The Prize of Having Big Size, Debt and Equity Related To Profitability: An Empirical Analysis

Theme: Corporate Finance

Keywords: Capital Structure, Profitability, National Stock Exchange, FGLS, Energy Sector.

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Abstract

This study attempts to investigate the effect of capital structure and firms' size on profitability by using panel data model for a group of nine energy sector companies listed on National Stock Exchange of India under thematic index. The study period ranges between 2006 -2016 i.e., a period of eleven years. The FGLS panel data analysis reveals that the Long-term debt, equity and firms' size in sales have a significant positive effect on return on assets whereas firms' size in assets has a significant negative effect on return on assets (ROA). In the case of return on

equity (ROE), the second dependent variable, used as a measure of profitability only two independent variables i.e., short-term debt and firms' size in assets, out of five independent variables have significant negative effect on return on equity (ROE). The implication of this study is that these energy sector companies should finance their projects through long-term debt and equity funds ensuring a sufficient level of cash inflows so that the dependence on the short-term debt may be avoided. The two profitability measures, return on assets (ROA) and return on equity (ROE), tend to decrease as the assets size of these companies increase.

Introduction

It is difficult to have an ecumenical mix of debt to equity ratio which can be applied everywhere. Some practitioners have also contended that the growth firm should use a greater amount of equity finance. Companies often focus on the different costs and benefits associated with debt and equity mix while selecting their capital structures. Whenever the topic of the debt to equity is discussed, the optimal capital structure is presented as a solution or an appropriate capital structure. But the point of optimality has also been questioned in recent years and further there is no model to select an optimal capital structure. Since the optimal capital structure which has been selected this year would not remain optimal capital structure for all the time and if the economy enters into a recession in any year, the companies having more debt to equity find themselves burdened with debt. The capital structure can be defined as the combination of debt and equity that a firm uses to finance its operation. It is commonly known that the overall value of the firm can be maximized by minimizing its cost of capital that is, the lower the cost of capital and the higher the value of the firm. Though the existence of the optimal capital structure is still obscure, yet theoretically it is defined as that combination of debt and equity which reduces the cost of capital and enhances the firms' profitability. Theories such as Trade-off theory (Kraus and Litzenberge, 1973), Agency Cost Theory (Jensen and Meckling, 1976), Signaling Theory (Ross, 1977), Pecking Order Hypothesis (Myers and Majluf, 1984), Organizational Theory (Fama and Jensen, 1985) and Market timing theory (Graham and Harvey, 2001) have tried to explain capital structure, yet there is no common consensus regarding the

model that can determine the optimal capital structure. (Myers, 2001) said that "there is no universal theory of the debt-equity choice and no reason to expect one". (Ross, Westerfield, & Jaffe, 2002) argued that "the value of the firm is always the same under different capital structures. They further opined that only that capital structure can have the highest firm value that managers choose and this capital structure will be the most beneficial to the firm's stockholders." (Graham and Harvey, 2001) found out that the tax advantage is very important for large, regulated, and dividend-paying firms or the companies that have a high level of corporate tax brackets and therefore they have large tax incentives to use debt. (Myers, 1984) pointed out that firms that hold valuable intangible assets or growth prospects tend to borrow less than firms that hold mostly tangible assets. (Rajan and Zingales, 1995) confirming (Myers, 1977) said that "firms expecting high future growth should use a greater amount of equity finance".

The rest of the study is organized as follows: Section 2 presents the results of previous empirical studies; section 3 specifies the research methodology, data used in the study and statistical results and discussion. Finally, section four presents the conclusion and recommendations.

2. Review of Literature on Capital Structure

One of the most debatable issues in the financial literature after the mid- past century has been the theory of capital structure. The origin of this debate was the seminal work of Modigliani and Miller who argued that financial leverage does not affect the market value of the firm if there is an existence of a perfect capital market, homogeneous expectation, and no corporate tax. However, (Durand, 1959) questioned their unrealistic assumptions of Modigliani and Miller and (Modigliani and Miller, 1963) corrected their hypothesis and relaxed the assumption of zero taxation and accepted Durand's idea that levered firm would have more value than the firm without debt because of the availability of tax-shield. (Miller, 1977) developed a model through which he showed that when both personal and corporate taxes are taken into account corporate tax advantage is offset by the effects of personal taxes and capital structure becomes irrelevant. Since then many studies have tried to explore the choice of an appropriate mix of debt and equity and its relationship with the profitability of the firm.

(Myers and Majluf, 1984) find profitable firms generating high earnings often use less debt capital comparing with equity than those that do not generate high earnings. (Long and Malitz, 1986) results show that there is no relationship between capital structure and profitability. (Graham, 2000) findings suggest that "the typical firm could double tax benefits by issuing debt until the marginal tax benefit begins to decline." (Chiang et al., 2002) found that profitability and capital structure are interrelated; their study had the sample of 35 companies listed in Hong Kong. (Abor, 2005) studied the relationship between capital structure and profitability of listed firms on the Ghana Stock Exchange over a five-year period (1998 to 2002) and found out a significantly positive relation between the ratio of short-term debt to total assets and ROE and negative relationship between the ratio of long-term debt to total assets and ROE. But the total debt to total assets was found to have a significant positive relationship with ROE meaning that profitable firms choose more debt as their main financing option. (Raheman et al., 2007) tried to examine the effect of Capital Structure on the profitability of firms listed on Islamabad Stock Exchange with a sample of 94 non-financial firms for a period of six years from 1999 – 2004. The results showed that the ratio of total debt / total assets and long-term debt / total debt had a significant negative relationship with profitability indicating that if the firms employ more debt, it would adversely affect their profitability. (Gill, et al., 2011) tried to extend Abor's (2005) findings regarding the effect of capital structure on profitability by examining the effect of capital structure on profitability of the American service and manufacturing firms. The findings of his study show a positive relationship between short-term debt to total assets and profitability, between long-term debt to total assets and profitability and between total debt to total assets and profitability in the manufacturing industry by selecting a sample of 272 American firms listed on New York Stock Exchange for a period of 3 years from 2005 – 2007. (Shubita and Alsawalhah, 2012) results show a significant negative relationship between short-term debt and profitability, between long-term debt and profitability and between total debt and profitability implying that an increase in the short-term debt or long-term debt or total debt is associated with a decrease in profitability. (Yegon, et al., 2014) found a significant negative relationship with the shor- term debt and profitability and the long-term debt was also found to have a significant negative

relationship with the profitability. However, the total debt had no significant relationship with the profitability.

Objectives of the study

The objective of this study was to examine the link between capital structure, firms'size, and profitability of energy sector companies listed on the National Stock Exchange of India.

The specific objectives of this study were to:

i. Assessing the impact of debt financing on firms' profitability listed on the Nifty Energy Index of National Stock Exchange of India.

ii. Studying the impact of equity financing on firms' profitability listed on the Nifty Energy Index of National Stock Exchange of India.

iii. Studying how the size of firms, in terms of sales and total assets, affects profitability.

Research Hypotheses

H01a: There is no significant impact of Short-Term Debt to Total Liabilities on firms' ROA/ROE.

H02a: There is no significant impact of Long-Term Debt to Total Liabilities on firms' ROA/ROE.

H03a: There is no significant impact of ETL (Equity to Total Liabilities) on firms' ROA/ROE.

H04a: There is no significant impact of Company Size in terms of assets on firms' ROA/ROE.

H05a: There is no significant impact of Company Size in terms of sales on firms' ROA/ROE

3. Research Methodology and Data

This study aims at investigating the effects of capital structure choices and firms' size on the financial performance of companies listed on Nifty Energy Index during the ten year period from 2006 to 2016, which is one of the largest sectors in India. The study period starts from 2006 just two years before the world economic meltdown till 2016 in order to capture all the

three phases of Indian stock market i.e., the stock market upturn, then its crash and finally the recovery phase. Previous studies reported that exogenous variables force institutions in the same industry in the same fashion that leads to the existence of an industry specific capital structure. This is why; we have selected a specific sector. Since energy sector facilitates economic development and important for a developing country like India, we have selected this sector. This study is based on secondary data which has been collected from annual financial reports of the sampled firms. In this study nine (9) firms of energy sector have been taken as a sample. All the sampled firms are listed on Nifty Energy Index in India. The companies include (1) Bharat Petroleum Corporation Ltd. (2) GAIL (India) Ltd. (3) Hindustan Petroleum Corporation Ltd. (4) Indian Oil Corporation Ltd. (5) NTPC Ltd. (6) Oil & Natural Gas Corporation Ltd. (7) Power Grid Corporation of India Ltd. (8) Reliance Industries Ltd.(9) Tata Power Co. Ltd. In order to achieve the stated objectives of this study, Ratio Analysis has been employed to confirm the relationship between capital structure and profitability.

Table-1 Description of Variables and their Measurement

Variable	Full Names	IV/DV[1]	Measurement	Signs[2]
ROA	Return on Assets	DV	The Return on Assets ratio was calculated by dividing net profit as a percent of Total Assets.	
ROE	Return on Equity	DV	The Return on equity ratio was calculated by dividing net profit as a percent of shareholder equity.	
LDTL	Long-Term Debt	IV	Long-term Liabilities / Total Liabilities	+/-
SDTL	Short-Term Debt	IV	Current Liabilities / Total Liabilities	+/-
ETL	Equity	IV	Equity/ Total Liabilities	+/-
SG	Total Assets	IV	Log of total assets	+
Size	Total sales	IV	Log of total sales	+

1. Where IV means Independent variable and DV means Dependent variables.
2. After doing the Literature Review, we expect that the three independent variables may have either a positive or negative sign, but the size, in terms of sales and assets, will have a positive effect on profitability. However, contrary to our expectation, firms' size in assets has a negative relationship, sign, with both the measures of profitability in this study.

Descriptive Statistics, Correlation Matrix and VIF Factor

The descriptive statistics and a correlation matrix of dependent and independent variables have been reported in Tables 2 and 3 respectively in the Appendix. It can be seen that the short-term debt and the long-term debt have significant negative correlation with Return on Assets but equity has a significant positive correlation with Return on assets. On the other hand, all the independent variables except equity have no significant correlation with Return on Equity. The firms' equity financing is positively correlated to return on equity. The net sales of the sample firms are positively correlated with short-term debt having 0.516 correlation coefficient but the net sale has a negative relationship with the long-term debt having a -0.369 correlation coefficient. Further, the total assets of the sample firms have a positive relationship with the net sales which is the expected relationship between them. All the correlation coefficients of the variables are below 0.8 and no variable has VIF greater than 5 (Table 4) implying that there is no severe multicollinearity as recommended by Gujarati (2003).

3.1 Model Specification

Feasible generalized least square (FGLS) regression used to analyze the panel data for the likelihood of a presence of heteroskedasticity in the variance of error term and autocorrelation among the panels. The first order auto regressive model has been employed in FGLS by STATA 13 for this multivariable regression analysis.

The basic model for analysis is

$$Y_{it} = \beta_0 + \beta_1 x_{it} + \varepsilon$$

Where

Y = dependent variable

x = independent variable

β_0 = intercept

β_1 = coefficient of the explanatory variable

ε = error term

i = cross-sectional variable starting from 1,2, 3,…………………………… 9

t = time series variable starting form 1, 2, 3 …………………………….. 11

Now the model for estimation as per the dependent and independent variable s are given below.

$$roa_{it} = \beta_0 + \beta_1 \, ldtl_{it} + \beta_2 \, sdtl_{it} + \beta_3 \, etl_{it} + \beta_4 \, size_{it} + \beta_5 \, sg_{it} + \varepsilon_{it} \ldots\ldots\ldots (1)$$

$$roe_{it} = \beta_0 + \beta_1 \, ldtl_{it} + \beta_2 \, sdtl_{it} + \beta_3 \, etl_{it} + \beta_4 \, size_{it} + \beta_5 \, sg_{it} + \varepsilon_{it} \ldots\ldots (2)$$

Here, roa and roe represent return on assets and return on equity respectively as dependent variables and ldtl for Long-term Liabilities to Total Liabilities, sdtl for Current Liabilities to Total Liabilities, etl for Equity to Total Liabilities, size for Log of total sales and sg for Log of total assets as independent variable in equation 1 and 2.

The study employed multidimensional tests to identify and verify the level and degree of consistency, robustness, and accuracy of the models used. Standard and available econometric literatures (Baltagi, 1995 ; Arellano, 2003; Drukker, 2003; Pesaran, 2003 & 2004; Im et al, 2003; Colin and Trivedi, 2005; Wooldridge, 2006; Baum, 2006; Mátyás & Sevestre, 2008; Hsiao, 2014) have been pursued to reach sufficient estimator for panel data analysis. The study tried to identify appropriate model by testing fixed effect or random effect model for panel data analysis through the Hausman's specification test. For equation 1, the null hypothesis of random effect model preference over fixed effect model was rejected. The test result for Eq. 1 is chi2 (5) = 16.19 and P = 0.0011. However, for Eq. 2, the null hypothesis of random effect model preference over fixed effect model could not be rejected. The test result for Eq. 2 is chi2 (5) = 7.21 and P = 0.2054. To detect the cross sectional dependence, heteroscedasticity and serial correlation, some special diagnostic tests were employed. Since panel data set contains both cross section and time dimension, the Pesaran test for cross section independence has been used. The result for Eq. 1 is -0.374 having a p value of 0.7088 and to check for group wise heteroscedasticity the modified Wald test was used for Eq. 1 chi2 (9) = 828.94, p =0.000; and finally, to detect the serial correlation in panel data Wooldridge test has been used. The test result for Eq. 1 is F (1, 62) =9479, F= 0.003.So these diagnostic results indicate the presence of

group wise heteroscedasticity and first order auto-correlation except cross-sectional dependence.[1]

For the Eq.1, to deal with these problems the study used FGLS estimator which assumes this entire problem and a common coefficient of AR (1) for all panel. The panel unit root tests, Fisher type, Pesaran and Im-Pesaran-Shin unit root have revealed that the return on asset, short-term debt, and equity are not panel stationary, so they have been used in their first differences in order to avoid spurious results (Gujrati, 2003). The results of the Eq.1 have been reported in Table 5.

Since the null hypothesis of random effect model preference over fixed effect model could not be rejected for Eq.2. By running random effect model, we checked for the Pesaran test for cross section independence. The result for Eq. 2 is -0.052, having a p value of 0.9586 and to check for the serial correlation in panel data Wooldridge test has been used. The test result for Eq. 2 is F (1, 8) = 8.475, F= 0.0196. It is difficult to check group wise heteroscedasticity in random effect model with xttest3 stata command. We used the xtreghet command to check it.[2] Table -6 reports the result, where it can be seen that even this random effect model is also suffering from the group wise heteroscedasticity and it also has first order auto-correlation except cross-sectional dependence. Even in the case of Eq. 2, we have to use FGLS estimator for the same reasons as discussed for Eq. 1. Table 7 reports the results for the Eq. 2.

3.2 Results and Discussion

The FGLS panel data analysis reveals that out of five independent variables selected, four independent variables, i.e. long-term debt, equity and firms' size in sales and assets have a significant relationship with return on assets (ROA). The results support the previous findings of Paradogonas (2007) that the size, managerial competency, debt composition, fixed assets formation and sales influence significantly firms' profitability. The Long-term debts, equity, and firms' size in sales have a significant positive effect on return on assets whereas firms' size in assets has a significant negative effect on return on assets (ROA). When ROA is negative it

indicates that a company is not utilizing its capital properly and is investing a very high amount of capital into its production while receiving little cash inflows.

In the case of return on equity (ROE), the second dependent variable, used as a measure of profitability only two independent variables i.e., short-term debt and firms' size in assets, out of five independent variables have significant negative effect on return on equity (ROE). The negative effect of short-term debts were also seen in the study of (Shubita and Alsawalhah, 2012) and (Yegon, et al., 2014) but it is against the findings of (Gill, et al., 2011). The implication of this study is that these energy sector companies should finance their projects through long-term debt and equity funds. The short-term debt taken to finance day-to-day operation is not contributing to increase the return on equity rather it has a negative effect on it. The two profitability measures, return on assets (ROA) and return on equity (ROE), tend to decrease as the assets size of these companies increase.

4. CONCLUSION & Recommendation

An enormous literature exists that discusses the relationship between capital structure and profitability, yet the exact relationship is still obscure because of the mixed findings. Scholars in the field of corporate finance theory also agree that the relationship between real decisions and financial decisions of a firm is not obvious even if many theories of capital structure have tried to explain this relationship. In the present context, this study aimed at investigating the impact of capital structure (short-term- debt, long- term- debt, equity) and firms' size in sales and assets on financial performance as measured by return on assets (ROA) and return on equity (ROE) for a period of eleven years starting in 2006. This study hypothesized that these independent variables are not significantly associated with firm's financial performance. The results indicated that the long-term debt, equity and firms' size in sales do have significant positive impact on ROA but firms' size in assets has a significant negative impact and ROA. The short-term debt and firms' size in assets has a negative impact on return equity. This negative relationship confirmed that short-term debts are more high-priced than long-term debt and equity. So, the more the short-term debt is employed, the lower will be return on equity. The results of this study cannot be generalized because of a small size of sample. Indian energy firms

should try to utilize their capital in a more productive way so that their return on assets (ROA) may not go negative. So, it is recommended to conduct the same or a similar study by incorporating those factors which explain return on equity more and find out the nature of the relationship of those variables with return on equity (ROE).

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Notes:

1. According to Reed& Ye (2014), we should use Feasible Generalized Least Squares (FGLS) estimator if the panel suffers from Group wise hetroskedasticity and Serial correlation. Reed, W. R., & Ye, H. (2011). Which panel data estimator should I use? Applied Economics, 43(8), 989.
2. The command we have used to check for group wise hetroskedasticity in the random effect model: xtreghet roe ldtl sdtl etl size sg, id(companycode) it (year) model(xtmlh) mhet (ldtl sdtl etl size sg) diag lmhet.

Table-2 Descriptive Statistics

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

VARIABLES	N	sum	mean	min	max	Var	sd	skewness	kurtosis
roe	99	13.56	0.137	0.0232	0.302	0.00277	0.0527	0.501	3.279
roa	99	6.054	0.0612	0.0103	0.173	0.00138	0.0371	0.921	3.306
sdtl	99	24.57	0.248	0.00981	0.711	0.0212	0.146	1.220	4.042
ldtl	99	30.45	0.308	0.0203	0.600	0.0174	0.132	0.432	2.790
size	99	1,087	10.98	8.054	13.57	1.913	1.383	-0.379	2.105
sg	99	486.4	4.913	3.984	6.343	0.179	0.424	0.452	3.863
etl	99	41.80	0.422	0.0699	0.695	0.0244	0.156	0.00813	1.703

Table-3 Correlation Matrix

(1)

	roa	roe	sdtl	ldtl	etl	size	sg
roa	1						
roe	0.722***	1					
sdtl	-0.349***	-0.156	1				
ldtl	-0.423***	-0.173	-0.334***	1			
etl	0.795***	0.290**	-0.515***	-0.441***	1		

size	-0.0224	0.109	0.516***	-0.369***	-0.0908	1	
sg	0.0369	0.121	-0.0679	-0.123	0.0440	0.644***	1

$^*p < 0.05,$ $^{**}p < 0.01,$ $^{***}p < 0.001$

Table -4 Variable Inflation Factor

Variable	VIF	1/VIF or Tolerance
Sdtl	2.22	0.4514
Ldtl	1.37	0.7285
etl	1.17	0.8566
size	3.87	0.2586
sg	2.73	0.3658

-- Mean VIF 2.27

$^*p < 0.05,$ $^{**}p < 0.01,$ $^{***}p < 0.001$

Table- 5 Cross-sectional time-series FGLS regression, For the Equation 1.

	(1)
VARIABLES	D.roa
ldtl	0.0271**
	(0.0132)
D.sdtl	0.00571
	(0.0230)
D.etl	0.177***

	(0.0173)	Coefficients: generalized least squares
size	0.00360**	
	(0.00167)	Panels: homoscedastic
sg	-0.0121**	
	(0.00516)	Correlation: no autocorrelation
Constant	0.0108	
	(0.0206)	Standard errors in parentheses
Observations	90	*** p<0.01, ** p<0.05, * p<0.1
Number of company code	9	

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Table-6 * Panel Group wise Heteroscedasticity Tests

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Ho: Panel Homoscedasticity - Ha: Panel Group wise Heteroscedasticity

- Lagrange Multiplier LM Test   =3871.7680   P-Value > Chi2(8)   0.0000

- Likelihood Ratio LR Test   = 28.8782   P-Value > Chi2(8)   0.0003

- Wald Test   = 6.42e+04   P-Value > Chi2(9)   0.0000

Table-7:Cross-sectional time-series FGLS regression, For the Equation 2.

VARIABLES	D.roe
ldtl	0.0120
	(0.0380)
D.sdtl	-0.136**
	(0.0666)
D.etl	0.0791
	(0.0499)
size	0.00615
	(0.00482)
sg	-0.0297**
	(0.0149)
Constant	0.0783
	(0.0595)
Observations	90
Number of company code	9

Coefficients: generalized least squares

Panels: homoscedastic

Correlation: no autocorrelation

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0