Impact of Macroeconomic Factors on Capital Structure choice of Indian Firms

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ABSTRACT

Several studies have been conducted to explore the factors affecting choice of capital structure, i.e., split between debt and equity, of firms. Most of these studies have focused on firm specific factors. Recently, studies have been conducted to determine the influence of macroeconomic variables on this decision of firms, but they are still in the nascent stage. Moreover, most of these studies have been confined to developed countries, with different business environments, so their results may or may not be applicable in the Indian context.

In this paper, influence of macroeconomic variables, like inflation, GDP growth rate, interest rates, and net FDI, on the capital structure of Indian firms has been empirically examined. Some firm-specific variables—return on equity and asset tangibility—have also been used to improve fit of the model. Panel data regression analysis has been conducted on the data of 65 NSE 100 companies, over the past 20 years.

Inflation and net FDI flows, as a percentage of GDP, were found to be negatively related with leverage of firms, while GDP growth was found to have an insignificant relationship with the same. With respect to firm specific factors, both, return on equity and asset tangibility, were found to be positively related to leverage of firms.

KEY WORDS: Capital structure, Leverage, Interest rate, GDP, Indian firms, Panel Data, Random Effects Model

JEL CLASSIFICATION: G32, G31, C30

1. INTRODUCTION

Capital structure of a company refers to its method of financing of operations through a combination of debt and equity. It represents the mix of long-term debt, preferred stock, and common equity that a company uses to finance its operations and growth. The capital structure of a company affects its cost of capital, risk profile, and financial flexibility. A company's capital structure is a crucial factor in determining its ability to generate profits and sustain growth over the long term.

India is one of the fastest growing economies globally, with a rapidly evolving business environment. In such a dynamic environment, businesses have had to recalibrate their decisions on a regular basis. Significant economic reforms over the past few decades have led to changes in financial system, corporate governance practices and

business mechanisms. These changes have significant influence on the capital structure decision of Indian firms, which makes it crucial to attempt to understand how macroeconomic variables impact this decision.

Numerous studies have attempted to study the relationship between both firm-level indicators and the capital structure of firms. Recently, many studies have also examined the relationship between macroeconomic variables and financing decisions of firms. However, these studies are in the nascent stage, and there is a paucity of research in this area in the Indian context. If India is to emerge as the largest economy in the world some years into the future, policymakers must study the impact of their decisions on macroeconomic factors and consequently on capital structure of firms, to ensure that policies benefit the firms.

This paper attempts to empirically identify the impact of macroeconomic variables: consumer price inflation, GDP growth rate, market capitalization to GDP ratio, and lending interest rate on the capital structure of 65 non-financial companies listed on NSE, and part of the NSE 100 Index. Total Outside Liabilities to Tangible Net Worth ratio has been used a proxy variable for leverage, or capital structure for these companies. In addition to the macroeconomic variables, firm specific variables, like return on equity (ROE) and asset tangibility have been used. A panel data regression analysis has been conducted to study the impact of these variables on the capital structure of firms, using data for the period from 2002-03 to 2021-22.

The remaining paper has been structured in the following way. Section 2 provides a review of existing literature on the subject. Section 3 describes the data and methodology used in the study, along with analysis of the results obtained in the econometric model. Section 4 provides a conclusion.

2. LITERATURE REVIEW

Capital structure has been the subject of several research studies. One of the earliest papers to examine the capital structure choice of firms was "The Cost of Capital, Corporation Finance and the Theory of Investment" (June, 1958) by Miller & Modigliani. They put forward the "theory of irrelevance", arguing that a firm decision of choosing between debt and equity is irrelevant, and it is only the investment decision that has an important effect on the firm's value. Their theory was based on assumptions of selfless management, symmetrical distribution of information between management and investors of firms, no transaction and brokerage costs, and no corporate taxes. However, subsequent literature has shown that the financing decision of a firm also bears importance in value creation of a firm. The debt-equity structure matters once provision is made for presence of taxes, asymmetric information, risk and cost of bankruptcy, and problems of agency.

Another important theory, called Pecking Order Theory, was put forward by Myers & Majluf (1984). According to this theory, firms first prefer to opt for internal financing through retained earnings, and then they choose external financing from equity and debt. Firms choose external financing only when internal finances are insufficient. Macroeconomic variables can affect availability of internal financing, and thereby affect capital structure of firms.

Several empirical studies have been conducted to explore the determinants of capital structure at firms. These studies have focused both on firm specific and macro-economic factors.

Of papers addressing impact of firm specific factors on choice of capital structure of firms, a paper by Titman and Wessels (1988) showed that debt levels of a firm and the "uniqueness" of a firm's line of business have a negative relationship. Smaller firms tend to use more short-term debt than larger firms, owing possibly to greater transaction costs incurred in issuing long-term debt or equity. In the Indian context, a study on capital structure decisions by Sinha (1993) found that fixed assets to total assets ratio, and growth rate of assets are positively related with debt-equity ratio, while operating income-gross assets ratio is negatively related. The relation between size of the firm and debt-equity ratio was found to be insignificant.

Several papers have studied the impact of different macroeconomic variables on capital structure of firms, with varying results. Numerous studies have focused on role of financial markets. A negative relationship between financial market development and long-term and short-term debt-to-equity ratio was found by Demirguç-Kunt and Maksimovic (1996). In the context of developing countries, Agarwal and Mohtadi (2004) found a positive relationship between equity market development on the proportion of equity in the overall capital structure of the firms and banking sector development in the proportion of debt component in the capital structure. Bopkin (2009) conducted a study on emerging markets and found bank credit and GDP to be significant variables in predicting firm capital structure. Analyzing the effect of macroeconomic variables on capital structure of Kenya's listed companies, Muthama et al. (2013) found GDP growth rate and interest rate to be positively related to long-term debt ratio, and that inflation and interest rate negatively affect short-term debt ratio. Mokhova and Zinecker (2014) showed through evidence that macroeconomic indicators represented by monetary and fiscal policies significantly affect the capital structure choice of firms. Yadav et al. (2019) studied how financial markets affect capital structure choice in a sample of 12 developed and developing Asian market economies, and determined that factors pertaining to stock market and to banking sector have opposite effects on this choice.

Studies have also been conducted to examine whether relation between macroeconomic factors and capital structure of firms are consistent across economies. Rajan and Zingales (1995) conducted a study to confirm whether the relationships seen between firm-specific variables and capital structure in the USA are extendable to the G7 countries. The authors found that effects of firm-specific factors on capital structure are uniform across the G7 economies. De Jong et al. (2008) appended to this study through an examination of 42 countries, consisting of 21 emerging and 21 developed economies. This study found that there are differences in relationship of firm-specific factors and capital structure across the economies. Booth et al. (2001) carried out a study with the objective of comparing emerging and developed economies in this context. The conclusion of this study was that relationship between macroeconomic factors and capital structure as observed in developed countries were also observed in emerging countries, notwithstanding differences in culture and institutions. Economic growth rate, inflation rate, government policies and development of financial markets were shown to affect the capital structure of firms in both developed and emerging economies.

To summarize, research findings confirm that macroeconomic variables influence capital structure of firms. Studies have also shown how these variables can be used in conjunction with firm-specific variables, or internal factors of firms, to help study influence on capital structure. However, there is a dearth of studies that undertake an examination of how macroeconomic variables directly affect capital structure and financing. In the Indian context, several studies have focused on impact of firm-specific variables on capital structure of firms, but there is a paucity of research on the impact of macroeconomic variables on the same. Results obtained in such studies in the case of developed economies may not be extendable to the Indian context owing to cultural, legal and institutional differences, which create differences in business environments and hence decisions of the firms. The objective of this paper is to add to the existing literature in explaining the effects of macroeconomic variables on capital structure of firms in India.

3. DATA, FINDINGS, AND ANALYSIS

3.1 Data

This study uses data of 65 Indian non-financial companies listed on the National Stock Exchange (NSE) and a part of the NSE 100 index as of March 2023. The NSE 100 index is a free-float market weighted index of the 100 largest companies, by market capitalization, that are listed on the NSE. Financial companies have been deliberately excluded, as their capital structure, assets, liabilities and associated financial measures tend to be different from traditional companies. Companies that have been a part of NSE 100 for the past 20 years have been used, and those that have recently become a part and those that have been delisted sometime in between, have been omitted. The firm-specific data on these 65 companies from the year ended March 2003 to March 2022 has been obtained from CMIE Prowess database.

The objective of this paper is to examine the impact of macroeconomic variables on capital structure of firms. A description of the dependent and independent variables used in the study has been given below.

(1) Total outside liabilities to tangible net worth (TOL_NW)

This study uses Total outside liabilities to tangible net worth ratio as a proxy for leverage of the firms. Here, Total outside liabilities = Total liabilities – Equity. It is the sum total of secured loans, unsecured loans, and current liabilities as on the date of the balance sheet. Tangible net worth is net worth less net intangible assets. This ratio shows relationship between total outside liabilities and tangible net worth. A higher value of this ratio implies that a firm is using more outside sources of borrowing to finance its operations as opposed to internal sources, like equity. Data on this variable for the 65 companies has been sourced from CMIE Prowess database.

(2) Return on equity (ROE)

Return on equity denotes a firm's capacity to earn profits on the amount invested by shareholders. It is defined as ROE = Net Income / Shareholder's Equity. A high value is indicative of wise use of

shareholder's money and efficiency in generating profits, while a low value indicates the opposite. Data on this has been obtained for all 65 firms from the CMIE Prowess database.

Hypothesis 1: TOL_NW is positively related to ROE.

(3) Asset tangibility (TANG)

Net Property, Plant and Equipment (Net PPE), as a proportion of Total Assets of a company, has been used as a proxy for asset tangibility for each firm in this study. Greater the amount of such assets, greater is the need for the firm to undertake large investments to replace depreciated capital. Manufacturing companies tend to have a larger value of this variable. Since these assets can be collateralized, cost of debt is reduced. A positive relationship might prevail between this variable and the dependent variable. Data on this variable for each of the 65 companies has been sourced from CMIE Prowess database.

Hypothesis 2: TOL_NW is positively related to TANG.

(4) Consumer Prices Inflation (INF)

Inflation in consumer prices shows the percentage change in cost to an average consumer of acquiring a basket of goods and services. Data on annual inflation rate of India has been sourced from World Bank Open Data for the years ended March 2003 to March 2022. Inflation generally causes fall in consumption demand, and introduces volatility and reduction in earnings of firms. Therefore, firms associate inflation with declining profitability, and this dissuades them from raising debt.

Hypothesis 3: TOL_NW is negatively related to INF.

(5) GDP growth rate (GDP_GROWTH)

Growth in real GDP causes rises in incomes of consumers and boosts overall productivity and business sentiment. Thus, GDP growth usually incentivizes firms to increase investment. Data on annual GDP growth of India from years ended March 2003 to March 2022 has been sourced from World Bank Open Data.

Hypothesis 4: TOL_NW is positively related to GDP_GROWTH.

(6) Lending interest rate (INTT)

Lending rate is the bank interest rate at which firms can raise medium-term loans to meet their financing. In this study, annual data on this variable has been sourced from World Bank Open Data for the period under examination of the study. The rationale behind incorporating this variable is that interest rates are important determinants of capital structure of firms. Jan and Rafiq (2011) found positive relation between interest rate and short-term debt ratios. However, some papers were unable to find significant relationship between interest rate and capital structure (Tai, 2017). This variable has been incorporated to examine both the type and significance of the influence of interest rates on capital structure.

Hypothesis 5: TOL_NW is negatively related to INTT.

(7) Net Foreign Direct Investment, as % of GDP (FDI_GDP)

Net foreign direct investment refers to investment flows from foreign investors which lead to acquisition of a management interest in a domestic company. It is different from foreign portfolio investment (FPI),

which involves a mere transfer of ownership. Net FDI, as a percentage of GDP, can have a bearing on the capital structure of firms. Since FDI increases equity in the capital mix of firms, this variable might bear a negative relationship with the dependent variable. Annual data, for India, on this variable, for the period from March 2003 to March 2022, has been sourced from World Bank Open Data.

Hypothesis 6: TOL_NW is negatively related to FDI_GDP.

3.2 Descriptive statistics

The summary statistics for TOL_NW and ROE of the 65 companies have been calculated and presented in the table below.

As shown in the table, both TOL_NW and ROE have great variability. This is due to the long time period of 20 years used for the analysis, during which company profitability and capital structures can change drastically. This variability is also reflective of the differing characteristics of individual firms, arising out of operation in different industries, with different managements and short-term and long-term goals. The average TOL_NW is 1.456 times, while the average ROE is 24.72%. The standard deviations are 1.889 and 21.682 percentage points respectively, implying high variability.

There is also considerable variability in TANG, with a mean of 0.241 and standard deviation of 0.449, for similar reasons.

Variables	Mean	Median	Std. Dev.	Min	Max	Observations
TOL_NW	1.456	0.970	1.889	0.000	27.790	1300
ROE	24.72	20.54	21.682	-76.56	189.24	1300
TANG	0.241	0.215	0.449	0.000	0.8499	1300
INF	6.359	5.464	2.605	3.328	11.989	20
GDP_GROWTH	6.125	7.536	3.350	-6.596	8.681	20
INTT	10.518	10.271	1.319	8.333	13.312	20
FDI_GDP	1.73	1.65	0.678	0.6	3.6	20

3.3 Methodology and Conceptual Framework

This study uses Panel Data Regression Analysis to examine effect of return on equity, asset tangibility, consumer price inflation, GDP growth rate, lending interest rate and net FDI, as percentage of GDP, on Total Outside Liabilities to Tangible Net Worth ratio.

There are advantages of using Panel Data, as it can evaluate both cross sectional and time series data to obtain more reliable estimates of parameters. Klevmarken (1989) has shown how it can control for individual heterogeneity, and the data is more informative, variable, with lower collinearity than simple time series data. It

will also help us to incorporate firm specific variables and account for effects of macroeconomic variables on cross-sectional data on capital structure of firms across a 20-year time period.

There are three methods of regression analyses for Panel Data: Pooled Ordinary Least Squares (OLS) Estimation model, Fixed Effects model, and Random Effects model.

A Pooled OLS model assumes that coefficients of the model remain constant across time and across cross sectional units. Due this restrictive nature, it is not widely used in literature.

Individual Specific Effects models, like Fixed Effects model and Random Effects model assume that there is some unobserved heterogeneity across individual data items. In Fixed Effects, intercept may differ across subjects, but it does not vary over time. In Random Effects, similarly, the intercept differs across subjects and stays constant over time; however, these intercepts arise randomly and distributed independently of the regressors.

Hausman test helps determine which of the two Individual Specific Effects models is more appropriate for a given dataset.

The econometric model used for this analysis can be described using the following equation:

$$TOL\_NW_{it} = \beta_0 + \beta_1 ROE_{it} + \beta_2 TANG_{it} + \beta_3 INF_{it} + \beta_4 GDP\_GROWTH_{it} + \beta_5 INTT + \beta_6 FDI\_GDP_{it} + u_{it}$$

where:

The subscript 'i' denotes the companies, i = 1, 2, 3, …, 65.

The subscript 't' denotes the time, t = 1, 2, 3, …, 20.

β_0 denotes the unknown intercept for each cross-sectional entity.

β_k, k = 1, 2, …, 6 denotes the coefficients for the independent variables.

u_{it} denotes the error term.

The results obtained using Fixed Effects and Random Effects methods using the econometric model specified above have been tabulated in the tables given below. The Hausman Test has been conducted to identify the more appropriate of these methods for this study. The results of the same have been shown in the table below. Multicollinearity has been checked using variance inflation factor (VIF), which has been provided in the appendix.

Fixed effects

Variable	Estimate	Std Error	t-value	p-value	Sig
roe	0.0047909	0.0029253	1.65659	0.097845	*
tang	2.1514389	0.575912	3.7357	0.000196	***

inf	-0.026495	0.0184512	-1.43593	0.151264	
gdp_growth	-0.01708	0.0140549	-1.2152	0.224522	
intt	0.125339	0.0364157	3.4419	0.000597	***
fdi_gdp	-0.249682	0.0811047	-3.0785	0.002126	***
R-Squared: 0.2007					

*** p < 0.01, ** p < 0.05, * p < 0.1

Random effects

Variable	Estimate	Std Error	t-value	p-value	Sig
(Intercept)	0.18998	0.39140	0.4854	0.627393	
roe	0.00544	0.00278	1.9584	0.050186	*
tang	1.61799	0.50063	3.2319	0.00123	***
inf	-0.03037	0.01845	-1.646417	0.099923	*
gdp_growth	-0.01819	0.01404	-1.2955	0.195154	
intt	0.13223	0.03617	3.656	0.000256	***
fdi_gdp	-0.26595	0.08069	-3.2961	0.00098	***
R-Squared: 0.2019					

*** p < 0.01, ** p < 0.05, * p < 0.1

Hausman Test

Chisq = 3.5428, df = 6, p-value = 0.7383

alternative hypothesis: one model is inconsistent

Based on the results of the Hausman test shown above, it can be inferred that the Random Effects model is more appropriate than the Fixed Effects model, since p-value = 0.7383 > 0.05. Hence, estimation results in random effects table are all that are required for the purpose of this study.

3.4 Analysis

As per the results obtained in the Random Effects model, the following observations can be made with respect to the independent variables and their relationship with the dependent variable:

(1) ROE: Return on equity is found to be significant at 10% significance level. With a p-value of 0.050186, it is very close to being significant at the 5% significance level. The sign of the coefficient is positive, implying a positive relationship between ROE and TOL_NW. This implies that as return on equity increases, companies tend to source finances from outside liabilities. The possible reason behind this is

that an increase in ROE reflects rise in profitability, which increases firms' ability to make interest payments on debt. Thus, firms take on debt to fuel growth, without diluting earnings.

(2) TANG: Asset tangibility, measured in this study, as the ratio of Net Property Plant & Equipment to Total Assets is found to be significant at 1% level of significance. The sign of the coefficient is found to be positive, indicative of a positive relationship between TOL_NW and TANG. This implies that as share of net PPE in total assets increases, there is a rise in tendency of firms to finance their operations through debt. A possible explanation for this is that it is easier to reduce cost of debt by collateralizing fixed assets (Morellec 2001). This induces firms with greater requirement of fixed tangible assets to use external debt, resulting in the positive relationship described above.

(3) INF: The inflation rate has been found to be significant at 10% significance level. The sign of the coefficient is negative. This implies that as inflation rate increases, firms are dissuaded from taking up external debt for financing. A possible explanation for this is that an increase in consumer inflation causes fall in consumer spending, and this tends to threaten profitability. Consequently, firms are dissuaded from raising debt for investments.

(4) GDP_GROWTH: The growth rate of GDP is found to be insignificant in determining TOL_NW.

(5) INTT: The lending interest rate has been found to be significant at the 1% level of significance. The coefficient is positive, indicating a positive relationship between INTT and TOL_NW. The reason for this positive relation is that total outside liabilities also includes current liabilities, which tend to increase as lending interest rate rises.

(6) FDI_GDP: The FDI to GDP ratio is found to be significant at the 1% significance level. The sign of the coefficient is negative, implying that as FDI rises as a percentage of GDP, there is a fall in the proportion of external debt financing used by firms. FDI is usually made in terms of an equity investment, and this causes a rise in share of equity in the capital structure of firms. Thus, FDI_GDP is negatively related to TOL_NW.

To summarize, macroeconomic variables have an impact on the capital structure of firms, and this influence is statistically significant.

4. CONCLUSION

In this study, panel data regression analysis was performed on 65 companies listed on the NSE 100 Index, from the years ended March 2003 to March 2022, to determine impact of macroeconomic variables on capital structure of these firms. The dependent variable was Total Outside Liabilities to Tangible Net Worth (TOL_NW) ratio, which served as a proxy for leverage. The dependent variables included return on equity (ROE), asset tangibility as firm-specific factors. The macroeconomic predictors were inflation rate, real GDP growth rate, lending interest rate, and net FDI, as percentage of GDP.

It was found that the firm-specific variables are significantly related to the dependent variable. Of the macroeconomic predictors, significant relationship was observed between TOL_NW and the variables inflation rate, lending interest rate, and FDI (% of GDP). The relationship between TOL_NW and GDP growth rate was found to be statistically insignificant.

The study has established that macroeconomic variables play a role in decisions related to capital structure, and has provided insight into how Indian firms respond to changes in these variables. Policymakers can also take note of how their policies, which affect these macroeconomic variables, end up affecting the capital structure choice of firms.

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Appendix

Correlation matrix

	tol_nw	roe	tang	inf	gdp_growth	intt	fdi_gdp
tol_nw	1						
roe	0.082545	1					
tang	0.056129	-0.07173	1				
inf	-0.0583	0.043957	-0.08154	1			
gdp_growth	0.013833	0.085163	0.021394	-0.03307	1		
intt	0.08312	0.152289	0.089986	0.062997	0.058989	1	
fdi_gdp	-0.0756	0.035399	-0.09652	0.420387	-0.33397	0.292397	1

VIF Table

	VIF	1/VIF
roe	1.038962	0.962499
tang	1.035057	0.96613
gdp_growth	1.190904	0.839698
intt	1.180366	0.847195
inf	1.247288	0.801739
fdi_gdp	1.583476	0.631522