CHAPTER 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

In this chapter the theoretical framework and methodology adopted in the study has been discussed. It outlines the various dimensions of the study and the procedures followed for the collection of data and selection of the sample companies for the study. The tools and techniques followed for analysing the data for the study are also dealt in this section. Further the limitations of the study have also been highlighted.

4.2. DIMENSIONS OF THE STUDY

The study is a sectoral study of Indian firms. Three different sectors i.e. Informational Technology, Fast Moving Consumer Goods (FMCG) and Service have been chosen for study. The various dimensions examined in the study are as follows:

1) To empirically examine the determinants of dividend smoothing by firms and find out its linkage with information content of dividends. This involves:

   • To empirically test the validity of Lintner model in three sectors chosen for study.

   • To examine whether companies in IT, FMCG and Service sector strive for stability in their dividend payments. (DIVIDEND SMOOTHING)

   • To study to what extent dividend payment pattern of companies (IT, FMCG and Service sector) in India is consistent with their earnings pattern (SIGNALING HYPOTHESIS).

   • To identify and specify target payout ratios and speed of adjustment coefficients for each sector undertaken for study.
2) To identify various corporate dividend policy determinants. This focuses on analysing the influence of firms’ characteristics like profitability, growth, risk, cash flows, agency cost and on dividend payment patterns.

3) To investigate the association between various Ownership groups and dividend payout policies of Indian corporate firms.

4) To find the impact of dividend announcement on shareholders’ wealth. This aims at testing the dividend relevance and irrelevance proposition in IT, FMCG and Services sector.

4.3 THE DATA AND SAMPLE

4.3.1 SECTORS

The study is focused on three sectors IT, FMCG and Service sector.

IT SECTOR

IT sector has been chosen for study because it is a sunshine sector of India. It currently accounts for almost 4.8% of India’s GDP. It will account for 7% of India’s GDP by 2010. The dividend payment pattern of IT companies have changed leaps and bounds over past few years. They were at the bottom of the charts in terms of dividend payout in 2000 and but after 2004 there was a sudden spurt in their dividend payout. To the best of our knowledge, so far no study has been undertaken in India to empirically test the above stated four research objectives in the Indian IT sector. Therefore, this sector has been chosen for study.

FMCG

FMCGs (Fast Moving Consumer Goods) are those goods and products, which are non-durable, mass consumption products, available off the shelf. FMCG industry has played a major role in the Indian economy during the last few years and it is registering an uptrend in growth. FMCG stocks are known as “dividend yield” stocks. FMCG companies are consistent dividend payers. According to CII-A T Kearney report, FMCG industry will grow at a compounded growth rate of 9% to reach a size
of 1, 43,000 crores by 2010 from present level of Rs. 93000 crores under favorable conditions. This growth can be attributed to improved performance of companies like HLL, Dabur India and Nestle India.

**SERVICE SECTOR**

Indian Service sector comprises of trade hotels, transport, communication, IT and software, banking and insurance etc. Till 2002 Service sector was ignored in India and the main emphasis was on manufacturing and agricultural sector. It was only after 2002 that Service sector started growing at a healthy rate of 8-10%. Today it is the highest contributor to the GDP of our economy.

These sectors have been chosen for study as they became active during post liberalisation period. So far to the best of the researcher’s knowledge this is the first attempt undertaken to study the dividend behaviour, patterns and determinants in Indian IT, FMCG and Service sector.

**4.3.2 THE DATA**

The research is analytical and empirical in nature and makes use of secondary data. The data has been sourced from Prowess database of Centre for Monitoring Indian Economy (CMIE). The data used for achieving each objective was made suitable for analysis as per the methodology. Thus, the data collected from Prowess database has been complied and used with due care and caution as per the requirement of the study. The analysis has been carried out both on panel and pooled data depending on the requirements of the techniques used for analysis. In the forthcoming paragraphs the importance of Panel data over Pooled data has been discussed.

Over the two decades the literature on dividend behaviour has seen the major shift from macro modelling towards the micro modelling of financing. For the micro modelling the use of Panel Data models has major significance, which takes care of the various econometric problems associated with the other models like time series and cross section models. A Panel data is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample. Panel data sets for economic research possess several major advantages over conventional cross sectional or time series data sets. Longitudinal data allow a
researcher to analyse a number of important economic questions that cannot be addressed using cross sectional or time series data sets alone. Chirinko, Fazzari and Meyers (1999) have noted that sometimes the studies at aggregate level fail to find an economically significant relationship between the two variables due to problems of simultaneity or firm heterogeneity which may be better addressed at micro level data.

Other advantages of panel data are set are outlined as follows:

*Panel data controls the individual heterogeneity.* Therefore the risk of obtaining biased results comes down; Moulton (1986,1987) , Klevmarken (1989) and Solon (1989) have argued that panel data gives more information , more variability , less collinearity among the variables, more degrees of freedom, and more efficiency. Freeman (1984) has argued that the panel data set are better able to identify and measure effects that are simply not detectable in pure cross-section or time series data set. Panel data models enable construction and testing of more complicated behavioral models than purely cross sectional and time-series data. In other words, it can be said that the technical efficiency of economic behavior is better studied and modeled with Panel data (Baltagi and Griffin;1988; Cornwell, Schidt and Sickles;1990, Kubhakar;1990,1991,1993)[109].

The analysis of first and third research objective has been done using Panel data as it overcomes the various shortcomings of purely cross sectional or time series data.

**4.3.3 ASSUMPTIONS MADE FOR DATA ANALYSIS IN EACH SECTOR**

Only those firms in each sector have been included in the analysis that have earned profits and corresponding to that declared dividends. All those observations where the companies either have not declared any dividend or incurred losses have been eliminated.

**4.3.4 SAMPLE PERIOD**

The sample period undertaken for study of each objective is from the year 2000 to 2008 except for the third objective, which is from the year 2001 to 2008 due to nonavailability of data for the year 2000. The data has been taken after 2000 because of definitional change in the shareholding pattern. Since the period of 5 to 6 years
usually covers a business cycle. Therefore the period chosen covers a complete business cycle i.e. both recessionary and booming phases of the sectors. This would highlight whether the dividend payment patterns, trends and determinants vary or remain consistent during boom and recession.

### 4.3.5 THE SAMPLE

The sectoral analysis has been done by taking sample of companies, which are the constituents of CNX IT, CNX FMCG and CNX Service Sector respectively.

In order to have a good benchmark of the Indian IT sector, IISL (India Index services and Product Ltd.) has developed the CNX IT sector index. IISL is a joint venture between NSE and credit rating agency CRISIL Ltd. The sample selected for study consists of all the companies, which are constituents of CNX IT index of NSE.

Akin to CNX IT index, IISL (Indian Index Services and Products Ltd.) has developed the CNX FMCG sector index. The CNX FMCG Index is a 15 stock Index from the FMCG sector that trade on the National Stock Exchange.

In the similar manner to do analysis of research objectives in Service sector, all the companies, which are constituents of CNX service sector Index, have been undertaken. CNX Service sector index is a 29 stock index developed by IISL.

The list of the sample companies for each of the sector has been appended to the annexure (Annexure I)

### 4.4 MODELS DEVELOPED AND TECHNIQUES USED

For the conduct of the study various models have been developed. This section discusses these models and various tools and techniques used to carry out the research.

#### 4.4.1 LINTNER MODEL

The first research objective is based on the theoretical model set by John Lintner. Lintner (1956) developed a model to study the determinants of the dividend behavior of American corporations assuming that the dividend payout is a function of net current earnings after tax (PAT) and dividend paid during the previous year i.e. lagged
dividend ($\text{Div}_{t-1}$). Companies decide to payout a fixed proportion of their net profits as dividend to common stockholders; but in view of their well known preference for stable dividends may try to achieve the target level only by a fraction of the amount indicated by the target payout ratio whenever profit changes. The above theoretical formulation of Lintner has been used as an estimating equation for corporate dividend in the present study, which is as follows-

\[
\text{D}^*_{it} = \alpha_i E_{it} \quad (4.1)
\]

\[
\text{D}_{it} - \text{D}_{i(t-1)} = a_i + C_i \{\text{D}^*_{it} - \text{D}_{i(t-1)}\} + u_i \quad (4.2)
\]

Where,

$\text{D}^*_{it}$= desired dividend payment during period ‘t’

$\text{D}_{it}$= Actual dividend payment during period ‘t’

$\alpha_i$= Target payout ratio

$E_{it}$ = Earnings of firm during period ‘t’

$a_i$ = a constant related to dividend growth

$C_i$= partial adjustment factor

$u_i$= error term

\[
\text{D}_{it} - \text{D}_{i(t-1)} = a_i + C_i \{\alpha_i E_{it} - \text{D}_{i(t-1)}\} + u_{it} \quad (4.3)
\]

\[
\text{D}_{it} = a_i + \alpha_i C_i E_{it} + (1-C_i) D_{i(t-1)} + u_{it} \quad (4.4)
\]

This model can further be simplified in the form of a multiple regression equation

\[
\text{D}_{it} = a_i + \alpha_i E_{it} + C_i D_{i(t-1)} + u_{it} \quad (4.5)
\]

To understand the relationship between dividend and earnings (PAT) a Multiple linear regression analysis was carried out in respect of companies which are constituent of CNX IT index, CNX FMCG Index and CNX Service sector Index respectively, for Pooled and Panel data of 9 years i.e. from 2000 to 2008. Fixed effect (one way and two way) static Panel data analysis has been done.
4.4.1.1 Panel Data Analysis

In a Panel data set, a given sample of \( N \) individuals is observed at different time periods and thus provides multiple observations on each individual in the sample.

The linear model assumed is as follows:

\[
Y_{it} = \alpha + X_{it} \beta + \mu_{it} \quad (4.6)
\]

It is assumed that there are data for \( i = 1, 2, 3, \ldots, T \) time periods. If \( T_i = T \) is constant for all cross sectional units, then data set is called a Balanced Panel. Otherwise the Panel is unbalanced.

\( \alpha \) is a \( 1 \times 1 \) scalar constant representing the effects of those variables peculiar to the \( i \)th individual in more or less the same fashion over time.

\( \mu_{it} \) represents the effects of the omitted variables that are peculiar to both the individual and time periods.

This model is also called the analysis of Covariance model. This model covers both quantitative and qualitative factors, which are affecting the dependent variable.

In the Panel data models the unobservable effects can be accommodated using one of the two techniques. First, the unobservable effects can be included in the error term. The variance covariance matrix of the resulting non-spherical errors must be transformed to obtain consistent estimates of the standard errors. In this case the “random effects” estimator is appropriate (Hsaio, 1989). However, a problem arises with random effects estimator if the unobservable effects, which have been included in the error term, are correlated with some or all of the regressors. As a consistent alternative to the random effect estimator is a dummy variable can be included in each firm. This estimation is known as” Fixed effects” and it gives consistent estimates regardless of correlation between firm specific error component and regressors.

The choice of Fixed and Random effects depends on whether individual effect is considered to be fixed and random. While random effects estimation addresses the endogeneity issue by instrumenting potentially endogeneous variables, it is also
assumes that the individual firm effects are uncorrelated with the exogeneous variables.

4.4.1.2 Fixed Effect Models

If the coefficients are assumed to be fixed then the coefficients are estimated by dummy variable models. This estimation approach is known as Fixed effect approach which yields consistent results regardless of correlation between firm specific error component and regressors. If the dummy variables are taken for the firms only then that model is called one way fixed effect model, and if taken both for both firm and time then that model is called Two way fixed effect model.

In One Way Fixed Effect Model, the disturbance term is divided into two parts. That is

\[ u_{it} = \mu_i + \nu_{it} \quad (4.7) \]

However in the Two-way Fixed Effect Model, the disturbance term is divided into three parts.

\[ u_{it} = \mu_i + \lambda_t + \nu_{it} \quad (4.8) \]

where , \( i = 1 \ldots N \) and \( t = 1 \ldots T \)

\( \mu_i \) denotes the unobservable individual effect

\( \lambda_t \) denotes the unobservable time effects

\( \nu_{it} \) is the remainder stochastic disturbance term.

The results were obtained by estimating the Fixed Effect One Way, Two Way Static Panel data models, F –test (Moulton and Randolph, 1989), Likelihood Ratio (LR) test (Gouriéroux, Holly and Monfort, 1982), Lagrange Multiplier (LM) test (Breusch and Pagan, 1980), and Hausman specification test (Hausman, 1978). It was necessary to carry out these tests to know the significance of the firm and time effects in the data sets, and to find out a suitable Panel data method for estimation of the model.

The Lagrange Multiplier (LM) test shows the acceptability of Panel data models over classical regression models. Hausman’s (1978) test was performed so as to choose the
most appropriate model. The test statistic is asymptotically distributed as $\chi^2$ under the null hypothesis that correlation between stochastic error term and explanatory variables is null and hence the random effects model is more suitable compared with the fixed effect model. High values of Hausman statistics indicate the use of Fixed effect models over Random Effect models and the low value of Hausman statistics induces to use the Random effect models. The F test and Likelihood Ratio (LR) test results show that both the firm and time effects are present in the data. Langrange Multiplier test statistics indicate that either the Fixed effect firm and firm and time models or the Random effect firm and firm and time models are to be preferred to Classical Linear Regression model. [110]

4.4.1.3 Lintner Model Used

**Pooled Data Analysis**

Following Multiple linear regression equation has been developed to empirically test the Lintner model using pooled data in each of the three sectors respectively.

\[ Y = \alpha + \beta_1X_1 + \beta_2X_2 + u_{it} \]  \hspace{1cm} (4.9)

Where,

- $Y =$ dependent variable (equity dividend in Rs. crore during period t)
- $X_1 =$ independent variable (PAT) in Rs. Crore
- $\alpha =$ Constant
- $\beta_1 =$ regression coefficient of PAT
- $X_2 =$ Equity dividend during period t-1
- $\beta_2 =$ regression coefficient of dividend during period t-1 i.e. (1-c) and c is the adjustment factor.
- $u_{it} =$ Error term

**Panel Data Analysis**

The Multiple linear regression equation developed to empirically test Lintner model using Fixed effect firm / Fixed effect firm and time estimations is stated below:
\[ Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \mu_i + \lambda t + \epsilon_{it} \quad (4.10) \]

\[ Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + u_{it} \quad (4.11) \]

Where,

\( Y \) = dependent variable (equity dividend in Rs. crore during period \( t \))

\( X_1 \) = independent variable (PAT) in Rs. Crore

\( \alpha \) = Constant

\( \beta_1 \) = regression coefficient of PAT

\( X_2 \) = Equity dividend during period \( t-1 \)

\( \beta_2 \) = regression coefficient of dividend during period \( t-1 \) i.e. \((1-C_i)\) and \( C_i \) is the adjustment factor.

\( \mu_i \) = firm specific components

\( \lambda_t \) = time specific components

\( \epsilon_{it} \) = disturbance term

The target payout ratio of Information Technology sector, FMCG sector and Service sector respectively has been calculated through the Regression coefficient of PAT and with the help of regression coefficient of lagged dividend, the partial adjustment factor as discussed in the Lintner model has been obtained. Multiple regression analysis was carried out to empirically test the Lintner model and to find the applicability of smoothing approach to dividend in each of the three sectors.

Therefore,

Target payout ratio \( \times \) adjustment factor = \( \beta_1 \)

\( \alpha_i \times C_i = \beta_1 \)

\( \alpha_i \times (1-\beta_2) = \beta_1 \)

**This implies** \( \alpha_i = \text{target payout ratio} = \beta_1 / (1-\beta_2) \)

Speed of adjustment factor= \( 1-\beta_2 \)
The presence or absence of serial auto correlation in the time series data has been tested using Durbin Watson statistics. As a summary measure, the coefficient of determination ($R^2$) i.e Adjusted R square tells to what extent proportion of variations in the dependent variable is accounted for the explanatory variables. For judging the significance of individual regression coefficients ‘t’ test is conducted. Similarly for evaluating the overall significance of the estimated regression equations and validity of the regression model, F ratios have been calculated. All the above results have been obtained through the use of SPSS 17 and STATA 9 softwares for data analysis.

Thus, the regression results form the basis of testing the applicability of Lintner model, which is a finance classic, is proposed to be tested in each of the three sectors.

### 4.2.2 CORPORATE DIVIDEND POLICY DETERMINANTS: FACTOR ANALYSIS AND MULTIPLE LINEAR REGRESSION ANALYSIS

To categorize the key determinants of corporate dividend payout ratios for Indian Information Technology, FMCG and Service sectors; the technique of Factor analysis has been used. On the basis of literature review, the following key variables have been identified that influence the dividend payout ratio of the firm.

$$Y = \text{Equity dividend (in crores)}, X_1 = \text{PAT (in Rs crore)}, X_2 = \text{Lagged dividend (Rs. crore)}, X_3 = \text{Current ratio of firm ‘i’ during period’t’}, X_4 = \text{Debt equity ratio of firm ‘i’ during period’t’}, X_5 = \text{Quick ratio of firm ‘i’ during period’t’}, X_6 = \text{Annual sales growth of firm ‘i’ during period’t’}, X_7 = \text{Natural log National Stock Exchange adjusted average closing stock prices of the firm ‘i’ during period ‘t’}, X_8 = \text{Cashflows of firm ‘i’ during period ‘t’}, X_9 = \text{Retained profits of the firm ‘i’ during period’t’}, X_{10} = \text{Capital expenditure or Gross fixed assets (t-(t-1))}, X_{11} = \text{Nifty beta of firm ‘i’ during period’t’}, X_{12} = \text{Market capitalisation of firm ‘i’ during period ‘t’}, X_{13} = \text{Price earning ratio of firm ‘i’ during period ‘t’}, X_{14} = \text{Price to book value ratio of firm ‘i’ during period’t’}, X_{15} = \text{Promoter holding of firm ‘i’ during period’t’}, X_{16} = \text{Natural Log of Total assets of firm ‘i’ during period’t’}, X_{17} = \text{Interest coverage ratio of firm ‘i’ during period’t’}, X_{18} = \text{RONW of the firm ‘i’ during period ‘t’}, X_{19} = \text{ROE of firm ‘i’ during period ‘t’}, X_{20} = \text{Lagged PAT (in Rs crore)}, X_{21} = \text{Standard deviation of earnings per share}$$

The statistical techniques of Principal Component Factor analysis and regression analysis were used to explore the relationship between these variables. Since the
variables identified as per the available literature were not on same scale; all the
variables were standardised and converted to same scale. The final analysis was carried
by reckoning the following key variables.

Y= dividend payout ratio
X_{1}=PAT to assets ratio^{27}
X_{2}=Lagged dividend ratio
X_{3}=Current ratio of firm ‘i’ during period ‘t’
X_{4}=Debt equity ratio of firm ‘i’ during period ‘t’
X_{5}= Quick ratio of firm ‘i’ during period ‘t’
X_{6}= Annual sales growth of firm ‘i’ during period ‘t’^{28}
X_{7}= Natural log National Stock Exchange adjusted average closing stock prices of the
firm ‘i’ during period ‘t’
X_{8}= Cashflows ratio of firm ‘i’ during period ‘t’^{29}
X_{9}= Retained ratio of the firm ‘i’ during period ‘t’
X_{10}= Capital expenditure or Gross fixed assets (t-(t-1)) to fixed asset ratio
X_{11}= Nifty beta of firm ‘i’ during period ‘t’
X_{12}= Natural log of Market capitalisation of firm ‘i’ during period ‘t’
X_{13}= Price earning ratio of firm ‘i’ during period ‘t’
X_{14}= Price to book value ratio of firm ‘i’ during period ‘t’
X_{15}= Promoter holding of firm ‘i’ during period ‘t’
X_{16}= Log of Total assets of firm ‘i’ during period ‘t’
X_{17}= Interest coverage ratio of firm ‘i’ during period ‘t’
X_{18}= RONW of the firm ‘i’ during period ‘t’

^{27} In FMCG and Service sector respectively PAT has been expressed as % of total assets. At the same
time to obtain better results total assets was substituted by gross fixed assets in IT sector
^{28} In case of constituent companies of CNX Service sector the annual sales growth was replaced with
growth in revenue as majority of the constituents of this Index are banks where sales growth figure is
not available
^{29} In case IT and FMCG sector cashflows have been expressed as a percentage of Net sales. However, in
case of Service sector cashflows ratio has been computed by expressing cashflow as a% of PBIT
$X_{19}=\text{ROE of firm ‘i’ during period ‘t’}$

$X_{20}=\text{Lagged PAT to lagged assets ratio (in Rs crore)}^{30}$

$X_{21}=\text{Standard deviation of earning per share}$

### 4.4.2.1 An Overview of the Factor Analysis and Multiple Linear Regression Analysis

A two-step multivariate procedure is employed where the data is first subjected to a Factor analysis and then Multiple Linear regression is performed on extracted factors.

Typically, empirical studies estimate a regression equation using some measure of dividend as dependent variable, and the independent variable represents (proxy) the unobservable attribute(s). This technique has several problems. First, treating the various theoretical attributes as if they are mutually exclusive may lead to spurious correlations or misspecification problems. Second, it may be almost impossible to find perfect proxies for abstract theoretical attributes as there may be many close substitutes. Third, problems of multicollinearity between the independent variables, which may lead to incomplete specification of regression equation. Finally, if the selected proxies are imperfect representations of chosen attributes, then an error in-variable problem may be introduced in the regression equation$^{4}$. [111]

Factor analysis provides a set of “latent” dimensions or factors from observable proxies or variables. It also facilitates the need for a simultaneous investigation of alternative theories because the chosen set of factors represents combinations of several variables that may be interrelated. Furthermore; the use of factor analysis overcomes some of the problems associated with traditional regression analysis, especially multicollinearity. Factor analysis tries to simplify complex and diverse relationships that exist among a set of observed variables by uncovering common dimensions of factors that link together seemingly unrelated variables and consequently provides insight into underlying structure of data (Dillion and Goldstein, 1984). [111]

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$^{30}$ The results in IT sector are reported by expressing lagged PAT as a% of gross fixed assets.

For the analysis of pooled data for nine years i.e. 2000 to 2008 Factor analysis and the technique of multiple linear regression analysis is used. A linear relationship is assumed to facilitate the estimation procedure. The determinants, by and large, are not directly observable, and the proxies chosen to represent them may be correlated. A two step multivariate procedure is used in our investigation. In the first step, a set of dimensions (unobservable attributes) is measured by relating them to observable proxy variables using factor analysis. In the second step, the relationship between equity dividend and dimensions obtained from first step is estimated using regression analysis. The equity dividend(Rs crore) ($Y$) is the dependent variable and other variables ($X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}, X_{14}, X_{15}, X_{16}, X_{17}, X_{18}, X_{19}, X_{20}, X_{21}$) are taken as independent variables.

The first model can be expressed as:

$$X = BT + E \quad (4.12)$$

Where $X$ is a matrix of independent variables, $T$ is a vector of unobservable factors; $B$ is the vector of error terms. The regression model for second step is shown in equation (5), where $\gamma_i$ represents factor $i$, $a_i$ its regression coefficient, $a_0$ is the intercept, and $\mu$ is the error term.

$$\text{Div} = a_0 + a_i \gamma_i + \mu \quad (4.13)$$

Equation (4) is estimated using factor analysis.

Factor analysis has been carried out through the use of SPPS 17 software. Factor analysis simplifies the complex and diverse relationship among variables by uncovering the common dimensions that link them together, thus providing insight into the structure of the data. The technique of Principal Component analysis has been used to extract factors. The basic principal is to seek orthogonal; linear composites of the original variables whose scores display maximal variance. That is, the observable variables are grouped into factors based on their correlations (or associations). Variables that are highly correlated are formed into a factor with the condition that this factor is not related to the second factor and so on. The Factors also exhibit maximum sequential variance in that the first factor accounts for highest amount of variance, the second factor accounts for second highest, and so on.
To improve the interpretation of the results from factor analysis, a subsequent orthogonal rotation is performed to obtain a simple structure. This reduces the problem associated with too many variables loadings on more than one factor. The simple structure is obtained through Varimax orthogonal transformation.

4.4.2.2 Factor Identification and Selection

Generally, the identification of the factors is determined by the factor loadings, and the relationship of the factor with the variable is based on the signs of factor loadings. A factor loading is simply the correlation of an original variable with factor. As suggested by Dillion and Goldstein, variables with factor loadings greater than absolute value of 0.30 or more are considered significant and thus used in labelling of factors. The present study has interpreted the factors loaded by variables having significant loadings of magnitudes of 0.30 and above.

The Scree plot method has also been used. In scree plot method, eigen values are plotted in a descending order against the number of factors. The eigen value represents the variance explained by each factor and is equal to the sum of squared loadings.

Once the factors have been extracted the next step involves the estimation of the relationship between the extracted factors and the Equity dividend (Rs crore). Since the factors are derived through orthogonal transformations, there are no multicollinearity problems.

4.4.2.3 Structural Breaks

The dummy variable has been used as a substitute for Chow test to take care of the structural breaks. It has been assumed that structural break affects only the regression constant. In the IT sector the dummy variable has taken the value of 0 from 2000-2004 and 1 from 2005-2008. Similarly, in the FMCG sector to introduce structural break dummy variable has been given a value of 0 from 2000-2004 and 1 from 2005 – 2008. However, there has been no structural break in the services sector but out of 29 sample companies 9 are banks whose dividend payout is governed by Banking regulation act. Therefore, dummy variable has been introduced has a value of 1 if it is a bank and 0 otherwise.
4.4.3. QUADRATIC POLYNOMIAL REGRESSION ANALYSIS

Apart from the above determinants of corporate dividend policy, influence of ownership groups on dividend payout has also been reported by the previous studies. The key ownership variables that can affect Dividend Payout (DP ratio) are as follows:

- Promoter holding (Percentage of equity shares held by promoters i.e. persons in overall control of the company)
- Institutional holding (Aggregate percentage of equity shares held by Insurance companies, Mutual funds, Financial Institutions, banks, Venture capital funds).
- Foreign institutional investment (Percentage of equity shares held by companies registered in country other than the country in which they are currently investing).
- Corporate holding (Percentage of equity shares held by corporate bodies).
- Debt equity ratio (Ratio of total debt to equity capital, measure of leverage. It is used to address debt holders and shareholders conflicts).

The basic reason of using a Quadratic polynomial regression is that the relationship is supposed to have only one knot i.e. increasing effect up to the threshold and decreasing thereafter or vice versa. Previous studies have hypothesised that the ownership control would have non-linear relationship i.e. positive up to a threshold level and negative thereafter due to shift in priorities and benefits to owners.

For the analysis the square of the variables namely (promoters)$^2$, (institutional)$^2$, (foreign)$^2$ and (corporate)$^2$ to examine the presence of non-linearity in ownership effect after a certain threshold has been included. The squared percentages have been taken in the model to test for the hypothesized parabolic relation between dividend payout and ownership groups. A negative coefficient for ownership variables and a positive coefficient for squared ownership variables support the postulated relation. Equation 9 and 10 shows the model developed for analysing the third research objective. The technique of Quadratic polynomial regression analysis has been used for data analysis.
4.4.3.1 Quadratic Polynomial Model

MODEL I

Dividend payout \( i_t = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} \\
+ \beta_8 X_{8it} + \beta_9 X_{9it} + \mu_i + \epsilon_{it} \) \hspace{1cm} (4.14)

MODEL III

Dividend payout \( i_t = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \beta_7 X_{7it} \\
+ \beta_8 X_{8it} + \beta_9 X_{9it} + \mu_i + \lambda_t + \epsilon_{it} \) \hspace{1cm} (4.15)

Where,

\( \mu_i \) = firm specific components, \( \lambda_t \) = time specific components, \( \epsilon_{it} \) = disturbance term

\( Y = \text{dividend payout ratio of firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{1it} = \text{Promoter holding of firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{2it} = \text{Institutional holding of the firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{3it} = \text{Corporate holding of the firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{4it} = \text{Foreign institutional holding of the firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{5it} = \text{Debt Equity ratio of firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{6it} = \text{Square of promoter holding of firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{7it} = \text{Square of Institutional holding of the firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{8it} = \text{Square of Corporate holding of the firm} \ 'i' \text{ during time period} \ 't' \)

\( X_{9it} = \text{Square of foreign institutional holding of the firm} \ 'i' \text{ during time period} \ 't' \)

4.4.3.2 Linear Model

MODEL II

Dividend payout \( i_t = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \mu_i + \lambda_t + \epsilon_{it} \) \hspace{1cm} (4.16)

\( \mu_i = \text{firm specific components,} \ \lambda_t = \text{time specific components,} \ \epsilon_{it} = \text{disturbance term} \)
Y = Dividend payout ratio of firm ‘i’ during time period ‘t’

X_{1it} = Promoter holding of firm ‘i’ during time period ‘t’

X_{2it} = Institutional holding of the firm ‘i’ during time period ‘t’

X_{3it} = Corporate holding of the firm ‘i’ during time period ‘t’

X_{4it} = Foreign institutional holding of the firm ‘i’ during time period ‘t’

X_{5it} = Debt Equity ratio of firm ‘i’ during time period ‘t’

Panel data has been used for analysis. The results have been estimated by calculating Fixed effect firm model, Fixed effect firm and time model and Random effect model. For Random effect Maximum Log Likelihood method has been used.

The Random effects examine how group and/or time affect error variances. This model is appropriate for n individuals who were drawn randomly from a large population. In a random effect model, the intercept is held constant and no longer represents an individual cross-sectional unit, whereas ε_{it} the stochastic error term, becomes the disturbance term specific to the cross-sectional unit ε_{it} = μ_{i} + ν_{it} reflects the error component disturbances and no longer has a constant variance. The individual specific effects are random and normally distributed. They are independent of the residual terms ν_{it} which are also normally distributed.

As discussed in the methodology used for Lintner model following tests were conducted for selection of appropriate Panel data models:

- Lagrange Multiplier (LM) test
- Hausman statistics
- F test

### 4.4.4. EVENT STUDY APPROACH

It is well accepted that Shareholders’ wealth is reflected by share prices. According to Dividend relevance hypothesis dividend payout has an impact on share prices. Previous researchers have found that dividend announcements generate abnormal returns. These studies have used Event Study approach which is the most
sophisticated methodology available in Corporate Finance to analyze the impact of an event (dividend announcements in the context of present study) on share prices. In the following segment Event Study approach has been discussed in detail.

4.4.4.1 Event Study Methodology: A Brief Introduction

The first step in the event study methodology is to identify the event and the relevant event period over which to evaluate stock returns. This step is often most difficult in the process because it is often difficult to separate one “event” from all the other “events” that may be happening in a given time period. While some event dates are readily identified, such as dividend and earnings announcement or a CEO firing, other events are more difficult to isolate to a particular point in time. For example, FASB and SEC guidelines changes or mergers are particularly difficult to pinpoint to a particular day because they occur over a period of time and information comes in over a period of time. An SEC guideline change may trickle out over an extended time period, making it too difficult to identify the relevant event date and time. In case of mergers, is the event first announcement of proposed merger, or the completion of the merger? And when does the information actually introduce itself into the financial markets and thereby affect share price? Even in instances where the researcher knows that there was a financial impact, the fact that the impact was spread over a long period of time makes it more difficult to isolate the event under study from any and all other factors that affected stock returns over the same period of time. In short, the price affect of the event under study may be lost in the “noise” that is also reflected in stock price variations.

[112]

After the appropriate event is determined firms that might be impacted by the event are then identified. The event day may or may not be the same for all the sample firms. Regulatory changes would affect all firms at the same time, although some might be affected more than others.

Once the event days are identified and affected firms are identified, the next step is to estimate the “normal” change in stock prices (i.e. the returns) for those firms. Several methods are available for estimating returns including the mean-adjusted model, the market-adjusted model, and the market model. The mean adjusted method uses the

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5 This section has been taken from “A beginner’s guide to event studies” by William H. Wells
mean daily returns on each individual firms’ stock over predetermined estimation period. The estimation period for mean adjusted method uses the mean daily return on each individual firm’s stock over a predetermined estimation period. The estimation period for the mean adjusted model, as well as the other two models, typically includes a period of about 180 trading days immediately preceding the event date. The mean return is now used as a benchmark for the firm’s daily stock returns during the event period. The event period usually includes the day before the event through one to three days following the event date. The event period is often expanded to include preceding and subsequent days so that the researcher can identify possible leaks and/or delayed reactions to events.

In addition to mean adjusted model, the market model and market adjusted models are also employed in event studies. The market-adjusted model is similar to the mean adjusted model, except that the market’s mean return is used as the benchmark. That is, some proxy for the market, such as S&P 500 Index, the NYSE Composite Index or some broader index containing NYSE, AMEX and NASDAQ listed companies is used to measure the market’s return. Each firm’s observed event period returns are compared to the market’s return to identify any investor reaction to the event.

The market model is a more sophisticated model that incorporates a risk adjustment component to the estimate of returns. This method begins by estimating “beta” for each stock. Stocks with high betas would be expected to have higher than average returns in good times and lower than average returns (at least above normal relative to the “average” stock) during an event period and yet still not be impacted by the event itself. That is, the high-beta stock might naturally show above average returns, even without any reaction to an abnormal event. Therefore, researchers sometimes rely on the market model to refine their predicted returns over event period in question.

Betas are obtained in number of ways, but most often by using regression analysis to assess individual daily returns against the market’s returns over some estimation period. Again, this estimation period is typically prior to the event date. The intercept and slope from regression and the market’s daily returns are used to estimate the firm’s daily stock returns during the event period. Because beta is a measure of co-movement with the market’s daily return and is therefore a measure of co-movement with market’s return and hence a measure of market risk, this model is often selected.
in an effort to achieve a better estimate of returns when firms are of higher or lower natural risk than average. For the accomplishment of the fourth research objective Market model has been used.

After the estimation model is determined and both estimated and actual returns are obtained for each stock within the sample, the difference between the two returns is computed for each event day. These values are identified as unexpected or abnormal returns and are attributed to the effect of event on stock returns. That is, if investors believe that an event affects a firm’s value, the firm’s stock price will be bid up or down accordingly. Abnormal returns are returns that are statistically larger or smaller than predicted. It can be concluded that stockholders reacted positively to the announcement if positive abnormal returns are generated.

Finally, the individual daily abnormal returns for the individual firms are aggregated across all firms in the sample for each day. These standardized abnormal returns (SARs) are examined to determine whether, on average, the event produce returns (good or bad) that are different from the returns that would be expected. That is, did the event cause investors to bid up or sell down the price of the sample stocks to a degree that would not be anticipated? Also, because it may be difficult to pinpoint a specific event day, a cumulative effect over a period may be present and observable. Cumulative standardized returns (CARs) are calculated by summing daily SARs across time, and CARs are also standardized to determine if cumulative returns are statistically different from zero.[113]

4.4.4.2 Application of Event Study Approach:

To analyse the impact of dividend announcements on shareholders' wealth in the selected sectors in India, Event study approach has been used. The following steps were followed to perform event study:

- The first step was to find out the dividend announcement dates in each of the sector respectively from 2001 to 2008. Consequently 168 dividend announcements dates were obtained in IT sector and 199 and 202 dates in the FMCG and service sector respectively.
- Estimation window of 150 days was chosen based on literature survey.
The event window of 20 days before the event and 20 days after the event i.e. 41 days has been taken.

For calculating expected returns as per Market model daily adjusted closing prices were taken.

Cumulative abnormal returns were calculated with the help of average abnormal returns to see the reaction over a period of time.

Finally, t statistics were calculated to cross-sectionally by using standard deviation of abnormal returns.

To estimate the stock price response to dividend announcements, Returns ($R_{it}$) which is the time t return on security ‘i’ were calculated as ($P_{it} - P_{it-1})/P_{it-1}$ where $P_{it}$ is the adjusted closing price of the stock ‘i’ on day t. $P_{it-1}$ is the adjusted closing price of stock i on day t-1

$$R_{it} = (P_{it} - P_{it-1})/P_{it-1}$$

Similarly returns on Market Index were calculated using the following formulae:

$$R_{mt} = (I_t - I_{t-1})/I_{t-1}$$

Then, abnormal returns were calculated for each of the days in the event window according to the equation:

$$AR_{it} = R_{it} - E (R_{it}), t=(-20,-19\ldots,20),$$

The expected return is estimated by employing the market model [114]. The market model parameters were estimated prior to the event window. In the present study an estimation window of 150 days have been used.

$$E(R_{it}) = a + b_1 R_{m,t} + e_{i,t}$$

Where, $R_{m,t}$ is the return on the market portfolio on day ‘t’ proxied by specific sector indices, $e_{i,t}$ is the random error term and $a_i$ and $b_i$ are the market model parameters.

Note that CNX IT index has been taken as proxy for market index in IT sector while in FMCG and Service sector, the proxies used are BSE FMCG and NIFTY 50 respectively. BSE FMCG and NIFTY 50 Index have been taken because the values of CNX FMCG and CNX Service sector are not reported by NSE.
The abnormal returns may be positive or negative as per the response of investors to the occurrence of event (In this case dividend announcement). For this one has to apply as many regressions as the numbers of dividend announcement dates are.

The ARs are then averaged across the sample of firms according to the formula:

\[ \text{AARs} = \text{Avg}(AR_t) = \frac{1}{N} \text{AR}_{it} \] \hspace{1cm} (4.21)

Where,

\( N \) is the number of sample observations.

Thus, the abnormal returns were averaged by dividing it by the number of days to find out daily average abnormal returns. The process was repeated for all the dates and finally average cumulative abnormal returns were obtained. This is the second measure (CAR), it measures the investors’ total return over a period starting from before the announcement of dividend to after the dividend announcement day. The cumulative abnormal returns from day \( t_1 \) through \( t_2 \), \( \text{CAR}_t \), are:[39]

\[ \text{CAAR}_t = \sum \text{Avg} (AR_t) \quad \text{where } t = t_1 \text{ to } t_2 \] \hspace{1cm} (4.22)

CAAR may be positive or negative. If CAAR is negative in periods after dividend announcements, this suggests dividend announcements do not carry information about future earnings and cash flows of the companies. A positive CAR indicates distribution of dividend adds to shareholders’ value by conveying good news to the market. We use a 41 day event window period starting from \(-20\) to \(+20\) day relative to the dividend announcement day (0 day). For the purpose of analysis both interim and final dividend announcements has been taken.

To compute the \( t \)-statistic, first all abnormal returns are standardized as:

\[ \text{SAR}_{it} = \frac{\text{AR}_{it}}{S_i (\text{AR})} \] \hspace{1cm} (4.23)

where \( S_i (\text{AR}) \) is the standard deviation of the abnormal returns of stock ‘\( i \)’ in the estimation period. The \( t \)-statistic for the sample of \( N \) observations for each day ‘\( t \)’ in the event window is calculated as:
\[ t(SAR) = \left( \sum_{i=1}^{N} SAR_{it} \right) \cdot \frac{1}{\sqrt{N}} \]  

(4.24)

Apart from Market model, Market adjusted Model has also been used to conduct event study. Market adjusted model is widely used in empirical research on the subject. This model assumes that expected return is constant across securities, although it is not necessarily constant for a given security. The mathematic expression for this model is:

\[ A_{it} = R_{it} - R_{mt} \]  

(4.25)

Where, \( R_{mt} \) = the return of market index.

This relationship means that market portfolio of risky assets is a linear combination of all securities.

4.4.5. LIMITATIONS OF THE STUDY:

The study is based on the financial data obtained from Prowess data base of CMIE. Thus the study possesses all the inherent limitations of the secondary financial data. Non availability of the required financial data for the whole period of the study has restricted the size of the sample. Presence and absence of autocorrelation has been examined with the help of Durbin-Watson statistics. However, no attempt has been made in this study to remove them, in case their existence is felt.

Certain results obtained through the results should be viewed with care and caution in view of the following facts. Out of 29 companies included in the CNX Service Index, 9 are banks. Payment of dividends by banks is covered under the Banking Regulation Act and may not strictly adhere to the variables identified in the study. Banks have to fulfill the norms of the RBI before distributing any dividends.

Similarly in this index, 6 are Government companies. Again their dividend payment would also depend upon the policy decisions by the Government of India apart from the variables identified in the study.

In the CNX FMCG Index there are MNCs like Colgate-Palmolive, Glaxo Smithkline and Hindustan Unilever. Dividend payments by MNCs are high as through such payments they are able to repatriate funds to their parent company. Thus their
dividend decisions are based on the requirements by their parent companies apart from the variables identified in the study.

The application of Market model in Event study approach requires the usage of Market Index. Since the values of CNX FMCG and Service sector are not reported by NSE, the BSE FMCG Index and Nifty 50 have been used as the proxies to obtain expected returns in FMCG and Service sector during the event window respectively.

More and more companies are now repurchasing their shares, which are a form of dividend distribution. This has not been dealt in the study. The study is focussed exclusively on cash dividends.

Thus, while using the findings of the study one should be careful and use it judiciously by taking the various limitations into consideration.