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Article

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Impact of CEO's characteristics on investment decisions of Indian listed firms: Does crisis make any difference?

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Abstract: Using a sample of listed Indian manufacturing companies, this study examines the role of chief executive officer's (CEO's) personal characteristics like age, tenure, education, and career experience in the determination of investment decisions of the firm. The dynamic panel data model estimation, more specifically the system generalized method of moments estimation results reveal a negative relation between CEO's age and corporate investment. CEO's financial education is positively associated with investment decisions. The investment cash flow sensitivity analysis posits that CEO's age and financial education reduce the sensitivity of investment with respect to cash flow. The results are robust across different periods, defined on the basis of crises. In times of financial crisis, we document that firm's liquidity and age, CEO's career experience and tenure turn out to be significant determinants of corporate investment. This paper provides an out-of-sample evidence of the role of CEO's personal characteristics on the determination of corporate investment, which is an unexplored issue from an emerging market perspective.

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PUBLIC INTEREST STATEMENT

One of the main drivers of economic growth is corporate investment and what factors affect investment behavior of firms is, indeed, a question of great importance. Financial constraints and macroeconomic factors as determinants of corporate investment have gained high attention in the earlier studies which confirm that managers are rational. But in the wake of behavioral corporate finance theories, the subsequent studies argue that managers are not fully rational as they are suffering from various psychological biases, which are varying across the various personal characteristics of the corporate managers. In this context, the linkage between CEO's characteristics and corporate investment has received persistent attention in the academic literature. This study investigates relationship between CEO's personal characteristics and corporate investment of Indian listed companies. Our results reveal that CEO's age and financial education play a vital role in determination of corporate investment as well as investment cash flow sensitivity of the firm. The findings of this study have implications for corporate managers and investors in the company.

Subjects: Economic Psychology; Finance; Corporate Finance

Keywords: CEO age; cash flow; career experience; chief executive officer; corporate investment; financial education; generalized method of moments

1. Introduction

The determinants of corporate investment have been mainly explained by the traditional corporate finance theories such as agency theory (Jensen & Meckling, 1976) and asymmetric information theory (Myers & Majluf, 1984).Consistent with these theories, the empirical studies find that cash flow, growth opportunities, profitability, and financial leverage are the major determinants of the corporate investment. Extant literature on corporate finance has documented that the chief executive officer (CEO) plays a central role in firm's decisions making process (Jensen & Meckling, 1976), and thus, corporate investment decisions of a firm might be influenced by the inherent cognitive biases of the CEO. Despite such facts, the relationship between corporate investment decisions and personal characteristics of the CEO has been largely unexplored in the standard finance literature. The basic assumption of traditional corporate finance theories is that corporate managers are fully rational and they always make optimal financial decisions to maximize the firm's value (Oliveira, 2007).

In the wake of behavioral corporate finance theories, the subsequent studies argue that managers are not fully rational rather they are suffering from certain psychological biases (Baker & Wurgler, 2013; Ben Mohamed, Fairchild, & Bouri, 2014; Fairchild, 2005, 2007). The inherent cognitive biases of managers arise either because of preferences or because of mistaken beliefs (Barberis & Thaler, 2003; Ritter, 2003). These includes mental accounting, framing, regret aversion, familiarity, conservatism, representativeness, salience effect, disposition effect, heuristics, over and under reaction, availability bias, frame dependence, anchoring, optimism, bandwagon effect, innumeracy, extrapolation bias, illusory superiority or Dunning–Kruger effect, wishful thinking, and belief perseverance (Baker & Nofsinger, 2002; Barberis & Thaler, 2003; Byrne & Brooks, 2008; Ritter, 2003). The upper echelons theory (UET) of Hambrick and Mason (1984) considers organization as a reflection of its top managers and the outcome of an organization are considerably influenced by the values and characteristics of decision makers.

Recently, there is growing interest among academic researchers and practitioners to ascertain the relationship between behavior of top managers and various corporate finance decisions such as capital structure, dividend payment, and corporate performance (Baker & Wurgler, 2002; Malmendier & Tate, 2005a). The literature pertaining to behavioral corporate finance tries to answers the following research questions (i) How the age of CEO affects the riskiness of the corporate policies? (ii) What is the impact of financial education of CEO on investment decisions? (iii) Is there any significant difference between the financing decisions of experienced and younger CEO? (iv) Is there any relationship between the cognitive behavior of top managers and corporate performance? (v) Are the financing decisions taken by CEO having longer tenure different from that taken by CEO having shorter tenure? The available research works posit that the psychological and social characteristics of CEOs can be approximated by demographics like tenure, education, background, age, and gender (Hambrick, 2007). It has been argued that younger CEOs invest more aggressively (Prendergast & Stole, 1996), whereas older CEOs are risk-averse and reluctant to adopt new information to devise investment strategies (Hambrick & Mason, 1984). Also, short-tenured CEOs are more inclined to accept risky investment and quickly respond to new information (Hirshleifer, 1993), whereas CEOs with longer tenure are risk-averse and conservative (Audia, Locke, & Smith, 2000; Grimm & Smith, 1991). One of the plausible reasons could be that CEOs with short-tenure have strong incentives to opt for short-term outcomes to build their reputation (Hirshleifer, 1993). As well, CEOs having high career experiences are likely to be less affected by external borrowing constraint due to their strong social connections (Hu & Liu, 2015). CEOs with financial education have greater knowledge about the market trends and conditions, which help them to choose the right investment alternatives (Malmendier & Tate, 2005b).These studies establish both direct and indirect relationship between CEO's personal characteristics and corporate investment policies. The empirical validation of the relationship

between personal characteristics of CEO and corporate investment are limited to developed economies (Ben Mohamed et al., 2014; Malmendier & Tate, 2005a, 2005b; McKnight, Tomkins, Weir, & Hobson, 2000). However, there is a dearth of studies in the context of emerging market though there is a growing unanimity among academic researchers that each emerging market economy is unique, with its own market structure, regulatory environment, and levels of market development (Bekaert & Harvey, 2003).

Considering the research gap and relevance of this issue, the objective of this study is to examine the impact of various personal characteristics of CEO such as age, tenure, education, and career experience on corporate investment decisions of Indian firms. There are several compelling reasons to consider India as a suitable case for this study. There is growing consensus among researchers that Indian economy is one of the fastest growing economies in the world with a vibrant capital market, high financial market integration, and stable political environment. More specifically, the program like "Make in India" launched by Government of India on September 2014 has significantly attracted global manufacturing firms to invest in India. Further, there are significant differences in the culture across countries. For instance "The way you network in India does tend to be different from how you network in the United States; the way you motivate employees in Japan is quite different from how you do so in Canada" (Molinsky, 2016). The difference in the structure of the market, policy environment, and culture makes it imperative to have an out-of-sample empirical evidence from the Indian market.

This study provides evidence of the impact CEO's personal characteristics on corporate investment. Employing econometric models such as panel data model, more specifically system generalized method of moments (GMM) we find a negative association between CEO's age and corporate investment. It could be due to the fact that younger CEO invests more aggressively and take bolder investment decisions (Li, Low, & Makhija, 2014). Additionally, the positive association between CEO's financial education and investment decisions implies that financially educated CEO can analyze the market condition more efficiently, which helps to raise external funds in a cost effective manner (Ben Mohamed et al., 2014; Malmendier & Tate, 2005b). We find that CEO's age reduces the investment cash flow sensitivity. Consistent with Ben Mohamed et al. (2014), we find that CEO's financial education reduces the sensitivity of investment with respect to cash flow. To check the robustness of our empirical results, we divide the sample period in two parts based on occurrences of crises. One part spans from 1999 to 2000 to 2006 to 2007 (without any major crisis) and the remaining period 2007–2008 to 2013–2014 which has witnessed a series of crises such as global financial crisis (2007–2008), the European sovereign debt crisis (2010) and the Russian financial crisis (2014). The estimated results reveal that CEO's age and financial education influence corporate investment decisions across the periods. As well, career experience and tenure are found to be significant determinants of corporate investment during the crises period only. Overall, our findings suggest that CEO's cognitive behavior considerably affect the corporate investment decisions of a firm. We contribute and extend the related literature in two aspects. First, to our knowledge the present study is perhaps the first-ever empirical evidence from emerging market on the impact of CEO's personal characteristics on corporate investment. As an out of sample evidence, the estimated results from an emerging economy with its unique market structure, regulation, and macroeconomic environment helps to shed more light on the CEO's behavior and corporate investment relationship. Second, this study also tries to explore the relationship between CEO's personal characteristics and corporate investment policies during normal market condition as well as financial crisis.

Rest of the paper is structured as follows: Section 2 presents the theoretical background and hypothesis. Section 3 deals with the model specifications and methodology. Section 4 describes the variables and data. Section 5 discusses the results. Section 6 concludes.

2. Theoretical background and hypothesis formulation

Earlier literature on corporate investment finds that cash flow, firm size, profitability, sales, and leverage are crucial determinants of corporate investment (Aivazian, Ying, & Qui, 2005; Fazzari,

Hubbard, & Peterson, 1988; La Cava, 2005; Rajakumar, 2005; Tokuoka, 2012). Further, the literature on behavioral corporate finance provides evidence on the relationship between manager's personal characteristics such as age, tenure, education, and career experience and various corporate finance decisions (Bertrand & Schoar, 2003; Hambrick & Mason, 1984; Hu & Liu, 2015; Malmendier & Tate, 2005b). Prior theoretical and empirical studies find conflicting evidence with regard to how age of the CEO affects the corporate finance decisions. One strand of literature posit that younger CEOs are risk-averse and face greater career concern, which may lead to excessive conservatism in the investment policies (Eaton & Rosen, 1983; Hirshleifer & Thakor, 1992; Holmström, 1999; Scharfstein & Stein, 1990). Also, due to more career concern and lesser reputation in comparison to older CEOs, younger CEOs avoid risky and innovative investment opportunities (Zwiebel, 1995). Another strand of literature argues that younger CEOs are risk lover, have higher energy levels, make bolder decisions and make riskier investments compared to older managers (Li et al., 2014; Roberts & Rosenberg, 2006; Serfling, 2014).

Prendergast and Stole (1996) develop a managerial signaling model that shows younger managers attempt to signal to the market that they are high quality managers with superior ability by pursuing riskier and more aggressive investment strategies. In particular, younger managers overweight their personal beliefs and exaggerate their investment behavior to appear talented. It has also been argued that older CEOs are more risk-averse and more inclined to adopt less risky decisions in order to safe their career, love quiet life, and maintain the status quo, which makes these CEOs reluctant to invest in risky projects and affect the firm's investment negatively (Bertrand & Schoar, 2003; Serfling, 2014). Older managers are reluctant to change their investment behavior because it may indicate that their previous investment decisions were incorrect (Bertrand & Schoar, 2003; Eaton & Rosen, 1983; Li et al., 2014; Serfling, 2014). Considering these above mentioned arguments, we hypothesize that corporate investment declines with the increase in age of the CEO.

The literature on the relationship between tenure of CEOs and corporate investment has been broadly divided with two groups. First group of studies argue that CEOs with shorter duration have lower power, lower level of work knowledge, lower knowledge about the organization than the older CEOs. Therefore, the short-tenured CEOs invest less in riskier projects than the CEOs having longer tenure (Finkelstein & Hambrick, 1996; Hermalin & Weisbach, 1991; Mezghanni, 2010; Miller & Shamsie, 2001; Richard, Wu, & Chadwick, 2009). Another strand of literature states that short-tenured CEOs invest more aggressively over long-tenure CEOs. Probably, this is due to the fact that the short-tenured CEOs are more open to innovations, change and experimentation, and strong desire to choose short-term outcomes to build their reputation in the organization. The existing studies also argue that longer tenured CEOs are risk-averse and possess less knowledge of the changing environment, which reduces their ability to level up the firm's investment when there are insufficient internal funds (Finkelstein & Hambrick, 1996; Gibbons & Murphy, 1992; Graham, Harvey, & Puri, 2013; Hambrick, Geletkanycz, & Fredrickson, 1993; Hambrick & Mason, 1984; Hirshleifer, 1993; Miller, 1991; Miller & Shamsie, 2001). Following these arguments, the dimension of the effect of tenure on corporate investment is allowed to be empirically determined.

Existing studies acknowledge that CEO's education is reflected in their decision-making process (Becker, 1970; Dollinger, 1984; Gunz & Jalland, 1996; Schroder, Driver, & Struefert, 1967). Particularly, CEOs having financial education background are expected to be less influenced by irrational behavior as they posses better exposure to financial market and understand the macroeconomic fundamentals (Ben Mohamed et al., 2014; Malmendier & Tate, 2005b). All these considerations led these CEOs to raise the external capital in a cost effective manner, which helps to reduce the average cost of capital. Therefore, we assume that financial education of CEO may influence investment decisions and reduces the investment cash flow sensitivity.

A related strand of literature finds that CEOs with higher career experience make more investment even if the internal funds are less. This could be due to the fact that they have a strong social network, and expertise in formulating and implementing investment strategies (Geletkanycz & Boyd,

2011; Granovetter, 1985; Haynes & Hillman, 2010; Hillman & Dalziel, 2003; Holmstrom & Costa, 1986; Nahapiet & Ghoshal, 1998; Scharfstein & Stein, 1990; Virany, Tushman, & Romanelli, 1992). Further, diverse career experiences enable manager's to obtain right information to choose better investment avenues (Granovetter, 1973). Consistent with these findings, we expect a positive association between career experiences of CEOs and corporate investment decisions.

Recent studies of Ben Mohamed et al. (2014) and Hu and Liu (2015) have investigated the interaction between cash flow (financial constraints) and CEO's age, tenure, financial education, and career experience. They assume that these personal characteristics affect the investment cash flow sensitivity. Taking a cue from these studies, we hypothesize that CEO's personal attributes influence investment cash flow sensitivity.

In a nutshell, the extant review of literature on corporate investment shows that the firm-specific factors, personal characteristics of CEO and CEO's behavior with investment cash flow sensitivity are play a vital role in the determination of corporate investment.

3. Models and estimation method

Following Q-model and Euler equation, we have considered lagged investment, Tobin's Q ratio, sales and cash flow as the determinants of corporate investment in our analysis. Also, we have incorporated the following firm-specific variables such as leverage, liquidity, firm size, firm age, cost of borrowing and return on assets in our model (Aivazian et al., 2005; Audretsch & Elston, 2002; Calomiris et al., 1994; Fu & Liu, 2015). Assuming the linear relationship between these firm-specific factors and corporate investment a panel model is specified as follows:

$$\begin{aligned}(I/K)_{it} = {} & \alpha + \beta_1(I/K)_{it-1} + \beta_2 Q_{it} + \beta_3(S/K)_{it} + \beta_4(CF/K)_{it} + \beta_5(TIE/TB)_{it} + \\ & \beta_6 PROF_{it} + \beta_7 LIQ_{it} + \beta_8 LEV_{it} + \beta_9 SZ_{it} + \beta_{10} AGE_{it} + \vartheta_i + \lambda_t + \mu_{it}\end{aligned} \tag{1}$$

where I = net investment, K = capital stock at the beginning of the period, α = intercept, β = regression coefficient, Q = Tobin's Q ratio, S = net sales, CF = cash flow, TIE = total interest expenses, TB = total borrowings, $PROF$ = return on assets, LIQ = liquidity, LEV = leverage, SZ = firm size and, AGE = firm age, ϑ_i is the firm-specific effects, λ_t is the time-specific effect, μ_{it} is an idiosyncratic error term. The subscripts i and t represent the firms and time, respectively.

To investigate the importance of CEO's personal characteristics such as age, tenure, financial education, and career experience on the investment cash flow sensitivity we have specified the models as follows:

$$\begin{aligned}(I/K)_{it} = {} & \alpha + \beta_1(I/K)_{it-1} + \beta_2 Q_{it} + \beta_3(S/K)_{it} + \beta_4(CF/K)_{it} + \beta_5(TIE/TB)_{it} + \beta_6 PROF_{it} + \\ & \beta_7 LIQ_{it} + \beta_8 LEV_{it} + \beta_9 SZ_{it} + \beta_{10} AGE_{it} + \beta_{11}(CF/K)_{it} \times CAGE_{it} + \\ & \beta_{12}(CF/K)_{it} \times TENU_{it} + \beta_{13}(CF/K)_{it} \times FE_{it} + \beta_{14}(CF/K)_{it} \times CE_{it} + \vartheta_i + \lambda_t + \mu_{it}\end{aligned} \tag{2}$$

Here, $CAGE$ = CEO age, $TENU$ = CEO tenure, FE = financial education, CE = career experience.

The interaction term in Equation (2) captures the effect of CEO's personal characteristics on investment cash flow sensitivity. We expect that $\beta_4 > 0$ as an increase in cash flow leads to an increase in the level of investment expenditure or cash flow does not affects firm's investment (i.e. $\beta_4 = 0$). The primary hypothesis of this paper is that the sensitivity of investment to cash flow decreases with the CEO age, CEO's tenure, financial education, and career experience because of several reasons: (i) Risk taking preference and aggressiveness to investment decreases with increase in CEO's age. (ii) A long tenured CEO has more knowledge about the company's investment behavior in different periods, which helps to devise better investment strategy. (iii) Financial education enables top managers to understand the market behavior effectively and finance the firm's assets in a cost effective manner. (iv) A high career experienced CEO have a strong social network with the financial institutions, lending agencies and banks which lead to the better access of external finance. Therefore, we expect that $\beta_{11} < 0$, $\beta_{12} < 0$, $\beta_{13} < 0$, and $\beta_{14} < 0$.

Further, we also modify Equation (2) by incorporating a direct impact of CEO's personal characteristics on investment to separate their impact on the investment cash flow sensitivity and the model is specified as follows:

$$(I/K)_{it} = \alpha + \beta_1(I/K)_{it-1} + \beta_2 Q_{it} + \beta_3(S/K)_{it} + \beta_4(CF/K)_{it} + \beta_5(TIE/TB)_{it} + \beta_6 PROF_{it} + \beta_7 LIQ_{it} + \beta_8 LEV_{it} + \beta_9 SZ_{it} + \beta_{10} AGE_{it} + \beta_{11}(CF/K)_{it} \times CAGE_{it} + \beta_{12}(CF/K)_{it} \times TENU_{it} + \beta_{13}(CF/K)_{it} \times FE_{it} + \beta_{14}(CF/K)_{it} \times CE_{it} + \beta_{15} CAGE_{it} + \beta_{16} TENU_{it} + \beta_{17} FE_{it} + \beta_{18} CE_{it} + \vartheta_i + \lambda_t + \mu_{it} \quad (3)$$

Following López-Gutiérrez, Sanfilippo-Azofra and Torre-Olmo (2015), and Tran and Le (2017), we estimate Equations (1)–(3) using System-GMM (Generalized Method of Moments). More specifically, these models are estimated using two steps System-GMM with robust errors, which is consistent in the presence of any pattern of heteroscedasticity and autocorrelation (Arellano & Bover, 1995; Blundell & Bond, 1998). The use of panel data surpasses the problem of heterogeneity by taking the first differences and thereby eliminating the individual effect, which makes the results unbiased. The used GMM also address the issue of endogeneity. In particular, the model includes the lagged explanatory variables as instruments, which allows for additional instruments by taking advantage of the conditions of orthogonality existing between the lags in the independent variables of the model (Arellano & Bond, 1991). For the post-estimation tests, we apply the Arellano–Bond test for autocorrelation of the disturbance term μ_{it} and Sargan tests of over identifying restrictions. Wald test is used to test the joint significance of the estimated coefficients for all the variables.

4. Variables and data

The dependent variable is the net investment (*I*) in the current year and normalized by capital stock (*K*) at the beginning of the period. It is represented as (*I/K*). The major variables of interest in this paper are CEO's personal characteristics i.e., age, tenure, financial education, and career experiences. Following Serfling (2014), we measure the CEO's age (*CAGE*) as the natural logarithm of CEO's age. CEO's tenure (*TENU*) is defined as the numbers of years the CEO has held the position in that company. Following Malmendier and Tate (2005b), we measure the financial education (*FE*) variable in the following way. CEOs having graduate degrees in the streams of accounting, finance, commerce, economics, and any other professional courses related to finance such as chartered accountant, chartered financial analyst and master of business administration are considered as financially educated CEOs. On the other hand, CEOs not having the above mentioned finance degrees are regarded as CEOs without financial education. Financial education (*FE*) takes the value one if the manager has any one of the aforementioned degrees and zero otherwise.

The career experience (*CE*) of CEO is measured as the natural logarithm of the total experience of CEO. Apart from these variables, we have also considered certain factors which have been identified as common determinants of corporate investment in existing literature. All these variables include cash flow (*CF*), sales (*S*), leverage (*LEV*), Tobin's Q ratio (*Q*), and return on assets (*PROF*). *CF* is measured as the ratio of profit after tax plus depreciation to capital stock at the beginning of the period, *S* is measured as the sales to capital stock at the beginning of the period, *LEV* is measured as the ratio of total debt to total assets, age of the firm is defined in the natural logarithm of the firm's age (current year minus incorporation year of the firm), total interest expenses (*TIE/TB*) is the ratio of interest payment to total borrowings, and liquidity (*LIQ*) is the ratio of current assets to current liabilities.

The data pertaining to firm-specific variables and CEO's characteristics have been collected from Bloomberg database. The study period spans from 1998 to 1999 to 2013 to 2014. The frequency of data is yearly. To construct a balanced panel data-set, we have excluded companies not having continuous data throughout the sample period. In this process, we have constructed a balanced panel data-set of 617 firms but out of which only 493 firms have the data for CEO career experiences. Therefore, the estimation is carried out separately for the two subsamples. One sample of 617

Table 1. Summary statistics

Variables	No. of observations	Mean	Standard deviation
I/K	9255	0.09	0.18
CAGE	9255	57.04	10.62
TENU	9255	9.78	3.96
FE	9255	0.41	0.12
CE	7395	26.01	8.80
CF/K	9255	0.19	0.33
S/K	9255	0.22	0.38
TIE/TB	9255	0.10	0.17
Q	9255	1.26	0.84
PROF	9255	0.04	0.12
LIQ	9255	0.30	0.21
LEV	9255	0.38	0.19
SZ	9255	7.93	1.79
AGE	9255	34.02	11.27

Notes: This table presents the descriptive statistics of dependent and independent variables. *I/K* is the dependent variable where *I* = net investment in fixed assets, *K* = capital stock at the beginning of the period, *CAGE* = CEO age, *TENU* = CEO tenure, *FE* = financial education, *CE* = career experience, *CF* = cash flow, *S* = sales, *TIE* = total interest expenses, *TB* = total borrowings, *Q* = Tobin's Q ratio, *PROF* = return on assets, *LIQ* = liquidity, *LEV* = leverage, *SZ* = firm size and *AGE* = firm age.

firms include all the variables excluding the CEO's career experience and other sample 493 firms consider all the variables including career experience. Since the dependent variable (*I/K*) is calculated by taking the first difference of the fixed assets, the first year data are not taken into account in the estimation.

The descriptive statistics presented in Table 1 shows that average investment is 9% of capital stock. The average age of CEOs in India is 57 years. Average tenure of CEO is 9.78 years. On average, 41% of CEOs are having financial education background. CEOs have average career experience of 26 years. Indian manufacturing sector generates the cash flow at the average rate of 19% and average growth rate in sales is 22%. This sector borrows from the external market at the average interest rate of 10%.

Indian manufacturing sector have Tobin's Q ratio more than one, i.e., 1.26 which implies that there are more growth opportunities exist in the market. Leverage is 0.38 which indicates that 38% of the total assets have been financed using debt instruments. Table 2 shows the correlation between the dependent and explanatory variables. From the correlation matrix we do not find any multicollinearity problem. The negative correlation between investment and age of the CEO (−0.11) shows that as CEO become older, investment decreases. A positive correlation between the investment and financial education (0.22) shows that financial education of CEO helps to increases investment. The correlation between investment and career experience is 0.07 which states that experienced managers may take suitable policy decisions to strengthen investment. We have observed a positive association between investments with firm-specific factors which depicts that investment of a firm may be influenced by cash flow, Tobin's Q, liquidity, and sales.

Table 2. Correlation matrix

Variables	*I/K*	*CAGE*	*TENU*	*FE*	*CE*	*CF/K*	*S/K*	*TIE/TB*	*Q*	*PROF*	*LIQ*	*LEV*	*SZ*	*AGE*
	(1)	(2)	(3)	(4)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
I/K	1.00													
CAGE	−0.112	1.00												
TENU	0.023	0.045	1.00											
FE	0.221	0.071	−0.013	1.00										
CE	0.072	0.031	0.012	0.025	1.00									
CF/K	0.373	0.05	0.017	0.011	0.011	1.00								
S/K	0.181	0.012	0.018	0.007	0.026	0.004	1.00							
TIE/TB	−0.062	0.002	0.040	0.005	−0.022	0.014	−0.002	1.00						
Q	0.223	0.088	0.027	0.063	0.013	0.135	0.004	0.020	1.00					
PROF	0.051	0.046	0.031	0.009	0.051	0.177	0.005	0.019	0.415**	1.00				
LIQ	0.064	0.025	0.017	0.033	0.042	0.045	−0.026	0.017	0.043	0.062	1.00			
LEV	−0.092	−0.029	0.093	0.010	0.032	−0.122	0.033	−0.070	−0.252	−0.507	−0.039	1.00		
SZ	0.181	0.085	0.090	0.041	0.012	0.076*	0.038*	0.025	0.344	0.125	0.316**	0.040	1.00	
AGE	0.062	0.190	0.039	0.005	0.012	0.006	0.028	0.052	0.122*	0.061	0.182	0.102	0.349**	1.00

Notes: This table presents the correlation matrix of dependent and independent variables. *I/K* is the dependent variable where *I* = net investment in fixed assets, *K* = capital stock at the beginning of the period, *CAGE* = CEO age, *TENU* = CEO tenure, *FE* = financial education, *CE* = career experience, *CF* = cash flow, *S* = sales, *TIE* = total interest expenses, *TB* = total borrowings, *Q* = Tobin's Q ratio, *PROF* = return on assets, *LIQ* = liquidity, *LEV* = leverage, *SZ* = firm size and *AGE* = firm age.

**5% level of significance.

*10% level of significance.

5. Discussion of results

Table 3 reports the GMM estimation results of Equation (1)–(3). The p-values ofm_1 and m_2 test statistics indicate that very little unobserved firm-specific effects exist in the estimation results. The results from Sargan test reveal that the instruments used are valid. The Wald test confirms that the models are correctly specified. First three columns (1)–(3) present the results of the impact of firm-specific factors, investment cash flow sensitivity with respect to CEO's characteristics and the individual impact of CEO's personal characteristics on corporate investment for the 617 companies. We further include career experience as another CEO's characteristics and re-estimate the Equations (1)–(3) and reported the results in columns (4)–(6) for 493 firms. The positive coefficient of lagged investment and firm-specific variables such as Tobin's Q, sales, cash flow, profitability, and size implies that these variables are crucial to determine corporate investment. The negative coefficients of leverage and total interest expenses infer that high use of debt and high cost of borrowing reduce the investment. Our findings are consistent with Audretsch and Elston (2002), Aivazian et al. (2005), Calomiris et al. (1994), Carpenter and Guariglia (2008), Chen and Chen (2012), Fazzari et al. (1988), Guariglia (2008) and La Cava (2005).

Columns 2 and 5 depict GMM estimation results of interaction of cash flow with CEO's personal characteristics. We derive the following inferences from the estimated results. The association between corporate investment and internal fund are positive and significant. This implies that internal fund can be considered as a determinant of corporate investment policy. The investment cash flow sensitivity with CEO's age is negative and significant. This indicates that the impact of cash flow on corporate investment goes down with the CEO's age. Also, we find that financial education reduces investment cash flow sensitivity. The possible explanation for the above findings is that the CEO's age and financial education can influence the firm investment policy as their decision taking ability, better outside connections, and greater ability to identify the investment opportunities in the market enable them to raise the external capital in a cost effective manner. The coefficients of the interaction terms of tenure and career experience with cash flow have not changed their sign and remain positive which infers that tenure and career experience do not affect the investment cash flow

Table 3. GMM estimation results of base line investment models

Variables	Coefficients (z)	Coefficients (z)	Coefficients (z)	Coefficients (z)	Coefficients (z)	Coefficients (z)
	(1)	(2)	(3)	(4)	(5)	(6)
$(I/K)_{it-1}$	0.1321*** (3.65)	0.1378*** (2.78)	0.1427*** (3.89)	0.1541*** (3.28)	0.1428*** (3.88)	0.1511*** (3.11)
Q_{it}	0.0324*** (3.28)	0.0432*** (3.21)	0.0317*** (2.68)	0.0416** (2.39)	0.0419*** (2.76)	0.0529*** (2.81)
$(S/K)_{it}$	0.1126* (1.67)	0.0823* (1.69)	0.0711** (2.15)	0.0715** (2.19)	0.0891** (2.31)	0.0783* (1.88)
$(CF/K)_{it}$	0.2217*** (3.55)	0.1922*** (3.61)	0.1874*** (2.89)	0.1521** (2.46)	0.1618** (2.15)	0.1719** (2.18)
$(TIE/TB)_{it}$	−0.0409** (−2.45)	−0.0216** (−2.28)	−0.0316** (−2.41)	−0.0418* (−1.72)	−0.0315* (−1.81)	−0.0326** (−2.16)
$PROF_{it}$	0.0917** (2.35)	0.1115** (2.51)	0.1126*** (2.56)	0.1217* (1.88)	0.1321* (1.91)	0.1126** (2.16)
LIQ_{it}	0.0616 (1.33)	0.0712 (1.46)	0.0543 (1.36)	0.0627 (1.33)	0.0926 (1.51)	0.0821 (1.11)
LEV_{it}	−0.0912** (−2.45)	−0.0913** (−2.31)	−0.0893*** (−3.26)	−0.1218*** (−2.88)	−0.0891* (−1.88)	−0.1136* (−2.29)
SZ_{it}	0.2217*** (18.46)	0.1964*** (17.21)	0.1813*** (8.22)	0.1816*** (9.81)	0.2145*** (6.23)	0.1728*** (5.83)
AGE_{it}	0.0512 (1.33)	0.0533 (1.17)	0.0621 (1.09)	0.0428 (1.21)	0.0416 (1.21)	0.0529 (1.51)
$(CF/K)_{it} \times (CAGE)_{it}$	–	−0.1231** (−2.46)	−0.1346** (−2.41)	–	−0.1429** (−2.09)	−0.1321** (−2.27)
$(CF/K)_{it} \times (TENU)_{it}$	–	−0.1261 (−1.11)	−0.1411 (−1.37)	–	−0.1319 (−1.16)	−0.1416 (−1.35)
$(CF/K)_{it} \times (FE)_{it}$	–	−0.1591** (−2.23)	−0.1629** (−2.38)	–	−0.1486** (−2.41)	−0.1211** (2.42)
$(CF/K)_{it} \times (CE)_{it}$	–	–	–	–	−0.1236 (−1.46)	−0.0829 (−2.31)
$CAGE_{it}$	–	–	−0.2151** (−2.38)	–	–	−0.2316*** (−2.71)
$TENU_{it}$	–	–	0.0216 (0.78)	–	–	0.0315 (1.08)
FE_{it}	–	–	0.1108** (2.42)	–	–	0.1921** (2.18)
CE_{it}	–	–	–	–	–	0.1214 (1.29)
Constant	0.1129** (2.18)	0.0821** (2.21)	0.0469** (2.12)	0.0874** (2.32)	0.0611** (2.17)	0.0319** (2.31)
Wald test	χ^2 (11) = 567.42 [0.0000]	χ^2 (14) = 353.27 [0.0000]	χ^2 (17) = 320.61 [0.0000]	χ^2 (11) = 358.95 [0.0000]	χ^2 (15) = 426.84 [0.0000]	χ^2 (19) = 338.66 [0.0000]
m_1 (p)	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
m_2 (p)	[0.63]	[0.43]	[0.26]	[0.65]	[0.35]	[0.36]
Sargan test	χ^2 (90) = 31.26 [0.6328]	χ^2 (90) = 67.29 [0.3516]	χ^2 (90) = 81.59 [0.5418]	χ^2 (90) = 25.22 [0.5321]	χ^2 (90) = 68.15 [0.2291]	χ^2 (90) = 36.15 [0.5229]
NOB	8021	8021	8021	6409	6409	6409

Notes: This table presents the baseline GMM estimation results. The estimated results are shown without and with career experience in columns (1–3) and columns (4–6), respectively. (i) *I/K* is the dependent variable where *I* = net investment in fixed assets, *K* = capital stock at the beginning of the period, *CAGE* = CEO age, *TENU* = CEO tenure, *FE* = financial education, *CE* = career experience, *CF* = cash flow, *S* = sales, *TIE* = total interest expenses, *TB* = total borrowings, *Q* = Tobin's Q ratio, *PROF* = return on assets, *LIQ* = liquidity, *LEV* = leverage, *SZ* = firm size and, *AGE* = firm age, *i* = number of firms represented as 1, 2 ..... *n*, and *t* = time period. (ii) *z*-statistics given in the parenthesis.(iii) *p*-values given in the square brackets. (iv) $m_1(m_2)$ is a test for first- (second-) order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. (v) Wald test is a test of joint significance of the estimated coefficients which is asymptotically distributed as chi-square under the null of no relationship and Sargan test of over identifying restrictions, which is asymptotically distributed as chi-square under the null of instrumental validity. (vi) NOB is the number of observations.

***1% level of significance.

**5% level of significance.

*10% level of significance.

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sensitivities. These findings are consistent with Ben Mohamed et al. (2014), and Malmendier and Tate (2005b).

Columns (3) and (6) show the independent role of CEO's personal characteristics on corporate investment. The negative coefficient of CEO's age on the corporate investment suggests that younger CEOs make more investments than older CEOs. It could be due to the fact that younger CEOs invest aggressively and take bolder investment decisions. This is consistent with the findings of Li et al. (2014). This result also supports the argument of Serfling (2014) that older CEOs are more risk-averse and therefore, they are not in favor of taking bolder investment decisions in the market. The coefficient of CEO tenure is positive but statistically insignificant which implies that CEO's tenure is not associated with investment. The possible explanation for this is that a high tenured CEO may not be in touch with the changing environment and mostly depend on their previous knowledge and experience for making investment decisions. The positive association of financial education of CEO with corporate investment implies that CEO with financial education are able to analyze the market condition efficiently which helps to raise the external funds in a cost effective manner and therefore, can make investments in the absence of insufficient internal fund (Malmendier & Tate, 2005b). Though the relationship between CEO's career experience and corporate investment is positive but their relationship is not significant. These results support the findings of Ben Mohamed et al. (2014) and Hu and Liu (2015).

5.1. Robustness of the results

Further, we also check role of firm-specific factors, CEO's personal characteristics with investment cash flow sensitivity and the independent role of CEO's personal characteristics on the investment decisions across different periods. We divide our data into two sub-periods, i.e., data period without any major crisis (1999–2000 to 2006–2007) and the remaining period (2007–2008 to 2013–2014) which has witnessed the series of crises such as global financial crisis (2007–2008), the European sovereign debt crisis (2010) and the Russian financial crisis (2014), and carryout our analysis. Table 4 presents the estimated results of the impact of firm-specific factors and CEO's personal characteristics on investment decisions for 617 companies. The result presented in the Table 5 includes the impact of career experience along with other personal characteristics of CEO on corporate investment for the 493 firms.

The *p*-values of m_1 and m_2 test statistics, Sargan test results and Wald test results presented in Tables 4 and 5 indicate that very little unobserved firm-specific effects exist in the estimation results, the instruments used are valid and models are correctly specified. The significant positive association of lagged investment with corporate investment in both the periods implies its persistent effect in firms' investment undertaken. Consistent with the findings of whole sample period, we gather sufficient evidence (from Tables 4 and 5) of the impact of firm-specific factors on investment decisions. Also, firm's age and liquidity are found to be significant determinants of corporate investment during crisis periods. The investment cash flow sensitivity analysis reveals that CEO's characteristics do affect the role of cash flow in the determination of investment. Particularly, during crisis period the role of CEO age and financial education are significant to affect the investment cash flow sensitivity, which has been clearly evident from the higher coefficient values of these variables (from Tables 4 and 5). In addition, the career experience of CEO turns out to be significant to influence the investment cash flow sensitivity, which is evident from the change of coefficient sign during crisis period. Consistent with the entire sample period analysis, we infer (from Tables 4 and 5) the role of CEO age and financial education as significant determinants of investment decisions across both periods. Interestingly, all the personal attributes of CEO are found to be significant during crisis period. This shows the ability of CEO to obtain finance from external market in times of illiquidity and funding constraints. Overall, it is evident from the estimated results that CEO's personal characteristics are crucial to determine corporate investment decisions along with firm-specific determinants.

Table 4. Robustness test results across different periods (excluding career experience)

Variables	Without crisis period	Without crisis period	Without crisis period	During crises period	During crises period	During crises period
	Coefficients (*z*)	Coefficients (*z*)	Coefficients (*z*)	Coefficients (*z*)	Coefficients (*z*)	Coefficients (*z*)
	(1)	(2)	(3)	(4)	(5)	(6)
$(I/K)_{it-1}$	0.1762*** (2.93)	0.1819*** (2.83)	0.1328*** (2.81)	0.1217** (2.35)	0.1185*** (2.89)	0.1126** (2.51)
Q_{it}	0.0531** (2.66)	0.0418** (2.35)	0.0321** (2.33)	0.0717** (2.45)	0.0611** (2.15)	0.0668* (1.89)
$(S/K)_{it}$	0.0835** (2.21)	0.0605** (2.16)	0.0612** (2.36)	0.1144*** (2.71)	0.1216* (1.79)	0.1135*** (5.81)
$(CF/K)_{it}$	0.1761** (2.11)	0.1651** (2.35)	0.1511** (2.39)	0.1812** (2.31)	0.1637*** (6.16)	0.1613*** (3.26)
$(TIE/TB)_{it}$	−0.0312* (−1.69)	0.0308** (−2.19)	−0.0306** (−2.31)	−0.0414* (−1.72)	−0.0513* (−1.81)	−0.0591** (−2.18)
$PROF_{it}$	0.1174** (2.19)	0.1095** (2.11)	0.1083** (2.21)	0.1152** (2.49)	0.1311** (2.28)	0.1959*** (3.11)
LIQ_{it}	0.0411 (1.15)	0.0461 (1.55)	0.0415 (1.21)	0.0623** (2.29)	0.0764** (2.18)	0.0829** (2.16)
LEV_{it}	−0.1124* (−1.65)	−0.1391* (−1.79)	−0.1281** (−2.39)	−0.1835*** (−2.99)	−0.1425** (−2.41)	−0.1126*** (−2.65)
SZ_{it}	0.1355** (2.22)	0.1546* (1.79)	0.1491* (1.66)	0.1851*** (7.91)	0.1612* (1.89)	0.1744** (2.35)
AGE_{it}	0.0219 (1.31)	0.0389 (1.21)	0.0215 (1.29)	0.0319*** (3.31)	0.0217* (1.72)	0.0351** (2.33)
$(CF/K)_{it} \times (CAGE)_{it}$	–	−0.1541** (−2.23)	−0.1429** (−2.11)	–	−0.2721** (−2.31)	−0.2327** (−2.06)
$(CF/K)_{it} \times (TENU)_{it}$	–	−0.1532 (−1.21)	−0.1439 (−1.36)	–	−0.1694 (−1.21)	−0.1528 (−1.19)
$(CF/K)_{it} \times (FE)_{it}$	–	−0.1522** (−2.29)	−0.1124** (−2.09)	–	−0.2418** (−2.29)	−0.1657*** (−2.79)
$CAGE_{it}$	–	–	−0.1624** (−2.21)	–	–	−0.1991** (−2.44)
$TENU_{it}$	–	–	0.0035 (1.26)	–	–	0.0474** (2.41)
FE_{it}	–	–	0.1321** (2.51)	–	–	0.1929*** (3.26)
Constant	0.0421** (2.28)	0.0369** (2.15)	0.0626** (2.31)	0.0356** (2.29)	0.0429* (1.85)	0.0319* (1.87)
Wald test	χ^2 (11) = 721.53 [0.0000]	χ^2 (14) = 824.29 [0.0000]	χ^2 (17) = 985.23 [0.0000]	χ^2 (11) = 876.36 [0.0000]	χ^2 (14) = 828.26 [0.0000]	χ^2 (17) = 942.29 [0.0000]
m_1 (*p*)	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
m_2 (*p*)	[0.46]	[0.42]	[0.63]	[0.49]	[0.45]	[0.56]
Sargan test	χ^2 (90) = 31.26 [0.4689]	χ^2 (90) = 28.11 [0.3951]	χ^2 (90) = 31.65 [0.3126]	χ^2 (90) = 45.39 [0.4953]	χ^2 (90) = 32.69 [0.1726]	χ^2 (90) = 34.39[0.3948]
NOB	3702	3702	3702	3085	3085	3085

Notes: This table reports the GMM estimated results across crisis and non-crisis periods. (i) *I/K* is the dependent variable where *I* = net investment in fixed assets, *K* = capital stock at the beginning of the period, *CAGE* = CEO age, *TENU* = CEO tenure, *FE* = financial education, *CF* = cash flow, *S* = sales, *TIE* = total interest expenses, *TB* = total borrowings, *Q* = Tobin's Q ratio, *PROF* = return on assets, *LIQ* = liquidity, *LEV* = leverage, *SZ* = firm size and *AGE* = firm age, *i* = number of firms represented as 1, 2 ..... *n*, and *t* = time period. (ii) *z*-statistics given in the parenthesis. (iii) *p*-values given in the square brackets. (iv) $m_1(m_2)$ is a test for first- (second-) order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. (v) Wald test is a test of joint significance of the estimated coefficients which is asymptotically distributed as chi-square under the null of no relationship and Sargan test of over identifying restrictions, which is asymptotically distributed as chi-square under the null of instrumental validity. (vi) NOB is the number of observations.

***1% level of significance.

**5% level of significance.

*10% level of significance.

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Table 5. Robustness test results across different periods (including career experience)

Variables	Without crisis period	Without crisis period	Without crisis period	During crises period	During crises period	During crises period
	Coefficients (z)	Coefficients (z)	Coefficients (z)	Coefficients (z)	Coefficients (z)	Coefficients (z)
	(1)	(2)	(3)	(4)	(5)	(6)
$(I/K)_{it-1}$	0.1411*** (2.86)	0.1612*** (2.88)	0.1319*** (2.81)	0.1113** (2.21)	0.1109*** (2.78)	0.1124** (2.44)
Q_{it}	0.0428* (1.66)	0.0316** (2.12)	0.0417** (2.31)	0.0678** (2.42)	0.0651** (2.37)	0.0611** (2.15)
$(S/K)_{it}$	0.0831* (2.05)	0.0713** (2.14)	0.0811** (2.12)	0.0984*** (2.68)	0.1017** (2.11)	0.1147*** (3.78)
$(CF/K)_{it}$	0.1351** (2.47)	0.1468** (2.19)	0.1578** (2.29)	0.1714** (2.28)	0.1604*** (2.68)	0.1811*** (3.21)
$(TIE/TB)_{it}$	−0.0319* (−1.78)	0.0215** (−2.42)	−0.0314** (−2.51)	−0.0511** (−1.99)	−0.0436* (−1.72)	−0.0541*** (−2.71)
$PROF_{it}$	0.0904** (2.15)	0.1031** (2.15)	0.1147** (2.38)	0.1147** (2.53)	0.1367** (2.41)	0.1755*** (2.91)
LIQ_{it}	0.0512 (1.45)	0.0511 (1.21)	0.0568 (1.31)	0.0744** (2.46)	0.0861** (2.39)	0.0868** (2.35)
LEV_{it}	−0.1314** (−2.34)	−0.1412** (−2.31)	−0.1204** (−2.48)	−0.1711*** (−2.84)	−0.1841** (−2.19)	−0.1979*** (−2.81)
SZ_{it}	0.1415** (2.23)	0.1816** (2.13)	0.1712** (2.16)	0.1911*** (3.26)	0.2112** (2.44)	0.1911** (2.41)
AGE_{it}	0.0316 (1.41)	0.0388 (1.51)	0.0324 (1.46)	0.0541** (2.49)	0.0412** (2.26)	0.0418** (2.01)
$(CF/K)_{it} \times (CAGE)_{it}$	–	−0.1421** (−2.31)	−0.1611** (−2.09)	–	−0.1126** (−2.52)	−0.0.1251** (−2.19)
$(CF/K)_{it} \times (TENU)_{it}$	–	−0.1324 (−1.44)	−0.1429 (−1.31)	–	−0.1619 (−1.16)	−0.1745 (−1.46)
$(CF/K)_{it} \times (FE)_{it}$	–	−0.1218** (−2.16)	−0.1129** (−2.05)	–	−0.1724** (−2.18)	−0.1904** (−2.26)
$(CF/K)_{it} \times (CE)_{it}$	–	−0.0944 (−1.31)	−0.0816 (−1.38)		−0.1129** (−2.19)	−0.0914** (−2.14)
$CAGE_{it}$	–	–	−0.1819** (−2.49)	–	–	−0.1911** (−2.51)
$TENU_{it}$	–	–	0.0692 (1.35)	–	–	0.0789** (2.31)
FE_{it}	–	–	0.1329** (2.44)	–	–	0.1704*** (3.38)
CE_{it}	–	–	0.0911 (1.58)	–	–	0.1324*** (2.71)
Constant	0.0329** (2.25)	0.0322** (2.19)	0.0402** (2.28)	0.0911** (2.14)	0.0344* (1.81)	0.0236** (2.19)
Wald test	χ^2 (11) = 878.28 [0.0000]	χ^2 (15) = 826.24 [0.0000]	χ^2 (19) = 925.08 [0.0000]	χ^2 (11) = 822.15 [0.0000]	χ^2 (15) = 829.12 [0.0000]	χ^2 (19) = 811.67 [0.0000]
m_1 (p)	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]
m_2 (p)	[0.65]	[0.49]	[0.68]	[0.55]	[0.51]	[0.43]
Sargan test	χ^2 (90) = 38.23 [0.5211]	χ^2 (90) = 39.05 [0.4413]	χ^2 (90) = 33.22 [0.3211]	χ^2 (90) = 52.44 [0.5215]	χ^2 (90) = 51.99 [0.3152]	χ^2 (90) = 31.33[0.3521]
NOB	2958	2958	2958	2465	2465	2465

Notes: This table reports the GMM estimated results across crisis and non-crisis periods. *I/K* is the dependent variable where *I* = net investment in fixed assets, *K* = capital stock at the beginning of the period, *CAGE* = CEO age, *TENU* = CEO tenure, *FE* = financial education, *CF* = cash flow, *S* = sales, *TIE* = total interest expenses, *TB* = total borrowings, *Q* = Tobin's Q ratio, *PROF* = return on assets, *LIQ* = liquidity, *LEV* = leverage, *SZ* = firm size and *AGE* = firm age, *i* = number of firms represented as 1, 2 ..... *n*, and *t* = time period. (ii) *z*-statistics given in the parenthesis. (iii) *p*-values given in the square brackets. (iv) $m_1(m_2)$ is a test for first- (second-) order serial correlation in the first-differenced residuals, asymptotically distributed as N(0,1) under the null of no serial correlation. (v) Wald test is a test of joint significance of the estimated coefficients which is asymptotically distributed as chi-square under the null of no relationship and Sargan test of over identifying restrictions, which is asymptotically distributed as chi-square under the null of instrumental validity. (vi) NOB is the number of observations.

***1% level of significance.

**5% level of significance.

*10% level of significance.

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6. Conclusions

This paper examines the impact of CEO's personal characteristics on investment decisions of Indian manufacturing firms over the period 2000–2014. By hand-collecting the biographical information of 617 Indian CEOs, we find that investment decisions of firms are influenced by CEO's personal characteristics like age and financial education. The negative relation between CEO's age and corporate investment shows that younger CEO invests more aggressively in comparison to older CEO. Also, CEO's financial education is positively associated with investment. In addition, this study finds that CEO's age and financial education affect the sensitivity of investment with cash flow. The robustness test documents that empirical results are consistent across the different sub-periods, i.e., without crises and during crises period. Interestingly, CEO's career experience, and tenure turn out to be significant determinants of corporate investment during financial crisis. This paper contributes to the existing literature by documenting the role of personal characteristics of CEO such as age, tenure, education and career experiences on the determination of corporate investment decisions. Results are relevant for corporate managers and investors in the company. The behavior of CEO may be considered as an important source of information for investment policy formulation and implementation. This research can be considered as a base line study and one of the logical extensions of our finding could be to identify other social and cognitive attributes of top managers which may affect firm's investment decisions.

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