Chapter-2

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.

2.1 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 study the impact of economic reforms on the financial performance of the Indian corporate sector over the period 2002-14; 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 Indian economy, the data relating to economy has been used while company specific data has been used for measuring the performance of the Indian corporate sector.

To measure the economic development, the macro economic data has been collected from the annual reports and Handbooks of statistics issued by ministry of finance and Securities Exchange Board of India (SEBI). 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.

For the information regarding performance of the corporate sector, the data of 47 companies from the Nifty fifty Index of the National Stock Exchange is being considered. Nifty consists of fifty large companies which broadly represent all the industries of the Indian economy.

The scope of research has been restricted to the listed large cap companies. 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. An attempt has been made to include all the fifty companies of the NSE index 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 47.

The companies which are continuously in operation since 2002 and are part of the Nifty Index till date are being included in the study. Any company formed after 2002-03 or discontinued its operations before year 2013-14 is being excluded.

This implies that only those companies that have a normal uninterrupted functioning in all 12 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 performance of the companies is sourced from ‘Prowess’ data base available in the public domain and maintained by “Centre for Monitoring Indian Economy” (CMIE). Prowess data base collects information of companies from regulatory reports, official websites and the press releases from the respective companies. Besides the direct data source, 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 12 years i.e., 2002-03 to 2013-14. A longer time period of 12 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 Indian economy were taking place. The period also covers the post global financial crisis period.

Although the economic reforms process had already started in 1980’s and gained momentum only after 1991 when the Indian economy was opened up for the first time. But the reform by the Indian government became a continuous process after 2002-03. In order to study and analyze the impact of these reforms on the financial performance of the companies, the entire period under study has been broadly divided into two sub periods – sub period I (2002-03 to 2007-08) and sub period II (2008-09 to 2013-14). The first sub period (2002-03 to 2007-08) signified the period when the reforms were speed up and the entire Indian economy was in the fats expansion mode. This was the time when the funds were available at a very low cost due to excess liquidity in the world markets. This sub period I was prior to the sub-prime crisis. Sub period II (2008-09 to 2013-14) reflects the period when all the global economies were facing the heat of sub-prime crisis. Though some of the advanced economies have started recovering but most of the global economies are still facing the slowdown. A lot of policy changes took place. During this period, the reforms process slowed down and the slowdown started reflecting in the performance of the Indian Corporate Houses as well.
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 12 years (2002-03 to 2013-14).

**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 entire study is based on the NSE data but all the listed companies are not being considered. To measure the financial performance relating to selected companies, 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 all the companies included in the Index 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.

**2.2 Statistical Tools**

The objective of the present research is to study the relationship between economic development and the performance of 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 economic development. For this purpose, the different indicators of economic development - trends in Gross Domestic Product (GDP), fiscal deficit, trends in Inflation Rate, interest Rates, balance of payment, foreign exchange reserves, foreign direct investment (FDI) and foreign institutional investment (FII) trends, exchange rate, savings/GDP Ratio, capital Formation/GDP Ratio have been considered. An effort has been made to see the impact of the economic reforms on the economic development with the help of these indicators.

In order to analyse the performance of the corporate sector over the entire period of the study and over sub-periods, the average of each ratio is computed and tabulated.

To measure the performance of 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 \( (R_1) = \) Operating Profit Ratio (EBIT as a percentage to sales)

Ratio 2 \( (R_2) = \) Return on Assets

Ratio 3 \( (R_3) = \) Return on Capital Employed

Ratio 4 \( (R_4) = \) Raw material as a percentage to sales

Ratio 5 \( (R_5) = \) Wages as a percentage to sales

Ratio 6 \( (R_6) = \) Selling and Distribution expense as a percentage to sales

Ratio 7 \( (R_7) = \) Debt – Equity Ratio

Ratio 8 \( (R_8) = \) Current Ratio

These ratios gives indication of the financial performance of the corporate sector. Total eight ratios are being computed. First six ratios are calculated to
find out the operating efficiency and the last two ratios are computed to judge the leverage and liquidity position of the firm. The above mentioned ratios are calculated on year to year basis for the sample firms. In order to find out the change in their performance 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 12 years (2003-2014) of the study as well as for the Sub-period I (2003-08) and Sub-period II (2009-14).

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 economic development and performance of 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. 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 economic developments with the performance of Indian Corporate Sector, the method of *Multiple Regression Analysis* 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.

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.

\[ Y = a + b_1*X_1 + b_2*X_2 + \ldots + b_p*X_p \]

In the above regression equation, Y is the dependent variable and X1, X2 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

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1  www.statsoft.com/textbook/stmulreg.html
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 R^2, 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.
2.3 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 12 years (2002-03 to 2013-14) which is large enough to eliminate the impact of temporary and cyclical factors. The pre and post global financial crisis period selected for the study makes all the sense for the current study. The study is based on a sample of 47 companies. The companies from Nifty Index 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 is an attempt to present the relationship between economic development and performance of corporate sector in India during the period of 12 years.