Chapter 3

Database and Research Methodology

In research, the research plan needs to be cautiously designed to yield results that are as objective as realistic. It is the main part of a grant application describing a principal investigator's proposed research, stating its importance and how it will be conducted. The present study has been framed to examine the appearance of EVA in India’s most valuable companies. In this chapter the research methodology followed in the dissertation has been discussed. It describes the research objectives, period of the study, sample selection and sources of data collection. It also explains the statistical techniques applied in the study. Finally, it also discusses the limitations of the study.

3.1 Research Objectives

The purpose of this section is to clearly and concisely describe what the proposed research is intended to accomplish. This research work is particularly aimed at accomplishing the following specific objectives:

1. To compute and analyze the Economic Value Added (EVA) and Market Value Added (MVA) of selected Indian companies.

2. To identify the most significant predictor among traditional and value based performance measures, that best explains the changes in Market Value Added of selected Indian companies.

3. To examine the influence of firm specific attributes on the shareholder value creation of the selected Indian companies.

4. To have a comprehensive view about EVA disclosures in Indian companies. This objective is subdivided into two parts:

   (i) To examine the extent of EVA use and reporting practices in corporate financial reports of selected Indian companies and

   (ii) To provide the empirical evidence on the factors influencing the selected Indian companies’ EVA disclosure choice.
The sub-objectives of each objective are explained and analyzed in the specific chapters of the dissertation dealing with each objective.

3.2 Study Period and Sample Selection

The present study is based on the secondary data and covers a period of 12 years ranging from 1995-96 to 2006-07. The purpose of considering such a longer time frame is to avoid factors like temporal instability and business cycles that might influence the results of the study.

Initially, top 200 companies have been selected from Business Today’s Survey i.e. BT-500 India’s most valuable private sector companies (year 2005 rankings). The rationale behind selecting BT-500, as sample base is that, these companies are ranked on the basis of market capitalization in Indian Securities Market and are projected as India’s largest and best performing companies. As the proposed study seeks to focus on the India’s most valuable companies only, this sample base can be observed to be the true representative of the need. Further, companies which do not meet the following specified criteria have been identified and eliminated:

At first, from the top 200 companies’ list, Banks, Financial Institutions and NBFCs have been excluded to prevent distortions in the comparisons. As the second criteria, companies, for which complete financial information for the last 15 years (i.e. 1993-2007) is not available, have also been excluded. Here it is worth mentioning that although the study covers a time span of 12 years yet for certain items like calculation of average capital employed and adjustment for research and development expenditure etc., the financial information for previous years is also required. For instance, to calculate average capital employed on 31st March 1996, one also needs beginning capital i.e. as on 1st April 1995 which is the ending capital of the previous year 1994-95. Further, as the third criterion, companies for which capital market data (regarding share prices) is not available for the last 15 years have also been removed from the list. This criterion has been applied for making beta computations that are required for estimating cost of equity capital. Thus, after applying above filters, the resultant sample of 104 companies (list provided in Appendix A) has finally been selected for the purpose of achieving 1st objective of the study i.e. computations of EVA and MVA of sample companies.
For the subsequent analysis, four companies were identified as outliers, thus, a final sample of 100 companies was selected and analyzed for objectives 2\textsuperscript{nd} and 3\textsuperscript{rd}.

As far as 4\textsuperscript{th} objective is concerned, i.e. to study the extent of EVA reporting practices in Indian corporate sector, the sample of the study constitutes all the 500 companies from BT-500 India’s most valuable private sector companies (year 2005 rankings). The EVA reporting practices of these companies (list provided in Appendix C) have been analyzed over a period of 5-years i.e. from 2003-04 to 2007-08.

### 3.3 Data Collection

All the financial information required for the study has been sourced from the CMIE’s corporate database \textit{Prowess} and the data regarding share prices has been taken from the \textit{Capitacharts} of Capital Market Publishers of India Ltd. The risk-free rates have been obtained from the annual reports of Reserve Bank of India.

Further, to examine the extent of EVA reporting practices among selected Indian companies, annual reports of all the 500 companies were examined over a period of five years i.e. from 2004 to 2008. These annual reports were at first downloaded from the EDIFAR (Electronic Data Information Filing and Retrieval System) link in SEBI’s (Securities and Exchange Board of India) website. The annual reports which were not available from the SEBI’s website were downloaded from the websites of respective companies. In case of companies or years for which annual reports could not be located from the specified sources, the publicly available financial statements were investigated instead of the complete reports.

### 3.4 Data Analysis Techniques

The dissertation has applied various statistical techniques suitable to carry out the analysis of the data for different objectives of the study. The main statistical techniques used in the study are: Univariate and Bivariate Regression Analysis, Panel Data Regression Models, Univariate Analysis (t-test), Correlation Analysis and Ratio Analysis. Among these, Panel Data Analysis has been done on EViews Software, a Windows-based econometric software by Quantitative Micro Software (QMS). The other statistical techniques have been carried out on SPSS Software. The brief description of the techniques applied is as follows:
3.4.1 Univariate Regression Analysis

Regression analysis is concerned with the study of the dependence of one variable, the dependent variable Y, on one or more other variables, the explanatory variables, with a view to estimating or predicting the (population) mean or average value of the former in terms of the known or fixed values of the later (Gujarati, 2004). Univariate Regression Analysis deals with studying the dependence of a variable on just a single explanatory variable i.e. when there is only a single explanatory variable in the analysis.

In the present study, Univariate Regression Analysis is used to compute beta, a systematic risk factor that measures the returns of a company’s shares relative to the returns of the market. For this purpose, the individual security prices have been taken as the dependent variable and return on the market index has been considered as the independent variable. Beta being x-coefficient in the standard regression equation has been determined for each year separately for all the sample companies.

3.4.2 Correlation Analysis

In the present study, Correlation analysis has been used at first to measure the strength or degree of linear association between different variables. Secondly, it has been used to examine the direction of the relationships i.e. whether two variables are positively correlated with each other or negatively. Thirdly, the study calculates Pearson’s Correlation Coefficient matrix to check the existence of multicollinearity among the independent variables. Multicollinearity exists when two or more independent variables are highly correlated with a set of other independent variables. For the detection of multicollinearity, the suggested rule of thumb is that if the pair-wise or zero-order correlation coefficient between two regressors is high, say, in excess of 0.8, the multicollinearity is a serious problem (Gujarati, 2004). The remedy adopted in the study is to drop one of the collinear variables and run the regression analysis.

In addition, the study also undertakes to calculate Average Variance Inflating Factor (VIF) to detect multicollinearity. It is also suggested that if the Average VIF is close to 1, this confirms that multicollinearity is not a problem for the model (Field, 2000).

3.4.3 Panel Data Analysis

In financial modeling, the types of data generally available for empirical analysis are namely, time series, cross section and panel. In time series data, the values of one or more
variables are observed over a period of time. In cross-sectional data, values of one or more variables are collected for several sample units, or entities, at the same point in time. However, Panel data comprises both cross-sectional and time series elements i.e. it has space as well as time dimension. In the present study, a panel of 100 companies is studied over a period of 12 years. Thus, Panel data analysis has been used because the data set includes both cross-sectional as well as time series data. Moreover, as each cross-sectional unit in the dataset has the same number of time-series observations, the study has used balanced panel.

**Choice of Pooling Technique**

The next methodological requirement is to examine the different methods of pooling panel data. The simplest, and possibly naïve approach is to disregard the space and time dimensions of the pooled data and just estimate the usual OLS Regression (Gujarati, 2004). This model assumes that the intercept as well as slope coefficients are constant across time and space (cross-sections) and the error term captures differences over time and cross-sections. Therefore, despite its simplicity and being used extensively in practice, the pooled regression may distort the true picture of the relationship between dependent and independent variables across individual observations (Gujarati, 2004). The two additional pooling models considered are the (1) fixed effects (or dummy variable) model (FEM) and (2) the random effects model (REM) or error components model (ECM). A brief explanation regarding both these models as given by Gujarati (2004) is given below:

“In FEM the intercept in the regression model is allowed to differ among individuals in the recognition of the fact that each cross-sectional unit, may have some special characteristics of its own. To take into account the differing intercepts, dummy variables can be used. The FEM using dummy variables is known as the least-squares dummy variable (LSDV) model. FEM is appropriate in situations where the individual specific intercept may be correlated with one or more regressors. In REM it is assumed that the intercept of an individual unit is a random drawing from a much larger population with a constant mean value. REM is appropriate in situations where the intercept (random) of each cross-sectional unit is uncorrelated with the regressors.”
The procedures used to carry out tests between the models are as follows. First it is worth determining whether the fixed effects are necessary or not. To do this, the model is estimated using common coefficients, and tested against the fixed effects specifications using the *F-test* of the joint significance of variables that are presently included in a panel or pool equation. The *F* ratio given in Gujarati (2004) and used for this test is:

\[
F = \frac{(R^2_{UR} - R^2_R) / (n - 1)}{(1 - R^2_{UR}) / nT - n - K}
\]

Where _UR_ indicates the unrestricted model (common effects) and _R_ indicates the pooled or restricted model with only a single overall constant term. Under this, the null hypothesis is that the efficient estimator is pooled least squares (Greene 1993).

EViews also provides built-in tool i.e. *Redundant Fixed Effects-Likelihood Ratio* for testing the joint significance of the fixed effects estimates in least squares specifications. The Redundant Fixed Effects test also assists in determining whether the fixed effects are necessary or not. As per this test, pooled regression model is rejected (the restricted model) over the Fixed Effects Regression Model (Least Squares Dummy Variable Regression Model being less restricted), it the *F* value comes out to be significant. In such a case, the restricted regression is specified as invalid.

The second test is used to choose between a fixed or random effects specification. Given a model and data in which fixed effects estimation would be appropriate, a *Hausman test* identifies whether random effects estimation would be almost as good. This is accomplished using a Hausman test. Under this hypothesis, there are two sets of estimates; one of which is consistent under both the null and alternative hypothesis, and another that is consistent only under the null (EViews6 User Guide II). In other words, in a fixed-effects kind of case, the Hausman test is a test of H₀: that random effects would be consistent and efficient, versus H₁: that random effects would be inconsistent. (Note that fixed effects would certainly be consistent.). So if the Hausman test statistic is large (and _p_ is significant), one must use Fixed Effects. If the statistic is small (and _p_ is insignificant), the null hypothesis will be accepted and the one may get away with Random Effects.
3.4.4 T-test or Univariate Analysis

The study at first applies various tabulations and classifications to identify the EVA reporting companies’ extent of EVA disclosures, industry affiliations, residential status, area of EVA applicability, and medium of disclosures. Further, in order to differentiate between the performance of EVA reporting and EVA non-reporting companies, Univariate Analysis has been applied. The study uses t-test that assesses the statistical significance of the difference between two independent sample means. The t-statistic is the ratio of the difference between the sample means ($\mu_1 - \mu_2$) to their standard error ($\text{SE}_{\mu_1\mu_2}$) (Hair et al., 2003). The standard error is an estimate of the difference between means to be expected because of sampling error, rather than real differences between means. It is calculated as:

$$ t \text{ statistic} = \frac{(\mu_1 - \mu_2)}{\text{SE}_{\mu_1\mu_2}} $$

where, $\mu_1 =$ mean of group 1 (EVA reporting companies)

$\mu_2 =$ mean of group 2 (EVA non-reporting companies)

$\text{SE}_{\mu_1\mu_2} =$ standard error of the difference in group means

If the t value is sufficiently large, then statistically it can be said that the difference is not due to sampling variability but represents a true difference. The decision regarding acceptance or rejection of null hypothesis is made on the basis of obtained t-statistic and its statistical significance. For each pair of observations in a table, the significance value ($p$ also known as probability value) is provided for the hypothesis that there is no difference between the means of two independent groups. A lower p-value indicates a greater likelihood that the two figures compared represent real differences between the two categories (Malhotra and Singh, 2007). Thus, for the purpose of identifying the factors affecting the EVA disclosure choice of selected Indian companies (Part II of 4th objective), the following hypothesis has been formulated:

$H_0 =$ EVA reporting companies are not significantly different from the EVA non-reporting companies in terms of their age, residential status, size, profitability, leverage, sales efficiency and earnings potential.
3.4.5 Ratio Analysis

On the basis of theoretical framework and the review of literature, the study identified the need to compute several important financial ratios that are consistently being used to gauge a firm’s financial performance. Thus, right from the first objective, till the last one, the study undertakes to calculate various financial ratios. A comprehensive description of these ratios is given along with the discussion parts of the chapters.

3.5 Limitations of the Study

One of the foremost limitations of the study is its sample that constitutes India’s largest and the best performing companies only. Since, the study was based upon identifying the value creating capabilities of India’s most valuable companies (in terms of market capitalization), top 200 companies were selected initially from the Business-Today’s annual survey of India’s most valuable companies.

Second, there is no one particular definition of EVA. For every company, definition of EVA that is implemented is highly customized with the aim of striking a balance between simplicity and precision (Stewart, 1994). For instance, R&D Adjustment is more significant in case of a pharmaceutical company than in a trading company. As far as the sample of the present study was concerned, the individual companies were from different industries. Thus, the study used similar definition of EVA that was proposed and used by the Stern-Stewart & Company’s associates while conducting BT-Stern Stewart EVA study in the year 2000. The purpose was to have a consistent approach throughout to the extent it is practical to do so. Hence, although the study has provided significant insights on shareholder value addition by selected companies, a firm-level study limited to specific industries could reveal more precise results.

Third, data constraints in relation to missing financial or capital market data forced the exclusion of certain companies from the list of companies to be analyzed. Moreover, absence of detailed financial information (regarding cumulative non-recurring incomes & expenditures, cash operating taxes etc.) also put constraints in making certain EVA-based accounting adjustments. Moreover, for the last objective i.e. EVA reporting practices in Indian companies, a few annual reports could not be obtained. Thus, the publicly available financial statements were investigated instead of the complete reports.
Fourth, in analysis of impact of firm-specific attributes on EVA performance of the companies, just eight explanatory variables namely Age, Size, Profitability, Risk, Efficient Resource Management, Liquidity, Marketing Expenditure and Research and Development Expenditure have been considered. In fact, more comprehensive results can be obtained by the inclusion of some more firm-specific attributes e.g. Listing Status, Residential Status and Shareholding Pattern etc.

The limitations and constraints listed above, perhaps, do not affect the worth of the research work significantly. It is expected that the findings of the present study will certainly provide an addition to the present knowledge of the subject as far as Indian context is concerned.