RESEARCH METHODOLOGY

4.0 INTRODUCTION

The previous chapters of introduction, review of literature & corporate governance overview helped to define and understand the concepts of corporate governance and capital structure. However, this chapter aims at describing the approaches used to achieve the research objectives. It presents the study variables, research problem, the research design, model specification and the complete methodology utilized to obtain and analyse the data related to the relationship between corporate governance and capital structure. The methodology adopted for the study is detailed under the following major sub-sections:

4.1 Study Variables

4.2 Statement of Research Problem

4.3 Research Objectives

4.4 Formulation of Research Hypothesis

4.5 Procedure/Research Approach

4.1 STUDY VARIABLES

This study presumes the causal relationship and examines the impact of two groups of variables i.e. independent variables and control variables, on dependent variable. The first group of variables includes corporate governance variables represented by board size, board independence, and CEO duality. The second group consists of control variables, which includes firm attributes that
are expected to influence capital structure decisions. Control variables used in this study are profitability and size of firm. To represent profitability, study uses ROA (Return on Asset) defined as EBIT/Total Assets. Size of firm is measured by using book value of total assets in place (log of total assets). The capital structure is represented by Debt to Equity Ratio, and is considered as dependent variable.

4.1.1 DEPENDENT VARIABLES (LEVERAGE RATIOS: A CRITERION OF CAPITAL STRUCTURE)

There are several ways of measuring capital structure and there is hardly an agreement on, which is the most efficient one. This study chooses DE (Debt to Equity ratio) as proxy variable for capital structure. However, debt to asset ratio is also used in regression and correlation analysis. In case of regression analysis, debt to asset ratio is used to check the robustness along with debt to equity ratio. Capital structure which does not have high debt indicates the efficiency of financing decisions.

4.1.2 INDEPENDENT VARIABLES OR EXPLANATORY VARIABLE (CORPORATE GOVERNANCE)

To collect and analyse data on corporate governance practices, a set of parameters indicative of good corporate governance practices were identified. For this study, characteristics of the board of directors are used. They are:

a. Board Size
b. Board Independence
c. CEO Duality

da. Board Size

The size of the board is given by the total number of directors (both executive and non-executive) serving on the board of the company
(Berger and al., 1997; Anderson and al., 2004). This study employs logarithm of board size (Yermack, 1996; Coles et al., 2008; Cheng 2008).

b. Board Independence

Board independence is the variable that measures the independence of the board. It is given by the percentage of board members classified as independent directors on the board. The independent directors are neither shareholders nor managers or having family relationships with owners/top management in the company. In other words, they do not have any significant contractual relationship with the company (El Gaied and Rachhi, 2008; Goh, 2014; Fuzi, 2016).

c. CEO Duality

CEO duality measures the combined functions of leadership by a binary variable taking the value 1 if the CEO is also chairman of the board and 0 otherwise (Biepke and Abor, 2006; Goh, 2014).

4.1.3 CONTROL VARIABLES

Previous studies e.g. Chen and Zhao (2006); Chang and Dutta (2012), on this issue have recommended the use of control variables. The inclusion of control variables helps to know the behaviour of dependent variable under certain conditions (Francis, 1990). Previous studies have already established the relationship and their impact on dependent variables and therefore these variables are secondary focus of this study. On the basis of conclusions drawn from the literature review, the variables which are likely to influence firm’s capital structure and would probably disturb the test are profitability and size of the firm. Following the review this research, profitability and size of the firm are used as control variables that may affect dependent variables and therefore, included in the regression model.

a. Return on Assets (ROA) as a measure of Profitability, and

b. Total Assets (TA) as a measure of Size of the firm (SZ)
a. **Return on Asset (ROA)**

Return on Asset (ROA) measures company’s earnings pertinent to all the funds it has at its disposal. It is believed a better governance model helps in effective and efficient utilization of assets which is reflected in the form of profits (Bolbol et. al. 2004; Khatab 2011; Niresh and Velnampy 2014; Tayeh 2015).

b. **Size of the Firm**

There are three main methods which can be used to measure size of the firm. They are total sales, total assets or market value of equity. In this study total asset is used as a proxy variable for measuring the size of the firm (Lim 2012; Fatma and Chichti 2011; Dang et al. 2013).

### 4.1.4 OPERATIONAL DEFINITIONS

<table>
<thead>
<tr>
<th>Corporate Governance (Independent Variables)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. Board Size (BS)</strong></td>
</tr>
<tr>
<td>Logarithm of total number of Board of Directors (BODs).</td>
</tr>
<tr>
<td>Adopting the measure used by Berger and al. (1997); Anderson and al. (2004); Marra et al. (2011); Samaha et al. (2012); Ajanthan (2013), Velnampy and Nimalthasan (2013); Gowsika (2015); Somathilake and Udaya Kumara, (2015) to test the model.</td>
</tr>
<tr>
<td><strong>b. Board Independence (BI)</strong></td>
</tr>
<tr>
<td>$=$ Number of Independent Directors (IDs) / Total number of Board of Directors (BODs).</td>
</tr>
<tr>
<td>Adopting the measure used by Kee et al. (2003); Lin, Chen (2008); Heng et al., (2012) to test the model.</td>
</tr>
<tr>
<td><strong>c. CEO Duality (CEOD)</strong></td>
</tr>
<tr>
<td>Dummy variable, 1 if CEO is chairman as well and 0 if otherwise.</td>
</tr>
<tr>
<td>Adopting the measure used by Biepke and Abor (2006); Lin and Liu (2009); Bodaghi and Ahmadpour (2010); Marra et al. (2011); Ajanthan (2013); Velnampy and Nimalthasan (2013); Somathilake and Udaya Kumara (2015) to test the model.</td>
</tr>
</tbody>
</table>
### Profitability Ratios and Size (Control Variable)

| a. | Return on Assets (ROA) | $\text{Return on Assets (ROA)} = \frac{\text{Company's net earnings}}{\text{Total Assets}} \times 100$  
Adopting the measure used by Berger et al. (1997); Bolbol et al. (2004); Khatab (2011); Niresh and Velnampy (2014); Tayeh (2015). |
| b. | Size of the firm (SZ) | $\text{Size of the firm (SZ)} = \text{Natural Logarithm of firm’s Total Assets.}$  
Adopting the measure used by Comment and Schwert (1995); Harford (1999); Fatma & Chichti (2011); Lim (2012); Dang et al. (2013), Ajanthan (2013), Velnampy and Nimalthasan (2013), Agyei and Owusu (2014); Quang and Xin (2015). |

### Leverage or Capital Structure Ratios (Dependent Variable)

| a. | Debt-to-Equity (D/E) | $\text{Debt-to-Equity (D/E)} = \frac{\text{Debt Capital}}{\text{Equity Capital}} \times 100$  
Adopting the measure used by Wiwattanakantang (1999); Udomsirikul et al. (2011); Sheikh & Wang, (2013). |
| b. | Debt Ratio (DR) | $\text{Debt Ratio (DR)} = \frac{\text{Debt Capital}}{\text{Total Assets}} \times 100$  
Adopting the measure used by Rajan & Zingalas (1995); Arbabiyan and Safari Gerayeli (2009). |

#### 4.2 STATEMENT OF THE RESEARCH PROBLEM

The incidents of corporate misconducts highlight the importance of decision making taken by board of directors. Many of the researches argued that effective decisions pertinent to capital structure and investment which are taken by the board of directors, help in fulfilling the shareholders’ wealth maximization objective while failing in that often led to the corporate misconduct and failure. Therefore, reforms related to various corporate governance always stressed on making appropriate changes in terms of board composition, board size and its structure.

A review of the related literature showed identifiable corporate governance variables may have an impact on determining leverage. In this study, corporate governance practices are measured by using three different variables related to board characteristics while capital structure decisions are measured by using leverage ratio
i.e. debt to equity ratio and/or debt ratio. These characteristics are mainly selected as corporate governance variables because the agency and stewardship perspectives which were discussed and investigated in Chapter 2 suggested the relationship.

Ample of studies conducted in developed countries that have investigated the role of corporate governance on capital structure decisions but there are very scarce researches in India with only a few empirical studies paying attention to this issue. In addition, most of the studies that have investigated this issue in India have used a sample period prior to the introduction of these major corporate governance reforms i.e. Companies Act 2013 and Revised clause 49 of listing agreement and have only covered a very few corporate governance aspects.

Corporate Governance is an important factor in improving the value and performance of the firm and the impact differs from country to country due to the dissimilar social, economic, and regulatory conditions. Capital structure also has different impacts on the value of the firm i.e. it varies from country to country because of the different regulations. Despite the importance of the link between corporate governance and firms financing structure, existing empirical evidences are not really convincing on how corporate governance variables affect the financing structure of the listed firms.

It is in the light of the above problems, this research work studied the effects of corporate governance practices on the capital structure decisions.

4.3 OBJECTIVES OF THE STUDY

Generally, this study seeks to explore the relationship between corporate governance and firm’s capital structure decisions in the India. However, it is set to achieve the following specific objectives:

1. To investigate the impact of corporate governance practices such as board size, board independence, CEO duality on capital structure choices of Indian firms.
2. To identify the relationship between profitability and capital structure.
3. To identify the relationship between size of the firm and capital structure.
4. To suggest the corporates for good corporate governance practices for their success.

4.4 RESEARCH HYPOTHESES

With the purpose of giving specific direction to investigation and based on the understanding of the subject from the available literature and research objectives this study formulated the hypothesis and later tested with the data collected using appropriate statistical tools. Justification of these testable hypotheses is derived from previous studies discussed in details in the literature review sections. From the review of literature, it is evident that capital structure is affected by the corporate governance. Based on that it can be assumed that corporate governance does affect a firm’s capital structure and therefore a relation between corporate governance and firm’s capital structure is expected. Based on the theories and previous research, this study believes that corporate governance may have an impact but not confident enough to hypothesize a direction therefore not predicting/ specifying a direction and using two-tailed hypotheses. The formulated hypotheses were used as a basis for analysis and conclusion on the relationship among corporate governance practices, capital structure, profitability and size of the firm. To proffer useful answers to the research questions and realize the study objectives, the following hypotheses stated in their null forms:

**Hypothesis 1:**

\[ H_0: \text{There is no significant impact of corporate governance practices on capital structure.} \]

This hypothesis is further broken into three sub hypothesis.

\[ H_{0,1a}: \text{There is no significant impact of board size on capital structure.} \]

\[ H_{0,1b}: \text{There is no significant impact of board independence on capital structure.} \]
Hypothesis 1:

There is no significant impact of CEO duality on capital structure.

Hypothesis 2:

H_0^2: There is no significant correlation between profitability and capital structure.

Hypothesis 3:

H_0^3: There is no significant correlation between size of the firm and capital structure.

Hypothesis 1 will be evaluated on the basis of the regression analysis while hypothesis 2 and 3 will be evaluated by the correlation analysis.

In case of regression, rejection of null hypothesis implies that corporate governance impacts capital structure. If the null hypothesis is rejected, the sign of the estimated coefficient could be either positive, suggesting corporate governance variable(s) has/have positive impact on capital structure variable or negative, implying that the corporate governance variable(s) has/have inverse/negative impact on capital structure variable. Failure to reject the null hypothesis suggests that corporate governance does not impact capital structure decisions. Similarly, in case of correlation, rejection of null hypothesis implies that both the variables are correlated while the sign i.e. positive or negative represents the direction of their relationship.

4.5 PROCEDURE/RESEARCH APPROACH

4.5.1 RESEARCH DESIGN

Quantitative and qualitative research methods are the two approaches that have been employed by researchers around the world. In 1959, the concept of mixed method originated and thereafter researchers started combining the two methods in order to obtain better results and explanations. Punch (1998) suggested that it is important to establish the appropriate research approach with regards to the research issues. Berg (2004) stated that the qualitative method presents a descriptive and non-quantitative approach to
collect the information in order to present understanding of the phenomenon. On the other hand, Hussey and Hussey (1997) and Bryman (2012) emphasized that the quantitative approach uses different types of statistical analysis and therefore provides stronger forms of measurement, reliability and ability to generalize the findings.

This study applied the deductive positivism approach. Under this approach, the pre-existing theoretical basis is identified, studied and relied upon in hypotheses development and the empirical findings demonstrate whether the tested hypotheses are proven or rejected. In order to achieve the objectives, this study used the multiple regression as the main tool of analysis. Hair et al. (2009) stated that regression is the appropriate method of analysis when the research problem involves a single metric variable presumed to be related to two or more independent variables. Therefore, multiple regression analysis is chosen as the main tool of analysis in this study. Multiple regression models are one of the most common methods of analysis that have been used by previous researchers (e.g. Saad, 2010; Ting, 2011; Achchuthan, 2013) to investigate the relationship between corporate governance and capital structure. The objective of the study is to establish a relationship between corporate governance practices and capital structure decisions. This research study thus aims at assessing the impact of corporate governance practices on the company’s capital structure decisions as measured in terms leverage i.e. debt to equity ratio. The study is based on desk research and econometric analysis of data collected to establish the relationship between the selected variables. The annual reports of the companies which included a separate section on corporate governance, income statements and the balance sheets of the companies, were used to collect relevant information. Financial statements provide the financial performance indicators in the form of absolute numbers and ratios that have formed the basic source of data and information.

This research is exploratory and explanatory in context and design. Exploratory research strategy provides an advantage of having a flexible research design while explanatory study emphasises on studying a situation or a
problem in order to explain the relationship between variables (i.e., Board Characteristics and Capital Structure) Research Design. This study followed quantitative approach in the sense that it aims to draw out conclusions from the financial data gathered, summarized, and processed. The quantitative research instrument is developed from the materials that other researchers had developed and used in their study.

In line with the prior studies, this study made use of the corporate annual reports of the listed companies in India to find out the relationship that exist between corporate governance variables and capital structure. This study adopted the panel data regression model for analysing the impact of the corporate governance variables on the capital structure variable of the listed companies.

However, both Pearson and the Spearman correlation were also used to measure the degree of association between variables under consideration and the t-test statistics was computed using the SPSS to find out if there is any statistically significant difference between the two variables. To evaluate this research topic, researchers have used different methods of MS Excel, Statistical Package for Social Science (SPSS) and EViews for analysing the data. Here, correlation and multiple-regression are used to analyze the data.

A deductive approach to link theory and research is adopted. The author reviews existing literature and deduces hypotheses. Consequently, the process of data collection is based on and guided by existing theory and empirical studies. Subsequently the findings from the research are compared with the literatures and the author checks how well the results support the theoretical arguments from previous literature. Through inductive reasoning, existing concepts can be refined or refuted and the findings contribute to the existing literature (Bryman and Bell, 2011).

4.5.2 SAMPLING DESIGN

Sampling design is a concrete plan for drawing or selecting a sample from a given population. Sampling plan provides a way to select an object from the
sampling frame. It refers to the method a researcher adopts in selecting a sample and the deciding upon the sampling technique. The sample of this study composed of listed companies in India for the period of 2012-2015.

4.5.2.1 Study Population

The current study consisted of the population of listed companies in India. Stock exchange was chosen as a sampling frame. Out of five permanent stock exchanges, BSE Ltd. was used as sampling frame for this study. All 30 listed companies of the S &P BSE SENSEX were selected. Therefore, this study is confined to BSE SENSEX-30 companies only. Reason for selecting BSE SENSEX is that more than 5000 companies are listed on BSE making it world's No. 1 exchange in terms of listed members (www.bseindia.com). BSE SENSEX is a benchmark index. It is the barometer of Indian Capital Market and all the companies of SENSEX are well established and financially sound, and dominant in their respective industry. S & P BSE SENSEX is selected because they are perceived to have the resources and motivation to drive the advantage of adopting suitable corporate governance practices. Furthermore, these companies are better performers, exhibited higher stock returns and are assumed to engage in good corporate governance practices.
Table 4.1: Details of Stock Exchanges

<table>
<thead>
<tr>
<th>S.N.</th>
<th>Name of the Exchange</th>
<th>Valid Upto</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ahmedabad Stock Exchange Ltd. Address: Kamdhenu Complex Opp, Sahajanand College, Panjarapole, Ambawadi, Ahmedabad - 380001</td>
<td>PERMANENT</td>
</tr>
<tr>
<td>2.</td>
<td>BSE Ltd. Address: P J Tower, Dalal Street, Mumbai 400023</td>
<td>PERMANENT</td>
</tr>
<tr>
<td>3.</td>
<td>Calcutta Stock Exchange Ltd. Address: 7, Lyons Range, Kolkata - 700001</td>
<td>PERMANENT</td>
</tr>
<tr>
<td>4.</td>
<td>Delhi Stock Exchange Ltd.,The Address: DSE House, 3/1, Asaf Ali Road, New Delhi - 110002</td>
<td>PERMANENT</td>
</tr>
<tr>
<td>5.</td>
<td>National Stock Exchange of India Ltd. Address: Bandra Kurla Complex, Bandra (East) Mumbai 400051</td>
<td>PERMANENT</td>
</tr>
</tbody>
</table>

4.5.2.2 Sampling Unit

Out of 30 companies, all non-financial listed companies of BSE SENSEX were selected. BSE is the oldest stock exchange in Asia. BSE Sensex companies represent nearly 93% of the total market capitalization on Bombay stock Exchange Limited. Besides, BSE Sensex Index is considered to be the best indicator that reflects the whole economy of India. Hence for the purpose of this study, BSE Sensex 30 companies were considered as the sample size.

4.5.2.3 Sample Selection Rules

This research is exploratory in nature and using the secondary data for the analysis. The relevant data was extracted from the comprehensive income statements and financial position of the BSE listed companies over the period of 2012 to 2015. From the population of 30 firms listed on BSE Sensex a sample of 21 non-financial listed companies were purposively selected for analysis on
the availability of corporate governance data and other selection criteria. The sample was selected by elimination procedure.

1. The study excluded companies from the banking and financial sectors. This was due to the following reasons:
   a. Financial characteristics and use of leverage of the banking and financial sectors are substantially different from non-financial companies, which poses difficulty for the calculation of performance measure.
   b. Their debts like liabilities are not strictly comparable to the debt issued by non-financial firms.
   c. Their leverage is strongly influenced by regulations such as the minimum capital requirements which may directly affect their capital structure.
   d. By the very nature of their business, banks are highly leveraged. They accept large amounts of uncollateralized public funds as deposits in a fiduciary capacity and further leveraged those funds through credit creation.
   e. The presence of a large and dispersed base of depositors in the stakeholders group sets banks apart from other corporates.
   f. Balance sheets of the firms in the financial sectors (banks, financial institutions etc.) have a strikingly different structure from those of non-financial companies.

2. Companies which were involved in amalgamation are also dropped.

3. The determination of sample size is the result of a compromise between the need for a large sample to obtain statistically significant results and the need for inclusion of companies that were listed in the year 2012 and remained listed during the study period. This is done to maintain the homogeneity of data as only they would be fulfilling the benchmark conditions. Companies that were replaced were excluded from the study. Faced by these constraints, it was decided to study 21 listed companies for the period of four years (2012-
2015). As a result, the final sample set consists of a balanced panel of over a period of four years which would satisfy the condition of large sample size.

4.5.2.4 Sample Size

Total data was consisted of 84 observations (21 listed companies for four years). Panel data increases the sample size. The determination of sample size is the result of a compromise between the need for a large sample to obtain statistically significant results and the need for detailed information on directors which implies work on a relatively small sample. Thus, the final sample was constituted of 84 observations.

4.5.2.5 Sampling Technique

Sampling

This study is exploratory in nature and its findings will be treated as preliminary (Malhotra, N. K. & Dash, S., 2006). Purposive sampling was done to select firms on the basis of conditions that were laid down for selecting sample.

Sample Selection

The analysis used a data of 21 non-financial companies of BSE Sensex-30 during 2012 to 2015 after following sample selection rules. In this research the researcher relied on the secondary data from the firms’ annual reports. These data were manually collected from the annual reports for the sample firms. Final Sample consisted of 82 observations for 21 firms over 4 years. Sample selection criteria helped to economize on the time and cost for data collection. Sensex-30 companies represent the market health and therefore the results should illuminate significant link between corporate governance and capital structure.
Table 4.2: Sample Selection

<table>
<thead>
<tr>
<th>Population of BSE Sensex Listed Firms</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firms in the Financial Sector</td>
<td>04</td>
</tr>
<tr>
<td>Actual Workable Population</td>
<td>25</td>
</tr>
<tr>
<td>Firms with Data irregularities</td>
<td>05</td>
</tr>
<tr>
<td><strong>Total sample selected</strong></td>
<td><strong>21 (70%)</strong></td>
</tr>
</tbody>
</table>

Table 4.3: Structure of the Sample used in the study

<table>
<thead>
<tr>
<th>Number of annual observation per company</th>
<th>04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of companies</td>
<td>21</td>
</tr>
<tr>
<td><strong>Total Number of observations</strong></td>
<td><strong>84</strong></td>
</tr>
</tbody>
</table>

4.5.3 DATA COLLECTION

Database Selection

For selection of the companies, the database of companies listed on BSE during 2012-15 was obtained from Prowess database published by CMIE (Centre for Monitoring Indian Economy). This database contained all the relevant information relating to the listed companies, which were relevant for our study.

Sources of Data

This study collected data from secondary sources. The required data related to financial statement and corporate governance variables were extracted from Prowess database published by CMIE (Centre for Monitoring Indian Economy), annual reports of the companies form their official websites and BSE (Bombay Stock Exchange) website. Other sources were journals; newspapers articles; books; reports provided by SEBI, RBI, MCA, and OECD etc.
Time Frame of the Study -Study Duration

The study examined the data for the years 2012 to 2015. The reason for selection of the years was that the Revised Clause 49, Companies Act, 2013 and many corporate governance reforms were introduced during this period.

4.5.4 RESEARCH MODEL

Figure 4.1: Conceptualization of Model

This study covers information about BSE Sensex listed companies for the period 2012-15. A multiple regression analysis was run to examine the linkage between the corporate governance practices i.e. board size, board independence and CEO duality and capital structure i.e. level of debt using proxy variable debt to equity ratio. Two control variables i.e. profitability (ROA) and size of the firm (Total Assets) were also included that may affect the relationship.
4.5.5 MODEL SPECIFICATIONS

Before specifying the model it is necessary to understand the terminologies:

**Cross-sectional data:** Cross-sectional data are the data that are collected on several units at one point in time.

**Time series data:** Time series data are the data that are collected on one unit over several time periods.

**Panel data:** Panel data are repeated cross-sections over time which means that there will be space (firm, individuals, etc.) as well as time dimensions. So, panel data helps to explore cross-sectional and time series data simultaneously. The combination of time series with cross-sections can enhance the quality and quantity of data in ways that would be impossible using only one of these two dimensions i.e. time or cross section. Panel data is more useful to this study because panel data, unlike cross-sectional data, allows controlling for unobservable heterogeneity through individual firm effect. Panel data usually give the researcher a large number of data points (N & T), increasing the degrees of freedom and reducing the collinearity among explanatory variables hence improving the efficiency of econometric estimates but it is a kind of phantasm, more data points doesn’t necessarily imply more information (heterogeneity bias).

**Balanced Panel:** A panel is said to be balanced if each subject (firm, individuals, etc.) has the same number of observations.

**Unbalanced Panel:** A panel is said to be unbalanced if each subject (firm, individuals, etc.) has a different number of observations.

**Short Panel:** A panel is said to be short panel if the number of cross-sectional subjects (N) is greater than the number of time periods (T).

**Long Panel:** A panel is said to be long panel if the number of time periods (T) is greater than the number of cross-sectional subjects (N).
A micro-panel data set: A micro-panel data set is a panel set for which the time dimension T is largely less important than the individual dimension N.

A macro panel data set: A macro panel data set is a panel set for which the time dimension T is similar to the individual dimension N.

Potential gains of using panel data framework

- It takes heterogeneity into account to get individual-specific estimates.
- Especially suitable to study dynamics of change.
- It studies more sophisticated behavioural models.
- It minimizes bias due to aggregation.

This study employs a balanced panel data set for multiple regression analysis. Panel data sets for economic research possess have several major advantages over conventional cross-sectional or time-series data sets. In panel data, most of the variables that measure the data are in the percentage and proportions form, and low variables are dummy, so the ideal method to use is the parametric methods to test and analyse the data, this provide the actual standard errors and significance. A longitudinal, or panel, data set is one that follows a given sample of individuals or cross section units (i.e. country, region, state, firm, consumer, individual etc.) over time, and thus provides multiple observations on each individual in the sample (Hsiao, 2003). In order to better explain the required relationship the descriptive statistics, correlation matrix and an econometric technique of panel data analysis were used.

Determination of Regression Model appropriate for the study:

The study employed multivariate regression analysis using panel data framework to measure the dependence of capital structure (leverage) which is a measure of capital structure on three corporate governance variables by using Fixed-effect estimation, and Random-effect estimation. Therefore, appropriate model is selected out of these two models:
1. Fixed Effects Models (FEM)
2. Random Effects Models (REM)

Estimating techniques are the fixed effects model and the Random Effects Model (REM). The econometric technique used to analyze, whether the Fixed Effects Model estimator is an appropriate alternative to the Random Effects Model or vice versa, by estimating the coefficients determined by the Hausman test. The Hausman test estimates the null hypothesis ($H_0$) on the assumption that the model is Random Effects (RE) against the alternative hypothesis ($H_1$) that the model is Fixed Effects (FE). This is done with the underlying objective testing if the error term is correlated with the regressors. In case of the absence correlation, it may be suggested that the random effects model is more powerful and appropriate for the study. On the other hand, the existence of correlation indicates that the random effects model inconsistent in estimation and the fixed effects model would be the appropriate choice model which allows for cross sectional heterogeneity by letting the intercept differs across entities/individuals. It also tries to explain the causes of variation within individuals or entities.

If the p-value is greater than 0.05 i.e. $p > 0.05$, fixed effect is insignificant and the random effects model appropriate to be used.

If the p-value is less than 0.05 i.e. $p < 0.05$, the fixed effect estimator is significant and should be employed.

An essential benefit of this design is that it facilitates the evaluation of causality between variables since the direction of the influence becomes more apparent over time (Bryman and Bell, 2011). This model is definitely more reliable than Ordinary Least Squares (OLS) model since it provides ways of dealing with heterogeneity (that is useful in measuring the individual companies’ effects) and examines fixed and random effects in the longitudinal data which are the drawbacks of OLS. A GLS random effects regression model is more suitable in that it corrects for the omitted variable bias, presence of autocorrelation and heteroskedasticity in pooled time series data. This methodology allows
researchers to examine variations among cross-sectional units simultaneously with variations within individual units over time (Gaur & Gaur, 2006). It assumes that regression parameters do not change over time and do not differ between various cross-sectional units, enhancing the reliability of the coefficient estimates. An important assumption for choosing random-effect estimation is that the unobserved heterogeneity should not be correlated with the independent variables. The following equation is formulated for the study:

\[ Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + e \]

Where, \( Z \) = Regression Score  
\( \beta_0 \) = Regression constant  
\( \beta_1 - \beta_n \) = Regression Coefficient  
\( X_1 - X_n \) are the independent variables  
\( e \) = error term

Adopting the model used by bolbol et al. (2004); Ehikioya (2009); Heenitigala and Armstong (2011) and Ujunwa (2012), this study formulated the following model to measure the impact of corporate governance on Capital Structure as:

- Capital Structure (Leverage) = f (BS; BI; and CEOD)

- Capital Structure (Leverage) = f (Profitability; and Size of the firm)

\[ \text{LEV}_{it} = \beta_0 + \beta_1 \text{Log BS}_{it} + \beta_2 \text{% BI}_{it} + \beta_3 \text{CEOD}_{it} + \beta_4 \text{% ROA}_{it} + \beta_5 \text{Log SZ}_{it} + \epsilon \]

Where, \( \beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \) are the regression co-efficient of variables.

\( \epsilon \) = Error Term

The subscripts ‘i’ and ‘t’ represent firms and years respectively.

\( \beta 0 \) = Intercept of the equation

\( \beta_i \) = Marginal effect of variable on debt to equity ratio i.e. independent and control variable coefficients.
LEV\textsubscript{it} = Leverage or Debt to Equity Ratio of ‘i’ company in ‘t’ years

BS\textsubscript{it} = Board Size of ‘i’ company in ‘t’ years

BI\textsubscript{it} = Board Independence of ‘i’ company in ‘t’ years

CEOD\textsubscript{it} = CEO/Chair Duality of ‘i’ company in ‘t’ years

ROA\textsubscript{it} = Return on Assets of ‘i’ company in ‘t’ years

SZ\textsubscript{it} = Size of the firm of ‘i’ company in ‘t’ year

The following model is used to test the hypotheses formulated in the present research. The output is presented in the next chapter. If corporate governance variables encourage low (high) leverage, it is expected that negative (positive) estimates of the variables would be observed. Proxies for dependent and independent variables are listed in Table 4.4

Table 4.4: Proxies for dependent and independent variables

<table>
<thead>
<tr>
<th>Variable Type</th>
<th>Variable Category</th>
<th>Variable Proxy</th>
<th>Notation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dependent</td>
<td>Capital Structure i.e. Leverage</td>
<td>Debt to Equity ratio</td>
<td>LEV</td>
</tr>
<tr>
<td>Independent</td>
<td>Corporate Governance i.e. Board Characteristics</td>
<td>Board Size</td>
<td>BS</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Board Independence</td>
<td>BI</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CEO duality</td>
<td>CEOD</td>
</tr>
<tr>
<td>Control</td>
<td>Profitability</td>
<td>Return on Assets</td>
<td>ROA</td>
</tr>
<tr>
<td></td>
<td>Size of the Firm</td>
<td>Total Assets</td>
<td>TA</td>
</tr>
</tbody>
</table>

For correlation analysis debt ratio is also used as proxy variable for capital structure along with debt to equity ratio to check the robustness of the result.
4.6 SUMMARY OF CHAPTER

This chapter gives an overview of the research methodology used by the researcher in the study. It describes the research design, sample and data sources used in this study. Variables are defined and a summary of operationalization of the variables are also given. It explained the model used in the study and delineated the method used for data analysis for testing the hypotheses.