

Capital Structure Determinants of S&P BSE 500: A Panel Data Research

Shalini R, Mahua Biswas

Abstract: *The paper identifies the most important factors specific to companies which impacts on the capital structure of 416 companies belonging to 14 industrial sectors listed in S&P BSE 500 for a duration of 19 years which is from 2000 to 2018. Multi regression model is used to understand the influence of select variables on capital structure. The study finds that 4 explanatory variables like firm size, tax paid, depreciation to total assets ratio and profitability ratio are statistically significant capital structure determinants.*

Index Terms: *Capital structure, financial leverage, firm size, tax paid, profitability*

JEL classification: *G32*

I. INTRODUCTION

Capital structure is a combination of various securities known as debt equity ratio in a corporate firm. The decision regarding the composition of debt and equity are considered to be one of the most crucial decisions of a company as it has a direct bearing on the success or failure of the company. A number of theories have been proposed and lot of research has been done in the past five decades on the capital structure decisions and the factors which influence them. This topic gained special importance due to subsequent publication of seminal papers by Modigliani and Miller (1959, 1961). It has been more than five decades that neither the research nor the theory has been able offer acceptable answer as to which factors influence the capital structure decisions (Brealey and Myers 1991).

Extensive research has been conducted on developed markets whereas emerging economies is still deficient of such meticulous investigation. There have been quite a few noteworthy papers conducted on country-to-country comparisons (Jong& Kabir 2008, Rajan and Zingales, 1995). Researchers like Bhaduri (2002), Harvey et al (2004) etc have focused on a few European and Asian countries. Bhaduri has conducted research specific to India with highly noteworthy results but chose a few number of variables and small sample due to limitation of data. Due to the uniqueness of India as a country, it becomes important to understand the behaviour of the firms by studying the nation individually.

There is also some degree of work done specific to India related to capital structure theories and determinants (Booth (2001), Bhaduri (2002); Singh and Kumar (2008); Farhat et al (2009). India as an emerging economy is based on

common law with comfortable external debt environment. It has the potential for enormous expansion and the economy has been growing significantly in recent years. So, it becomes important for us to understand the significance of capital structure decisions at the micro and macro level of financing. (Joy Pathak) So it becomes extremely important for finance policy-makers at the firm or comprehensive level to understand what drives corporate financing. S&P BSE 500 companies are considered to be the most liquid stocks. This index nearly covers 93% of the total market capitalization of Bombay Stock Exchange. It considers all the major industrial sectors of the country. Hence this study is taken up to find out the factors that determine the capital structure of all BSE 500 companies excluding financial companies.

II. LITERATURE REVIEW

Lot of research has been done in the area of the determinants of capital structure in several countries across the world.

A. International evidences

Rajan & Zingales (1995) find growth, tangibility, profitability and size as the important variables in their study. Similar results have been witnessed in Shelunkova (2014) where size, profitability, asset structure and liquidity influence the capital structure. Alzomaia (2014) shows the relationship which is positive between profitability, size, and leverage. Joshua Abor (2008) indicates that size, earnings, age, risk, tangibility and managerial ownership are significant in impacting the capital structure of Ghanaian firms. Cortex & Susanto (2012) reveal that profitability, and tangibility ratio are statistically impactful. Frank & Goyal (2007) shows that the most reliable factors are tangibility, profits, log of assets, market to book ratio and expected inflation.

B. Indian evidences

Pathak (1997) studies six determinants influencing the leverage of select firm. Baral (2004) indicates that rate of growth, size and rate of earnings are significant variables of capital structure of companies which listed in the exchange. Shalini & Biswas (2017) finds that factors specific to oil companies which influence the capital structure are liquidity, size of investment, fixed assets assets to total assets ratio and earnings. Rasoolpur (2014) shows interesting result wherein ratio of selling expenses to sales and current ratio are the important factors determining of capital structure. Shalini & Biswas (2019), studies the capital structure of FMCG companies using panel data analysis, it is found that growth opportunity, business risk are earnings are significant. Riyazahmed (2012) finds that

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capacity serve the debt, dividend payout, degree of operating leverage, and business risk is statistically significant factors determining the financial leverage. Pandey (2000) shows that earnings, business risk, firm size, growth rate, and tangibility ratio have noteworthy impact on different types of debt. Shalini & Biswas (2016) shows that current ratio is positively correlated with the capital structure of power sector companies in our country. Kakani & Reddy (1998) shows that profitability, capital intensity and earnings volatility are negatively impacting the capital structure of the firm.

C. Financial Leverage as a dependent variable

Leverage has been defined in various ways. (Rajan & Zingales, 1995), focused on defining the leverage based on the objective of the study. Leverage may be defined as debt to net assets or debt to firm value or debt to capitalization or debt to total assets etc. Debt to capital or debt to total assets is regularly used leverage in most of the empirical studies. Some of the previous research studies done by Chung, 1993, Pandey et.al, 2000, Titman & Wessels 1988, use different types of measures of leverage. Riyazahmed (2012) has used financial leverage as a measured variable in his study.

D. Other Empirical evidences

Sinha & Bansal (2013), Pandey (2000), Shelunkova (2014), Joshua Abor (2008), Rasoolpur (2012), Baral (2004) have used multi regression analysis to analyse the dependent and independent variable. Picu et.al. (1999) have done a conceptual study considering the cyclical factors affecting the capital structure. Frank & Goyal (2007) have used sign test to analyse the factors determining the capital structure. Alzomia (2014) has used cross sectional pooled data methodology for analyzing the capital structure determinants. Song (2005) has used fixed effect panel data model of regression due to availability of large amount of data over a period of time. Omet et.al (2015) have used unrelated regression analysis and panel data for their study. Cortez et.al have used multi regression and panel data to analyse the relationship of various factors.

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 companies listed in S&P BSE 500.

III. METHODOLOGY

A. Source of Information

Secondary data is used in this study. The data is sourced from CMIE Prowess. Various National and International journals and the companies’ annual reports were also used to collect the relevant data.

B. Period of the study

Data is collected for a period of 19 years i.e., 2000-2018.

C. Sampling & Population

To achieve the objective of this research, the companies which are included are S&P BSE 500 as on Nov 2018. Of the total 500 companies, banking and financial companies have been excluded from this study due to unusual signs (Pandey2000). Again, due to the missing data, some

companies have been removed from the list. Sector wise total number of companies selected for this study is as follows:

Table 1: List of Sectors and Companies

Sector	No. of Companies
Automobile	24
Chemicals	39
Consumer durables	12
Construction	35
Communication	26
Diversified	11
Energy	29
Engineering	36
FMCG	50
Health care	43
Metals	21
Services	51
Technology	25
Textiles	14
Total	416

D. Statement of Hypothesis

The hypothesis tested for the present study is to examine the relationship between independent variables and the capital structure of select BSE 500 companies.

H₀: There is no significant influence of independent variables on the financial leverage of select BSE 500 companies.

E. Specification of the model

Since the data is time series and cross sectional in nature, panel data analysis is done. STATA 13 has been used for this purpose. Pooled OLS regression and Hausman test (to check fixed effect and random effect) is done. To test the assumptions of the regression, autocorrelation, heteroscedasticity and stationarity is conducted. The capital structure of any company is measured in terms of its leverage ratios. Here, the capital structure of the select firms is measured in terms of Total Debt to Total assets Ratio.

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

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

Where:

- LEV_{it}= total debt to assets ratio
- GROW_{it}= percentage change in total assets
- TANG_{it}= fixed assets to total assets ratio
- NDT_{it}= depreciation to total assets ratio.
- SIZE_{it}= log of total sales .
- PROF_{it}= EBIT to total assets ratio.
- UNQ_{it}= selling costs to sales



TAX PAID it = tax provision to PBT ratio
BRISK it = variance in operating profit
 β_0 = intercept.
 $\beta_1 - \beta_8$ = Coefficients
 eit = error term

Random-effects GLS regression		Number of obs = 7294
Group variable: Year	Number of groups = 19	
R-sq: within = 0.6612	Obs per group: min = 324	
between = 0.7428	avg = 383.9	
overall = 0.6615	max = 419	
Wald chi2(8) = 14233.17		
corr(u_i, X) = 0 (assumed)	Prob > chi2 = 0.0000	

Analysis of Regression results – Pooled OLS regression

Source	SS	df	MS	Number of obs = 7294
F(8, 7285) = 1779.62				
Model	14741349.4	8	1842668.68	Prob > F = 0.0000
R-squared = 0.6615				
Adj R-squared = 0.6411				
Total	22284435.8	7293	3053592.86	Root MSE = 32.178

Financialleverage	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Size	-4.407776	.453456	-9.72	0.000	-5.296681 -3.518870
EffectiveTaxPaid	.1335913	.0011294	118.29	0.000	.1313773 .1358053
Uniqueness	.3053816	.3443065	0.58	0.575	-.7616164 1.372138
Nondebttaxshield	-32.63518	7.446977	-4.38	0.000	-47.23339 -18.03698
Tangibility	1.922426	1.942799	0.99	0.322	-1.886023 5.730873
ProfitabilityRatio	-5.835865	1.112728	-5.26	0.000	-8.037135 -3.674596
GrowthOpp	-7.29e-06	.0000191	-0.40	0.689	-.000045 .0000297
BusinessRisk	-.0000101	.0016728	-0.01	0.995	-.0032892 .0032691
_cons	16.38335	1.350634	10.37	0.000	13.3448 19.42191

From the above table it can be seen that the p value is significant at 5% for variables like size, tax paid, non-debt tax shield and profitability ratio. R square is 0.6615.

The findings of the study are in congruence with some of the earlier research like Rasoolpur (2012), Kavitha (2014), Amraoui et al (2018).

Fixed effect model

Fixed-effects (within) regression		Number of obs = 7294
Group variable: Year	Number of groups = 19	
R-sq: within = 0.6612	Obs per group: min = 324	
between = 0.7364	avg = 383.9	
overall = 0.6615	max = 419	
F(8, 7267) = 1773.06		
corr(u_i, Xb) = -0.0038	Prob > F = 0.0000	

Financialleverage	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
Size	-4.685539	.4991274	-9.39	0.000	-5.663974 -3.707104
EffectiveTaxPaid	.1335354	.0011302	118.15	0.000	.1313199 .1357509
Uniqueness	.3452702	.545215	0.63	0.527	-.7239143 1.414455
Nondebttaxshield	-32.13645	7.452856	-4.31	0.000	-46.74621 -17.52669
Tangibility	2.244485	1.976573	1.14	0.256	-1.630173 6.119144
ProfitabilityRatio	-5.670055	1.114714	-5.09	0.000	-7.855219 -3.484891
GrowthOpp	-6.39e-06	.0000191	-0.34	0.738	-.0000438 .000031
BusinessRisk	-.0001184	.0016749	-0.07	0.944	-.0034017 .0031648
_cons	17.08867	1.638408	10.43	0.000	13.87692 20.30043

Cross sectional fixed effect model with LSDV (Least Square Dummy Variable) is represented in the above table. It can be observed that variables like size, tax paid, depreciation to total assets (NDTS) and earnings ratio are statistically significant at 5% level of significance. R square is 0.6612

Random Effect model

Financialleverage	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
Size	-4.472736	.4637379	-9.64	0.000	-5.381645 -3.563826
EffectiveTaxPaid	.1335772	.0011292	118.29	0.000	.1313639 .1357905
Uniqueness	.3172311	.5444127	0.58	0.560	-.7497983 1.38426
Nondebttaxshield	-32.48761	7.446169	-4.36	0.000	-47.08183 -17.89338
Tangibility	1.992132	1.949529	1.02	0.307	-1.828873 5.813138
ProfitabilityRatio	-5.805748	1.112903	-5.22	0.000	-7.986998 -3.624497
GrowthOpp	-7.29e-06	.0000191	-0.38	0.702	-.0000447 .0000301
BusinessRisk	-.00004	.0016728	-0.02	0.981	-.0033187 .0032386
_cons	16.54098	1.583452	10.45	0.000	13.43747 19.64449

Cross sectional Random effect GLS model is represented in the above table. It can be seen that variables like size, effective tax paid, NDTS and profitability are statistically significant at 5% level of significance. R square is 0.6612

Hausman Test

While working with Panel data, the researcher has to choose between fixed effect or random effect model. 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 has been conducted to find out whether fixed effect model is appropriate or random effect model is appropriate for this study.

	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	FixedAutom-e	RandomAuto-e	Difference	S.E.
Size	-4.685539	-4.472736	-.2128033	.1845952
EffectiveTax-d	.1335354	.1335772	-.0000418	.0000467
Uniqueness	.3452702	.3172311	.0280392	.0331569
Nondebttax-d	-32.13645	-32.48761	.351155	.3156419
Tangibility	2.244485	1.992132	.252353	.3258535
Profitabil-A	-5.670055	-5.805748	.1356925	.063518
GrowthOpp	-6.39e-06	-7.29e-06	8.99e-07	8.02e-07
BusinessRisk	-.0001184	-.00004	-.0000784	.0000834

Test summary	Chi-square statistic	Probability
Cross section Random	7.11	0.4176

H_0 : Random effect is appropriate
Since $P > 0.05$, Null hypothesis is accepted, that means for this study, random effect is appropriate and Fixed effect model is not appropriate.

Preconditions of Regression like stationarity, heteroscedasticity and autocorrelation are tested.

Test of Stationarity

Dickey-Fuller test for stationarity No. of obs = 7293

Test	1% Critical	5% Critical	10% Critical
Statistic	Value	Value	Value
Z(t)	-85.480	-3.960	-3.410

The approx. p-value for $Z(t) = 0.0000$
Since Absolute value of Test Statistic is > all other 3 values, Null Hypothesis should be rejected. It means that the data is stationary.

Breusch-Pagan / Cook-Weisberg test for



heteroskedasticity

Ho: Constant variance
Variables: fitted values of Financialleverage
chi2(1) = 179.56
Prob > chi2 = 0.0000

Since p is not greater than 0.05, heteroscedasticity assumption is not met.

Test of Autocorrelation

Durbin-Watson d-statistic	(9, 7293)
2.003992	

A Durbin-Watson value of 2 indicates that there is no auto-correlation in the sample data set.

IV. CONCLUSION

Out of the 8 explained variables, only four variables, size, effective tax paid, depreciation to total assets ratio and profitability are statistically very important determinants of financial leverage. Hence the companies under study should focus on these variables which deciding their capital structure. This study can be further extended by doing sectoral analysis. This analysis will specifically identify the factors which influence capital structure of companies belonging to each industrial sector. Such analysis will help the companies to design an optimum capital structure and increase their profits and reduce risks. Finally, due to the limitation in gathering secondary data, the research has a limitation in collecting data only for 19 years. And again, only firm specific factors are considered for this study. The paper would like to expand the research for a longer and bigger panel data in near future along with macro-economic factors. Nevertheless, this study is a first step undertaken for research project to examine capital structure of BSE 500 companies.

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