AN EMPIRICAL INVESTIGATION INTO THE DETERMINANTS OF CAPITAL STRUCTURE IN INDIAN IRON & STEEL INDUSTRY

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ABSTRACT

This paper intends to identify the determinants of capital structure in the Indian Iron & Steel Industry. A sample of 21 firms in the Iron & Steel Industry listed at the Bombay Stock Exchange for the period 2001-02 to 2010-11 was selected. The relation of size, tangibility, profitability, debt service capacity, degree of operating leverage and age with leverage has been found to be negative and statistically significant. All these relations are consistent with the predictions of Pecking Order theory. The relation of non-debt tax shield with leverage has been found to be positive and relation is statistically significant. All other variables have been found statistically insignificant in determining the capital structure in Iron & Steel Industry during study period.

Key Words: Capital Structure, Growth, Profitability, Tangibility

INTRODUCTION

An endeavor has been made to examine the determinants of capital structure in the Indian Iron & Steel Industry. The capital structure decision is vital to minimize the risk of bankruptcy and to maximize the shareholders' wealth. Modigliani and Miller (1958) are the first authors who developed capital structure theory. Since then, many researcher followed Modigliani and Miller's (1958) path to develop new theory on capital structure and tried to departure from their assumptions. However, the empirical evidence regarding the alternative theories is still inconclusive (Rajan & Zingales, 1995). Although capital structure theory was developed long time ago and has been debated for many years, it is still one of the main unsolved issues in the literature of corporate finance.

This study focuses on Indian Iron & Steel Industry while only limited research has been conducted on such firms recently. Further, this study validates some of the findings of previous authors by testing the relations of capital structure with determinants of

capital structure in sample firms. Thus, this study adds substance to the existing theory developed by previous authors.

LITERATURE REVIEW

Biger *et al.* (2008) after collecting data from enterprise's census for the year 2002-2003, carried out by General Statistical Office, Vietnam, found leverage decreases with profitability and growth opportunities and increases with firm size. Gill *et al.* (2009) in their study found that leverage is negatively correlated with profitability and collateralized assets. Their study was based on the data gathered data form American firms. Odit and Gobardhun (2011) on the basis of data collected from Mauritius firms found a positive relationship between leverage and firm growth.

Gill and Mathur (2011) collected data from 166 Canadian firms and found a positive relationship between firm size and leverage and negative relationships between i) profitability and leverage and ii) collateralized assets and leverage. The review of literature shows that firm's growth opportunities, firm size, asset tangibility and profitability influence the capital structure of the firm but there are so many variables that may influence capital structure but these variables have not been considered in previous studies. Most of the research studies have been conducted in developed countries and there is lack of such studies in developing countries and most of the studies have used four to seven variables in their studies, whereas, this study includes fifteen variables which may influence capital structure of Iron & Steel industry.

OBJECTIVES AND SCOPE OF THE STUDY

The objective of this study is to identify the most significant factors considered by Iron & Steel Industry for designing their capital structure. The present study has been based on secondary data only. The necessary data has been procured from the 'Prowess' maintained by Centre for Monitoring Indian Economy (CMIE). The present study covered period of ten years from 2001-02 to 2010-11. From the list of 500 top companies from Bombay Stock Exchange, firms relating to Iron & Steel Industry have been selected. After proper screening and filtering, we dropped the firms with incomplete data and left with a sample of 21firms.

RESEARCH DESIGN

Measurement of Variables

Dependent Variable

Capital structure refers to the combination of securities to finance the investment needs of a firm. In line with the Pandey et al. (2000) total debt to total assets ratio has been used for measuring leverage in the present study. Total debt includes debt from banks (short term as well as long term) and financial institutions, inter-corporate loans, fixed

deposits from public and directors, foreign loans, loan from government, etc. Total assets include fixed assets and current assets. This study has used book value of debt and total assets. The leverage has been defined for the purpose of this study as follows:

Capital Structure = Total Debt/Total Assets

Independent Variables

The literature has identified a number of firm characteristics as determinants of capital structure decisions made by corporations. Those factors have been discussed in the following section: Growth has been measured as percentage change in total assets. This study has measured size (SZ) of the firm by the taking the natural log of total assets. Earnings before Interest and Taxes (EBIT) divided by total assets have been used as a measure of profitability in this study. Tangibility has been measured as the ratio of net fixed assets to total assets. In this study age has been measured by number of years since incorporation. This study uses the value of the deviation from mean of net profit divided by total number of years for each firm in a given year as a proxy for measuring earning volatility.

This study has used earnings before interest and taxes to fixed interest charges as proxy for measuring the debt service capacity. This study has used dividend per share to earnings per share to measure the dividend payout ratio. This study has used the current ratio as a proxy for liquidity position of the firm. This study has used the depreciation scaled down by total assets to measure non-debt tax shield. The percentage change in EBIT to percentage change in sales is being used for measuring operating leverage.

MPS/EPS has been used as a proxy for price-earning multiplier.

PH has been measured as a percentage of shares held by the promoters to the total number of shares outstanding.

This study has used the following method to calculate the effective tax rate:

TR = 1- (EAT/ EBT)

This study has used selling and distribution expanses over sales as a proxy for uniqueness.

Note: all the variables were calculated using book value.

Panel Data Model

The panel data model has been adopted from Cuong and Canh (2012). From a random sample, we perform panel data techniques of Fixed Effects model and Random Effects model. After this we apply the Hausman's specification test, if the results of this test rejects the null hypothesis, which is, *"difference in coefficients not systematic",* then we

use Fixed Effects model otherwise we apply Random Effects model. Further, we test the validity of Random Effects model by applying Wald chi-square test. Variance Inflation Factor (VIF) has been used to check the multi co-linearity among regressors. In the present study, analysis has been performed with the help of software packages STATA.

EMPIRICAL RESULTS

VIF Test

The value of VIF for all independent variables has been found below 5, hence, there should not be any problem of multi-co linearity in model.

Hausman Test for Fixed versus Random Effects

The value of Hausman's specification test is -22.01; the negative value fails to reject the null hypothesis. Thus, the Random Effects model should be appropriate for this study. Therefore, for the remainder of the analysis we work with Random Effects model.

Regression Results

Table 1.1: Random-effects Regression Results for Determinants of Capital Structure in Iron & Steel Industry

R-sq: within = 0.4259 between = 0.7854 overall = 0.5616	Number of observations = 210 Number of groups = 21 Wald chi^2 (15) = 248.54 Prob > chi^2 = 0.0000
Variable	**Regression Coefficients**
Size (Assets)	-0.046 (2.43)**
Growth (Assets)	0.046 (1.33)
Profitability	-0.599 (3.04)*
Tangibility	-0.256 (2.06)**
Age	-0.002 (2.32)**
Earnings Variability	0.001 (1.04)
Debt Service Capacity	-0.001 (2.61)*
Dividend Payout Ratio	-0.077 (0.79)
Liquidity	-0.008 (0.49)
Non-debt Tax Shield	12.607 (10.55)*
Degree of Operating Leverage	-0.002 (3.20)*
Price-earnings Ratio	0.001 (1.32)
Promoter Holdings	0.084 (0.93)
Tax Rate	-0.007 (0.13)
Uniqueness	-0.151 (0.41)
Cons	0.476 (4.32)
Durbin-Watson Test= 0.747	

**, * indicates significance at 5 per cent and 1 per cent level respectively
Note: The figures given in parentheses indicate the t-values.

EMPIRICAL ANALYSIS

The objective of this study was to find the determinants of capital structure in the Indian Iron & Steel Industry. It is demonstrated through R-square (overall) in the table that 56.16 per cent of variation in capital structure has been explained by model.

The relationship between size and leverage has been observed as negative in Iron & Steel Industry and the relation is statistically significant at 0.05 level. The relation of growth with leverage has been found to be positive in Iron & Steel Industry but the relation is not statistically significant. The relation of profitability with leverage is found to be negative and statistically significant at 0.01 level in Iron & Steel Industry. The beta coefficient for profitability is -0.599 which shows that with one unit change in profitability, the leverage will decline by 0.599 units. The negative relation of profitability with leverage is consistent with the predictions of Pecking Order theory. Negative relationship between profitability and leverage supports the findings of Biger et al. (2008) and Gill et al. (2009) but contradicts with the finding of Abor (2005) who found a positive relationship between profitability and leverage.

The relationship among tangibility and leverage has been found to be negative in Iron & Steel Industry and the relation is statistically significant at .05 level. The negative relation between tangibility and leverage are consistent with Pecking Order theory. Age has negative relation with leverage in Iron & Steel Industry and the relation is statistically significant at .05 level. The positive sign of relationship have been observed between volatility and leverage in Iron & Steel Industry but the relation is not statistically significant. The relation of debt service capacity and degree of operating leverage with capital structure has been found to be negative and statistical significant at .01 level. The relation of dividend payout ratio, liquidity, tax rate and uniqueness with leverage has been found to be negative whereas the relation of price earnings ratio and promoter shareholdings with leverage have been observed as positive for Iron & Steel Industry but these relations are found to be statistically insignificant. The relation of non-debt tax shield with leverage is found to be positive and statistically significant at .01 level.

CONCLUSION

The capital structure of the Indian Iron & Steel Industry is influenced by the firm size, profitability, tangibility, age of the firm, debt service capacity, non-debt tax shield and degree of operating leverage. All other variables have been found statistically insignificant in determining the capital structure in Iron & Steel Industry during study period.

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