the allocation of resources, and matching those who have capital to those who need it. Today the financial markets perform essentially the same fundamental role as centuries ago. What is significantly different, however, is the speed of the processes, the international nature of investment businesses, the complexity of deals to meet the sophistication of the users' requirements and the sheer size of the 'market' (Loader, 2002; 2). There is another thing which has changed over time: trying to predict stock returns to get the highest expected return of an acceptable risk level. Thus, forecasting the stock returns has always been a pragmatic emergence in the financial studies of asset pricing.

A vast number of assets changes hands every day in financial markets around the world. Whether these assets are in the form of stocks, bonds, currencies or derivatives; there are common features driving the market price of these assets. For example, asset prices fluctuate more wildly than the prices of ordinary consumption goods in our daily lives. Another distinguishing feature of assets is that these assets entail uncertain payments, most of which occur far in the future. The price of assets is driven by expectations about these future payoffs. New information causes market participants to re-evaluate their expectations. For example, "news" about a company's future earning prospects changes the investors' expected value of stocks or bonds; while news of a country's economic prospects affect currency exchange rates. Depending on the information, market participants buy or sell the assets accordingly. In short, the information affects their trading activity and, thus, the asset price (Brunnermeier, 2001; 2).

Since information has a fundamental importance to forecasting future returns; financial practitioners and economists have sought to identify the most useful variables that predict stock returns. Among many others, information and variables the market price of a share is a key factor that impacts investment decision of investors. The share price is one of the most important indicators available to the investors for their determination to invest in or not a particular stock (Gill et al, 2012). The share price in the market is not static but dynamic nature. The most obvious factors that influence the share price are

demand and supply. The price of any commodity is affected in both from micro-economic and macro-economic factors in economics (Uddin et al, 2013). A number of macro-economic aspects including politics, general economic conditions i.e. how the economy is performing, government regulations, etc, as well as company-related aspects for instance ownership structure, management quality, labor force quality, dividend per share, book value (asset value) of the firm, earnings per share, price earnings ratio and dividend cover etc, all of these factors have an impact on the investor's pricing decision (Razuk, 2001; 5).

When Kendall (1953) observed that stock prices, he seemed to wander that stock prices behaviour were random over time almost sixty years ago; he and most of the other scholars contributed in literature on market efficiency and tested whether a typical price changes could be predicted using past returns (Lewellen, 2004; 210). Since then different valuation techniques have been produced in order to estimate the future prices of a stock. The type of analysis emphasized in this study takes into consideration business financial statements, health of financial statements, management, competitive advantages, competitors rivalry and markets. This type of an analysis technique is known as "fundamental analysis" in the business world. The main objective of fundamental analysis is to determine the -intrinsic value of a security by the careful examination of key value drivers such as earnings risk, growth, and competitive position. Ratio analysis is one of the main tools that fundamental analysts use in achieving this objective. Financial ratios are defined as mathematical relationships between relevant figures which are obtained from financial statements. The assessment of the relationship between financial ratio and stock prices may indicate whether there are patterns in the markets' response to that information, therefore indicating the usefulness of ratio analysis as a quantitative tool for security valuation (Razuk, 2001; 5).

It is important to note that a number of financial ratios and other variables as stated previously may impact on the dependent variable that are not included in the model proposed. The purpose of this study is not to create a model that explains the stocks' behavior, but rather to demonstrate whether if and how the selected financial ratios impact share prices in Istanbul Stock Exhange, Turkey.

In this research, effectiveness of financial ratios as predictors of stocks' performance are assessed in Istanbul Stock Exhange. The financial ratios are used in this study: price to book ratio (P/B), price to earning ratio (P/E), dividend per share (DPS) and firm sizes. A regression analysis is tested to find the correlation among the percentage changes in the financial ratios and the percentage change in the stock returns for the companies listed as BIST 100 in BIST.

The paper structure is organized in the following form. Section 2 provides a review of the existing literature on stock return predictability with financial ratios. Section 3 discusses data and methodology for constructing stock return predictors. Section 4 provides empirical findings. Section 5 puts up a conclusion.

2. LITERATURE REVIEW

Here is some empirical evidences that explain the association between dividend, book to market ratio, firm size and other income statement variables connected with stock returns. Collins (1957) found that dividend per share and book value per share influence share prices in the banking industry in the USA. Size of the firm, book to market ratio and earnings to price ratio reflects capital market integration (Eun Lee, 2010). Lam (2002), Chui and Wei (1998) captured the cross sectional variations of the stock returns and idiosyncratic return volatility with higher transaction costs, with lower investors sophistications that is linked with book to market ratio (Ali, Hwang, and Trombley, 2003). Midani (1991) investigated a sample of 19 companies in Kuwait and found earnings per share as a determinant of share prices. Nirmala et al (2011) collected data from Indian stock markets for the period of 2000-2009 and identified price-earnings and dividend per share ratio as the major determinants of share prices. Earnings-to-price ratio is determined to contribute significantly in explaining the long-term stock price variation (Campell and Shiller, 1988).

The intuition behind for dividend is explained by Skinner (2008); that dividend succintly predicts the stock returns because of policy payouts that emerged with pay dividends, regular repurchases and occasional repurchases. Dividend yield is a good predictor of the stock return (Al-Hares, Abu Ghazaleh, and Haddad, 2012); on the same way book to market and earnings-price ratio are the good predictors of stock returns for the short sample (see Lewellen (2004)), since there is strong and positive relationship between corporate dividends and stock return (see, Chen and Wu, (1999), Huang et al (2009)).

Similar studies by Ang and Liu (2007) demonstrated that expected stock return and return volatility are completely explained by the price ratio and dividend ratio. There is a common dynamic stochastic trend among earnings to price ratio and dividend ratio with expected stock return (see also Lee, 1996).

Book to market ratio is strongly associated with risk and stock returns (Hung, Chiao, Liao, and Huang (2012)). After controlling for risk factors- book to market ratio does not provide any significant information for expected stock return (Lewellen, 1999); meanwhile book to market ratio is strongly influenced by the past activities of trading institutions that predicts the stock return and firm size (Jiang H, 2010).

Morelli (2007) studied beta, size, book to market equity and stock returns for the UK securities data and found that market is segmented between ups and downs with a significant relationship between beta and stock returns, while book to market ratio is found to be a significant determinant of stock return. Aharoni et al. (2013) considered dividend discount model with comparative static valuation model and determined book to market ratio as a predictor of stock returns. Apergis and Payne (2014) studied the G-7 stock markets using the panel nonlinear co-integration model, and found that there is asymmetric effect between stock returns and size. Although some authors, such as Lo and MacKinnlay (1990), point out that the models for predicting the stock returns might be just data snooping, it is still widely believed that some financial and economic factors can explain much of the variation of the stock returns so as to have a great forecast power for stock return for example: the articles by Keim and Stambaugy (1986), Fama and French (1988), Campbell and Shiller (1988), Ferson and Harvey (1991, 1993), Whitelaw (1994), Pesaran and Timmermann (1995), Pointiff and Schall (1998) Bossaerts and Hillion (1999) and Martijn Cremers (2002). In these papers, the stock returns are suggested to be predictable by a linear model with some financial predictors such as earnings yield and some economic cycle components as well, including interest rate, inflation rate, industrial production growth effect on stock returns.

3. DATA AND METHODOLOGY

In order to examine the relationship between financial ratios and stock returns panel data methodology is used to estimate the relations among the related variables BIST100 companies that are taken into account for the period of 2004: II-2014: IV. However, due to some missing observations, we used 47 companies' quarterly data for our analysis in order to maintain the robustness and validity of our model. We obtained the data series for i variables from the İstanbul Stock Exchange's official website. Since, we are interested in applying panel data models, we will give a general introduction about the model, then we will present information about the panel data method. The companies that are taken into consideration for estimation in the analysis are shown in the Appendix 1.

$$STOCKRETURNS_{it} = \alpha_{it} + \beta_1 P/E_{it} + DPS_{it} + FIRMSIZE_{it} + P/B_{it} + \varepsilon_{it} \quad (1)$$

Here; $STOCKRETURNS_{it}$ = stock returns of firm *i* at time *t*

α_{it} = a constant impact which reflects the timing differences between firms

P/E_{it} = price to Earning Ratio of firm *i* at time *t*

DPS_{it}= dividend per share of firm *i* at time *t*

$FIRMSIZE_{it}$ = size of firm *i* at time *t*

P/B_{it} = price to book ratio of firm *i* at time *t*

β= Beta coefficient

ε_{it} = represents the residual of model.

Panel data analysis is significantly used from 1980s due to its validity. It reflects the desire properties for controlling unobservable individual private effects and may be associated with other variables in the scope of the model which is used to determine an economic relationship. (Hausman and Taylor, 1981: 1377). Hence, the panel estimation is the combined effect of multiple cross section objects' observations that are driven from the period of analysis in the panel data analysis, consequently the merger of time series and cross section observations are used for the estimation process. In a typical panel data analysis, an analysis is carried out by using "N" number of individual's T-term time series data for the dependent variable. General equation for panel data are expressed by equation number (2): (Kaya and Yılmaz, 2006: 69)

$$Y_{it} = \beta_{1it} + \beta_{2it} X_{2it} + \beta_{3it} X_{3it} + \varepsilon_{it} \qquad t = 1...T \text{ ve } i = 1...N \quad (2)$$

The simplest form of panel data analysis is used to keep the coefficients in the model constant for all cross sectional individuals. This assumption is represented by the equation as follows:

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_{it} \quad (3)$$

Equation (3) suggests that all independent variables affect all the cross sectional individual observations equally. However, this equation is insufficient if it is assumed that independent variables affect different individuals in different ways. At this point, the basic issue arises on how to define the starting point (β_1) in an estimation model. The starting point can be held constant for all the individuals or different starting points are allowed for different cross sectional individuals not using

a starting point. In this regard, there are two alternative methods to define the starting point; "fixed effects model," and "random effects model". In the panel data analysis, models are called "fixed effects model" on the assumption that coefficients change accordingly with the unit and a time effect. The general formulation of the model is based on the differences between the units that can be captured with the differences occuring in the constant term. Thus, in this models only the constant term varies and constant term can show us differences at the cross sectional based as opposed to the time effect. Even though the time dimesion is retained by constant variables, behaviors between individuals show differences (Pazarlıoğlu and Gürler, 2007: 37-38). The fixed effects model is expressed in equation (4) used by: (Judge, 1985: 519)

$$y_{it} = \bar{\beta} + \alpha_i + \beta_1 X_{1it} + \ldots + \beta_k X_{kit} + \varepsilon_{it} \qquad i = 1, 2, \ldots, G \text{ ve } t = 1, 2, \ldots, N \tag{4}$$

Equation (4), y_{it} represents the dependent variable; $\bar{\beta}$ average constant term; α_i difference from the average constant term for the *i* section; , X_{it} independent variables; *i* cross sectional unit; *t*, time and ε_{it} error term. If there is a relationship between error term and explanatory variables in this equation, using the fixed effect model gives more accurate results. As, in equation 4, estimators of fixed effects model are acquiring drift. There is a thumb rule for the application of fixed and random effect model. One might conclude the appropirate selection of the model to choose a Hausman test, however, it is also certainly true in the econometrics that when the number of cross sections are too small and the number of observations are too large, we can apply a fixed effect model.

Fixed effects model formulate is an alternative approach to random effects model which is also expressed as "Error Components Approach". It is demonstrated that there are different trend values for each section unit in the random effects model and those trend values are remaining constant over a period of time. There is a temporary cross sectional relationship between the explained variables and explanatory variables. In this regard, the main difference of the random effects model are the trend values valid for the cross section unit which stems from a common trend value like α and ε_i that creates random variation, changes along the cross sections and remain constant for certain period. Therefore, starting from the common trend ε_i , it measures the random deviaiton of each unit of cross section (Brooks, 2008: 498)[1] . Random effects model can be expressed in equation 5, which was used by (Wooldridge, 2009: 489)

$$y_{it} = \beta_0 + \beta_1 X_{1ij} + \ldots + \beta_k X_{kij} + \alpha_i + \varepsilon_{it} \tag{5}$$

α_i , since it is considered to be related with one or more than one X_{ij} in the fixed effects model. In the random effects model number (5), it is assumed that α_i is unrelated to each explanatory variable for all time periods.

Cause and effect relationship between the variables was imparted for the first time in the literature by Granger (1964, 1969) and then was analyzed by using causality analysis developed by Hamilton (1994). In the Granger causality, the direction of relationship between dependent and independent variables is investigated. Sometimes the current value of dependent variable “Y” is better estimated with the previous period values than the current value of the independent variable “X” as Granger causality from X variable to Y variable was referenced in (Charemz and Deadman, 1993: 190) to demonstrate the causal relationship. We specifically reached at the following “causal relationship” with two variables that forms in (6) and (7) equation and this relationship was mentioned in (Kutlar, 2007: 267);

$$Y_{it} = \sum_{i=1}^{n} \alpha_{it} Y_{i,t-k} + \sum_{i=1}^{n} \beta_{it} X_{i,t-k} + EC_{it-1} + u_{1it} \tag{6}$$

$$X_{it} = \sum_{i=1}^{n} \alpha_{it} X_{i,t-k} + \sum_{i=1}^{n} \beta_{it} Y_{i,t-k} + EC_{it-1} + u_{2it} \tag{7}$$

Econometric assumption states that error terms of $u_{1i,t}$ and $u_{2i,t}$ should be assumed to be unrelated. Thus, equations number (6) and (7) determine the dependent variable values based on the past obserations along with its own past values.

[1] We would strongly urge you to look the paper (Brooks, 2008:498) on how to calculate the common trend.

However, by doing so, we may attain single and bi-directional causal relationship between Y_{it} and X_{it}, and we may also accomplish no casual relationship among variables from Granger causality analysis.

4. FINDINGS AND DISCUSSIONS

"The econometric estimation embarks on the unit root tests which inquire whether variables we obtain maintain the stationary property or not? Whenever panel data set is used to test the presence of unit root; testing the cross sectional dependence is crucial. If cross-sectional dependence is rejected, then using the first generation unit root tests is more suitable. On contrary, if it is determined that cross-sectional dependence is valid, then using the second generation unit root tests provides more consistent results in panel in data set (Çınar, 2010: 594). In this study, LM Pearson cross sectional dependence test is applied and it is observed that variables are not cross sectional dependent. Therefore, it would be suitable to use the first generation for panel data unit root tests.

Table 1: The Results of the Panel Unit Root Tests

Methodology	Variables	Statistic	Probability	Number of Cross	Number of Observation
Levin, Lin and Chu t Statistic	P/E	-49.5079*	0.0000	47	1397
	DPS	-58.6118*	0.0000	47	1815
	STOCKRETURNS	-32.2954*	0.0000	47	1885
	FIRMSIZE	-82.0030*	0.0000	47	1834
	P/B	-36.4890*	0.0000	47	1785
Im, Pesaran and Shin W Statistic	P/E	-35.2243*	0.0000	47	1394
	DPS	-41.4148*	0.0000	47	1815
	STOCKRETURNS	-31.2249*	0.0000	47	1815
	FIRMSIZE	-39.2561*	0.0000	47	1834
	P/B	-35.8025*	0.0000	47	1785
ADF-Fisher χ^2 Statistic	P/E	882.913*	0.0000	47	1397
	DPS	1090.34*	0.0000	47	1815
	STOCKRETURNS	961.794*	0.0000	47	1885
	FIRMSIZE	857.409*	0.0000	47	1834
	P/B	1039.44*	0.0000	47	1785
PP-Fisher χ^2 Statistic	P/E	1034.13*	0.0000	47	1441
	DPS	1176.77*	0.0000	47	1838
	STOCKRETURNS	1040.15*	0.0000	47	1907
	FIRMSIZE	932.387*	0.0000	47	1848
	P/B	1126.68*	0.0000	47	1903

Not: *The statistics for Fisher tests are computed using an asymptotic χ^2 distribution and all other tests assume asymptotic normality. *, ** and *** indicate the stationary of the variables at the significance level of 1 percent, 5 per cent and 10 per cent, respectively.*

Table 1 shows the results of the unit root test of the variables that are taken into account in the model and various types of the unit root tests. According to results of the various types of the unit root tests, the variables used in the model are stationary at the different significance levels. Since variables are found to be stationary at the different significance levels, there is no need to investigate a co-integration relationship which requires to investigate the long term relationships among the financial variables. Therefore, there is no need to investigate a long run casual relationship for this model. However, some studies from the literature found that, even though, there is no long term realtionship between variables, there might be possibility that a causal link in the short term exists. Boulila and Trabelsi (2004) found a long-term relationship between the variables (co-integration) for three countries in their study, which covers sixteen Middle East and North Africa countries and applied the error correction mechanism for these countries. However, they also found that a long-term relationship does not exist between pairs of variables in thirteen countries including Turkey and they also apply a short-term causality tests on the assumption of existence of short term relationship in these countries. Likewise, Ünalmış (2002) could not find long term relationship for two of the five variables in his study, which investigates the relationship between financial development and economic growth in Turkey and he also found that the short-term Granger causality test for these variables do not have a long run relationship. In this study, we conducted Granger Causality test with assumption of existence of short term relationships between variables.

Table 2: The Results of Granger Causality Analysis

Variable Pairs	The Direction of Causality	F Statistic	Probability
STOCKRETURNS (2) - P/E (5)	—	0.6083	0.6936
P/E(5) - STOCKRETURNS(2)	→	3.1252	0.0083
STOCKRETURNS (2) – DPS (7)	—	0.0303	0.9702
DPS(7) – STOCKRETURNS(2)	→	2.6287	0.0725
STOCKRETURNS (2) – FIRMSIZE (3)	→	3.2649	0.0206
FIRMSIZE(3) – STOCKRETURNS(2)	→	2.8461	0.0364
STOCKRETURNS (2) - P/B (2)	→	29.8585	0.0000
P/B(2) - STOCKRETURNS(2)	—	1.9042	0.1493

Note: *Values in parenthesis show the optimum lag lengths determined by taking AIC and SIC into consideration. *, ** and *** indicate the significance at 1 per cent, 5 per cent and 10 per cent significance level, respectively.*

Table 2 shows the results of Granger Causality analysis. Causal relationship between stock price and price/earnings ratio from price/earnings ratio to stock price has been found. Likewise, a causal relationship between stock price and dividend per share from dividend per share to stock price has also been found. A bi-directional casual relationship has been found between stock price and firm size. In other words, when stock price affects the firm size of the company, firm size of the company affects stock price. In the last investigation of causal relations, a one-way causal relationship has been found from stock price to market value/book value ratio.

Table 3: F and LM Test Results Demonstrating the Effects Unit and Time

Relationship	F Test		LM Test		Hausman Test
	Test	Statistics	Test	Statistics	
Model 1	F_{Unit}	0.9496	F_{Unit}	-2.5225	16.9558 *
	F_{Time}	33.4060*	F_{Time}	82.6105*	
	$F_{Unit-Time}$	16.7493*	$F_{Unit-Time}$	57.1013*	

Note: **, ** and *** indicate the significance at 1 per cent, 5 per cent and 10 per cent significance level, respectively. Test statistic developed by King-Wu were used in the calculation of LM test statistics for random effects models.*

Following the determination of causal relationships between variables, results of fixed and random effects models used to forecast the financial variables and their behaviour. For this purpose, *F* and *LM* tests are conducted to decide the appropriate panel data model.

Table 3 demostrates that the F and LM test results show the effects of unit and time. According to the table Hausman test statistics is rejected at 1% significance level and explain that fixed effects model is more appropriate than the random effects model with F-test results. Because of time effect and unit-time effect are rejected at 1% significance level according to the F test results, Therefore, it will be appropriate to use fixed effect model based on units of time.

Table 4: The Results of the Estimates of fixed and random effects models

Fixed Effect Model			**Random Effect Model**		
Variable	**Coefficient**	**t statistic**	**Variable**	**Coefficient**	**t statistic**
C	0.0722*	17.1957	C	0.0725*	4.9467
P/E	-0.0012	-1.3407	**P/E**	-0.0008	-0.8474
DPS	0.0013***	1.7834	**DPS**	0.0013**	1.9448
FIRMSIZE	0.0106*	2.4507	**FIRMSIZE**	0.0137**	2.3415
P/B	0.2708*	18.3534	**P/B**	0.2766*	16.2572
Unit Effect	There is not		Unit Effect	There is not	
Time Effect	There is		Time Effect	There is	
Unit - Time Effect	There is		Unit - Time Effect	There is	
R^2=0.6432	F=28.0844*		R^2=0.1978	F=93.7587*	
$F_{(probability)}$=0.0000	DW=1.8796		$F_{(probability)}$=0.0000	DW=1.8112	

Note: **, ** and *** indicate the significance at 1 per cent, 5 per cent and 10 per cent significance level, respectively.*

Table 4 shows the results of estimates of fixed and random effects models. As stated above, it was shown that fixed effect model gives more consistent results in the Hausman test. According to this DPS variable, FIRMSIZE and P/B variables are found positive and significant at the 10%, 1% and 1% significance level respectively. P/E variable found insignificant. R^2 value which shows the explanatory power of the model is approximately 64%. F value which shows overall significance of

the model is significant at the 1% significance level. Durbin-Watson value shows that model does not include autocorrelation.

5. CONCLUSION

Financial system plays a vital role in allocating capital source in a given economy. In a well organized financial system, funds flows from those who have surplus funds to those who have a shortage of funds, market-based financing as an indirect way, and bank-based finance (Duisenberg, 2001). The proper allocation of resources makes the decision makers to forecast the stock prices in appropriate way which is paradigm shift in financial and academic studies since 1980. Since investors cannot predict the stock prices accurately, forecasting the future returns have been a challenging issue in asset pricing. It is, not surprising that financial agents and policy makers in finance use many kind of variables in an attempt to forecast stock returns.

In this study, financial ratios are engaged to forecast the stock return for Borsa Istanbul 100. Borsa Istanbul is one of the influential, robust, technologically advanced, stable and with the highest potential stock market in the Middle East that play a vital role in the economic and regional foundation for Turkey. We used a Panel estimation for the period of 2004 to 2014 quarterly data to forecast the stock returns. We incorporated the financial ratios such as price to book ratio (P/B), price to earning ratio (P/E), dividend per share (DPS) and firm sizes that predict stock return effectively. The result of the panel estimation indicates that firm size has the higher power to predict the stock return among the other variables. Dividend per share and price to book ratio have less forecasting power. However, there is no significant relationship between price to earning ratio and stock returns. According to the Granger Causality Test, there is a causal relationship between stock price and price/earnings ratio. This study also explores the causal relationship between stock price and dividend per share. A bi-directional casual relationship has been found between stock price and firm size too. There is one-way causal relationship from stock price to market value/book value ratio.

The results from this study have important implications for policy makers, financial brokers and financial analysts who used to forecast the models for the future considerations and this estimation will give the glimpse to increase the capital funds and other investment projects in Turkey. In addition, adopting the firm size variable which has good power to predict the stock return will give a benchmark for investors to make investment, and earn better return in Turkish stock market.

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