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An Investigation into the Effect of CEO's Perceptual Biases on Investment Efficiency and Financing Constraints of the Iranian Listed Firms

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ABSTRACT

Efficient market hypothesis predicts that capital markets are beset with certain biases which result from wrong estimation, and negatively influence shareholders' expectations for higher returns, which in turn affects investment efficiency, financial constraints and corporate performance efficacy in competitive markets, and eventually mitigates firm value. The present study aims at examining the impact of CEOs' perceptual biases on investment efficiency and financing constraints of the firms listed on the Tehran Stock Exchange over the period 2013-2017. Earnings forecast error and CEOs' overconfidence biases serve as the measure of CEO's perceptual biases, the model developed by Biddle et al [42] is employed to proxy for investment efficiency, and KZ model is also adopted to calculate financing constraints. The results reveal that both earnings forecast error and overconfidence biases negatively affect investment efficiency, while they positively influence corporate financing constraints. These results indicate that CEO's perceptual biases creates a constraint on financing, and, on the other hand, reduces the efficiency of corporate investments. Under these conditions, the trust and confidence of investors and shareholders in relation to the company will be reduced, and the company will face negative features like the risk of a financial crisis.

1 Introduction

Nowadays, behavioral psychology is not only concerned with identifying interpersonal behaviors and restoring relationships among individuals, but also goes further and influences other domains of science including economy, politics, sociology and culture [1]. To put it differently, identifying the personality traits of such individuals as directors, as representatives of shareholders in the specified domains, assists stakeholders in making informed decisions [2]. On the other hand, The CEO's perception of corporate functions can help increase his decision-making insight. also identifying the individual differences in the characteristic patterns of the CEOs working in the firms operating in capital markets help investors and shareholders conduct a more painstaking investigation into the behavioral performance of the firms, thereby making more accurate inferences about corporate conditions [3]. The traditional financial economic model predicts that decision makers exhibit logical behaviors and

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always seek to maximize their utility [4]. Nevertheless, empirical researchers are inclined to believe that the probability of irrational decision-making influences the way to find the answers to financial puzzles [5]. The underpinnings of behavioral finance are argued to be based on two pillars: the limits of arbitrage, according to which rational investors fail to take advantage of arbitrage opportunities owing to the presence of certain risks [6]. The second building block of behavioral finance is psychology, which lays the groundwork for evaluating investors' behavior and judgment as well as their errors while making judgments [7]. Various concepts have been propounded as the technical proxies for behavioral finance that influence corporate performance. Managerial optimism, overconfidence, efficacy motives, managerial myopia and other ethical and behavioral factors, for instance, serve to effect simple changes or wedge open the gap between managers and shareholders [8]. In fact, if the criteria are correctly identified, the priorities of the company will be identified against it and will lead to more coherent operations. It is argued that the identification of these measures leads to the elimination of the corporate problems in an attempt to enhance the level of trust and reliability in marketplace, while at the same time influences different sections such as investment and financial performance. Investment has drawn a lot of attention from capital market activists such that appropriate management affects firm value. Investment is counted as one of the cornerstones of capital market, and hence CEOs' performance in this regard exerts a significant effect on firm value [9, 44, 45]. Besides resource development, the rise of investment efficiency is of paramount importance. Investment efficiency is perceived as a hindrance to both overinvestment and underinvestment, that is to say that resources are required to be allocated to underinvested activities rather than the overinvested ones [10,50]. It is noteworthy that efficient investments not only contribute to the mitigation of information asymmetry by diminishing cost of capital, but also release good news about firms, and hence lessening stock volatility and pushing up investors and shareholders' trust and certainty. On the other hand, financial managers need to specify the most favorable combination of the financing resources to maximize shareholders' wealth and firm value. Internal and external financing are the most common ways of financing exercised by companies. In this regard, inflows from operating activities serve as the major way of financing a firm, whereas debt or stock issuance is an external way to meet the corporate financing requirements [11]. According to Modigiladiani and Miller [12], in a capital market, corporate investment decisions are not contingent on the availability of internal resources, hence no influence on the cost of internal or external financing. This enables firms to raise funding through capital market at a given capital rate. Nevertheless, it is hypothesized that a capital market cannot be fully efficient. The presence of agency problems and information asymmetry, which is attribuTable to CEOs' financial and behavioral characteristics as well as their decision-making procedure, causes investors and creditors to distrust directors, and thus claim higher return rate to finance their investment projects [13]. External financing thus leads firms to confront with financial constraints, and consequently place higher value on internal financing (operating cash flow). Understanding the content and the nature of the manager's perceptual bias will make the CEO more coherent and more intuitive [54]. Adopting the development of various theories including agency problems, principal-client, public choice and many other theories, one can conclude that the extent of a gap between shareholders and firms gives the corporate management a pivotal role in the development or efficiency of capital markets. Therefore, the identification of the individual differences in the psychological and internal characteristics of CEOs assist in designing appropriate training programs for capital markets. Thus, the purpose of the present study is to investigate the impact of CEO's behavioral biases on investment efficiency and financing constraints in the Iranian listed firms.

2 Theoretical Framework and Hypothesis Development

2.1 Behavioral Finance Approaches

The school of behavioral finance, which is a combination of finance and psychology, is grounded on the assumption that psychology plays a pivotal role in financial decisions. As cognitive errors and deviations exert a significant effect on investment theories, they in turn influence financial alternatives [14]. This suggests that behavioral finance seeks to influence the psychological processes underlying decision-making. Nowadays, the idea of investors' rational behavior is not necessarily sufficient to justify market reactions. Therefore, behavioral finance has drawn considerable attention as a paradigm according to which financial markets are studied and also dismisses two major and restrictive assumptions of the traditional paradigm i.e. expected utility maximization and full rationality. Behavioral finance develops the claim that finding appropriate answers to empirical puzzles in the domain of finance requires us to accept the likelihood of the irrational behavior of certain economic factors [15]. Robert Olsen, however, puts forward the view that behavioral finance does not aim at acknowledging the inaccuracy of the irrational behavior, but is inclined to demonstrate the application of psychological decision-making processes in identifying and predicting financial markets. The proponents of behavioral finance show consensus on the necessity for the awareness of the psychological preferences in investments such that those who believe in the leading role of psychology as a factor influencing security exchanges and investors' decisions find it difficult to cast doubt on the reliability of the behavioral finance [16, 17].

2.2 CEO's Perceptual Biases and Financing Constraints

One of the most crucial corporate activities is to determine the optimum combination of financial resources to obtain maximum return and mitigate cost of financing. Corporate management is required to figure out how to raise more funding and then consume the available financial resources. Examples of financing include inflows from corporate operating activities, retained earnings, short-term and long-term loans and new stock issuance. The main factors affecting the source of finance are classified as either internal or external; internal factors which exert significant impacts on the corporate decisions include operating cash flows, firm size, growth opportunities, corporate operational identity, and financial constraints, whereas external factors consist of macroeconomic variables [11]. One of the most fundamental questions raised in the financial literature is how decisions need to be made regarding the financing constraints [18] as financing constraints may impede optimal resource allocation and diminish firm value [19]. A long history of theoretical and empirical literature including Almeida and Campello [20], Hovakimian [21] and Stulz [22] has documented the presence of a significant correlation between financial constraints and weak investment decisions, particularly in firms with adverse managerial conditions. In fact, despite the agency problems concerning the managerial control, investors often claim higher return on their investment as a compensation for cost of control. Not only does this constrains managerial ability in accepting projects with positive net present value, but this also curbs CEOs' access to external financing, thereby requiring them to rely more on inside sources of

finance [23]. Perceptual bias, due to its impact on managerial decision-making features, can make managing directors difficult to estimate the amount of funding they need. [11, 19]. The existence of these problems will reduce the trust and confidence of the creditors and suppliers of funds relative to the company, and the company faces serious problems with obtaining funds to invest in its future projects and projects. In this situation, shareholders and investors will also be less willing to buy company stocks, and because of these restrictions, [20] the company has no choice but to refer to its domestic financial resources, which means increasing the risk of the company. Accordingly, the first hypothesis of the research is presented:

- *Hypothesis 1: CEOs' perceptual bias significantly affects investment efficiency of the listed firms.*

2.3 CEO's Perceptual Biases and Investment Efficacy

Investment in various areas has always been counted as one of the major ways to develop firms and avoid recession. In addition to investment development, resource constraints have drawn a lot of attention towards the improvement of investment efficacy. Conceptually, investment efficiency occurs when a firm invests only in net present valued project. This scenario comes true only if the market is perfect, and the problems of an imperfect market such as inappropriate choice and agency costs do not provoke any interruption [24]. Two theoretical measures of determining investment efficiency have been introduced in the literature. First, firms need to collect the prerequisite resources to finance their investment opportunities. In an efficient market, all projects with positive net present value must be financed, yet many studies confirm that financial constraints contain managerial ability in financing, suggesting that firms suffering from financing constraints are likely to refute the projects with positive net present value owing to the high cost of financing, which in turn results in underinvestment [25]. Second, when a firm decides to raise funds, there is no guarantee for appropriate investment. Managers, for example, are likely to disinvest by choosing inappropriate projects, and hence overinvestment [26]. It should be noted that the CEO's perceptual bias makes it difficult for companies to face even a lot of business due to the extreme optimism of the company. Because of these biases, the company's investment opportunities are lost due to the false priorities that the CEO, based on the optimism and more confidence that he pursues, is lost, which makes the company's investments without any validation or an estimate of the net present value of that investment. Also, due to its lack of research and development, the CEO will delay many investment projects to pursue policies and strategies, which will greatly reduce investment efficiency. Accordingly, the second hypothesis of the research is presented:

- *Hypothesis 2: CEOs' perceptual bias significantly affects financing constraints of the listed firms.*

2.4 Review of Literature

He et al [27] scrutinize managerial overconfidence, internal financing and investment efficiency on a sample of 114 Chinese listed firms over the period of 2010-2015. Their findings reveal that internal financing can lead to overinvestment and mitigation of investment efficiency in case of managerial overconfidence, though it tends to increase investment opportunities and compensate for financial

constraints. Ulupinar [28] investigates the impact of managerialstability on CEOs' behavioral biases. The research employs three measure of CEO's tenure, managerial ownership and CEO's duality to evaluate CEO's perceptual biases based on overconfidence and optimism during the years 1994-2006. The results indicate that all mentioned measures exert a positive influence on CEOs' perceptual biases, confirming that CEOs' biased behaviors are exacerbated as their positions at the top of their organizations are consolidated. In a study entitled "behavioral biases in firms' growth expectations", Koga and Kato [29] examine 1000 firm-year observations in the Japanese listed firms from 1989 to 2015. They conclude that optimistic and pessimistic biases are significantly influenced by financial market conditions and firm-specific characteristics.

They also report that biases influence corporate actual business decisions. Fixed investments, together with research and development expenditures fluctuate with respect to managerial optimism and pessimism. The findings also suggest that corporate perceptual biases can be considered as a substitute mechanism for traditional optimization mechanisms in controlling how macroeconomics and financial conditions influence corporate investment behaviors. Undertaking a project on career concerns, shareholder monitoring and investment efficiency, Wan et al [30] reveal that investment efficiency exhibits a significant decline around CEOs' retirement, but this drop in efficiency is attenuated as shareholders impose stronger surveillance. Additionally, they document the effect of monitoring and incentive mechanisms in this regard. Farid and Ghadakforoushan [24] study the effect of financing type on investment efficiency with a particular focus on firm value. Having employed systematic sampling method, they build their research hypotheses on a sample 85 firms listed on the Tehran Stock Exchange during the years 2011-2015, and then tested using panel data technique. The results point to the significant effect of financing type on investment efficiency. Moreover, financing procedure and investment efficiency show different correlations in firms with distinct value. Financial statement users including investors are recommended to invest in the firms with higher debt ratio and financial leverage, yet lower retained earnings.

3 Research Methodology

As an applied, quasi-experimental and ex post-facto study, the current research uses multivariate regression method and econometrics models to test the hypotheses. The statistical population is composed of all firms listed on the Tehran Stock Exchange during the years 2013-2017. This sample needs to meet the following conditions:

1- They were listed on Tehran Stock Exchange prior to 31 March, 2013 and continue to 2017.
2- To increase comparability, their fiscal year ended in March
3- No changes in their fiscal year or activities happened during this period.
4- They are not included in financial intermediaries and investment companies.
5- They should not have more than a six-month hiatus during the proposed period.

After applying the above limitations, a sample of 102 firms are selected. The research data were drawn from Stock Exchange websites and Rahavard Novin software. The final data are analyzed using Eviews and Stata software's.

3.1 Research Variable

Independent Variable is included as CEOs'–Perceptual Bias which contains earnings forecast bias and overconfidence bias that are adopted to measure the CEOs' perceptual bias,

- **Earnings Forecast Bias:** as management earnings forecast error constrains investors' perception of the information content of the earnings, this is expected to reduce firm value. Following Chen and Firth [31] and Gelb and Zarowin [32], the current study employs the absolute deviation of the actual from forecasted earnings divided by forecasted earnings per share as follows:

$$\mathrm{EFE_{it}} = \frac{|\mathrm{AE_{it}} - \mathrm{FE_{it}}|}{\mathrm{FE_{it}}} \quad (1)$$

where:

EFE refers to earnings forecast error of firm i in year t, AE stands for the actual earnings per share of firm i in year t, FE denotes the forecasted earnings per share of firm i in year t.

- **Overconfidence bias:** The extant theoretical literature proposes various proxies for managerial overconfidence, among which managerial decisions on stock options [33], Net Purchases of the Firm's Shares by the CEO [34], CEOs' media reputation and relative compensation [35], and corporate investment decisions [36] deserve more attention. As the firms listed on the Tehran Stock Exchange fail to disclose the relevant information, the present study employs the measure of capital expenditures (CAPEX), which is developed by Ahmed and Duellman [34], and whose validity is verified by Hasanialghar and Rahimian [37] and Mehrani and Taheri [15]. They document that corporate investment decisions contain certain information relative to the level of managerial overconfidence [15]. As a dummy variable, if the capital expenditure ratio of the firm i is greater than the median of the capital expenditures of the sample firms at the same period, it takes the value 1, 0 otherwise. The capital expenditure ratio of each firm per year is calculated according to equation 2 and through dividing capital expenditures by the firms' total assets at the end of the previous year:

$$\left(\frac{\mathrm{C}}{\mathrm{A}}\right)_{\mathrm{it}} = \frac{\mathrm{CE_{it}}}{\mathrm{TA_{it-1}}} \quad (2)$$

where:

CE points to the capital expenditures of the firm i in year t, which, according to Lewellen and Bandirath [38], results from the difference of the net book value of fixed assets at the beginning and ending periods plus depreciation expense.

Financing constraints loom large as a result of errors in management's economic decisions, indicating its unfavorable performance in a competitive market [39] . KZ index serves as the proxy for financing constraints. Having extended the theoretical foundations of the study by Kapllan and Zingales [40], Dongmei [41] introduces an index, according to which firms with financing constraints are easily detecTable. Accordingly, firms with the maximum value of this index are highly constrained in raising sources of funds. Equation 3 illustrates the calculation of this variable:

$$\mathrm{KZ_{it}} = -1.002 \times \mathrm{CF_{it}} + 0.383 \times \mathrm{Q\,Tobin_{it}} + 3.139 \times \mathrm{Lev_{it}} - 39.368 \times \mathrm{DIV_{it}} - 1.315 \times \mathrm{C_{it}} \quad (3)$$

where:

KZ indicates financing constraints of the firm i in year t, CF denotes the cash flow of the firm i in year t. Q Tobin refers to the Q Tobin value of the firm i in year t, Lev stands for the financial leverage of the firm i in year t, DIV points to the dividends of the firm i in year t, C is the cash holding of the firm i in year t. However, as the above-mentioned model is in compliance with the

economy of the US, this study uses equation 4, as the new version of equation 6, which is adjusted to the Iranian economy by Tehrani and Hesarzadeh (2009) as follows:

$$KZ_{it} = 17.330 - 37.486 \times \left(\frac{\text{Cash Holding}_{it}}{\text{Total Assets}_{it}}\right) - 15.216 \times \left(\frac{DIV_{it}}{\text{Total Assets}_{it}}\right) + 3.394 \times Lev_{it} - 1.402 \times Q\ Tobin_{it} \quad (4)$$

To calculate the variable of investment efficiency, the model proposed by Biddle et al [42] is adopted. Considering the firm-specific empirical models of normal investment, Biddle et al [42] hold the view that total investment is the function of corporate growth opportunities. That is to say that investment is a function of growth opportunities and is sized up based on the sales level. Accordingly, this model accounts for the sales volume and level of expectations from corporate investment in an efficient market. Equation 8 computes the investment inefficiency as follows:

$$Investment_{it} = \beta_o + \beta_1 \text{Sales Growth} + \varepsilon_{it} \quad (5)$$

where:

Investment refers to the corporate investment of the firm i in year t, Sales Growth stands for the sales growth of the firm i in year t, E points to the regression residual which accounts for the efficiency or inefficiency of the investment. That is if E>0 (positive deviation from expected investment), it suggests negative net present valued projects or investment inefficiency, whereas efficient investment or projects with positive net present value hold true when E<0.

The current study employs various variables influencing investment efficiency and financing constraints as control variables. These variables are as Table 1.

Table 1: Assessment of the variables of audit firms

Variable	Symbol	Measurement method
Board size	BSIZE	it refers to the members of the boards of directors [42, 43].
Board independence	BIND	following Khodadadi et al [46] and Bebchuk et al [47], this variable is calculated via non-duty members of the board to the total members ratio.
Firm Size	SIZE	Following Higgins et al [48], the log of annual net sale is used to compute firm size.
Institutional ownership	INST	it refers to the sum of the shares owned by banks and insurance companies, investment companies, pension funds, financing firms, investment funds and public institutions and organizations divided by total issued shares [49]

3.2 Research Model

Model (1) is presented to test the hypothesis 1 of the research:

$$Investment_{it} = a_0 + a_1 CAPEX_{it} + \alpha_2 Over - Invest_{it} + \alpha_3 EFE_{it} + \alpha_4 BSIZE_{it} + \alpha_5 BIND_{it} + a_6 INST_{it} + \varepsilon_{it} \quad (1)$$

$$KZ_{it} = a_0 + a_1 CAPEX_{it} + \alpha_2 Over - Invest_{it} + \alpha_3 EFE_{it} + \alpha_4 BSIZE_{it} + \alpha_5 BIND_{it} + a_6 INST_{it} + \varepsilon_{it} \quad (2)$$

4 Empirical Results

4.1 Descriptive Statistics

To examine the general characteristics of the variables, and estimate the research model, one is required to get acquainted with their descriptive statistics. To this end, the descriptive statistics of 510 (102*5) firm-year observations during the years 2013-2017 are represented in Table 2. As tabulated in Table 1, the mean values of overconfidence biases and earnings forecast errors are calculated 0.475 and 0.073, respectively, suggesting that 7.3 percent of the forecasted earnings per share is explained by the difference between actual earnings and forecasted earnings. Likewise, the investment efficiency is computed 0.249. The mean of board independence reveals that 61.6 percent of the studied board members consists of non-duty CEOs. Furthermore, approximately 41 percent of the shares of the studied sample is on average owned by institutional investors, whereas some firms seem not to be appealing to this type of investors.

Table 2: Descriptive Statistics of the research variables

Variable	observations	Mean	Median	Minimum	Maximum	Standard Deviation
CAPEX (overconfidence bias)	510	0/475	0/454	0/000	1/000	0/51
EFE (earnings forecast error)	510	0/072	0/055	-7/032	9/836	0/094
KZ (financing constraints)	510	12/686	12/473	-1017/281	3021/362	12/326
INV (investment efficiency)	510	0/249	0/193	0/0001	0/976	0/094
Size (firm size)	510	12/679	11/893	14/817	6/791	9/372
BIND (board independence)	510	0/616	0/562	0/000	1/000	0/139
BSIZE (board size)	510	5/16	5	3	7	0/348
INST (institutional ownership)	510	0/411	0/383	0/000	0/871	0/383

4.2 Default Tests of Regression

One of the assumptions of the regression equation is constant property of the variance of errors that is considered as variance homogeneity assumption. One of the tests to recognize the heterogeneity of variance is the Breusch-Pagan test which is about being constant or variable of the error term variance. Another default test for regression is serial autocorrelation test among the error terms that is taken into consideration in this study. For this reason, the Breusch-Godfree serial autocorrelation test was used. Another test for regression is normality test of error terms. One of the tests which determines the normality of error terms is Jarque-Bera test.

Table 3: Default Tests of Regression

Model	test	Statistic F/J-B	Significance level	Situation
Model 1	Breusch-Godfree test	9/847	0/001	Non-rejection of H_0, having a serial auto-correlation
	Breusch-Pagan- Godfree test	3/388	0.066	Rejection of H_0, having no variance hetergeneity
	Jarque-Bera test	69/093	0.000	Non-rejection of H_0, abnormal distribution of error terms
Model 2	Breusch-Godfree test	10/376	0.000	Non-rejection of H_0, having a serial auto-correlation
	Breusch-Pagan-Godfree test	4/008	0.066	Rejection of H_0, having no variance hetergeneity
	Jarque-Bera test	72/554	0.001	Non-rejection of H_0, abnormal distribution of error terms

4.3 Model Review Using the Combined Data Method

The data of the research is as combined data. In combined data, we firstly used the Limer's F-test to determine is it combined or panel data? Then we used Hasmen's test to determine the constant or random effects of the research variables for more accurate estimation (distinguish between being random or being constant). According to the results of Table 4, the significance level of Limer F-statistic for all three models was less than 0.05. The results of Hasman's test showed that in regression models of the present research, because the significance level of the test is more than 5%, so we use the random effects model to estimate the model. It is noteworthy that since the models studied here have serial autocorrelation and since the random effects model has selected to test the regression models, so there is no problem for testing hypotheses because in random effects method, the generalized least squares method (EGLS) was used.

Table 4: The Results of the Combined Data Effects Test (Panel)

Selected model	Test result	Significance level	Degree of freedom	/ F- statistic χ^2	Test	
Panel	Rejection H_0	0/000	(70/239)	1/784	Constant effects (F)	Model 1
Random	Non-rejection H_0	0/081	5	6/401	Random effects) ((Hasman)	
Panel	Rejection H_0	0/000	(70/239)	1/702	(F) Constant effects Random effects	Model 2
Random	Non-rejection H_0	0/102	6	7/554	(Hasman)	

Moreover, to ensure of lacking a collinearity problem between the explanatory variables, the collinearity test was evaluated using the variance inflation factor (VIF) which considering that the values of this statistic for explanatory variables is less than 10, so there is no collinearity between them.

4.4 Testing the Research Hypotheses

The results of testing the hypotheses are represented in order.

First hypothesis

The first hypothesis predicts that CEOs' perceptual bias significantly affects the investment efficiency of the listed firms. The results of testing this assumption are illustrated in Table 4 as follows. As tabulated in Table 4, the value of f-statistics and its level of significance suggests the significance of the fitted regression model at 5% level. Given the value of adjusted R2, the researchers reached the conclusion that independent and control variables explain about 72% of the variations of the dependent variable, i.e. investment effciency. As indicated in the Table 5, the estimated coefficients of the variables of the managerial overconfidence and earnings forecast error, as the proxies for CEOs' perceptual biases, are positive and significant at 5% and 1% levels, thereby exerting a negatively significant effect on investment efficiency.

Table 5: Results of Testing Hypothesis 1

Dependent Variable: Investment Efficiency (INV)		Period Time: 2013-2016		
Observations: 510 (firm-yea		Sample: 102 firms		
investment efficiency (INV)				variable
t-statistics	standard error	regression coefficient	type of correlation	

2/716	0/036	0/097	؟	interception
-4/178	0/028	0/114**	-	earnings forecast error
-2/563	0/033	-0/085*	-	overconfidence bias

Table 5: Continue

Dependent Variable: Investment Efficiency (INV) Period Time: 2013-2016 Observations: 510 (firm-yea Sample: 102 firms					
investment efficiency (INV)	investment efficiency (INV)	investment efficiency (INV)	investment efficiency (INV)		
2/128	0/040	0/086*	+	firm value	2/128
1/018	0/057	0/058	+	board independence	1/018
2/163	0/046	0/099*	+	board size	2/163
2/187	0/029	0/063*	+	institutional ownership	2/187
21/86**	f-statistics	0/712		R2	21/86**
1/817	Durbin-Watson	0/691		adjusted R2	1/817
Note: * denotes the statistical significance at 5% level. **refers to the statistical significance at 1% level symbol: earnings forecast error (EFE), the first meaure of overconfidence (CAPEX), the second measure of overconfidence (Over_Invest), Borad size (BSIZE), board independence (BIND), firm size (SIZE) institutional ownership (INST)					

Moreover, considering the level of significance and t-statistics, Firm size, board size and institutional ownership impose positively significant impact on investment efficiency.

Second hypothesis

Table 6 represents the results of testing the second hypothesis which states that CEOs' perceptual biases significantly influence the financing constraints of the listed firms.

Table 6: The Results of Testing the Second Hypothesis

Dependent Variable: Financing Constraints (KZ) Period Time: 2013-2016 Observations: 510 (firm-year) Sample: 102 firms				
Financing Constraints (KZ)				variable
t-statistics	standard error	regression coefficient	type of correlation	
2.615	0.039	0/102	؟	interception
3/179	0/036	0/116**	+	earnings forecast error
2/403	0/039	0/094*	+	overconfidence bias
-2/339	0/053	-0/124*	-	firm value
-2/569	0/033	-0/091*	-	board independence
-2/463	0/042	-0/104*	-	board size
-2/562	0/030	-0/077*	-	institutional ownership
16/40**	F-statistics	0/584		R2
1/789	Durbin-watson	0/537		adjusted R2
Note: * denotes the statistical significance at 5% level. **refers to the statistical significance at 1% level symbol: earnings forecast error (EFE), the first meaure of overconfidence (CAPEX), the second measure of overconfidence (Over_Invest), Borad size (BSIZE), board independence (BIND), firm size (SIZE) institutional ownership (INST)				

As indicated in Table 6, the value of f-statistics and its level of significance confirm that the fitted regression model is significant at 1% level. Regarding the value of adjusted R2, one can conclude that independent and control variables explain about 58% of the variations of the dependent variable, i.e. financing constraints. As can be seen, the estimated coefficient of overconfidence bias and earnings forecast error positively influence the variable of financing constraints with t-statistics of 2.403 and

3.179, respectively, suggesting that CEOs' perceptual bias results in the exacerbation of corporate financing constraints. Considering 1% and 5% levels of significance, all research control variables including firm size, board independence, board size and institutional ownership are argued to have negatively significant effect on investment efficiency.

5 Conclusions

CEOs' individual performance is influenced by his/her psychological characteristics, particularly his perceptual biases, which deviate his/her decisions from their rational trend into a sensitive or biased one. Perceptual bias is an internal status always resulting in wild estimates and biased judgment. The present study is concerned with scrutinizing the effect of CEOs' perceptual biases on investment efficiency and financing constraints of the firms listed on the Tehran Stock Exchange. In the pursuit of this goal, it sampled 102 firms listed during the years 2013-2017. The results of testing the first hypothesis reveal that CEOs' perceptual biases often manifests in terms of earnings forecast bias and overconfidence bias, exerting significantly negative effect on investment efficiency. In fact, earnings forecast bias denotes the CEOs' earnings estimates which do not necessarily lead to actual earnings owing to severe economic fluctuations, and, as a result, diminishes earnings quality, which in turn elicits investors' severe reactions to the firms, besetting firms for future financing. Under these circumstances, shortage of cash brings previous investment projects to serious challenges, and hence reduced investment efficiency. On the other hand, managerial overconfidence, which seeks its roots in the decisions on capital expenditures, is believed to be one of the paramount factors contributing to the mitigation of investment efficiency as managerial overconfidence is intended to have CEOs make optimistic overestimates on projects, and accordingly purchase fixed capital to facilitate future investment efficiency. Nevertheless, the findings suggest that increasing capital expenditure mitigates investment efficiency, and consequently, reduces the trustworthiness of the management. In fact, overconfident CEOs are well-known for overestimating the future return of the projects or the likelihood of the favorable effects of the corporate cash flows due to their overconfidence biases, which enhances capital expenditures, and hence diminished investment efficiency. Interestingly, CEOs' decisions to elevate investment efficiency is highly contingent on the available resources, so they are required to count all economic variations to avoid internal optimism. These findings are in compliance with those documented by He et al [27] and Wan et al [30], which confirms the assumption propounded in the first hypothesis. The second hypothesis further indicates that CEOs' perceptual biases positively influence financing constraints. As such, when management makes future earnings forecast errors, the corporate dividend policy is confronted with serious problems so that it can no longer meet shareholders' expectations to obtain higher returns. This undermines shareholders' confidence in corporate performance and thus constrains firms' potential to attract more cash finance for their investment projects, thereby imposing greater financing constraints. On the other hand, overconfidence bias pushes up financial constraints because overestimation of corporate future investment return levels up shareholders and investors' expectations, which in turn not only causes a sharp decline in shareholders and investors' confidence in corporate performance as long as a rise in firms' capital expenditures retards the development of their investment projects, but also builds more obstacles on the way firms try to finance their investment projects due to the lack of cash inflows and poor financial performance. These findings are in line with those reported by He et al [27], Wan et al [30], Chavoshi et al [51], Agah et al [52], Mardani and Sarlak [53] and Hematfar and Soheili [55]. Regarding the results of test-

ing the first hypothesis, the identification of CEO's perceptual biases urges a particular attention to their psychological characteristics during the process of decision-making since biased decisions increases agency costs. In fact, it is recommended that monitoring institutions hold periodical workshops on psychology to not only eliminate perceptual biases, especially those interrupting investment decision-making. This not only helps reduce the costs of making biased decisions, but also makes marketplace look more appealing to investors and shareholders. The findings also suggest that a comprehensive database is designed to facilitate the process of evaluating investment plans either economically or legally, thereby avoiding making fallacious decisions by managers. The results of testing the second hypothesis recommend monitoring bodies of stock exchange amend their standards and guidelines to minimize the financing constraints, and firms deserves to exploit external financing based on their investment and financial potential. Furthermore, firms are required to both have their CEOs attend their firms periodically and specify their tenure to mitigate the CEOs' perceptual biases during the process of undertaking projects and financing. They also need to prevent CEOs from financings based on job ownership and managerial entrenchment since these kinds of investment plans are suspected to generate any returns for investors and shareholders, and hence increasing the likelihood of financial constraints.

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