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Do Based-Market Data Predict Stock Return Better Than Accounting Data? The Case of Tehran Stock Exchange (TSE)

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Abstract

Investors seek factors determining the stock return and use them to predict the future stock return. This paper examines and compares the strength of accounting data (Firm Size, Return on Equity, Return on Assets, profit margin ratio, Financial Leverage ratio) versus based-market data (Price to Earnings ratio, book to market ratio and Dividend yield) in explaining and determining stock return of companies listed in Tehran Stock Exchange during 2004-2014. Analysis show accounting data have significant relationship with stock return when market data omitted. But by entering market data and accounting data in model together, their determining power is decreased generally.

Key words: Stock return; Market data; Accounting data

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INTRODUCTION

The purpose of investors is to earn positive return. The stock return consists of change of stock price and dividend. Since one of the key factors of a successful investment is on time decision-making, then factors used to forecast stock return must have a high predictive power and be easily visible .The change of stock price is subject to many financial and economic factors to them which investors must attend when to buy and sell stocks. Rational investors prefer efficient portfolios, since such as portfolios maximize expected returns against given level of risk, or minimize risk for given level of return (see Strong (2000)). Investors need to instruments in other to forecast the stock return. This issue has made introduce models to predict the stock return. The one of models that is used to explain the stock return is the Capital Asset Pricing Model (CAPM). Capital Asset Pricing Model definite the return of stock as function of the systematic risk of a stock. Indeed, in this model, systematic risk is only factor can effect on stock return. The stock prices is affected by several variables such as earnings, expected cash flows of firm and return on equity. Also firm's characteristics is useful to forecast the stock return. Fama and French (1993) introduced a multi-factors model, that in according to it, firm size and book to market ratio (B/M) have important effect on stock return.

The purpose of this paper is to examine the relation between financial variables such as firm size, Return o Equity, Return on Assets, Price to Earnings ratio, Book to Market ratio, Profit Margin, Leverage and stock return. Findings show despite this relationship is meaningful for many of the variables but their effect on stock return is different. Therefore the main purpose this study is to discover the effect of each variable on stock return and determine relative explanatory power of them for stock return.

The overall organization of this paper is as follows. After the introduction, Section 2 introduces a brief literature review. Section 3 is methodology. Section 4 explains research findings and results and conclusion is presented in the final section.

1. LITERATURE REVIEW

The financial literature extensively examined the determinants of stock return. Many of researchers (Fama

& Macbeth (1973) and Lintner (1976)) have examined the impact of inflation on stock return and a number of researchers have considered the complete list of macroeconomic variables.

Sharp (1964), Lintner (1965), Fama & Macbeth (1973) and Chen et al (1986) concentrated on multivariable models and examined the pricing of risky securities. The study done by Chen et al (1986) is one of the most important studies on determinate the risk of macroeconomic variables. They assumed that sudden changes in macroeconomic variables play a crucial role in changes of stock price and found that monthly growth rate of industrial productions and sudden changes in risk premium and anticipated inflation have significant explanatory power.

Rutledge et al (2008) examined the relationship between size and stock return for Chinese stock market and showed that small firms have higher return. Fama & French (1992) concluded that firm size explained stock return for period 1963-1990. Davis & Desai (1998) introduced firm size as an important factor inducing changes of realized stock return. Moosavi (1999) investigate the impact of size on return of investment during 1371-1375 that showed there is a weak and significant relationship.

Drew et al (2003) deduced that small and growing companies have higher returns than larger companies. Gordon (2010) indicated that common stock returns is inversely related to firms size. Rouwenhorst (1998) showed that stocks of small companies have better performance than large companies. Chaopricha et al (2007) investigated the relationship between financial characteristics and stock returns and found that size is an important factor to predict stock return. Lakonishok et al (1994) examined growth strategies and concluded that this strategy resulted in higher returns. Banz (1981) and Ringanom (1981) found that the stocks of small firms in England have higher return than large firms. Fama & French (1996) deduced that stock return is described by two factors: size and book to market ratio.

Maroney (1995) concluded that stock return will be high when the book to market ratio is high. Lam (2002) found that firm size, book to market ratio and earnings to price ratio explain stock return in Hong Kong stock market. Rosenberg et al (1985) expressed that firms with high book to market ratio have high stock return too. Ashiq & Hwang (2002) showed that book to market ratio has the high ability to predict stock return.

Rouwenhorst (1998) showed that value stocks with high book to market ratio have more performance than growth stocks with low book to market ratio. Chaopricha et al (2007) investigated the relationship between firm characteristics and stock return. They had not consensus that a single variable be best predictor. Lewellen (2003) tried to answer the question whether earnings to price ratio can predict stock returns or not. He used from regression analysis to test the hypothesis. He revealed that earnings to price ratio can predict stock return.

Umar (2008) in the research as a fundamental analysis of stock market returns in Saudi Arabia during 1990-2004 showed that relationship between book to market ratio and earnings to price ratio with annual return is weak. Ball (1978) and Basu (1983) reported that in addition to firm size and systematic risk, the earning to price ratio explained variance of stock return. Ball believed the earnings to price ratio includes unknown components that is associated with stock returns which can be named "risk factors". According to Ball (1978) it is expected that stocks with high earnings to price ratio yield higher expected return.

Omran & Rajab (2004) followed the researchers such as Lev & Thiagrajan (1993), Riahi Belkaoui (1997) that investigated the linear and nonlinear relationship between the financial ratios and stock returns Egypt firms for period 1996-2000 and the estimation results of multivariate linear model showed that coefficient on return on equity was significant in the model.

Ho et al (2008) considered the financial leverage and asset pricing in Hong Kong and concluded that there is a significant relationship between stock return and leverage. Also, Bhandri (1998) observed a positive and significant relationship between financial leverage and the average of stock return.

Bora and Ag (2014) considered the effects of three independent variables on stock return: price to earnings ratio, price to book ratio and debt to equity ratio. They collected the necessary data of companies listed in the US and Turkey markets and assessed the relationship between variables by the panel data method. Their study suggested that the explanatory power of independent variables was relatively high and statistically significant in explaining the cross-section of stock returns in the United States, however, it was not in Turkey. DeHaan et al (2015) found negative returns when the market is notified of an upcoming Friday earnings announcement, which is consistent with investors inferring forthcoming bad news. Yezegel (2015) showed that analysts issue recommendations when they face greater demand from investors, when the relative supply of information available on earnings announcements is higher and when they detect mispricings. These results are consistent with analysts striving to meet the demands of investors by providing useful recommendations after earnings announcements. Then close relationship between earnings information and stock return is expected.

Westerlund et al (2015) proposed a simple panel data test for stock return predictability. The list of predictors they applied for test were inflation, dividend price ratio, dividend payout ratio, book to market ratio, the three month Treasury Bill rate, one-year government bond yield and cross-sectional beta premium. They showed that most financial and macroeconomic predictors are in fact able to predict returns.

Narayan and Deepa (2015) examined Indian stock returns predictability. Their analyses revealed that book to market ratio, dividend price ratio, dividend payout ratio, and earnings price ratio predict aggregate market excess returns. At the industry level, DE, EP and DP predicted returns consistently. Cash flow to price ratio and stock variance had very limited content to predict returns of aggregate market.

Hoang et al (2015) considered the determinants of predictability using industry characteristics and found strong evidence that return predictability had links to certain industry characteristics, such as book to market ratio, dividend yield, size, price earnings ratio and trading volume. Furthermore, they found that the book to market ratio, dividend yield and trading volume had a positive effect, while the size and price earnings ratio had a negative impact on sector stock return predictability.

Wang et al (2015) examined the effect of firm investment on stock returns by using data on the Chinese stock market. They found that stocks with higher investment experience lowered future returns and there was an obvious investment effect in the Chinese stock market. The investment effect was stronger for firms that had higher cash flows, lower debt or for state-owned firms. Additionally, the stock returns didn't significantly positively correlate with firm profitability or book to market ratio, so the results didn't support risk-based explanation.

Gray and Johnson (2011) showed an asset-growth effect exists in the Australian equity market. The findings of their paper supported suggestion that future stock returns are negatively related to past levels of growth in total assets.

Ghaemi (2000) investigated the impact of some factors on stock return firms listed in Tehran Stock Exchange and showed that systematic risk (beta) had effect on return but firm size, book to market ratio, trading turnover and earnings to price ratio had not.

2. METHODOLOGY

2.1 Variables

Variables used in study and calculating method of them have been represented in Table 1.

Table 1
Variables of Research and Calculation of Them

Variables	Definition
Size	The natural log of total asset at the end of the year
Book to Market value (BM)	Book value of stock over stock price at the end of the year
Return on Asset (ROA)	Earning after tax over total asset at the end of the year
Return on Equity (ROE)	Earning after tax over equity at the end of the year
Margin Profit (MP)	Earning after tax over Sales
Price to earnings ratio (PE)	Stock price over earnings per share
Financial Leverage (LEV)	Total debt over total asset
Dividend Yield (DY)	Dividend per share over stock price
Stock Return (R)	$(\boldsymbol{P_t} - \boldsymbol{P_{t-1}} + \mathrm{D})$ over $\boldsymbol{P_{t-1}}$

Note. P_{t-1} and P_t are stock price of beginning and end each year, respectively. And D is annual dividend. The stock price is adjusted for effects due to new issuing common share of stock during year.

2.2 Model

This study is an ex-post design research. It focuses on listed firms in Tehran Stock Exchange (TSE) for the period 2005-2015. In order to test the hypothesis, the data are analyzed using panel data regression model. The data in this research are checked simultaneously both cross sectional and time series. The term "panel data" refers to the pooling of observations on a cross-section of households, countries, firms, etc. over several time periods. (Baltagi.,2005) In first stage, only the accounting data (Firm Size, Return on Equity, Return on Assets, Profit Margin ratio, Financial Leverage ratio) are imported in panel data regression model. Therefore, the model is as follows:

$$R_{it} = \beta_{io} + \beta_1 SIZE_{it} + \beta_2 ROA_{it} + \beta_3 ROE_{it} + \beta_4 PM_{it} + \beta_5 LEV_{it} + \upsilon_{it} \quad (1)$$

Then, only based-market data (Price to Earnings ratio, book to market ratio and Dividend yield) are imported in the panel data regression model as follows:

$$R_{it} = \beta_{io} + +\beta_1 BM_{it} + \beta_2 PE_{it} + \beta_3 DY_{it} + u_{it} \quad (2)$$

Finally, to measuring explaining power of the accounting data and the based-market data in comparison with each other, all them are modeling and considered as follows:

$$R_{it} = \beta_{io} + \beta_1 SIZE_{it} + \beta_2 BM_{it} + \beta_3 ROA_{it} + \beta_4 ROE_{it} + \beta_5 PM_{it} + \beta_6 PE_{it} + \beta_7 LEV_{it} + \beta_8 DY_{it} + z_{it} \quad (3)$$

2.3 Data and Sample

Accounting and market Data required for examining the proposed model has been collected from the financial database of Securities and Exchange Organization of Iran. The sample consists of a panel of yearly observations on 243 companies spanning the period from March 2004 through February 2014 for a total of 2430 firm-year observations. These companies have been selected across all companies listed in Tehran Stock Exchange based on two measures: first the end of their financial year is February and second their data required to study are available.

2.4 Hypothesis Test

First, I test the Hypothesis that "There is a significant relation between accounting data (Size, ROA, ROE, PM, LEV) and stock return". For this end, I use panel data regression model 1 and estimate its coefficients. By assessing the significant and value of the estimated coefficients can determine effect and power of each accounting predictors in explain and predict the stock return. Also determination coefficient of the panel data regression model 1 that evaluates explanatory and predictive power of all the accounting predictors for stock return is considered. Then in order to compare predictive power of the accounting predictors with base-market predictors, I use the panel data regression model 2 and estimate its coefficients and determination coefficient. Next I compare the results of two models 1 and 2. Finally, in order to compare predictive power of all predictors each other, I use the panel data regression model 3 and estimate it. Surely, relative predictive power of all variables is considerable by model 3.

3. RESULTS

Descriptive Statistics

In Table 2, I report summary statistics for firm basic financial variables of sample.

Table 2
Descriptive Statistics

Variable	Mean	Std. Dev	Min	Max
Size	27.8	2.2	21.6	37
BM	0.52	0.45	0.04	4.34
ROA	0.10	0.13	-0.09	0.76
ROE	0.26	0.16	-0.22	0.85
PM	0.27	1.35	-10.30	17.15
PE	5.97	1.21	-23.00	31.29
LEV	0.75	0.23	0.11	0.35
DY	0.14	0.04	.02	0.48

3.1 Model Estimation

3.1.1 Identification Test and Selection Between Pool Or Panel

Before estimating the models 1, 2 and 3, it is necessary to specify whether data are pool or panel. For this purpose, to decide between the pool and panel, I use F test as follows:

$$F_0 = \frac{(RRSS - URSS)/(N-1)}{URSS/(NT-N-K)} \sim F_{(N-1),(NT-N-K)}$$

Where *RRSS* and *URSS* are sum of square residuals in restricted and unrestricted models, respectively. N, T and K are number of sample companies, number of year sample and number of explanatory variables of models, respectively. The results of F test for models 1, 2 and 3 have been presented in Table 3.The number of (N - 1) and (NT - N - K) are freedom degrees of F statistic.

Table 3
Results of F Test for Determining Whether Data are Pool or Panel

	Model 1	Model 2	Model 3
N	243	243	243
T	10	10	10
K	5	3	8
F_0	2.34	2.01	2.56
$F_{(N-1)(NT-N-K)}$	1.000	1.000	1.000
Null hypothesis: data are pool	Rejection***	Rejection***	Rejection***

Note. *** denotes that null hypothesis is rejected at significant level of 0.01.

3.1.2 Hausman Test

Hausman test is a test of whether the Fixed Effects or Random Effects Model is appropriate. The results of this test for models 1, 2 and 3 are presented in the Table 4 .The p-value for the test in each three of models is less than 1%, indicating that the random effects model is not appropriate and that the fixed effects specification is to be preferred.

Table 4
Hausman Test Summary- Test Cross-Section Random Effects

	Model 1	Model 2	Model 3
Chi-Sq. Statistic	16.52	15.63	19.96
Chi-Sq. d.f.	5	3	8
p-value	0.0055	0.0014	0.0105

Note. *** denotes significance at the 1% level.

3.1.3 Main Findings

Table 5 presents the estimation results of the panel data regression model 1. First column shows the variables of the model represent the accounting predictors of stock return. Second column shows estimated coefficients on them. As expected, coefficients on ROE, ROA and PM

are positive that shows these variables have positive relationship with stock returns. While, coefficients on SIZE and LEV are negative that shows companies with large asset and high leverage have low stock return, their high p-values evidence that these variables are not statistically significant and have not effect on stock return. Among these variables, PM has largest coefficient with p-value 0.0212 that is significant at level of 5%. Low values of R^2 and adjusted R^2 of regression model reported in the last two rows denote low explanatory power of accounting data for stock return.

Table 5
Estimation Results of Panel Data Regression Model 1

Variable	Coefficient	Std. Error	t-Statistic	p-value
C	0.8525	0.2114	4.0325	0.0001***
SIZE	-1.80E-04	1.69E-04	-1.0678	0.2857
ROE	0.2805	0.0303	9.2524	0.0001***
ROA	0.0264** 2.2210 0.0981 0.2180			
PM	0.5698	0.2471	2.3051	0.0212**
LEV	-0.9495	1.0056	-0.9443	0.3451
R^2	0.572			
Adjusted R^2	0.569			

Note. ***, ** denote significance at the 1% and 5% level, respectively.

The next set of estimation results presented in Table 6. These estimations show the coefficients and their significant statistically of panel data regression model 2. Generally estimation results of model 2 are better than them of model 1. All the coefficients of model 2 are statistically significant at the 1% and 5% level and the large values of R^2 and adjusted R^2 denote high explanatory power DY, PE and BM for stock return. This finding verifies every well that based-market data have high predictive and determination power in compared with accounting data and consistent with many of studies the revealed relationship these variable to stock return (refer to introduction of this study).

Table 6
Estimation Results of Panel Data Regression Model 2

Variable	Coefficient	Std. Error	t-Statistic	p-value
C	-0.5678	0.2817	-2.0156	0.0440**
DY	0.2964	0.0988	3.0010	0.0027**
PE	0.1714	0.0625	2.7438	0.0061***
BM	0.7658	0.0871	8.7934	0.0001***
R^2	0.875			
Adjusted R^2	0.869			

Note. ***, ** denote significance at the 1% and 5% level, respectively.

The final set of estimation results show the relation between all variable, accounting and based-market data, with stock return. As the Table 7 presents, compared with model 2, the presence of the accounting and the based-market data together in regression model, has been decreased the total explanatory power of model from 0.87 to 0.65. This result suggests previous Result based on to be highest explanatory power of based-market data than it of accounting data. All of coefficients except it of SIZE are significant at the 1%, 5% and 10% levels. Again coefficient on LEV is negative that suggests leverage has reversal effect on stock return. High leverage increases the default risk and the required return that in turn reduces stock price in future.

Table 7
Estimation Results of Panel Data Regression Model 3

Variable	Coefficient	Std. Error	t-Statistic	p-value
C	0.0756	0.0299	2.5284	0.0115**
SIZE	-2.67E-06	2.36E-04	-1.1347	0.2566
ROE	0.5072	0.2566	1.9768	0.0482**
ROA	0.0218	0.0124	1.7645	0.0778*
PM	0.7403	0.3971	1.8644	0.0624*
LEV	-0.9394	0.5696	-1.6493	0.0992*
DY	0.3384	0.0676	5.0068	0.0001***
PE	0.1012	0.0254	3.9845	0.0001***
BM	0.3185	0.1219	-2.6129	0.0090***
R^2	0.659			
Adjusted R^2	0.658			

Note. ***, ** and * denote significance at the 1%, 5% and 10% level, respectively.

CONCLUSION

The extensive literature has focused on studying financial characteristics of companies as predictors of stock return. In this research, along with other studies, relationship between financial variables and stock return is examined. Investors look for the variables predict stock return better. The accounting data are available easily and their interpretation for investors is straightforward. The variables that combine accounting data with market data such as Book to Market ratio, Dividend yield and Price to earnings ratio are more powerful than accounting data in predicting stock return. This paper shows that accounting data such as Return on Asset, size, Return on Equity and leverage have the relatively low explanatory power in compared with the based-market data.

Many research concluded a negative relationship between size and stock return and a positive relationship between Book to Market and stock return. But this study shows that there is not a significant relationship between size and return stock. This result is inconsistent with

studies that revealed significant relationship between size and stock return (see Banz (1981), Reinganum (1981), Fama and French (1992) and (1998), Lakonishok et.al (1994), Davis and Desai (1998), Rouwenhorst (1998), Lam (2002), Drew et al (2003), Chaopricha et al (2007), Rutledge and Karim (2008), Gordon and TangSimon (2010), Hoang et al (2015)). Presence of other variables in model has been reduced its effect. The relationship between Book to Market ratio and return stock is positive in models 1 and 3 that is consistent with Rosenberg et al (1985), Maroney (1995), Fama and French (1996), Lam (2002), Ashiq and Hwang (2002), Hoang et al (2015), Naraya and Deepa (2015) and Westerlund et al (2015).

In models 1 and 3 relationship between ROA and stock return is verified that implies ROA is a powerful predictor for stock return. The results of models 1 and 3 shows, Similar to ROA, ROE has significant effect on stock return. These findings is consistent with Lev and Thiagarajan (1993), Riahi-Belkaoui (1997) and Omran and Ragab (2004).

The estimation results of models 1 and 3 indicate a positive and significant relationship between profit margin and stock return. Despite the leverage have not significant effect on stock return in model 1, its coefficient is significant at the 10% level in model 3 and its magnitude is negative and noticeably large compared to other variables. It is compatible with Bhandri (1998) and Ho et al (2008).

The results of estimation model 2 show clearly that variables of based-market are appropriate predictors for stock return. The determination coefficient of model 2 is high as explanatory variables explain roughly 87 percent of variation of stock return. It result implies that based-market data predict stock return better than accounting data with the determination coefficient of 57 percent. Dividend yield is more powerful than two other based-market data, namely Price to Earnings ratio and Book to Market ratio with the coefficient of -0.76. Many studies have been confirmed strong relationship between Price to Earnings ratio, Dividend yield and Book to Market ratio and stock return. (See Naraya and Deepa (2015), Hoang et al (2015), Wang (2015), Westerlund et al (2015), Bora and Ag (2014), Yezegel (2015), DeHaan et al (2015).

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