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Determinants and the Stability of Dividends in India:

Application of Dynamic Partial Adjustment Equation using Extended Instrumental Variable Approach

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Summary

This paper improves on earlier research on stability and determinants of dividend policies by using a more advanced estimation methodology, a larger and more representative sample of panel data (PD), and different proxies for a longer time window 1971-2007. It is aimed to find whether the Indian private corporate sector follow stable cash dividend policies, whether dividends smoothen earnings in India, to estimate the implicit target payout ratio and speed of adjustment of dividends towards a long run target payout ratio. We further test applicability of dividend stability hypothesis and add to the relatively limited literature on aspects of dividend decision by examining the dynamics of relationship between dividend payouts and a host of other explanatory variables. We estimate the basic static PD model, GMM-in-Levels {GMM (in-Lev)} model, and its other variations GMM-in-first-differences {GMM (in-Diff)] and GMM-in-Systems {GMM (in-Sys)}so to include other lag structures. This procedure shows us how much the size of the dividend determinants, the speed of adjustment coefficient and the one of the implicit target payout ratio varies across the different estimation techniques. In addition, it will also be useful to compare our results with those of Pooled OLS-estimation with alternate data definitions for checking the robustness of the results.

Keywords: Dividends, Determinants, Stability, Panel Data, Partial Adjustment Model, GMM, GMM (in-Diff), GMM (in-Sys), India.

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Introduction

There is no consensus in the financial markets or in financial literature about the need, importance and factors affecting dividend policy behavior. On one hand there is a view that dividends significantly affect the value of firm and shareholders' wealth as per Jensen (1986); while there prevails a skeptical view about the 'value added' by dividends on the other hand according to Modigliani and Miller (1958) and Miller and Modigliani (1961). Though Damodaran (2000) points, dividend decisions like investments and financing decisions are crucial and involve tradeoffs, there seems to be little consensus on what should lead us in terms of a "right" dividend policy. The theories in financial literature dealing with determinants and stability of dividend can be grouped into two categories. Those based on the implicit assumption of asymmetric information, and that based on the explicit assumption. The seminal work in that of Lintner (1956), Fama and Babiak (1968) and Marsh and Merton (1986) hypothesize asymmetric information, whereas the theories based on explicit assumption of dividends include the agency theory, pecking order theory and the dividend signaling theory. Among the foremost papers on dividend policy, Lintner (1956) embodies dominant patterns of decision-making with respect to dividends. The decisive contribution to the theoretical modeling of dividends by Miller and Modigliani's (1961) view dividend payment policies as a passive residual of retentions; prior to their work it was believed that the dividend payment by firms would increase firm value. Further the proponents of signaling theories like Aharony and Swary (1980) and Kwan (1981) present that the firms change their dividend policies to signal relatively better information to the market. Since Lintner neither considers the factors like size, debt, investment, managerial aspects *etc.* nor considers regulatory constraints in determining dividends, of late this led other researchers to explore and investigate other plausible variables which might possibly be significant. The issue of dividend stability and determinants has been researched and proved for across countries, except for some very recent studies in emerging markets.

Objectives

This piece of research is planned in context of an emerging market, India and aims to set the stage for enquiry into relevance of dividend policy by emphasizing its importance to the firm. As such, this is a first attempt to take a holistic view of dividend using rich set of unexplored panel data pertaining to Indian companies for the period 1971 through 2007. In the backdrop of findings of prior researches we review herein, the objectives are to analyze issues relating determinants and stability of the corporate dividend structures in India. It would be intriguing to find whether the Indian private corporate sector follow stable cash dividend policies, whether dividends smoothen earnings in India and to estimate the implicit target payout ratio and speed of adjustment of dividends towards a long run target payout ratio. We further test applicability of dividend stability hypothesis and add to the relatively limited literature on aspects of dividend decision by examining the dynamics of relationship between dividend payouts and a host of explanatory variables. The factors as to how liberalization process affects these determinants and whether these factors have changed over time are also explored. Very particularly, we examine the role of industry type and select macro-economic factors in determining the Indian corporate payout policy behavior by interpreting the existence and importance of firm and time effects on data and if so, look whether the information in these effects is more parsimoniously captured by our variables, that vary only over firms or only over time.

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Motivation

The proposed study attempts to unearth various factors that determine the dividend policy decisions in India. Although tax policy, depreciation policy, retention policy, interest rate, size of the firm, age of the firm and investment opportunities *etc.* are theoretically assumed to be major determinants of the corporate dividends, in the light of lower effective corporation tax rate than nominal rate and higher effective depreciation rate than its nominal or general rate, the meager dividend performance in India cannot be attributed to the taxation and depreciation systems.

It is contemplated to shed light on several unresolved issues on dividend policy from a developing country perspective. Detailed empirical evidence for a developing countries' viewpoint is important, because the institutional frameworks can differ significantly from those in the developed countries. Given that the Indian capital market is developing and the economy is targeted to be one of the largest in world, our results could fill an important gap in empirical literature. Dividend policies have implications on financing and investment behavior of firms. Payment of dividends reduces free cash flows and alternatively the scope for investments in newer and efficient projects. Deciding what percentage of earnings to payout as dividends is a basic choice confronting managers because this decision determines not only how much funds flow to investors, but also what firms are retained for reinvestments. Thus, the decisions taken by managers relating dividend are interwoven with that of investments.

Conflicting opinions exists regarding whether dividend is decided first and retained earnings are residual, or retained earnings is a active variable and dividends the result thereof. This attempt could highlight the importance of dividends by enquiring its specific role and significance amongst other investment and financing decisions. The question we wish to address is whether corporate investments and financing patterns lead to payouts or it is the other way round.

According to Stable Dividend hypothesis, a firm's value is influenced by the regularity of its dividend payout. Firms with stable dividend policies enjoy better valuation in the capital markets than those with variable dividend policy. It therefore follows that the investors of firms following stable dividend policy will enjoy better opportunity for wealth creation. Stable dividend policy results in more predictable cash flows in the hands of the shareholders; this reduces uncertainty and consequently the required rate of return whereas variable dividend policy makes the cash flow in the hands of shareholder more variable and hence increases their risk and subsequently, the required rate of return. Managers may then have to satisfy the share holder's preference for increases in rate of return; else the value of the firm will be subsequently affected.

Likely Contribution to Knowledge

The proposed study is different from rest in many ways. Unlike earlier studies we take a holistic view of dividend using Panel Data (PD) pertaining to Indian companies for the years 1971 through 2007. Second, earlier studies on dividend policy did not control for unobserved firm-specific effects which might be correlated with other explanatory variables causing Ordinary Least Squares (OLS) and Within-Groups estimators to be biased and inconsistent. We use the Generalized Method of Moments technique developed by Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998).

We hypothesize that dividend policy of the firms is chosen, and is not randomly distributed among companies. We also expect the strong influence of industry, financial and macroeconomic factors. We demonstrate specifically the firm, inter and intra-industry effects across varying periods and the significance or otherwise, of time and random effects by pooling time series and cross- sectional data.

Few studies in the West demonstrate that dividend payments tend to follow aggregate economic activity in the economy. Some macro-economic indicators like interest rates, inflation, *etc.* are likely to affect dividends in some particular way. Thus dividends are roughly assumed be influenced by, or may *interalia* influence macro economic policies like that of general price levels and interest rate cycles based on aggregate demand activity in the economy. The analysis of behavior of corporate cash payouts therefore assumes significance from the point of macro-economic and microeconomic policies. An enquiry into a number of such variables and the analysis of plausible impact of structural reforms could make study of the Indian case more interesting.

Literature on dividend policies reviewed herein for purpose of present work reinforces the fact that number of studies on dividends in emerging market context is scanty. Dividend policy theories are exhaustively propounded; critically evaluated and empirically tested in the West, and mostly in the context of developed markets. Use of reliable databases, wide and deep sample frame and use of contemporary econometric techniques characterize research on the given subject. Given the limited published work in developing countries like India, a need is felt to attempt a comprehensive integration of both, qualitative support to the quantitative findings on dividend policy. Further, the limited numbers of studies in emerging markets most of them we are able to review, suffer from inadequateness due to scanty coverage of data. This is also true for India. No major private players were able to collect and disseminate wide-based data, till some limited sources very recently. The rich data compiled by Reserve Bank of India (RBI) on Company Finances is extensive, but scantly used by researchers. In fact the RBI has been regularly publishing studies on financial performance of Private Corporate Sector for over three decades. The usage of such a consistent, reliable and wider data canvas can improve reliability of tested models. Panel Data Analysis (PDA) on corporate dividend policies has emerged in dividend related literature over past decades in the developed economies, due to presence of strong and reliable long run databases at government and at a private level. Only a couple of studies on dividends in the context of India make use of PD, though for maximum period of ten-fifteen years. Majority of studies either use time series data confined to a particular industry or check for the cross-sectional trends and determinants over few industries. Major manufacturing industries like Jute, Textile, and Chemicals *etc.* are mainly considered. It is for this reason the usage of PD covering Private and Public limited companies spread over different industries for the longer time frame could be insightful.

The tendency to pay dividends is under going a metamorphosis in developed and developing countries as well. The earlier studies explore typical dividend determining variables, examine influence of traditional theories and fit basic regressions on time series or cross-sectional data. Recent developments in interdisciplinary research and advances in computational methods have led to use of different variables, test of emerging explanations, use of pooled data analysis, lag dependent variables, and qualitative variables to explain dividend behavior in developed markets. No systematic attempt to comprehensively apply these emerging techniques in discovering the determinants of corporate dividend policies in Indian context is yet evident. We resort to the use of classical OLS based analysis, static panel analysis (time, firm and random effects) and also dynamic panel data analysis for our interpretations. We subject our PD estimates to a host of alternate model specifications across three different time series, over a longer time frame of 35 years. This study aims to extend understanding of the importance and determinants of dividend policy and may provide guidance on forecasting dividend yields of a company. Moreover, complements the emerging body of literature on payout policies in emerging economies. One could rely on the methods and models empirically tested and those which have been proved to be most useful in explaining dividend behavior of firms in developed countries by attempting to exploit the theoretical advances and analytical advances in this area. Such an analysis will also indicate as to how the behavior of specific variables in Indian context differs from those in the developed markets

2. Review of Literature

Several studies {Smith (1963, 1971), Dhrymes and Kurz (1967), Plattner (1969), Hakansson (1969), Long (1978), Chateau (1979), Murray (1981), Penman (1983), Poterba (1986), West (1988), Han *et. al.,* (1989), Frankfurter and Lane (1992), Cochrane (1992), Isa (1993), Elston (1994), Christie and Nanda (1994), Lee (1995), Raaballe and Bechmann (2000), Desai *et. al.,* (2002), Scott *et. al.,* (2003), Elston *et. al.,* (2004), Faulkender *et. al.,* (2004), Omran and Pointon (2004) for Egypt and Lüders *et. al.,* (2004)} depict the impact of various factors determining dividend policies. Brittain (1966) elaborately captures the effects of various financial and macro-economic variables on the dividend policies of the firms while Fama (1981 and 1984) study the impact of macro-economic factors on dividend adjusted stock returns while in his later paper examines the relation between dividends and investments. Campbell and Shiller (1988a and 1988b) study the effect of stock prices, discount factors and earnings on dividend policies of the firms and Mohd. Perry (1995) uses firm size and industry representation as control variables. The former, controls for both the transaction cost and agency cost proxies. Industry representation is used as a control variable for it is an important factor in payout decisions. It is found that the dividend policy is positively related to the firm size, amount of institutional holding and number of shareholders and is negatively related to past and future growth, operating and financial leverage risk. Redding (1995) studies interrelationships between firm size and liquidity on dividend payments from a theoretical and empirical perspective and it is shown that the dividend decision is quite robustly positively correlated with company size and the liquidity of company's shares. The effect of the proxies of size and liquidity on the level of dividend payment is also examined wherein the dependent variable is the dividend yield and suggests that size and liquidity has its strongest contribution in explaining the dividend decision. Other informational factor such as monitoring and signaling remains strong determinants of the level of corporate dividend. Ang *et. al.*, (1995) examines the diversities in dividend policies for Indonesian firms whereas, Kester and Md. Isa (1996) compares the dividend policy behaviour of firms in Malaysia. Sarig (1984, 2001) also demonstrates firm effects. In the later study, using Vector Auto Regression estimation for the data period 1950-1997 find that the corporate investment decisions determine payout policies and not the other way round. Booth (2002) in his study of the Importance of dividends reveals the firm effect. Carvalhal-da-Silva and Leal (2002) attempts to link corporate governance indicators, market valuation tools and dividend indicators in Brazil whereas in a more recent study Kowalewski *et. al.,* (2007) constructs measures of the quality of the corporate governance for 110 non-financial companies listed on Warsaw Stock Exchange to find evidence that an increase in the transparency indices leads to an increase in the dividend-to-cash-flow ratio. They also find that more profitable companies have higher dividend payouts, while riskier and more indebted firms prefer to pay lower dividends.

The studies like that of Mazumdar (1959), Rao and Puranandam (1965), Kumar and Manmohan (1966), Sharan (1980), Rao *et. al.,* (1984), Khurana (1985), Dholakia and Bhatt (1986), Chawala and Srinivasan (1987), Kevin (1992), Panigrahi *et. al.,* (1991), Mahapatra and Sahu (1993), and Roy and Mahajan (2003) depict the impact of financial variables in evaluation of dividend policies for India.

Of late researchers resort to use Static and Dynamic PDA is in determining dividends with the use of limited dependent variable techniques like Tobit, Probit and Logit regressions, the Fixed and Random Effect Models (FEM and REM respectively), and also emerging techniques like that of the Generalized Methods of Moments (GMM). Some prominent studies that use PDA are those by Frankfurter and Gomg (1993), Lasfer (1996), Benito and Young (2001, 2002), Kang (2001), Pandey (2001), Barclay *et. al.,* (2003), Baker and Smith (2003), Kumar (2003), Benzinho (2004), Stacescu (2004), John and Kayazenva (2006), Gopalan *et. al.,* (2006 and 2007) *among others*.

Lee and Xiao (2003) investigate cash dividend paying behavior in China and find no correlation between FCF and the probability of paying dividends, that current profitability is a precondition for cash payments and that cash dividends may be used as a tool for expropriating minor shareholders. Bebczuk (2003) analyses PD of 55 listed companies in Argentina for the period 1996-2002 using Tobit estimation instead of dynamic GMM based technique for he notes that the dependent variable is truncated at zero with many observations displaying such a value and that, endogeneity doesn't seem to be particular in the subject understudy. Dummy variables are used for time, for ADR (American Depository Receipts) issues and for foreign owned firms and Industry. Study reports that the bigger and more profitable firms, firms with more good investment opportunities and more fluid access to debt pay more dividends. Riskier and more dividends indebted firms prefer to pay lower dividends and the same applies to foreign owned firms and do not seem to care about maintaining stable payout ratios over time. The industry dummies tend to turn non-significant. Benito (2003) uses PD methodology to examine the dividend policies of firms in Spain. His results are consistent with a tax discrimination model in which cash flow is the marginal source of funds. High degrees of persistence are also found in binary PD models that control for unobservables and initial conditions. Whilst companies in Spain use the dividend to adjust the balance sheet, the paper finds that such persistence occurs slowly. De Angello *et. al.,* (2004) uses PD for the period 1973-2002 to suggest that firms with relatively high amounts of earned equity (retained earnings) are especially likely to pay dividends. Using a broad variety of multivariate Logit specifications, they consistently observe a positive and highly significant relation with Fama-MacBeth *t*-statistics in the double digits between the probability that a firm pays dividends and the relative importance of earned equity in its capital structure controlling for firm size, current and lagged profitability, growth, leverage, cash balances, and dividend history. In the regressions, earned equity has an economically more important impact than does profitability or growth. This evidence is consistent with the hypothesis that firms pay dividends to mitigate agency problems. Employing the PD methodology Omet (2004) examines the dividend policy behavior of companies listed in Amman Securities Market, Jordan. The study uses a balanced PD for 44 firms and employs Pooled OLS, the FEM and the REM. The dummy variable measures the differential intercept and the differential earnings per share coefficient based on the time period 1985-1999 whereas, Goergen *et. al.,* (2004a, 2004b) use the GMM technique consistent with Arellano and Bond (1991), Arellano and Bover (1995) and Blundell and Bond (1998) procedures on firm level PD and find German companies are more willing to cut the dividend in the wake of a temporary decrease in profitability. Chay and Suh (2005) by examining cross-sectional determinants of corporate dividend policy in twenty-four countries around the world including India, suggest that cash flow uncertainty has negative relation with corporate dividend policy around the world. Renneboog and Trojanowski (2007) using PDA estimations on the Lintner (1956) framework examine whether or not dividend policy is influenced by the firm's corporate control structure whereas, Kowalewski *et. al.* (2007) using PD for Poland suggest that large and more profitable companies have a higher dividend payout ratio. Furthermore, riskier and more indebted firms prefer to pay lower dividends. More recently, Hedensted and Raaballe (2008) based on a total sample largely uncontaminated by share repurchases in Denmark find that the characteristics of dividend payers are: Positive earnings, high ROE (net earnings to book equity), low volatility in ROE, high retained earnings, large firm size, and whether the firm paid out dividends in the previous year. MV/BV, leverage and owner structure play no role in whether a firm pays dividends or not. Andres *et. al.,* (2008) employ partial adjustment model on dynamic panel data find that German firms do not seem to base their dividend decisions on long term target dividend payout ratios based on public earnings. Regarding the speed of adjustment of dividends towards the long term target payout ratio, the authors find that UK and US companies slowly adjust their dividend policy whereas German companies tend to be more willing to cut the dividend in the wake of a consistent decrease in profitability.

3. Data Specifications and Methodology

For the purpose of empirical analysis, the period of study is taken from 1971-2007 and is sourced from the various annual studies based on the annual accounts of selected companies from among the non-government non-financial Public and Private limited companies and non-government financial and investment companies. This is the largest possible span for which firm level data is currently available for Indian firms. The unpublished private corporate firm level data for the empirical study is requested from the RBI and sourced from the database maintained from its Annual Studies on Company Finances. Banking, insurance and other financial companies as also companies limited by guarantee and associations, organizations functioning not-for-profit or in formative stage and those not operative for more than six months during the year are excluded in the dataset.

The average number of public limited companies for which equity dividend data is available in the full period is 1815, and the numbers of equity dividend related firm level observations are 67,174 (see table 1, in Appendix). For time series and static panel modeling, the entire time frame is divided into 1971-1992, 1993-2007 denoting the pre-reform and the post-reform periods respectively, and for the entire period 1971-2007. The subdivision of panels enables us to illustrate the effect of economic liberalization on the corporate dividend policy in India. Since the use of dynamic models involve variable in their own lagged form, the entire sample had to be revised. In such case the entire sample period ranges from 1975-2007, with the periods 1975-1992 and 1995-2007, classified as pre-liberalization and post-liberalization periods respectively.

Using PDA, the models like Fixed Effects, Random Effects for Static PDA and GMM technique for Dynamic PDA have been used for the estimation of our dividend data. The primary motivation for analyzing Panel Data is to control for unobservable firm heterogeneity. Hsiao (1985) argue that pooling data, using appropriate estimation techniques, and grouping individuals according to certain *a priori* criteria can help overcome this heterogeneity problem. However it is rather difficult to establish exogeneity between the regressors and error term especially in company financial data and therefore the direction of causality between variables might be ambiguous because of the potential endogeneity. Consequently, the contemporaneous data for both dependent variable and its determinants may cause spurious results. In financing literature the endogeneity problem is either largely ignored or corrected for only using fixed effects or control variables approach. We control for this important problem by employing GMM technique to avoid significant bias in estimates.

3.1 Static Panel Data Technique

We prefer PDA, as it is possible to include time effects as well as to control for the heterogeneity of firms by including firm-specific effects, which may be random or fixed. However, the Fixed Effects Model (FEM) is costly in degrees of freedom because it is equivalent to the use of a dummy variable for every firm, Greene (2003). The assumption involved in FEM is that the effects are fixed that means the error term is assumed to be random. In this type of model the regressors may be correlated with the individual and time effects. For the error, which is generally denoted as μ_{it} having the properties E(μ_{it})=0, and that μ_{it} is uncorrelated across *i* and *t*. This model is also called as Least Square Dummy Variable Model. If the coefficients are assumed to be fixed then the coefficients are estimated by dummy variable models. This estimation is called as Fixed Effect Approach which yields consistent estimates regardless of correlation between firm specific error component and regressors. When we take the dummy variables for the firms only then that model is called as One Way FEM, while when we take a dummy both, for firm and time, that model is known as Two Way FEM. In the One Way FEM, the μ_i's are assumed to be fixed parameters to be estimated, and the remainder disturbances stochastic with v_{it} independently and identically distributed IID $(0,\sigma^2_v)$. The x_{it} are assumed independent of the v_{it} for all *i* and *t*. The FEM is an appropriate specification when we focus on a specific set of *N* observations and our inference is restricted to the behavior of these sets of firms or observations. If the μ_i and λ_t (unobservable time effect) are assumed to be fixed parameters to be estimated and the remaining disturbances stochastic with v_{it}:IID $(0,\sigma^2_v)$ then $u_{it} = \mu_i + \lambda_t + v_{it}$ represents a Two Way FEM or the Error Component Model (ECM). Inference in this case is conditional on the particular *N* individuals and over the specific time periods observed.

If there are two many parameters in the FEM and the loss of degrees of freedom is very high it can be avoided if the μ_i can be assumed to be random. This is the Random Effects Model (REM). If an effect is assumed to be the realized value of a random variable, it is called a Random Effect. In this case the μ_{it}:IID $(0,\sigma^2_\mu), v_{it}$:IID $(0,\sigma^2_v)$ and the μ_i are independent of v_{it}. The individual effect is characterized as random and inference pertains to the population from which the sample was randomly drawn.

If the u_i:IID $(0,\sigma^2_\mu), \lambda_i$:IID $(0,\sigma^2_\lambda)$, and v_i:IID $(0,\sigma^2_v)$ are independent of each other then this is the Two way REM. Inference in this case pertains to the large population from which the sample was randomly drawn. REM assumes the independence between error terms and explanatory variables. In this set up it is assumed that the effects are random variables except for the additive constant, which is a fixed quantity. In FEM the effects of omitted variables are treated as fixed constants over time. But in the case of REM the individual or time effects are treated as random variables.

3.2 Dynamic PDA using Extended Instrumental Variable (IV) Technique

Dividend decisions are dynamic by nature and could be modeled as such. PDA allows us to study the dynamic nature of the dividend decisions at the firm level. Dynamic panel-data models can be estimated by the Generalized Method of Moments developed by Hansen and Singleton (1982), Holtz-Eakin, Newey and Rosen (1988), Arellano and Bond (1991) and Arellano and Bover (1995) to estimate the structural model of dividend. GMM is used when the regression is dynamic and include lagged dependent variables. However the lagged dependant variables can create a bias of estimates obtained through classical regression analysis because the error term by definition is correlated with the lagged dependent variable. Due to such a correlation the OLS assumptions will be biased as the assumptions of non-spherical error terms are violated. Similarly, if there is a target dividend ratio, then firms should take the appropriate steps to reach this objective. However, the fixed or random effects models may also give biased and inconsistent estimators due to the correlated error term with lagged variable.

To deal with variables that may be correlated with the error term, Instrumental Variables (IV) can be used. Application of GMM to econometric models can be considered as an extension of IV estimation method. IV estimation is widely used for models with random regressors (*e.g.* lagged dependent variable) which exhibit the correlation with model errors. Using IV has the additional advantage of solving problems encountered in static models, mainly the simultaneity bias between the dividend measure and the explanatory variables, and the measurement error issue. The prime advantage of GMM is that the model need not to be homoscedastic and serially independent. The covariance matrix of the averages of sample moments is taken into account for minimizing the GMM criterion function. The advantage of GMM is that it finds the parameters of interest by maximizing an object function which includes the moment restriction that the above mentioned correlation between the error term and the lagged regressor is zero. GMM differs from other estimation principles such as least squares, or maximum likelihood in the objective of the minimization problem as the GMM estimators are defined by choosing the parameters to minimize the criterion function.

For notational convenience, let X be a combined data matrix of endogenous (dependent) and predetermined (independent or explanatory) variables in the model. β is a K-element vector of unknown parameters. Suppose there are L moment equations,

$m(X,\beta) = (m_1(X,\beta), ..., m_L(X,\beta))$, where $L \geq K$ ……………………………………………**(1)**

GMM sets the moment or orthagonality restrictions close to zero. The GMM estimator is the value of the parameters that satisfies the sample moment condition. Corresponding to the moment conditions $E(m(X,\beta)) = 0$, we write the sample moment equations as follows

$m(\beta) = 1/N \sum_{i=1,2,...,N} m(X_i,\beta)' = 0$ ……………………..………………...……………**(2)**

Assuming p^{th} order auto-covariances, the well-known White-Newey-West estimator of covariance matrix of sample moments is

$Var(m(\beta)) = S_0 + \Sigma_{j=1,2,...,p}(1 - j/(p+1))(S_j + S_{j'})$ ..……..……………………….………..**(3)**

Where $S_0 = m(\beta)m(\beta)' = 1/N^2\ \Sigma_{i=1,2,...,N}\ m(X_i,\beta)'m_i(X,\beta)$, ………………………...…..**(4)**

$S_j = m(\beta)m_{-j}(\beta)' = 1/N^2\ \Sigma_{i=j+1,2,...,N}\ m(X_i,\beta)'m(X_{i-j},\beta)$ and $j = 1,..., p < N$. ….**(5)**

Given a positive definite symmetric weighting matrix W, the goal is to minimize the quadratic function:

$Q(\beta) = m(\beta)'W\,m(\beta)$ ………………………………………………………………….…**(6)**

Optimally, W is chosen to be the inverse of the consistent estimator of asymptotic covariance matrix of $m(\beta)$. *That is,*

$W=W(\beta)= [Var(m(\beta))]^{-1}$ ....**(7)**

The GMM estimator β^* of β is obtained from solving the zero gradient conditions:

$\partial Q(\beta^*)/\partial\beta = 0$. *Let* $G(\beta^*) = \partial m(\beta^*)/\partial\beta$, which is L by K matrix of derivatives ………**(8)**

The estimated variance-covariance matrix of β^* is

$Var(\beta^*) = [G(\beta^*)'[Var(m(\beta^*))]^{-1}G(\beta^*)]^{-1}$ ....**(9)**

The asymptotic efficient estimator β^* is normally distributed with mean β and covariance matrix $Var(\beta^*)$.

The intuition behind GMM is to choose an estimator for β that solves $g'(\hat{\beta})=0$. These GMM estimators allow controlling for unobserved individual effects which is present in the static model, endogeneity and simultaneity of explanatory variables and the use of lagged dependent variables, Hansen (1982). Firm and individual effects are taken care by first differencing the variables while use of time dummies for each year takes care of time-effects.

Consider the following model

$y_{it} = \alpha y_{it-1} + \beta' x_{it} + \gamma' f_i + u_{it'}$ ……………………………….……………..……….……**(10)**

where $u_{it} = \eta_i + v_{it}$ and $E(v_{it} / x_{i0},....,x_{iT},\eta_i) = 0$ ……………………....……………..**(11)**

f_i is an observed individual effect and η_i is an unobserved individual effect. In this model, regardless of the existence of unobserved individual effects, unrestricted serial correlation in v_{it} implies that y_{it-1} is an endogenous variable. In estimating our dividend model we want to allow for the possibility of simultaneous determination and reverse causality of the explanatory variables and the dependent variable. We therefore relax the assumption that all explanatory variables are strictly exogenous. In principle, the simultaneity bias in the estimated models can be tackled by the use of instrumental variables to obtain consistent estimates of the coefficients. Consistent GMM estimation requires that the instruments used be uncorrelated with the unobservable effects to the function since these effects may be included in the error term. Examples of these effects include attributes of the mangers of firms such as ability and motivation, or their attitudes towards taking risk. They might also include time-invariant industry specific effects, which are specific to the industry in which the firm operates. These might involve those structural characteristics such as entry barriers, market conditions and industry wide business risk. While the time dummies take note of the macro economic shocks common to all the firms, these effects are mainly macroeconomic effects such as prices and interest rates (inflation levels and yield curve in our model). Mostly these effects will be captured by the presence of firm specific and time specific dummies.

Considering the following model:

$$Y_{it} = \alpha Y_{it-1} + \alpha_1 Y_{it-2} + \beta X_{it} + \beta_1 X_{it-1} + \beta_2 X_{it-2} + u_{it} \quad \text{……………………………………...}\mathbf{(12)}$$

Where $u_{it} = \mu_i + \lambda_t + \varepsilon_{it}$ and $E(\varepsilon_{it})$=0. …..…..………..……………………...……..**(13)**

In this model, regardless of the existence of unobserved effects, unrestricted serial correlation in ε_{it} implies that Y_{it-1} is an endogenous variable. Relaxing the assumption that all explanatory variables are strictly exogenous *i.e.* explanatory variable is uncorrelated with the error term at all leads and lags, and assuming weak exogeneity *i.e.* explanatory variable is uncorrelated with future realizations of the error term (*i.e.* may be affected by past and current dividend payout ratios, but not by future ones) of the explanatory variables, the joint endogeneity of the explanatory variables requires an IV procedure to obtain consistent estimates of the coefficients of interest.

In case the unobserved effects are not present, we can employ GMM in Levels {GMM(in-Lev)} under the assumption that the error term ε_{it} is serially uncorrelated or at least follows a moving average process of finite order and also assume that the future innovations of the dependent variable do not affect current values of explanatory variables, the observations *viz.* $(Y_{it-2}, Y_{it-3}....., Y_{in})$ and $(X_{it-2}, X_{it-3}....., X_{in})$ can be used as valid instruments in the GMM estimations. However in the presence of unobserved individual effects since the GMM (in-Lev) estimator produces inconsistent estimates, one can estimate the specific model in first differenced form, refered to as GMM in Differences or the 'Difference estimator'{GMM (in-Diff)}. In this case:

$$\Delta Y_{it} = \alpha \Delta_{it-1} + \alpha \Delta_{it-2} + \beta \Delta X_{it} + \beta_1 \Delta X_{it-1} + \beta_2 \Delta X_{it-2} + \Delta \varepsilon_{it} \quad \text{…………………...….……….}\mathbf{(14)}$$

Using first differences eliminates the specific firm effect, thus avoiding any correlation problem between unobservable firm specific characteristics and explanatory variables. First differencing equation removes the firm-effect and produces an equation that can be estimated using instrumental variables. This has the additional advantage that it solves the problem of possible endogeneity in the regressors. The use of instrumental variable is thus again required because $\Delta\varepsilon_{it}$ is correlated with ΔY_{it-1} by construction and joint endogeneity of the explanatory variables. Under the assumption that the error term $\Delta\varepsilon_{it}$ is not serially correlated and the explanatory variables are weakly exogenous the following moment condition apply to the lagged dependent variable and the set of explanatory variables

$E(Y_{it-s}\Delta\varepsilon_{it}) = 0 \qquad \forall s \geq 2;\ t=3,\text{-----}\ T$ ………..…………………….…………...**(15)**

$E(X_{it-s}\Delta\varepsilon_{it}) = 0 \qquad \forall s \geq 2;\ t=3,\text{-----}\ T$ .....…………..……………………….......**(16)**

so that $(Y_{it-2}, Y_{it-3}, ..., Y_{in})$ and $(X_{it-2}, X_{it-3}, ..., X_{in})$ are valid instruments.

Arellano and Bond (1991) have shown that under the assumptions that the error term ε_{it} in equation 10 is not serially correlated and the explanatory variables are weakly exogenous, *i.e.* GMM (in-Diff) is an efficient GMM estimator for the above model.

Although GMM (in-Diff) solves the problem of the potential presence of unobserved individual effects, the estimator has some statistical shortcomings. Blundell and Bond (1997) show that when the dependent variable and the explanatory variables are persistent over time, lagged levels of these variables are weak instruments for the regression equation in differences. Blundell and Bond (1997) suggest the use of Arellano and Bover's (1995) 'System estimator' {GMM (in-Sys)} to overcome the statistical problems associated with GMM (in-Diff) estimator. Arellano and Bover (1995) show that, when there are instruments available that are uncorrelated with the individual effects η_i, these variables can be used as instruments for the equations in levels. They develop an efficient GMM estimator for the combined set of moment restrictions relating to the equations in first differences and to the equations in levels. The GMM (in-Sys) estimator makes additional assumption that differences of the right-hand side variables are not correlated with the unobserved individual effects, however there may be correlation between the levels of the right-hand side variables and the unobserved individual effects.

$E(Y_{it}\eta_i) = E(Y_{is}\eta_i) \qquad \forall t, s,$ ……………....…………………………….………..………..**(17)**

$E(X_{it}\eta_i) = E(X_{is}\eta_i) \qquad \forall t, s,$ …………....…………..……………………………….......**(18)**

These assumptions may be justified on the grounds of stationarity. Arellano and Bover (1995) show that combining equations 15-16 and 17-18 gives the following additional moment restrictions

$$E(u_{it}\Delta Y_{it-1}) = 0 \quad \text{..} \textbf{(19)}$$

$$E(u_{it}\Delta X_{it-1}) = 0 \quad \text{..} \textbf{(20)}$$

Thus, valid instruments for the regression in levels are the lagged differences of the corresponding variables. The instruments for the regression in differences are the same as before, that are, the lagged levels of the corresponding variables. Hence, we use $(Y_{it-2}, Y_{it-3}, ..., Y_{i1})$ and $(X_{it-2}, X_{it-3}, ..., X_{i1})$ as instruments for the equations in first differences, and ΔY_{it-1} with ΔX_{it-1} as instruments for the equations in levels. Again, these are appropriate instruments only under the above assumption of no correlation between the right-hand side variables and the unobserved individual effect.

To assess the validity of the assumptions on which the three different estimators are based we consider four specification tests. The test statistic m_2 for the null hypothesis of no second order serial correlation is reported along with the result of two Wald tests; Wald Test1 for the joint significance of the time dummies variables and Wald Test2 for the joint significance for all variables respectively. The m_2 test of second-order serial correlation of the error term checks whether the error term in the differenced model follows a first-order moving average process where the use of endogenous variables dated t–2 as instruments is valid only if n is serially uncorrelated, implying a first-order moving average error term in the differenced model. However, following the recommendation by Arellano and Bond (1991), their two-step GMM estimator is applied for inference on model specification. Specifically, with respect to the validity of the instruments on which these estimators are based, we conduct the Sargan Test of over-identified restrictions, which tests validity of instruments for the null hypothesis that the over identifying restrictions are valid. This is based on hetroskedasticity consistent two-step GMM estimator that tests for the validity of extra instruments in the equation. The statistics is asymptotically distributed as a chi-square with as many degrees of freedom as over identifying restrictions under the hypothesis of the validity of the instruments. The Hausman specification test checks the validity of the additional instruments used in the levels equations of the system estimator.

4. Explanatory Variables and Hypothesis

The result of intensive modeling and theoretical examination of dividends brings out a broad understanding on the various sets of variables affecting dividend policies. Several studies use different combinations of variables for explaining the dividend behavior. These factors vary from country to country and affect in different magnitudes due to variations in socio-economic and legal environment of each country. To motivate the expected signs on these determinants of dividends, we draw upon our review of the literature and select a list of plausible variables that are *priori* expected to influence cash dividend distribution, and subject them to procedures to identify their relative dominance over time, 1971-2007. The definition of the underlying determinants and their nature of relationship expected with the Dividend Payout Ratio (DPR) are classified into those that vary both across firms and time, and those that vary only over time, and are briefly indicated below.

4.1 Variables those Vary both Across Firms and Time (X_{it})

i. Earnings (ERNG)

Return on Assets defined as net earnings after taxes by total assets of the firm surrogates ERNG variable. Earnings of the firm undoubtedly expected to have the largest influence on dividend payment decision. It is hypothesized that *the net income or the profit after tax of the firm would be positively related to dividends as it is negatively with the debt levels.*

Loss making and low profit margin firms are more likely to omit dividends whereas poor quality firms cannot afford to match dividend payments because they face high transaction costs when the cash flows don't materialize. Large firms are mature, have sufficient internal funds to finance profitable investment opportunities and can obtain funds for investments through the internal sources without issuing additional equity. Owing to their magnitude of size and profits large firms are in a better position to distribute residual funds as dividends even if tax system discriminates against dividends, Siddharthan *et. al.* (1991), and Aurebach and Hasset (2002). It is found that earning profits is not the essential criterion which influences payers to pay. Firms reporting losses also demonstrate their liking for paying dividends, however the tendency to pay is more pronounced in profit making firms.

ii. Firm Size (SIZE)

Theoretically, the relation between size and dividends is not clear. The variable firm size can serve as an inverse proxy for unobservable credit risk, a proxy for diversification, external cost of financing, information asymmetry and also for agency cost. The relationship with dividends depends on what size proxies for. This variable has been the subject of attention in determining dividends especially by Fama and French (1999) and also by Aivazian *et. al.,* (2001), accordingly depicts contradictory signs with dividends in numerous studies. Many studies argue that larger firms tend to be more diversified and hence are less likely to go bankrupt and hence smaller dividend distributions. On the other hand, Warner (1977) and Titman and Wessels (1988) document that bankruptcy costs are relatively higher for smaller firms and hence larger firms tend to be more diversified and fail less often. Accordingly, the trade-off theory predicts an inverse relationship between size and the probability of bankruptcy. If diversification goes along with more stable cash flows, this prediction is also consistent with the FCF theory by Jensen (1986) and Easterbrook (1986). Fama and Jensen (1983) argue that larger firms tend to provide more information to lenders than smaller firms. Therefore, the monitoring cost should be smaller for larger firms and hence these arguments predict a negative relationship with dividends, which is used as a prominent signaling device. Also, it may be expected that smaller firms grow faster through retentions and so there would be a negative relationship between the retention ratio and firm size, and hence a positive relationship between the DPR and firm size is expected. Reeding (1997) show, that firm size and liquidity explain the decision of whether to pay dividends well, whereas existing informational explanations (such as monitoring and signaling) explain the level of dividends well. On the other hand, size may be inversely related to the level of information asymmetries between insiders and outside investors, Rajan and Zingales (1995). Equity holders of larger firms put less pressure on the firm's managers for issuing excess dividend. On the contrary, smaller firms will pay out higher excess dividends to mitigate the agency problem resulting from asymmetric information. Moreover Smith and Watts (1992) point out, the theoretical basis for an impact of size on dividend policy is not strong, and indeed some negative relationships have been observed, Keim (1985) and Allen and Michaely (1995).

The inclusion of size may be best regarded as a simple control variable, without a particular sign expectation. Our measure of size is natural logarithm of net sales following

Titman and Wessels (1988) as logarithmic transformation accounts for the conjecture that small firms are particularly affected by size effect. Alternatively, one could use the natural logarithm of total assets. However we think that net sales is a better proxy for size, because many firms attempt to keep their reported size of asset as small as possible, *e.g.,* by using lease contracts.

iii. Investment Ratio (INVR)

In confirmation with the Pecking Order Theory large investment opportunities imply higher growth opportunities for the firm and interalia, low payout. The trade-off model predicts that firms with more investment opportunities have less leverage because they have stronger incentives to avoid underinvestment and asset substitution that can arise from stockholder-bondholder agency conflicts. This prediction is strengthened by Jensen's (1986) FCF theory, which predicts that firms with more investment opportunities have less need for the disciplining effect of debt payments to control FCF. A rapidly growing concern will have constant needs of long-term funds to seize favorable opportunities and for that purpose it may need to finance greater part of its funds for expansion, Pogue (1971), Pruitt and Gitman (1971) and Smirlock and Marshal (1983). Such a decision will mean that dividend must be kept at a minimum. Mason and Merton (1985) point out the firms with growth options are those that have relatively more capacity expansion projects, new product lines, acquisitions of other firms and maintenance and replacement of existing assets. Tax based theory, signaling theory, and agency theory explain the association between growth opportunities and financing decisions. The tax argument relies on the progressivity in taxes which implies that expected tax liabilities are higher when there is greater volatility in taxable income. Thus, firms with high growth options and high cash flow volatility have incentives to reduce debt in their financing mix over the range of progressivity, Smith and Watts (1992). According to agency theory firms with more growth opportunities are less likely to issue debt for two reasons. First, the underinvestment problem suggests that firms generally issue only risky debt that can be supported by assets-in-place. If not, managers acting on behalf of shareholders may decide not to undertake positive NPV investments to avoid the possibility of the payoffs going to debt holders. Second, given that debt has been issued, the asset substitution problem occurs when managers acting on behalf of shareholders opportunistically substitute higher variance assets for lower variance assets. In this way, wealth is being transferred to the shareholders provided the debt was issued and priced on the basis of low variance assets. Asset substitution is less likely when there are more assets-in-place since it is relatively easy for outsiders such as auditors to monitors the existence and value of these assets such as land, building, and plant. However, when a firm has more intangible growth opportunities, asset substitution in more likely since outside monitoring of these assets is more difficult. Thus, firms with more growth opportunities are likely to pay lower dividends, other things being equal which is also consistent with the Residual theory. The amount of retained profits of the firm can be expected to be positively related to the growth rate of the firm. It is argued that a high growth rate of the firm reflects greater investment opportunities, higher profits, and greater need for finance. All such factors would make the firm to earn higher proportion of its net profits and in turn would distribute smaller dividends. *A negative relationship between dividends and investment ratio of the firm is expected.* The ratio of fixed and inventory investment along with R&D spending to total capitalization is taken as a measure the investment ratio of the firm.

iv. Tangibility of Assets (TNGA)

Our choice for the inclusion of the tangibility variable amongst the independent variables emerges from the theoretical support of the agency model, asset substitution, and the trade-off theory model. Consistent with Aivazian *et. al.,* (2003) we hypothesize that the firms most likely to pay a dividend are also likely to access the public debt markets if they are larger in size and have more tangible assets. In this case, they are also more likely to follow a dividend smoothing policy. The positive relationship between a firm's liquidation value and the level of debt is predicted by both tax model and the agency model. In contrast, firms that are unlikely to pay dividend are more likely to seek out the lower rescheduling risks attached to informed bank debt, if they are also smaller with few tangible assets. However, if these firms do pay dividends, they are more likely to follow a genuine residual policy, since there is little need for them to smooth their dividends. *A positive relationship between collateralisable assets and dividend payout is expected.* We use the ratio of net fixed assets to total assets as a proxy for tangibility of collateralisable assets in our empirical tests.

v. Financial Slack (FSLK)

Financial Slack surrogate Business Risk and is proxied by long term borrowing to total assets. The theory of finance suggests that risky firms or firms that have high possibility to default should not be highly levered. High fixed operating costs or business risk may affect the firm's dividend payout, all else constant, to the extent that these will increase the frequency of costly additional external financing. This is due to the greater variability in earnings and funding needs that high operating leverage or business risk may induce in a firm. The same reasoning applies to interest charges, which are characterized by Rozeff (1982) as "quasi-fixed costs". Both these operating and financial risks translate into a high total risk of the firm's stock returns. In addition, as observed by Holder *et. al.,* (1998), transaction costs of new issues in the form of underwriting fees is usually larger for riskier firms. According to the Pecking Order theory, firms should prefer to finance investment by retentions rather than by debt. A higher retention ratio implies a lower DPR, so a lower payout ratio should be associated with lower gearing rather than higher gearing. Conversely, a higher payout ratio should be associated with higher gearing. Thus, if the sign of the regression coefficient attached to the gearing variable is positive, this would be consistent with both the pecking order theory and the greater financial risk proposition. Higher leverage ratios face the greater pressure of paying back the principal as well as the interest. The debt covenant may also prohibit the firms from paying higher dividend. Therefore the management tends to pay lower dividends for highly leveraged firms and thus a negative sign is expected. *The expected sign of the coefficient of financial slack is negative.*

vi. Cost of Borrowings (COBW)

This cost is measured as the total interest payments adjusted to corporate tax rate to percentage of total borrowings of the firm. This variable would force the firms to distribute smaller dividends. When the cost of borrowing increases, the dependence on borrowed funds is likely to decline as a result the retention ratio is expected to have a positive relationship with the cost of borrowing. This would force the firms to exert more reliance on internal funds. Firms may get into financial distress if they fail to adjust themselves to adverse shocks. Using interest coverage ratio consistent with James (1996) as the proxy of the severity of financial distress, Chemmanur and Fulghieri (1994) theorize that firms with lower financial distress probably opt for public debt against bank debt since the lower interest cost of public debt outweighs the benefits of flexible renegotiations in bank debt. *A negative relationship between cost of borrowings and dividend is expected.*

vii. Operating Risk (ORSK)

Operating Risk is a proxy for observable credit risk and increases the probability of our independent variable, Operating Risk (distress), Johnson (1997). This variable is also hypothesized to measure Earnings Volatility alternating Information Asymmetry consistent with Ikenberry and Vermaelen (1996). Many authors include a measure of operating risk as an explanatory variable, Titman and Wessels, (1988), Kremp *et. al.,* (1999), and Booth *et. al.,* (2001) implying riskiness of cash flows consistent with the Signaling theories that less volatile cash flow results higher future dividends. To the extent that the high figures of variability are correlated with firm's FCF in the Jensen (1986) sense and associated agency costs, expected dividend payouts will be lower. Two issues are particularly noteworthy. First, DeAngelo and Masulis (1980) argue that for firms which have variability in their earnings, investors will have little ability to accurately forecast future earnings based on publicly available information and the market will demand a premium to provide debt. This drives up the cost of debt. Second, to lower the chance of issuing new risky equity or being unable to realize profitable investments when cash flows are low, firms with more volatile cash flows tend to keep low dividends. *A negative relation between operating risk and dividend is expected.* This relation also props up from a tradeoff theory and the pecking order perspectives; firms with high volatility of results try to accumulate cash during good years to avoid under investment issues in the future. The variable operating risk (earnings volatility) measured as the standard deviation in the ratio of operating income to total assets of the firm lagged three years.

viii. Corporate Tax Rate (CTAX)

It is suggested by a number of authors that the taxation policy of the government may negatively affect the dividends distributed by the company. High corporate tax rates increase the total tax payments of the firm, reduces its net income which in turn, reduces its retained profit, Panda and Lal (1993), Damodaran, (2000). The impact of taxation on financing is twofold. On the one hand, companies have an incentive to take debt because they can benefit from the tax shield. On the other hand, since revenues from debt are taxed more heavily than revenues from equity, firms also have an incentive to use equity rather than debt. As suggested by Miller (1977), the financial structure decisions are irrelevant given that bankruptcy costs can be neglected in equilibrium. DeAngelo and Masulis (1980) show that the firms with large non-debt tax shields have a lower incentive to use debt from a tax shield point of view, and thus may use less debt. Empirically, this substitution effect is difficult to measure as finding an accurate proxy for tax reduction that excludes the effect of economic depreciation and expenses is tedious, Titman and Wessels (1988). This variable is measured as the ratio of the total tax payments to total profits before tax (with negative values truncated to zero). *CTAX is regarded as a simple control variable, with no particular sign expectation.*

4.2 Variables that Vary only over Time *(Z_t)*

Studies like that of Modigliani and Cohn (1979), Roppaport (1981), Lawson and Stark (1981), Lee (1992), Rao and Radjeswari (2000) for India, and Valckx (2003) document the influence the impact of macro-economic variables like inflation and interest rates on dividend policies. Such variables are assumed to vary only over time and have a uniform effect on dividend behaviour of firms. The variables CPID and YLCR capture the effects of inflation and interest rate differential on dividend distribution decisions.

i. Consumer Price Index Deflator (CPID)

Consumer price index (inflation) would have a negative relationship with dividend and have a positive relationship with debt if higher inflation increases the wealth transfer to debtors, generated by the tax deductibility of nominal interest payments. We anticipate that increases in real general prices will generate upward pressure on firms' demands for funds thus, raise leverage and constrain dividends. The higher is inflation the greater is the tax deduction gained by the borrower, not only on that component which reflects the real cost of funds but also on that part which represents compensation for reduction in the real value of t principal. However, the tax advantages of debt disappear under if borrowing rates increase more than one for one with inflation to keep after tax real returns unchanged, the increased tax deduction that inflation creates may be completely offset by higher borrowing costs. It is also likely that an aggregate measure of the real cost of debt and an aggregate measure of the real cost of equity influence firms' gearing decisions. In equilibrium, the cost of debt, plus some risk premium, should be equal to the cost of equity. However, equilibrium conditions may not hold continuously. If this is the case, and if deviations in relative real cost of debt are not just firm-specific, then this factor may influence managers' gearing decisions. When the real cost of debt rises relative to the real cost of equity, firms can be expected to increase their gearing. Such higher levels of debt are consistent with a greater likelihood of dividend omission and reductions as it increases the probability of financial distress in future years. This tendency is associated with the fear of assets seizure in case of default posted as collateral, psychological costs associated with bankruptcy and loss of control over the firm. A highly leveraged firm caused due to higher inflations would tend to lower its DPR because of high fixed financial commitments. *A negative relation between inflation and dividend is expected.*

ii. Yield Curve of Interest Rates (YLCR)

Bolton and Freixas (2000) highlight the effect of monetary policies on corporate sector and adds that the effect may not be similar across the sample countries. Kashyap *et. al.,* (1993) argue that tight monetary policies increase the cost of banks' capital, which in turn discourages firms from bank borrowings. In the same spirit, Oliner and Rudebusch (1996) contend that lenders would not be funding low-quality firms under such conditions. Pandey and Bhat (2004) in their study of dividend behavior under monetary policy restrictions find that the restricted monetary policies have significant influence on the dividend payout behavior of Indian firms. The YLCR variable is measured as the difference between the call/notice money rates and the long term rates for term greater then 5 years for the fiscal year-end. *A negative sign on the yield curve differential variable is expected.* This is because, as the term structure of interest rate increases, relative cost of debt rises and in accordance with the Managerial Model have a negative charge on dividend distribution.

4.3 Variables that Vary only across Firms *(W_i)*

i. Industry Uniqueness Dummies

These are categorization variables and used to pick up commonalities across industries. If a firm offers unique products or services, its consumers may find it difficult to find alternatives in case of liquidation, and hence, the cost of bankruptcy increases. Firms in the same industry also follow some different characteristics or procedures. Also many characteristics of the firms may be reasonable similar within the industry groups, but cannot be captured easily. In a theoretical model, Titman (1984) shows that a firm's financing depend on the uniqueness of its product. For these reasons the industry classifications of firms are included in our specification. Four broad industry classifications used here are Textiles **(TEXL)**, Trading **(TRDG)**, Chemicals, Cement and Metal Industry **(CHCM),** and Food Manufacturing **(FDMG).** Related to this prediction is the observation reported in Bhole (1980) and in Pandey (2001), that a firm's industrial classification is an important determinant of dividends. Their previous empirical results are in broad agreement and show that the industries producing consumer goods, less capital intensive industries and those having low growth opportunities have larger dividend payouts while Basic Metal, Engineering, Chemical, Hotels, and Shipping industry have higher retention ratios.

5. Empirical Model Specifications

In this part of the work we specify the theoretical and empirical static and dynamic panel data models along with the classical time series model using the Ordinary Least Square (OLS) method for determining the corporate dividend function for Indian RBI sample firms.

5.1 Static Panel Data Model

Considering the hypothesized behavior of the regressors with the regressand and assuming a linear relationship between them, Static Model in the form of Panel regression is

$$y_{it} = \alpha + \beta' X_{it} + \rho' Z_t + \pi' W_i + u_{it} \quad \text{..} \textbf{(21)}$$

Dividend Payout Ratio (DPR), the dependent variable is Rupee value of total cash dividend (final and interim) paid during the year expressed as a percentage of total size of earnings. X_{it} is a vector of determinants that vary across both firms and time, Z_t is a vector of determinants that vary only over time, W_i is a vector of determinants that vary only across firms, α, β, ρ and π are vectors of coefficients that are assumed in the standard model to be constant over time and across firms, u_{it} is a composite residual comprised of a firm-specific component, u_i, a time-specific component, λ_t time effect assumed constant for given *t* over *i,* and a component that varies over both firms and time, v_{it} where the panel data have *n x t* observations, where *t* = 1…*t* (time period) of each *i* = 1…*n* cross-sectional observation unit in the sample and $u_{it} = \mu_i + \lambda_t + v_{it}$. Models like fixed effect and random effect models of the static panel data are used to find out the determinants and factors affecting the corporate dividend policy in India.

Based on the above discussions, the static panel data model is specified as

$$DPR = \alpha + \beta_1 ERNG + \beta_2 SIZE + \beta_3 INVR + \beta_4 TNGA + \beta_5 FSLK + \beta_6 COBW + \beta_7 ORSK + \beta_8 CTAX + \beta_9 CPID + \beta_{10} YLCR + \beta_{11} CHCM + \beta_{12} TRDG + \beta_{13} TEXL + \beta_{14} 15FDMG + \mu_i + \lambda_t + \varepsilon_{it} \quad \text{..} \textbf{(22)}$$

Where, DPR= Dividend Payout Ratio, ERNG= Earnings, SIZE= Size of firms, INVR= Investment Rate, TNGA= Tangibility of Assets, FSLK= Financial Slack, COBW= Cost of Borrowings, ORSK= Operating Risk, CTAX= Corporate Tax Rate, CPID= Consumer Price Inflation Deflator, YLCR= Yield Curve Interest Rate, CHCM= Industry dummy for Chemical, Cement and Metal Industry, TRDG= dummy for Trading Industry, TEXL= dummy for Textile Industry, FDMG= dummy for Food Manufacturing Industry, α= Intercept term, and μ_i is the Error term.

It is expected that

$\beta_1>0$, $\beta_2=?$, $\beta_3<0$, $\beta_4>0$, $\beta_5<0$, $\beta_6<0$, $\beta_7<0$, $\beta_8=?$, $\beta_9<0$, $\beta_{10}<0$, $\beta_{11}>0$, $\beta_{12}>0$, $\beta_{13}>0$, and $\beta_{14}>0$ …………………………………………………………………………………………...**(23)**

5.2 Dynamic Panel Data Models

In Static Panel Data Models we take care of individual specific as well as time effects, but such models cannot explain the impact of adjustment cost and floatation costs on firms financing and dividend distribution decisions. Estimating parameters using a pure static model if all the coefficients of possible lagged variables are not different from zero, restricts the previous periods so that they have no impact at all on current adjustments. Thus a dynamic model is specified. The use of dynamic econometric model is attributed to couple of other reasons. Firstly, since the firms cannot offset the adjustment and flotation costs immediately, it is expected that there is a role of the lagged values of both the dependent and independent variables to adjust these costs to determine the optimum dividend payouts. Secondly, a dynamic model is more general than a static model. A firms' dynamic adjustment of dividend policy decisions make take several years to complete. The significance of explanatory variables can change considerably in the dynamic analysis. Applicability of such a procedure will help identify broad group of factors influencing dividends, increase their robustness pattern, and establish a degree of genralizibility over cross section of industry, and time over the period of study. Therefore a partial adjustment model is specified to find out the effect of these costs on the dividends.

Given the desired dividend payout ratio

$$DPR^*_{it} = \sum_{i=1}^{k} b_k X_{kit} + \mu_i + \lambda_t + e_{it} \quad \text{……...…………………………...……………………(24)}$$

Where, DPR^*_{it} is the desired dividend payout ratio, firms represented by subscript $i=1.....N$ and time by $t=1....T$. k represents the number of explanatory variables, X represents the explanatory variables, μ_i are firm-specific effects, λ_t are firm invariant time specific fixed effects and ε_{it} is the composite disturbance term with the properties E(ε_{it})=0 and var(ε_{it})=σ^2.

The firm-specific effects allow for unobserved influences on the dividend behaviour of each firm and are assumed to remain constant over time. There may several possible sources of these unobserved influences. *For instance*, this firm-effect can be viewed as a firm's component of the 'normal' signaling constraint which quoted firms may have to satisfy. The time dummies control for the impact of time on the dividend behaviour of all sample firms.

Firms always try to achieve their desired DPR but owing to the effect of above mentioned adjustment and flotation costs, may not succeed in doing so. They therefore try to achieve the current DPR which is much close to the desired one. This leads to the Partial Adjustment mechanism and is given by

$$DPR_{it} - DPRIV_{it-1} = \lambda(DPR^*_{it} - DPR_{it-1}) \quad \text{...…………………………………..…………....(25)}$$

Where, 0<γ<1 and $(DPR^*_{it} - DPR_{it-1})$ is the desired change, whereas only a fraction γ of the desired change of DPR is achieved which is equal to $(DPR_{it} - DPR_{it-1})$. Combining equations 7.4 and 7.5 and taking the first difference to eliminate the unobservable firm specific effects μ_i we use the following Dynamic Partial Adjustment Equation

$$(DPR_{it} - DPR_{it-1}) = a_0(DPR_{it-1} - DPR_{it-2}) + \sum_{t}^{k} a_k(X_{kit} - X_{kit-1}) + (n_{i,t} - n_{i,t-1}) \quad \text{……..………..(26)}$$

Where, $a_0 = 1-\gamma$, $a_k = \gamma\beta_k$, and μ_i has the same properties as ε_{it}.

Provided there is no serial correlation in the disturbance, Arellano and Bond (1991) shows that the levels of all right-hand side (dependent) variables lagged twice (or more) are valid instruments in the first differenced equation. On the basis of selection of instrumental variables three types of models namely, GMM, GMM 1 and GMM 2 can be specified. In GMM and GMM 1 models all variables other then the lagged dependent variable are taken to be strictly exogenous in the sense that they are assumed to be uncorrelated with the fixed effects and errors. The lagged dependent variables are necessarily correlated with the error term through fixed effects. That is why only the lagged dependent variables will be instrumented. The instruments for GMM 2 model are selected in accordance with Blundell *et. al.,* (1992) according to which, for the variables which are found to be pre-determined, instruments dated *t*-1, and for the variables which are exogenously determined, instruments dated *t*-3 are chosen. In order to check the possibility that X_{it} is predetermined with respect to μ_{it} we use the instrument dated *t*-2 for each variable included in the instrument set. Ideally, the instruments would include all the instruments dated *t*-2 and earlier. In other words, we allow for the endogeneity of the regressors as it is likely that shocks affecting dividend choices may also affect measured other financial variables. Then X_{it} is added to the existing instrument to investigate the potential biases, which arises from the correlation between X_{it-1} and the first difference error term $\Delta\mu_{it}$. In the presence of the measurement error the estimate of the coefficient of *X* is expected to fall, which suggests a downward bias due to the simultaneous determination of X_{t-1} and $\Delta\mu_{it}$. The Arellano-Bond one-step GMM estimator are adjusted for hetroskedasticity but can be shown that they are consistent only if there is no second order serial correlation in the differenced residuals.

We further proceed with Arellano and Bover (1995) and Blundell and Bond (1998) procedures where the autoregressive parameter is moderately large as a result both one step and two step versions of GMM first-difference show a downward finite sample bias. Arellano and Bover (1995) and Blundell and Bond (1998) estimations are further extensions over Arellano and Bond (1991) as the lagged levels of the series provide weak instruments for the first differenced GMM equation. In the refined procedure the authors propose a linear GMM estimator in a system of first-differenced and levels equations that offers significant efficiency gains in situations by using lagged differences of the series as instruments for the equations in levels, in addition to lagged levels of the series as instruments for equations in first differences. The resulting linear estimator uses $(DPR_{i,t-1} - DPR_{i,t-2})$ and $(X_{i,t-1} - X_{i,t-2})$ as additional instruments in the levels equation 25, under the assumption that these differences are uncorrelated with the firm-specific effect, η_i even though the levels of the series are correlated with η_i. This technique is refereed to as GMM-in Systems {GMM (in-SYS)}.

$\Delta DPR = \alpha + \beta_1\Delta DPR_{it-1} + \beta_2\Delta DPR_{it-2} + \beta_3\Delta ERNG + \beta_4\Delta ERNG_{it-1} + \beta_5\Delta ERNG_{it-2} + \beta_6\Delta SIZE + \beta_7\Delta SIZE_{it-1} + \beta_8\Delta SIZE_{it-2} + \beta_9\Delta INVR + \beta_{10}\Delta INVR_{it-1} + \beta_{11}\Delta INVR_{it-2} + \beta_{12}\Delta TNGA + \beta_{13}\Delta TNGA_{it-1} + \beta_{14}\Delta TNGA_{it-2} + \beta_{15}\Delta FSLK + \beta_{16}\Delta FSLK_{it-1} + \beta_{17}\Delta FSLK_{it-2} + \beta_{18}\Delta COBW + \beta_{19}\Delta COBW_{it-1} + \beta_{20}\Delta COBW_{it-2} + \beta_{21}\Delta ORSK + \beta_{22}\Delta ORSK_{it-1} + \beta_{23}\Delta ORSK_{it-2} + \beta_{24}\Delta CTAX + \beta_{25}\Delta CTAX_{it-1} + \beta_{26}\Delta CTAX_{it-2} + \Delta \mu_{it}$ ……………………………………………….....**(27)**

All variables with the prefix symbol Δ represents their first difference form, and the subscripts *t-1* and *t-2* added to his variables show their one year, and two year lagged values respectively.

Given the above model it is expected that

$\beta_1>0, \beta_2>0, \beta_3>0, \beta_4>0, \beta_5>0, \beta_6=?, \beta_7=?, \beta_8=?, \beta_9<0, \beta_{10}<0, \beta_{11}<0, \beta_{12}>0, \beta_{13}>0, \beta_{14}>0, \beta_{15}<0, \beta_{16}<0, \beta_{17}<0, \beta_{18}<0, \beta_{19}<0, \beta_{20}<0, \beta_{21}<0, \beta_{22}<0, \beta_{23}<0, \beta_{24}=?, \beta_{25}=?$ and $\beta_{26}=?$…………….**(28)**

5.3 Pooled OLS Model

The OLS model is estimated on the pooled data with alternate data specifications as parts of our robust analysis and to assist formulate the macro-economic modeling for dividend decisions of the RBI firms in the private corporate sector. The FEM and the REM (firm and time) models can show the aggregate impact of various individual time varying variables, but fails to gauge the possible impact of various individual time varying variables. In order to facilitate aggregate analysis, and to show the impact of individual time varying variables on the dependent variables, the model on the time series have been specified with OLS technique. The following model has been estimated:

$DPR_{it} = \alpha + \sum_{t=1}^{k} \beta_k X_{kit} + \mu_{it}$ ………………………………...…………………………**(29)**

Where α is the intercept term, β_k assumes to be the vector of coefficients of the explanatory variables, the dependent variable DPR_{it} is dividend payout ratio, X_{kit} is a vector of explanatory variables using alternate definitions and μ_{it} is the error term, where $\mathrm{E}(\mu_{it}) = 0$ and $\mathrm{var}(\mu_{it}) = \sigma^2$.

Based on the above discussions the time series model can be specified as

$DPR=\alpha+\beta_1 ERNG + \beta_2 SIZE + \beta_3 INVR + \beta_4 TNGA + \beta_5 FSLK + \beta_6 COBW + \beta_7 ORSK + \beta_8 CTAX + \beta_9 CPID + \beta_{10} YLCR + \beta_{11} CHCM + \beta_{12} TRDG + \beta_{13}\ TEXL + \beta_{14} FDMG + \mu_{it}$ ……………………………………………………………………...……………...**(30)**

The expected relationship between the dividend payout ratio and the other independent variables has been specified in the above equation 23.

We proceed as follows. Firstly estimate the basic model, and other variations so to include other lag structures. We report the main results relating to the models explained in Section 2. For all these specifications, we report the results of each of the four estimation techniques described above: the preferred Fixed / Random Effect, GMM-in-Levels {GMM (in-Lev)}, GMM-in-first-differences {GMM (in-Diff)} and GMM-in-Systems {GMM (in-Sys)}. This procedure shows us how much the size of the dividend determinants, the speed of adjustment coefficient and the one of the implicit target payout ratio varies across the different estimation techniques. In addition, it will also be useful to compare our results with those of Pooled OLS estimation with alternate data definitions for checking the robustness of the results.

6. Results and Interpretations

6.1 Descriptive Statistics and Estimation Issues

The summary statistics and the correlation coefficients of the regression variables used for the estimation of DPR are presented in table 2 and 3 *(in Appendix)*. The correlation matrix of the independent variables used in the dividend determination model rules out the possibility of serial correlation between the explanatory variables. Before going for the estimation of the parameters in static PD models, it is very much important to know the existence and importance of firm and the time effects on the data. The Monte Carlo experiments conducted by Baltagi and Chang (1992) suggest that *F*-tests of the firm intercepts and the time intercepts perform well in finite samples. So the *F*-test has been conducted to find out the evidence of individual and time effects and then the Hausman specification test has been done to examine the issue of whether or not the firm effects are uncorrelated with the regressors.

The fixed firm and time effects specification includes the firm dummy variables, the time dummy variables and those variables that vary over both firms and time, X_{it}. The variables that vary only over time, Z_t, are linear combinations of the time dummy variables and the variables that vary only over firms W_i, are linear combinations of the firm dummy variables. This perfect collinearity prevents us from being able to incorporate Z_t and W_i in the fixed firm and time effects specification. Table 4 demonstrates that there is existence of both firm and time effects. Given that both the firm and the time effects are significant even at least percentage level, the issue is whether the information in these effects is more parsimoniously captured by our variables that vary only over firms or only over time. More specifically we question whether our firm dummy variables be replaced by the industry dummy variables without a loss of explanatory power and likewise whether the time dummy variables be replaced by our macro-economic variables. Replacing the T (N) time (firm) dummy variables with the K_z (K_w) variables that vary only over time (firms), implies a set of T-K_z (N-K_w) linear restrictions on the coefficients of the time (firm) dummy variables. These restrictions can be tested by comparing the residual sums of squares of the restricted and unrestricted models in the usual manner.

The test statistics for the time intercepts *Vs* the macro-economic variables, and the firm intercepts *Vs* the industry and listing dummy variables report the results on the firm and time effects. We cannot reject the restrictions that are required to validly replace the time dummies with the macro-economic variables. This suggests that, after allowing for the effects of the variables that vary over both firms and time, the macro-economic variables explain most of the residual variation in dividends over the time dimension. In contrast, the restrictions implied by replacing the firm dummy variables with the industry dummy variables are rejected. This rejection implies that the industry dummy variables do not have rich enough structures to adequately describe the unobserved firm-specific factors (firms' operating risk, effective marginal tax rates and investment opportunities *etc*).

To examine the issue of whether or not the firm effects are uncorrelated with the regressors, Hausman (1978) specification test is used. The Hausman specification test rejects the exogeneity in the random effects model. In a comparison of the fixed and random effect models, where time effects also included, the Hausman statistic also rejects the null hypothesis of exogeneity. As a result we prefer to focus on Fixed Effect Model (FEM) estimates. For comparison, the estimates using the Random Effect Model estimates (REM) are appended in table 5.

6.2 Estimation Results from Panel Data Models

The results are discussed in two parts. Foremost the results from the Static Panel Models are discussed and then the results from the Dynamic Models using extension of IV-based GMM technique.

6.2a Static Data Analysis

The FEM estimates are found to be suitable for estimating the dividend function in case of Static Panel Data Analysis. The results of estimation of the dividend distribution equation in the static panel data form for all three periods; the pre-reform period 1971-1992, the post reform period 1992-2007, and the full period 1971 through 2007, in respect of Fixed Effect Firm (FEF) and Fixed Effect Firm and Time (FEFT) are presented in table 6.

The Static Panel results broadly suggest that firm, institutional and macro-economic factors combine to affect dividend distribution decisions. For all the periods, the *F*-statistics for the FEM shows that it is correctly specified and that there is no autocorrelation among variables. The model fits the data well as depicted by the larger *R*-square. In case of dynamic estimation, the m_2 test under the null of no serial correlation is accepted and the Wald 1 and 2 tests of the joint significance of regressors are tolerant. The time dummies are jointly significant suggesting that the aggregate time varying factors exerts a significant influence on the dividend distributions of the firm.

6.2b Dynamic Panel Data Analysis

Recent developments show the superiority of the GMM technique in estimating the dynamic panel data models. For the dynamic panel analysis, the basic model is estimated based on GMM (in-Lev) in table 7, and other variations so to include other lag structures. Two versions of the GMM technique are used for the purpose of analysis, the GMM (in-Diff) and secondly, the Linear GMM estimator in form of GMM (in-Sys) in table 8 and 9 respectively. In GMM (in-Diff) technique, the model is estimated in first-differences using level regressors as instruments to control for unobservable firm heterogeneity. The GMM (in-Sys) model is estimated in both levels and first-differences, *i.e.,* level-equations are simultaneously regressed using differenced lagged regressors as instruments. The GMM (in-Sys) procedure is preferred as it helps to partially retain the variations between firms apart from controlling for individual heterogeneity.

According to the partial adjustment dynamic model, dividends are the results of a partial adjustment towards a target ratio. The changes in dividends are determined by the difference between last year's dividend and this year's target payout level which is assumed to be a fixed proportion of the earnings and in any given year firm adjusts partially to the target dividend level. Since the Linear GMM estimator {GMM (in-Sys) in a system of first differenced and levels equation offer efficiency gains in situations where the GMM (in-Diff) performs poorly, we resort to the use of Linear GMM (in-Sys). The Sargan test on the validity of the instrument set consistently rejects instruments dated *t-2,* possibly due to the fact that the measurement errors are serially uncorrelated. The estimates obtained from the GMM (in-Sys) based model as reported in the table 9 are preferred for the purpose of interpretations.

The regression coefficient for the earnings variable has the expected positive sign across all the three periods and across the estimated OLS, Static as well as in the partially adjusted dynamic models. The earnings variable has the significantly largest impact on dividends. In all the models, the coefficient in the post-reform period are significantly larger compared to the pre-reform periods. The correlation matrix also signifies larger correlations between dividends and earnings in the later periods compared to the former. Interestingly the size variable is found to be highly correlated with earnings indicating that dividends, earnings and size move linearly and positively; further, bigger firms earn larger profits and distribute higher dividends. The regression coefficient of the lagged value of the earnings ratio also has a positive sign and is statistically significant in the dynamic estimations for all the three periods, which means that the underlying variable has a persistent positive effect on the dividend payouts over time. Our results for this variable corroborates with that of Aivazian *et. al.,* (2001) they show a positive relationship between profitability and the ratio of dividends to total assets for a wide cross-section of emerging markets. Also, Pandey (2001) suggests that low profitability of Malaysian firms is associated with low dividends. Our findings that large and profitable firms are more willing to pay then the small and less profitable ones are in tune with that of Forbes and Hatern (1998), Aurebach and Hasset (2002) and DeAngello *et. al.,* (2004). Recently, Renneboog and Trojanowski (2007) for German firms find that Profitability is a crucial determinant of payout decisions, but the presence of strong block-holders or block-holder coalitions weakens the relationship between the corporate earnings and the payout dynamics. Block-holders appear to realize that an overly generous payout may render the company liquidity constrained, and, consequently, result in suboptimal investment policy. Their results challenge some of the implications of the agency theories of payout, and favor a pecking-order explanation for the observed patterns.

The size variable is positively related with dividends. Our coefficient on firm size is more difficult to interpret since the natural log of real total sales is used. Thus, percentage change comparisons cannot easily be made. Instead we observe that as sales increase, so does predicted dividends but at a diminishing rate. Large and established companies find it easy to raise funds from the external sources because of their size and age and thus can formulate a liberal dividend policy. Size can proxy external borrowing costs consistent with the Residual Theory and considering the fact of lower issuing costs of large firms, dividends are positively related to size. Since size can be regarded as a proxy for information asymmetry between firm insiders and the capital markets. Large firms are more closely observed by analysts and should therefore be more capable of issuing informationally more sensitive equity. Accordingly, consistent with the pecking order theory of finance a negative relationship between leverage and size, with larger firms exhibiting increasing preference for equity relative to debt is demonstrated by the correlation matrix in the post-reform periods. Size may also be an important factor, not just as a proxy for agency costs (which can be expected to be higher in larger firms) but also because transaction costs associated with the issue of debt securities are also (negatively) related to firm size as documented, by Smith (1977). The size variable is statistically significant in all the three periods and for both, the static and the dynamic models. The coefficients however, in the post-reform period are smaller compared to the former as the aggregate dividend payments in the later period have registered a general decline. A positive size effect suggests that the large firms can support higher dividend payments than the small firms consistent with the findings of Kahle (2002), and Grullon *et. al.,* (2002) that owing to higher firm maturity, large firms has larger information asymmetry surrounding a firm’s prospects, stronger cash flows, lower financing costs and higher dividend payouts. Dividend payout acts as an indirect monitoring tool both existing and potential creditors. This variable also exerts a positive with earnings, and the coefficient of the lagged value of size is also positive and statistically significant for the pre-liberalization period in India.

The investment ratio of our RBI sample firms demonstrates the expected statistically significant negative sign for all the periods, and across all our models. The lagged values of this coefficient are negative and statistically significant indicating the persistent effect this variable carries on dividend payouts. This means that given the ability to pay, higher investments in fixed assets, inventory and R&D expenditures in the current and prospective years forces the firms to distribute smaller portions of their profits as dividends. The fund accumulated through retained profits in absence of suitable investment opportunities, if remained unutilized or utilized for short-run investments will fetch a very low rate of return. So the discriminate cost of the retained earnings will be higher because it will not minimize the shareholders interest. In such cases it would be desirable to payout high dividends to shareholders and raise capital when needed. This tendency relates to the general acknowledgement that, the associated agency costs are higher for firms with substantial growth opportunities. Higgins (1972) has argued that assuming tax payments and interest payments are not subject to change from year to year, high investment rate of the company would require higher retention ratio and thus lower payouts. The importance of the dividend yield has been linked to low investment opportunities for US multinational firms, by Riahi-Belkaoui and Picur (2001), although they do not find a significant relationship between dividends and investment opportunities. Ramcharran (2001) finds support for the aspect of pecking order theory, that lower dividends are associated with greater investments growth in his study of 21 emerging equity markets. For Malaysian firms listed on the Kuala Lumpur Stock Exchange, Pandey (2001) finds; where there were more growth opportunities the DPR was lower; and in industries where there were fewer growth opportunities and greater surplus cash, higher dividends were paid. Bhole (2000) suggest that greater the prospective investment opportunities, the higher will be the retention ratio of the firms in India. Galai and Masulis (1976), Jensen and Meckling (1976) and Myers (1977) argue that when a firm issues debt, managers have an incentive to engage in asset substitution and transfer wealth away from bondholders to shareholders. Consistent with the 'Maturity Hypothesis' of Grullon *et. al.,* (2002) as firms mature their investment opportunities shrinks resulting in declining future profitability. The most important consequence of a firm becoming mature is decline in risk. The decline in risk mostly occurs because the firms' assets in place have become less risky and the firms have less growth opportunities available. Finally the decline in investment opportunities generate an increase in FCF, leading to an increase in dividends whereas, higher growth opportunity may render dividend policy less relevant for inducing primary market monitoring vehicle given the likelihood that growth may already be inducing external fund raising and associated monitoring.

The tangibility (collateralisable asset) variable has the expected positive sign, though is statistically significant only in the post-liberalization periods. The correlation coefficients on the real tangible assets variable and firm size variable are positive and significantly different from zero. This is consistent with the view that there are various costs (agency costs and expected bankruptcy/financial distress costs) are associated with the use of external funds and that these costs may be moderated by size and collateral. Large firms often have more diversified operations and longer operating and credit histories. Likewise, firms with high quality collateral can obtain debt at lower premiums because of the greater security for creditors. Based on the agency problems between managers and shareholders, Harris and Raviv (1991) suggest that firms with more tangible assets should take more debt. This is due to the behavior of managers who refuse to liquidate the firm even when the liquidation value is higher than the value of the firm as a going concern. In an agency theory framework, debt can have another disciplinary role *i.e.* by increasing the debt level, the FCF will decrease as Grossman and Hart (1980), Jensen (1986) and Stulz (1990) demonstrate. Lenders require assets that can be used as collateral to compensate for the chance of the asset-substitution problem occurring. For firms that cannot provide collateral, lenders may require higher lending terms and thus may prove more costly to the firm. Moreover the asset substitution problem is less likely to occur when firms have more assets already in place, Myers (1977). Tangible assets are likely to have an impact on the borrowing decisions of a firm because they are less subject to informational asymmetries and usually they have a greater value than intangible assets in case of bankruptcy. Additionally, the moral hazard risks are reduced when the firm offers tangible assets as collateral, because this constitutes a positive signal to the creditors who can request the selling of these assets in the case of default. Galai and Masulis (1976), Jensen and Meckling (1976) and Myers (1977) argue that stockholders of levered firms are prone to over-invest, which gives rise to the classical shareholder-bondholder conflict. However, if debt can be secured against assets, the borrower is restricted to using debt funds for specific projects. Creditors have an improved guarantee of repayment, and the recovery rate is higher, *i.e.,* assets retain more value in liquidation. Without collateralized assets, such a guarantee does not exist, *i.e.*, the debt capacity should increase with the proportion of tangible assets on the balance sheet. Hence, our results in association with the tradeoff theory suggest a positive relationship between measures of leverage and the proportion of tangible assets. Recent empirical studies like that of Rajan and Zingales (1995), Kremp *et. al.,* (1999), and Frank and Goyal, (2002) conclude a positive relation between collaterals and the level of debt. Shareholders may expropriate wealth from bondholders by paying themselves dividends. Bondholders try to contain this problem through restrictions on dividend payments in the bond indenture. However, fewer restrictions are placed on the firm if debt can be collateralized as the borrower is restricted to use the funds for a specific project.

The financial slack variable captured by leverage, in accordance with our assumption displays a statistically significant negative relation with dividend payouts for all three periods and across all model estimations in accordance with Benito and Young (2001) that higher levels of debt increases the probability of financial distress in future years and are consistent with a greater likelihood of dividend omission and reductions. Similarly, Kowalewski *et. al.,* (2007) find that more profitable companies have a higher DPR, while riskier and more indebted firms prefer to pay lower dividends for Polish firms. This tendency is associated with the fear of assets seizure in case of default posted as collateral, psychological costs associated with bankruptcy and loss of control over the firm. Companies with high leverage choose a lower dividend policy to lower its costs of external financing, Rozeff (1982) and Kahle (2002). Higher debt also alternates dividend as a signaling device. A firm can signal its higher quality, either by increasing its debt ratio, Ross (1977) or by paying higher dividends, Bhattacharya (1979). Adding more debt to firms serves as a credible signal of high future cash flows communicates confidence that the firm will have sufficient cash flows to meet these obligations. Jensen (1986) argues that leverage and dividend may serve similar purpose in alleviating the FCF problem. For example, a firm can pre-commit to making large dividend payments or interest payments; both will reduce the firm's FCF and the attendant equity agency costs, Easterbrook (1984).

For all the three periods the regression coefficients indicating cost of borrowings has the expected negative sign and are statistically significant in all the periods, and more particularly in the post-reform period for the GMM (in-Sys) estimations. This variable is also negatively correlated with leverage. The coefficients of the lagged value of this cost are also negative. When the cost of borrowings is high, it is very much essential to reduce the debt levels. There are two alternatives to reduce the debt of a company. A company may reduce its part of debts either by means of creating new obligations to replace old one or by retained earnings, Srivastav (1984). But owing to the fact that further debt creation to replace the old debts involves flotation costs, could hamper the liquidity position and profitability position of the company. So it is required to adopt that a larger portion of earnings will have to be retained for the retirement of the debts. Thus the requirements to debt maturity also influence the formulation of dividend policy and retention of earnings of a company and restrict the freedom of the corporate management.

The coefficients of the operating risk variable carry the expected negative sign and are statistically significant from zero for all the periods. In the dynamic models however this variable doest demonstrate its stickiness. Our results follow the predictions according to the pecking order model of financing which suggests an inverse relationship between dividends and the volatility of the firm's cash flows. The trade-off model allows the same prediction, but the reasoning is slightly different. More volatile cash flows increase the probability of default, implying a negative relationship between payouts and volatility of cash flows. Thus, lower payouts might be associated with higher figures of cash volatility and this explains the expected negative sign.

The coefficient of effective corporate tax is negatively associated with dividends for all the periods; however it is statistically significant only in the post-liberalization period in India and neither for the whole period and the pre-reform period respectively. As the tax rate increases, the profit after tax available for distribution contracts thus high taxation is said to be the cause of the lowering the earnings of the company and consequently, their rates of dividend. The coefficient on the tax variable is insignificant also the lagged values fail to exert any influence, suggesting that we have been unable to detect a role for the tax system in determining corporate dividends.

6.3.c Dividend Stability in India

The proposition of the Lintner model suggests that managers change dividends primarily in response to unanticipated and non-transitory changes in their firm's earnings, and they have reasonably well-defined policies in terms of the speed with which they adjust dividends towards a long-run target payout ratio. The estimation procedures based on GMM (in-Diff) and the preferred GMM (in-Sys) demonstrate how much lag dividend coefficients (DPR_{it-1}), the size of the speed of adjustment coefficient (*i.e.,* $1-\alpha$) and the implicit target payout ratio (*i.e.,* $\beta/(1-\alpha)$) varies across the different estimation techniques. In both the estimated dynamic models using GMM (in-Sys) and GMM (in-Diff), the coefficients for the lagged DPR are positive and statistically significant for all the periods robustly indicating that the dynamics implied by the model are not rejected. The higher coefficients and the associated *t*-statistics of lagged dividend variable imply the greater importance of past dividend in deciding the dividend payment. Put simply, the past values of dividends have been an important determinant of dividend policy prior to the reform era, in the post-reform period, and also for the entire period under study in spirit of the recent study by Guttman *et. al.* (2007) who find that the previous year's dividend can serve as a focal point that allows managers and investors to coordinate on just one out of a continuum of equilibria in which dividends are smoothed. This coefficient varies from 0.37, obtained in the GMM (in-Diff), to 0.57, when the preferred GMM (in-Sys) model is used. Using GMM(in-Sys), which econometrically ought to give a parameter estimate closer to the true observed value, the coefficient value of past dividends for the entire period 1971-2007 is equal to 0.57 that is relatively low compared to the developed markets. For instance, the value of this coefficient for U.S. companies reported by Aivazian *et. al.,* (2001) is equal to 0.834. Considerably in the post-reform periods compared to the former, coefficients of lagged dividend in GMM (in-Sys) model decrease significantly (from 0.664 to 0.3676), indicating that our sample firms have highly unstable dividend policies during the post-reform periods. This decrease is relatively similar in case of GMM (in-Diff) estimations. When the Lintner speed of adjustment factor is closer to +1, this means that companies do not smooth dividends. The estimated speed of adjustment factor (1-0.37) for the post reform period is 0.63, compared with 0.34 in the former periods. India companies pay dividends with an average adjustment parameter of 0.43 for the full period 1971-2007. Thus broadly it can be inferred that the tendency to smoothen dividends have considerably decreased during the post 1993 years, and the firms have developed a general likening to relatively retain their earnings, unlike the past. This result is consistent irrespective of the technique used. The desired (target) payout ratio is given by the ratio of estimated coefficients on earnings and the estimated adjustment parameter. The desired payout ratio in the full period is 10% compared to the average observed value of 25%. In the post-reform period, Indian firms target a smaller ratio (11%) compared to 16% in the pre-reform periods, indicating a general averseness in dividend payments in the later periods. Finally, the current earnings coefficient is positive and significant for all periods indicating that any change in current earnings is reasonably reflected in cash dividends. Across all the periods, the implicit target payout ratios are significantly lower then the observed values. This is also true irrespective of the technique used to obtain the estimators. In other terms, biases due to fixed-effects cannot account for the discrepancy between implicit and observed dividend payout ratios. Thus, it seems that for Indian RBI firms the dividend decisions are not based on long term target dividend payout ratios.

Overall, there is strong and robust evidence that management of Indian companies always consider past dividend a more important benchmark for deciding the current dividend payment. Benzinho (2004) reports similar results in a study of Portuguese Corporations. Corporate Portugal follows relatively stable cash dividend policies and the main factor that determines the dividends is the earnings of the firm in that year and also the lagged dividends. In the post-reform periods compared to the former, coefficients of lagged dividend decrease significantly, indicating that our sample firms have highly unstable dividend policies during the post reform periods. It is found that Indian companies pay dividends with an average adjustment parameter of 0.43 for the full period 1971-2007 through the GMM (in-Sys) procedure, compared to GMM (in-Diff) estimates which is relatively higher (0.63). The dynamic models also explains that the tendency to smoothen dividends have considerably decreased during the post 1993 years compared to the pre-reform periods. Further, the high adjustment factors together with low payout ratios indicate that the firms frequently change their dividend payments with changes in earnings, and dividend smoothing is of a lower order. This causes more variability in dividend payments of Indian companies consistent with the findings of Bhole (1980), and Pandey and Bhat (2004). The later study uses the GMM estimator which is most suitable methodology in a dynamic setting. Using CMIE data for the 1989 through 1997 period their results show that the Indian firms have lower target ratios and higher adjustment factors. The estimations by Goergen, *et. al.,* (2004) on the published earnings and the cash flow model for German firms using alternate GMM (in-Diff) and GMM (in-Sys) procedures suggest that dividend decisions are not based on long term target payouts, as originally hypothesized by Lintner (1956) and support the view that the implicit payout ratios deviate substantially from observed payout ratios. They find German firms are more willing to cut the dividend in the wake of a temporary decrease in profitability. This causes a higher degree of 'Discreteness' in the dividends-per share time series as opposed to the 'Smoothness' (*i.e.,* frequent annual small adjustments in the DPS) observed in the U.S. and the U.K.

Adaoglu (2000) shows that the companies listed on Istanbul Stock Exchange continue to follow unstable dividend policies even after the regulation that required half of the earnings to be distributed as cash dividends was abandoned. Companies from Anglo-American countries slowly adjust their dividend policy. For instance, the partial adjustment model by Short *et. al.,* (2002) shows that UK firms have a long term target payout ratio, which is positively correlated to institutional ownership and negatively to managerial ownership. In contrast, emerging markets firms often have a target payout ratio but they are generally less concerned with volatility in dividends over time and, consequently, dividend smoothing over time is less important, Glen *et. al.,* (1995). Also in other previous studies, the estimated speed of adjustment is usually substantially lower than the observed one. *For instance,* Behm and Zimmermann (1993) test the partial adjustment model for a sample of 32 major German quoted firms during 1962 and 1988. Using an OLS regression on pooled data, they find that a specification based on current earnings only has a speed of adjustment of 0.26. Including lagged earnings into the model reduces the speed of adjustment coefficient to 0.13. The implicit target payout ratio of 48 per cent in their study is also lower than the observed ratio of 58 per cent (both figures are on a net basis). For U.S. studies, the estimated average speed of adjustment is also lower than the observed one. For example, the one estimated by Lintner was approximately 30 per cent with a target payout ratio of 50 per cent of earnings. Lintner's implicit target payout ratio seems to be substantially higher than our in specifications whereas, Fama and Babiak (1968) find an average speed of adjustment of approximately 0.37, slightly higher than Lintner's. To summarize, the estimations of the dividend stability model for Indian RBI firms suggest that dividend decisions are not based on long term target payouts, as originally hypothesized by Lintner (1956). Overall, there is strong and robust evidence that dividend decisions for Indian RBI firms are not based on long term target dividend payout ratios and management of Indian companies always consider past dividend a more important benchmark for deciding the current dividend payment. Further the firms frequently change their dividend payments with changes in earnings, and dividend smoothing is of a lower order.

7. Robust Test, Role of Macro-Economic Factors and Industry Affiliation

Table 10 presents the results of the Pooled OLS models of corporate dividend equation for three periods, 1971-1992, 1993-2007 and the whole period 1971-2007. The pooled OLS model results are helps to gauge the impact of various individual time varying variables at an aggregate level for the purpose of comparisons.

For all periods, the *F*-statistics for the time series model shows that the estimation is correctly specified, the model of fit depicted by the adjusted *R*-square is high, and the autocorrelation and hetroskedasticity problem is corrected for. The intercept term for all three periods is significant and positive but decreases in the post-reform periods, as also in case of our preferred static model suggesting reluctance of the Indian RBI sample firms in avoiding dividend payments. In smaller coefficient value of the intercept term in the post-reform periods compared to the former also hints of the overall decreased payouts in the later periods. The regression coefficients for all the hypothesized variables depict the correct signs. The specified model reveals that the tangibility of assets, size, and earnings are statistically significant, bear positive loading and are the prime movers of dividends. The factors like that of financial slack, operating risk, corporate tax, cost of borrowings and the growth of the firm are major constraints on the dividend payout decision, bearing a negative sign with the dependent variable. Amongst the variables, tangibility, growth of the firm and corporate tax rate fail to add any explanatory power to the time series model, though they have the expected signs.

The results of the Static Models (table 6) and the Pooled OLS (table 10) suggest a partial role for the macro-economic variables over different periods for sample. The consumer price inflation index indicator and the differential in yield curve interest rates maintain their expected signs. The insignificance of the inverse relation of inflation deflator with dividends suggests that general goods price inflation has played little independent part in the trend towards increase in leverage and correspondingly on dividends over the sample period as hypothesized. This may be because creditors are able to compensate themselves for the wealth transfer to debt holders created by inflation through increases in nominal interest rates. The descriptive statistics on the financial slack variable indicates that the relative debt levels of the sample RBI firms shrink in the post-reform periods. Prior to liberalization, banks were often forced to ration credit. Controls on both lending growth and interest rates meant that banks could not use prices to equate loan supply and demand. As a result, increased demand for debt often meant that the queue of borrowers simply lengthened. Following deregulation, this need to ration credit disappeared. Secondly, during inflationary tendencies the negative relation between dividends and general prices may weaken if the firms follow liberal depreciation policies resulting in higher reserves which outweigh the actual requirement of capital expenditures and dividends would not significantly lag behind the increasing reported earnings with the advent of generally rising prices.

The second macro-economic variable assumed to vary only over time; the yield curve interest rate demonstrates the expected negative sign and adds significant explanatory power to our models. Indian corporate sector has typically favored debt based financing. The financing pattern of Indian firms is found to be debt based and different from that in developed countries and other emerging markets, Saggar (2005). An examination of the financing pattern of Indian firms using balance sheet data in the full period shows a typical pattern of lower but significant dependence on internal funds and a larger dependence on borrowings. Borrowings from banks constitute the major component of total borrowings, is consistent with the notion that the Indian financial system is essentially a bank-oriented one, Pal (2002). Credit constraints have much more pronounced impact on real sector in bank-based economies than in market-based economies. Since debt is associated with increase levels of debt servicing; constraints on the dividend flow are evident. A negative sign is suggestive that the bank-oriented economies would experience difficulties to restructure their financing arrangements in such a manner as to reduce their debt dependence. In such a condition more internal funds become available to firms, allowing them to reduce their reliance on more expensive debt funds, lowering out dividend distributions.

Coefficients on the industry dummy variables have been estimated using the OLS and the REM. They cannot be estimated within the FEM framework because they are linear combinations of the firm dummy variables. The coefficients estimated for the OLS model are inconsistent because the firm effects have been incorrectly omitted. They are also likely to be inconsistently estimated for the random effects models given our *a priori* belief that the industry dummy variables are correlated with the unobserved determinants of dividends. More specifically, we feel that the industry dummy variables are correlated with the risks of financial distress that are captured by the firm effects. Also, the Hausman tests suggest that the REM may be inconsistently estimated because of endogeneity in the variables that vary over both firms and time. The coefficients for all the industry dummies are positive however their relative magnitude varies over time. The coefficient for the dummy representing the CFCH, *i.e.* the Cement, Fertilizer and Chemical Industry, is significant in the pre-reform as well as the post-reform periods. The dummies for Textile and the Food Manufacturing industry are significant only in the pre-reform periods, while the coefficient of the Trading industry suffers in the liberalization period.

8. Summary and Findings

We shed light on several issues on dividend policy from a developing country perspective by analyzing the issue of stability and determinants of the corporate dividend policy structure in India. We add to the relatively limited literature on the dynamics of the dividend decision by examining the dynamics of the relationship between dividend payouts and a set of explanatory variables. The static panel test statistics for the time intercepts versus the macro-economic variables, and the firm intercepts Vs the industry and listing dummy variables support the results on the firm and time effects. It is noticed tat the magnitudes of the independent variables have changed in dynamic analysis compared to the static analysis.

Last years dividend payout levels has a positive influence on the current years divided payouts, since the lagged dividend variable has a positive and a significant coefficient and confirms the dividend stability hypothesis. Bigger firms earn larger profits and distribute higher dividends. The regression coefficient of the lagged value of the earnings ratio also has a positive sign and is statistically significant in the dynamic estimations for all the three periods, which also means that the underlying variable has a persistent positive effect on the dividend payouts over time. The size variable is statistically significant in all the three periods and for both, static and the dynamic models. This variable also exerts a positive relationship with earnings, and the coefficient of the lagged value of size is also positive and statistically significant for the pre-liberalization period in India. We find that given the ability to pay, the firms with higher investments in fixed assets, inventory and R&D expenditures in the current and prospective years forces the firms to distribute smaller portions of their profits as dividends. The tangibility (collateralisable asset) variable has the expected positive sign, consistent with the view that agency costs and expected bankruptcy/financial distress costs associated with the use of external funds may be moderated by size and collateral. The coefficients of the Operating Risk variable carry the expected negative sign following the predictions according to the pecking order model of financing for India. The regression coefficients for all other hypothesized variables depict the correct signs. Incidentally, corporate tax is found to be negatively related with dividends.

Considerably in the post-reform periods compared to the former, coefficients of lagged dividend in GMM (in-Sys) model decrease significantly indicating that our sample firms have highly unstable dividend policies during the post-reform periods. Further it is found that he tendency to smoothen dividends have considerably decreased during the post 1993 years, and the firms have developed a general likening to relatively retain their earnings, unlike the past. The tendency of decreasing dividend in recent years is in tandem with the observation by fama and French (2001) for the U.S. In the post-reform period, Indian firms target a smaller ratio (11%) compared to 16% in the pre-reform periods, indicating a general averseness in dividend payments in the later periods. Finally, the current earnings coefficient is positive and significant for all periods indicating that any change in current earnings is reasonably reflected in cash dividends. Across all the periods, the implicit target payout ratios are lower then the observed values. The high adjustment factors together with low payout ratios indicate that the firms frequently change their dividend payments with changes in earnings, and dividend smoothing is of a lower order. This causes more variability in dividend payments of the Indian companies.

The time-series and the static panel regressions suggest a partial role for the macro-economic variables over different periods for sample. The consumer price index indicator and the differential in yield curve interest rates maintain their expected negative signs. The insignificance of the inverse relation of inflation variable with dividends suggests that general goods price inflation has played little independent part in the trend towards increase in leverage and correspondingly on dividends over the sample period. The coefficients for all the industry dummies are positive however their relative magnitude varies over time. More specifically, we feel that the industry dummy variables are correlated with the risks of financial distress that are captured by the firm effects. The overall results through alternative estimation techniques of fixed effect panel, random effect panel, GMM estimations and the classical model are corroborant, and thus robust. The empirics reveal that the tangibility of assets, size, and earnings in an increasing order has statistically significant positive loadings; and are the prime movers of dividends in India. The analysis of determinants of dividends as presented herein is to best of our knowledge the foremost attempt to cover a wider sample, considers a host of micro and macro-economic factors, and in terms of applying contemporary econometric techniques.

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Appendix

Table 1 Study Year, Financial Year and Total Number of Public Limited Firms in the RBI Study, 1971 through 2007

Study Year	Financial Year	No. of Public Limited Firms
1975-76	1970-71	1650
	1971-72	1650
	1972-73	1650
	1973-74	1650
	1974-75	1650
	1975-76	1650
1980-81	1976-77	1720
	1977-78	1720
	1978-79	1720
	1979-80	1720
	1980-81	1720
1982-83	1981-82	1651
	1982-83	1651
1984-85	1983-84	1838
	1984-85	1838
1986-87	1985-86	1942
	1986-87	1942
1988-89	1987-88	1885
	1988-89	1885
1990-91	1989-90	2131
	1990-91	2131
1992-93	1991-92	1802
	1992-93	1802
1994-95	1993-94	1720
	1994-95	1720
1996-97	1995-96	1930
	1996-97	1930
1998-99	1997-98	1848
	1998-99	1848
2000-01	1999-00	1927
	2000-01	1927
2002-03	2001-02	2031
	2002-03	2031
2004-05	2003-04	1910
	2004-05	1910
2006-07	2005-06	1722
	2006-07	1722

1971-1992 Average No. of Firms (Pre-reform period)	**1781**
1993-2007 Average No. of Firms (Post-reform period)	**1865**
1971-2007 Average No. of Firms (Full period)	**1815**
1971-1992 Total No. of Firm Level Observations (Pre-reform period)	**37,394**
1993-2007 Total No. of Firm Level Observations (Post-reform period)	**26,176**
1971-2007 Total No. of Firm Level Observations (Full period)	**67,174**

Notes: a. Column number 3 represents the number of firms in the sample with equity shares in their capital structures respectively. **b.** The number of total firms in the database is equal to the number of equity firms in each year as listed above. **Source:** Unpublished Firm level data on Indian Public Limited Companies requested from Reserve Bank of India, Mumbai, 2007.

Table 2 Descriptive Statistics of the Variables used in the Panel Data

Statistics	DPR	ERNG	SIZE	INVR	TNGA	FSLK	COBW	ORSK	CTAX
1971-1992									
Mean	0.32	0.04	10.69	1.02	0.40	0.405	0.08	3.44	0.24
Median	0.12	0.04	10.80	1.01	0.38	0.390	0.07	0.04	0.12
Var.	81.54	0.34	3.71	146.52	0.18	0.217	0.08	151103.00	3.28
Skew.	157.18	153.58	-0.46	-113.05	100.09	101.726	79.39	117.97	-53.80
CoV	28.35	13.70	0.18	11.84	1.04	1.150	3.57	112.88	7.70
S.Dev	9.03	0.58	1.93	12.10	0.42	0.466	0.28	388.72	1.81
1993-2007									
Mean	0.11	0.03	12.54	1.21	0.42	0.408	0.07	6.00	0.17
Median	0.03	0.03	12.66	0.90	0.40	0.380	0.08	0.03	0.03
Var.	150.21	0.08	3.44	194.29	0.05	0.159	0.49	511492.60	3.93
Skew.	-89.64	-16.94	-0.56	55.91	0.27	10.645	-63.97	140.78	-37.81
CoV	113.07	9.46	0.15	11.49	0.52	0.976	9.45	119.15	11.57
S.Dev	12.26	0.28	1.85	13.94	0.22	0.399	0.70	715.19	1.98
1971-2007									
Mean	0.25	0.04	11.33	1.09	0.41	0.406	0.08	4.33	0.21
Median	0.09	0.03	11.43	0.97	0.39	0.390	0.07	0.03	0.08
Var.	105.29	0.25	4.39	163.04	0.13	0.197	0.22	275709.40	3.50
Skew.	17.26	158.49	-0.36	-37.86	101.54	79.683	-61.59	154.31	-47.37
CoV	41.74	13.11	0.19	11.73	0.89	1.093	6.08	121.31	8.79
S.Dev	10.26	0.50	2.10	12.77	0.36	0.444	0.47	525.08	1.87

Notes: a. **b.**The abbreviations Var., Skew., CoV., S.Dev., and N denote variance, Skewness, Coefficient Covariance, Standard Deviation and Number of Observations, respectively. **Source:** Unpublished Firm-level Data requested from RBI

Table 3 Correlation Coefficients of the Variables used in the Panel Data

Variables	DIV	ERNG	SIZE	INVR	TNGA	FSLK	COBW	ORSK
				1971-1992				
DPR	1.000							
ERNG	0.000	1.000						
SIZE	0.010	0.030	1.000					
INVR	0.000	0.000	0.020	1.000				
TNGA	0.000	0.780	-0.070	-0.010	1.000			
FSLK	-0.010	0.070	0.030	-0.030	0.270	1.000		
COBW	0.000	0.000	0.000	0.000	0.000	0.000	1.000	
ORSK	-0.020	0.000	0.010	0.000	0.000	0.000	0.000	1.000
CTAX	-0.050	0.000	0.000	0.000	0.000	0.000	-0.490	0.000
				1993-2007				
DPR	1.000							
ERNG	0.000	1.000						
SIZE	0.000	0.090	1.000					
INVR	-0.020	-0.020	-0.020	1.000				
TNGA	0.000	-0.040	-0.010	0.020	1.000			
FSLK	0.000	-0.360	-0.030	0.010	0.170	1.000		
COBW	0.000	-0.010	0.000	0.000	0.010	0.000	1.000	
ORSK	0.000	0.000	0.010	0.000	0.010	0.000	0.000	1.000
CTAX	0.080	0.000	0.010	0.000	0.000	0.000	-0.360	0.000
				1971-2007				
DPR	1.000							
ERNG	0.000	1.000						
SIZE	0.000	0.030	1.000					
INVR	-0.010	0.000	0.010	1.000				
TNGA	0.000	0.690	-0.040	0.000	1.000			
FSLK	-0.010	-0.010	0.010	-0.020	0.250	1.000		
COBW	0.000	0.000	-0.010	0.000	0.000	0.000	1.000	
ORSK	0.000	0.000	0.010	0.000	0.000	0.000	0.000	1.000
CTAX	0.020	0.000	-0.010	0.000	0.000	0.000	-0.380	0.000

Source: Same as in Table 1.

Table 4 Tests of the Significance Showing the Existence and Importance of the Firm Varying and the Time Varying Effects in Static Panel Data Models

Estimation Period	Test Statistic	Probability Values	Test Statistic	Probability Values
	Time Intercepts		**Firm Intercepts**	
1971-1992	20.54	0.00	50.73	0.00
1993-2007	12.88	0.00	28.29	0.00
1971-2007	18.87	0.00	24.20	0.00
	Time *Vs* Macro Economic Variables		**Firm *Vs* Industry Variables**	
1971-1992	1.65	0.12	19.24	0.00
1993-2007	1.06	0.23	21.23	0.00
1971-2007	1.47	0.25	24.29	0.00
	Hausman test		**Hausman test**	
1971-1992	87.65	0.00	125.34	0.00
1993-2007	82.40	0.00	117.23	0.00
1971-2007	74.30	0.03	113.90	0.00

Notes: a. Null Hypothesis for Time Intercept is $H_0 = X_t = 0, \forall_{t=1.....T}$ while for the Firm Intercept is $\mu_{i=0}, \forall_{i=1.....N}$ b. Statistics in column 2 and 4 show the relationship between Fixed Effect firm and the Random Effect Firm Model, and the relationship between Fixed Effect Firm and Time Effect Model and Random Effect Firm and Time model respectively. **Source:** Same as in Table 1.

Table 5 Static Dividend Model (Random Effect Estimates) of the Determinants of Corporate Dividends in India for three Periods

Independent Variables	Random Effects Firm Model			Random Effects Firm and Time		
	1971-92	1992-07	1971-07	1971-92	1992-07	1971-07
Constant	-0.02*** (0.02)	-0.02*** (0.04)	0.02*** (0.00)	0.05 (0.16)	-0.03*** (0.01)	-0.02 (0.00)
ERNG	0.0428*** (0.015)	0.053*** (0.00241)	0.038*** (0.003)	0.03888** (0.0037)	0.0617 (0.0039)	0.021*** (0.003)
SIZE	0.012*** (0.002)	0.006*** (0.001)	0.008*** (0.001)	0.017*** (0.003)	0.009*** (0.002)	0.011*** (0.002)
INVR	-0.006*** (0.00017)	-0.032*** (0.001)	-0.025*** (0.002)	-0.030*** (0.001)	-0.029*** (0.003)	-0.005*** (0.004)
TNGA	0.014 (0.21)	-0.017 (0.019)	0.004 (0.002)	-0.003 (0.002)	0.019 (0.023)	-0.004 (0.003)
FSLK	-0.022*** (0.001)	-0.027*** (0.007)	-0.027*** (0.000)	-0.025** (0.001)	-0.027*** (0.002)	-0.025*** (0.001)
COBW	-0.038*** (0.0151)	-0.059*** (0.0193)	-0.061*** (0.0207)	-0.044 (0.0227)	-0.044** (0.0221)	-0.042*** (0.0171)
ORSK	-0.0031** (0.0014)	-0.0011 (0.0022)	-0.015*** (0.0027)	-0.0049** (0.0019)	-0.0019 (0.027)	-0.015*** (0.0027)
CTAX	-0.036 (0.011)	-0.002*** (0.0003)	-0.0023 (0.009)	-0.0049 (0.011)	-0.002*** (0.0005)	-0.0041 (0.012)
CPII	-0.0024 (0.0052)	-0.0002 (0.0006)	-0.0003 (0.0002)	-0.0031 (0.0066)	0.0003 (0.0007)	0.0003 (0.0004)
YLCR	-0.039*** (0.002)	-0.028*** (0.009)	-0.031*** (0.002	-0.031*** (0.019)	-0.013 (0.012)	-0.037*** (0.131)
CHCM	2.04*** (0.22)	2.378* (1.36)	2.865** (0.99)	2.151** (0.938	2.11 (3.28)	2.865** (0.99))
TRDG	0.66 (0.544)	0.619 (0.533)	0.62 (0.38)	0.627 (0.570)	0.48 (0.57)	0.51 (0.56)
TXTL	0.396*** (0.124)	0.213 (0.189)	0.396*** (0.124)	0.213 (0.189)	0.306 (0.370)	0.47 (0.23)
FDMG	0.211 (3.28)	0.243 (0.257)	0.135* (0.74)	0.176 (0.151)	0.11 (0.971)	0.132 (0.1521)
Observations	**38726**		**19983**		**58709**	
Adjusted R^2	**0.21**	**0.49**	**0.55**	**0.33**	**0.52**	**0.67**
F-Statistics	**39.89 (0.00)**	**24.89 (0.00)**	**69.37 (0.00)**	**35.19 (0.00)**	**36.02 (0.00)**	**85.69 (0.00)**
Estimated ρ	**0.020**	**0.023**	**0.051**	**0.0111**	**0.042**	**0.025**

Notes: a. The values in parenthesis below the coefficients show robust standard errors, and the values in the parenthesis of F-statistics show the probability values. b. *, **, and *** show the 10%, 5% and 1% level of significance respectively c. ρ represents autocorrelation **Source:** Same as in Table 1

Table 6 Preferred Static Dividend Model (Fixed Effect Estimates) of the Determinants of Corporate Dividends in India for three Periods

Independent Variables	Fixed Effects Firm Model			Fixed Effects Firms and Time		
	1971-92	**1993-07**	**1971-07**	**1971-92**	**1993-07**	**1971-07**
Constant	-----	-----		0.278 (0.092)	0.082** (0.015)	0.071 (0.089)
ERNG	0.043** (0.000)	0.073*** (0.0026)	0.040** (0.00)	0.0479*** (0.0051)	0.0743*** (0.0032)	0.055* (0.01)
SIZE	0.022*** (0.003)	0.012*** (0.00)	0.019*** (0.001)	0.045*** (4.87)	0.03*** (0.003)	0.014*** (0.003)
INVR	-0.013*** (0.00)	-0.002*** (0.009)	-0.001*** (0.00)	0.008*** (0.002)	-0.003*** (0.011)	-0.014 (0.56)
TNGA	0.031 (0.016)	0.043 (0.009)	0.047 (0.019)	0.027 (0.004)	0.021 (0.002)	0.052 (0.005)
FSLK	-0.229*** (0.018)	-0.114*** (0.018)	0.184*** (0.03)	-0.168*** (0.012)	-0.11*** (0.031)	-0.14*** (0.003)
COBW	-0.032*** (0.002)	-0.056 (0.004)	-0.05*** (0.003)	-0.03*** (0.002)	-0.029 (0.003)	-0.03*** (0.001)
ORSK	-0.005*** (0.002)	-0.0019 (0.00)	-0.00*** (0.00)	-0.003*** (0.001)	-0.00*** (0.00)	-0.151 (0.002)
CTAX	-0.0036 (0.011)	0.0013 (0.00)	-0.0023 (0.009)	-0.0036 (0.011)	-0.002** (0.003)	0.00 (0.014)
CPII	-0.003 (0.00)	-0.002 (0.00)	-0.004 (0.00)	-----	-----	-----
YLCR	-0.063*** (0.031)	-0.047*** (0.013)	-0.06*** (0.002)	-----	-----	-----
No. of Firms	38726		19983		58709	
Adjusted R^2	**0.86**	**0.83**	**0.89**	**0.85**	**0.80**	**0.87**
***F*-Statistics**	**18.65 (0.00)**	**25.63 (0.00)**	**30.24 (0.00)**	**18.83 (0.00)**	**25.71 (0.00)**	**31.12 (0.00)**
Estimated ρ	**0.0367**	**0.03215**	**0.0384**	**0.00166**	**0.0235**	**0.0478**

Notes: a. The values in parenthesis below the coefficients show robust standard errors, and the values in the parenthesis of F-statistics show the probability values. **b.** *, **, and *** show the 10%, 5% and 1% level of significance respectively **c.** The Fixed Effect Firm Model doesn't have any intercept term. **d.** ρ represents autocorrelation. **Source:** Same as in Table 1.

Table 7 Dynamic Dividend Model based on GMM Estimates on the Determinants of Corporate Dividends in India for three Periods

Independent Variables	1975-1992		1995-2007		1975-2007	
	Coefficients	Standard Errors	Coefficients	Standard Errors	Coefficients	Standard Errors
Δ DPR_{it-1}	0.683***	0.022	0.3349***	0.02031	0.4011**	0.029
Δ DPR_{it-2}	0.5546	0.5187	0.5957	0.147	0.5562	0.6413
Δ ERNG	0.046**	0.001	0.062**	0.000	0.049***	0.00
Δ $ERNG_{it-1}$	0.026**	0.000	0.056*	0.016	0.048***	0.014
Δ $ERNG_{it-2}$	0.0002	0.0001	0.0012***	0.0003	0.007	0.0126
Δ SIZE	0.017**	0.006	0.010**	0.000	0.012**	0.005
Δ $SIZE_{it-1}$	0.009**	0.004	0.015	0.175	0.009	0.046
Δ SIZE	0.003	0.011	0.005	0.006	0.009	0.011
Δ INVR	-0.011***	0.0031	-0.024***	0.007	-0.015***	0.0007
Δ $INVR_{it-1}$	-0.033***	0.009	-0.074***	0.026	-0.0057**	0.0026
Δ $INVR_{it-2}$	0.0016	0.0027	-0.0084	0.0163	-0.0001	0.013
Δ TNGA	0.0124	0.0318	0.0131	0.0561	0.0513***	0.0213
Δ $TNGA_{it-1}$	0.015	0.006	0.0116	0.211	0.0179	0.114
Δ $TNGA_{it-2}$	0.054	0.065	0.069	0.064	0.071	0.067
Δ FSLK	-0.023***	0.018	-0.108***	0.021	-0.015***	0.063
Δ $FSLK_{it-1}$	-0.0033	0.0009	-0.0026	0.0005	-0.0039	0.0011
Δ $FSLK_{it-2}$	-0.0059	0.0019	-0.0037	0.0012	0.0004	0.0231
Δ COBWG	-0.0103**	0.0041	-0.004***	0.0065	-0.021***	0.0097
Δ$COBWG_{it-1}$	-0.0148	0.0095	-0.0228*	0.0083	-0.0119	0.0086
Δ$COBWG_{it-2}$	-0.0073	0.0069	-0.0063	0.0072	-0.0026	0.0071
Δ ORSK	-0.1034**	0.0511	-0.0178**	0.0083	-0.0062**	0.0025
Δ $ORSK_{it-1}$	-0.0483	0.0504	-0.0088	0.0079	0.0021	0.0019
Δ $ORSK_{it-2}$	0.0122	0.0484	-0.0088	0.0034	0.0017	0.0272
Δ CTAX	0.00179	0.040	-0.000***	0.0002	-0.0024	0.0269
Δ $CTAX_{it-1}$	-0.0019	0.022	-0.0011	0.0016	-0.0028	0.029
Δ $CTAX_{it-2}$	-0.0005	0.011	0.0003	0.00207	0.0010	0.0131
Observations	**32595**		**15472**		**53309**	
m_1 statistics	**-6.213**		**-5.716**		**-5.221**	
m_2 statistics	**0.5263**		**0.4215**		**0.3197**	
Wald Test 1	**339.46**		**316.72**		**321.13**	
Wald Test 1	**116.71**		**78.14**		**68.13**	
Sargan Test	**68.58**		**36.76**		**66.71**	

Notes: a. The prefix depicts that the concerned variable is in its first difference form. b. *, ** and *** show the 10%, 5% and 1% level of significance respectively. c. Time dummies are included in the model for all three periods. d. m_1 and m_1 statistics are the First and Second order autocorrelation of residuals under standard normal; distribution with the null hypothesis of no serial correlation. d. Wald Test1 and Wald Test2 are, test for joint significance of the estimated coefficients which is asymptotically distributed as Chi-Square under the null of no relationship, and a test for joint significance of the time dummies respectively. e. Sargan test of over identifying restrictions is asymptotically distributed as Chi-Square under the null of instrumental validity. **Source:** Same as in Table 1.

Table 8 Dynamic Dividend Model based on GMM (in-DIFF) Estimates on the Determinants of Dividend Policy in India for Three Periods

Independent Variables	1975-1992		1995-2007		1975-2007	
	Coefficients	Standard Errors	Coefficients	Standard Errors	Coefficients	Standard Errors
Δ DPR_{it-1}	0.611***	0.011	0.2806***	0.0239	0.3711***	0.0433
Δ ERNG	0.0469***	0.0522	0.06171**	0.000	0.066**	0.068
Δ $ERNG_{it-1}$	0.018***	0.00	0.023***	0.0027	0.021***	0.002
Δ SIZE	0.014***	0.016	0.021***	0.003	0.0152***	0.00
Δ $SIZE_{it-1}$	0.005**	0.002	-----	-----	-----	-----
Δ INVR	0.013***	0.0023	-0.041***	0.016	-0.026***	0.004
Δ $INVR_{it-1}$	-0.018*	0.011	-0.0263***	0.0047	-0.025***	0.002
Δ TNGA	-----	-----	-----	-----	0.0261**	0.0123
Δ FSLK	-0.015***	0.021	-0.011***	0.003	-0.014***	0.017
Δ COBWG	-----	-----	-0.0021***	0.0006	-----	-----
Δ ORSK	-0.079***	0.0038	-0.048***	0.023	-0.054***	0.004
Δ CTAX	-----	-----	-0.0021***	0.0005	-----	-----
No. of Firms	**32595**		**15472**		**53309**	
m_1 statistics	**-4.236**		**-4.263**		**-4.581**	
m_2 statistics	**0.4216**		**0.6790**		**0.326**	
Wald Test1	**332.01**		**351.72**		**326.73**	
Wald Test2	**84.23**		**82.43**		**72.61**	
Sargan Test	**39.44**		**38.59**		**66.57**	

Notes and **Source:** Same as in Table 6.

Table 9 Preferred Dynamic Dividend Model based on GMM (in-SYS) Estimates on the Determinants of Dividend Policy in India for Three Periods

Independent Variables	1975-1992		1995-2007		1975-2007	
	Coefficients	Standard Errors	Coefficients	Standard Errors	Coefficients	Standard Errors
DPR_{it-1}	0.664***	0.043	0.3676***	0.040	0.5713***	0.0071
ERNG	0.045**	0.000	0.064**	0.008	0.046***	0.005
$ERNG_{it-1}$	0.022**	0.000	0.0154***	0.0019	0.017***	0.004
SIZE	0.019***	0.0013	0.029***	0.004	0.0287***	0.002
$SIZE_{it-1}$	0.0151***	0.0018	-----	-----	-----	-----
INVR	-0.022***	0.001	-0.061***	0.084	-0.036***	0.0011
$INVR_{it-1}$	-0.031***	0.000	-0.048***	0.002	-0.027***	0.000
TNGA	-----	-----	-----	-----	0.0503***	0.0153
FSLK	-0.0029***	0.003	-0.056***	0.004	-0.032***	0.0021
COBWG	-----	-----	-0.0059***	0.0019	-----	-----
ORSK	-0.049***	0.0003	-0.025***	0.002	-0.053***	0.004
CTAX	-----	-----	-0.0036***	0.0014	-----	-----
No. of Firms	**32595**		**15472**		**53309**	
m_1 statistics	**-3.521**		**-3.573**		**-3.412**	
m_1 statistics	**0.3207**		**0.421**		**0.371**	
Wald Test1	**276.86**		**311.17**		**311.72**	
Wald Test2	**87.36**		**73.82**		**110.21**	
Sargan Test	**64.78**		**82.19**		**86.79**	

Notes and **Source:** Same as in Table 6.

Table 10 Pooled Ordinary Least Square Estimates of the Determinants of Corporate Dividends in India for Three Periods

Independent Variables	1971-1992		1993-07		1971-07	
	Coefficients	Standard Errors	Coefficients	Standard Errors	Coefficients	Standard Errors
Constant	0.050***	0.022	0.046***	0.019	0.048***	0.014
ERNG	0.004***	0.003	0.074***	0.003	0.058***	0.003
SIZE	0.063***	0.04	0.043***	0.003	0.054***	0.00
INVR	-0.023***	0.00	-0.031***	0.00	-0.028***	0.00
TNGA	0.046	0.002	0.047	0.003	0.054	0.002
FSLK	-0.147***	0.011	-0.109***	0.002	-0.143***	0.016
COBW	-0.026**	0.007	-0.045***	0.00	-0.032***	0.006
ORSK	-0.062***	0.007	-0.023***	0.00	-0.031***	0.004
CTAX	-0.040	0.01	-0.020	0.01	-0.030	0.01
CPII	-0.045	0.004	-0.065	0.006	-0.043**	0.022
YLCR	-0.064	0.02	-0.045	0.0043	-0.032	0.302
CFCH	2.151**	0.938	1.11***	0.57	1.79***	0.003
TRDG	0.523	0.398	0.627	0.571	0.354	0.411
TXTL	0.563***	0.113	0.437	0.389	0.306	0.373
FDMG	0.287***	0.005	0.012	0.008	0.189	0.131
Firms	**38726**		**19983**		**58709**	
Adjusted R^2	**0.73**		**0.70**		**0.77**	
F-Statistics	**96.012 (0.00)**		**169.33 (0.00)**		**129.13 (0.00)**	
Estimated ρ	**0.1242**		**0.1499**		**0.1520**	

Notes: a. The values in the parenthesis of F-statistics show probability values. b. *, ** and *** show the 10%, 5% and 1% level of significance respectively c. ρ represents the autocorrelation. **Source:** Same as in Table 6.