CHAPTER – 3

RESEARCH METHODOLOGY

The present study is an attempt to examine the contribution of corporate governance parameters as signals and their effects on the permeative underpricing phenomenon of Indian IPOs. This chapter outlines the research methodology and design of the dissertation. It explains in detail the specific objectives towards which this research effort is directed, period and sample of the study and data sources relied on. It also discusses the statistical techniques used to analyze the data together with limitations of the study.

3.1 OBJECTIVES OF THE STUDY

The primary objective of the study is to examine the role of corporate governance parameters in providing justifications to the underpricing phenomena of IPOs in India.

The specific objectives of study are as follows:

1. To analyze the corporate governance mechanisms in terms of board composition and ownership structures at the time of Initial Public Offerings in Indian firms listed on BSE.

2. To study the relationship of gender diversity on boards of Indian IPO firms with their listing day performance.

3. To examine the association and contribution of corporate governance mechanisms at the time of IPO in explaining the listing performance of Initial Public Offerings in India.

3.2 PERIOD OF THE STUDY

The study examines the IPOs issued in India between April 2001 and March 2012. IPOs have been included post 2001 as this was the year when based on the recommendations of the report of Kumar Mangalam Birla Committee on Corporate Governance, SEBI had specified principles of corporate governance and introduced a new clause 49 in the listing agreement of stock exchanges in the year 2000. The clause has been revised periodically
in light of evolving corporate governance systems and dynamism of environment calling for rebuilding mechanisms but its eminence remains intact. It has become a benchmark for governance norms and practices for Indian companies which are listed or are planning to get listed. The study measures IPO performance in terms of listing day pricing performance and hence listing and listing agreement become important parameters. To provide a comprehensive and broader coverage in terms of time the IPOs issued till March 2012 have been covered. An effort has been made for comprehensive coverage in terms of time, variables and companies to provide for intensive examination as desired by a research work.

3.3 UNIVERSE OF THE STUDY

Universe of the study consists of all Indian companies which raised capital for the first time since their inception at par or premium through an equity issue and have been listed on Bombay Stock Exchange (BSE). The study has been restricted to companies which issued equity share capital during the period under study excluding those which resorted to other instruments to raise funds be it debt based securities, preference issues or any other. The companies which got listed on NSE or any other exchange have also not been made part of the study. Further, those companies which approached the markets with a further issue (FPO), i.e not for the first time have not been considered.

3.4 SAMPLE OF THE STUDY

Of all the IPOs issued during April 2001 to March 2012 and listed on BSE, the final sample of study consists of 404 Indian IPOs (for IPO firms relating to year 2001 and 2002, prospectuses could not be procured from all the sources mention and so had to be left out of the sample). The considerations involved in making an IPO issuing company part of the final sample are:

1. The firm is listed on the Bombay Stock Exchange (BSE): delisted, acquired or defaulting companies not listed on BSE at the time of data collection have not been included.

2. The initial public offering is of common stock and no other securities like debt, preference securities etc.
3. The issue must be the first issue, further issues (FPO), rights issues have been excluded.

4. The companies for which the issue document, prospectus, could not be procured from all mentioned sources had to be left out of the study.

5. Market information relating to listing day, listing price and SENSEX values has been other consideration for inclusion of IPO issue in the sample.

6. Data regarding board of directors, ownership details and other control variables like offer price, listing date, issue size, date of incorporation are available.

BSE Sensitive Index has been taken as representative of market for the sample IPOs. Daily four values of Sensex are available, namely, opening, high, low and closing value. For calculating market returns and IPO returns, closing value of the index and closing share prices of IPO firms have been taken respectively. These values have been included to calculate returns on listing day of IPOs.

3.5 SOURCES OF DATA

Data for study has been collected from secondary sources. The data relating to board of directors, their composition, age, ownership, and nature of directorship, board committees and other governance variables have been extracted from the issuing prospectus, final offer document, prepared and submitted by companies at the time of IPO. These prospectuses have been procured from websites of SEBI, BSE and of respective companies. Issue-related data including data for issue price, gross proceeds raised from the issue and oversubscription have been taken from IPO prospectus and ACEEQUITY database which is a commercial agency engaged in monitoring and compilation of information on all listed companies in India. For firm specific variables, Capitaline, ACE EQUITY and Prowess Databases have been relied upon. Capitaline is one of the most reliable and empowered Indian corporate database. It provides extensive, accurate and reliable data on companies running to almost 1500 fields with regular and timely updates and is a storehouse of comprehensive information and pertinent tool for researchers. Closing market prices of IPO firms and closing values for BSE Sensex for
calculating IPOs and market returns respectively have been taken from ACEEQUITY database and BSE website.

3.6 MEASUREMENT OF INITIAL PRICE PERFORMANCE OF IPOs

The study aims at measuring the initial price performance of the IPOs on day of listing on Bombay Stock Exchange with the intent of confirming the existence of underpricing of IPOs in Indian markets and exploring role of corporate governance parameters in this phenomenon. The tendency of issuing firms to offer premium to initial subscribers has been empirically supported though the concentration of such efforts is in respect of developed markets keeping the evidence on emerging markets limited. In this study the premium available to the initial subscribers of Indian IPOs has been investigated using two methods: unadjusted and adjusted returns.

As a first measure, raw return (RR), has been employed wherein underpricing is measured using initial returns, calculated as closing price on the first trading day on the secondary market minus the offer price, divided by the offer price (Certo et al., 2001; Arthurs et al., 2008).

\[ R_i = \frac{P_1 - P_0}{P_0} \times 100 \]

where, \( R_i \) = Subscribers’ initial return (regarded as raw return)

\( P_1 \) = Closing price of the security on first day of trading

\( P_0 \) = Offer price of security

Secondly, market adjusted excess return (MAER), regarded as adjusted underpricing has been used. To adjust for market movements between the prospectus date and first trading day of IPO, it is calculated by subtracting the market return (as measured by the BSE’s sensitive index) from the initial raw return. The level of underpricing has been market adjusted as proposed by Carter et al. (1998) and Certo et al. (2001b) and is calculated as the percentage increase from the offering price to the closing price on the first day of trading.
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\[ MAER = \frac{P_1 - P_0}{P_0} - \frac{M_1 - M_0}{M_0} \times 100 \]

where, \( MAER \) = Market adjusted excess return

\( P_1 \) = Closing price of the security on first day of trading

\( P_0 \) = Offer price of security

\( M_1 \) = BSE Sensitive Index on first day of trading

\( M_0 \) = BSE Sensitive Index on offer date

3.7 STATISTICAL TECHNIQUES USED

In order to achieve the objectives of study and analyze the collected data appropriate statistical techniques have been employed drawing support from literature. All statistical work has been done using SPSS version 19 and E-views version 6.

3.7.1 Independent Sample t-test

The independent samples t-test is used when two separate sets of independent and identically distributed samples are obtained, one from each of the two populations being compared. The two samples are independent of each other in the obvious sense that they are separate samples containing different sets of individual subjects. It can be used to determine if two sets of data are significantly different from each other and is most commonly applied when the test statistic would follow a normal distribution if the value of a scaling term in the test statistic were known. The two-sample t test is fairly robust to departures from normality. For the difference in means the statistics involved for each variable in this test include mean and standard error of the mean. It also involves the Levene’s test.

**Levene's test** (Levene 1960) is used to test if k samples have equal variances. Equal variance across samples is called homogeneity of variance. Independent sample t-test assumes that variances are equal across groups or samples. The Levene test can be used to verify that assumption.
The t-statistic here is computed as:

\[ t = \frac{\text{differences between sample means}}{\text{estimated SE of differences between means}} \]

which implies numerically as

\[ t = \frac{\overline{x}_1 - \overline{x}_2}{\sqrt{SE}} \]

where \( SE = \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} \)

The independent sample t-test has been applied to check for the differences in firms with women and no woman and also for analyzing differences across corporate governance dimensions in firms with positive and negative listing day returns. After verifying the assumption of equality of variances, the statistical significance of differences amongst two samples have been checked.

### 3.7.2 ANOVA

When there are more than two independent groups, the One-Way ANOVA procedure is considered. The reason for doing an ANOVA is to see if there is any difference between groups on account of variable under consideration.

In general, the purpose of analysis of variance is to test for significant differences between means. If only two means are being compared, ANOVA will produce the same results as the t test for independent samples. Here the study units are split into groups based on some independent variable and each of the units will be assigned to one group only (companies with 0, 1, 2 or more than two women directors). Each group is then measured on the same independent variable (eg, returns, board size, promoter ownership etc.) for studying the differences among groups on these attributes.

The purpose of an ANOVA test is to determine the existence of a statistically significant difference among several group means. The test actually uses variances to help determine if the means are equal or not. The distribution used for the hypothesis test is called the F distribution, named after Sir Ronald Fisher, an English statistician. The F statistic is a
ratio (a fraction) expressed as:

\[ F = \frac{\text{Mean square between groups (variation between samples)}}{\text{Mean squares within groups (variations within samples)}} \]

which can be mathematically put as

\[ F = \frac{\left\{ \frac{\sum n (x - \bar{x})^2}{k - 1} \right\}}{\left\{ \frac{\sum (n - 1) SE^2}{n - k} \right\}} \]

where, \( k \) denotes the number of different groups, \( n \) represents the total number of observations and \( SE \) is the standard error measured through standard deviation of samples. Higher value of \( F \) (greater than one) indicates numerator value greater than denominator which will lead to acceptance of alternate hypothesis.

### 3.7.3 Chi-Square Test of Association

The Chi Square Test of Association was derived mathematically by Karl Pearson early in the century, and is often known as Pearson's Chi Square Test of Association. The Chi-Square Test of Association allows the comparison of two attributes (i.e. qualitative variables) in a sample of data to determine if there is any relationship between them. The essential question being asked by the Chi Square Test of Association is: "Is one way of categorizing things related to the other way of categorizing things, or are they independent?" The idea behind this test is to compare the observed frequencies with the frequencies that would be expected if the null hypothesis of no association/statistical independence were true.

The chi-square statistic \( \chi^2 \) compares the observed count in each table cell to the count which would be expected under the assumption of no association between the row and column classifications and is calculated as:

\[ \chi^2 = \sum_{i=1}^{k} \left[ \frac{(O_i - E_i)^2}{E_i} \right] \]
where, O<sub>i</sub> is the observed frequency in the i<sup>th</sup> cell of the table; E<sub>i</sub> is the expected frequency in the i<sup>th</sup> cell of the table. In the study, chi-squared test of association has been applied to study the association between initial returns, raw and adjusted, categorized as positive and negative and each of the governance variables included in the study.

3.7.4 Regression Analysis

Models of multiple regression analysis using OLS (ordinary least squares) have been employed for explaining the role of gender diversity and of governance measures in the underpricing phenomenon. Multiple regression reveals the extent and direction of relationship between dependent variable and several independent variables. It helps to determine the causal effect of one set of variables (independent variables) on the other (dependent variable). The adjusted R<sup>2</sup> generated by it indicates the proportion of variation in the dependent variable explained by the independent variables.

Regression models have to be used very carefully; otherwise they may produce very biased and misleading estimations. The violations of such assumptions have been checked by examining outliers and residuals. Another problem, multi-collinearity among independent variables may affect the overall estimations of the model as well as coefficients of individual variables. VIFs have been computed using SPSS software to determine the extent of collinearity among independent variables. The VIF is defined as under:

\[
VIF = \frac{1}{(1 - R^2)}
\]

where R<sup>2</sup> expresses the strength of linear relationship between independent variables.

As the name suggests, a variance inflation factor (VIF) quantifies how much the variance is inflated. The VIF measures the impact of collinearity among the variables in a regression model. The VIF is always greater than or equal to 1. When values of R<sup>2</sup> and VIF values are high for any of the variables in the model, multicollinearity is probably an issue resulting in instability of the beta coefficients.
In regression analysis, homoscedasticity means a situation in which the variance of the dependent variable is the same for all the data and is a major assumption of regression based on OLS and thus facilitates analysis. OLS assumes that errors are both independent and identically distributed. Heteroscedasticity, where variance of the dependent variable varies across the data, complicates analysis as it causes standard errors to be biased. Hence, when heteroskedasticity is present, robust standard errors tend to be more trustworthy. The use of robust standard errors does not change coefficient estimates, but (because the standard errors are changed) the test statistics gives reasonably accurate p values.

Heteroscedasticity-consistent standard errors (White’s) have been used to allow the fitting of a model that does contain heteroscedastic residuals using e-views. The first such approach was proposed by White (1980), and further improved procedures have been produced since for cross-sectional data, time-series data and GARCH estimation. In the study, hence the White’s heteroscedasticity consistent standard errors have been used to tackle the problem of heteroscedasticity.

3.8 LIMITATIONS OF THE STUDY

The present research endeavor is based on secondary data collected from different sources as specified above and hence the results and conclusions drawn are dependent on correctness of data. Other than this, following are the limitations of study:

- The scope of present study is limited to Indian companies which came out with a public issue of equity securities between April 2001 and March, 2012.
- Non-availability of data on various factors reduced the sample size of the study. The study would have been more conclusive if data for all variables of all IPOs was available.
- Listing day performance alone may not be able to capture the effects of the qualitative phenomenon of corporate governance which may influence performance over a long run. Measuring IPO performance over different time periods may present variations in results.
- Governance structures change over time and these changes may be affecting performance on the notion that it is the change of governance that determines performance, rather than the level of governance. The results would have painted a different picture in a panel study.
- BSE Sensitive Index (SENSEX) has been used for calculating market returns. Incorporating other indices may have resulted in different conclusions and inferences.
- Endogeneity and mediating effect of independent variables is another aspect which is suspected to be influencing the relationships between dependent and independent variables. This aspect could not be incorporated in present research effort.