Capital Structure and Its Impact on Profitability- An Empirical Study on Indian Infrastructure Construction Industry

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ABSTRACT

The purpose of this study is to analyse and study the impact of profitability in the capital structure for the top firms of the infrastructure construction industry of India, according to their market capitalization. These firms are listed in National stock exchange. Along with that empirically analysing howthe profitability of these firm are affected by their capital structures. Both the Time series and cross-sectional data are taken into consideration for analysis. These are tested with the empirical panel data regression. For this EViews software is used. And the result of the study demonstrates that the capital structure has a significant impact on the profitability of the top specific firmstaken for the study. On the basis of this analysis the final conclusion of the project is made which provides future scope for the further research work in this area.

Key words: Capital Structure, Return on Equity, Return on Asset, Panel Data,Total Liability

CHAPTER 1

1. Introduction:

1.1. Introduction to the Topic:

In the epoch of liberalization, globalization along with privatization of economic and fiscal strategies and policies, investment opportunities and financing have expanded, and along with this, reliance on the capital markets has also augmented. For the establishment and expansion of a business capital is required. A firm may go for either from debt funding or the equity funding or may be the mix of both the debt and equity to raise its capital. One ofthe protruding issues faced by the managerial people while taking a decision of determiningthe firm's ideal capital structure in addition to what will be the correct blend of debt and equity for financing the firm. We know that the cost of capital should be minimized to make the most of the value of the firm. Therefore, the most important thing for the organization' management team is to detect the apt capital Structure by choosing a structure of capital with the correct proportion of equity and debt that will cut the cost of its capital and lift thefirms' profitability. In this research project using the panel data regression, we have tried to understand the effect of dept and equity of the firm on its overall profitability. Then arrived equity funding has a meaningful positive impact on the specified firms chosen for the project from the infrastructure construction industry. overall profitability in contrast to the debt funding, which is found to have a negative impact on the given firm's profitability. That is why, the management people should choose the capital

structure in such a way so that they can maximize the firm value.

1.2. Sector Dynamics:

The construction sector of India consists of Urban Infrastructure construction segment andthe real estate construction segment. This sector is very crucial for the economic development of the country. Currently government is trying to make world class infrastructure in the country to meet the global standards. It is one of the swiftly growing sectors of the country. In the financial year 2020-21 the FDI flow to the sector was $ 26.30 billion i.e., 13% of the total FDI inflow. In 2020 the central government has taken a total of 9,335 projects under the National Pipeline Infrastructure Scheme. Under this there are lot of major projects undertaken in the sector. The sector is predicted to have a 7% growthrate till the year 2026.

CHAPTER 2

2. Literature Review:

2.1. Literature Review survey

Narinder Pal Singh Mahima Bagga (2019 march), studied the capital structures impact onprofitability of the NIFTY 50 firms using their 7 years data. Their conclusion says that a profitability of those particular firm is highly affected by their capital structures.

Rubi Ahmad, Oyebola Fatima Etudaiye-Muhta (2017), studied the capital structures' impact on profitability of the listed firms from Nigeria, using empirical Panel data. Their conclusion says that the Asset tangibility, tax, firm size growth opportunity, and inflation significantly influence the optimal structure of capital of these Nigerian firms.

Felicia Omowunmi Olokoyo (2013), studied the capital structures' impact on profitability of the Quoted firms from Nigeria, using empirical Panel data. Their Finding says that firmsleverage has a noteworthy positive connection with the performance of these firms.

Aydin Ozkan (2001), studied the factors that acts as a Determinants of the optimal Structureof capital and its Alteration to the Long-term Targets of the UK firms with the help of PanelData. Their finding talks about the positive impact of firm size and the negative impact ofliquidity, growth opportunities, profitability of the firms.

Martin Hoesli, Elion Jani, Philippe Gaud and Andre´ Bender (2005), studied the capital structures of the firms from Switzerland, using the Dynamic empirical Panel data. Their finding suggest that company size and the asset tangibility are positively correlated with the firms' leverage, on the other hand firms' profitability and its growth are negatively related with the leverage.

Zeeshan Ahmed, Daw Tin Hla (2018), studied the unitability of the return of stock and the measure of the capital structure of the non-financial firms of Pakistan, using a model of dynamic panel. The finding suggests that firms' volatility of the return of stock is inversely related to the firms' book leverage and their long-term ratio of market leverage. Also, Volatility of the return of these stock impacts the increase in the ratio of total market leverage. However, firms are classified into different group and accordingly it may have an inverse relationship.

Luís Pacheco, Fernando Tavares (2015), studied the determinant factors of capital structures of the hospitality sector SME firms. The result conclude that both the theory of Pecking Order and the Trade-off should be considered while studying the structure of capital of the medium and small Enterprise of the hospitality sector.

Harsh Purohit, Shivi Khanna (2012), studied the determinant factors for the capital structures for the manufacturing industry firms of India. This study talks about the various relevant factors that should to be studied to find out the optimal capital structure of the manufacturing sectors.

Jain Surbhi, Bhargava Ankush, Bhargava Arpit (17th July 2017), studied the determinant factors of capital structures of the manufacturing sector firms of India. This study providesthe finding that the ratio of Debt to Equity is inversely proportionate to these particular firms' profitability. The films taken here are listed in the Bombay Stock Exchange.

Chong-Chuo Chang, Munkh-Ulzii Batmunkh, Wing- Keung-Wong Munkhchi meg Jargalsaikhan (2019), studied the determinant factors of capital structures of the Four Asian Tigers Country. This study concludes about the presence of a substantial negative relation between firm's financial leverage and their profitability. There is a noteworthy positive relationship between leverage and the overall growth of the firms located in Korea, Taiwan and Hong Kong. Also, firms' size and leverage are the directly proportional factors.

Mohamed M. Khalifa Tailab (2014), studied the determinant aspects of capital structures of the energy sector company from America. This study concludes that the total amount ofdebt effects negatively on the ROA and the ROE of the American firm from the energy segment.

Ramachandran Azhagaiah Candasamy Gavoury (2011), studied the determinant factors of capital structures of the firms from the IT Sector of India. This study concludes that The Capital Structure has major influence on firms' Profitability, and increase when the debt fund is minimum of the IT firms listed in BSE.

Chan Ping Chuen Albert, Chiang Yat Hung, Hui Chi Man Eddie (2002), studied the influence of capital structures on the overall profitability of construction industry firms of Hong Kong. The findings talk about the capital structure and its positive impact on the firm's asset however its negative correlation with the profit margins. The findings concludes that the capital structure has a strong relationship with the firm's asset and the profit margins.

The research paper written Ngatno, Arief Youliant and Endang P. Apriatni (2021), studiedControlling effects of firms' corporate governance system on its capital structure along with the firm performance. The results concludes that the decisions related to the capital structure financing have a major influence on the financial performance of the firm.

2.2. Theoretical Context:

Deciding on optimal capital structure of the organisation has always been a very important matter of discussion. Various theory like Modigliani and Miller trade-off theory are considered for this previously. Based on these theories various research work has similarlybeen conducted on the different parts of the globe.

According to the Modigliani and Miller theory a firm's capital structure is not relevant while doing the valuation of a firm. Since the company's market value is based on its operating profit only. The trade-off theory concludes that, choosing the proportion of debt and the equity in such a way that in takes into account of the benefits and costs

associatedwith it and these two should be balanced. According to the pecking order theory, internal funds are always prioritised over equity financing while determining the firm's capital structure.

Although many theories are there to determine the appropriate proportion of equity and liability of a firm, still taking decisions to choose optimum capital structure has always been very perplexing for the firms. Therefore, this study solely focusses on empirical panel data regression method to analyse the impact of capital structure on the overall profitabilityof the specified firms.

CHAPTER 3

3.1. Research Gap

The previous study and research on this area of capital structure indicates a substantial effect of capital structure on a firms' performance. The researchers used mainly the techniques and methods of ROA and ROE analysis, leverage analysis, EBIT analysis regression and hypothesis test. Previously conducted research studied the impact of the structure of capital its' on tax avoidance, interrelation between capital structure and cost ofcapital, etc. Findings suggest that there increase in profitability directly influences the decrease in leverage. Mostly microeconomic factors are considered for the research. Earlierstudies state the existence of dynamic adjustment to the capital structure. Most of the research is conducted on the manufacturing sector, hospitality sector, small mediumenterprises, etc. And majority of the researches are conducted with secondary data and regression-based model. However, there are very limited research conducted on infrastructure construction sector of India. Therefore, the financial leverage analysis of thetop firms of the infrastructure construction industry can be a broader area to research and how their profitability is affected by the capital structures. Earlier the mostly used methodsto determine the capital structures are Net Income Approach, MM model etc. However, there is a need for reliable research work using empirical panel data regression. It is necessary to help managerial people to study the influence of the capital structure on enhancing the profitability of the infrastructure construction sector in India.

3.2. Objective:

- To study the relationship between capital structure and profitability of the infrastructureconstruction sector firms by using panel data regression model.

3.3. Scope of the research:

The study emphases on the structure of capital and its impact on the profitability of the particular firms taken for the project. Since these 10 firms that are listed in NSE, accordingto their market capitalization, it will help the readers to get a brief idea about that particularsector and its capital structure. Since empirical panel data regression is used here, it will help the readers and the industry people to analyze the industry and make managerial decisions in the near future. Based on this study, there is a broader scope to conduct furtherresearch work and study in this area.

This is a comprehensive study considering the major internal factors – total liability, total equity, and total asset in the firm's financial statement that creates a greater bearing on thefirm's overall financial leverage along with the degree of profitability of the given firms.

CHAPTER 4

4. Research Methodology

4.1. Sample design:

There are total 200 infrastructure construction companies listed in the Indian stock exchanges. Out of which the infrastructure construction companies listed in NSE with market Capitalisation of more than 1200 Crores are taken for this research project.

	Company Name	market capitalization
1	GR infra	**14016.04Cr**
2	KNR construction	7964.56cr
3	Rail Vikas	7203.74cr
4	PNC infratech	6436cr
5	Man infra	3912cr
6	Nagarjuna Construction Company Limited (NCC Ltd)	3765cr
7	Ashoka Buildcon limited	2572cr
8	Hindustan Construction Co. Ltd	2526cr
9	Ramky infra	1295cr
10	Patel engneering	1271 cr

Table: 1

4.2. Data Design:

- Number of Years: 7 Years (2015-2021)
- Population size - 200
- Sample size :10

4.3. Statistical Design:

- The panel data regression is used to analyze the data in this research project. Becausethe data set is-

1. Both the Time series data and the Cross-sectional data
2. Pooled OLS data- Multiple firms and multiple data.

4.4. Research Design:

The research design that is followed for this study is empirical. The collected financial data,facts, and information are

already available in the companies' annual reports chosen here. These are required to analyzed empirically to make a critical evaluation of the research project. This study aimed at empirically analyzing the facts and figure to find out a conclusion, which can be reliable for the managerial personnel of the infrastructureconstruction sector while choosing the optimal capital structure.

4.4.1. Study Variables:

- The dependent variable considered here are – Return on Assets (ROA) and theReturn on Equity (ROE).
- Independent variables are – The ratio of the firms' Total Liability to Total Asset i.e.(TLTA) and the Total Equity to Total Asset (TETA).
- Control Variables- Asset Tangibility (TANG), Tax, Liquidity (LIQ), Inflation Rate.

4.4.2. Data Sources (Secondary Sources):

For data collection, mainly secondary sources are used here. Secondary data for the project are gathered from the companies' financial statements from their annual report collected from their official website.

4.4.3. Formulae used of Analysis:

$$ROE=\frac{\text{Net income}}{\text{shareholders equity}}$$

$$ROA=\frac{\text{Net income}}{\text{Total Asset}}$$

$$TANG=\frac{\text{Fixed Asset}}{\text{Total Asset}}$$

$$\text{Effective Tax Rate}=\frac{\text{PBT}}{\text{Amount of Tax paid}}$$

$$LIQ=\frac{\text{Current Asset}}{\text{Current Asset}}$$

$$TLTA=\frac{\text{Total Liability}}{\text{Total Asset}}$$

$$TETA=\frac{\text{Total Equity}}{\text{Total Asset}}$$

Formula: Profitability= f (TLTA, TETA, TANG, TAX, LIQ) $ROA=\alpha_{it}+ \beta_1TLTA+\beta_2 TANG+ \beta_3LIQ+\beta_4TAX +€_{it}$ ---------- (1)

$ROA=\alpha_{it} + \beta_2TETA+ \beta_2 TANG+ \beta_3LIQ+\beta_4TAX +€_{it}$ ---------- (2)

$ROE=\alpha_{it}+ \beta_1TLTA+\beta_2 TANG+ \beta_3LIQ+\beta_4TAX +€_{it}$---------- (3)

$ROE=\alpha_{it} + \beta_2TETA+ \beta_2 TANG+ \beta_3LIQ+\beta_4TAX +€_{it}$---------- (4)

i=1, 2… ,10

t=2015, …, 2021

α= individual firm effects

β= Coefficient for each independent variable

€= Error term

4.5. Reason for choosing Panel Data Regression:

Panel data is the multi-dimensional data which uses measurements over a particular period. The cross-sectional component helps in studding the differences observed between the variables of the individual firms, however the time series component determines the differences observed for variables of one firm over the given period. The major advantageis that researchers can study the variances in data amongst each firm is also taken in a panelstudy along with the variations observed for individual firms' data throughout the study (e.g.- changes in one ROE of one of the firms over the period).

4.6. Data Analysis Techniques:

Descriptive statistics- is used to find out the mean, mode, median and standard deviation, variance, of the variables. Normality is tested using Descriptive Statistics. In this, skewness of the data set and its kurtosis should be 0 for the normal distribution data.

Correlation analysis- it specifies the relationship between two variables. Firstly, it demonstrates the direction of relationship between any two study variables. Secondly, it also demonstrates the how strongly these two variables are interrelated.

Unit root test- Before we apply the regression model in our dataset which is Panel data, wemust check the property of Unit Root of these variables. These variables must be having static property. This study uses the Augmented Dicky Fuller Test and the Phillips Perron tests to analyze the unit root properties of the specified variables.

Regression Analysis— Here the Random effect model, Pooled OLS, Fixed Effects modelsare conducted for regression. Regression analysis is used to determine how strong the relationships are between dependent (ROA and ROE) and independent variables (TLTA, TETA) and along with the (TANG, TAX, LIQ,) as the control variables of the firms takenfor the research.

Panel Data Regression- Panel data is the multi-dimensional data which uses measurementsover a particular period. The cross-sectional component helps in studding the differences observed between the variables of the individual firms, however the time series componentdetermines the differences observed for variables of one firm over the given period.

Pooled OLS Model is used to find the line of best fit for the given dataset, demonstrating the association between two data points. It assumes a constant coefficient in both the slopesand the intercepts. Here all the data are pooled and the ordinary least square is applied.

Fixed effect Model- The fixed effects model is used to indicate the associations between our independent and certain unique variables of the distinct entities, assumes that each company has their own characteristics that influence these relationships between our specified variables.

Random Effect- Random effect is the most relevant one due to the heterogeneous nature of the firm. It takes into account the systematic random effect of individual cross section. It considers unique characteristics and the time cost features of the data. The model of randomeffect hint at a random distinction across companies, which is not correlated with their certain exceptional characteristics

Hausman test- Here the Hausman test is performed for the regression of panel data in orderto detect which one of the above models is more appropriate for writing the inference of our research.

CHAPTER 5

5. Analysis and Interpretation:

5.1. Descriptive Statistics:

	ROA	ROE	TANG	TAX	IR	LIQ	TLTA	TETA
Mean	0.0489	0.0433	0.3913	36.2715	0.0470	2.0683	0.5903	0.4097
Standard Error	0.0074	0.0488	0.0169	11.1379	0.0011	0.2586	0.0308	0.0308
Median	0.0532	0.1016	0.3997	24.2234	0.0476	1.2902	0.5872	0.4128
Standard Deviation	0.0619	0.4082	0.1412	93.1861	0.0092	2.1633	0.2576	0.2575
Sample Variance	0.0038	0.1666	0.0199	8683.6527	0.0001	4.6797	0.0663	0.0663
Kurtosis	3.9507	15.1675	-0.1365	52.7893	-1.0566	6.0028	-0.6185	-0.6199
Skewness	-0.5887	-3.1605	-0.4215	6.9180	0.0812	2.6086	-0.2273	0.2264

Minimum	-0.1927	-2.1258	0.0410	-44.7198	0.0343	0.4554	0.0734	0.0195
Maximum	0.2483	1.2022	0.6867	753.9790	0.0618	10.3473	0.9805	0.9266

Table: 2

Interpretation: The descriptive statistics results are demonstrated in the table no-2. We can see that some of the variables above are skewed negatively. However, some of them are skewed positively. Here the nature of the variables is leptokurtic. Also, the values of the kurtosis and the skewness are non-zero. So, we can conclude that the variable distribution is non- normal.

5.2. Correlation Analysis:

	ROA	ROE	TANG	TAX	IR	LIQ	TLTA	TETA
ROA	1							
ROE	0.695305	1						
TANG	0.178421	0.047356	1					
TAX	-0.15918	-0.05239	0.0173	1				
IR	-0.07508	-0.02903	-0.0043	0.2327	1			
LIQ	0.308179	0.1099	-0.2935	-0.0660	0.0624	1		
TLTA	-0.66763	-0.30087	-0.1326	0.1550	0.0047	-0.697	1	
TETA	0.667806	0.300946	0.1328	-0.1551	-0.0043	0.697	-1	1

Table: 3

Interpretation: From the table 3 we can say that TLTA has a great negative correlation with ROA also it has a negative correlation with the ROE. TETA has a strong positive correlation with ROA. TAX and Inflation rate negatively correlate with both the ROA and ROE. But Liquidity and the Asset tangibility positively correlate with both the ROA and ROE.

5.3. Unit root test:

Null hypothesis, Ho: The series has a unit root i.e., the study variables taken are non- Stationary

Alternate Hypothesis, H1: The series doesn't have a unit root i.e., the study variables takenare stationary

The variables taken in the project must be stationary before applying the panel data regression Model. So, the unit root test is conducted. Here both the Augmented Dicky Fuller (ADF) test along with the Phillips-Perron (PP) tests are conducted and the the stationary characteristic variables is checked.

When P> 0.05, Accept Null Hypothesis, Variables are non-stationary When P< 0.05, Reject the Null Hypothesis, Stationary

Variables	Test	ADF (P value)	PP	Inference
ROA	Level, Trend and Intercept	0.0267	0.0494	Stationary
	1st difference, Intercept	0.0000	0.0001	
ROE	1st difference Trend and Intercept	0.0000	0.0001	Stationary
	1st difference, Intercept	0.0000	0.0001	
TANG	Level, Trend and Intercept	0.0266	0.0266	Stationary
	1st difference, Intercept	0.0000	0.0001	
TAX	Level, Trend and Intercept	0.0000	0.0000	Stationary
	1st difference, Intercept	0.0000	0.0000	
LIQ	1st difference, Trend and Intercept	0.0008	0.0000	Stationary
	1st difference, Intercept	0.0001	0.0000	
TLTA	1st difference, Trend and Intercept	0.0000	0.0003	Stationary
	1st difference, Intercept	0.0000	0.0008	
TETA	1st difference, Trend and Intercept	0.0005	0.0000	Stationary
	1st difference, Intercept	0.0004	0.0000	

Table: 4

Interpretation: Here, stationarity is achieved for all the variables so we can apply the Paneldata regression now. Here the Augmented Dicky Fuller (ADF) Test along with the Phillips-Perron (PP) test are conducted. Stationarity is tested for both the individual Intercept and the Trend and Intercept. Variables are tested for the 5% level of significance. For the variables where the stationarity is not achieved in the raw data, there 1st difference Unit Root test is done and stationarity is achieved.

5.4. Panel data regression analysis:

5.4.1. Pooled OLS Model:

$ROA=\alpha_{it}+ \beta_1 TLTA+\beta_2 TANG+ \beta_3 LIQ+\beta_4 TAX +\epsilon_{it}$ ----------(1)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.203360	0.040579	5.011423	0.0000
TLTA	-0.215763	0.034442	-6.264610	0.0000
TANG	-0.016428	0.046527	-0.353074	0.7252
TAX	-2.74E-05	5.95E-05	-0.460494	0.6467
LIQ	-0.009500	0.004206	-2.258395	0.0273

R-squared	0.496995	Mean dependent var	0.048926
Adjusted R-squared	0.466040	S.D. dependent var	0.061895
S.E. of regression	0.045228	Akaike info criterion	-3.285452
Sum squared resid	0.132962	Schwarz criterion	-3.124845
Log likelihood	119.9908	Hannan-Quinn criter.	-3.221657
F-statistic	16.05582	Durbin-Watson stat	1.230994
Prob(F-statistic)	0.000000		

Table: 5

The null hypothesis, H0 – TLTA does not have any impact on ROA

Null hypothesis is rejected since TLTA significance level is 0.0000<0.05

Inference will be TLTA does have a significant negative Impact on the ROA according tothe above model. Value of β1 is -0.215763.

$ROA=\alpha_{it} + \beta_2 TETA + \beta_2 TANG + \beta_3 LIQ + \beta_4 TAX + \epsilon_{it}$ ---------- (2)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.012407	0.019140	-0.648207	0.5191
TETA	0.215886	0.034438	6.268911	0.0000
TANG	-0.016511	0.046517	-0.354946	0.7238
TAX	-2.73E-05	5.95E-05	-0.459828	0.6472
LIQ	-0.009504	0.004205	-2.260258	0.0272

R-squared	0.497255	Mean dependent var	0.048926
Adjusted R-squared	0.466316	S.D. dependent var	0.061895
S.E. of regression	0.045216	Akaike info criterion	-3.285969
Sum squared resid	0.132893	Schwarz criterion	-3.125362
Log likelihood	120.0089	Hannan-Quinn criter.	-3.222174
F-statistic	16.07253	Durbin-Watson stat	1.230152
Prob(F-statistic)	0.000000		

Table :6

The null hypothesis, H0 – TETA has no impact on ROA

Null hypothesis is rejected since TETA's significance level is 0.0000<0.05

Inference will be TETA has significant positive Impact on ROA according to the above model. Value of β1 is 0.215886.

$ROE=\alpha_{it}+ \beta_1 TLTA+\beta_2 TANG+ \beta_3 LIQ+\beta_4 TAX +€_{it}$---------- (3)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.730876	0.354652	2.060822	0.0433
TLTA	-0.798915	0.301011	-2.654108	0.0100
TANG	-0.286309	0.406636	-0.704091	0.4839
TAX	4.23E-05	0.000520	0.081349	0.9354
LIQ	-0.050998	0.036764	-1.387189	0.1701

R-squared	0.116765	Mean dependent var	0.043311
Adjusted R-squared	0.062412	S.D. dependent var	0.408225
S.E. of regression	0.395281	Akaike info criterion	1.050310
Sum squared resid	10.15607	Schwarz criterion	1.210917
Log likelihood	-31.76086	Hannan-Quinn criter.	1.114105
F-statistic	2.148265	Durbin-Watson stat	1.480235
Prob(F-statistic)	0.084774		

Table :7

The null hypothesis, H0 – TLTA has no impact on ROE

Null hypothesis is rejected since TLTA significance level is 0.0100<0.05

Inference will be TLTA has significant negative Impact on ROE according to the above model. Value of β1 is -0.798915.

$ROE=\alpha_{it} + \beta_2 TETA+ \beta_2 TANG+ \beta_3 LIQ+\beta_4 TAX +€_{it}$---------- (4)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.068057	0.167321	-0.406748	0.6855
TETA	0.799266	0.301044	2.654978	0.0100
TANG	-0.286547	0.406638	-0.704673	0.4835
TAX	4.24E-05	0.000520	0.081620	0.9352
LIQ	-0.051003	0.036757	-1.387562	0.1700

R-squared	0.116821	Mean dependent var	0.043311
Adjusted R-squared	0.062472	S.D. dependent var	0.408225
S.E. of regression	0.395268	Akaike info criterion	1.050246
Sum squared resid	10.15542	Schwarz criterion	1.210853
Log likelihood	-31.75862	Hannan-Quinn criter.	1.114041
F-statistic	2.149445	Durbin-Watson stat	1.480298
Prob(F-statistic)	0.084630		

Table :8

The null hypothesis, H0 – TETA has no impact on ROE

Null hypothesis is rejected since TETA significance level is 0.0100<0.05

Inference will be TETA has significant positive Impact on ROA according to the above model. Value of β1 is 0.790266.

5.4.2. Fixed Effect Model:

For Regression Model 1, equation (1)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.172675	0.076803	2.248301	0.0285
TLTA	-0.243821	0.090748	-2.686783	0.0095
TANG	0.039298	0.061789	0.635995	0.5274
TAX	-3.15E-05	5.41E-05	-0.583061	0.5622
LIQ	0.002875	0.008784	0.327280	0.7447

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.708690	Mean dependent var	0.048926
Adjusted R-squared	0.641064	S.D. dependent var	0.061895
S.E. of regression	0.037082	Akaike info criterion	-3.574521
Sum squared resid	0.077004	Schwarz criterion	-3.124822
Log likelihood	139.1082	Hannan-Quinn criter.	-3.395895
F-statistic	10.47961	Durbin-Watson stat	2.071879
Prob(F-statistic)	0.000000		

Table :9

For Regression Model 2, equation (2)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.071211	0.033237	-2.142544	0.0365
TETA	0.244473	0.090776	2.693145	0.0093
TANG	0.039136	0.061773	0.633540	0.5290
TAX	-3.16E-05	5.41E-05	-0.584615	0.5612
LIQ	0.002813	0.008788	0.320124	0.7501

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.708847	Mean dependent var	0.048926
Adjusted R-squared	0.641258	S.D. dependent var	0.061895
S.E. of regression	0.037072	Akaike info criterion	-3.575063
Sum squared resid	0.076962	Schwarz criterion	-3.125364
Log likelihood	139.1272	Hannan-Quinn criter.	-3.396437
F-statistic	10.48761	Durbin-Watson stat	2.069519
Prob(F-statistic)	0.000000		

Table :10

For regression Model 3, Equation (3)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.821479	0.814692	1.008330	0.3176
TLTA	-1.441921	0.962623	-1.497907	0.1398
TANG	0.374406	0.655438	0.571230	0.5701
TAX	4.79E-05	0.000574	0.083556	0.9337
LIQ	-0.036375	0.093178	-0.390376	0.6977

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.246474	Mean dependent var	0.043311
Adjusted R-squared	0.071548	S.D. dependent var	0.408225
S.E. of regression	0.393350	Akaike info criterion	1.148625
Sum squared resid	8.664577	Schwarz criterion	1.598324
Log likelihood	-26.20187	Hannan-Quinn criter.	1.327251
F-statistic	1.409021	Durbin-Watson stat	1.704292
Prob(F-statistic)	0.184412		

Table :11

For Regression Model 4, equation (4)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.620493	0.352643	-1.759553	0.0839
TETA	1.444179	0.963142	1.499446	0.1394
TANG	0.373944	0.655418	0.570542	0.5706
TAX	4.77E-05	0.000574	0.083158	0.9340
LIQ	-0.036682	0.093238	-0.393419	0.6955

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.246534	Mean dependent var	0.043311
Adjusted R-squared	0.071622	S.D. dependent var	0.408225
S.E. of regression	0.393335	Akaike info criterion	1.148546
Sum squared resid	8.663890	Schwarz criterion	1.598245
Log likelihood	-26.19910	Hannan-Quinn criter.	1.327172
F-statistic	1.409474	Durbin-Watson stat	1.704222
Prob(F-statistic)	0.184204		

Table :12

5.4.3. Random Effect Model:

For Regression Model 1, equation (1)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.159164	0.055285	2.878990	0.0054
TLTA	-0.198756	0.054337	-3.657833	0.0005
TANG	0.040787	0.053244	0.766035	0.4464
TAX	-2.50E-05	5.19E-05	-0.482239	0.6313
LIQ	-0.003850	0.006206	-0.620352	0.5372

Effects Specification	S.D.	Rho
Cross-section random	0.033786	0.4536
Idiosyncratic random	0.037082	0.5464

Weighted Statistics

R-squared	0.273244	Mean dependent var	0.018747
Adjusted R-squared	0.228521	S.D. dependent var	0.041831
S.E. of regression	0.036742	Sum squared resid	0.087749
F-statistic	6.109651	Durbin-Watson stat	1.846314
Prob(F-statistic)	0.000309		

Unweighted Statistics

R-squared	0.473027	Mean dependent var	0.048926
Sum squared resid	0.139298	Durbin-Watson stat	1.163065

Table :13

For Regression Model 2, equation (2)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.039618	0.025861	-1.531933	0.1304
TETA	0.199119	0.054356	3.663225	0.0005
TANG	0.040649	0.053236	0.763569	0.4479
TAX	-2.51E-05	5.19E-05	-0.482658	0.6310
LIQ	-0.003880	0.006207	-0.625081	0.5341

Effects Specification	S.D.	Rho
Cross-section random	0.033783	0.4537
Idiosyncratic random	0.037072	0.5463

Weighted Statistics

R-squared	0.273614	Mean dependent var	0.018744
Adjusted R-squared	0.228914	S.D. dependent var	0.041830
S.E. of regression	0.036732	Sum squared resid	0.087699
F-statistic	6.121032	Durbin-Watson stat	1.845024
Prob(F-statistic)	0.000304		

Unweighted Statistics

R-squared	0.473329	Mean dependent var	0.048926
Sum squared resid	0.139218	Durbin-Watson stat	1.162253

Table :14

For Regression Model 3, equation (3)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.724419	0.356816	2.030230	0.0464
TLTA	-0.797575	0.303441	-2.628438	0.0107
TANG	-0.274343	0.408372	-0.671798	0.5041
TAX	4.44E-05	0.000518	0.085663	0.9320
LIQ	-0.050559	0.037043	-1.364863	0.1770

Effects Specification	S.D.	Rho
Cross-section random	0.027516	0.0049
Idiosyncratic random	0.393350	0.9951

Weighted Statistics

R-squared	0.114319	Mean dependent var	0.042588
Adjusted R-squared	0.059815	S.D. dependent var	0.406962
S.E. of regression	0.394603	Sum squared resid	10.12126
F-statistic	2.097453	Durbin-Watson stat	1.484327
Prob(F-statistic)	0.091208		

Unweighted Statistics

R-squared	0.116750	Mean dependent var	0.043311
Sum squared resid	10.15623	Durbin-Watson stat	1.479217

Table :15

For Regression Model 4, equation (4)

Sample: 2015 2021
Periods included: 7
Cross-sections included: 10
Total panel (balanced) observations: 70
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.073154	0.168310	-0.434640	0.6653
TETA	0.797939	0.303459	2.629477	0.0107
TANG	-0.274630	0.408357	-0.672524	0.5036
TAX	4.45E-05	0.000518	0.085916	0.9318
LIQ	-0.050567	0.037035	-1.365370	0.1768

Effects Specification	S.D.	Rho
Cross-section random	0.027462	0.0049
Idiosyncratic random	0.393335	0.9951

Weighted Statistics

R-squared	0.114384	Mean dependent var	0.042590
Adjusted R-squared	0.059884	S.D. dependent var	0.406967
S.E. of regression	0.394593	Sum squared resid	10.12075
F-statistic	2.098807	Durbin-Watson stat	1.484373
Prob(F-statistic)	0.091031		

Unweighted Statistics

R-squared	0.116807	Mean dependent var	0.043311
Sum squared resid	10.15558	Durbin-Watson stat	1.479282

Table :16

5.4.4. Hausman Test:

Null Hypothesis H0: Random effect model is Appropriate Alternate Hypothesis H1: Fixed effect Model is Appropriate For ROA model 1, equation (1)

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.814443	4	0.5893

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
TLTA	-0.243821	-0.198756	0.005283	0.5352
TANG	0.039298	0.040787	0.000983	0.9621
TAX	-0.000032	-0.000025	0.000000	0.6672
LIQ	0.002875	-0.003850	0.000039	0.2794

Table :17

Since the significance level is 0.5893 > 0.05, we accept our null hypothesis. So, we can infer that the Random Effect Model is Appropriate here.

For ROA model 2, equation (2)

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	2.812386	4	0.5897

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
TETA	0.244473	0.199119	0.005286	0.5327
TANG	0.039136	0.040649	0.000982	0.9615
TAX	-0.000032	-0.000025	0.000000	0.6642
LIQ	0.002813	-0.003880	0.000039	0.2820

Table :18

Since the significance level is 0.5898 > 0.05, we accept our null hypothesis. So, we can infer that the Random Effect Model is Appropriate here.

For ROE model 3, Equation (3)

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.414710	4	0.3528

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
TLTA	-1.441921	-0.797575	0.834567	0.4806
TANG	0.374406	-0.274343	0.262831	0.2057
TAX	0.000048	0.000044	0.000000	0.9885
LIQ	-0.036375	-0.050559	0.007310	0.8682

Table :19

Since the significance level is 0.3528 > 0.05, we accept our null hypothesis. So, we can infer that the Random Effect Model is Appropriate here.

For ROE model 4, Equation (4)

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.416579	4	0.3526

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
TETA	1.444179	0.797939	0.835555	0.4796
TANG	0.373944	-0.274630	0.262817	0.2058
TAX	0.000048	0.000045	0.000000	0.9897
LIQ	-0.036682	-0.050567	0.007322	0.8711

Table :20

Since the significance level is 0.3526 > 0.05, we accept our null hypothesis. So, we can infer that the Random Effect Model is Appropriate here.

5.4.5. Panel Data Regression Interpretation:

The regression analysis and the Hausman test are done for all the four regression equations. Where we have tested the effect of TLTA (Total liability total asst ratio) and TETA (total Equity and Total Asset ratio) on the ROA (Return on Asset) and ROE (Return on Equity) with the consideration of the effect of TAX (Tax rate), LIQ (Liquidity of the firm) and TANG (Asset tangibility of the firm).

According to the Hausman test for all the four equations, our random effect model should be considered as the most appropriate one. Thus, we are only discussing the result of random effect model for our final interpretation.

Therefore, we can say that for the equation (1) the TLTA, at the significance level of 5 %has a major positive impact on our ROA. Also, the co-efficient is negative. Total liability of the firm has a substantial negative effect on the return of asset of the firm. So, if the total debt of the specified firms increases, the return on Asset will decrease for the firm. Here the value of the probability of F statistics is substantial at the 5% significance level thus we can infer that the model is a good fit for out test.

For the equation (2) the TETA has a substantial positive effect on the ROA at the 5% significance level. Also, the co-efficient is positive. Total equity of the firm has a substantial positive effect on the return of asset of the firm. So, if the firm's total equity increases, the return on Asset will increase for the firm. Moreover, here the value of the probability of F statistics is substantial at the 5% significance level thus we can conclude that the model is a good fit for out test.

Therefore, we can say that for the equation (3) the TLTA has a substantial negative effect on the ROE at the 5% level of significance. Also, the co-efficient is negative. Total liability of the firm has a substantial negative effect on the return of equity of the firm. So, if the firm's total debt increases, the return on equity will decrease for the firm. Here the value of the probability of F statistics is substantial at the 10% significance level thus we can conclude that the model is a fit for out test.

Therefore, we can say that for the equation (4) the TETA has a substantial positive effect on the ROE at the 5% level of significance. Also, the co-efficient is positive. Total equity of the firm has a substantial positive effect on the return of equity of the firm. Thus, if the firm's total equity increases, the return on equity will also increase for these firms. Here the value of the probability of F statistics is substantial at the 10% significance level thus we can conclude that the model is a fit for out test.

All other control variables are found to have non- substantial effect on our panel data regression result. However, from the correlation test, we can see that control variable TAX and IR negatively correlate to profitability (ROA, ROE). However, the control variable TANG and LIQ positively correlate to the firm's profitability.

CHAPTER 6

6. Conclusion:

6.1. Findings:

- In this research I have analyzed the effect of capital structure on the profitability thegiven companies for the year 2015 to 2021. We have found that the capital structurehas as substantial effect on the firms' profitability.
- The control variables TANG and LIQ are positively correlated with our profitabilitywhereas the IR and TAX negatively correlate with our profitability.
- The TAX, LIQ and the TLTA are positively skewed whereas TANG, IR TETA,ROA, ROE are the negatively skewed variables.
- The total liability or debt of a firm has substantial negative relationship with itsprofitability that is ROE and ROA for the specified firms taken for the research.
- The firm's total equity has a substantial positive effect on the profitability, i.e., ROA, ROE of the specified firms taken for our research.

6.2. Conclusion:

- Since according to the result of panel data regression the total equities of the specified firms have a favorable effect on its profitability parameters so the firms should opt for a capital structure with higher proportion of equity over the debt.
- However, we can see that TLTA is negatively correlated with the TAX variable from the correlation analysis. Thus, to minimize its tax liability, the firms need to opt for debt financing to a certain extent.

6.3. Limitations:

- Only top 10 firms listed in NSE according to their market Capitalization is taken for this research so making inference for the entire sector is still difficult.
- There may be a lot of unknown facts regarding each firm, e.g., certain change in accounting procedure or certain other parameters that are not considered for this research work.
- There may be some other financial or non-financial parameters that can effect to a certain extent on the profitability of the firms, e.g., efficiency of the workforce,organizational culture, firms' size, business risk, etc.

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