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## **LEVERAGE AS A DETERMINANT OF RETURN ON EQUITY WHETHER FIRM SIZE MODERATE LEVERAGE -RETURN ON EQUITY RELATIONSHIP.**

### **Abstract:**

The aimed of this study is to determine the impact of leverage on return on equity and to analyze whether the firm size affects as moderator in return on equity and leverage relationship. Theories have different views between debt and equity return relationship. Some advocate that the capital structure is irrelevant and some have opposite view as the leverage increase it not only increase the value of firm but also the wealth of equity holders. As when the sizes of firm increase it affect the capital structure of a firm. The regression equations were used to analysis the leverage equity relationship in Pakistan cement industry.

The dependent variable was the return on equity and independent variable was leverage. Firm size used as a moderator in this study. The significant negative relationship was found in return on equity and leverage. Significant relationship was also found during the years of 2006, 2007 and 2008. The insignificant relationship was found in the period of 2009-10. Firm size used as a moderator which gives a highly significant result. It also check at three level of mean difference value of increase and decrease and found when the size increase relationship between return on equity and leverage also increase significantly. On the basis of analysis it was concluded as the firm size increase it increase the positive significant relationship between return on equity and leverage.

The major contribution of this study is the introduction of the concept of moderation in identifying the relationship between leverage and determinants of capital structure. Therefore, the findings of this study will provide a novelty and useful insights about the structure and favorable composition of capital structure decisions to the finance managers.

### **Keywords:**

Key Words: Return on equity, Leverage, Firm Size, Moderator, Capital structure.

### **JEL Classification:** G32

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## 1. INTRODUCTION

In the modern day debt financing is significant source of financing for the firms including short term and long terms financing. The amount of debt being used in capital structure is influenced by the growth of companies and profit being generated and is termed as leverage. The effect of leverage on return on equity varies to the degree to which firm's assets are being financed by debt. Other things held constant, as amount of borrowed money is low, lower will be the interest rate and lower will be profit whereas as amount of debt increases at low interest rate greater will be profit. According to Mbaii (2012), debt impose a fixed obligatory payment of interest. Although debt provide an opportunity to increase profit in different business operations by using appropriate leverage.

Pandey (2007), Leverage can increase shareholders' return and as well can increase the firm's risk also. The leverage employed by a firm is intended to earn more on the fixed charged funds than their relative costs. Leverage is the final component of return on equity. Matt (2000), defines leverage as a measure of how much firm uses portion of equity and debt to finance its assets. As debt increases, financial leverage increases. Management tends to prefer equity financing over debt since it carries less risk

According to Franklin and Muthusamy (2011), Leverage provides the potentials of increasing the shareholders' wealth as well as creating the risks of loss to them. The leverage is a prerequisite for achieving optimal capital structure. An optimal capital structure can influence the value of firm and hence wealth of shareholders through decreased cost of capital. Hence, determination of optimal debt level and its impact on the firm's overall capital structure is regarded as an integral part of a firm's financial decision. Leverage, or an increase in financial efficiency, called the variation of return on equity, depends on the return on assets and the cost of credit i.e., interest rate. According to Brezeanu (1999), leverage also expresses the impact of financial expenses due to loans on the return on equity of an enterprise.

According to Niculescu (1997), the equity return of a company is usually referred to as the return on equity (ROE) and is a measure of the company's income based on the shareholder's equity. Return on equity (ROE) measures the rate of return on the ownership interest of the common stock owners. It measures a firm's efficiency to generate profits from every unit of shareholders' equity. The return on equity is a result of the efficiency of all commercial, operational and financial activity of the enterprise. The figure is calculated as a percentage and is a direct reflection of how well the company is using its invested equity. The determination of profits is determined after preferred stock dividends but before common stock dividends are paid. Return on equity (ROE), is a financial ratio that measures the return generated on stockholders'/shareholders' equity, the book or accounting value of stockholders'/shareholders' equity which reflects the accumulation over time of amounts received by the company from stock/share issues plus the profits/earnings retained by the company.

Cement industry is indeed a highly important segment of industrial sector that plays a pivotal role in the socio-economic development. Since cement is a specialized product, requiring sophisticated infrastructure and production location. Growth of cement industry is rightly considered a barometer for economic activity. In 1947, Pakistan had inherited 4 cement plants with a total capacity of 0.5 million tons. Some expansion took place in 1956-66 but could not keep pace with the economic development and the country had to resort to imports of cement in 1976-77 and continued to do so till 1994-95. The industry was privatized in 1990 which led to setting up of new plants.

### **1.1 Research Objectives:**

- To understand the relationship between ROE and Leverage.
- To determine whether firm size work as moderator in Leverage-ROE relationship.

## **2. LITERATURE REVIEW**

Abor (2005), finds a negative but statistically insignificant association between leverage and equity returns, which are taken as the geometric mean of returns. Madan (2007) uses another definition. Returns are taken to be profits after tax and the ratio of book value of equity to assets are used to measure leverage. He finds leverage has a negative relation with returns. Titman (1988) defines returns as profits after taxes and interest which is the earnings the shareholders receive on their investments. He uses industry as a proxy for business risk. Black (1972) gets inflation adjusted stock returns for all firms including financials. He uses the cross section of all firms without assuming different risk classes. He shows returns increase with leverage.

Different definitions for leverage are also implemented to understand the leverage-stock returns relation in the literature. Modigliani and Miller (1958), calculate financial leverage by taking the ratio of equity to total assets for the leading firms in an industry over one year. He shows that at the industry level, leverage raises industry profitability and higher leverage implies greater risks. Morri and Beretta (2008), finds a negative association between stock returns and leverage based on pure capital structure changes such as exchange offers. Michales et al (1999), report a negative relation between leverage and stock returns by studying changes in leverage and show that they are negatively related to current and future returns. They calculate returns as risk adjusted raw returns. They differentiate between borrowing for operations or for growth to examine the effect of leverage due to economic performance and not due to growth, mergers and acquisitions and other reasons. Chhibberet et al., (1999), finds a negative relation between returns and leverage. They use book leverage in their tests. They argue that firms, which get affected more adversely in financial distress, have lower leverage. Roden et al., (1999), investigate the book-to-price effect in expected stock returns and its relation to leverage. They divide the book to price value into an enterprise and a leverage component. These stand for the operational risk and financial risk. They show that the leverage component is negatively related to stock returns.

Modigliani and Miller (1958), were the first to study the relationship between capital structure and firm value. They argued that, under certain conditions, the ratio of debt and equity does not affect firm value.

Himmelberg et al., (1999), Large companies possess the ability to undertake diversification, attain economies of scale and a lower cost of bankruptcy, and so, usually, their credit ratings are higher. Therefore, they can get lower borrowing costs and higher stock issue prices, and so the value of large companies is higher. In contrast, Michaelas et al., (1999) found that fewer small businesses can benefit from the interest tax shield, and instead, face a relatively high potential bankruptcy cost. Bankruptcy costs will reduce the company's value, and so, company size will positively affect its value.

Myers(1977), recognized that the underinvestment problem by noting that shareholders of firms with risky debt will invest only when or up to the point at which, the expected return on investment is at least as great as the promised payment to bondholders. When the expected return is less than the promised payment, shareholders fail to exercise the investment option or invest less than the optimal amount, which reduces firm value. It is this decline in firm value which limits the amount of debt a given firm can issue.

There are three major explanations for the capital structure decision of corporations, the trade-off theory, the pecking order theory and the market timing theory. According to the trade-off theory firms choose the capital structure such that marginal benefits of debt financing, such as tax benefits or the ability to finance additional positive-NPV projects, and costs of financial distress are balanced, see for example Frank and Goyal (2009) and Fischer, Heinkel and Zechner (1989). In general, tax benefits dominate bankruptcy costs if the leverage ratio is low, but bankruptcy costs dominate tax benefits if the leverage ratio is high. According to the pecking-order theory, funding costs are mainly driven by the costs of asymmetric information.

Since retained earnings are not related to asymmetric information, a firm prefers this funding source to debt and issuing new equity. Furthermore, asymmetric information tends to make new equity more expensive than debt, see Frank and Goyal (2009) and Myers (1984). Finally, the market-timing theory says that managers base the capital structure decision on current and expected equity and debt market conditions, see Baker and Wurgler (2002).

Rajan and Zingales(1995) also worked on the determinants of capital structure. They have taken the data from G-7 countries including US, Japan, Germany, France, Italy, UK & Canada. They have also selected the sample from non financial firms. They have also used tangibility, market to book value which shows growth, profitability & size as independent variable to see their impact on the dependent variable leverage. They find all four independent variables significant at different level of significance i.e.; 1%, 5 % and at 10%.

### 3. METHODOLOGY

#### 3.1 Data Collection:

The sample used in this study consists of 17 Cement companies, listed on Pakistan's KSE indices. The technique of Convenient Sampling is being adopted for the study. The companies included in this sample cover a 95 percent of cement sectors. Firms' data was not available in consecutive years in our study period excluded from the sample to enhance reliability. The sample period ranges from 2006 till 2011. The data used were extracted State Bank of Pakistan publication "Balance Sheet Analysis of Joint Stock Companies Listed at Karachi Stock Exchange from State Bank of Pakistan's website. The data of sales, EBIT, equity and debt was collected to calculate the size of firms, leverage ratio and return on equity ratio.

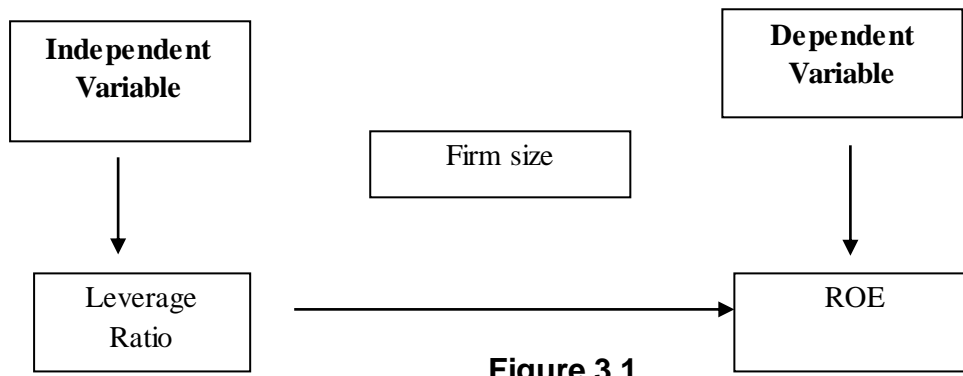
**Table: 3.1**

S. No	Company	S. No	Company
1	Dadabhoj Cement Limited	2	Zeal Pak Cement Limited
3	Dewan Cement Limited	4	Al- Abbas Cement Limited
5	Fecto Cement Limited	6	Attock Cement Limited
7	Lafarage Pak Cement Ltd	8	Bestway Cement Limited
9	Maple Leaf Cement Limited	10	Kohat Cement Limited
11	Mustehkam Cement Ltd	12	Fauji Cement Limited
13	Lucky Cement Limited	14	D.G Khan Cement Limited
15	Gharibwal Cement Limited	16	Pioneer Cement Limited
17	D.G Khan Cement Limited		

The regression method is used in this study to determine the impact of leverage on return on equity. Return on equity is the dependent variable and leverage as an independent variable. Firm size is used as a moderator to check whether the relationship of leverage and return on equity is affected from the size of firms. The participated variables are return on equity, leverage and firm size. The return on equity ratio was calculated by earning before interest divided by the equity. The leverage ratio was calculated by divided the total debt from the net equity. The natural log of sales was

used as a proxy of firm size which used as a moderator in this study. The dummy variables were also created to analysis the company effect and time effect. First the simple moderator was used to analysis the effect of firm size on the leverage equity relationship. After that moderator was run at three levels of mean average values to find out the size of firm effect positively or negatively on with increase and decrease moderator size. The following regression equations were used to determine the ROE and leverage relationship whether the firm size as a moderator.

**Theoretical Framework**



**3.2 Measure of Variable:**

1. **Return on equity** = EBT / Equity
2. **Leverage** = Total Debt/ Total Assets
3. **Firm Size** = Natural Log of sales

**3.3 Estimation Equation:**

**1. Equation for Regression:**

$$ROE = \beta_0 + \beta_1 (\text{Leverage}) + \varepsilon \dots\dots\dots(1)$$

**2. Equation for Company Analysis:**

$$ROE = \beta_0 + \beta_1 LEV + \beta_2 D_1 + \beta_3 D_2 + \beta_4 D_3 + \beta_5 D_4 + \beta_6 D_5 + \beta_7 D_6 + \beta_8 D_7 + \beta_9 D_8 + \beta_{10} D_9 + \beta_{11} D_{10} + \beta_{12} D_{11} + \beta_{13} D_{12} + \beta_{14} D_{13} + \beta_{15} D_{14} + \beta_{16} D_{15} + \beta_{17} D_{16} + \varepsilon \dots(2)$$

**3. Equation for Time Analysis:**

$$ROE = \beta_0 + \beta_1 (\text{Leverage}) + \beta_2 D_{y06} + \beta_3 D_{y07} + \beta_4 D_{y08} + \beta_5 D_{y09} + \beta_6 D_{y10} + \varepsilon \dots(3)$$

**4. Equation for Moderation Analysis:**

a)  $ROE = F(LR, FS, LRFS) \dots\dots(4)$

b)  $ROE = F(LEV, FS, LEVFS, FS^2, LEVFS^2).....(5)$

### 4EMPIRICAL RESULTS

This section includes the calculations, findings, and analysis of data used for study.

#### 4.1 Unit Root Test:

First the unit root test was run to check the stationary of data. The data was find stationary at level, mean that mean and variance, that are constant, but all other higher order moments (third and fourth) are also independent of t. The two tests used to check the satationarity of data, first Augmented Ducky Filler test is used on three variables which confirm stationary of data at level. After that Phillips-Perron (PP) test is used for supporting Augmented Ducky Filler to check the stationary of data. The data found stationary by using both test also at level difference. The table of unit root test as below which show the stationary of data.

**Table:4.1 Unit Root Test Results**

Variables	ADF	PP	p Value
ROE	11.42	11.42	0.0000
LEV	5.99	5.99	0.0000
FS	3.82	3.82	0.0037
<b>Critical Value</b>			
1% level	-3.49635		
5% level	-2.89033		
10% level	-2.5822		

#### 4.2 Regression Analysis:

##### 4.2.1 Equation for Regression:

$ROE = \beta_0 + \beta_1LEV + \varepsilon$  ..... (01)

**Table :4.2 Regression Results**

Model	Beta	t	Sig.
Constant	0.925	4.811	.000
LEV	-0.024	-1.874	.064
N=102    R <sup>2</sup> = .34    Adjusted R <sup>2</sup> =.33    F= <b>3.510</b> Sig.=.064 <b>DW = 1.113</b>			

$$ROE = 0.925 - 0.024Lev$$

(0.0192) (0.013) (Standard Error)  
 (4.811) (-1.874) (t-statistic)  
 (0.000) (0.064) (p-value/sig. level)

R= 0.184    R<sup>2</sup> = 0.034    R<sup>2</sup><sub>adjusted</sub> = 0.024    F = 3.510(p-value = 0.064 DW = 1.113

When the data was found stationary after that regression equation were run to check either the leverage effect the return on equity. First the simple regression equation No 1 was run to check the relationship between return on equity and leverage. A negative relationship was found between return on equity and leverage. The value of R<sup>2</sup>= 0.34,and adjusted R<sup>2</sup>=0.34 statistically satisfactory respectively. The F = 3.510, p-value (0.064) is also significant which show that our all model if fit. The t values are also significant at 0% and 5% level of significance.

**4.2.3 Equation showing Company Effect:**

$$ROE = \beta_0 + \beta_1LEV + \beta_2D_1 + \beta_3D_2 + \beta_4D_3 + \beta_5D_4 + \beta_6D_5 + \beta_7D_6+ \beta_8D_7 + \beta_9D_8 + \beta_{10}D_9 + \beta_{11}D_{10} + \beta_{12}D_{11} + \beta_{13}D_{12} + \beta_{14}D_{13} + \beta_{15}D_{14} + \beta_{16}D_{15} + \beta_{17}D_{16} + \epsilon$$

..... (02)



**Table:4.3 Company Effect Result**

	<b>Beta</b>	<b>t</b>	<b>Sig.</b>
<b>(Constant)</b>	1.051		.001
<b>LEV</b>	-.035	-1.692	.094
<b>D<sub>1</sub></b>	-.037	-.527	.600
<b>D<sub>2</sub></b>	.118	1.871	.065
<b>D<sub>3</sub></b>	.070	1.118	.267
<b>D<sub>4</sub></b>	.041	.634	.528
<b>D<sub>5</sub></b>	.218	3.230	.002
<b>D<sub>6</sub></b>	-.020	-.312	.755
<b>D<sub>7</sub></b>	.065	.882	.380
<b>D<sub>8</sub></b>	.112	1.738	.086
<b>D<sub>9</sub></b>	-.161	-2.489	.015
<b>D<sub>10</sub></b>	.238	3.479	.001
<b>D<sub>11</sub></b>	.115	1.843	.069
<b>D<sub>12</sub></b>	-.041	-.577	.565
<b>D<sub>13</sub></b>	-.010	-.165	.869
<b>D<sub>14</sub></b>	.046	.602	.549
<b>D<sub>15</sub></b>	.090	1.420	.159
<b>D<sub>16</sub></b>	.112	1.738	.086
N=102 R <sup>2</sup> = .419 Adjusted R <sup>2</sup> =.310 F= 3.837 Sig.=.000 DW = 1.333			

Within the industry companies were analysis to check the significant relationship between leverage and return of equity. Again the regression equation for company effect (Equ. No 02) were run that are mention above and found some companies that have low sale volume have significant relationship between leverage and equity relationship. The F = 2.049, p-value (067) is also significant which show that our all model if fit. The t values are also significant at 0% and 5% level of significance.

#### 4.2.4 Equation showing Time Effect:

$$\text{ROE} = \beta_0 + \beta_1 (\text{Leverage}) + \beta_2 D_{y06} + \beta_3 D_{y07} + \beta_4 D_{y08} + \beta_5 D_{y09} + \beta_6 D_{y10} + \varepsilon$$

.....(03)

**Table :4.4 Time Effect Results**

	<b>Beta</b>	<b>t</b>	<b>Sig.</b>
<b>(Constant)</b>	1.035		.000
<b>LEV</b>	-.027	-2.184	.031
<b>Dy06</b>	-.110	-2.170	.032
<b>Dy07</b>	-.085	-1.669	.098
<b>Dy08</b>	-.094	-1.865	.065
<b>Dy09</b>	-.030	-.584	.561
<b>Dy10</b>	-.010	-.204	.839
N=102 R <sup>2</sup> = .115 Adjusted R <sup>2</sup> =.059 F= 2.049 Sig.=.067 DW = 1.06			

The time effect was also analysis by adopting the regression equation No 3 mention above. During the time period of 2006, 2007 and 2008 found the statistically significant relationship between equity return and leverage. Insignificant relationship was found during the period of 2009-10. The F = 3.510, p-value (0.064) is also significant which show that our all model if fit. The t values are also significant at 0% and 5% level of significance.

### 4.3 Moderation Analysis :

#### 4.3.1 Equation showing Moderation Effect:

$$\text{ROE} = F(\text{LR}, \text{FS}, \text{LRFS}) \dots\dots\dots(04)$$

**Table :4.5 Moderation Effect Result**

Model	B	t	Sig.
(Constant)	.596		.000
LEV	-.039	-33.559	.000
FS	.015	5.043	.000
LEVFS	.066	107.841	.000
N=102      R <sup>2</sup> = .992      Adjusted R <sup>2</sup> =.992      F= 4020.418      Sig.=.000			

The results have improved in terms of R<sup>2</sup> and F-statistic; the new variable FS is significant. The moderation effect was checked to analyze whether the moderator affects the return on equity and leverage relationship. Firm size was used as a moderator in this research study. The F = 4020.418, p-value (0.000) is also highly significant which shows that our all model is fit.

The moderation found highly significant as t values of coefficient of leverage (LEV) and firm size (FS), leverage and firm size (LEVFS) t = 33.12, p-value(0.000) t=-33.559, p-value,(0.000) t=5.043 p-value(0.000) respectively. The negative relationships also exist between leverage and equity relationship.

**4.3.2 Evaluating the effect of Leverage:**

$$ROE = 0.596 - 0.039LEV + 0.015FS + 0.066LEVFS \dots\dots\dots(05)$$

$$\delta ROE / \delta LEV = 0.039 + 0.066FS$$

**Table: 4.6 Effect of Leverage**

	N	Mean	Std. Deviation
ROE	102	.5657	.15173
LEV	102	15.1512	1.17899
FS	102	.0139	.45082

For FS variable, range is: = (-0.45082 → 15.1512 → 0.45082)

$$\delta ROE/\delta LEV = -0.039 + 0.066(FS = -0.45082) = -0.06875 \quad (5.a)$$

$$\delta ROE/\delta LEV = -0.039 + 0.066(FS = 15.1512) = 0.9609 \quad (5.b)$$

$$\delta ROE/\delta LEV = -0.039 + 0.066(FS = 0.45082) = -0.009246 \quad (5.c)$$

The effect of LEV on ROE enhances when FS increases and its negativity is decreasing, showing that as FS used as moderator modify ROE-LEV relationship

**4.3.3 Nonlinear Moderation:**

$$ROE=F(LEV, FS, LEVFS, FS^2, LEVFS^2) \dots\dots\dots(06)$$

**Table :4.7 Nonlinear Moderation Results**

Model	Beta	t	Sig.
(Constant)	.555		.000
LEV	-.077	-41.839	.000
FS	.002	6.416	.000
LEVFS	.139	171.366	.000
FS <sup>2</sup>	.003	40.322	.000
LEVFS <sup>2</sup>	-.005	-89.611	.000
N=102 R <sup>2</sup> = 1.000 Adjusted R <sup>2</sup> =1.000 F=211274.780 Sig.=.000 DW = 1.186			

$$ROE = .555 - 0.077LEV+ 0.002FS+ 0.139LEVFS+ 0.003FS^2 - 0.005LEVFS^2 \dots\dots\dots(07)$$

Moderation was also check at three level of mean difference to determine the impact of moderator on return on equity and leverage relationship. The F = 211274.780 at-p-value (000) is also highly significant which show that our all model is significantly statically fit.

The moderation found highly significant as t values of coefficient of leverage (LEV) and firm size (FS) , leverage and firm size (LEVFS) firm size square (FS<sup>2</sup>), leverage firm size square (LEVFS<sup>2</sup>) t = 40.603, p-value(0.000) t= -41.839 p-value (0.000) t=6.416, p-

value (0.000),  $t=171.366$ ,  $p\text{-value}(0.000)$   $t=40.322$ ,  $p\text{-value}(0.000)$  respectively. The negative relationships also exist between leverage and equity relationship.

## 5. CONCLUSION

The Modigliani-Miller theorem, proposed by Franco Modigliani and Merton Miller, forms the basis for modern thinking on capital structure that determined that capital structure is irrelevant. Later on the theory of optimal capital structure, Pecking order theory, net income approach theory, signaling theory, agency theory give the opposite view about the capital structure and prove that total value of firm affected by combining the debt equity relationship. The return on equity is affected by increasing or decreasing the proportion of debt in capital structure. But still it under discussion that what proportion of debt and equity in capital structure that can increase the return of equity holders. Different researchers found the negative relationship in equity return and leverage. In this research negative relationship were also found in debt and equity relationship. It concluded that companies have low sales volume have insignificant relationship between equity return and leverage. Similarly during the period of 2006, 2007 and 2008 significant relationship were found in debt and equity relationship. In this period companies were operate at their maximum capacity to fulfill demand of earth quake reconstruction. In the period of 2009-10 Pakistan borrow from IMF to support the country economy and overall construction ratio decrease which were started after the earth quake.

In this research moderator was also check to determine whether the firm size affect the return of equity and leverage relationship. It gives the highly significant result which concludes that firm size effect to maintain the optimal capital structure by combining the debt and equity proportion. As the size of firm increase relationship between leverage and equity significant effected. Because the large companies possess the ability to undertake diversification, attain economies of scale and a lower cost of bankruptcy, and so, usually, their credit ratings are higher. Therefore, they can get lower borrowing costs and higher stock issue prices, and so the value of large companies is higher.

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