

Empirical Testing of Target Adjustment Model of Capital structure: A Study on Indian Power Sector

Dr. Nirmala J*

Assistant professor, Department of Management Studies,
Vijayanagara Sri Krishnadevaraya University, Bellary
Email: nirmala029@gmail.com

Abstract:

The paper is on the study of empirical testing on target adjustment model on traditional trade-off theory of capital structure. The study is based on the sample data drawn from the power sector for the five year that is from the year 2011-12 to 2015-16. The study examines the optimal capital structure of selected companies in the power sector listed firms in Bombay Stock Exchange. For examining the target capital structure of power sector companies in this study considers, amount of debt issued in the select companies of the power sector as a dependent variable and change in debt and target debt as the independent variables of the select companies of the power sector are included. These variables relates to the traditional trade-off theory. The empirical evidence provides strong evidence of the traditional trade-off theory.

Keywords: power sector, Bombay stock exchange, traditional trade-off theory. Simple regression test, capital structure, change in debt and amount of debt issued.

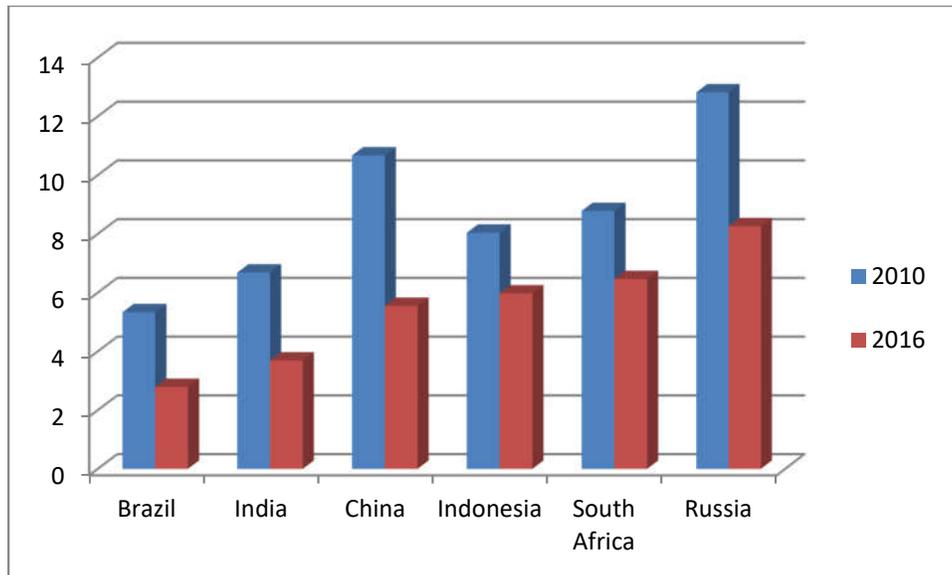
Introduction

Every company irrespective of the size strives hard to have optimal capital structure. Capital Structure is a mix of debt and equity capital of firm. It is also called as financial structure of a firm. It is very important as it related to the ability of the firm cater to the needs of its stakeholders, besides expansion, diversification and modernization.

The CEOs of companies who are guided by the board of directors shall act prudently to ensure optimal capital structure. The capital in both the forms, as stated above is imperative to undertake large scale operations. The objectives are envisaged by objective clause of Memorandum of Association, which is a charter of the company. Capital is needed for companies to go for the acquisition of fixed assets, intellectual capability and also to maintain modernization to meet the demand periodically. As long as the companies functions effectively, they can earn profit and thereby meet the obligations in terms of payment of interest on long term liabilities and tax.

Indian Corporate debt:

In this section the researcher studied the Indian corporate debt growth in the study period. The rate of debt growth measured to single digits in financial year 2016 for the first time ever since financial year 2013. Corporate firm's debt repayment capability has remained fragile. Less profitability on slower demand and the crumple in commodity prices has worn corporate firm's debt repayment capability. It is estimated corporate firm's debt increases to 56% of gross domestic product in the year 2016 from 55% in the year 2014. The net profit of corporate firms in the BSE 500 reduced to 17% in 2015 from 18% in the year 2012. The interest coverage ratio measured by EBIT/interest on debt declined to 3.77 from elevated of 8.94 in the year 2005.

Figure: Interest coverage ratio (ICR)

Source: International Monetary Fund, global financial stability report

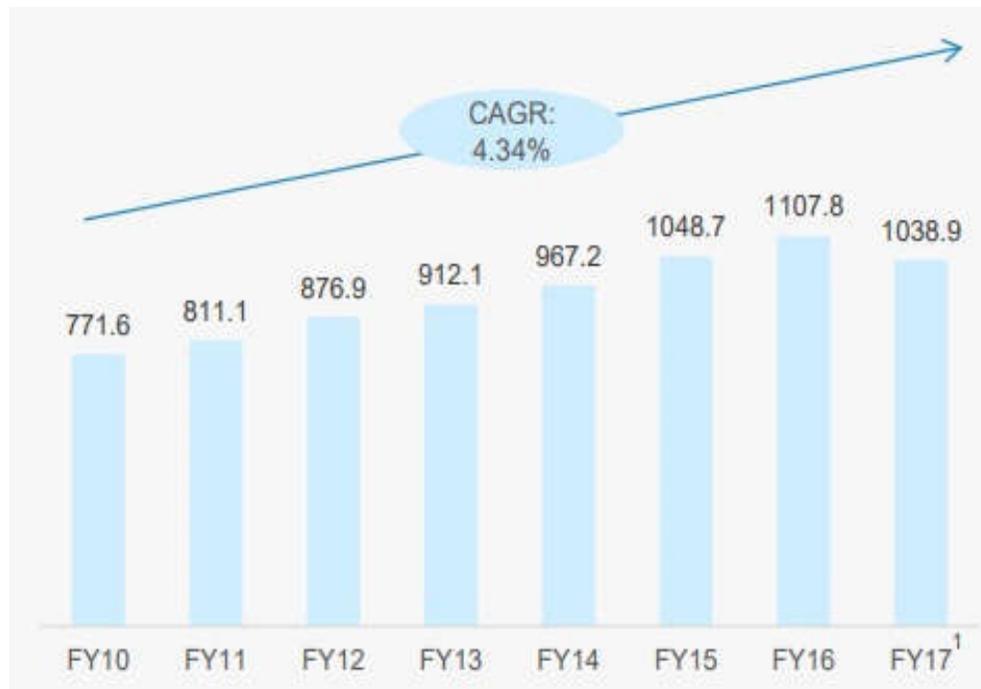
Trade-Off Theory:

This theory is propounded by *Kraus and Litzenberger*⁵ the term trade-off theory is used by different authors. Under this a decision maker of a firm evaluates the various costs and benefits of alternative leverage plans. That means marginal costs and marginal benefits are balanced. The original version of the trade-off theory grew out of the debate on the **Modigliani-Miller** theorem. When corporate income tax was added to the original irrelevance, benefit for debt shield earnings from taxes, since the firm's objective function is linear and there is no offsetting cost of debt, which 100% debt financing.

Power Sector in India:

The development and existence of adequate transport, road and railways and other infrastructure is vital for persistent growth of the economy. The country's power sector is one of the main diversified in the global market. Sources of power generation vary from conformist sources like natural gas, coal, lignite, nuclear, oil and hydro power to feasible non conformist sources like solar, wind and domestic waste. India takes third position among 40 nations in producing. The Indian power sector's Market Size is changing that has redefining the whole industry outlook. Sustained economic growth of power sector is continually increasing demand of electricity in India. The Indian government has taken initiatives in aiming 'Power for all which has accelerated capacity addition in India. The Indian Ministry of Power has set an objective to increase 1,229.4 billion units of electricity in the year 2017, which is 50 billion units higher than the 2016's objective.

Figure: Electricity Production in India (Billion units)



Source : SIAM, TechSci Research

Table: Indian per capita electricity consumption (Kilo watt per hour)

Financial year	Consumption (Kwh)
2011	818.7
2012	883.6
2013	914.41
2014	957
2015	1010
2016	1075

Source : SIAM, TechSci Research

Review of Literature

In this study an attempt has made to examine the contributions given by the experts on cost of capital, capital structure, and its associated issues across the world. In order to find out the gaps of optimal capital structure it is appropriate to review the literature available on the affiliated aspects of this study.

Attiya Yasmin Javid and Qaisar Imad (2012)¹, investigates in their study on A De-composition Analysis of Capital Structure- evidence from Pakistan's Manufacturing Sector in detail by carrying out panel data regressions for 77 non-financial firms for the period 2008–2010. They examined capital structure by ratios of non-equity liabilities to TA, debt to TA, debt to capital, and adjusted debt to adjusted capital and found that large firms are more likely to access long-term debt borrowing than small firms and that, small firms resort to short-term debt.

Nyanamba, Nyangweso, and Omari,(2013)², made an attempt to explore the factors which affects the capital structure along with microenterprises. The aim of the study was to identify the factors influencing capital structure of microenterprises, and to set up the level to which the factors affect, and to evaluate the extent to which microenterprises used external sources finance.

Lucy, Muathe and George (2014)³ conducted a study to investigated on the relationship between capital structure and performance of firms Listed In the Nairobi Securities Exchange(NSE), Kenya. This paper evaluated the relationship of capital structure on the performance of nonfinancial firms listed in the Nairobi Securities Exchange. The analysis employed a descriptive non experimental research design.

Songul kakilli acaravci (2015)⁴, investigated capital structure determinants Turkey by applying panel data methods. The sample period is 17 years for 79 companies in the manufacturing sector traded on the Istanbul Stock Exchange. The model was expanded with sector specific effects and size. The paper compares effects on capital structure according to size and sectors of variables used in models are profitability, tangibility, non-debt tax shields, growth opportunities and size, are considered as the firm specific variables that affect capital structure.

Tharmalingam and Weerakoon (2016)⁵, examined the determinants of capital structure of selected listed companies in Sri Lanka with sample 55 companies listed in Colombo Stock Exchange, analysed applying the fixed effects model. Based on the results of the panel data analysis over the period of 2003 to 2012, Profitability has insignificant relationship with leverage, while size and growth is significant positive association with leverage. Tangibility and Non-debt tax shields point towards insignificant impacts on leverage.

Research methodology

In this study an attempt is made in testing traditional trade-off theory by regressing current debt ratios of select companies in the power sector next to past debt ratios of select companies in the power sector. Regressing current debt ratios against past debt ratios absorbs in the twofold estimate that company's debt ratios are moderately constant but have a mean-reverting tendency. If debt ratios are steady over time, there is a significant relationship between company's debt ratios of power sector at two diverse time period.

Objectives of the study:

1. To understand the capital structure adopted by the selected power sector companies listed in the BSE.
2. To evaluate empirically target adjustment model of traditional trade-off theory in the power sector.

Data collection techniques:

The data was collected from Capitaline database which is secondary source in nature.

Selection Criteria:

The firms engaged in mergers and acquisition during the study period is also excluded justifying the reason that during the period the real picture of the companies under mergers and acquisition distort the facts.

Sample size:

The study conducted is to test the applicability of the traditional trade-off theory by the means of empirical evidence of the selected power sector company's target capital structure. The study period is from the year 2010-11 to 2015-16. The top 10 companies of S&P BSE Power is selected which is according to their market capitalization out of which 9 companies are selected on the basis of selection criteria of the study.

Analytical Software:

Stata 12.0 software is used for the study. The study has used simple regression and panel data as statistical tool for analysis. The power sector company's data are collected in time-series as well as cross-sectional series in nature.

Research Model for Empirical Testing of Target Adjustment Model

To know whether the companies under the study are maintaining optimal capital structure, the following model is applied (*Lakshmi Shyam Sunder & Stewart C. Myers 1994*). The target adjustment model state that changes in the leverage are explained by variations of the current ratio from the optimal capital structure (target).

$$\Delta D_{it} = \alpha + \beta_{TA} (D_{it}^* - D_{it-1}) + \varepsilon_{it}$$

Source: (Sunder & Myers 1994)

Where,

ΔD_{it} = The debt amount issued of the power sector companies i at time t,

D_{it}^* = target debt level of the power sector companies i at time t.

D_{it-1} = Change in debt of the power sector companies i at time t.

Hypothesis:

The hypothesis to be tested is:

H1: $\beta_{TA} > 0$, the target adjustment model indicates the select companies of the power sector are towards the optimal capital structure.

Testing the target adjustment model of the traditional trade-off theory of Power sector.

Independent Variable: Δd_{it} = (The target debt level of power sector firm i at time t)

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(Change in debt of firm i at time t)

Dependent Variable: d_{it} = The amount of debt issued of firm i at time t

Method : Panel data

Data analysis:

. regress dit Δd_{it}

Source	SS	df	MS	
Model	3.2585e+10	1	3.2585e+10	Number of obs = 45
Residual	153215654	43	3563154.75	F(1, 43) = 9144.89
Total	3.2738e+10	44	744042606	Prob > F = 0.0000
				R-squared = 0.9953
				Adj R-squared = 0.9952
				Root MSE = 1887.6

dit	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Δd_{it}	1.200118	.0125497	95.63	0.000	1.174809	1.225427
_cons	-10.20801	334.1387	-0.03	0.976	-684.0629	663.6469

Interpretation:

On the above analysis of Target adjustment model of 45 observations (9 companies with 5 years data), R^2 is 0.9953 or approximately 99% of variance of amount of debt issued explained by its independent variables. This shows that selected companies of Power sector's debt issue is deviated by 99% from the target debt. At 95% confidence level T- value is more than 1.96. T statistic is positive and it is 95.63. This indicates that independent variable of target adjustment model has significant influence on the amount of debt issue is the current year.

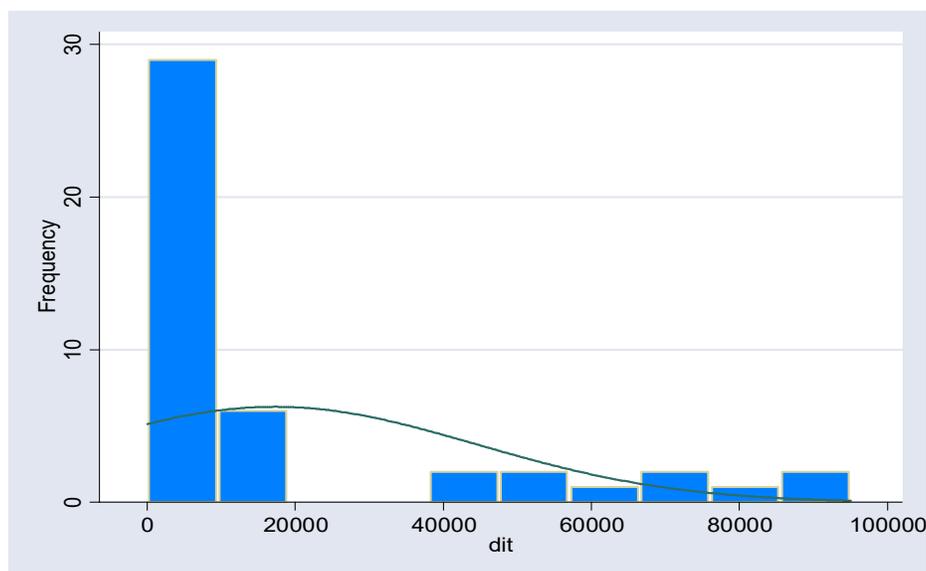
Adjusted R-square is 0.9952, which means 99.52% is adjusted by the number of independent variables. As the number of independent variables in the target adjustment model is small and number of cases in Power sector (9 companies) is large, adjusted R-square is closer to R-square value.

P value of the above analysis is less than 0.05. This indicates the regression model is acceptable as coefficient of target adjustment model is different than zero which means adjustment towards target. In addition, coefficient of target adjustment model is more than 1 which implies that the selected companies are not maintaining positive adjustment cost towards the target.

The standard beta coefficient is 0.9976. The coefficient is 1.200. According to the theory the speed of adjustment towards the target should vary from 0 to 1. Whereas in the case of power sector the speed of adjustment is towards the target leverage cannot be calculated as the coefficient is more than 1. The companies with actual leverage have deviated from target leverage. The companies finds difficult to adjust as it is costly to revert to the target.

The companies may encounters potentially large financial distress cost. Therefore the selected companies of power sector are not following Traditional Trade off theory as its coefficient is more than 1. Significantly, these power companies are considerably over levered which are above-target leverage.

Figure: Frequency of dit(Debt amount issued) of power sector



The above graph shows the frequency of debt amount issued of selected companies in the power sector. Debt amount issued (dit) is the dependent variable of target adjustment model. The above frequency histogram graph for 45 observations (9 companies with 5 years) is by the estimation of summary of statistics. The average of dit is equal to 17220.91, average to describe the company's debt amount issued with a single value that signifies the centre of the data. Standard deviation is 27277.14 this indicates how spread out the debt amount issued of power companies are from the mean.

Skewness is 1.595589 and it is positively skewed or right skewed data as its skewness value is greater than 0. Companies of power sector have increasingly debt amount issued in the study period. Kurtosis value is 4.168471, it is a positive kurtosis which indicates that the distribution has sharper peak and heavier than the normal distribution. The companies of power sector that follow a t-distribution have a positive kurtosis value.

Conclusion:

Analysis from power sector of nine companies, the standard beta coefficient is 0.9976. The coefficient is 1.0018. The speed of adjustment is towards the target leverage cannot be calculated as the coefficient is more than 1 For that reason the selected companies of power sector are not following Traditional Trade off theory as its coefficient is more than one.

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