Do Adjustment Costs Affect the Corporate Investments in India: A Dynamic Panel Data Analysis

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The success in achieving sustainable growth targets hinges on the appropriate mix of policies which would promote, *inter alia*, development and availability of efficient infrastructure, investment or capital formation, and savings. The development process can be improved through total investments which further can be categorized as public investment and corporate investment. Therefore, investment decisions of firms are one of the most important issues in the area of macro economics, industrial economics and corporate finance. Corporate investment has both micro and macro economic implications. Therefore, the behaviour of corporate investment has a major focus of attention in any economy.

While discussing about the factors affecting the corporate investment, it has been established that in a perfect frictionless capital market, the corporate investment is determined by internal cash flow only (Modigline and Miller, 1958).But, in the real world, there are a variety of forces that reject this theory. Over the last two decades, a number of researchers have specified and extended various models to find out the effect of different financial constraints which arise because of information asymmetric and agency problems in the capital market. They have concluded that information and agency costs which arise from the external borrowings and the internal sources of a firm influence the corporate investments underlying investment opportunities.

In the case of India, it is certainly worth appreciating that the Fiscal Responsibility and Budget Management Act, 2003 has been passed to promote fiscal prudence which may help to deal with the problem of low level of public sector investment. But this is not enough. There is a need for developing a culture of financial responsibility and prudence by the private corporate sector also. Like the public (Government) sector, the private corporate sector too has been in deficit, and its contribution to the national savings kitty has been meagre in relation to its draft on national financial resources. If an appropriate and effective policy-mix is to be devised for increasing corporate investment during the period of liberalization, we need to know more about the behaviour of corporate investment, and the factors which influence the corporate investment decision in the inefficient market. In this context, the major objective of this paper is to study the determinants of corporate investments in India. Notwithstanding micro-and macro-economic significance of corporate investments, there has been a dearth of systematic empirical studies on this subject in India. Almost none of the available empirical studies on this subject have used Panel Data Analysis, particularly in its dynamic form. The present paper seeks to bridge these gaps in the literature on corporate finance.

The rest of the paper is organized as follows. In Section-I, we describe the data, periods and techniques used in this paper. In Section-II, we provide a brief review of the earlier work on corporate investment. In Section-III, a dynamic model is specified for finding out the determinants of corporate investment in India. In Section-IV, the empirical results are presented. Conclusions and Managerial Implications are given in Section-V.

DATA, PERIOD AND METHODOLOGY

The determinants of corporate investment have been studied for respective samples of 597 firms because of the unavailability of continuous data for more number of companies during the period 1996-97 to 2005-06. The dynamic Panel Data analysis has been carried out with the help of data collected from the corporate data base (PROWESS) maintained by Center for Monitoring the Indian Economy (CMIE). The data used in the analysis consists of the manufacturing firms listed on the Bombay Stock Exchange (BSE).

The empirical technique, which has been used here, is the Generalized Method of Moments (GMM). The GMM model has been used to analyse the behaviour of corporate investment because of following reasons: First, it can explain the impact of adjustment and flotation costs on the dependent variable. Second, in the presence of heteroskedasticity problem, which is a common problem in the panel data set, the standard instrumental variable estimates of the standard errors are inconsistent, preventing valid inference. The user forms of the diagnostic tests for endogeneity and over identifying restrictions will also be invalid if heteroskedasticity is present. The conventional instrumental variable estimator (though consistent) is however, inefficient in the presence of heteroskedasticity problem. Therefore, in the presence of this problem, the Generalized Method of Moments (GMM) method has been introduced by L.Hansen (1982). This method makes use of the orthogonality conditions

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to allow for efficient estimation in the presence of heteroskedasticity of unknown form. This method has been developed again by Holtz Eakin, Newey and Rosen (1988), Arellano and Bond (1991, 1998), and Blundell (1998).

The model has been estimated as follows:

The equation to be estimated is in matrix notation,

$Y = X\beta + u$ ---------- (1)

Where, $E(uu') = \Omega$ with the row

$Y_i = X_i \beta + u_i$ ---------- (2)

The matrix of regressors X is n*k, where n is the number of observations. The error term u is distributed with mean zero and the covariance matrix Ω is n*n.

The cases of Ω that we will consider are:

Homoskedasticity: $\Omega = \sigma_I^2$ ---------- (3)

Heteroskdasticity: $\Omega = \begin{vmatrix} \sigma_I^2 \ldots\ldots\ldots\ldots 0 \\ \cdot \\ \sigma_i^2 \ldots\ldots 0 \\ \cdot \\ 0 \ldots\ldots\ldots\ldots \sigma_n^2 \end{vmatrix}$ ---------- (4)

Some of the regressors are endogenous, so that $E(X_i u_i)$ is not equal to zero. We partition the set of regressors into $[X_1 X_2]$, with the K_1 regressors X_1 assumed under the null to be endogenous, and the $(K-K_1)$ remaining regressors X_2 assumed exogenous. The set of instrumental variables is Z and is n*L; this is the full set of variables that are assumed to be exogenous i.e. $E(Z_i u_i)=0$. We partition the instruments into $[Z_1 Z_2]$, where the L_1 instruments Z_1 are excluded instruments and the remaining $(L-L_1)$ instruments $Z_2=X_2$ are the included instruments or exogenous regressors.

Regressors $X=[X_1 X_2]=[X_1 Z_2]$ = [Endogenous, Exogenous], Instruments $Z=[Z_1 Z_2]$ = [Excluded, Included]

And the instrumental variables estimator of β is

The instrumental variable estimator $(\beta) = (X' Z (Z' Z)^{-1} Z' X)^{-1} X' Z (Z'Z)^{-1} Z'Y$ ---------- (3.23)

The assumption that instruments Z are exogenous can be expressed as $E(Z_i u_i) = 0$.

The L instruments give us a set of L moments,

$g_i(\beta cap) = Z_i' \hat{u}_i = Z_i' (y_i - X_i \beta cap)$ ---------- (5)

Where, g_i is L*1. The exogeneity of the instruments means that there are L moment conditions or orthogonality conditions, which will be satisfied at the true value of β: $E[g_i(\beta)]=0$. Each of the L moment equations corresponds to a sample moment, and we can write L sample moments as:

$g'(\beta\ cap) = 1/n \sum_{i=1}^{n} g_i(\beta cap) = 1/n \sum_{i=1}^{n} Z_i' (y_i - x_i \beta cap) = 1/n\ Z' \hat{u}$ ---------- (6)

The institution behind GMM is to choose an estimator for that solves $g'(\beta\ cap) = 0$.

These GMM estimators allow controlling for unobserved individual effects which is present in the static model, endogeneity and simultaneity of explanatory variables and its lagged values and the use of the lagged dependent variables. Firm or individual specific effects are taken care of by first differencing the variables. The use of time dummies for each year in the sample takes care of time effects. In principle, the simultaneity problem in the estimation of models can be tackled by the use of instrumental variables. Consistent GMM estimation requires that the instruments used be uncorrelated with unobservable effects to the function since these effects may be included in the error term. Examples of these effects include attributes of the managers 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, factor market conditions and industry-wide business risk. While the time dummies take notice of macro economic shocks common to all firms, these effects are mainly macroeconomic effects such as prices and interest rates etc. Mostly these effects will be captured by the presence of firm specific and time specific dummies. The Company Finance Studies published by the Reserve Bank of India (RBI) and prowess maintained by CMIE have been the sources of data used in this paper.

BRIEF REVIEW OF EARLIER STUDIES

Early applied study on investment especially the work of Meyers and Kuh (1957) stressed the significance of financing constraints in business investment. During the modern era, there is a vast literature that estimates the impact of financial constraints on the investment behavior of companies beginning with the famous paper by Fazzari, Hubbard and Petersen

(1988). They have classified firms according to whether they were likely to be financially constrained on the basis of their size, dividend payouts and capital structure and this characteristic determines whether they are more sensitive to the supply of internal funds measured by cash flow. The highest sensitivities to cash flow are found for firms categorized as financially constrained, and this is taken to indicate that financial constraints are binding in this case. In other words it can be said that when firms face financial constraints, their investment spending should vary not only with the availability of profitable opportunities, but also with the availability of internal funds. Many further studies have followed the same methodology including Chirinko and Schaller (1995), Hubbard et al. (1995), Caballero, et. Al. (1995) Calomiris and Hubbard (1995), Hubbard (1998). Lamont (1997) and Shin and Stulz (1998)), Blanchard et al. (1994) and Hadlock (1998). Alemeida et.al. (2003), Hoshi, Bond et. Al.. (2001), Fazzari (2000) and Gilchrist et. al (1995) have shown that investment is more sensitive to internal funds for Japanese firms compared to those that have close ties with banks and are therefore, less likely to have financial constraints.

More recently, the literature has raised several new objections to this approach. In this context, Kaplan and Zingales (1997, 2000) have applied an alternative approach to clarify the firms into financially more or less constrained. They found that financially constrained firms have the lowest sensitivity of investment to cash flow. The second strand of the literatures by Bond and Meghir (1994) and Bond and Cummins (2001) address the issue related to measurement error in Tobin's Q. In this regard, they have argued that if investment opportunity is not measured properly, then cash flows in addition to conveying information about internal liquidity may also reflect information about future investment opportunities that are not captured by proxies for Q ratio. Cleary (1999) has also found that the most constrained firms have the lowest sensitivity. Gomes (2001) and Alti (2003) propose that cross-sectional variations in the informational content of cash flows regarding investment opportunities could generate the patterns reported by Fazzari et al. even in the absence of financing frictions. Cummins et al. (1999) and Erickson and Whited (2000) further argue that differences in investment—cash flow sensitivities across constrained and unconstrained firms can be explained by an empirical model in which investment spending depends only on investment opportunities, but where those opportunities are measured with error. These various arguments have put into question one's ability to draw inferences about the relationship between financing frictions and investment by looking at empirical investment—cash flow sensitivities.

Some authors have argued that the financial constraints have incarnated because of imperfections in the capital market and in the whole financial system as well. The financial system has an important role to play in economic fluctuations, and investment in particular. (See Gertler, 1988). The market-oriented financial systems where the finances are mainly through commercial paper, corporate bond and equity markets are more likely to show greater sensitivity to cash flow. Relationship-oriented systems are likely to foster closer and more transparent arrangements that allow them to exercise greater scrutiny over borrowers, and as a result, investors will be less sensitive to internal sources of funds. The principal differences between the two structures are discussed by Rajan and Zingales, (2003). Bond et al. (2003) have argued that investment will be more sensitive to internal funds (cash flow) for countries where the financial system is relatively market-based, and vice versa.

It can be also argued that the industrial structure also affects the investment process and the cash flow. Dedola and Lippi (2004) and Peersman and Smets (2004) have shown that industries with characteristics such as greater investment intensity, openness and more durable goods are more likely to show greater sensitivity to changing monetary policy because their cost side is more sensitive to the real cost of capital. These industries are more interest sensitive than others, enhancing the impact of the interest channel of monetary policy on the output cycle. They also argue that industries that have greater difficulty in accessing financial markets, with higher working capital requirements and greater borrowing capacity (as measured by size and leverage) could be more prone to the broad credit channel effects of monetary transmission. The major financial constraint arises because of dependence on external sources of finance of the companies. In this context, firm size has been used as an indicator of access to external finance (Gertler and Gilchrist, 1994). In addition, small firms are generally younger, with higher levels of firm-specific risk, and less collateral, making them less likely to attract external finance. The evidence suggests that small firms are more sensitive to investment and cash flow than larger firms. According to Schaller (1993), small firms and those that do not belong to a corporate group in Canada are more sensitive to cash flow than others. However not all evidence on size goes in the same direction. In their seminal study Fazzari, Hubbard and Petersen (1988) point out that when they split samples according to size, small firms have relatively low cash flow coefficients. Also, Hu and Schiantarelli (1998) find that larger firms are more likely to be financially constrained. They explain their result by arguing that firm size may be inversely related to concentration of ownership, which tends to mitigate agency problems.

MODEL SPECIFICATIONS

Without considering any financial constraints, Modgline and Miller (1958) have argued that Tobin's Q ratio which is

calculated as (ratio of total market value of the assets to book value of the assets is the only variable that characterize the firm's investment level. But in practice, there is the role of financing constraints for investment (Fazzari et.al. (1988), Devereux and Schiantrelli (1990), Oliner and Rudebusch (1992). They have argued that considering the information asymmetry, agency problem in the market, including the Tobin's Q ratio, a wider range of financial factors are responsible for the determination of corporate investment. In their model, financial distress costs are added in terms of the sources and use of funds. It has been argued that agency costs are assumed to be an increasing function of debt and decreasing function of investment. Following the arguments, they have specified the model as follows:

I = f (Investment Opportunities) + h (internal funds)

Where investment opportunities refer to Tobin's Q, stock of liquid financial assets, stock of outstanding debt etc. and internal funds refer to internal cash flow. Several researchers have also argued that there should be some control variables like size of the company which controls the demand effects that are not adequately reflected in Q. Therefore, the corporate investment model can be specified as:

$$I / K_{it} = a + b_1 C_{it} / K_{it} + b_2 Q_{it} + b_3 TAN_{it} + b_4 L_{it} / K_{it} + b_5 D_{it} / K_{it} + b_6 S_{it} / K_{it} + U_{it} \quad \text{---------- (7)}$$

Where, I= gross investment expenditure, K =capital stock, C= cash flow, Q = Tobin's q, TAN= Tangibility, L= stock of liquid assets, D= leverage ratio, S= size of the company, U = Error term

It can also be argued that firms' observed corporate investment couldn't be their optimal investments given that there are some costs, and therefore, lags, in adjusting to the optimum. Firms cannot immediately offset the effects of random events. Therefore, even if the selected variables are the true determinants of the corporate investment, they may not explain the actual investment behaviour. So here the model has been specified to investigate the role of adjustment costs by adopting the partial adjustment mechanism. The desired corporate investment of the firm is given as:

$$I/K^*_{i,t} = \sum_{i=1}^{k} \beta_k X_{kit} + \mu_i + \lambda_t + \varepsilon_{it} \quad \text{---------- (8)}$$

Where, Firms are represented by subscript i=1.....N, and time by t=1———T. In this model, corporate investment is explained in terms of k explanatory variables X_1 .....X_k, time invariant unobservable firm or industry specific effects μ_i, firm invariant time specific fixed effects λ_t and a disturbance term ε_{it}, which is assumed to be serially uncorrelated with mean zero, and is possibly heteroskedastic. β_k's which are common to the each firm are the unknown parameters of interest. μ_i captures various characteristics of the firm, which are not observable but have a significant impact on the firms' capital structure decisions. They change across firms but are assumed to remain unchanged for a given firm through time. 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, factor market conditions and industry-wide business risk. On the other hand, λ_t is the same for all firms at a given point in time but vary through time. These effects are mainly macroeconomic effects such as prices and interest rates.

Firms adjust their investments so as to bring their current investment close to the desired one. This leads to a partial adjustment mechanism, which is given by

$$I/K_{i,t} - I/K_{i,t-1} = \alpha \ (I/K^*_{i,t} - I/K_{i,t-1}) \quad \text{---------- (9)}$$

Where $0<\alpha<1$, $I/K_{i,t}$ is the actual investment ratio and $I/*K^*_{i,t}$ is the desired investment ratio of the firm i at time t. ($I/K^*_{i,t}$ – $I/K_{i,t-1}$) can be interpreted as the desired change where as only a fraction of the desired change is achieved, which is equal to ($I/K_{i,t}$ –$I/K_{i,t-1}$). Combining (2) and (3), we get:

$$I/K_{i,t} = (1-\alpha)\ I/K_{i,t-1} + \sum_{i=1}^{k} \alpha\beta_k X_{kit} + \alpha\mu_i + \alpha\lambda_t + \alpha\varepsilon_{it} \quad \text{---------- (10)}$$

Taking first differences in order to eliminate the unobservable firm specific effects, α_i gives the following equation.

$$(I/K_{i,t} - I/K_{i,t-1}) = (1-\alpha)\ (I/K_{i,t-1} - I/K_{i,t-2}) + \sum_{i=1}^{k} \alpha\beta_k (X_{kit} - X_{kit-1}) + (\alpha\varepsilon_{it} - \alpha\varepsilon_{i,t-1}) \quad \text{---------- (11)}$$

The possible *a priori* major determinants of corporate investment and the nature of relationship between those determinants and corporate investment are discussed below:

Cash flow (CF/K): Internally generated funds are cheap in terms of cost and it is risk free also. Companies with higher class flow have more incentive to invest more. The cash flow has been measured as the sum of the income before depreciation and amortizations.

Growth Opportunities (Q): Firms with high growth opportunities have greater need for external financing, and, therefore,

may be financially constrained. At the same time, a high market-to-book ratio may indicate that the firm's growth opportunities are recognized by the market, which implies that, other things equal, firms with higher market-to-book ratios will have easier access to external funds. Market to Book ratio has been used as a proxy for the growth opportunity of the company.

Asset Tangibility (TAN): It can be also argued that because of financial constraints in terms of agency costs and asymmetric information, asset tangibility matters for the investment. Higher tangibility increases the debt burden capacity of the company which in turn increases the investment opportunity of the company. We measure tangibility as the ratio of fixed assets to total assets ratio.

Liquidity (L/K): It has been argued that firms with ample cash reserves are not liquidity constrained since their investment is not limited by a lack of finance (Kaplan and Zingales 1997; Kashyap, Lamont, and Stein 1994). Therefore, a positive relationship can be assumed between liquidity of the firm which measured as the ratio of cash and short-term assets to capital stock and investment.

Leverage (LEV): As argued by Lang, Ofek, and Stulz (1996), leverage may negatively affect investment expenditures in a number of ways. First, it may reduce the amount of cash available for investment. Second, due to reasons discussed by Myers (1977) or Jensen and Meckling (1976), highly levered firms may face higher hurdles in accessing external sources of capital. We measure leverage as the ratio of total debt to equity ratio of the company.

Size (SZ): Firm size is one of the most widely used proxy variables for the level of financial constraints (Devereux and Schiantarelli 1990; Oliner and Rudebusch 1992). Smaller firms are likely to be financially constrained for a number of reasons explained as follows: First, empirical evidence shows that transaction costs of new issues decrease with the issue size. This makes external funds relatively more expensive for small firms. Second, small firms get less analyst coverage and may thus have less access to external sources of capital because of adverse selection problems (Myers and Majluf 1984). Third, large firms can raise debt more easily because they are more diversified and less prone to bankruptcy. Thus, higher sensitivity of investment to internal capital in small firms will support the hypothesis that financial constraints lead to underinvestment. Therefore, a positive relationship can be assumed between size of the firm and corporate investment. We measure size as the natural logarithm of the book value of assets.

EMPIRICAL FINDINGS

Tables 1 and 2 have shown the descriptive statistics and the correlation matrix of the variables used in the model. From the correlation matrix it can be inferred that there is no multicollinearity problem in the data set.

Table 1: Descriptive Statistics of all the Variables during the Period 1996 to 2005

Variables	Mean	S.D	Minimum	*Maximum*
I/K	0.19	0.15	0.0009	*0.88*
CF/K	0.11	0.09	-0.056	*0.41*
Q	3.61	3.07	0.53	*16.07*
TAN	0.48	0.31	0.005	*1.51*
L/K	0.17	0.12	0.002	*0.82*
LEV	0.76	1.27	0.000	*0.94*
SZ	*8.5*	*1.54*	*4.56*	*12.92*

Table 2: Correlation Matrix of the Independent Variables

Variables	CF/K	Q	TAN	L/K	LEV	*SZ*
CF/K	**1.00**	-0.14	0.13	0.45	-0.11	*-0.16*
Q	-0.14	**1.00**	-0.19	0.06	-0.21	*0.02*
TAN	0.13	-0.19	**1.00**	0.20	-0.22	*-0.07*
L/K	0.45	0.06	0.20	**1.00**	-0.36	*-0.35*
LEV	-0.11	-0.21	-0.22	-0.36	**1.00**	*0.32*
SZ	*-0.16*	*0.02*	*-0.07*	*-0.35*	*0.32*	***1.00***

Table 3: GMM Estimates of Determinants of Corporate Investment of the Indian Companies during the Period of 1996-97 to 2005-06.

Variables	FS	HLC	LLC	LC	SC	HRC	*LRC*
1	2	3	4	5	6	7	*8*
$\Delta I/K_{it-1}$	0.236*** (3.096)	0.241*** (2.997)	0.309*** (4.017)	0.267*** (3.091)	0.411*** (3.893)	0.279*** (3.467)	*0.315*** (3.193)*
$\Delta CF/K$	0.461*** (3.517)	0.273*** (3.467)	0.531 (0.119)	0.164 (0.865)	0.238*** (3.475)	0.407*** (3.661)	*0.211** (2.193)*
$\Delta CF/K_{it-1}$	0.132 (0.924)	0.107 (0.634)	0.073 (0.171)	0.012 (0.897)	0.087 (0.767)	0.117 (0.931)	*0.089 (0.653)*
ΔMVB	0.011** (2.02)	0.097*** (5.301)	0.029** (1.973)	0.019 (0.706)	0.021** (2.417)	0.037*** (3.417)	*0.029 (1.013)*
ΔMVB_{it-1}	0.002 (1.107)	0.017* (1.761)	0.014* (1.731)	0.007 (0.631)	0.006*** (3.073)	0.019*** (4.093)	*0.011 (0.873)*
ΔTAN	0.417*** (5.666)	0.625*** (5.681)	0.331*** (4.788)	0.573** (2.187)	0.283 (1.073)	0.411** (2.017)	*0.309 (0.897)*
ΔTAN_{it-1}	0.178** (1.994)	0.171** (1.987)	0.201** (2.117)	0.187 (0.831)	0.059 (0.763)	0.201 (0.766)	*0.103 (0.611)*
$\Delta L/K$	0.681*** (7.582)	0.398*** (7.626)	0.667 (0.705)	0.117 (1.016)	0.216 (1.081)	0.631 (0.863)	*0.229 (0.671)*
$\Delta L/K_{it-1}$	0.123* (1.562)	0.391** (2.172)	0.089 (0.661)	0.091 (1.043)	0.124 (0.673)	0.057 (0.431)	*0.091 (1.137)*
ΔLEV	-0.02*** (-2.774)	-0.03*** (-2.871)	-0.051 (-1.107)	-0.107** (2.321)	-0.086 (1.023)	-0.131** (2.117)	*-0.097 (0.898)*
ΔLEV_{it-1}	-0.005** (-2.516)	-0.007** (-2.197)	-0.026 (-0.769)	-0.061** (-2.127)	-0.003 (0.897)	-0.041** (-2.197)	*-0.081 (-0.903)*
ΔSZ	0.051*** (2.951)	0.079*** (2.678)	0.081*** (2.985)	0.076*** (2.873)	0.053** (0.317)	0.031*** (3.811)	*0.071*** (3.497)*
ΔSZ_{it-1}	0.045* (1.765)	0.049* (1.771)	0.053* (1.803)	0.016 (0.857)	0.028*** (2.189)	0.011 (0.763)	*0.043 (0.877)*
Observations	4776	3128	1648	1904	2872	1680	*3096*
m_1 statistics	-4.8971	-6.7137	-5.6715	3.2761	-1.2673	-4.6731	*-3.2674*
m_2 statistics	0.3073	0.6695	0.8331	0.1723	0.1097	0.4312	*0.8372*
WaldTest 1	$\chi^2(13)$ =203.89	$\chi^2(13)$ =261.27	$\chi^2(13)$ =301.19	$\chi^2(13)$ =251.24	$\chi^2(13)$ =237.31	$\chi^2(13)$ =243.67	*$\chi^2(13)$ =211.39*
WaldTest 2	$\chi^2(8)$ =171.67	$\chi^2(8)$ =61.29	$\chi^2(8)$ =89.61	$\chi^2(8)$ =169.24	$\chi^2(8)$ =87.61	$\chi^2(8)$ =91.24	*$\chi^2(8)$ =93.27*
SarganTest	*$\chi^2(31)$ =58.96*	*$\chi^2(29)$ =47.86*	*$\chi^2(21)$ =53.29*	*$\chi^2(26)$ =37.41*	*$\chi^2(27)$ =41.37*	*$\chi^2(21)$ =59.63*	*$\chi^2(29)$ =44.97*

Notes: (i) Each variable prefixed with the symbol Δ is in its first difference form. (ii) *,** and *** show the 10 %, 5%, and 1% level of significance respectively. (iii) FS=Full sample, HLC= Higher Leverage Companies, LLC= Lower Leverage Companies, LC=Larger Companies, SC= Smaller Companies, HRC= Higher Retention Companies, LRC= Lower Retention companies. (iv) Five test statistics are reported as follows: (1) First and Second order autocorrelation of residuals (m_1 and m_2 statistics), which is distributed as standard normal N (0,1) under the null of no serial correlation. (2) Wald test 1 is a wald test of joint significance of the estimated coefficients which is asymptotically distributed as Chi- Square under the null of no relationship. (3) Wald test 2 is a wald test of the joint significance of the time dummies. (4) Sargan test of over identifying restrictions, which is asymptotically distributed as Chi-Square under the null of instrumental validity. The figures in the parenthesis are the t-statistics.

Table 3 presents the dynamic regression results of corporate investment model. All the GMM estimation results for the period 1996-97 to 2005-06 are as follows:

In the model, none of the test statistics show evidence in favour of the existence of misspecification. The correlation2 test for the absence of second order autocorrelation of residuals is satisfied. Also, the Wald tests of the joint significance of the regressors and the time dummies are both satisfied. The Sargan test reveals that the instrument used in the GMM estimation are valid.

For the full sample, all the regression coefficients of all the variables have their expected signs and they are statistically significant (Column 2). The coefficient of the lagged value of the corporate investment has the positive sign and statistically significant, which implies that role of adjustment cost on the determination of corporate investment and the speed of adjustment has been 77 percent.

During the period of liberalization, corporate leverage has increased considerably in the case of India. Higher leverage means that a greater portion of a firms' cash flow must be used to meet interest payments on debt. Bernanke and Gertler (1989) have found that the variability of investment increases with higher leverage in the case of USA. Therefore, the

sample was split into two sub samples based on the firm's average leverage ratio. The firms which have more than average value of leverage ratio have been taken as higher leveraged companies and the companies which have below the average are taken as lower leveraged companies. From this analysis it has been found that there are 391 companies, which have leverage ratio more than average and rest of the companies have less than that. Columns (3) and (4) present the results from higher and lower leveraged companies' estimations. The results show that the variables like market to book ratio and its lagged value, tangibility and its lagged value, size of the company and its lagged value have their expected signs and they are statistically significant for both higher and lower averaged companies. But the variables like cash flow, liquidity and its lagged value have their expected signs for both types of companies and they are not statistically significant. This result would suggest that financial factors are not constraints for corporate investment for low leverage companies, but they matter for higher leverage companies. The adjustment speeds for high and low leverage companies have been 76 percent and 70 percent respectively.

In columns (5) and (6), we present the results from the estimation of corporate investment equation on two sub samples of companies based on their size which has been decided on the basis of market capitalization. The average market capitalization of the larger companies in the sample has been more than 100 crore and for smaller companies it is less than 100 crore. Using this criterion it has been found that there are 238 large companies and 359 small companies. It has been expected that larger companies might have greater access to external capital markets because of the size of their collateral assets, access to alternative sources of finance and lower risk through diversification, stability of cash flows, commercial relationships and reorganization in capital markets and credit history. Internal cash flow is statistically significant for smaller firms not for the bigger firms. This implies that smaller firms may be more reliant on internal sources of funds than larger firms. Therefore, any fluctuation to cash flow will have a larger impact on investment.

The lagged value of cash flow is not statistically significant for both larger and smaller firms. Market to book value and its lagged value have a significant and positive impact on investment for smaller firms, but not for the larger firms which reflect that because of good reorganization and greater access to the market, market- to book ratio or the growth opportunity of the company has not much impact on investment for larger firms. For smaller firms, it creates a value addition in the mind of the investor which in turn increases the investment. Tangibility and liquidity are not statistically significant variables to determine the corporate investment for both types of companies. Debt ratio is significant for larger companies and it has the expected relationship (negative) for both larger and smaller companies. Size of the company is statistically significant and it has the positive relationship in both the cases and its lagged value is significant for smaller companies not for larger companies. The adjustment speeds for optimal corporate investment for large and small companies have been 74 percent and 59 percent respectively in India.

Columns (7) and (8) present the results of the estimation of two sub samples based on retention ratios. The retention ratio is defined as the ratio of retained earnings to profit after tax. The companies which have more than average retention ratio are considered as higher retention companies and the companies which have below average have been considered to be lower retention companies and using this method we found that there are 210 higher retention companies and 387 lower retention companies. Fazzari. et. al. (1988) have argued that the availability of internal finance may constraint investment spending by firms with higher retention ratios. The reason behind this is that firms may pay low dividends if their demand for investment finance exceeds the amount of internal funds available. Oliner and Rudebusch (1989) have also argued that investment by firms with high retention ratios would be expected to be more sensitive to cash flows. Higher cash flows would facilitate increased investment without recourse to expensive external funds; lower cash flows would constrain investment. Our results show that cash flow is significant for both types of companies. Market to book ratio and its lagged value are significant for higher retention companies not for the lower companies. Tangibility is significant and positive for higher retention companies. Leverage and size of the companies are statistically significant for higher retention companies, not for the lower retention companies. For high retention companies, the adjustment speed is 73 percent and for low retention companies, it has been 69 percent.

CONCLUSIONS AND MANAGERIAL IMPLICATIONS

The variables- like market to book ratio and its lagged value, tangibility and its lagged value, size of the company and its lagged value are the major determinants of both high and leveraged companies. Internal cash flow, market to book ratio are the major determinant of corporate investment for smaller firms not for the bigger firms. Debt ratio and size of the company are the important determinants for both larger and smaller companies. Internal cash flow is a major determinant for both higher and lower retention companies. Markets to book ratio, tangibility, size of the companies have emerged as important variables for higher retention companies but not for lower retention companies. For the full sample as well as all other disaggregated samples, the lagged value of investment has the positive sign and statistically significant which implies that the dynamics implied by our model is accepted in all the cases.

The variables like growth opportunity and internal cash flow have emerged as the important determinants of corporate investments in India. The managerial implications of the findings are very much crucial for the Indian corporate sector. Both the variables are positively related to corporate investment, which implies that the managers should work in a direction to increase the internal cash flow to reach the optimal investment for more profitability and growth. With the increasing cash flows, the book value of the company will increase. Therefore, the managers should be concerned about increasing the market value of the company by which the market to book ratio can increase. The adjustment costs of the companies have played a major role for determination of corporate investment, so that the managers should consider the lagged values of the corporate investment with other financial variables while making the corporate investment policy of the companies.

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