
Effect of Board Size on Earning Response Coefficient (Evidence from Pakistan)

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Abstract

This study investigates whether large board size plays a significant role to enhance the Earning Response Coefficient (ERC) while controlling the established determinants of Earning Response Coefficient (Beta, Growth, Size and Earning Persistence). The study selected 250 non-financial firms of different sectors on the basis of purposive sampling technique which are enlisted in Pakistan stock exchange (PSX) for the time periods of eight years ranging from 2008 to 2015. Using reverse regression, it has been observed through statistical analysis that Beta is negatively related to ERC while others determinants (Growth, Size and Earning Persistence) are positively related to earning response coefficient (ERC). Moreover, the analysis result also suggested that corporate governance facet (large board size) plays a significant role to enhance the earning response coefficient, because large board size has different skills, capabilities, knowledge and expertise which have great potential to increase the earning response coefficient (ERC). The important contribution for literature is that before making investment decision in stock market, investors should evaluate the corporate governance variables (Board size) of the firms which can boost earning response coefficient (ERC). Secondly, previous studies (Collins & Kothari, 2004) and others researchers mostly worked on developed countries in the same area, but this research study is limited to emerging economy of Pakistan, that's why it has great contribution for literature .

Key Words: Board size, Board size and ERC, ERC Determinants.

In capital market, the stock return actually captures the earning surprise which is termed as Earning Response Coefficient (ERC). These earning surprise can be measured by taking the difference between realize earning and forecast earning. Actually the Earning Response Coefficient represents the reaction of market with respect to changes in the stock prices. Beaver (1968) and Ball & Brown (1968) have explored and documented such relationship in their studies. These measurement of surprise for earning informativeness has been used as a proxy by the Collins and Kothari (1989); Easton and Zmejewaski (1989); Kormendi and Lipe (1988). Furthermore, the ERC is clear cut signal that how much the stocks have the ability to provide expected return to the investors. The capital market has various attributes (volatility, return, earning announcements dates) and these traits are fruitful to give meaningful information to the inventors regarding stock returns (Beaver, 1968; and Ball and Brown, 1968). These elements are changes with respect to market reactions and it's also effect the expected return of the company stocks. The investors make their final decision in stock investment on the basis of financial reports disclosure which represent the company financial health and the ability to pay its debts. According to Kim (2005) who documented that Earning Response Coefficient (ERC) represents earnings validity and also act as proxy for markets expectations with respect to security return in future.

The capital markets researchers' have constantly found the four substantial determinant of ERC comprising Beta, Firm Growth, Earning Persistence and Firm Size (Bernards and Ruland, 1987; Easton and Zmejewaski, 1989; Collins and Kothari, 1989; Biddle and Seaowe, 1991; Choe and Jung, 1992; Dhaliwal and Reynolds, 1995; Kai, 2003; Kim, 2005; Cheng and Naser, 2010, Zakaaria et al 2013). The determinant of ERC can be measured and identified through the operating results which play an important role to predict the stock return (Bernards & Stobars (1987). By using equally weighted index model, Collin and Kothari (1989) documented that beta is found a significant variable and also count as a measurement of systematic

risk. They applied reverse regression model for measuring unexpected earning on stock return and found that negative and significant relation exist between beta and ERC. Similarly, the same study is further extended by previous researchers (Huson, Scott and Wiere; 1999) and documented that that inverse relation exist between ERC and beta which means as the ERC will decrease, beta will increase and vice versa.

Collin and Kothari (1989) documented that those companies having maximum profit margin has the ability to growth opportunity and in turn will positive and significant effect the Earning Response Coefficient (ERC). This shows that opportunity of growth have a positive effect on market reaction and companies earning announcements information. Contrary to this study, Paluppi (2006) documented that there exist a negative relation between company profitability and opportunity of growth and consequent negative relation with Earning Response Coefficient (ERC) because investors are more interesting to invest such securities which give return in short term instead of long term. Collins and Kothari (1989) stated that opportunity of growth can be measured by market to book value of equity. Moreover, the same can be used for the proxy of Growth expectation. The below ration shows the growth opportunity (GOP).

$$\text{Growth Opportunity} = P_{ij} / B_{ij}$$

In this equation the market to book value of equity is P_{ij} and B_{ij} respectively. This ratio advocated that return of security increases as increases the potential of Growth and increase of Growth opportunity is positive signal for investors. This also suggested that Growth opportunity and Earning Response Coefficient (ERC) are directly correlated with on another which means that as Growth opportunities increases ERC will also increase. The Earning Persistence represents that how much the current earning will retain and persist in future as well, because investors feel more confidence when stock return are persistence and continue in future. Previous researchers (Kormendi and Lipe, 1987; Collins and Kothari, 1989) also argued that security return and Earning Persistence are positively interlinked to one another.

The last determinant of ERC is Size of Firm which is categorized as Small and Large firms and also measured through various scales like total capital and total income (Brigham and Houston, 2012). The common perception about big companies is that such companies disclose their information more frequently and timely and ultimately it will decrease the uncertainty and expected future cash flow. This indicate that Large size Firms has great potential to enhance Earning Response Coefficient (Naimah and Siddhartha, 2006).

Board size plays a significant role to communicate required information amongst investors and managers. Large board size has the characteristics to approach capital market easily and can monitor all sorts of activities of a firm in a better way (Cheng, 2017; Lehn et al., 2009, Phillips and Sipahioglu, 2004). Fama (1980) argued that board of directors actually acts on behalf of owners' so due to this reason board of directors' plays a noteworthy role to enhance firm Performance. Hermalin and Weisbach (2003) documented that small board size is more beneficial for firm performance, because in large board size diverse directors' have different mindset, skill and competences which become hard to gather on one point and give birth to agency problem. But Dalton and Dalton (2005); Shah (2016) statement is quite opposite who says that large board size has different skills, capabilities, knowledge and expertise which have great potential to increase the earning response coefficient (ERC).

On the other hand, large board size has advantages over the small board size, because larger board has a wide range of expertise in different areas / fields. Larger boards may have gender diversity with different professional skills, experience and nationality (Shah, 2016; Dalton & Dalton, 2005).

Literature Review

Earning Response Coefficient

Earning response coefficient (ERC) is the combination of two proxies i.e accounting earning and stock price proxy. Schultz (2005) says that CAR (Cumulative Abnormal Return) is the proxy of stock price while EU (Unexpected Earning) is the proxy of accounting earning. In early 1980, capital market researchers find out the causes which can effect the magnitude and volatility of ERC. Miller and Rocks (1986) conducted a study regarding relationship between unexpected earning and stock return. They concluded that during earning announcement of a company, earning response coefficient (ERC) plays an important role to estimates the relation between unexpected returns and returns of equity.

Determinants of Earnings Response Coefficient

Earning response coefficient (ERC) has the following four determinants.

Beta, Size, Growth and earning persistence.

Beta:

Previous researchers (Zahra, 1999; Colins and Kothari, 1989) conducted studies regarding beta and earning response coefficient (ERC) and found negative association between these two variables. Similarly, others researchers (Vafeas, 2000; Shangguan, 2007; zhang, 2014) also conducted studies between these two variables where beta was acting as control variable and results showed a significant and negative association between these two variables.

Size:

Javed (2015) & Brown (2006) argued that size of firm can be measured through different scales like total assets, capital and income. Similarly, Shangguan and Lana (2007) argued that firm size indicate as a proxy to measure total assets of the firm. Earning response coefficient increases as the size of firm increase, that's why size of firm plays an important contribution to enhance Earning Response Coefficient (ERC) of a firm.

Growth:

Haat (2008) said that most of the investors take investment decision on the basis of growth opportunities of a firm. Phillips et al; (2006) argued that those firm whose growth level is high has the ability to earn more return in future, moreover high growth firms has also the quality of greater earning response coefficient (ERC).

Earning Persistence:

Nasir (2016); Collins and Kothari (1989) argued that if current earning of a firm persists in future as well, such earning of firm is known as earning persistence of a firm. Investors mostly prefer such stocks whose earning remain persist in future. Firms having greater ability of earning persistence has the quality of higher Earning Response Coefficient (ERC).

Board Size and Earning Response Coefficient (ERC)

Board size is a significant Facet of Corporate Governance which acts as a communication bridge amongst managers and investors. Previous studies (Lehn et al, 2009; and Philips & Sipahiouglu, 2004) documented that large board of directors has the advantages to better monitors and evaluate all the activities of the firm in efficient and effective way and also helps to access the capital market without any obstacle. Moreover large board size has the ability to achieve economy of scale by utilizing the debts in effective and productive way.

The board of directors takes decisions in the best interests of the shareholders. According to Fama (1980), owners (shareholders) of the firm delegate their power to the board and in turn the board serve their interest in their best efforts. Goodstain, Gautms, & Boaker, (1999) identified that board is also responsible for the better management of Corporate Governance System which has the potential to monitors and controls all the functions of corporations in effective and efficient way. Furthermore, Denis & McConnel (2003) argued that company gives authority and responsibility to the board to hire, fire, promote and evaluate CEOs and executives for the best interest of the firms' value.

Board size and its effect on earning response coefficient (ERC) have been defined by different researchers; some says that small board is more beneficial for firm performance while others are in favor of large board size. Lipton and Lorsch (1999) argued that best choice for board size is seven to eight, if size exceed than this, then it can create problems for CEOs and management to control firm activities. Large board size create agency problems in a firm; because different directors have different skills, expertise and knowledge which is difficult for management to focus all of them on point. Dalton and Dalton (2005) and Shah (2016) arguments is quite opposite who stated that larger board size has significant role to increase earning response coefficient (ERC) because of multi skills, capabilities, knowledge and expertise.

H1: A significant relationship exists between large board size and earning response coefficient (ERC).

In order to test the hypothesis, it's mandatory to control other variables which also determine ERC. The control variables are Beta, Growth, size and earning Persistence.

Research Methodology

Study Period and Sample Selection:

All non-financial firms are the study population. The study selected 250 firms of different sectors on the basis of purposive sampling technique for the period of 2008 to 2015, which can fulfill all the required data of the research. The data gathered from balance sheet analysis, annual reports and companies own sites.

Statistical Tool for Data Analysis

The collective data has been passed away through various statistical tool and technique like Descriptive Statistics, Correlational Analysis and Multiple Regression Analysis.

Model Specification:

$$UR = ERC * (UX/P)$$

Variables n i.e x_1, x_2, \dots, x_n which actually represent ERC

Then

$$UR = (x_1, x_2 \dots x_n) * (UX/P)$$

In the UR regressions, the mathematical expression of the Coefficient $X_i * (UX/P)$ on $\{X_i * (UX/P)\}$ represents the X_i effect on ERC. Moreover, a significant measurement error exist, its clearly indicates that reverse regression will be used instead of direct regression. In this aspect, owing to the significant measurement error in UR, in this study for estimation purpose reverse regression is adopted instead of the direct regressions (Collins and Kothari, 1989). Other scholars also have applied it with the same rational making strong the argument of using this method in this study (Chao and Jung, 1992; Dhalewal and Reynolds, 1994; Cready, Hurt and Saida, 2000; and Gunny, Jacob and Jorgensan (2009). Through regressions, the $\{X_i\}$ effect is tested which is base on the below technique.

$$UX/P = [1/ (x_1, x_2, \dots, x_n)] / UR$$

The above expression represents the regressions equation.

$$UX/P = a_0 + a_1 UR + a_2 UR * X_1 + a_3 UR * X_2 + \dots + a_{n+1} UR * X_n + \epsilon$$

By applying reverse regression, the tests of coefficient is now reverse to the ERC and therefore it becomes Returns Response Coefficient (RRC). Its mean that the regressions results will react oppositely. Foreexample, if a positive and significant relation found amongst coefficient of $X_i * UR$, so it will indicates that the coefficient X_i is negatively associated to ERC and vice versa.

As we discussed above that Coefficient $\{X_i\}$ represent the effect of X_i on ERC, for this purpose this study will run regression to investigate the effect of Beta, Firm Size, Earning Persistence and Growth with these variables as the $\{X_i\}$. The hypothesis of the study is, a significant relation exists between large board size and its effects on ERC. The researcher has used Board Size (BDSZ) in this regression equation to set of $\{X_i\}$. After adding the measure of Board Size in a set of $\{X_i\}$, the below regression equation was intended.

$$UX/P = a_0 + a_1 UR + a_2 UR * BSZ + a_3 UR * BETA + a_4 UR * GRTH + a_5 UR * EPRS + a_6 UR * SZ + \epsilon$$

Thus when the value of $a^2 < 0$ and also significant will show that large Board Size significantly effect on Earning Response Coefficient (ERC).

Measurement of Variables:

Control Variables:

Beta, growth, size and earning persistence are determinants of ERC and act as a control variables in this research study.

Unexpected Earnings:

Unexpected earning is calculated by taking difference between current years earning per share (EPS) minus previous year EPS. Moreover the unexpected earning is then deflated by previous years stocks prices.

Unexpected Returns:

The CAR (Cumulative Abnormal Return) is actually proxy of unexpected return (UR) which is obtained from annual report of the firms. Abnormal return is actually measured by differences between actual return and expected return, while sharp market model (1963) is used to obtain estimated expected return.

Data Analysis

Descriptive Statistics

The sample size of this study consists of 250 non-financial firms selected from Pakistan stock exchange for the time span of 2008 to 2015. The secondary data has been collected from Pakistan Stock Exchange (PSX) listed firms and balance sheet analysis of state Bank of Pakistan (SBP). Initially the analysis consider 2000 observations, but some abnormalities were found in the data that were dropped through statistical tests i.e weinsurization and Cook’s Distance test and finally 1697 observations used to estimates results.

Table 1: *Descriptive Statistic of Earning Response Coefficient and Board Size*

Variable	Obs	Mean	Std. Dev	Min.	Max
Uxp	1696	0.16853	1.42202	-4.4595	9.36208
Beta	1697	0.5916	0.47862	-0.1684	1.90629
Sz	1697	15.1934	1.56921	11.3189	19.2532
Grth	1697	0.90628	0.94755	-1.8798	4.91669
Eprs	1697	2.69677	9.35632	-34.972	34.6436
Car	1697	0.06011	0.87625	-1.1231	4.40488
Bsz	1697	7.9505	1.40666	7	13

The descriptive statistics of Earnings Response Coefficient (ERC), Board Size and control variables are presented in above table. The mean value of the UXP is 0.1682 and the standard deviations is 1.422. Likewise the mean of Beta is 0.591 which is almost half of the market beta value of 1.0. This shows that the selected companies in the sample are not substantially financially geared and the same companies may have on average low level of systematic risk in comparison to and in context of overall the entire market. The standard deviation of beta is 0.478 which highlights low dispersion in the distribution of beta values. The mean value of size is 15.193 and the standard deviation is 1.569. Similarly, the mean value of growth is 0.906 which is favorable as the market is willing to pay on average high price for the selected companies’ stock due to the high growth potential. The average value of earnings persistence is 2.696 and the standard deviation is 9.356. The mean value of CAR is 0.060 and its deviation is 0.876. The mean value of BSZ (Board Size) is 7 which show that on average there are 7 members in a board.

Correlation analysis:

To test all the variables of the study, correlation analysis was performed. Pearson correlation coefficient is shown amongst all the variables in the table.

As Pearson correlation represent the strength of linear relationship between two variables. The below table shows that board size (bz), beta, growth (grth), size (sz), cumulative abnormal return (car) and earning persistence (eprs) are significantly correlated with the ratio of unexpected earning to price (UX/P). However the relation among all the variables is moderate and statistically significant.

The table of correlation indicates that there is no serious issue of multicollinearity amongst all the independent variables because none of the pearson coefficient exceeds 0.7 (Pallat, 1996).

Table 2: Correlation Matrix

	Uxp	Bsz	Beta	Grth	Sz	Car	Eprs
Uxp	1						
Bsz	-0.03	1					
Beta	0.027	0.166**	1				
Grth	-0.04	0.203**	0.028	1			
Sz	-0.056*	0.366**	0.199**	0.199**	1		
Car	0.045	-0.026	0.116**	-0.0173	0.0447	1	
Eprs	-0.33**	-0.0244	-0.160**	-0.091**	-0.311**	-0.130**	1

*. Correlation is significant at the 0.05 level (2-tailed)

** . Correlation is significant at the 0.01 level (2-tailed)

Ordinary Least Square (OLS) Assumptions:

The OLS assumptions has been fulfilled before performing regression analysis that data has followed normal distributions and outlier has been dropped while applying different statistical tools like winsurization and Cook’s Distance tests. Another problem is multicollinearity that must need to be addressed. To check the existence of multicollinearity issue, Variance inflation factors (VIF) test has used which obviously revealed that there is no serious issue of multicollinearity amongst explanatory variables as all the values of test is less than critical value as VIF values shown in all econometrics models . In panel data one main issue is heterogeneity that has tested through Breush Pagan/Cook Weisberg test for heteroscedasticity and result of all models are shown in annexure B. Moreover, various statistical tests were used to find out the most appropriate model and finally, Fixed Effect Model was selected on the basis of Hausman Tests.

Now to find out the effect of board size on ERC Determinants, the following two econometric models are used to show the effect of these two variables.

The estimation of two regressions equation are as follows.

$$UX_{it}/P_{it} = \alpha_0 + a_1CAR_{it} + a_2CAR*BETA_{it} + a_3CAR*GRTH_{it} + a_4CAR*EPRS_{it} + a_5CAR*SZ_{it} + \text{Year fixed effect} + \epsilon_{it} \tag{1}$$

$$UX_{it}/P_{it} = \alpha_0 + a_1CAR_{it} + a_2CAR*BSZ_{it} + f(\text{control variables}) + \epsilon_{it}$$

Table 3: Dependent Variable UX/P

Variables	Pool OLS Regression DV=UX/P		Robust Pool		RE		FE		VIF
	beta	P-value	beta	P-value	beta	P-value	beta	P-value	
Car	2.1594	0.0000	2.1594	0.0010	2.1594	0.0000	1.9078	0.0000	1.20
Carbeta	0.3644	0.0000	0.3644	0.0640	0.3644	0.0000	0.3155	0.0020	3.14
Cargrth	-0.0959	0.0400	-0.0959	0.2070	-0.0959	0.0600	-0.0974	0.0850	2.57
Careprs	-0.0192	0.0000	-0.0192	0.0200	-0.0192	0.0000	-0.0201	0.0010	1.15
Carsz	-0.1410	0.0000	-0.1410	0.0010	-0.1410	0.0000	-0.1221	0.0000	1.34
_cons	0.1466	0.0100	0.1466	0.0000	0.1466	0.0000	0.1469	0.0000	
R2	0.0342		0.0342		0.0342		0.0337		
Adjusted R2	0.0308								
F-value	9.9700		3.2500		59.8500		7.8100		
P-value	0.0000		0.0035		0.0000		0.0000		
Lamgre			0.0000 1.0000						
Hausman test							5.74 (0.04525)		

The table shows the association of CAR with Beta using the fixed effects model. As can be seen from the respective test values, all assumptions of multiple regressions are being fulfilled. The result indicates that a positive and significant relationship exist between the interactions of CAR and coefficients of beta, which means that beta is negatively and significantly related to the ERC. These results are similar to the previous studies (Zakaria, 2013; Dhaliwal et al., 1992; Dhaliwal and Reynold, 1996; Billing, 2000; & Shanguan, 2009). The previous researchers have explored and submitted that beta has negative relation with ERC. Similarly, the relation between the interaction of CAR and Firm Growth is negative and significant which mean that according to reverse regression, the Firm Growth has positive and significant link with ERC. These results are similar to other pertinent studies (Zakaria, 2013; Collin & Kothari, 1989; Martikinen, 1997; Billing, 1999; Park & Pincus, 2001; Kims, 2005; Ghosh et al., 2005; Shanguan, 2007). The results also depict that CAR and earnings persistence are significantly and negatively related with each other which means that earnings persistence is positively and significantly related with ERC. These results are similar to other related studies (Zakaria, 2013; Kormendi and Lipe, 1988; Collin and Kothari, 1989; and Dhaliwal and Reynold, 1994). As regards CAR and Firm Size, their relation is also negative and significant which means that the Firm Size has positive and significant relation with ERC. These results are consistent with Billing (1999) and Vafeas (2000). However, a study conducted by Martikinen (1998) who investigated that there exist no relation between firm size and ERC which mean that ERC will remain same for both small and large firm sizes. Similarly, Walker (1995) also noted that the firm size is not a significant determinant of ERC. Nevertheless, Shanguan (2007) found the consistent results that firm size is positive and very significant determinants of ERC which mean that for large size firms, the ERC will be high.

Effect of Board size on ERC:

$$UX_{it}/P_{it} = \alpha_0 + a_1CAR_{it} + a_2CAR * BSZ_{it} + f(\text{control variables}) + \epsilon_{it} \quad (2)$$

Table 4: *Dependent Variable UX/P*

	Pool OLS Regression DV=UX/P			Robust Pool		RE		FE		
Variables	beta	P-value	beta	P-value	beta	P-value	beta	P-value	VIF	
Car	0.060	0.166	0.060	0.391	0.060	0.166	0.070	0.133	1.39	
Carbsz	-0.169	0.013	-0.042	0.025	-0.042	0.013	-0.029	0.032	3.32	
Beta	0.206	0.004	0.206	0.030	0.206	0.004	-0.151	0.305	1.11	
Grth	-0.120	0.001	-0.120	0.001	-0.120	0.001	-0.023	0.672	1.08	
Eprs	-0.054	0.000	-0.054	0.000	-0.054	0.000	-0.064	0.000	1.05	
Sz	-0.081	0.000	-0.081	0.000	-0.081	0.000	-0.572	0.000	1.16	
R2	0.134		0.134		0.134		0.058			
Adjusted R2	0.131									
F-value	37.430		24.170		262.000		42.980			
P-value	0.000		0.000		0.000		0.000			
Lamgre					0.000	1.000				
Hausman test	0.0000						62.18(0.000)			

The above regression result shows the effect of Board size on ERC. After statistical results the above table presents that the coefficient of interaction between CAR and Board Size is found negative and significant which mean (according to reverse regression) that the interaction of coefficient of CAR with board size has significant and positive relationship with ERC. On the basis of this result it accepts the alternative hypothesis that large board size and ERC are significantly interlinked to each other.

Conclusion

The results indicate that significant and positive associations exist between ERC and its determinants except beta, which is negative and significantly linked with earning response coefficient (ERC). Others researchers (Zakaria, 2013; Shanguan, 2007) also obtained the same results from these

variables. Secondly, the result of this study confirm the expected significant positive relationship between large board size and earning response coefficient (ERC) that large board size plays an important role to enhance the earning response coefficient (ERC) an emerging economies, because large board size has different skills, capabilities, knowledge and expertise which is beneficial to increase the earning response coefficient (ERC). These finding are consistent with those of previous studies in developed markets (Dhaliwal et al, 1991; Dhaliwal and Reynolds, 1994; Shangguan, 2007) and emerging markets (Zakaria, 2013; Kai, 2002; and Cheng and Nasir, 2010). Moreover this research study is conducted in emerging economy of Pakistan where corporate governance and capital market is not well developed and fluctuation in stock prices occurs due to different circumstances i.e. political instability, war and terror etc but still the statistical results are same as found in developed countries, that's why this study has great literature contribution an emerging economies. The finding of this study highlights some ideas to others researchers in capital market in the area of corporate governance and earning response coefficient (ERC).

In future, it's need of time to pursue similar studies an emerging economies. Moreover, Researchers should include maximum enlisted firms and also increase the span of time for conducting such nature of research. It's also suggestions to include more key variables of corporate governance which can enhance the robustness of results.

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