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Insider ownership and investment efficiency

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Insider ownership and investment efficiency

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Abstract

Agency problems in firms are known to influence suboptimal capital investment decisions. Using panel data of publicly listed firms in India, we find evidence that increased insider ownership is associated with lower investment efficiency, i.e. as insider ownership increases, firms show tendency to make capital investments beyond the optimal level. However, we do not find evidence of increased insider ownership leading to underinvestment (below the optimal level of capital investment). A plausible explanation, consistent with theory, is that such insiders are making capital investments for private gain and empire-building rather than in the best interest of the firm. Additional analyses show that the presence of independent directors on the board of firms mitigates such value-destroying investments stemming from increased insider ownership.

Key Words: Investment efficiency; Tobin's Q; insider ownership; suboptimal investment; overinvestment.

JEL Classification: G31, G32, G34

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1 Introduction

Investment decisions of a firm should be driven only by its investment opportunities (Modigliani and Miller, 1958); however, existing studies¹ show that market imperfections like information asymmetries and agency problems play a role in influencing the firm to make corporate investment decisions that may not be optimal. Such suboptimal investments can take various forms including asset substitution (Jensen and Meckling, 1976), overinvestment (Stulz, 1990), or underinvestment (Myers, 1977).

There is a well-established literature that examines the relationship between ownership structure and firm value.² Within this strand of literature, (Jensen and Meckling, 1976) particularly argue that ownership structure affects investments which in turn impact the value of the firm. This is presented as a two-stage process by Cho (1998). This paper focuses on the first stage of the process whereby the ownership structure is expected to influence firms' capital investments. This influence in capital investments stems from market imperfections, especially in the form of agency conflict (e.g. Jensen, 1986; Stulz, 1990).

In this context, we examine if the ownership structure of a firm impacts its investment efficiency³, and whether any such inefficient investment is related to overinvestment or underinvestment. Specifically, we ask the following central question:

Do insiders engage in value-enhancing capital investments?

Our analyses of firm-level data from publicly-listed firms in India provide new insights vis-à-vis investment efficiency of insiders. We find that insiders generally engage in

¹ For example, see (Boubakri et al., 2013; Harford, 1999; Jensen and Meckling, 1976; Mclean et al., 2012; Myers and Majluf, 1984; Richardson, 2006) among others

² See for example (Cho, 1998; Dahya et al., 2008; McConnell and Servaes, 1990; Morck et al., 1988; Stulz, 1988), among others

³ See (Stein, 2003) for a survey of literature on corporate investment and investment efficiency.

higher level of capital investments, but such investments do not go hand in hand with investment opportunities. Our analyses show that increase in insider ownership leads to decline in investment efficiency or reduced investment sensitivity to investment opportunities. Upon further examining, we find that increased insider ownership is associated with tendency to invest more than optimal level of capital investment; but we do not find evidence that such increased insider ownership is associated with underinvestment. The findings are robust to use of alternative measures of capital investments and also robust to alternative measures of investment opportunities. The findings suggest that insiders may be engaging in capital investments with the purpose of fulfilling their own interests and empire-building rather than with the purpose of enhancing value of the firm. Our findings also show, consistent with theory, that higher level of board independence plays a role in mitigating such inefficiency in capital investment of public firms.

1.1 Contribution to literature

We contribute to the literature in three different ways. First, we contribute to the emerging strand of literature that examines the ownership structure of firms to their investment efficiency (e.g. Chen et al., 2017, 2011; Ding et al., 2018; Jiang et al., 2018, 2011). We extend this body of literature by examining the influence of change in insider ownership to investment efficiency; we provide evidence that increased insider ownership leads to decline in investment efficiency of firms. To the best of our knowledge, this is the first study to examine the influence of insider ownership on investment efficiency. Second, we explore whether such inefficient investment is related to overinvestment or underinvestment. Only a few studies examine whether equity ownership structure is related to overinvestment or underinvestment. Extant literature examining similar phenomenon includes that of Biddle et al. (2009) where they examine the impact of financial reporting quality on overinvestment and underinvestment; and (Jiang et al., 2018) examine the effect of

multiple large shareholders on overinvestment and underinvestment. Finally, we also examine possible moderation effect of having independent directors on corporate investment inefficiency. Lu and Wang, (2015) examine the influence of independent board on risky investments. Our results show that higher level of board independence provides check on inefficient capital investments.

1.2 Remainder of this paper

The rest of this paper proceeds as follows: section 2 discusses the relevant literature leading up to development of hypotheses; section 3 provides a discussion on research method, variables and data to be used; section 4 presents the empirical analyses, findings, and robustness checks. Section 5 provides concluding remarks.

2 Related Literature and Hypothesis

In this section, we first briefly review the literature on ownership structure, investment behaviour, and investment efficiency; following this, we develop testable hypotheses.

2.1 Recent relevant literature

Recent studies examining investment efficiency show that ownership type is a determinant in firms' investment behaviour and investment efficiency. Mclean et al., (2012) find that better investor protection is associated with greater investment efficiency, among other things. Using data of newly privatized firms from 64 countries, Chen et al. (2017) show that government ownership weakens investment efficiency whereas foreign ownership enhances investment efficiency of firms. State intervention is also known to distort investment efficiency negatively (Chen et al., 2011). Jiang et al. (2011) show presence of strong negative association between control-ownership wedge and investment efficiency in 22 countries from East Asia and Western Europe. Richardson (2006) shows that, consistent

with agency theory, firms with higher level of free-cash flows tend to overinvest; and that such overinvestment could be controlled by the presence of activist shareholders. Morck et al. (2005) show that presence of closely-held groups in firms can lead to misallocation of resources. Boubakri et al. (2013) show - using data of newly privatized firms from 57 countries - that state ownership is negatively related to corporate risk-taking.

2.2 *Hypothesis development*

From shareholders' wealth maximization perspective, there is an understanding that capital investments should be value-enhancing. But whether or not this obligation on the part of decision-makers is actually carried out is not very straightforward especially when the level of insider ownership varies. On one hand, high concentration of ownership within a family or group of insiders can lead to expropriation of minority rights (La Porta et al., 1999) and insiders might engage in investment activities that benefit themselves at the expense of minority shareholders. The presence of dominant shareholders in a firm magnifies the agency risk to minority shareholders (Claessens et al., 2002; Lins, 2003). Further, as dominant shareholders are likely to engage in tunnelling activities (Gilson, 2006; Jiang et al., 2010; Johnson et al., 2000), they are able to extract private benefits with increased holdings in a firm. These arguments lead to a conjecture that increased insider ownership leads to capital investments that are not value-enhancing. This leads us to conjecture that increase in insider ownership leads to lower investment efficiency.

On the other hand, however, low concentration of ownership control can lead to non-alignment of interest between the dispersed owners and managers (Morck et al., 1988); when firm ownership is dispersed and insider control is low, a free-rider problem may arise whereby none of the owners have the incentive to monitor the performance of the firm

(Shleifer and Vishny, 1986). In such a scenario where proper monitoring mechanisms are lacking, self-serving interest of managers may lead to empire-building tendency with value-reducing (inefficient) investments (Harford, 1999; Lang et al., 1991). Conversely, higher insider ownership could be conducive to value-enhancing investments.

Based on these competing arguments presented above, the impact of insider ownership on investment efficiency remains an empirical issue and can be represented in two competing hypotheses below:

Moral hazard hypothesis (H1): Increase in insider ownership lowers investment efficiency.

Monitoring hypothesis (H2): Increase in insider ownership increases investment efficiency.

3 Research method

This study employs research methods and variables in line with extant literature.

3.1 Econometric model

In line with (Baker et al., 2003; Biddle et al., 2009; Chen et al., 2017; Fazzari et al., 1988; Mclean et al., 2012), we examine the impact of insiders on investment efficiency using the regression model of the following basic form:

$$CI_{i,t} = \beta_0 + \beta_1 Q_{i,t-1} + \beta_2 OP_{i,t} + \beta_3 IN_{i,t} + \beta_4 (Q_{i,t-1} * IN_{i,t}) + \alpha_i + \Omega_t + \varepsilon_{i,t} \quad (1)$$

where CI is the capital investment scaled by average total assets; Q is the Tobin's Q representing investment opportunity (Hayashi, 1982) for a firm calculated as sum of debt and market value of equity divided by book value of assets; OP is the cash flows from operations, scaled by average total assets; IN is the percentage of insiders; α and Ω are firm fixed effects and time fixed effects respectively. ε is the residual term and i indexes for firm, and t indexes for year. The standard errors are estimated by allowing for residuals to have unobserved firm effect (i.e. clustering by firm) (Petersen, 2009; Wooldridge, 2010).

3.2 Data

We source our data mainly from Prowess database (maintained by Centre for Monitoring Indian Economy Pvt Ltd.) which provides financial data of approximately 37,000 Indian firms, both public and private, from 1990. We take the subset of (approximately 7,600) firms that are listed on the two main stock exchanges of India. The ownership structure data we need for this study is available from year 2001; hence our data is restricted to year 2001 onwards to 2015. Following the general convention in the literature, we exclude firms belonging to financial sector. We also exclude firms with negative capital. Further, firms with shareholders' capital below \$1 Million are dropped. Key variables are winsorized at 1% at the top and bottom to mitigate the effect of outliers.

3.2.1. *Dependent variable*

We take three measures for capital investment (*CI*): cash outflows from investment activities and yearly change in gross fixed assets, both scaled by average book value of assets. Cash outflows are provided as negative figures in Prowess and we multiply these figures by -1 to turn them positive for ease of inference. For robustness tests, we use a third dependent variables by taking into account research and development expenditures, and sales growth figure (to proxy for investment opportunity) in line with existing literature (see Biddle et al., 2009; Chen et al., 2011); these will be discussed in later section.

3.2.2. *Independent and control variables*

For insider ownership (*IN*), we take the proportion of shares held by 'promoters'. Indian Company Act defines 'promoters' as insiders, among other things⁴. The availability of

⁴ See <http://www.mca.gov.in/MinistryV2/>

this simple measure allows us to do away with various complex and error-prone ways of calculating ownership and control structure as prevalent in existing literature.⁵

Investment opportunity for a firm is proxied by Tobin's Q (Hayashi, 1982). Q is calculated as the market value of equity plus the book value of assets minus the book value of equity, all divided by the average book value of assets (Baker et al., 2003). For additional checks, we use annual sales growth as a proxy for investment opportunities (see Biddle et al., 2009; Chen et al., 2011).

Cash flows (*OP*) is taken as the cash flows from operations figure provided by Prowess scaled by average book value of assets.

To complement existing studies, we also include additional control variables in the form of foreign institutional ownership measure (*FII*), leverage, and size of the firms. FII is the percentage of equity holdings by foreign institutions, as provided by Prowess; leverage is the long term debt divided by equity; and size is taken as the total assets (*Size*) of the firm.

A short description of all the variables used in this study is provided in Appendix I.

3.3 Summary statistics

Summary statistics for key variables are shown in Table 1.

. Regarding capital investments, the average cash outflows from investment activities (CFI) is 7.2% of the average book value of assets for a given year; similarly, average addition of gross fixed assets (Δ GFA) is 18% of average book value of assets for the year. Average Q of 1.34 can be considered to be on the lower side with about half of the firms having a Q of less than 1. The average (and median) cash flows from operations stand at 6% of average

⁵ For example, see (Claessens et al., 2000; Faccio and Lang, 2002; Leuz et al., 2010) among others

assets. Equity ownership by foreign institutions (FII) stands at 2.91% with more than half of the firms having no FII at all; 75th percentile FII of 1.67% suggests that foreigners hold higher percentage of shares in relatively few firms.

Insider ownership (Insider) stands at 52.14% with a standard deviation of 18.14. Also of interest is the variability of Insider, as constant insider ownership within firms would render our econometric modelling useless. Deeper investigation shows that within-firm standard deviation of insider ownership stands at 7.74, thus allowing us to use firm fixed effects.⁶ To provide a general idea on how insider ownership has changed in firms, we show the level of insider ownership of 12 randomly chosen firms in Figure 1.

[Insert Table 1 here...]

Correlation matrix of the main variables is presented in Table 2. Generally, the correlations among the variables are on the lower side. The two dependent variables have a correlation of 33%. Other noteworthy correlation figures include that between CFI and OP (27%) , which indicates a positive association between the two as expected, and FII and Size (49%) indicating positive association between size of a firm and foreign institutional investments. Q also exhibits positive correlation with FII (28%) and also with Size (15%). Other correlations are generally lower than 20%. Variance inflation factors (VIF) for all control variables are less than 2 (not shown for brevity).

[Insert Table 2 here...]

⁶ This is calculated by using xtreg command in Stata. Within-firm standard deviation of 0 is undesirable in fixed effects estimation as the variable of interest will simply be subsumed by the intercept in such cases.

4 Empirical analysis

To assess the impact of insiders on capital investment efficiency, we run the basic regression model as per specification (1) mentioned earlier.

The results of specification (1) are shown in Table 3. The dependent variable in the first two columns (I and II) is CFI whereas the dependent variable in columns III and IV is ΔGFA . Both of these variables proxy for CI (capital investment) as discussed in earlier section. Column I and III are the basic models while II and IV include control variables in the form of FII, Leverage and Size. Across all columns, Q (lagged by one time period) has a positive impact on CI. Similarly, OP and Insider also show positive and statistically significant impact on CI. However, especially important is the interaction term between Q and Insider ($L.Q \# Insider$) which shows negative coefficient across all columns with statistical significance (and three of the four columns show statistical significance at 95% confidence interval at least). This suggests that as Insider increases, CI decreases despite availability of investment opportunities. In other words, these results show that increase in insider ownership is related to decrease in investment efficiency or reduced investment sensitivity to investment opportunities (Q).

[Insert Table 3 here...]

In the above results, the contemporaneous nature of impact of Insider on CI could be questioned. It is also likely that there is some time lag before the impact of Insider on investment efficiency becomes apparent. The same argument could be applied for the impact of FII. To address this concern, we use Insider and FII lagged by one time period (year) in the regression and present the results in Table 4.

[Insert Table 4 here...]

The results presented in Table 4 show qualitatively similar results for the interaction term of interest: i.e. investment efficiency of a firm decreases as insider ownership increases. The results are statistically significant at 95% confidence interval across all models.

4.1 Alternative measure of capital investment

We include an additional measure of capital investment, by adding research and development expenses (R&D) of firms to the cash flows from investment activities (*CFI*) to create a new dependent variable *CFIRD*. Firms may treat long term R&D expenses as operational expense for the year for accounting purposes and this may not reflect the true level of long-term investments made by firms. We present the results from this new dependent variable in Table 5 which show that our results remain qualitatively similar to earlier results even when R&D expenses are taken into consideration as long-term investments.

[Insert Table 5 here...]

4.2 Industry-specific macroeconomic shocks

So far, we have not considered for industry-specific macroeconomic shocks that could impact our results. To account for this, we now replace year fixed effect in our econometric model with industry-year fixed effect.⁷ The results presented in Table 6 show that the earlier results still hold across all three independent variables.

[Insert Table 6 here...]

⁷ This can be achieved by using `reghdfe` command in Stata.

4.3 Alternative measure for investment opportunity

Tobin's Q has its limitations in capturing investment opportunities (see Gulen and Ion, 2016; Yoon and Starks, 1995). Hence, following extant literature (e.g. Biddle et al., 2009; Chen et al., 2011), we use annual sales growth as a proxy for investment opportunities. Sales growth (*SalesGr*) is calculated by taking the annual difference in sales divided by sales figure for previous year. In effect, we replace Q in our earlier specification with *SalesGr* and re-run the specification. The results presented in Table 7 show qualitatively similar results.

[Insert Table 7 here]

4.4 Over-investment and under-investment

So far, our results suggest that increase in insider ownership leads to decrease in investment efficiency; given that higher *Insider* and higher *Q* are associated with higher *CI* individually but since the interaction term between the two explanatory variables exhibits negative coefficient, it is likely that Insiders are overinvesting in the absence of proportional growth opportunities whereas underinvesting even when growth opportunities remain. To examine the issue of overinvestment and underinvestment more formally, in the spirit of (Biddle et al., 2009), we now delineate investment (in)efficiency into overinvestment and underinvestment to examine if increase in insider ownership leads to overinvestment or underinvestment (or both). Theoretically, positive (negative) deviation from prescribed level of investment is considered overinvestment (underinvestment). We estimate firm-specific model of capital investment as a function of Q by using the following specification:

$$CI_{i,t} = \beta_0 + \beta_1 Q_{i,t-1} + \psi_t + \varepsilon_{i,t} \quad (2)$$

where CI is the capital investment scaled by average total assets; Q is the Tobin's Q ; and ψ_t is industry-year fixed effect. We are mainly interested in the residual term (ε) which serves as the proxy for firm-specific measure of overinvestment (+ve residual) and underinvestment (-ve residual).

After running specification (2), we classify firm-year observations based on the magnitude of the residuals and these groups are used as the dependent variable. Specifically, we rank firm-year observations and classify them into quartiles. We classify the top quartile (highest overinvestment) as 1 (Overinvestment), and the bottom quartile (most negative residual) as 0 (Underinvestment); we use the two quartiles in the middle as a benchmark (Benchmark) and run a maximum likelihood function (multinomial logit) of the following basic form:

$$\ln\left(\frac{p}{1-p}\right)_{i,t} = \beta_0 + \beta_1 OP_{i,t} + \beta_3 IN_{i,t-1} + \alpha_i + \Omega_t + \varepsilon_{i,t} \quad (3)$$

where p is the probability of the firm being in one of the extreme quartiles (overinvestment or underinvestment) compared to the benchmark quartiles; and all other terms are as described previously in section 3.1.

For the key variables, the average and number of observations for Underinvestment, Overinvestment and Benchmark observations are as shown in Table 8.

[Insert Table 8 here...]

Fixed effect multinomial logit function is used to estimate the likelihood of overinvestment and underinvestment simultaneously but separately. The results of specification (3) is shown in Table 9. Panel A shows the results pertaining to

Underinvestment. The coefficient for *Insider* is slightly negative but statistically insignificant. On the contrary, in Panel B which shows results for Overinvestment, coefficient for *Insider* is positive (0.013) in column II and statistically significant at 1% confidence level. For a firm with an otherwise 50% chance of falling under Overinvestment category, if *Insider* increased from 50% to say, 75%, the probability of the firm falling under Overinvestment category increases to 58% $[= e^{0.13 * 25} / (e^{0.13 * 25} + 1)]$. In both the panels, *OP* exhibits statistically significant coefficients in the expected direction: higher OP increases (decreases) the likelihood of Overinvestment (Underinvestment).

[Insert Table 9 here...]

We repeat this exercise using the alternative measures of capital investment in specification (2) to find Overinvestment and Underinvestment firms. We also replace *Q* in this specification by *SalesGr* in line with (Biddle et al., 2009). The results (not shown for brevity) show qualitatively similar results.

We further run a binomial logit regression by treating the upper two quartiles (with positive residuals) as Overinvestment firms and the lower two quartiles (with negative residuals) as Underinvestment firms. Results (not shown for brevity) exhibit that increase in *Insider* leads to increased likelihood of firm falling under Overinvestment category.

4.5 *Cross-sectional heterogeneity*

In this section we explore if having varying level of independent directors moderate investment efficiency when insider ownership changes. We measure board independence as the percentage of independent directors on the board of directors (Weisbach, 1988). For this exploration, we divide our entire sample into two sub-samples based on level of independent directors: firms with less than 50% independent directors form the first sub-sample (referred

to as *NonIndep*) while those with equal to or more than 50% independent directors constitute the second sub-sample (*Indep*). As independent directors are expected to provide a check on unnecessary capital investments by mitigating agency problems (e.g. Lu and Wang, 2015), we expect moderating effect of independent directors on *Indep* subsample while this may not be the case for *NonIndep* subsample. We run our regression model for both of these subsamples and present the results in Table 10.

[Insert Table 10 here]

Columns I to III show the results from *NonIndep* subsample with firms having lower level of board independence (i.e. less than 50% independent directors). The impact of insider ownership on investment, as shown by the coefficient of interaction term $Q*Insider$, is more pronounced than our earlier results across all three models. On the contrary, results from *Indep* firms (i.e. having higher board independence) in columns IV to VI show that the coefficient of interaction term $Q*Insider$ is no longer statistically significant. Overall, these results suggest that though increase in insider ownership would lead to lower level of investment efficiency, such negative influence can be countered by higher board independence.

4.6 Addressing endogeneity

One concern related to endogeneity that could be raised is due to the possibility that insiders would be attracted towards firms with higher investment opportunities. We acknowledge this issue and this might well be the case; but even if insiders are attracted to buy their own shares in the presence of investment opportunities, it is less relevant in the context of our findings which show that insiders reduce investment efficiency.

5 Conclusion

Our analyses of firm-level panel data from publicly listed firms of India show that higher level of insider ownership lead to lower investment efficiency. These findings are robust to alternative measures of capital investment and investment opportunities. The findings also show that such inefficiency in capital investments is more of an overinvestment problem rather than an underinvestment issue. Taken together, these findings suggest that increase in insider ownership has detrimental effect in firms' investment activities and lead to possible empire-building; these findings are consistent with the notion of agency problems getting augmented by the increase of insider holdings, as discussed by (Gilson (2006), Johnson (2008), La Porta et al. (1999), McConnell and Servaes (1990), Stulz (1988), among others. A likely explanation is that with the increase in insider ownership, insiders tend to drive long term investments to fulfil their vested interest rather than to enhance firm value; as such they engage in capital investments beyond the optimal level of capital investment.

Our findings also show that independent directors mitigate the tendency to overinvest in the face of increasing insider ownership. This is consistent with the extant literature (e.g. Lu and Wang, 2015) that board independence is a reliable mechanism to reduce agency problems in firms.

Appendix I: Description of variables used in the study

Variable	Description
Insider	Equity held by promoters as a share of total equity shares. Source: Prowess, CMIE
Q	Tobin's Q to proxy for investment opportunity for a firm (Hayashi, 1982). Q is calculated as the market value of equity plus the book value of assets minus the book value of equity, all divided by the average book value of assets (Baker et al., 2003).
CFI	cash outflows from investment activities , scaled by average book value of assets
Δ GFA	yearly change in gross fixed assets, scaled by average book value of assets
CFIRD	cash outflows from investment activities and research and development expenses, scaled by average book value of assets
SalesGr	Annual growth in total sales; used as an alternative measure of investment opportunity. Calculated as annual difference in sales scaled by previous years' sales
OP	cash flows from operations
FII	percentage of equity holdings by foreign institutions, as provided by Prowess
Size	Balance sheet size of a firm (in USD million). Source: Prowess, CMIE
Indep	Measure of board independence; measured as number of independent directors scaled by total number of directors.
Overinvestment	Firms with capital investment higher than prescribed level; calculated as positive residuals from regression specification (2)
Underinvestment	Firms with capital investment lower than prescribed level; calculated as negative residuals from regression specification (2)
Leverage	Long term debt scaled by shareholders' equity. Own calculation; raw data from Prowess

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Figure 1: Change in level of insider ownership

This figure shows the change in insider ownership in 12 randomly chosen firms. Insider ownership is measured as the percentage of equity ownership held by promoters. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015



Table 1: Summary Statistics

This table presents the summary statistics of the key variables used in this study. CI is the capital investment proxied by CFI and Δ GFA. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. Q is Tobin's Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. *SalesGr* is annual growth in sales. OP is the cashflows from operations scaled by book value of assets. Insider is the percentage of equity ownership held by promoters. FII is the percentage of equity ownership of foreign institutional investors. Leverage is the long term debt scaled by shareholders' funds. Size is the total assets in million USD. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015.

Variables	No. of Observations	Mean	Standard Deviation	Minimum	25 th Percentile	Median	75 th Percentile	Maximum
CFI	28301	0.072	0.122	-0.247	0.006	0.04	0.108	0.646
Δ GFA	27448	0.18	0.4	-0.65	0.01	0.09	0.23	3.32
Q	28301	1.34	1.17	0.22	0.82	1	1.39	9.09
<i>SalesGr</i>	23840	0.16	0.49	-0.81	-0.07	0.09	0.28	3.14
OP	28301	0.06	0.12	-0.43	0	0.06	0.12	0.41
Insider (%)	28301	52.14	18.14	0	40.83	53.12	65.64	99.59
FII (%)	28301	2.91	6.45	0	0	0	2.17	63.3
Leverage	28301	0.96	1.33	0	0.13	0.52	1.22	7.82
Size (USD Million)	28301	301.5	1807.36	1.05	10.26	32.47	116.6	63741.44

Table 2: Correlation Matrix

This table presents the correlation matrix for the key variables used in this study. CI is the capital investment proxied by CFI and Δ GFA. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. Q is Tobin's Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. *SalesGr* is annual growth in sales. OP is the cashflows from operations scaled by book value of assets. Insider is the percentage of equity ownership held by promoters. FII is the percentage of equity ownership of foreign institutional investors. Leverage is the long term debt scaled by shareholders' funds. Size is the total assets in million USD. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels.

	CFI	Δ GFA	Q	<i>SalesGr</i>	OP	Insider	FII	Leverage	Size
CFI	1								
Δ GFA	0.329***	1							
Q	0.152***	0.120***	1						
<i>SalesGr</i>	0.156***	0.252***	0.135***	1					
OP	0.266***	-0.0404***	0.0979***	-0.0329***	1				
Insider	-0.0127*	-0.00314	0.0884***	-0.00687	0.118***	1			
FII	0.135***	0.0923***	0.280***	0.0416***	0.0442***	-0.139***	1		
Leverage	0.0416***	0.0228***	-0.0828***	0.0104	-0.0393***	0.0171**	-0.0433***	1	
Size	0.111***	0.0738***	0.158***	-0.00517	0.106***	0.122***	0.495***	0.166***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Regression of Ownership Structure on Capital Investment

This table shows the results from regression as specified in specification (1) of the main text. Dependent variable is capital investment proxied by either CFI or Δ GFA. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. Prefix “L.” denotes that the variable is lagged by 1 year. Q is Tobin’s Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. # denotes interaction term. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. All estimates are reported with the standard errors corrected by clustering at firm level. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets.

	I CFI	II CFI	III Δ GFA	IV Δ GFA
L.Q	0.0346*** (6.78)	0.0322*** (6.33)	0.0947*** (6.31)	0.0891*** (5.78)
OP	0.279*** (24.56)	0.286*** (25.04)	0.0607* (1.76)	0.0831** (2.39)
Insider	0.000519*** (3.55)	0.000687*** (4.69)	0.00278*** (5.16)	0.00332*** (6.21)
L.Q # Insider	-0.000177** (-2.15)	-0.000156* (-1.90)	-0.000650*** (-2.61)	-0.000606** (-2.39)
FII		0.000911*** (3.78)		0.00116 (1.38)
Leverage		0.00146 (1.32)		0.00283 (0.85)
Size		0.0194*** (8.02)		0.0847*** (8.79)
Firm fixed	YES	YES	YES	YES
Year fixed	YES	YES	YES	YES
Intercept	-0.0135 (-1.62)	-0.0794*** (-6.93)	-0.0168 (-0.56)	-0.291*** (-6.85)
Adjusted R-sq.	0.160	0.167	0.115	0.127
No. of obs.	26062	26062	25965	25965

Table 4: Regression of Ownership Structure on Capital Investment (one-year lagged values of Insider and FII)

This table shows the results from regression as specified in specification (1) of the main text with lagged values of key variables. Dependent variable is capital investment proxied by either CFI or Δ GFA. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. Prefix “L.” denotes that the variable is lagged by 1 year. Q is Tobin’s Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. # denotes interaction term. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. All estimates are reported with the standard errors corrected by clustering at firm level. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets.

	I CFI	II CFI	III Δ GFA	IV Δ GFA
L.Q	0.0336*** (6.87)	0.0330*** (6.71)	0.0892*** (5.95)	0.0868*** (5.66)
OP	0.280*** (24.60)	0.285*** (25.01)	0.0631* (1.82)	0.0844** (2.42)
L.Insider	0.000505*** (3.62)	0.000582*** (4.14)	0.00206*** (4.19)	0.00236*** (4.80)
L.Q # L.Insider	-0.000158** (-2.02)	-0.000155** (-1.96)	-0.000536** (-2.17)	-0.000526** (-2.10)
L.FII		-0.000256 (-1.10)		-0.00113 (-1.38)
Leverage		0.000996 (0.91)		0.00187 (0.56)
Size		0.0218*** (9.11)		0.0882*** (9.01)
Firm fixed	YES	YES	YES	YES
Year fixed	YES	YES	YES	YES
Intercept	-0.0123 (-1.57)	-0.0796*** (-7.31)	0.0222 (0.82)	-0.248*** (-6.26)
Adjusted R-sq.	0.160	0.166	0.114	0.125
No. of obs.	26062	26062	25965	25965

Table 5: Regression of Ownership Structure on Capital Investment and R&D Expenses (CFIRD)

This table shows the results from regression as specified in specification (1) of the main text with lagged values of key variables. Dependent variable is capital investment proxied by CFIRD which is the annual cashflows from investment activities plus research and development expenses, scaled by average book value of assets for the year. Prefix “L.” denotes that the variable is lagged by 1 year. Q is Tobin’s Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. # denotes interaction term. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. All estimates are reported with the standard errors corrected by clustering at firm level. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets.

	I CFIRD	II CFIRD
L.Q	0.0341*** (6.95)	0.0335*** (6.79)
OP	0.280*** (24.60)	0.286*** (25.00)
L.Insider	0.000503*** (3.60)	0.000580*** (4.11)
L.Q # L.Insider	-0.000163** (-2.07)	-0.000160** (-2.02)
L.FII		-0.000249 (-1.07)
Leverage		0.000942 (0.86)
Size		0.0217*** (9.02)
Firm fixed	YES	YES
Year fixed	YES	YES
Intercept	-0.0110 (-1.40)	-0.0778*** (-7.14)
Adjusted R-sq.	0.159	0.166
No. of obs.	26062	26062

Table 6: Regression of Ownership Structure on Capital Investment – Industry-year fixed effect

This table shows the results from regression as specified in specification (1) of the main text with lagged values of key variables. Dependent variable is capital investment proxied by either CFI, Δ GFA, or CFIRD. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. CFIRD which is the annual cashflows from investment activities plus research and development expenses, scaled by average book value of assets for the year. Prefix “L.” denotes that the variable is lagged by 1 year. Q is Tobin’s Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. # denotes interaction term. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. All estimates are reported with the standard errors corrected by clustering at firm level. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets.

	I CFI	II CFI	III Δ GFA	IV Δ GFA	V CFIRD	VI CFIRD
L.Q	0.0332*** (15.54)	0.0327*** (15.30)	0.0848*** (11.99)	0.0833*** (11.79)	0.0336*** (15.73)	0.0332*** (15.48)
OP	0.282*** (42.88)	0.288*** (43.59)	0.0724*** (3.39)	0.0938*** (4.39)	0.283*** (42.88)	0.288*** (43.57)
L.Insider	0.000497*** (5.12)	0.000587*** (6.01)	0.00186*** (5.92)	0.00220*** (6.98)	0.000495*** (5.09)	0.000585*** (5.98)
L.Q # L.Insider	-0.000159*** (-4.37)	-0.000159*** (-4.39)	-0.000533*** (-4.47)	-0.000541*** (-4.55)	-0.000163*** (-4.50)	-0.000164*** (-4.52)
L.FII		-0.000248 (-1.35)		-0.00119** (-2.02)		-0.000241 (-1.31)
Leverage		0.000671 (0.83)		0.00207 (0.80)		0.000605 (0.75)
Size		0.0223*** (13.14)		0.0887*** (16.24)		0.0222*** (13.05)
Firm fixed	YES	YES	YES	YES	YES	YES
Industry-Year fixed	YES	YES	YES	YES	YES	YES
Adjusted R-sq.	0.301	0.306	0.282	0.290	0.308	0.313
No. of obs.	25629	25629	25543	25543	25629	25629

Table 7: Regression of Ownership Structure on Capital Investment – Alternative Measure for Investment Opportunity

This table shows the results from regression as specified in specification (1) with some modifications. Dependent variable is capital investment proxied by either CFI, Δ GFA, or CFIRD. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. CFIRD which is the annual cashflows from investment activities plus research and development expenses, scaled by average book value of assets for the year. Prefix “L.” denotes that the variable is lagged by 1 year. *SalesGr* is annual sales growth and proxies for investment opportunity and is calculated as annual change in sales scaled by previous years’ sales. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. # denotes interaction term. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. All estimates are reported with the standard errors corrected by clustering at firm level. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets.

	I CFI	II CFI	III Δ GFA	IV Δ GFA	V CFIRD	VI CFIRD
L.SalesGr	0.0276*** (7.05)	0.0267*** (6.83)	0.125*** (10.91)	0.121*** (10.62)	0.0278*** (7.09)	0.0269*** (6.87)
OP	0.284*** (38.95)	0.292*** (39.92)	0.0694*** (3.28)	0.101*** (4.79)	0.284*** (38.93)	0.293*** (39.88)
L.Insider	0.000421*** (4.26)	0.000537*** (5.38)	0.00103*** (3.60)	0.00152*** (5.26)	0.000417*** (4.21)	0.000534*** (5.33)
L.SalesGr # L.Insider	-0.000274*** (-3.72)	-0.000269*** (-3.67)	-0.000684*** (-3.18)	-0.000658*** (-3.08)	-0.000273*** (-3.70)	-0.000268*** (-3.65)
L.FII		0.0000948 (0.48)		0.000574 (1.02)		0.000113 (0.57)
Leverage		0.00209** (2.35)		0.00602** (2.35)		0.00202** (2.27)
Size		0.0234*** (12.04)		0.0948*** (16.88)		0.0233*** (11.93)
Firm fixed	YES	YES	YES	YES	YES	YES
Industry-Year fixed	YES	YES	YES	YES	YES	YES
Adjusted R-sq.	0.291	0.297	0.309	0.321	0.298	0.304
No. of obs.	21689	21689	21655	21655	21689	21689

Table 8: Summary Statistics for Underinvestment, Overinvestment and Benchmark firm-year observations

This table presents the average of the key variables separately for Underinvestment, Overinvestment and Benchmark firm-year observations. CI is the capital investment proxied by CFI and ΔGFA . CFI is annual cashflows from investment activities scaled by average book value of assets for the year. ΔGFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. Q is Tobin's Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. SalesGr is annual growth in sales. OP is the cashflows from operations scaled by book value of assets. Insider is the percentage of equity ownership held by promoters. FII is the percentage of equity ownership of foreign institutional investors. Leverage is the long term debt scaled by shareholders' funds. Size is the total assets in million USD. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015.

	CFI	ΔGFA	Q	SalesGr	OP	Insider (%)	FII (%)	InvAsset	Leverage	Size
Underinvestment										
No. of observations	6467	6429	6467	6296	6467	6467	6467	6467	6467	6467
Mean	-0.025	0.1	1.6	0.16	0.02	51.78	2.82	0.1	0.8	265.8
Overinvestment										
No. of observations	6466	6431	6466	6374	6466	6466	6466	6466	6466	6466
Mean	0.218	0.32	1.47	0.24	0.1	52.14	4.17	0.06	0.91	398.88
Benchmark										
No. of observations	12933	12909	12933	12813	12930	12933	12933	12933	12933	12933
Mean	0.042	0.13	1.21	0.12	0.06	52.49	2.74	0.08	0.85	317.39

Table 9: Examining overinvestment and underinvestment

This table shows the results from fixed effect multinomial logit pooled regression as described in specification (3) of the main text with lagged values of key variables. Dependent variable is based on the level of unexplained capital investment, as proxied by the residuals calculated from specification (2); capital investment used in this model is CFI which is the cashflows from investment activities scaled by average book value of assets for the year. Firm-year observations are sorted according to unexplained investments and the quartile with the most positive (negative) deviation is classed as Overinvestment (Underinvestment) firms; and the middle two quartiles are used as the benchmark group. Prefix “L.” denotes that the variable is lagged by 1 year. Q is Tobin’s Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets.

	I	II
<u>Panel A - Underinvestment</u>		
OP	-3.420*** (-17.450)	-3.484*** (-17.590)
L.Insider	-0.002 (-0.650)	-0.002 (-0.910)
L.FII	-0.004 (-0.760)	0.007 (1.220)
Leverage		0.046** (1.960)
Size		-0.351*** (-7.150)
<u>Panel B - Overinvestment</u>		
OP	3.570*** (18.100)	3.696*** (18.440)
L.Insider	0.013** (2.760)	0.013*** (5.720)
L.FII	0.013** (2.760)	0.000 (0.070)
Leverage		-0.035 (-1.560)
Size		0.424*** (8.700)
Firm fixed	YES	YES
Year fixed	YES	YES
Pseudo R-sq.	0.0962	0.1021
Log-likelihood	-13648.46	-13560.21
Observations	24733	24733

Table 10: Regression of Ownership Structure on Capital Investment – subsamples based on board independence

This table shows the results from regression as specified in specification (1) with some modifications. Dependent variable is capital investment proxied by either CFI, Δ GFA, or CFIRD. CFI is annual cashflows from investment activities scaled by average book value of assets for the year. Δ GFA is the change in gross fixed assets during the year scaled by average book value of assets for the year. CFIRD which is the annual cashflows from investment activities plus research and development expenses, scaled by average book value of assets for the year. Columns I to III show results from *NonIndep* subsample where board independence is < 0.5 ; Columns IV to VI show results from *Indep* subsample where board independence is ≥ 0.5 . Prefix “L.” denotes that the variable is lagged by 1 year. Q is Tobin’s Q calculated as market value of equity plus book value of assets minus the book value of equity scaled by book value of assets. OP is the cashflows from operations scaled by average book value of assets. Insider is the percentage of equity ownership held by insiders. FII is the percentage of equity ownership by foreign institutional investors. # denotes interaction term. Leverage is long term debt divided by equity. Size is the total assets taken in natural log form. Data is for publicly listed Indian firms sourced from Prowess Database for years 2001 to 2015. All estimates are reported with the standard errors corrected by clustering at firm level. Statistical significance is reported against 10% (*), 5% (**) and 1% (***) significance levels with *t*-statistics shown in brackets

	<i>NonIndep</i> sub-sample			<i>Indep</i> sub-sample		
	I CFI	II Δ GFA	III CFIRD	IV CFI	V Δ GFA	VI CFIRD
L.Q	0.0482*** (14.07)	0.102*** (9.66)	0.0486*** (14.17)	0.0238*** (7.28)	0.0556*** (5.08)	0.0246*** (7.49)
OP	0.285*** (28.72)	0.0518* (1.68)	0.285*** (28.70)	0.297*** (30.29)	0.142*** (4.40)	0.299*** (30.35)
L.Insider	0.000562*** (3.81)	0.00166*** (3.64)	0.000556*** (3.76)	0.000739*** (4.78)	0.00202*** (4.00)	0.000748*** (4.82)
L.Q # L.Insider	-0.000372*** (-6.91)	-0.000787*** (-4.73)	-0.000376*** (-6.97)	-0.0000315 (-0.52)	-0.000110 (-0.54)	-0.0000435 (-0.71)
L.FII	-0.000833*** (-3.06)	-0.00327*** (-3.89)	-0.000808*** (-2.97)	-0.000116 (-0.40)	0.000971 (1.02)	-0.000110 (-0.37)
Leverage	0.00192 (1.61)	0.00830** (2.26)	0.00185 (1.55)	0.0000640 (0.05)	0.000253 (0.06)	-0.0000607 (-0.05)
Size	0.0212*** (8.10)	0.0796*** (9.84)	0.0212*** (8.05)	0.0269*** (10.14)	0.0901*** (10.46)	0.0268*** (10.08)
Firm fixed	YES	YES	YES	YES	YES	YES
Industry-Year fixed	YES	YES	YES	YES	YES	YES
Adjusted R-sq.	0.331	0.327	0.337	0.306	0.314	0.312
No. of obs.	12860	12830	12860	12094	12046	12094

