DETERMINANTS OF CAPITAL STRUCTURE IN INDIAN CEMENT INDUSTRY DURING 2006-15

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[*This paper investigates the impact of six firm specific factors of capital structure, viz, firm size, profitability, growth, tangibility, operating ability and signalling over the capital structure (measured by long term debt to total assets) of Indian BSE listed cement sector firms from the year 2006-2015. The sample comprises 19 Indian BSE listed cement sector firms and for the analysis purpose descriptive statistics, correlation and Panel regression analysis are used. The result points out that growth, tangibility and operating ability have a significant correlation with leverage whereas, size, profitability and signalling have no significant relation with leverage. The study further, finds a negative correlation between firm's size and leverage thereby supporting the pecking order theory.*

JEL Codes: G31, C13, C23.

Key words: *Capital structure, Leverage, Indian cement sectors, Panel Regression.*]

Introduction

Corporate sector plays an important role for fostering economic growth of any country. Hence, it is an economic imperative for any firm to evaluate its business environment within which it operates, in general and identifying the factors affecting its access to finance, in particular. Accordingly, managerial decisions related to finance is primarily concentrated on the issue of determining its capital structure. The traditional approach emphasized the existence of an optimal capital structure where the firm is expected to reduce its cost of capital and maximize the total value by consuming higher leverage. As the demand for leverage increases continuously over time, investor's expectation towards higher equity return due to higher risk eventually crowded out the benefits of relatively cheaper debt funds.

This was the view among the traditional economist which took shape historically though no such significant empirical testing was made on these particular issues. In contrast, Modigliani and Miller (1958) argued that the value of the firm hardly depend on the level of firm's leverage, rather the value of a firm depend

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more on its operating income and level of risk, irrespective of fixed capital structure. This is popularly known as Modigliani and Miller's theory in economic literature. Subsequently, three theories have been developed: static trade off theory, pecking order theory and agency cost theory. Later, Myers and Majluf (1984) developed the Modigliani and Miller's theory in the line of pecking order theory and after which, many studies have been conducted in the developing countries till now but a very few studies have been conducted in the context of less developed countries, in general and in Indian context, in particular.

The present study is primarily an attempt to extend the research on the Indian cement industries, which as a producer ranks second globally after China. Accordingly, this paper has attempted to investigate the impact of selected factors like growth opportunities, firm's size, and profitability, tangibility, operating ability and signalling on the capital structure of cement industry listed in Bombay stock exchange in India during the year 2006-2015. This study proposes a model of capital structure following Ranjan and Zingales (1995), Bhaduri (2002); Chen and Hammes (2004); Javid and Imad (2012); Fauzi et al (2013) to identify the firm specific determinants of capital structure and consequently, the hypothesis are developed in the context of theoretical framework of determinants of capital structure.

Apart from the introductory part, the paper is organized as follows: Section 2 presents the review of literature on capital structure to understand the theoretical framework of determinants of capital structure. Section 3 discusses the methodology and data used in this study. Results are presented and discussion is carried out in Section 4. Finally, Section 5 concludes the study.

Review of Literature

Theories of Capital Structure

The pecking order theory was firstly proposed by Donaldson (1961) who initiated that managers and owners initially prefers internal fund to finance its business instead of external fund, regardless of the size of the firm. Later, Myers and Majluf (1984) developed the pecking order theory by explaining that initially managers of a firm avoid issuing equity instead of riskless debt as because the outside investors discounts the stock price of a firm due to which the value of a firm decreases. The modified pecking order theory of Myers and Majluf (1984) explains the existence of asymmetric information and financial distress. According to Myers (1977) firms with low risk of financial distress issues direct conventional debt; firms with a medium risk of financial distress issues hybrid securities such as convertible debt or preference share; and firms that are highly risk due to financial distress issues external equity. Hamilton and Fox (1998) studied the pecking order theory model and revealed that initially managers of a firm try to finance their investment through internal fund as because they do not like to lose their control over the firm and if external fund is required would

prefer debt instead of equity. Equity is preferred as the last option by the firms (Bistrova, 2011).

Fama and French (2002) compared and examined the trade-off model with Pecking order model and showed that more profitable firms are less levered, as suggested by the pecking order theory. Frank and Goyal (2007) showed that pecking order can also be caused by the agency cost problem that arises between the firm's owners and investors. Additionally, many other studies have been conducted to test the pecking order theory such as Fama and French)(2005) explains that financial decision of a firm usually contradicts with the pecking order hypothesis whereas, Bharath et al (2009) showed empirical validity with the pecking order theory and Bessler et al (2008) also came up with similar conclusion. Similarly, many other studies have been conducted in developed countries to review the pecking order theory but the result differs from each other. However, most of the findings support the pecking order theory.

However, in Indian context, very few studies have been conducted as compared to developed countries. Some of the studies for instance Mishra (2011) found that unlike the suggestion of pecking order hypothesis growth is positively related to leverage in Indian firms whereas, Babu and Chalam (2014) findings support the existence of pecking order theory in contrast, Panda et al (2013) found the support of trade-off theory and not so much of pecking order theory.

The static trade-off theory has been extensively tested during last five decades about the argument that the issuing of debt financing gives a benefit of tax shielding which may decrease the cost of financial distress. The static trade-off theory suggests that optimal capital structure of a firm is achieved by trading off between the cost of debt and equity against their benefit, following a discussion saying that the optimal leverage should be found where a trade-off between tax shield benefits of debt and cost of financial distress was found (Shyam Sunder and Myers, 1999). Further, Miller (1977) suggested saying that the static trade-off theory should provide a key insight into optimum capital structure decisions in terms of tax shields, though he finds that the tax effects are very small when tested empirically.

The previous research conducted on static trade-off theory concludes with different results. Some of the studies, for instance Rajan and Zingales (1995); Titman and Wessels (1998) found a result in contrast to the trade-off theory. They found that a firm with higher profitability tends to borrow less whereas, the actual trade-off theory predicts that firms with higher profitability should borrow more to reduce tax burden. Similarly , Graham and Harvey (2001) in his study showed that large firms with high profitability and low financial distress expectation uses debt conservatively, in contrast, Frank and Goyal (2004) supports the trade-off theory on leverage decision.. Fama and French (2002) showed the softness of leverage whereas, Opler and Titman

(2001) supports the trade-off theory and confirms the role of target leverage.

The next significant theory that has been significantly tested is agency cost theory. The agency cost theory considers debt to be a basic factor that creates conflict between equity holders and managers. Jensen and Meckling (1976)asserts that agency costs rise due to a conflict of interest between shareholders or equity-holders and managers (i.e. agency cost of equity) and a conflict of interest between debt-holders and shareholders (i.e. agency costs of debt).Ryen et al. (1997) provide a theoretical summary of agency cost theory. According to Ryen et al., two sets of agency problems were faced by firms, conflict between managers and stockholders and conflict between stockholders and bondholders. For the managers and stockholders conflict, managers usually overspend or take less leverage and these are seen not benefiting the stockholders. Managers take lesser leverage in order to avoid total risk, which comprises of risk of losing job, reputation and wealth. On the other hand, overspending by managers to make opportunity lost of firms' cash flow which could be used on the activities that benefit stockholders.

Therefore, many studies had been diverted to find out the ways to reduce this agency costs between managers and stockholders. The conflict of shareholders and bondholders is another area of agency cost problem, whereby shareholders have better incentives to maximize their wealth at the expense of the bondholders by the increases in dividend rate, claim dilution, asset substitution and underinvestment. The only way bondholder can limit the action to benefit shareholders is to draft a bond covenants, an agreement to limit the firm on investment, financing, production, dividend pay-out and etc.

Theoretical Determinants of Capital Structure

The most common factors suggested by literature are: profitability, tangibility, growth and size (Javid and Imad 2012; Ranjan and Zingales1995; Chen and Hemmes (2004) and other factors like Non-debt tax shield, signalling managerial ownership are suggested by (Fauzi et al 2013; Hossain et al 2012 ;) Rajan and Zingales (1995) examined the determinants of capital structure using international samples of the G-7 counties mainly focusing on four determinants of capital structure: Tangible Assets; Market to Book Ratio; Size and Profitability. They found that in most of the G-7 countries Size and Tangible Assets are positively correlated with leverage supporting the pecking order theory whereas market to book ratio and profitability ratio are negatively related with the leverage ratio. Huang and Song (2002) found that unlike other countries, leverage in Chinese firms increases with firm size, non-debt tax shields and fixed assets whereas leverage ratio decreases with increase in profitability and also find that ownership structure have a significant impact in leverage. Javid and Imad (2012)found that growth opportunities have a weak relationship with two components of capital structure – the ratio of long term debt to total assets and long term debts to

capital but firm size has positive and significant relationship with these components. They also identified *that* profitability have negative relationship between all the four components of capital structure but tangibility has strong positive relationship with all the components of capital structure. Chen and Hammes (2004) found net size, profitability, tangibility, market to book ratio name significant impact on firm's choice of capital structure. Tangibility and size has found to be positively significant whereas profitability and market to book debt are negatively significant.

Fauzi et al (2013) revealed that tangibility, growth, signalling, managerial ownership and firm size has a significant impact on total debt, but non-debt tax shield and profitability have no significant impact on total debt. Hossain et al (2012) found that profitability, tangibility, liquidity and managerial ownership have significant negative relationship with leverage ratio whereas growth and non-debt tax shield are significantly related with leverage in a positive manner, but size, earning volatility and dividend payment were neither significant nor found exploratory variable of leverage. Akdal (2010) finds that profitability, non-debt tax shields, volatility, and liquidity are significantly negatively correlated with debt in support to pecking order theory. However tangibility and size were positively related to debt supporting the static trade-off theory.

Capital Structure in Indian Context

Some of the studies for instance Bhaduri (2002) studied the determinant of capital structure in the context Indian corporate sector considering a panel of 363 Indian firms over a period of 1989 – 1995 and found that there is a valid influence of different factors like growth, cash flow, size, product (uniqueness) and industries characteristics over the optimal capital structure. Their study uses an explanatory factor analysis model instead of using the popular methodology of Titman and Wessels (1988) and concluded that cost restructuring and different cost adjustment for long term and short term borrowings are also in influential for determination of optimal capital structure. Mishra (2011) studied the determinants of capital structure on Indian public sector units (PSU) and found that the capital structure of profit making PSUs was moved/ disturbed by asset structure, profitability and tax whereas asset structure, growth and tangibility are positively related to leverage but profitability, tax rate are negatively connected to leverage. Further he concluded that variables like not – debt tax shield, volatility and size are insignificant to capital structure.

Again, Chakraborty (2011 found that allied firms have higher level of leverage than the stand alone firms and overcome the difficulties and enjoys a low agency cost of debt also have a better access to external finance than unaccompanied firms. Pandey (2002) points out that growth and size have a significant positive relationship with all type of debt ratio whereas profitability has a negative correlation with debt ratio; risk is negatively related with long term debt and positively related with short term debt. He

also found profitability to be the most determined variable that has a significantly variable that has a significantly negative impact on all type of debt ratio. Handoo and Sharma (2014) observed that, factors like profitability, assets tangibility, size, tax rate and debt servicing capacity have strong impact while raising short term debt although growth and cost of debt along with previously factors are significant for raising long term debt.

From the above mentioned brief literature survey, it seems that several studies have been conducted to identify the most significant determinants of capital structure but however, the findings differ due to choice of explanatory variables considered in their study. So, there is a scope to contribute the existing literature of determinants of capital structure at least in two ways. Firstly, all the available determinants from the previous studies may be incorporated to assess the determinants of capital structure and. Secondly, the study of determinants of capital structure are usually not apparent in the combined analysis of many sectors so, the study particularly focus on cement sectors to ascertain the attributes.

Methodology and Data

This study examines the determinants of capital structure of 19 BSE listed cement sector firms in India using the panel regression techniques during the year 2006-2015. This study is basically an empirical research based on secondary sources of data and the data includes the published and audited balance sheet and income statement of the listed Cement sector firms during 2006-2015. All the financial data has been collected and/or converted in terms of Indian currencies (INR). In the data cleaning process, the accounting data is examined for any missing data and firms with missing data has not been included in this study to prepare a balanced panel for further analysis. To enhance the accuracy of the data; no approximation or rounding off exercise has been carried out. However, before using panel data analysis the assumptions of normality, multicollinearity, heteroskedasticity and outliers' detection has been conducted to make the data compatible for statistical analysis and the specification test is also carried out to make the model fit the data.

Panel Regression

As mentioned above the present study determines the optimal capital structure using a panel data analysis which contains both a cross-sectional and a time series dimension. General panel regression based on the above mention explanatory variables may be represented as

$$Y_{it} = \beta_0 + \beta_1.x_{1it} + \beta_2.x_{2it} + \beta_3.x_{3it} + \beta_4.x_{4it} + \beta_5.x_{5it} + \beta_6.x_{6it} + \alpha_i + U_{it}$$

Following (Baltagi, et al, 2005) the present study consider the following panel regression model.

$$Y_{it} = \alpha + \beta X_{it} + u_{it} \qquad .....(1)$$

Where Y_{it} is leverager of firm in year *t*; X_{it} denotes the determinents of capital structure of firm *i* in the year *t*, α is a constant, μ_{it} in the error term, and β the firm parameters related to determinants

of capital structure. Frther a one-way error component model for the distrubances is considered.

$u_{it}=\mu_{it}+\nu_{it}$ .....(2)

Where μ_i denotes the unobservable individual-specific effect and ν_{it} denotes the remainder disturbance. The panel data model is then estimated using a fixed effiects and random effects model. In fixed effects model the μ_i are assumed to be fixed parameters tobe estimated and the remainder disturbances stochastic ν_{it} □ IID (0, σ_ν^2). The X_{it} are assumed independent of the ν_{it} for all *i* and *t*. FE estimator cannot estimate the effect of any time invariant variable as these variables are wiped out by the within transformation. FE has less degree of freedom and takes into calculation only thevariation 'within' units, not between units. An advantage of random effects is that we can estimate individeual and time invariant variables. RE model is suitable as differences across economic groups (entities) have some influence on our dependentVariable. The random effects model is obtained by assuming that μ_i are random. And μ_i, ν_{it} □ IID (0, σ^2) and the μ_i are independent of the ν_{it}. In addition, the X_{it} are independent of the μ_i and ν_{it}, for all *i* and *t*. The use of panel data allows us not only to investigate dynamic relations but also to control for unobserved cross-section heterogeneity. With panel data, the issue is whether to use a random effects or a fixed effects estimation approach.

Breusch-Pagan Lagrange Multiplier (LM) Test

The LM test was performed in order to determine the tyoe of effects (random or fixed). Because the selected countries are not in a certain economic group, it was expected that individual effects would be random. Whether the effects are really random or not can be determined by LM test (Baltagi, 2001). Te null hypothesis in the LM test is that variances across entities are zero i.e., no significant difference across units (i.e. no panel effect). When the probability value obtained from the . . . . . $_0$ is rejected and it is decided that the effects are random. If H_0 can not be rejected , model estimation is made through the one-way fixed effect model. The hypothesis is as follows:

$H_0 = \sigma_\mu^2 = 0$ (there exist no random effect)

$H_0 = \sigma_\mu^2 \neq 0$ (there exist random effect)

Hausman Specification Test

Hausman test is not an alternative for LM test, but it functions to check the decision by LM test. Hausman test tests whether the unique errors (μ_i) are correlated with the regressor.

Test hypothesis:

H_0 : Co $\nu(\mu_i, X_{it}) = 0$

H_1 : Co $\nu(\mu_i, X_{it}) \neq 0$

Here μ_i indicates the individual effects in the equation (2), but X_{it} indicates the explanatory variables in the equation (1). When the probability value of χ^2 obtained from the analysis is smaller than 0.01, H_0 is rejected and in this case fixed effects model is used. However, when is accepted, random effects model is used. Hausman test is a function to check the decision by LM test.

Hypothesis Development

In the accounting literature the various factors determining the capital structure are documented which are contradictory to each other, (Harris and Raviv, 1991) (Titman and Wessels, 1988). However the present study follows (Rajan and Zingales, 1995) and considers the following explanatory or independent variables which are discussed as follows.

Firm size

Size of the firm is measured as logarithmic transformation of sales in the existing literature. Generally larger firms are more likely to have a credit rating and thus have more access to the debt financing which is usually not available to the smaller firm implying the fact that the larger firm would use more debt capital in their capital structure than the small firms. Hence, it is expected that there exist a positive relation between firm size and leverage (Titman and Wessels, 1988). The opposite view is that due to asymmetric information the large firm minimize the chances of under valuation of new equity issue which ultimately encourage the large firm to go for external financing through the equity issue this means that larger firm will use greater equity financing than smaller one.

Therefore, there exists a positive relation between size and leverage as observed by (Frankand Goyal, 2003) (Rajanand Zingales, 1995). However the study of (Bevan and Danbolt, 2000), (Shah and Hijazi, 2004) and (Rafiq et al. 2008) found positive relation between size and leverage. From the above controversial finding the present study hypothesized that.

H_0^1 - There is no relation between firm's Size and leverage.

Growth

Growth potentiality of firm can be captured from different stand point like market to book value ratio, rate of growth in sale, market capitalization, capital employed and other following the study of (Bhaduri, 2002)(Alkhatib, 2012) (Fauzi, Basyith, and Idris, 2013) (Panda, Mohapatra, and Moharana, 2013; Pandey, 2001; Rajan and Zingales, 1995) (Shah and Hijazi, 2004) and (Titman and Wessels, 1988) the present study deployed the expansion of sales from the previous year to current year has been use as a growth potentiality of the firm. In the capital structure theory inverse association is expected to prevail between growth potential leverage. This expected relationship is in same line with the agency theory coined by (Jensen and Mackling, 1976). Which also supported by (Mayer's, 1977) arguing the theory of information asymmetry which implies that firm with high level of debt may have possibility not excursing due cares with good investment potentialities.

Therefore, it is generally expected that firms with large investment opportunities would likely to maintain lower debt equity ratio as compared to other firms having lesser growth opportunity. Moreover, growth does not ensure immediate or instant revenue. Generation on account of the same reason firms may be unwilling to take on large contractual

liability at present.

Since, growth opportunities are essential in nature. Hence, firms prefer to keep low level of contractual liability. However, as per previous empirical study concluded mixed result between debt and growth opportunities. The study of (Rajan and Zingales, 1995) (Shah and Hijazi, 2004) (Titman and Wessels, 1988), Chung, 1993) observe the negative relation with the debt-equity ratio and growth potentiality which are in the same line of finding s documented by (Jensen and Mackling, 1976), (Mayer's 1977). However some the study like (Delcoure, 2007), (Rafiq et al., 2008), come up with a positive relation between growth and leverage but (Kester, 1986) does not observe any relation between them. In view of the above finding present study hypothesized that

H_0^2 - There is no relation between firm's Growth and leverage.

Profitability

In view to the mixed outcome regarding firm's profitability and leverage, the supply side are argued that the more profitable firms would have higher debt content in their capital structure. On account of the said reason the demand of the debt capital increase with increasing profitability of the firm. Modigliani and Miller (1963) argued that the taxes are paid after payment of interest, therefore firm may favour over equity and the profitable firm will prefer high level of debt to gain more favourable tax shield. However the later Miller (1977) contradicts with their earlier theory stating the fact about effect of personal taxation. But Deangelo and Masulis (1980) stated that firm may have other tax shield facilities like depreciation and may not find interest tax shield as attractive variable. The pecking order theory presented by Myers and Majluf (1984) and Myers (1984) argued that information asymmetry encourage the firm to prefer internal over external capital source. That is why the profitable firm prefer to finance their investment through retained earning rather than through external debt. Toy et al. (1974), Kester (1986), Titman and Wessels (1988), Rajan and Zingales (1995), Tong and Green (2005) and Rafiq et al. (2008). Also support the view of pecking order theory i.e. negative association between profitability and leverage. Thus the more profitable firm is expected to have lower amount of debt in their capital structure. Hence, this study hypothesized that –

H_0^3 - There is no relation between firm's profitability and leverage.

Tangibility

Tangibility is measure through a ratio between net fixed assets to total assets of a firm more the fixed assets holds by the firm greater is the chances to obtain or access to external financing at reasonable cost. Since, the fixed assets can be use/ pledge as collateral security while procuring the firm from external sources (Rajan and Zingales, 1995). The said theory of positive relation between debt and tangibility is supported (Bradly et al. 1984) and (Titman and Wessels, 1988) one of the popular capital structure theory

such as static trade off theory also argued that the firm with greater fixed assets can have better access to external debt by way of utilizing their fixed asset as collateral security. The opposite view is that the firm maintaining higher level of fixed assets are in a better position to issued equity at fair price. Therefore highly tangible firms more tend to use equity financing then that of debt capital while choosing the sources of external finance. In view of the controversial outcome present study hypothesized that

H_0^4 - There is no relation between firm's tangibility and leverage.

Operating Ability

Operating efficiency is the most important barometer for assessing the success of any firm since operating activity is the only regular nature of work for any firm where value is created for its shareholders. Here it is generally expected that firm which are efficient in its operating activity generate the higher amount of surplus shareholders payment of all types of external payment and consequently pay higher amount of dividend and vice-versa. The results of study of (Yuxan and Wenlin, 2014) also found the positive relation between operating efficiency and leverage. Therefore, the study hypothesized that.

H_0^5 - There is no relation between firms's operating ability and leverage

Signalling

According to trade off theory firm with higher debt contain in capital structure tend to declare higher rate of dividend. Since, higher amount of debt contain in the capital structure implies greater amount of risk beard by ordinary shareholders on account of the higher risk general investor always expect higher return at present then future in the form dividend. The assumption of positive relation is also supported by the empirical finding of the study of (Hossain and Ali, 2012) and (Fauzi, Basyith, andIdris, 2013). Hence, the study hypothesized that.

H_0^6 - There is no relation between firm's signalling and leverage

Results & Discussion

Descriptive Statistics

This section presents the results derived by using the methods described in the previous section. First, the summary of the descriptive statistics of the selected dependent and independent variables presented in the below is in order to explore the properties of the sample data. This study has employed 5-point summary measures to describe the sample data. Then, Correlation analysis is carried out to identify the linear relationship between two variables. Finally, the results of the panel regression is presented and discussed accordingly in the subsequent sections.

Table 1 shows the Summary of Descriptive Statistics of variables which are used in the sample. In this study the capital structure is represented by leverage and measured as the long term debt-equity ratio i.e. dependent variable (y) is calculated as the ratio of Long Term Debt to Total Asset.

Table 1 : Summary of Descriptive Statistics

stats	y	x1	x2	x3	x4	x5	x6
n	171	171	171	171	171	171	171
mean	0.31	6.94	0.18	0.2	0.63	1.78	22.81
sd	0.16	1.54	0.23	0.11	0.18	0.97	46.64
min	0.00	2.28	0.24	0.05	0.19	0.44	0.00
max	0.68	10.18	0.96	0.61	1.08	5.68	445.45
skewness	0.01	0.34	1.03	1.29	0.23	1.32	7.18
kurtosis	2.38	2.63	4.21	4.63	2.44	4.88	60.23

Source : Authors' calculation based on sample data

On the other hand this study includes six numbers of independents variables which are Size(x1), Growth(x2), Profitability(x3), Tangibility(x4), Operating Ability(x5) and Signalling(x6) from the year 2006 – 2015. These data contain sample of 19 BSE listed Cement Manufacturing companies.

Further the mean of the leverage is found to be 0.31 and this indicates that on an average the selected company are financed (leverage) with debt at approximately one-third of the equity option i.e. the firms decisions is inclined to equity financing rather than to Long Term Debt. The lower value of standard deviation which is approximately, at 0.16 indicates that the firms have, in the last nine years, focused more on equity then Long Term Debt. Among the independent variable, size, operating ability and signalling showed higher mean coupled with higher dispersions. The remaining explanatory variables showed just the opposites.

Correlation Analysis

The correlation coefficient is used to measure the degree of relationship between the two variables. The coefficient takes the extreme values of +1 or -1 implying the selected variables are perfectly correlated positively or negatively, respectively. If the coefficient is zero, the selected variable is totally non-correlated. The correlation coefficient only measures the degree of linear relationship between two variables.

Table 2 shows the correlation matrix and their significant level for dependent and independent variables.

Table 2 : Correlation Matrix of Selected Variables

	y	x1	x2	x3	x4	x5	x6
y	1						
x1	-0.1021	1.0000					
	0.1840						
x2	0.1604**	-0.1945	1.0000				
	0.0361	0.0108					
x3	-0.2255	0.1173	0.3098	1.0000			
	0.003	0.1265	0.0000				
x4	0.1663	-0.1274	0.0304	-0.2818	1.0000		
	0.0294	0.0968	0.6923	0.0002			
x5	-0.2608	0.0402	0.1258	0.5848	-0.7398	1.0000	
	0.0006	0.6018	0.101	0.0000	0.0000		
x6	0.0613	-0.0458	-0.0063	-0.1306	0.0033	-0.0574	1.0000
	0.4261	0.5513	0.9345	0.0886	0.9662	0.4558	

Source : Authors' calculation based on sample data

Note : Significant at 1% '*', 5% '**' and 10% '***, level; p-values are in parentheses

There is a positive correlation between dependent variable with that of growth and tangibility at 5% level of significance whereas profitability and operating ability are negatively correlated at 1% level of significance.

From the above table it is also evident that some of the independent variables are also significantly correlated among themselves. Growth and Profitability are correlated among themselves at 1% level of significance. Tangibility is correlated with operating ability at 1% level of significance. Moreover, Profitability is correlated with both Tangibility and operating ability at 1% level of significance. Size and Growth are correlated with each other at 5% level of significance. Lastly, Size and Tangibility and Signalling and Profitability are correlated at 10% level of significance.

From the above analysis, it is clear that the selected independent variables have a strong and significant relationship with

the dependent variable. However, significant correlation among some of the independent variables may lead to the problem of multicollinearity which may cause the estimated regression equation to be biased (Gujarati, 2003). To avoid such biased regression results the Variance Inflation Factor (VIF) technique may be applied later to identify the presence of possible multicollinearity problem and if necessary, regression results will be derived after removing such problem.

Test of Multicollinearity

As mention earlier multicollinearity arises when there is linear relationship between explanatory variable. To examine the possible degree of multicollinearity among the explanatory variable, pair-wise correlation matrix of selected variable may be used as a rule of thumb. If the pair-wise correlations among the explanatory variables be over and above 0.80, that may lead to multicollinearity (Gujarati, 2003). From Table 2, it is evident that none of the individual pair-wise correlation coefficient is over and above 0.80. Hence, it may be concluded that there is very little possibility of occurrence of multicollinearity problem in this study. However to supplement the above observation, this study further applied the VIF technique to detect the multicollinearity in the sample data. The results are given below.

Table 3 : Test of Multicollinearity

Variables	VIF	1/VIF
x5	3.44	0.291080
x4	2.49	0.401265
x3	1.87	0.533968
x2	1.19	0.838981
x1	1.11	0.899055
x6	1.02	0.979326
Mean VIF	1.85	

Source : Authors' calculation based on sample data

Theoretically, a VIF more than 10 implies the possibility of multicollinearity due to the respective variable. But from the above table it is evident that none of the VIFs are excessively high. Which automatically implies that the problem of multicollinearity of explanatory variables in not a major problem in this study. The estimated results are given below.

Table 4 : Random-effects GLS regression

				Number of obs= 171		
Random-effects GLS regression				Number of groups=19		
Group Variable : firm				Obs per group: min=9		
				avg=9.0		
R-sq:	within=0.2259			max=9		
	between=0.0548			wald chi2(6)=43.67		
	overall=0.1170			prob>chi2 =0.0000		
corr(u_i,x)=0 (assumed)						
y	Coef.	Std. Err.	z	p>|z|	[95% Conf.Interval]	
x1	-0.011	0.016	-0.673	0.501	-0.042	0.020
x2	0.133	0.039	3.453	0.001	0.058	0.209
x3	-0.168	0.124	-1.359	0.174	-0.411	0.075
x4	-0.230	0.088	-2.607	0.009	-0.403	-0.057
x5	-0.083	0.019	-4.286	0.000	-0.121	-0.045
x6	0.000	0.000	-0.017	0.987	0.000	0.000
_cons	0.683	0.151	4.51	0.000	0.386	0.98
sigma_u	0.134					
sigma_e	0.102					
rho	0.634(fraction of variable due to u_i)					

Source : Authors' calculation based on sample data

From the above table, it is evident that the model fit with the random-effects model as probability > chi2 = 0.0000 < 0.05, hence GLS regression model cannot be rejected. However in order to compare between random-effect and pooled regression, this study further applied the Breusch and Pagan Lagrangian multiplier test. Results are displayed below.

Table 5 : Breusch and Pagan Lagrangian multiplier test

Breusch and Pagan Lagrangian multiplier test for random effects y[firm,t]=xb+u[firm]+e[firm,t]		
Estimated results	Var	sd=sqrt(var)
y	0.0271719	0.01648389
e	0.0104555	0.102252
u	0.0180839	0.01344764
Test : Var(u) =0		
	chibar2(01)=205.31	
	Prob> chibar2=0.0000	

Source : Authors' calculation based on sample data

From the above table it is clear that the pooled regression model is rejected in favour of random-effect GLS regression. After which the study applied fixed-effect (within) regression model and results are given below.

Table 6 : Fixed-effects (within) regression

Fixed-effects (within) regression Group Variable : firm				Number of obs= 171 Number of groups=19 Obs per group: min=9 avg=9.0		
R-sq:	within=0.2269 between=0.0562 overall=0.1112			max=9 F(6,146) =7.14 prob>F =0.0000		
corr(u_i,xb)=-0.2223						
y	Coef.	Std. Err.	t	p>|t|	[95% Conf.Interval]	
x1	-0.021	0.026	-0.793	0.429	-0.072	0.031
x2	0.129	0.039	3.288	0.001	0.051	0.206
x3	-0.186	0.14	-1.327	0.186	-0.464	0.091
x4	-0.247	0.091	-2.7	0.008	-0.427	-0.066
x5	-0.089	0.02	-4.393	0.000	-0.13	-0.049
x6	0.000	0.000	-0.015	0.908	0.000	0.000
_cons	0.779	0.222	3.515	0.001	0.341	1.217

sigma_u	0.129
sigma_e	0.129
rho	0.616(fraction of variable due to u_i)
F test that all u_i=0	F(18, 146) =13.17 prob>F=0.0000

Source : Authors' calculation based on sample data

From the above table, it is further evident that fixed-effect (within) regression model also fit the data. Since Probability > F value is 0.0000 < 0.05. Hence the study needs to compare between fixed-effect (within) regression model and random effect GLS regression. For which the study applies Haussmann test and the result is presented below.

Table 7 : Hausman Test

	Coefficients			
	(b)	(B)	(b-B)	Sqrt(diag(V_b_V_B))
	fe	re	Difference	S.E.
x1	-0.02064	-0.01069	-0.0099562	0.020614
x2	0.128844	0.133216	-0.0043721	0.006839
x3	-0.18641	-0.16838	-0.180303	0.066034
x4	-0.24666	-0.23011	-0.0165471	0.023591
x5	-0.08942	-0.08299	-0.0064318	0.006287
x6	-2.2E-05	-3.12E-06	-0.0000188	0.000038

b=consistent under Ho and Ha; obtained from xtreg

B=inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(6)= (b-B)'[(V_b_V_B)^(-1)](b-B)=1.57

Prob>chi2=0.9545

Source : Authors' calculation based on sample data

From the above table, it is clear that Haussmann test rejects the random-effect model in favour of fixed-effect model.

However for unbiased results the study further attempts to detect the presence of heteroskedasticity and serial autocorrelation, before presenting the result of fixed-effect (within) regression model which are presented in the following tables:

Table 8: Heteroskedasticity Test

Modified Wald test for groupwise heteroskedasticity in fixed effect regression model
H0: sigma(i)^2= sigma^2 for all i
Chi2 (19) = 412.46
Prob>Chi2 =0.0000

Source : Authors' calculation based on sample data

Table 9 : Autocorrelation Test

Wooldridge test for autocorrelation in panel data
H0 : no first -order autocorrelation
F(1, 18)=79.744
Prob > F=0.0000

Source : Authors' calculation based on sample data

From the above two table, it is clear that the fixed-effect (within) regression model is biased due to the presence of heteroskedasticity and serial autocorrelation.

To rectify the same, this study further uses the robust estimation technique for unbiased results. The final estimated results are presented below:

Table 10 : Fixed-effects (within) regression vce(robust)

Fixed-effects (within) regression	Number of obs= 171
Group Variable : firm	Number of groups=19
	Obs per group: min=9
	avg=9.0
R-sq: within=0.2269	max=9
between=0.0562	F(6,18) =12.06
overall=0.1112	prob>F =0.0000
corr(u_i,xb)=-0.2223 (std. Err. Adjusted for 19 clusters in firm)	

	Robust					
y	Coef.	Std. Err.	t	p>|t|	[95% Conf.Interval]	
x1	-0.021	0.039	-0.53	0.603	-0.103	0.061
x2	0.129	0.048	2.662	0.016	0.027	0.231
x3	-0.186	0.187	-0.997	0.332	-0.579	0.206
x4	-0.247	0.092	-2.691	0.015	-0.439	-0.054
x5	-0.089	0.026	-3.494	0.003	-0.143	-0.036
x6	0.000	0.000	-0.113	0.912	0.000	0.000
_cons	0.779	0.271	2.871	0.010	0.209	1.349
sigma_u	0.129					
sigma_e	0.129					
rho	0.616(fraction of variable due to u_i)					

Source : Authors' calculation based on sample data

Discussions

On the basis of the derived results, the discussion is carried out in this section. Test of hypotheses were made based on the relationship of dependent variable and independent variable. This is presented in the following table:

Table 11: Comparative Analysis of Determinants of Capital Structure

Independent Variable	Dependent variableLong Term Debt to Total Assets				
	Value of of the coefficients	Std. Err.	t-statistics	P>|t|	Significance level
Size (x1)	-0.021	0.039	-0.530	0.603	Insignificant
Growth (x2)	0.129	0.048	2.662	0.016**	Significant at 5% level
Profitability (x3)	-0.186	0.187	-0.997	0.332	Insignificant
Tangibility (x4)	-0.247	0.092	-2.691	0.015**	Significant at 5% level
Operating Ability (x5)	-0.089	0.026	-3.494	0.003*	Significant at 1% level
Signalling (x6)	-0.000	0.000	-0.113	0.912	Insignificant

Number of observations =**171**
F-Statistics =**12.06**
Prob. > F = 0.0000
R^2 = **0.616 (61.60%)**

Source: Author's Calculation

Note: * *and ** indicate significant at 1% and 5% level of confidence, respectively.*

The correlation matrix, as depicted in Table 3, defined the linear relationship between the selected explanatory variables (size, growth, profitability, tangibility, operating ability, and signalling) and the leverage measure (long term debt to net total assets), the former are found to have strong and significant relationship with the latter. Therefore, the selected independent variables explained the dependent variable with a considerable extent.

From the descriptive statistic (Table 2), the mean value of leverage (y) of the cased of Cement manufacturing company is found to be 0.31 signifying that they are moderately leveraged with debt at approximately 31 % of the total are being financed through debt long term debt capital over the study period. That is, the selected firms' financing (capital structure) decision is inclined to mixed variables of debt and equity capital over the study period.

With regard to the regression results (Table 11) of the potential determinants of capital structure, R squared is found to be 0.616 indicating that 61.6 percent of the leverage (long term debt to total net assets ratio) variability of the Cement manufacturing firms in India is being explained by the selected potentials firm-specific factors in this study. Furthermore, the table also confirmed that three of the explanatory variables (growth, tangibility, and operating ability) are the statistically significant firm-specific potential determinant factors of capital structure in the selected firms over the study period. On the other hand, size, profitability, tangibility, operating ability, and signalling are found to be negatively related to leverage. However, growth proved to have positive relationship with the leverage. Therefore, testing the hypotheses, the regression results of the coefficients of capital structure determining factors went for the acceptance of the first, third and sixth null hypotheses.

In testing the consistency of the capital structure relevancy theories with the capital structure decisions made in the sampled cement firms, the researcher found that all the potential determinant factors (except size, profitability and signalling) are significant explanatory variables of capital structure decisions in the cement firms in India. Negative association between leverage and firms' size indicate a strong compliance to the pecking order theory but straight cut

rejection of assumption in Static trade-off theory and agency cost theory. On the other hand observation of negative relation between profitability and leverage strongly denied assumptions of all the capital structure theory of pecking order theory, static trade off theory and agency cost theory. However, report of negative relation between tangibility and leverage confirms the strong compliance of assumption made in pecking order theory, static trade off theory and agency cost theory. More so positive association of leverage with growth confirms the compliance of pecking order theory and simultaneously which denies the other two theories such as static trade off theory and agency cost theory.

Conclusions

The present study attempted to understand and interpret capital structure that has come up with many theories. Among the famous theories are Modigliani and Miller propositions, Static trade-off, Pecking order and Agency Cost. After reviewing the theories involved in capital structure, Titman and Wessels (1988), Harris and Raviv (1991) and Frank and Goyal (2003) also researched the determinants of capital structure. In this study, firm-specific determinants (internal factors) were examined in the context of India. The regression results of the capital structure model verified that 61.60 percent of the change in the dependent variable (capital structure measured by long term debt to net total assets) is explained by the independent variables that are selected and included in the model. This implies that the leverage ratio of cement manufacturing firms in India is highly explained by the selected firm specific variables. As a concluding remark, this research study found that growth, tangibility and operating ability are some potential determinants of capital structure in Indian manufacturing firms in general and Cement manufacturing firms in particular over the study period of 2006 to 2015 among the firm-specific factors. The study also observed the similarities to the factors that influence the capital structure of firms in developed and other developing counties that are studied by different researchers. However, in acknowledging the influence of other pertinent factors, like corporate governance, legal framework and institutional environment of the countries; that are not included in the present study, capital structure decision is not only the product of firm's own characteristics but also the macroeconomics environment in which the firm operates.

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