

Financial Leverage Decision in Cement Sector of Pakistan

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Abstract

This paper attempts to understand the behaviour of firms in cement sector of Pakistan regarding its financial structure decision. A typical firm will consider various factors before it adopts a specific blend of liability and equity in its capital structure. This paper uses four factors named as tangibility, profitability, size and growth. Panel data analysis is adopted to check the relationship of these factors with financial leverage for the period of 1999 to 2014. The results are explained considering existing but competing theories. It is observed that profitability and tangibility have significant relation with capital structure decision. These relationships can be explained with the existing theories, however, there was not enough evidence to consider any of the theories as superior.

Keywords: Agency cost theory, Trade-off theory, Pecking order theory, Leverage, Capital Structure.

1. INTRODUCTION

1.1 Capital Structure

Firms finance its assets by raising capital. Broadly, there are two ways to do so i.e., either to issue debt securities or equity. The major distinction between the two is that equity gives the right of ownership whereas debt does not. The relative mix of debt and shareholders' equity is generally known as capital structure.

Practically, there are large number of ways these debt and equity securities can be issued. It can take the form of common shares and preferred shares, long-term debt and short-term debt, and various other forms. Some of these securities can have a hybrid nature of both debt and equity. While the number of ways a firm can raise its capital is higher, a specific combination of the two can increase the overall market value of the firm. It is therefore probable that firms will choose a combination that maximizes its overall value.

Theories regarding the Capital Structure selections are quite controversial. It is mainly because the factors of capital structure are complex in addition the impact is not always clear. There are three competing theories namely, the Trade-off theory which is based on cost and benefits of leverage, pecking order theory which points out a specific sequence of financing and Agency cost theory which focuses on clash of interest of managers and stakeholders. We will provide a brief overview of these theories here.

Modigliani and Miller (1958) are the pioneers of the work on financial structure decision. They believed that such decisions have no impact on the market value of the firm given that the financial market is perfect. However, when the assumption of perfection was relaxed Modigliani (1982) himself admitted that capital structure and value of firm is relevant. DeAngelo and Masulis (1980), Kim (1986) found similar results suggesting that there is a Trade-off between costs related to leverage and the tax advantage of debt. Pecking order Theory on the other hand suggests that firms raises its capital in a specific pattern. This pattern is based on information asymmetry. The well-known advocates of this theory are Donaldson (1961) and Myers (1984). Jensen and Meckling (1976) provided an alternative theory of Agency Cost. They believed that Ideal Capital Structure can be achieved by reducing the agency cost between managers and stakeholders.

1.2 Cement Sector of Pakistan

Cement industry is amongst the oldest industries of Pakistan. Pakistan has huge resources of clay and limestone making it a very desirable place for the industry. At the time of her independence, Pakistan had an annual production of 0.3 million tonnes. This production increased to 0.66 million tonnes per year against the demand of 1 million per year by 1954. Pakistan Industrial Development Corporation (PIDC) established some new plants named as maple leaf and Zealpak with the production capacity of 0.24 and 0.1 million tonnes per year.

In 1927 the first cement plant was established at Wah. Later in 1947 at the time of independence four new plants were established. By 1956 the number increased to six plants. In 1972 State Cement Corporation of Pakistan (SCCP) was established which brought the whole industry under the government control. They established five new plants but made no investments in the next fifteen years. Consequently, the industry faced severe shortage in late seventies and early eighties. Just before privatizing in 1991, seven new plants were established. After privatization eight more plants were added to the industry. New techniques were introduced such as dry processing. The industry flourished once again. At present, there are 25 cement firms with the capacity of 19.5 million tons per annum.

2. RESEARCH OBJECTIVES

Our focus in this research is to understand the behavior of Cement firms regarding financial structure in Pakistani environment. Booth et al (2001) analyzed firms from Pakistan along with 9 other developing countries. But his study was restricted to 96 highly capitalized firms selected from KSE-100 index. Furthermore, his study was not restricted to a specific industry. We focus our study on Cement sector only because of its importance and contribution to GDP of Pakistan. Secondly, capital decisions vary from industry to industry (Boateng, 2004). Therefore, by choosing cement sector we will keep the industry wise variation constant. The study may help managers choose appropriate level of debt against equity which can increase the value of firm, hence contributing to GDP of Pakistan.

Our research questions for the study can be summarized as:

1. How is capital structure changing over time in cement sector of Pakistan?
2. What determines the changes in capital structure in cement Sector of Pakistan?
3. How various theories of capital structure explain these determinants

3. LITERATURE REVIEW AND THEORETICAL BACKGROUND

Modigliani and Miller (1958) initiated the work on firms' financial structure. They believed that firms' value cannot be changed by changing the level of leverage. However, this theory was strictly based on the assumptions of perfect capital market. Practically, managers do not treat debt and equity equally. This difference between theory and practice made Modigliani and Miller (1963) re-consider their proposition. They included the impact of corporate tax into their model. The new MM proposition suggested that increase in debt as compared to equity results in higher firm value since equity is taxed twice. Yet the firms are never 100% leveraged because of bankruptcy cost. The study of Donaldson (1961) suggested that firms have preferences. Firms prefer to finance from retained earnings or internal finances as opposed to debt or external financing. Since lesser information must be made public.

Modigliani and Miller (1958) under the same assumptions but without taxes, reached to the conclusion that firms value has no relevance to the way it raises its finances. However, Modigliani and Miller (1963) later acknowledged that leveraging a firm through debt has advantage in regard to the way firms are taxed, since firms do not pay tax on debt whereas shareholders income is taxed twice.

Debt on the other hand has its own perils. Financial distress in general words means that a firm is unable to pay its debt holder. Higher the value of leverage the higher is the chance of bankruptcy. Thus, higher debt levels are harmful for both shareholders and debt holders. This risk of incurring the cost of bankruptcy offsets the tax advantage

on borrowing. Megginson et al (2007) described that bankruptcy cost can have two forms; these costs can either be direct or indirect. Indirect costs do not involve cash but are linked with bankruptcy like the loss of sales, manager's time and key employees. These costs are not easily measurable, but they are significant in comparison to direct costs. Warner (1977) conducted a research based on 11 railroads. He concluded that these costs are not much significant. Altman (1984) however believed that Warner's bankruptcy costs are narrowly defined. He found strong evidence that the costs are very high. Based on this discussion one can safely conclude that firms that are more leveraged comes with advantage of tax shield on one hand and disadvantage of bankruptcy cost and financial distress on the other. Managers face a trade-off between tax shield and cost of financial distress. This indicates that firms can reach an optimal level by choosing from both debt and equity.

There are several studies supporting the trade-off theory. Graham and Harvey (2001) studied the responses of 392 chief financial officers on the cost of capital, capital structure and capital budgeting. His results were moderately in favor of trade-off theory. Marsh (1982) concluded that businesses have a targeted level of debt in mind and that these levels depend on bankruptcy risks and asset compositions.

Bradley, Jarrell and Kim (1984) studied the performance of 20 years' firms leverage ratios using cross-sectional data of 851 firms. He found that behavior of firms regarding its capital structure in industries is similar. Another significant result in his study was that earning volatility and leverage were inversely related. Wald (1999) conducted a comparative study for various countries. He correlated factors based on trade-off model like, profitability, size, riskiness and growth. His results were in favor of trade-off model.

There are some studies like Titman and Wessel (1998), Rajan and Zingales (1995), Fama and French (2002) and Wald (1999) who showed that most profitable firms are inclined to borrow less which is against what the trade-off theory suggests.

The "pecking order theory" believes that businesses follow a specific sequence while financing its capital structure. Its origin can be drawn to the study of Donaldson (1961). In his study, he pointed out that firms prefer internal financing to debt financing. Firms will finance its new investments initially from its retained earnings. If there are no adequate retained earning they will prefer to finance with debt and will go to equity in the last. This is mainly because that the firms do not want to disclose its business information which they had to make public more in case of equity then in case of debt.

Pecking order theory can describe the negative relation of profitability with leverage. Firms with higher profits will have higher retained earnings to finance from and thus no need for external financing. Less profitable firms are expected to borrow more.

Pecking order theory assumes that managers always work in the best interest of shareholders. In real world, this assumption does not hold. Managers work for their own interests whereas, shareholders search for their own benefits. The effort required to minimize this conflict is called agency cost. Agency costs made several economists review their work. Donaldson (1969) agrees that manager's decision regarding capital structure does not necessarily maximize shareholder's wealth.

Berle and Means (1932), Berle (1954), Myer and Majluf (1984) believes that the pecking order theory fails to provide an appropriate explanation of capital structure. Myers (1984) provides plenty of examples where firms issue common stock instead of debt.

Frank and Goyal (2003) provided empirical evidence suggesting that internal financing is always inadequate to cover investment spending Therefore; firms must go for external financing. The role of agency cost becomes significant because both pecking order theory and trade off theory fails to explain the financing behavior. "Agency costs are as real as any other cost" (Jensen and Meckling, 1976). These conflicting theories go side by side and we have no complete evidence in support of any one theory.

4. DATA AND METHODOLOGY

After a detailed discussion on previous literature we discuss here the methodology that has been adopted for the study. We have used panel data analysis to understand the significance and correlation of different variables. These variables are discussed in detail below:

4.1 Dependent variable: Leverage

Studies suggest level of leverage depends on how leverage is defined. Market based leverage can be calculated as book value of debt divided by book value of debt and market value of equity. Book value of leverage considers book value of equity instead. In mathematical form, we write it as:

$$Lm = \frac{Db}{Db + Em}$$

$$Lb = \frac{Db}{Db + Eb}$$

Whereas Lm is market-based leverage and Lb is book value-based leverage. Db and Eb are book values of debt and equity respectively while Em represents market value of equity. Several studies like Rajan and Zingales (1995), Titman and Wessels (1988) used both these values. We use book value of leverage because of lack of market data in Pakistan. Secondly, book value of leverage provides a relative ease of calculation. We

also focus on total debt instead of long term debt because the major source of debt in Pakistan are commercial banks which discourages long term financing in Pakistan (Booth et al (2001), Shah and Shah et al., (2004))

We write our leverage ratio as

$$Lb = \frac{Db}{Db + Eb}$$

Whereas Lb is the variable for our leverage, Db represents total debt and Eb represents total equity.

4.2 Independent variable

4.2.1 Tangibility of Assets

Tangibility of assets Tg can be measured as a ratio of Fixed Assets Fa to total Assets Ta . We can write it in mathematical form as

$$Tg = \frac{Fa}{Ta}$$

Trade-off theory suggests that firms with high level of tangible assets are in position to provide collateral for debt. Firms with high level of tangible assets have lower chances of bankruptcy. Thus, it provides incentive for managers to borrow instead of issuing common stocks. Studies like that of Titman and Wessels (1988) found positive relationship between leverage and tangibility. However, the results are not so clear for developing countries.

Pecking order theory also suggests a positive relationship. Myers (1984) argues financing with debt backed by collateral may decrease the asymmetric information related costs in financing. Jensen and Meckling (1976) argue that collateralized debt reduces the chances of agency cost of debt. Um (2001) suggests that with low level of tangible assets managers may choose high level of debt in order to reduce the equity agency costs.

4.2.2 Size

In most of the studies Size Sz is taken in one of the two forms. Some researchers have taken natural log of sales, since firms that are large will have more sales. Others have defined it as a natural log of total assets which is also true because bigger firms have more assets. Few of the studies have taken size measure based on number of employees, book value of equity and market value of equity. Our contribution to this research here is that we will use a composite index using Principal Component Analysis (PCA). PCA measure is used to assign weights to Index. PCA which is a robust and statistical way to identify the weights of the components in the formation of an index.

We use this Indexed measure mainly because studies have shown that sales and total assets are uncorrelated. We can eliminate biasness towards any of these measures by averaging them. As for as values of equity are concerned they are highly correlated with total assets. While in Pakistan number of employees is not reported by firms.

Trade-off theory proposes that bigger firms have the capacity to hold more debt. Large firms are regarded as “too big to fail” (Bevan and Danbolt, 2002). Due to higher debt capacity, trade-off model suggests a positive direct relation between leverage and size.

4.2.3 Growth of Firm

We define growth as change in size

$$Gr = \frac{d(Ta)}{Ta}$$

Based on pecking order theory, Um (2001) suggests that growing firms have higher investment opportunities. Retained earnings are normally not enough to finance these investments. Therefore, growing firms are expected to borrow more. Booth et al (2001) showed positive relationship for all countries in his sample except for Pakistan and South Korea. This negative relationship in Pakistan might be true because of the use of short term debt. Agency cost theory advocates that the using short term liability can reduce the agency problems as any effort by managers to extract wealth from lenders might reduce the chance of borrowing in the future.

4.2.4 Profitability

We define profitability Pr by dividing net income after taxes Ni by the value of total assets Ta

$$Pr = \frac{Ni}{Ta}$$

Trade-off theory suggests that profitability increases the debt capacity of firms. Thus, they are positively related (Um, 2001). Whereas, pecking order theory points out that companies prefer internal funding to debt funding. Higher profitability means higher level of internal resources (Myers 1984). There will be little need for external financing which implies an inverse relation between profitability and leverage.

4.3 Model Specification

The study uses secondary data and the population of the study consist all listed firms of cement Industry in Pakistan. Data is taken from State Bank of Pakistan's Publications (Financial Statements analysis of companies listed at Karachi Stock Exchange) for the period of 1999 to 2014

To observe how these determinants, affect the level of leverage we use Panel data analysis.

4.3.1 Static Model

The Static model that is most commonly used for the behavior of capital structure is formulated as

$$Lb_{it} = \alpha + \beta_1 Tg_{it} + \beta_2 Sz_{it} + \beta_3 Gr_{it} + \beta_4 Pr_{it} + \mu_{it}$$

Or in its extended form

$$\left(\frac{Db}{Ta}\right)_{it} = \alpha + \beta_1 \left(\frac{Fa}{Ta}\right)_{it} + \beta_2 (Sz)_{it} + \beta_3 \left(\frac{d(Ta)}{Ta}\right)_{it} + \beta_4 \left(\frac{Ni}{Ta}\right)_{it} + \mu_{it}$$

Endogenous variable Lb represents leverage which depends on tangibility Tg , Size Sz , Growth Gr and Profitability Pr . Here Db stands for total debt, Ta stands for total assets, Fa for fixed Assets.

5. RESULTS AND DISCUSSIONS

We took a total number of fourteen firms for this analysis. The rest were excluded either because of missing or unreliable data. The time period in consideration is from 1999 to 2014. This gives us a total of 224 observations.

5.1 Descriptive Statistics

These statistics enables us to understand the main properties of the data. We have shown descriptive statistics for all our variables used in this study. We have a total of 210 observations for each variable. The normal range for Leverage is 0 to 1 but there is only a single observation of leverage where the value is greater than 1. This value is of Fauji Cement for year 2001 where firm was continuously making losses to the point where reserves were in negative and firm was overly financed. All other observations or the variable are in the range of 0 to 1.

Table 1: Descriptive Statistics for variables

	Leverage	Profitability	Tangibility	Growth	Total Assets	Sales
Mean	0.552931	0.05756	0.723038	0.092455	12636778	6468974
Median	0.561924	0.029047	0.75486	0.054728	6415828	3566678
Maximum	1.037685	0.532343	0.976685	0.628479	88016062	81148219
Minimum	0.14687	-0.21497	0.156791	-0.31917	816700	1
Std. Dev.	0.188704	0.108627	0.156427	0.158648	15025026	8749639
Skewness	0.001701	0.978008	-0.75273	0.926451	2.189173	4.443916
Kurtosis	2.556829	4.632845	3.373412	4.050809	8.359104	31.96587
Sum	116.1154	12.08756	151.838	19.41563	2.65E+09	1.36E+09
Sum Sq. Dev.	7.442344	2.466142	5.114111	5.260351	4.72E+16	1.60E+16

Observations	210	210	210	210	210	210
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Many firms were making losses during the observed period, so negative value of profitability is normal for the data. Sales and total assets are used to build our variable of size. Growth is calculated as a percentage change in total assets. Due to calculation of growth involving lag periods we therefore have sacrificed observations of one period. The minimum value of sales is 0 for firms who stopped sales.

5.2 Firm Size

Firm size is calculated as an index of two variables. These variables are total assets and total Sales. We use Principal Component analysis to derive our measure. For this purpose, we select the principal component with the highest eigenvalue. We chose first component which has eigenvalue of 1.83 and thus eigenvectors for the corresponding components are both equal with the value of 0.7. Which when squared gives us weights of 0.5. Thus, while creating the index for size both variables, that is 'total assets' and 'total sales' will have weights of 0.5. This is because of the high correlation that exists among these two measures.

Table 2: Principle Component Analysis for Total Sales and Total Assets

Eigenvalues: (Sum = 2, Average = 1)					
				Cumulative	Cumulative
Number	Value	Difference	Proportion	Value	Proportion
1	1.827381	1.654761	0.9137	1.827381	0.9137
2	0.172619	---	0.0863	2	1
Eigenvectors (loadings):					
Variable	PC 1	PC 2			
SL	0.707107	-0.707107			
TA	0.707107	0.707107			
Ordinary correlations:					
	SL	TA			
SL	1	0.827381			
TA	0.827381	1			

Based on this discussion our size variable is calculated as

$$Sz_{it} = 0.5Ln(Ta_{it}) + 0.5Ln(Sl_{it})$$

Ln indicating natural logs implying that the variable is transformed into natural log form.

5.3 Industrial Trend of variables

We also need to understand how our variables change over time, most importantly how the leverage is changing over time. For this purpose, we have averaged firm values for each period and compared the values with other periods with the help of line graph. The result shows that Leverage has been decreasing over time. For example, in 1999 average leverage ratio for a cement firm was 61 percent, while it has dropped to 38 percent in 2014.

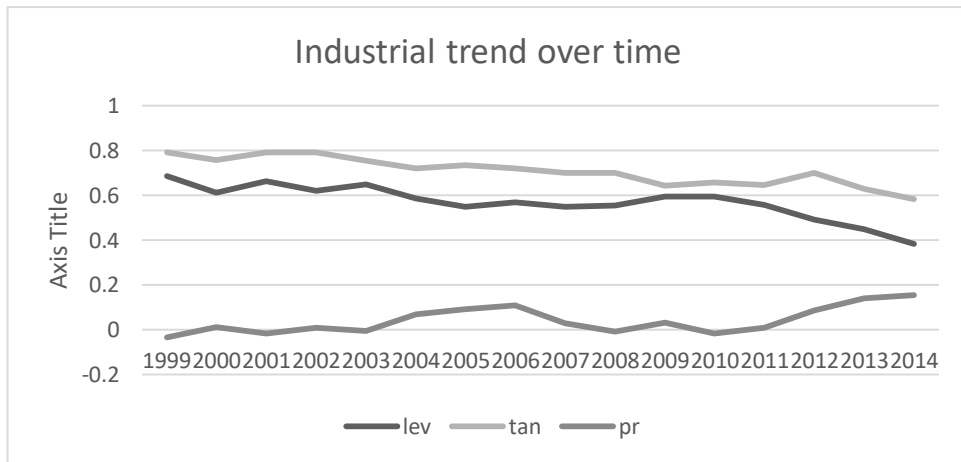


Figure 1. Trend of leverage, tangibility and profitability over time in cement industry

It is also worthy to note that this drop has significantly occurred in the last five periods of the study. During this period a significant change has also occurred in profitability as well. There might be structural changes responsible for such a shift as well. For example, pari-passu loans now restrict firm's up to a certain level of leverage. This also indicates the presence of agency cost. It is also observed that tangibility has been decreasing over time. This might also be causing the overall decrease in leverage.

5.4 Static Model Analysis

The Static model that is most commonly used for the behavior of capital structure is formulated as

$$Lb_{it} = \alpha + \beta_1 Tg_{it} + \beta_2 Sz_{it} + \beta_3 Gr_{it} + \beta_4 Pr_{it} + \mu_{it}$$

Since we are using panel data for this analysis we can estimate the model with three possible techniques. (a) general constant method, (b) Fixed effect method and (c) Random effect method.

The common constant method assumes that the constant term α is the same for all the cross-sectional units across the data. In our case these cross-sectional units are the cement firms which as per the technique should be assumed homogenous. This technique cannot be adopted for our model because of its restrictive nature.

The fixed effect method allows us to use different constants for each firm in our study. We have limited cross-sectional units of 14 in our study which makes the use of this technique more desirable. Random effect method on the other hand is simpler to estimate. Random effect technique assumes that the variability in the constant term across firms is random with a zero mean. Thus, its effect can be separated as an error term for individual firms.

Our fixed effect model can be written as

$$Lb_{it} = \alpha_i + \beta_1 Tg_{it} + \beta_2 Sz_{it} + \beta_3 Gr_{it} + \beta_4 Pr_{it} + \mu_{it}$$

Whereas, random effect assumes the constant term α as

$$\alpha_i = \alpha + v_i$$

Incorporating this fact into our model we get the Random Effect Model

$$Lb_{it} = \alpha + \beta_1 Tg_{it} + \beta_2 Sz_{it} + \beta_3 Gr_{it} + \beta_4 Pr_{it} + (v_i + \mu_{it})$$

To decide between the two techniques, we have used Hausman test. The results are as follows

Table 3: Correlated Random Test. Hausman Test

Test cross-section random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.845172	4	0.211

The Null hypothesis has been here that the Beta's estimated by the efficient random effect technique are similar to the consistent estimates of fixed effect. We reject the null hypothesis here for the efficient random effect technique. Thus, the coefficients estimated through the random effects are derived as in Table 4.

Based on the results it can be stated that growth and size of firm has no significant effect on leverage of the firm. Profitability on the other hand shows the strongest relation. More profitable a firm is, less likely it is to be levered. It is because firms have enough resources of internal finances available to them. Thus, pecking order theory is best in explaining this variation. However, we do not have significant evidence to reject Trade-Off theory and Agency Cost theory as well. All the three theories go together on

the explanation of tangibility. Only those firms with more tangible assets can afford more debt. There has been a positive relationship detected between leverage and tangibility of the firm. It has also been observed from financial statements of these firms that all secured debts are also on the condition that they must maintain a certain level of leverage. Thus, implying that agency cost of debt is in work.

Table 4. Random Effect Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.281828	0.143276	1.967025	0.0505
TG	0.283023	0.078638	3.599079	0.0004
PR	-0.763413	0.097399	-7.837983	0
SZ	0.00679	0.00774	0.877209	0.3814
GR	0.069867	0.057628	1.212375	0.2268
R-squared	0.29			

6. CONCLUSION

In this study, we aim to understand the behavior cement industry of Pakistan regarding its capital structure. One of the objectives is to understand how leverage is behaving over time. It is found from this study that leverage is decreasing overtime. The possible explanation for this decrease is that firms have become profitable over time and hence reduce the need for external financing. Also, those firms that are financing externally have been restricted by the availability of tangible assets and also by financial institutions providing that loan. We also checked four determinants of the leverage known as profitability, tangibility, size of firm and growth of firm. Since firms were mostly profitable they had lesser need for external financing. However, those firms which needed funds had collateralized their tangible assets along with restrictions on leverage. Consequently, it is safe to say that tangibility has a direct relation with leverage and that agency cost of debt also explains some of the variation in our concerned dependent variable. In the light of these determinants we tested hypothesis of three seemingly competing theories of capital structure known as pecking order theory, trade-off theory and agency cost theory. While we found out that pecking order theory was best in explaining most of the variation in leverages there is no clear-cut evidence of rejecting the other theories. Especially when restrictive loans are in work where firms are supposed to maintain certain level of leverage, agency cost of debt cannot be ignored. It is most probable that all these three theories do work at the same time and managers while deciding on financing go through a complex thought process

involving all such factors. We failed to observe significant relationship of size and growth either because firm size and the rate at which it grows does not matters in cement sector, or each firm respond differently to these changes. This fact however can be observed upon further investigation on the matter.

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