Chapter-3

Research Design and Methodology

The nature of database is the soul of any empirical work. It is the nature of the database which decides that how the data is arranged and processed and the kind of research methodology that is adopted. This in turn decides the relevance and the validity of the conclusions derived. The present chapter describes the database used and the methodology adopted to study the issue at hand.

This chapter is organised into three sections. The first section includes the sources of data, the types of companies included, the period of study, and the accounting data collected. The second section explains the methodology used to research the issue in hand including statistical techniques used. The last section is devoted to conclusions.

3.1 Sources of Data

The choice of data and its sources is decided on the basis of the nature of proposition at hand and the objectives of the study. The study aims to analyse the pattern of financing by the Indian corporate sector since economic liberalisation period; therefore, the secondary data has been used.

**Sample:** Two types of data have been used for the purpose of the study. To study the reforms and the growth of the capital market, the data relating to economy has been used while company specific data has been used for measuring the pattern of financing of the Indian corporate sector.

To measure the stock market development, the macro economic data has been collected from the annual reports and Handbooks of statistics of Securities and Exchange Board of India (SEBI) and its website www.sebi.gov.in. The annual reports issued by Reserve Bank of India (RBI) and its website www.rbi.org.in have been referred to source the information regarding progress of the economy. To measure the volatility of the Indian stock market, the BSE 100
index has been used as a proxy. This index represents the larger capitalization of the market in comparison to SENSEX which covers only 30 scrips. The information about BSE 100 index is available since 1991.

For the information regarding pattern of resource mobilization by the corporate sector, the data of 208 companies from BSE 500 index whose shares are quoted at BSE is being considered. BSE-500, consisting of 500 securities was constructed on August 9, 1999 and represents nearly 93% of the total market capitalisation on Bombay Stock Exchange Limited. It represents all 20 major industries of the economy. The value of the Index is based on free-float market capitalisation.

The scope of research has been restricted to the listed companies which are comparatively larger in size and represent the entire economy. The unlisted companies are excluded from the study as the data is not available and are generally of small size and do not have a significant impact on the economy. These small unlisted companies rely mainly on the funds contributed by promoters, their relatives and friends. Borrowings are mainly from bankers and that too on a short term basis.

The thrust of the government is now on Public-Private Participation (PPP) in developing the new projects. This trend has led to the emergence of joint sector involving the investment by public as well as by the government. An attempt has been made to include all the public limited companies included in BSE 500 index, whose data is published in the official directory. Though the BSE 500 index covers 500 companies but the types of companies which have been covered in the present study are decided on the basis of continuity of operations, availability of data and their normal functioning. The number stands reduced to 208.

The companies which are continuously in operation since 1991 i.e. the year of economic liberalization till date are being included in the study. Any company formed after 1991 or discontinued its operations before year 2011-12 is being excluded.
Further, in the selection of sample, only those companies for which the financial data to analyse the pattern of resource mobilisation was available in the public domain are being considered. This restriction has also reduced the number of companies covered under the study. This implies that only those companies that have a normal uninterrupted functioning in all 22 years are being considered so as to ensure uniformity in the sample.

The basic data for the study is secondary in nature. The data about the financial statements and the financial structure is being collected from ‘Prowess’ data base available in the public domain and maintained by Centre for Monitoring Indian Economy (CMIE). This data base has collected information for thousands of companies from regulatory reports, official websites and the press releases from the respective companies. The other sources used to supplement the basic data are the various publications and the respective websites of the regulator of capital markets (SEBI), the Reserve Bank of India (RBI), other institutions and intermediaries (NSDL, CDSL etc.). The database is quite comprehensive and provides all the relevant financial aggregates and ratios pertaining to these listed companies. The sources of data for prowess are primarily the annual reports (audited accounts) of companies and the Directorate General of Commercial Intelligence and Statistics (DGCIS).

**Period of Study:** The period chosen for the study is 22 years i.e., 1990-91 to 2011-12. A longer time period of 22 years has been used so as to avoid the temporary and cyclical factors which may influence the results of the study. The chosen period corresponds to the period when the structural reforms in the stock market were taking place. The period also covers the post global financial crisis period.

Although the economic reforms process had already started in 1980’s but it gained momentum only after 1991 when the Indian economy was opened up for the first time. In order to analyse the impact of these reforms in the stock
market on the pattern of resource mobilization by the corporate world, the entire period under study has been broadly divided into three sub periods-1990-1997, 1998-2007 and 2008-2012.

The first sub period (1990-1997) signified the period when the first set of reforms was introduced. This was the time when the economy had opened up, export led industries were given incentives and rate of industrial growth was very high. Sub period II (1998-07) reflects the period when the rate of growth had slowed down and a lot of policy changes took place. Many institutions such as, Securities and Exchange Board of India (SEBI) and National Stock Exchange (NSE) streamlined themselves to control the manipulations and to protect the interest of the general investor. During this period second set of reforms were made in the stock market. Sub Period III (2008-12) has been chosen to see the impact on pattern of resource mobilization by the corporate sector in the post global financial crisis period. The efforts for economic reforms by the government continued even during this period.

The data to be collected broadly refers to the accounting year 1st April to 31st March and is to be collected for the period of 22 years (1990-91 to 2011-12).

**Limitation of Accounting Data:** Although all the efforts have been made to maintain the relevance of the study but the data used still suffer from certain defects. The growth of the market as measured by market capitalization ratio, value traded ratio and turnover ratio are based on the turnover of the capital market segment only. It does not consider the turnover of the derivatives segment which is very popular among the market participant now. Secondly, the entire study is based on the BSE data while NSE trading platform is more popular among the investors. To measure the financial variables relating to resource mobilization, the data from the balance sheets is being taken. The accounting practices, as employed by the companies in computing their profits and to value its assets, differ from company to company in the same industry. Though these defects are vital, they need not lessen the significance of the data for the given purpose. The impact of price level changes impact the valuation...
of assets of all companies, more or less, to the same extent and therefore being ignored.

The CMIE database is perhaps quite comprehensive but includes the data relating to only listed companies. Fully foreign owned multinational companies, public sector units, cooperatives and tiny firms are left out. But information on as many companies as possible is being considered.

The balance sheet of the companies has been the main source of data relating to the companies on the premises that the annual accounts of companies are the most transparent and hence the most useful source of economic and business information. The annual results are governed by the statutory audit provisions and therefore improve the reliability of the data. Also, a whole set of public and private bodies, such as lenders, investors and business associates make use of this information, therefore risk involved is very low. Accounting data subject to these limitations have been used to verify the propositions made in the study.

3.2 Statistical Tools

The basic objective of the present research is to study the relationship between stock market development and the pattern of resource mobilization by the Indian corporate sector. Under the guideline of this primary objective, certain specific objectives are set. For the purpose of each objective, choice of statistical technique is different.

One of the specific objectives of this study is to measure stock market development. For this purpose, three indicators of stock market development - Market size, liquidity and volatility have been considered. An effort has been made to see the impact of the stock market reforms on the stock market development with the help of these three indicators. As a measure of stock market size, Market Capitalization Ratio (MCR) is used. The Market Capitalization Ratio is defined as the market value of listed shares divided by GDP. Market capitalization is computed on the basis of the value of the equity
securities only. To compute it, the stock market price per share is multiplied by the number of outstanding shares. Market capitalization as a proxy for market size is positively related to the ability of the firms to mobilise capital and diversify risk. For market liquidity, two measures will be used: (1) Value traded ratio, (2) Turnover ratio. The value traded ratio is the total value of traded share in the stock market divided by GDP. The value traded ratio (VTR) is used to measure the organised trading of the equities in relation to the national output. Therefore, it positively reflects liquidity on macro economy level. The second measure of the liquidity is the Turnover Ratio which refers to the value of total shares traded divided by the market capitalisation. High turnover is often taken as a proxy of low transaction cost. Turnover ratio complements total value traded ratio. Third indicator of stock market development is the volatility. Volatility refers to the variation in the assets price. Volatility as a proxy of risk involved signifies the maturity of the market. In general, it is believed that less volatile market reflects greater market efficiency and development. However, greater volatility is not necessarily a sign of less developed stock market. To define in simple way, volatility of an asset price is standard deviation of the asset return over a particular period of time, i.e. the deviation of the absolute returns from the mean return. For this study monthly volatility measures would be used which is computed as the 12 month rolling standard deviation estimate that is based on market returns. The volatility in return has been computed for the BSE 100 index. In order to analyse the indicators of stock market development over the entire period of the study and over sub-periods, the average of each ratio is computed and tabulated.

To measure the pattern of resource mobilization by the Indian Corporate Sector the financial ratios, a widely accepted tool of financial analysis, have been relied upon. For this purpose, following ratios are being computed.
Ratio 1 (R₁) = External Finance as a percentage of Total Finance.
Ratio 2 (R₂) = Funds from Capital Market as a percentage of Total Finance.
Ratio 3 (R₃) = Equity Finance as a percentage of Total Finance.
Ratio 4 (R₄) = External debt as a percentage of Total Finance.
Ratio 5 (R₅) = External debt as a percentage of External Finance.

These ratios indicate the changing pattern of the capital structure for the corporates. The above mentioned ratios are calculated on year to year basis for the sample firms. In order to find out the changing pattern of debt equity mix over a period of time, the different discrete statistics (mean, median, Max, Min, and standard deviation) are computed for each year, taking together all the sample firms. For this purpose, the version 19 of IBM SPSS statistical package has been used. Further the data has been processed using the Microsoft Excel Software. The average value of each ratio for each firm has been calculated for the entire period of 22 years (1990-12) of the study as well as for the Sub-period I (1990 to 1997), Sub-period II (1998 to 2007) and Sub-period III (2008 to 2012).

For sector wise and industry wise analysis the average value of whole period as well as sub-periods is based on the simple average of each year period. The paired Sample t-test compares the means of two variables. It computes the difference between the two variables for each case, and tests to see if the average difference is significantly different from zero. These tests are conducted for all the ratios used in the trend analysis.

To measurement the relationship between stock market development and pattern of resource mobilization by Indian corporate sector, the different statistical techniques like Correlation, Regression and appropriate statistical tests like two paired sample t-test, F-test etc. for hypothesis testing are being used. The Correlation Analysis shows only the degree of association between the two variables. Multiple Regression Analysis studies a more complete process of the relationship between a set of independent and dependent
variables. For the Post hoc analysis, Levene Statistics Test (LST), which measures relationship among more than two variables, is being used. The two paired sample t-test and ANOVA is being used to find out the difference in the means of two populations.

*Correlation coefficient* is a measure of the strength of the linear association between variables. It is the most widely used method of measuring the degree of relationship between two variables. This coefficient assumes that there is linear relationship between the two variables. Since more than two independent variables are being studied, the analysis concerning relationship is known as multiple correlations.

Customarily, the degree to which two or more predictors (independent or X variables) are related to the dependent (Y) variable is expressed in the correlation coefficient R, which is the square root of R-square. In Multiple Regression, R can assume values between 0 and 1. To interpret the direction of the relationship between variables, one looks at the signs (plus or minus) of the regression or B coefficients. If a B coefficient is positive, then the relationship of this variable with the dependent variable is positive if the B coefficient is negative then the relationship is negative. Of course, if the B coefficient is equal to 0 then there is no relationship between the variables.

With a view to assess the relationship of stock market developments with the pattern of resource mobilisation, the method of *Multiple Regression Analysis*¹ has been chosen because of the following reasons:

It is the best among multivariable techniques for assessing the individual as well as the combined effect of a set of independent variable on the explained variable.

The technique offers itself to standard probability test and other inferential procedures, thereby, lending the results to fairly easy interpretation.

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¹ [www.statsoft.com/textbook/stmulreg.html](http://www.statsoft.com/textbook/stmulreg.html)
In the linear regression model, the dependent variable is assumed to be a linear function of one or more independent variables plus an error introduced to account for all other factors.

\[ Y = a + b_1X_1 + b_2X_2 + ... + b_pX_p \]

In the above regression equation, \( Y \) is the dependent variable and \( X_1, X_2 \) are the independent or explanatory variables. The \( Y \) variable can be expressed in terms of a constant \( (a) \) and a slope \( (b) \) times the \( X \) variable. The constant is also referred to as the intercept, and the slope as the regression coefficient or \( B \) coefficient.

**Residual Variance and R-square \((R^2)\):** The regression line expresses the best prediction of the dependent variable \((Y)\), given the independent variables \((X)\). Usually there is substantial variation of the observed points around the fitted regression line. The deviation of a particular point from the regression line (its predicted value) is called the residual value. The smaller the variability of the residual values around the regression line relative to the overall variability, the better is the prediction. For example, if there is no relationship between the \( X \) and \( Y \) variables, then the ratio of the residual variability of the \( Y \) variable to the original variance is equal to 1.0. If \( X \) and \( Y \) are perfectly related then there is no residual variance and the ratio of variance would be 0.0. In most cases, the ratio would fall somewhere between these extremes, that is, between 0.0 and 1.0. 1.0 minus this ratio is referred to as R-square or the coefficient of determination. This value is immediately interpretable in the following manner. If R-square is 0.4 then it is clear that the variability of the \( Y \) values around the regression line is 1-0.4 times the original variance; in other words it has explained 40% of the original variability, and are left with 60% residual variability. Ideally, there is a need to explain most if not all of the original variability. The R-square value is an indicator of how well the model fits the data (e.g., an R-square close to 1.0 indicates that it has accounted for almost all of the variability with the variables specified in the model).
For the purpose of testing the significance of regression estimates, t-tests are used to assess the significance of individual b coefficients. It is used to test the hypothesis. A common rule of thumb is to drop from the equation all variables not significant at the .05 level or better.

*T-tests* in SPSS mean they test the hypothesis that the b coefficient is either significantly higher or lower than zero.

*F test:* The F test is used to test the significance of R, which is the same as testing the significance of R2, which is the same as testing the significance of the regression model as a whole. If probably (F) < .05, then the model is considered significantly better than would be expected by chance and the null hypothesis is rejected of no linear relationship of y to the independents. F is a function of R2, the number of independents, and the number of cases.

*Levene Statistic Test (LST):* To measure the relationship among more than two variables, Levene Statistic Test (LST) can be used. Analysis of variance is a statistical technique, measuring significance between two variables on the basis of standard deviation. When variables are more than two, Levene Statistic Test is used, which is based on the value of mean and not on the basis of standard deviation.

### 3.3 Conclusion

The secondary data used for the study, sourced from PROWESS (maintained by CMIE) is a reliable source. The economy related data is sourced from the reports of the regulatory authorities which is quite authentic. The period chosen for the study is 22 years (1990-91 to 2011-12) which is large enough to eliminate the impact of temporary and cyclical factors. The post liberalization period selected for the study makes all the sense for the current study. The study is based on a sample of 208 companies. The companies from BSE 500 were modified on the basis of three factors: continuity in operation, normal functioning and extreme value of ratios.

From the CMIE data bases, the secondary data has been collected. The data from ‘Prowess’ is quite reliable. It gathers data from the official sites of the
companies and other regulatory bodies. The data is also compiled on the basis of press releases made by the companies from time to time. Various statistical tools and techniques have been used like 't’ test, ANOVA and multiple correlation and multiple regression analysis. This study perhaps is an attempt to present the relationship between stock market development and pattern of resource mobilisation by corporate sector in India during the post liberalisation era with a special focus on period post sub-prime crisis of US.