Research Article

A Panel Data Analysis On The Capital Structure Determinants Of Construction Companies Listed In S&P Bse 500

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Abstract: Purpose: This study examines the determinants of capital structure of firms in Indian Construction sector. An attempt has been made to analyze the determinants of capital structure using firm specific factors like size, tangibility, profitability, tax paid, non debt tax shield, uniqueness, business risk and growth opportunity of construction companies. **Research methodology:** This empirical study extends from 2000 to 2019 (20 years) comprising of a total of 49 construction companies listed in S&P BSE 500. Pooled OLS regression has been used to assess the influence of defined explanatory variables on capital structure. This study helps us to understand how the financial leverage as dependent variable is influenced by eight independent variables. Since the data used under study is cross sectional and longitudinal, Panel data analysis has been done using STATA 13. Before doing the Panel data analysis, the time series data was tested to check the stationarity, heteroscedasticity and auto correlation. Diagnostic test like Hausman test was conducted to check whether fixed effect model or random effect model is appropriate for this study. The study finds that capital structure of Indian Construction sector depends significantly on two determinants like size and uniqueness. **Research implications:** This study provides insights and understanding of the capital structure determinants of Indian construction sector.

Key words: Capital structure, profitability, tangibility, size, uniqueness

JEL classification: G32

Introduction

Finance plays a pivotal role in the modern money oriented economy. Raising of funds and its effective utilization is very crucial for the survival and success of an enterprise. Funds can be raised for short term or long term purposes. Funds which are raised for long term constitutes the capital structure of the organization. Proper planning is required for capital structure decisions due to the reasons like – The amount of funds raised are quite huge and the decisions taken are irreversible. Hence the success of an organization depends mainly on its capital structure.

Capital structure refers to a combination of debt and equity. "Capital structure refers to the proportionate relationship between different components of financing mix or long term sources of funds such as debentures, long term debt, preference capital and equity share capital including reserves and surplus" Brealy & Myers (1991). The choice of proportion of capital structure depends on the financing decision of the company. "A firm may decide to finance its investment requirements either through equity only or through debt only or a mixture of both. Normally firms follow the third option" Bhattacharyya and Banerjee (2001). There is no one single capital structure which suits all the firms. Firms which are similar in size, nature of operations may have different capital structure depending upon the financing decisions taken by them. Hence capital structure differs from one corporate firm to another.

A number of theories on capital structure have been developed which explains various factors that determine the design of corporate capital structure. "Firms select debt or equity depending upon the characteristics that determine the various costs and benefits associated with debt and equity financing" Marsh (1982). The puzzle of capital structure and its determinants is not yet solved. Researchers in the area of finance are still working on developing a capital structure model which is universally acceptable for all the firms in designing their ideal capital structure. In this context, this study attempts to find out the determinants of capital structure of Construction companies.

Construction sector in India

Construction sector is one of the core sector of Indian economy. It is poised to grow due to various reasons like industrialization, urbanization, economic development and the people's rising expectation for improved quality of living. Construction industry is the second largest industry in India after agriculture, Indian Mirror (2019). Therefore, the fund requirement is also huge in this sector. Keeping in view the scale and size of companies in

construction sector, the financial requirements are enormous. The viability of any business enterprise eventually comes down to cost-benefit trade-off. Cost of funds is undoubtedly the most important determinant for capital structure decisions. And again the objective of any company is share holders' value maximization. Hence it becomes very crucial to analyse the factors that determines the capital structure of a business enterprise. An attempt is made in this study to analyse the factors influencing the capital structure of construction companies listed in BSE 500.

Review of Literature

Asher, Sethi & Kumar (2017) examined the capital structure determinants of Indian health care industry. It was found that growth, profitability, non debt tax shield and net fixed assets influence significantly on the capital structure. Frank & Goyal (2007) shows that the most reliable factors are market to book ratio, tangibility, profits, log of assets and expected inflation. Pandey & Singh (2015) finds a list of common capital structure determinants like business risk, corporate tax rate, dividend payout ratio, firm age, uniqueness. Debt serving capacity, cost of debt etc. Shalini & Biswas (2016) found in their study on Indian power sector companies that liquidity has a significant influence on the capital structure. Pratheepan & Banda (2016) finds that profitability, firm size and growth are significant with capital structure of listed Srilankan companies. Similar results have been witnessed in Bajramović (2017) where tangibility, non debt tax shield and size have significant influence on capital structure. Amraoui et al., (2018) finds that size, liquidity, tangibility and return on assets are significant. Acar (2018) finds that profitability, non debt tax shield, size, tangibility and liquidity are significant determinants of Turkish companies. Shalini & Biswas (2019) found that 4 explanatory variables like firm size, tax paid, depreciation to total assets ratio and profitability ratio are statistically significant capital structure determinants.

Research Gap

Very little research has been done on the capital structure of construction companies in India. Moreover, the studies related to capital structure analysis in India have so far concentrated only on small number of sample companies with a focus on a limited number of variables. Hence the present study attempts to evaluate the determinants of capital structure of Construction companies listed in S&P BSE 500 companies.

Methodology

The study is descriptive and analytical in nature.

Source of Information – The secondary data for this study is collected from CMIE Prowess. Various National and International journals and annual reports of the companies and other websites were also used to collect the relevant data.

Period of the study- Data is collected for a period of 20 years i.e., 2000-2019.

Sampling & Population – 49 Construction companies listed in S&P BSE 500 as on July 2020 have been chosen for this study.

Statement of Hypothesis – The following hypothesis has been tested on the relationship between independent variables and the capital structure of Construction companies.

H0: There is no significant impact of the selected independent variables on the capital structure of construction companies.

Specification of the model – Since the data is longitudinal and cross sectional in nature, panel data analysis is done. STATA 13 has been used for this purpose. Pooled OLS regression and diagnostic test like Hausman test (to check fixed effect and random effect) is conducted. To test the preconditions of regression, stationarity test, heteroscedasticity test and test for auto correlation is conducted. The capital structure of any company is measured in terms of its leverage ratios. Hence, in this study capital structure is measured as Total debt to Total Assets ratio.

The explanation of three estimation models –pooled OLS, the fixed effects, and the random effects–is given below:

$$LEV_{it}=\beta_0+\beta_1 SIZE_{it}+\beta_2 PROF_{it}+\beta_3 GROW_{it}+\beta_4 TANG_{it}+\beta_5 NDTS_{it}+\beta_6 UNQ_{it}+\beta_7 TAX_{it}+\beta_8 BRISK_{it}+\varepsilon_{it}$$

Where:

LEV_{it}= debt ratio of firm i at time *t.*

$SIZE_{it}$= size of firm *i* at time *t.*

$PROF_{it}$= profitability of firm *i* at time *t.*

$GROW_{it}$= growth of firm i at time *t.*

$TANG_{it}$= tangibility of firm *i* at time *t.*

$NDTS_{it}$= non–debt tax shields of firm *i* at time *t.*

UNQ_{it}= uniqueness of firm *i* at time *t.*

TAX $PAID_{it}$= effective tax paid of firm *i* at time *t.*

$BRISK_{it}$=business risk of firm *i* at time *t.*

β_0 = Common-intercept.

$\beta_1 - \beta_8$= Coefficients of the concerned explanatory variables.

ε_{it} = Stochastic error term of firm *i* at time *t.*

Analysis of Data

Tests for Stationarity, heteroscedasticity and auto correlation

If Stationarity, heteroscedasticity and auto correlation exists in time series data, it can cause serious issues like spurious regression and drifting behavior. Hence before using the panel data for analysis, these tests are run to check the existence or otherwise of Stationarity, heteroscedasticity and auto correlation.

Augmented Dickey Fuller Test for stationarity

Sector	Financial Leverage	Size	Effective Tax Paid	Uniqueness	Non debt tax shield
Construction	-3.960 (0.0000)**	-3.960 (0.0000)**	-3.960 (0.0000)**	-3.960 (0.0000)**	-3.960 (0.0000)**

Sector	Tangibility	Profitability Ratio	Growth Opportunity	Business Risk
Construction	-3.960 (0.0000)**	-3.960 (0.0000)**	-3.960 (0.0000)**	-3.960 (0.0000)**

Source: Researcher's calculation

Dickey fuller test is conducted to check the unit root in panel data. The above table shows that the panel data does not have unit root i.e., the p value of all the determinants in the construction sector is less than 1% hence the null hypothesis is rejected.

Heteroscedasticity - Cameron & Trivedi's decomposition

Sector	Financial Leverage	Size	Effective Tax Paid	Uniqueness	Non debt tax shield
Construction	674.99 (0.0000)**	254.74 (0.0000)**	873.68 (0.0000)**	330.00 (0.0000)**	96.88 (0.0003)*

Sector	Tangibility	Profitability Ratio	Growth Opportunity	Business Risk
Construction	34.43 (0.9826)	819.64 (0.0000)**	874.09 (0.0000)**	874.97 (0.0000)**

Researcher's calculation

Most of the variables have p value less than 5% except for tangibility ratio indicating that the null hypothesis is rejected and the panel data is fit for OLS regression.

Autocorrelation – Durbin-Watson Test

Sector	Financial Leverage	Size	Effective Tax Paid	Uniqueness	Non debt tax shield
Construction	2.087987	1.570123	1.99725	1.968253	1.914562

Sector	Tangibility	Profitability Ratio	Growth Opportunity	Business Risk
Construction	2.140227	1.914077	2.014123	2.000142

Source: Researcher's calculation

The above table shows that all the values lie in the range of 1.5 to 2.5 and it can be said that there is no auto correlation and the data is fit for OLS regression.

POOLED OLS REGRESSION results

Panel (data) analysis method is used when the data is cross sectional and longitudinal. A common panel data regression model looks like

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + \ldots ..+ b_nx_n + \varepsilon_{it}$$

Where y is the dependent variable, x is the independent variable, a is the constant and b_1 to b_n are coefficients, i and t are indices for individuals and time. The error εit is very important in this analysis.

FINLEV	Construction	P>t
SIZE	-11.34494	(0.000)
TAX	-.323717	(0.068)
UNQ	-1.205373	(0.014)
NDTS	-8.753919	(0.721)
TANG	.554853	(0.859)
PROF	-2.50625	(0.057)
GRO	-.001023	(0.527)
BUSRISK	-.0091388	(0.679)
_cons	35.2692	(0.000)

Source: Researcher's calculation

In **Construction** sector, the p- value of two variables viz., size 0.000 and uniqueness 0.014 is less than .05 indicating that these variables are significant at 5% level of significance. Hence null hypothesis can be rejected. A low p value indicates that any change in size and uniqueness will result in a significant change in the financial leverage of construction companies.

The above findings are also supported by the beta coefficient of the variables. 'Size' is significant and has negative relationship in Construction -11.344 in construction sector. It indicates that with every one unit of change in size, financial leverage will decrease by those many number units. The reason could be that as the size of the company increases, companies will have sufficient funds to meet their future requirements and hence do not want to go for external borrowings. This is in accordance with the findings of Abbas (2016), Pandey (2001), Frank & Goyal (2007), Rajan & Zingales (1995).

The beta coefficient of Uniqueness is significant in Construction sector It can be seen that Uniqueness has negative relationship with Financial Leverage in Construction -1.205. It indicates that with every change in Uniqueness ratio by 1 unit, Financial leverage will reduce by certain units. The reason could be that the increase in the advertising and selling expenses will increase sales and in turn profit. Hence increase in ratio of selling expenses to total sales will discourage the companies to borrow more. This leads to decrease in the debt component in capital structure. This is in accordance with the findings of (Titman & Wessels, 1988), Bhaduri (2002) Pandey, Chotigeat & Ranjit (2000) and Bradley, Jarrell & Kim (1984)

Regression Model

Regression analysis generates an equation to describe the statistical relationship between one or more predictor variables and the response variable. Based on the regression co-efficient using Pooled OLS regression, the following regression model is formed taking Financial Leverage as regressor and other Firm specific factors as Independent variables. The R-sq and Adj R-sq indicate the model of good fit.

Sectors	Regression Models	R sq	Adj R sq
Construction	Y=35.2692 + (-11.344)(Size) + (-.323)(Tax) + (-1.205)(Unq) + (-8.753)(NDTS) + (05548)(Tang) + (-2.506)(Prof) + (-0.001) (Grow) + (-0.009) (BRisk)+ ε	0.5206	0.5124

Hausman Test

While working with Panel data, the choice between fixed effect and random effect model has to be made. These techniques help to control time invariant inter-firm heterogeneity. Hausman test is used to choose the suitable model and in cases where the level of significance of the chi-square test is lower than 5%, then fixed effects model has to be applied. Hence this test is conducted to check whether fixed effect model or random effect model is appropriate for this study**.**

SECTOR	CHI SQUARE	P value	MODEL
Construction	3.50	0.8357	Random effect is appropriate

Random effects model is appropriate in this study indicating that the model parameters are random variables. Random effect models assist in controlling for unobserved heterogeneity when the heterogeneity is constant over time and not correlated with independent variables.

Conclusion

Out of the eight explained variables, only two variables like size and uniqueness ratio are statistically significant determinants of financial leverage. Hence the construction companies under study should focus on these variables which deciding their capital structure. The findings of the study is in accordance with the earlier studies by Abbas (2016), Pandey (2001), Frank & Goyal (2007), Rajan & Zingales (1995), (Titman & Wessels, 1988), Bhaduri

(2002) Pandey, Chotigeat & Ranjit (2000) and Bradley, Jarrell & Kim (1984). The growing need for industrialization, urbanization, economic development and people's rising expectation for improved quality of living requires huge investments in Indian construction sector. With the increase in the investment opportunities in construction sector, the sector is in the right orbit for growth.

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Appendix

List of Construction companies chosen for this study

ACC Ltd.	La Opala RG Ltd.
Ambuja Cements Ltd.	Larsen & Toubro Ltd.
Ashoka Buildcon Ltd.	Mahindra Lifespace Developers Ltd.
Birla Corporation Ltd.	NBCC India Ltd.
Brigade Enterprises Ltd.	NCC Ltd.
Cera Sanitaryware Ltd.	Oberoi Realty Ltd.
Dalmia Bharat Ltd.	Omaxe Ltd.
Dilip Buildcon Ltd.	Orient Cement Ltd.
DLF Ltd.	Orient Refractories Limited
Engineers India Ltd.	Phoenix Mills Ltd.
Garden Reach Shipbuilders & Engineers Ltd.	Prestige Estates Projects Ltd.
GE Power India Ltd.	Prism Johnson Ltd.
GMR Infrastructure Ltd	Rail Vikas Nigam Ltd.
Godrej Properties Ltd.	Rain Industries Ltd.
Grasim Industries Ltd.	Rites Ltd.
Heidelberg Cement India Ltd.	Shree Cement Ltd.
Indiabulls Real Estate Ltd.	Sobha Ltd.
India Cements Ltd.	Somany Ceramics Ltd.
IRB Infrastructure Developers Ltd.	Star Cement Ltd
Ircon International Ltd.	Sterling and Wilson Solar Ltd.
JK Cement Ltd	Sunteck Realty Ltd.
JK Lakshmi Cement Ltd.	Swan Energy Ltd.
Kajaria Ceramics Ltd.	The Ramco Cements Ltd.
Kalpataru Power Transmission Ltd.	Ultratech Cement Ltd.
KNR Constructions Ltd.	