

Relationship between Financial Characteristics of Companies in Cement Industry and Their Stock Returns in Tehran Stock Exchange

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Abstract

The aim of investors for investment is gaining returns. To this end and for maximizing the return, investors seek for identifying factors effective on return so that they can use them for predicting their investment's return. In the current work, relationship between financial characteristics of the companies and stock return in Tehran Stock Exchange in 2004-2011 is investigated. Financial characteristics include firm size, return on equity (ROE), return on assets (ROA), price-earnings ratio, book – market equity ratio, profit margin, profitability and financial leverage. Panel data method was used for data analysis and the results showed that the variables of firm size, book- market equity ratio, return on assets, and return on equity are significantly related to stock returns, but no relationship was observed between margin profit, financial leverage, and price-earnings ratio with stock returns.

Keywords: Return on equity, financial characteristics of company, panel data.

Introduction

Stock exchange is one of appropriate opportunities for investment and gaining return. Return of an investment denotes profits obtained from the investment and investors seek for those investment opportunities which increase their capital. To this end, investors should consider many factors. If investors invest regardless of effective and return-related factors, they won't gain desirable results¹. Risk and return are two basic factors for investors. Capital Asset Pricing Model (CAPM) is used for quantifying risk and return relationship. Systematic risk (Beta) is the only factor affecting stock returns in this model. There are also other effective factors on stock return. Fama and French introduced multi-factor model by adding two variables, book - market equity ratio and firm size, as two variables significantly affecting stock returns².

Aim of the investors for investment in stock of the companies is gaining logical return and stock return is composed of stock price changes and received profit. Thus, stock price or its changes is a criterion for decision making on stock exchange³. Logical investors seek for maximizing their return at an acceptable risk level. In this regard, they need criteria through which they can predict their investment performance. Such criteria should have high predictability and be easily observable. Quick decision making is a key rule in investment. Slowness in making decisions results in losing potential profit and incurring potential loss⁴.

The question is that: is there any significant relationship between variables of firm size, return on equity (ROE), return on assets (ROA), price-earnings ratio, book – market equity

ratio, profit margin, profitability and financial leverage and stock return?

Review of Literature

Financial authors search for factors which influence stock return since long ago. Many authors investigated inflation role in stock return. For example, Fama and Macbeth⁵, Lintner⁶ and some others investigated a comprehensive list of macroeconomic variables.

Authors such as Sharp⁷, Lintner⁸, Fama and Macbeth⁵, and Chen, Roll, and Ross⁹ studied pricing of securities risk focusing on multi-factor models.

The work by Chen et al.⁹ is one of the salient works regarding determining risk of macroeconomic variables. They assumed sudden changes in macroeconomic variables play a warning role for changes in stock prices and they concluded that the monthly growth rate in industrial production and a sudden change in the risk premium and unexpected inflation are factors that have significant explanatory power⁹.

Rutledge and Khondkar Karim¹⁰ studied relationship between size and return in Chinese market and found small size firms have more return. Fama and French found in period 1963-1990, the firm size can explain stock return changes¹¹. Davis and Desai¹² introduced firm size as an important variable for changes of realized stock return. According to Drew et al.¹³ in their work entitled *firm size, book-to-market equity and security returns* concluded small and growing firms provide higher returns than larger firms. Gordon¹⁴ indicated stock return is

related inversely to firm size. Rouwenhorst¹⁵ showed stock return of small firms outperform compared to large firms. Chaopricha et al.¹⁶ investigated relationship between firm characteristics and stock return. They found the size is an important factor in predicting stock return. Lakonishok, Shleifer, and Vishny¹⁷ studied growth strategies and found they obtain higher return. It means direct relationship between size and stock return. Banz¹⁸ and Reinganum¹⁹ in England found stock of smaller firms provide higher return compared to large firms.

Fama and French²⁰ concluded stock return is described only by two factors, size and book – market value ratio. Maroney found high B/M ratio leads to higher return²¹. Lam concluded variables of firm size, book- market value ratio, and E/P ratio can explain stock return difference in Hong Kong²².

Rosenberg et al. stated firms with higher book – market value ratio have high return average²³. Ashiq Ali and Hwang Seok stated BE/ME ratio has the ability to predict future return²⁴. Rouwenhorst²⁵ indicated value stocks (stocks with high book – market value ratio) acts better than growth stocks (stocks with low book – market value ratio).

Lewellen²⁶ studied the question if such ratio as EPS/P can predict stock return. They used regression analysis for testing hypotheses. Thus, they found this ratio is able to predict the stock return. Umar²⁷ conducted a study entitled *Fundamental analysis of Saudi emerging market stock returns 1990-2004* and found the relationship between annual stock return and B/M (book – market equity) and E/P (earnings – price) ratios.

Ball and Basu reported in addition to firm size and systematic risk, earnings - price ratio is effective in explaining stock return difference. According to Ball, earning – price ratio includes unknown factors related to stock return which can be called "risk factors". Ball argues it is expected stock with higher earning – price ratio provides higher expected return. Overall, findings of these work and similar ones suggest that there is significant relationship between stock return rate average and such variables as firm size, book- market value ratio, and earning – price ratio^{28,29}.

Chaopricha et al.¹⁶ studied relationship between firm characteristics and stock return. They found despite of lack of consensus on the best descriptive variable, some studies proposed market – book value ratio, size and price – earnings ratio as the main factors for predicting stock return.

Omran and Ragab followed works by Lev and Thiagrajan³⁰ and Riahi-Belkaoui³¹ conducted a study entitled *Liner versus Non-Linear relationship between financial ratios and stock return* in Egyptian firms. They tested linear and non-linear relationship between financial ratios and stock return using multivariate regression correlation analysis. Research period was 1996 – 2000. Results of linear model using strategy of stepwise

multivariate models indicated return on equity was the only significant ratio for the whole model³². Jamadori investigated effectiveness of financial ratios in predicting stock return and found only variables of return on equity and interest coverage ratio are able to predict stock return³³.

Ho et al.³⁴ used Beta pricing test and introduced the other common risk factor known as financial leverage in a work entitled *Corporate financial leverage and asset pricing in the Hong Kong market* and found there is relationship between return and market leverage (not book leverage). Ni the work by Ho et al., market leverage was calculated by ratio of total value of assets to market value of equity, and book leverage was calculated by ratio of total value of assets to book value of equity. Also, Bahandori reported there is a positive relationship between average rate of stock return and financial leverage³⁵.

Several studies in recent years have been conducted in Iran concerning relationship between financial variables and stock returns, main of which are as follows: Raei and Shavakhi Zavare³⁶ compared return in large and small size firms and they found large firms have higher return compared to small firms. Dashti in his studies during 1997-2001 found there is direct significant relationship between firm size and stock return³⁷. Bagherzadeh³⁸ investigated and identified factors affecting stock return in Tehran Stock Exchange during 1997-2004. Results of this work indicated positive relationship between size and stock return. MusaviKashi³⁹ in period 1992-1996 studied effect of size on investment return and found weak significant relationship between return and size. Rahmani and Tajvidi⁴⁰ found there is significant relationship between size and stock return. Kimiagari et al. investigated relationship between risk and return based on three-factor model of Fama and French in Tehran Stock Exchange. They observed that firm size can explain stock return changes; however, it is in contrast with finding by Fama and French, that size and return are directly related in Iranian capital market⁴¹.

Gholami⁴² investigated relationship between changes in operational, financial, and combined leverages and with stock return changes in the companies listed in Tehran Stock Exchange during 1994- 2000. He found no significant relationship between three leverages and stock return changes.

Taremi⁴³ studied relationship between size and book – market value ratio and stock return average in Tehran Stock Exchange during 2001-2004 and found there is inverse relationship between return average and size and book – market value ratio. Dashti observed a significant inverse relationship between book- market value ratio with return³⁷.

Rahimi studied relationship between stock return and price – earnings ratio in the companies listed in Tehran Stock Exchange. His hypothesis was: stocks with low price – earnings ratio had higher return compared to stock with high price – earnings ratio during 1994-1997. Their research results

supported this hypothesis⁴⁴.

Ghaemi in his doctoral thesis studied factors affecting return in Tehran Stock Exchange. His findings showed there only one effective factor on the return, that is, systematic risk index, and firm size, book – market value ratio, transaction turnover and earnings – price ratio do not influence returns⁴⁵.

Bagherzadeh³⁸ investigated and identified factors affecting stock return in Tehran Stock Exchange during 1997-2004. In investigating relationship between stock return and variables of book – market value ratio, and earnings – price ratio, he found unexpected results which were in contrast with similar studies in other countries. Relationship between size and stock return was positive and relationship between book – market value ratio and earnings – price ratio was negative.

According to a work by Mehrani and Mehrani, such variables as return on assets, return on equity, and profit margin have significant relationship with stock return. Also, findings indicated return on assets is more effective than other variables in predicting stock return⁴¹.

Research Questions and Hypotheses

As shown in literature, many studies have been conducted on variables affecting return; however, a few numbers of variables were measured. Current work aims at investigating effect of 7 basic financial variables on companies in cement industry within an eight-year period. Research hypotheses are as follows: There is a significant relationship between firm size and stock return. There is a significant relationship between return on assets and stock return. There is a significant relationship between return on equity and stock return. There is a significant relationship between ratio of book value to market value of equity and stock return. There is a significant relationship between price - earnings ratio and stock. There is a significant relationship between profit margin and stock return. There is a significant relationship between financial leverage and stock return.

Statistical Society and Sample: Statistical society includes all cement firms listed in Tehran Stock Exchange. For selecting research sample, firstly all cement companies listed in Stock Exchange during 2004-2011 were listed. Then, companies were selected which their information for period 2004-2011 were available and their fiscal year end was March 20. Thus, data for 24 companies in cement industry was extracted using stock reliable sites and software approved by Exchange Organization.

Research Variables: Current work is applied in terms of purpose and descriptive – correlation type in terms of subject nature. Research variables are shown in table-1.

Variables were calculated for sample companies during 2004-2011. Proposed method for such cases is combination of cross

sectional data and time series and estimation of the respected pattern based on time series and cross sectional data. If cross sectional data in different years are put together, integrated data will be obtained.

Table-1
Research variables

Variables	Symbol	Calculation Method
Size	SIZE	Total assets
Return on assets	ROA	Total assets / profit after tax
Return on equity	ROE	Equity / profit after tax
Price – earnings ratio	P/E	Earnings per share at end of period / market price of the share
Financial leverage	LEV	Assets / liabilities
Margin profit	MP	Sales / profit after tax
Book – market ratio	BM	market value of equity / book value of equity
Return	R	Price at the beginning of period / (Price at the beginning of period - Price at the end of period) / divided share

Testing Hypotheses: The starting point of econometric studies is regression model in which a relation is assumed between dependent and independent variables. Regression model explains changes observed in dependent variable by changes of independent variable. Causal relationship between dependent variable (y) and independent variables (x_1, x_2, \dots, x_n) may assume any form of implicit functions⁴⁶. The multivariate regression model is as follows:

$$y_i = \alpha + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + u_i$$

y_i : i^{th} observation of the dependent variable (y), x_{ki} : i^{th} observation for independent variable (x_k) for $k = 1, 2, \dots, k$, α : constant, $\beta_1, \beta_2, \dots, \beta_k$: Regression correlation coefficients, u_i : Disturbing statements.

Model Diagnostic Test: Now it should be specified whether type of model is Pool or Panel. To this end, F test is run, that is, bound regression versus unbound regression is tested using square residuals.

$$H_0: \mu_1 = \mu_2 = \dots = \mu_{N-1} = 0$$

$$H_a: \mu_i \neq \mu_j (\exists \mu_i \neq 0)$$

$$y_{it} = \alpha + \beta' X_{it} + v_{it} \rightarrow SSR$$

$$y_{it} = \alpha + \beta' X_{it} + \sum_{i=1}^{n-1} \mu_i D_{it} + v_{it} \rightarrow SSR$$

Using OLS residuals obtained from Pool and Fixed model, test

statistics can be calculated:

$$F = \frac{(ssr - ssur)/(N - 1)}{ssur/(N.T - K - N)}$$

If calculated value for F is larger than F in the table with degree of freedom (N - 1) and (N.T - K - N), H_0 is rejected. Otherwise, H_0 is supported.

The calculated F is 1.9 and F in table with Degree of Freedom (23 and 137) is 1.75 and since calculated F is larger than F in table, thus H_0 stating model is Pool is rejected.

If null hypothesis is rejected, panel data type should be tested in terms of random effects of fixed effects. To this end, Hausman test is used.

H_0 and H_1 are as follows in Hausman test:

$$H_0 : \alpha = \alpha_s$$

$$H_1 : \alpha \neq \alpha_s$$

Null hypothesis means there is no relationship between disturbing components related to intercept and explanatory variables and they are independent. While, H_1 means there is correlation between disturbing components and explanatory variable, and if there is correlation between disturbing components and explanatory variable, problem of bias and inconsistency is faced⁴⁷.

Panel data are examined in terms of being random or fixed.

In Hausman test, approval of H_0 suggests selection of random effects method, and its rejection denotes selection of fixed effects method⁴⁸.

Table-2
Summary of Hausman test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	26.870442	7	0.0004

Since prob is smaller than 0.05, thus the fixed effects model is approved.

Model Estimation

The main tool for estimation is using OLS estimator (Ordinary Least Square). It is the most known model in this regards. Research model is as follows: $R_{it} = \beta_{io} + \beta_1 SIZE_{it} + \beta_2 BM_{it} + \beta_3 ROA_{it} + \beta_4 ROE_{it} + \beta_5 MP_{it} + \beta_6 PE_{it} + \beta_7 LEV_{it}$

By entering coefficients:

$$R_{it} = -35.66036 + 2.96E - 05 SIZE_{it} - 20.66598 BM_{it} + 79.28163 ROA_{it} - 25.97661 ROE_{it} \pm 6.385081 MP_{it} - 0.068378 PE_{it} - 26.31235 LEV_{it}$$

One of the classic assumptions for estimation through OLS is

lack of relationship between residuals in different time series, which is known as lack of autocorrelation. If there is autocorrelation, such problems as non-real statistics for t and F would be encountered.

One of known tests for specifying autocorrelation is Durbin-Watson Test. According to this test, if its value is close to 2, there is no autocorrelation.

Table-3
Durbin- Watson Test

R-squared	0.242475	Mean dependent var	12.92969
Adjusted R-squared	0.171298	S.D. dependent var	41.44873
S.E. of regression	37.73205	Akaike info criterion	10.18590
Sum squared resid	212132.5	Schwarz criterion	10.46943
Log likelihood	-820.2441	Hannan-Quinn criter.	10.30100
F-statistic	3.406654	Durbin-Watson stat	2.017344
Prob(F-statistic)	0.000086		

Since Durbin - Watson statistics is 2, thus model doesn't have autocorrelation and results obtained from this mode are reliable.

Coefficient of independent variables in the model means change in the dependent variable per one unit change in related independent variable with fixed values for other variables.

Results for Hypotheses Testing

H_0 and H_1 are defined for each of hypothesis and considering obtained Prob, hypotheses are tested. Research Hypothesis: there is significant relationship between respective variable and stock return. H_0 : there is no significant relationship between respective variable and stock return. H_1 : there is significant relationship between respective variable and stock return.

$$H_0 : \beta_k = 0$$

$$H_1 : \beta_k \neq 0$$

H_0 suggests by fixed value for other dependent variables, related variable has no effect on stock return of the firms listed in Tehran Stock Exchange. If prob value is below 0.05, H_0 is rejected and it is said respective coefficient is significant.

Discussion: Results obtained from testing hypotheses indicate among the variables under study, firm size, return on assets, return on equity, and book - market value ratio are significantly related to stock return, and no relationship was observed between three variables of financial leverage, margin profit, and price - earnings ratio with return.

Table-4
Model Estimation Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Results for testing hypotheses
C	-35.66036	16.90960	-2.108882	0.0369	
BM	20.66598	9.694217	2.131785	0.0350	Supports
LEV	26.31235	23.18288	1.134991	0.2585	Rejected
MP	-6.385081	24.35348	-0.262184	0.7936	Rejected
PE	-0.068378	0.332111	-0.205889	0.8372	Rejected
ROA	79.28163	39.01790	2.031930	0.0443	Supports
ROE	-25.97661	11.06035	-2.348625	0.0204	Supports
SIZE	2.96E-05	9.71E-06	3.044659	0.0028	Supports

Findings in the current work concerning relationship between firm size and book – market value and stock return are consistent with many foreign works such as those by Fama and French⁴⁹, Rutledge and KhondkarKarim¹⁰, and Chaopricha et al.¹⁶. Of course, direction relationship of these variables in foreign works denotes the relationship between size and return is often negative and relationship between book – market value and return is positive. In the domestic works such as work by Raei and ShavakhiZavare³⁶, relationship between size and return is positive like the current work. There is controversy about larger or smaller firms with higher profitability and return. Some authors consider larger firms more profitable and with higher return because of following factors:

Large firms are more diversified in terms of activity. Such diversity helps higher profitability and return. Large firms provide their needed fund in lower interests due to their credit in global capital markets³⁹.

Conclusion

Findings about insignificant relationship between financial leverage and price – earnings ratio as well as about significant relationship between return on assets and equity and stock return are consistent with some domestic research works. Overall, it can be said most domestic and foreign related works referred to the fact that there is no consensus on one or more variable as the best descriptors of stock return. There is more dispersion about variables affecting stock return in the country's Stock Exchange, and sometimes conflicts are observed. Following factors can be mentioned for different use of these variables: Tehran Stock Exchange inefficiency, financial herding, making decisions on stock exchange based on canards, absence of analysts and analyzing associations and companies providing consulting services in the capital market of Iran, and behavior and perception of the users. The other reason regarding insignificance of margin profit, financial leverage, and price – earnings ratio is negligence of investors about these variables when investment, while for a correct decision making, a logical understanding of the accounting methods and rules, principles of preparing financial statements and market mechanisms is needed.

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