Factors affecting Financing Decision of Indian Power & Energy Sector and Testing of Capital Structure Theories: Panel Data Analysis

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Abstract
Capital structure (CS) is defined as combination of various sources of funds employed in business. Appropriate source of financing is inevitable for any company to exist. Present paper analyses the determinants affecting the choice of debt or equity of selected power and energy sector companies of India. For the purpose of empirical testing, panel data of 25 listed companies has been collected for 10 years (2010-2019). Based on panel regression model, the study concludes that profitability, tangibility, liquidity, non-debt tax shield, and interest coverage ratio are major determinants of CS choice of selected companies. In addition to this, study also validate the applicability of CS theories in Indian set up and concludes that power & energy companies follow the propositions of pecking order and trade-off theory. The findings of the paper will be useful to managers as it portrays critical factors affecting the CS and analysing their impact on financing decision. It will also enrich the existing pool of research in the area of capital structure and bridge the gap in existing research.

Key Words: Capital Structure, Determinants, Pecking Order Theory, Power & Energy, Trade-off theory

JEL Classification: G30, G32
INTRODUCTION

Finance is one of the key resources required for setting up as well as survival of any business. Conventionally, finance can be raised either from equity sources or borrowed sources. Such combination of borrowed and owned funds is defined as ‘Capital Structure’ (CS) in corporate finance. CS has remained to be the interest of many financial inquiries and managerial decision making. Appropriate source of finance can add value to the firms’ profitability and financial performance. David Durand (1952) has ignited the discussion in the area of capital structure in form of ‘Net Operating Income (NOI)’ approach. The theory proposed that firm value depends on earning efficiency of assets employed in the business and not on the source of financing those assets. Such irrelevance argument was further augmented by Modigliani and Miller (MM) (1958) wherein authors have concluded that firms’ performance is invariant of its CS in light of assumptions like absence of taxes and perfect capital market. On the contrary ‘Net Income’ (NI) approach concluded that higher borrowings lead to increase in value of firms as debt funds are cheaper than common stock. Hence, higher debt brings the overall cost of capital down and uplifts the value of firm. According to Ezra Solomon (1963), cost of capital also behaves like cost of production and follows U-shape pattern i.e. decreases with high debt ratio because debt is available at less cost, reaches to a minimum point termed as ‘optimal CS’ and then increases with debt ratio because investors and creditors expect higher return due to increase in risk. Later, MM (1963) revised their proposition of irrelevance by incorporating effect of corporate taxes and concluded that debt financing upsurges the value of firm as interest payment reduces the taxable profit and thereby tax liability can be curtailed.

Further, the debate on CS and value of firm has been broadened by Jensen & Mackling (1976) who have advocated ‘trade-off theory’ according to which every firm trades off between tax benefit of finance cost and cost of financial distress. Companies resort to borrowings to avail tax incentives on interest cost but debt financing beyond acceptable limits result into bankruptcy. Another important contribution is ‘pecking order theory’ from Myers (1984) which concluded that companies prefer retained earnings over debt and debt over external equity financing. It signifies that profitable firms prefers internal source of financing over external sources. This discussion concludes that CS decision requires critical evaluation of
various factors as appropriate financing policy is indispensable part of finance managers’ role.

CS has attained huge attention from research scholars as well as management practitioners, but the conclusions cannot be generalized because CS decisions are highly sensitive to firm specific and industry associated factors. Companies within the same industry may behave differently in their financing practices because of varying financial goals, profitability, size, access to capital market and such other factors. It is important to study the factors affecting CS decision as right mix of debt-equity proportion will minimize the cost of funds and will optimize value of firm.

POWER AND ENERGY SECTOR IN INDIA

Power & energy sector is one of the strategic industries with national interest. It provides infrastructural facilities for other businesses to exist. Indian power and energy sector secure third rank in the world in terms of production and India is the third largest consumer of electricity across the globe. The largest contributor of the segment is thermal energy that accounts for 63.42% of total installed capacity of power generation. Besides non-renewable sources, Indian energy sector has considerably grown in the renewable energy segments consisting of 21.96% of total capacity. Indian Hydro power segment is also growing with 12.72% share in total capacity. Power & energy industry requires large investments in form of set up and establishment cost. Besides, this industry has longer payback period so carefully planning of financing choice is inevitable. Increasing urbanization industrial growth, increasing national income and government initiative towards electrification of rural areas are the major growth drives of the industry. As 100% FDI is allowed, Indian power and energy sector has planned to accumulate investment of around USD 128 billion by 2023. Though constantly growing demand and favourable regulatory framework portrays positive sign for the sector, Indian energy industry has long way to go in the field renewable and non-conventional sources of generating power.
LITERATURE REVIEW

In this section critical evaluation of empirical studies in the area of CS and its determinants has been presented. Based on literature review, a conceptual model has been developed at the end.

Most of the research inquiries under CS have focused on identification of firm specific factors that lead to existing financing decision as well as the applicability of theories like ‘pecking order’ and ‘trade off’ in the real world. (Ashraf & Rasool, 2013; Awan & Amin, 2014; Alipour, Mohammadi, & Derakhshan, 2015; Hossain & Hossain, 2015; M’ng, Rahman, & Sannacy, 2017; Rao, Kumar, & Madhvan, 2019; Mayuri & Kengatharan, 2019; Nguyen, Ho, & Vo, 2019).

As company achieves stable profits, it gradually discharge its liabilities and become less dependent on external funds. Profitable firms rely on internally generated funds and hence there exists inverse relationship between profitability and leverage (Bauer, 2004; Iqbal, Ahmad, & Ali, 2019; Vintila, Gherghina, & Toader, 2019; Amraoui, Jianmu, & Bouarara, 2018). Though majority of research findings supports negative relationship between leverage and profitability, positive and consistent financial performance act as an attraction for lenders and financial institutions (FIs) as it ensures safety of funds and regular returns. Profitability improves borrowing power of firms and gives positive signal in the capital market (Ross, 1977; Myres & Majluf, 1984). This relationship has been validated through empirical findings of Dakua (2018), Ramli, Latan, & Solovida (2019) and Rao et al., (2019) who have concluded positive impact of profitability on borrowings.

Long-term debt are usually secured by pledging fixed assets with banks or FIs because of large amount and longer repayment period. Higher proportion of fixed asset (termed as Tangibility) facilitates debt raising for companies (Rani, Narain, & Dhawan, 2016; M’ng et al., 2017; Sathyanarayana, Harish, & Kumar, 2017; Yousef, 2019). On the contrary, agency theory (Ross, 1977) supports negative relationship between tangibility and debt ratio. ACARAVCI (2015) has validated the conclusion of agency theory through statistical evidence.

Large firms avails the benefit of huge asset base and diversified operations and hence they are less exposed to default risk as compared to small size firms. As a result larger firms can have better access to debt (Titman & Wessels, 1988). Trade off theory also supports that size and borrowings are directly related. Jarallah, Saleh, & Salim (2019) have
conducted an extensive research on a large sample of 1362 companies with time period of 25 years (1991-2015) and concluded that large size firms are better off compare to smaller ones while raising debt financing. Amraoui, Jianmu, & Bouarara (2018), Li & Islam (2018) and Wang, Manry, & Rosa (2018) have also concluded identical results in their research. As against this, pecking order theory concluded reverse i.e. large size firms depend on retained earnings as they have vintage benefit and established returns (Rao et al., 2019). Small size firms cannot generate enough earnigs to fund their investment requirements hence they rely more on external sources especially debt because issuing equity may not be feasible. Hence, as the firm grow in size it will reduce debt burden indicating negative impact of size on debt (Handoo & Sharma, 2014; Mallikarjunappa and Goveas, 2018; Vintila, Gherghina, & Toader, 2019).

Abor (2008) proposed that growing firms require capital to finance large scale operations. Most of research studies uses one of the three measurements of growth i.e. sales growth (Bogna, Marszalek, & Sekula 2015; Roa et al., 2019), asset growth (Titman & Wessels, 2018; Mallikarjunappa and Goveas, 2018), Tobin’s Q ratio (Rani et al., 2016; Yousef, 2019). High growth indicates better financial position which paves way for borrowings (Ramli, Latan, & Solovida, 2019). Besides, growing firms prefers debt as compared to equity to avail favorable financial leverage. Hence, growth has positive impact on debt ratio (Rani et al., 2016; Sathyanarayana et al., 2017; Mayuri & Kengatharan, 2019). On the other side, trade-off theory and agency theory determines negative relation between growth and debt financing as growing firms are more exposed to losses in case of financial distress (Yousef, 2019). Such negative relation was further supported by the research findings of Bauer (2004) and Alipour, Mohammadi, & Derakhshan (2015).

Liquidity shows the ability of a firm to meet short term obligations. Higher liquidity ensures sufficient funds indicating lower requirement of external financing (Berkman, İskenderoğlu, Karadeniz, & Ayyildiz, 2016; Amraoui et. al., 2018; Vintila, Gherghina, & Toader, 2019). Pecking order and agency theory signifies that greater liquidity indicates lesser borrowings. As against this, Amin (2014), Alipour, Mohammadi, & Derakhshan (2015) and Ramli et al., (2019) have suggested direct impact of liquidity as higher current ratio indicates better performance and capabilities to stand against short or long term financial crisis.
Interest payment on debt reduces tax liability and hence value of the levered firm will be higher than unlevered firm to the extent of tax savings on financial cost (MM, 1963). Hence, a positive relation between tax rate and debt financing can be assumed. Though theatrically it is inferred that tax rate has positive relation with leverage, very few empirical studies have proved the same (Only one i.e. Bauer, 2004). However, Fama & French (1998) have concluded that net tax benefit from debt is nil. Against this, non-debt tax shield such as depreciation and amortisation may serve as an alternative to reduce tax liabilities (DeAngelo & Masulis, 1980). Therefore, non-debt tax shield has negative impact on debt-financing (Titman & Wessels, 1988; Ramaratnam & Jayaraman, 2013; Hossain & Hossain, 2015; Vijayalakshami, 2016; Ramli et al., 2019).

Firms with higher debt should ensure enough earnings to serve interest cost of borrowings. High degree of debt service capacity depicts ability of firm to meet its fixed interest obligations even if operating profits shows considerable decline. Hence borrowings are directly correlated with interest coverage ratio of firms (Mittal & Singla, 1992).

On the basis of review of literature, a conceptual model (figure – 1) has been developed integrating the firm specific as well as macro economic variables affecting CS choice of firm. The current research is limited to assess the effect of firm specific factors on leverage decision.

Through review of existing literature, it is evidential conclusion of various theatrical and empirical research are contradictory which necessitates further probing in this area. Further, limited research work has been carried out focusing on power and energy sector of India.

Figure 1: Conceptual Model of CS Determinants

![Conceptual Model of CS Determinants](source: Developed by Author)
METHODS

Present section briefly outlines the operational plan of research comprising of objectives, variables of study, research hypothesis, sampling and data collection, analytical tools used and econometric model applied for testing.

Research Objectives

- Primarily the study is intended to analyse the determinants of CS decision of selected firms of Indian power and energy sector.
- In addition to this, the research will also comment on the applicability of CS theories like pecking-order and trade-off theory in the Indian power & energy sector.

Variables and Hypothesis

In light of existing literature, 10 variables are identified for the study and the same has been grouped as dependent and independent. This section gives an overview of selected variables and statement of null hypothesis that shall be tested using statistical methods.

**Dependent Variables**

Capital structure variables are considered as dependent one and they are represented by debt-equity ratio (Mallikarjunappa & Goveas, 2007; Sathyanarayana et. al., 2017; Baraja & Yosya, 2018) and debt-asset ratio (Margaretha & Fitrah, 2012; M’ng et al., 2017; Amraoui et al., 2018)

\[
\text{Debt–Equity Ratio} = \frac{\text{Total Debt}}{\text{Equity}} \quad \text{Debt–Asset Ratio} = \frac{\text{Total Debt}}{\text{Total Asset}}
\]

**Independent Variables**

**Profitability (PRF):** According to pecking order theory profitability has negative impact on debt ratio whereas signalling theory concludes inverse relation. Profitability can be measured by taking ratio of operating profit to total asset (ACARAVCI, 2015; Amraoui et al., 2018)

\[
\text{Profitability} = \frac{\text{EBIT}}{\text{Total Asset}}
\]

H01: Profitability has no significant impact on debt – equity ratio
H02: Profitability has no significant impact on debt – asset ratio.
Tangibility (TG): Tangible assets can be used as collateral for raising long-term loans and therefore directly related to debt ratio of firms. Tangibility is measured by proportion of net fixed assets to total assets (Berkman et al., 2016; Rani et al., 2016).

\[
\text{Tangibility} = \frac{\text{Net Fixed Assets}}{\text{Total Assets}}
\]

H03: Tangibility has no significant impact on debt – equity ratio
H04: Tangibility has no significant impact on debt – asset ratio.

Size (SZ): According to pecking order theory, large size firms can use accumulated profits to meet their financing requirement whereas trade off theory concludes that giant firms can easily raise funds and hence prefer debt over equity. Size of a firm can be represented by taking natural logarithm of total assets (Wang, Manry, & Rosa, 2018; Jarallah, Saleh, & Salim, 2019).

\[
\text{Size} = \log_{10} (\text{Total Asset})
\]

H05: Size has no significant impact on debt – equity ratio.
H06: Size has no significant impact on debt – asset ratio.

Growth (GR): Growing firms require new funds to support higher level of production and other operations. High growth signals better financial performance which assists in raising funds. Growth opportunities are calculated as sales growth on annual basis (Mayuri & Kengatharan, 2019; Rao et., al., 2019).

\[
\text{Growth} = \frac{\text{Sale}_n - \text{Sale}_{n-1}}{\text{Sale}_{n-1}}
\]

H07: Growth does not have significant impact on debt – equity ratio.
H08: Growth does not have significant impact on debt – asset ratio.
**Liquidity (LIQ):** Liquidity represents short-term solvency of firm. It is aimed to provide for sufficient funds for fulfilling current liabilities without restoring external financing. Current study uses ratio of current assets to current liabilities as proxy of liquidity (Rani et al., 2016; Amraoui et al., 2018; Baraja & Yosya, 2018)

\[
\text{Liquidity} = \frac{\text{Current Asset}}{\text{Current Liabilities}}
\]

H09: Liquidity does not have significant impact on debt – equity ratio.

H10: Liquidity does not have significant impact on debt – asset ratio.

**Non-debt tax shield (NTS):** Interest act as tax shield as it is allowed as expense under tax laws. Other than interest, depreciation and amortisation can also be claimed as expenses that will diminish tax liability. Therefore, it can serve as substitute for debt tax shield. Ratio of depreciation and amortisation to total assets has been used to represent non-debt tax shield (Dakua, 2018; Iqbal et al., 2019).

\[
\text{Non-debt tax shield} = \frac{\text{Depreciation & Amortisation}}{\text{Total Assets}}
\]

H11: Non-debt tax shield does not have significant impact on debt – equity ratio.

H12: Non-debt tax shield does not have significant impact on debt – asset ratio.

**Tax Rate (TR):** MM (1963) advocates that tax deductibility on interest payment has positive effect on value of the firm. On the other hand, net tax benefit from interest is eliminated when cost of financial distress is incorporated (Fama & French, 1998). Hence, tax rate can have two way effect on financing choice of firms. Effect of Tax rate can be measured by dividing tax provision with earning before tax (Mallikarjunappa & Goveas, 2007; Wang et al., 2018).

\[
\text{Tax Rate} = \frac{\text{Provision of Tax}}{\text{Profit Before Tax}}
\]
**H13**: Tax rate does not have significant impact on debt–equity ratio.

**H14**: Tax rate does not have significant impact on debt–asset ratio.

**Interest Coverage Ratio (ICR)**: Interest coverage ratio signifies firm’s ability to cover its interest cost against decline in operating profit. Higher coverage ratio indicates favourable scenario for debt raising. Interest cover is measured by taking ratio of earnings before interest and taxes (EBIT) and interest expenses (Mallikarjunappa & Goveas, 2007; Handoo & Sharma, 2014)

\[
\text{Interest Coverage Ratio} = \frac{\text{EBIT}}{\text{Interest Expenses}}
\]

**H15**: Interest coverage ratio does not have significant impact on debt–equity ratio.

**H16**: Interest coverage ratio does not have significant impact on debt–asset ratio.

**Sample Selection and Data Collection**

The scope of current research is focused on listed power and energy sector in India. Multistage sampling technique has been applied for sample selection. Constituents of Power & Energy sector index of Bombay Stock Exchange (BSE) are considered for study purpose. Secondary data for a period of 10 years (2010–2019) has been collected from CMIE Prowess and Ace Equity database. The final sample will include 250 (25×10) firm-year observations for each variable.

**Table 1. Sample Selection**

| Particulars                              | Number of Companies |
|------------------------------------------|---------------------|
| Constituents of S&P BSE Power            | 13                  |
| Constituents of S&P BSE Energy           | 23                  |
| **Total Companies**                      | **36**              |
| Less: Companies with Incomplete data     | (5)                 |
| Less: Companies listed for less than 10 years | (6)             |
| **Final Selection of Sample**            | **25**              |

**Statistical Tools and Econometric Models**

To draw meaningful insights from collected data statistical techniques such as descriptive, correlation and multiple regression has been applied. As the collected data consists of cross-sectional time series, panel data regression would be more appropriate than pooled regression.
Before applying econometric techniques, the data has been validated for few assumptions like stationarity, autocorrelation and multicollinearity. Stationarity of timeseries data has been checked using Augmented Dickey Fuller (ADF) test whereas to overcome the problem of autocorrelation and multicollinearity Durbin-Watson (DW) test and Variance Inflation Factor (VIF) has been applied.

Under panel regression, applicability of random effects or fixed effects model has been checked by Hausman test. Referring the past studies (ACARAVCI, 2015; Bogna, Marszalek, & Sekula, 2015; Li & Islam, 2018), below mentioned econometric models are developed and applied for statistical inferences.

\[
\text{DER} = \alpha + \beta_1 \text{PRF}_{it} + \beta_2 \text{TG}_{it} + \beta_3 \text{SZ}_{it} + \beta_4 \text{GR}_{it} + \beta_5 \text{LIQ}_{it} + \beta_6 \text{NTS}_{it} + \beta_7 \text{TR}_{it} + \beta_8 \text{ICR}_{it} + \varepsilon
\]

\[
\text{DAR} = \alpha + \beta_1 \text{PRF}_{it} + \beta_2 \text{TG}_{it} + \beta_3 \text{SZ}_{it} + \beta_4 \text{GR}_{it} + \beta_5 \text{LIQ}_{it} + \beta_6 \text{NTS}_{it} + \beta_7 \text{TR}_{it} + \beta_8 \text{ICR}_{it} + \varepsilon
\]

Where,
- \(\alpha\) = Intercept
- \(\beta\) = Regression Coefficient
- i = Number of Firms
- t = Time period from 2010-2019
- \(\varepsilon\) = Residual

**DATA ANALYSIS AND INTERPRETATION**

Present section highlights the result of various statistical tools used for study. It mainly comprises of descriptive analysis, outcome of stationarity test, correlation matrix and results of panel data regression. At the end of the section, conclusion of hypothesis testing is summarised.

**Descriptive Analysis**

Reviewing the output of descriptive statistics as presented in table – 2, it is revealed that Indian power and energy sector companies rely more on owned sources of funds so far as asset financing is concern. The average debt-asset ratio is 34.09% indicating lower level of debt. Average debt-equity ratio is 123% which is also lower than the ideal ratio. Analysing the
profitability and sales growth of firms, it is concluded that average return on assets is 3.95% which is lower than revenue growth i.e. 12.65% that shows operating inefficiency of firms. Standard deviations values of profitability and sales growth are more than average value which indicates high volatility and inconsistency of revenue in the industry.

Table 2. Descriptive Statistics

|       | Minimum | Maximum | Mean  | Std. Deviation |
|-------|---------|---------|-------|----------------|
| DER   | 0.1648  | 6.2010  | 1.2300| 1.1120         |
| DAR   | 0.1100  | 0.7462  | 0.3409| 0.1554         |
| PRF   | -0.1386 | 0.1803  | 0.0395| 0.0436         |
| TG    | 0.0208  | 0.6762  | 0.3801| 0.1445         |
| SZ    | 2.4550  | 5.8897  | 4.3568| 0.9209         |
| GR    | -0.2635 | 0.8439  | 0.1266| 0.2325         |
| LIQ   | 0.0496  | 5.1858  | 1.1044| 0.7550         |
| NTS   | 0.0013  | 0.0916  | 0.0270| 0.0136         |
| TR    | -0.0819 | 0.8903  | 0.3680| 0.2317         |
| ICR   | -2.5491 | 23.2695 | 5.0405| 4.8642         |

Source: Compiled from SPSS Output

Stationarity Test

While analysing time series data, it is important to check stationarity of the data. According to Gujarati (2003) a series whose mean, variance and autocovariance remains constant over a period is said to be stationary. Unit root testing has been used for checking nature of the series. For assessing stationarity, Augmented Dickey Fuller (ADF) test has been applied. At level data, the series was found to be non-stationary and therefore 1st level difference has been considered using maximum lag length as per Schwarz Info criteria. The results of ADF test are portrayed in table – 3 prescribing that all variables are stationary and good enough for further testing.

Table 3. Results of Unit Root (ADF) Test (1st Level Difference)

|       | ADF Test Statistic | Probability Value | Nature of Series |
|-------|--------------------|-------------------|-----------------|
| DER   | 40.3150            | 0.0198            | Stationary      |
| DAR   | 41.4037            | 0.0150            | Stationary      |
| PRF   | 61.7257            | 0.0000            | Stationary      |
| TG    | 45.7073            | 0.0048            | Stationary      |
| SZ    | 74.9336            | 0.0000            | Stationary      |
| GR    | 92.3264            | 0.0000            | Stationary      |
| LIQ   | 141.941            | 0.0000            | Stationary      |
| NTS   | 62.0369            | 0.0000            | Stationary      |
| TR    | 125.5620           | 0.0000            | Stationary      |
| ICR   | 49.6023            | 0.0016            | Stationary      |

Source: Compiled from E-Views Output
Correlation Analysis

Observing the correlation output presented in table – 4, it can be deduced that all selected determinants except growth are significantly related with debt-equity as well debt-asset ratio. Factors such as profitability, liquidity, tax rate, non-debt tax shield, and interest coverage ratio are having significant negative relationship with leverage variables. Results of the correlation study supports the argument of pecking order theory and contradicts the notion of signalling approach. Tangibility and size are the only factors that have significant positive relation with CS variables. Firms with higher proportion of fixed assets have better access to borrowings as they can use fixed assets as collateral. On the other hand, large firms have higher negotiating power plus they have historical financial records that provide an edge against small firms.

Table 4. Correlation Matrix

|          | DER     | DAR     |
|----------|---------|---------|
| PRF      | -0.534**| -0.437* |
| TG       | 0.210*  | 0.030*  |
| SZ       | 0.288*  | 0.278*  |
| GR       | 0.220   | 0.244   |
| LIQ      | -0.358**| -0.320**|
| NTS      | -0.111**| -0.211**|
| TR       | -0.269* | -0.232* |
| ICR      | -0.420**| -0.463**|

* - Significant at 5% level  ** - Significant at 1% level

Source: Compiled from SPSS Output

Regression Analysis

As the study is aimed to analyse the impact of selected variables on CS choice of companies, panel data regression has been used. Regression output of first model is summarized in table – 5 that abridged the results of fixed effect and random effect model using DER as dependent variable. The value of Hausman test depicts that fixed effect model is superior to random effect for this data and the same is further confirmed by explanation power ($R^2$) of the model. Fixed effect model can explain 84.20% changes in DER whereas random effect can explain up to 52.43%. The values of DW (1.5958) and VIF (2.583) statistics are also within acceptable limits
(Gujarati, 2003) and hence the problem of autocorrelation and multicollinearity has been controlled.

Analysing the regression coefficients of selected determinants, it is found that five variables are found to be significant (including liquidity at 10% level of significance) factors affecting financing decision. PRF, NTS, ICR, and LIQ are having significant negative impact on DER. On the other hand, TG is having positive and significant impact on DER.

**Table 5. Regression Output of Model 1**

| Coefficient | t-value | Prob. | Coefficient | t-value | Prob. |
|-------------|---------|-------|-------------|---------|-------|
| Intercept   | 0.2651  | 0.1340| 0.8937      | 0.1534  | 0.4705 | 0.6389 |
| PRF         | -0.0649 | -3.5483| 0.0006      | -0.0912 | -5.5653| 0.0000 |
| TG          | 2.7997  | 4.8571| 0.0000      | 2.0851  | 6.0618 | 0.0000 |
| SZ          | 0.1798  | 0.4027| 0.6881      | 0.2846  | 4.9099 | 0.0000 |
| GR          | 0.0001  | 0.0579| 0.9539      | 0.0040  | 3.6584 | 0.0004 |
| LIQ         | -0.1564 | 1.8527| 0.0669      | -0.0945 | -1.2825| 0.2024 |
| NTS         | -20.2341| -2.7503| 0.0071      | -9.6047 | -2.3486| 0.0206 |
| TR          | -0.0002 | -2.3771| 0.2394      | -0.0003 | -4.1215| 0.4691 |
| ICR         | -0.0604 | -3.4626| 0.0008      | -0.0472 | -3.5442| 0.0006 |

**F – Value**

- Fixed Effect Model: 26.38 (0.00)
- Random Effect Model: 13.47 (0.00)

**Source: Compiled from EViews Output**

Regression result of second model has been summarised in table 6 along with summary of model testing and outcome of Hausman test. Like first model, prediction based on fixed effect model has found to be stronger than random effects. The fixed effects model can explain 85.44% of variation in the debt-asset ratio. Among the selected factors tangibility, liquidity, non-debt tax shield and interest coverage ratio are having significant impact on CS measured by debt-asset ratio.
Table 6. Regression Output of Model 2

|                | Fixed Effect Model                   | Random Effect Model                   |
|----------------|--------------------------------------|---------------------------------------|
|                | R²: 0.8544                           | Adj. R²: 0.8249                       | R²: 0.3255                           | Adj. R²: 0.2703 |
|                | Co-efficient | t - value | Prob. | Co-efficient | t - value | Prob. |
| Intercept      | 0.7577       | 2.8522    | 0.0053 | 0.2563       | 3.1841    | 0.0019 |
| PRF            | -0.0316      | -0.6532   | 0.0351 | -0.0017      | -0.7377   | 0.4623 |
| TG             | 0.0525       | 0.6786    | 0.0002 | 0.0415       | 0.6605    | 0.0035 |
| SZ             | 0.0727       | -1.2135   | 0.2278 | 0.0416       | 2.6229    | 0.0100 |
| GR             | 0.0001       | 0.6739    | 0.5019 | 0.0003       | 1.7262    | 0.0871 |
| LIQ            | -0.0157      | 1.3880    | 0.0025 | -0.0151      | 1.4575    | 0.0178 |
| NTS            | -3.2454      | -3.2800   | 0.0014 | -2.5039      | -3.1427   | 0.0022 |
| TR             | -0.0001      | -1.3891   | 0.1679 | -0.0002      | -1.8820   | 0.3625 |
| ICR            | -0.0089      | -3.8214   | 0.0002 | -0.011293    | -5.2252   | 0.0000 |

F - Value: 29.04 (0.00) 5.89 (0.00)
DW: 0.7779; VIF: 2.583; Hausman Test: 65.46 (0.00)

Source: Compiled from EViews Output

Table 7. Hypothesis Testing

| Statement                                      | Decision | Type of Relationship                |
|------------------------------------------------|----------|-------------------------------------|
| H₀₁ & H₀₂: Profitability has no significant impact on debt–equity ratio and debt–asset ratio. | Reject   | Significant & Negative               |
| H₀₃ & H₀₄: Tangibility has no significant impact on debt–equity ratio and debt–asset ratio. | Reject   | Significant & Positive               |
| H₀₆ & H₀₆: Size has no significant impact on debt–equity ratio and debt–asset ratio. | Fail to Reject | ------                              |
| H₀₇ & H₀₈: Growth does not have significant impact on debt–equity ratio and debt – asset ratio. | Fail to Reject | ------                              |
| H₀₉ & H₁₀: Liquidity does not have significant impact on debt–equity ratio and debt–asset ratio. | Reject   | Significant & Negative               |
| H₁₁ & H₁₂: Non-debt tax shield does not have significant impact on debt–equity ratio and debt–asset ratio. | Reject   | Significant & Negative               |
| H₁₃ & H₁₄: Tax rate does not have significant impact on debt–equity ratio and debt–asset ratio. | Fail to Reject | ------                              |
| H₁₅ & H₁₆: Interest coverage ratio does not have significant impact on debt – equity ratio and debt – asset ratio. | Reject   | Significant & Negative               |
DISCUSSION

Based on the output of regression results, it can be inferred that profitability, tangibility, liquidity, non-debt tax shield and interest coverage ratio are the major determinants of CS decision of Indian power & energy sector.

Profitability has negative impact on leverage variables signifying that higher profits lead to lower debt ratio. Increasing profits improve level of retained earnings that reduce reliance on external financing. Findings of current study confirms the conclusion of pecking order and trade-off theory about the relation between profitability and leverage. The results are coinciding with findings of Bauer (2004), M’ng, et al., (2017), Iqbal, et al., (2019), and Yousef (2019).

Tangibility has significant positive impact on both measures of debt as expected in theory. Fixed assets can be used as collateral while raising loans and therefore enhances borrowing capacity of firms. Similar results were obtained by Rani et al., (2016); Li & Islam (2018); Rao et al., (2019). The results are contradictory with empirical findings of Bauer (2004). Positive impact of tangibility was further supported by conclusion of trade-off theory.

Results of regression output revel that CS variables are significantly and inversely affected by liquidity i.e. firms with high current ratio uses more of owned sources of funds. According to pecking order and agency theory, higher liquidity deduces low level of debt and external financing. The study confirms this proposition and coincide with past research (Mallikarjunappa & Goveas, 2007; Berkman et al., 2016; Vintila et al., 2019).

Present study depicts negative impact of non-debt tax shield on both debt ratios. Non-debt tax shield such as depreciation and amortisation can be used as substitute for interest cost (DeAngelo & Masulis, 1980). Hence, firms with high depreciation and amortisation avoids debt financing signifying the inverse relation. Past research studies such as Bauer (2004); M’ng et al., (2017) and Rao et al., (2019) have concluded parallel results.

Theatrically interest coverage ratio has positive impact on leverage but present outcome violates the same and illustrates significant negative impact on debt ratio. Such inverse relation was also found by Margaretha & Fitrah (2012) Handoo & Sharma (2014) and Rani et al., (2016). Possible
explanation for such relation lies in the fact that profitable firms have higher ICR and can raise equity financing at convenient terms.

Other variables like Size, Growth and Tax rate are found to be statistically insignificant in determining capital structure of selected power & energy sector companies of India. Comparing the empirical results with CS theories it can be concluded that propositions of pecking order and trade-off theory are partially applicable whereas signalling theory is not found to be relevant.

CONCLUSION

Capital structure has remained to be one of the focal points of research for academicians as well as practitioners. Though it’s a substantially researched theme, limited studies have focused on power and energy sector in Indian context. Present research paper employs empirical analysis to study determinants of CS of power and energy sector. With the help of panel data regression, the study concludes that profitability, tangibility, liquidity, non-debt tax shield and interest coverage ratio are important determinants of capital structure. Further, the research outcomes confirm the applicability of pecking order and trade-off theories of capital structure to Indian power & energy sector.

Outcome of the study will assist finance mangers as selecting the appropriate source of financing is one of most critical decisions under the ambit of corporate finance and it becomes more important when it comes to capital intensive industry like power and energy. It will also help practitioners to identify important factors that affect debt financing and thereby decision makers can focus on relevant factors and avoid the ones which are not affecting meaningfully. Besides, the study enriches the existing pool of research in this area and assess the applicability of various CS theories in Indian context.

Though current research attempts to provide a comprehensive view on determinants of CS, it encounters few limitations. Firstly, the study is based on secondary database hence reliability depends on accuracy of data. Secondly, the results are based on financial data of 25 listed companies which can be further explored for large sample. Finally, present research focuses only on firm specific factors and ignores factors like competitive forces, macro-economic variables such as inflation, GDP growth, moments in capital market and interest rates. One can extend the findings of current research by incorporating these factors.
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