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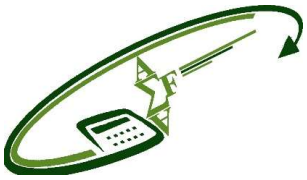

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The Effects of the CEO's Perceptual Bias in Economic Decision-Making and Judgment on the Capabilities of the Financial Reporting Quality

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ABSTRACT

The financial anomalies, which have brought about challenges for the nature of efficient-market hypothesis, provide ample experimental evidence on the deviation of market from rationality. According to the efficient-market hypothesis, investors avail themselves of all the information available in the market, and then attempt a thorough and painstaking interpretation of it. The empirical evidence, however, reveals that most investors fail to implement rigorous information processing, thereby rendering to a number of behavioral theories concerning market inefficiency and biased information processing. The current research sets out to identify and scrutinize the impact of the CEO's perceptual biases in judgment and economic decision-making on the reporting quality of the firms listed on the Tehran Stock Exchange. Adopting a mixed method, the present study first seeks to detect the components and indices of CEO's perceptual biases via critical appraisal and with the special participation of 10 accounting experts. Afterwards, the recognized indices are set to undergo a Delphi analysis given the mean and the coefficient of agreement. The verified indices are then adapted to the accounting models and analyzed in the form of research hypotheses. The results of qualitative analysis using Delphi method verify the reliability of 16 indices out of 22 ones. Regarding the quantitative analysis, the association between the indices of the CEO's perceptual biases in judgment and economic decision-making, and the primary proxies of financial reporting, namely reliability and competitiveness is tested. The findings reveal that the indices of the CEO's perceptual biases in judgment and economic decision-making exert a significantly negative effect on financial reporting reliability and competitiveness.

1 Introduction

Corporate financial performance demonstrates the degree to which firms have the capacity to achieve their financial goals. The retention and promotion of financial performance to meet shareholders' requirements and to attract new investors are of paramount importance in today's competitive world. The corporate financial performance is argued to appeal mainly to investors, creditors, directors and governments [1]. Over the past decade, information quality has turned out to be one of the major concerns of organizations and an appropriate setting for managerial information system. Furthermore,

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improved data resources and increased availability of information resources to CEOs and users have pointed up the necessity for good understanding of information quality [2]. In fact, financial statements aim at providing investors and other stakeholders with clear-cut information about corporate financial condition, performance and flexibility to allow them to make informed decisions. As long as financial statements satisfy these requirements, they will exhibit high quality [3]. While seeking to mitigate agency costs, CEOs are determined to guarantee the quality financial reporting such that their technical and perceptual (psychological) abilities make substantial contribution in this regard [4]. As such, perceptually and technically competent CEOs can make informed decisions and enhance corporate performance within a competitive market. A long history of literature has zeroed in on the pivotal role of individual characteristics and managerial tendencies in the explanation of corporate consequential variables including investment, merger, or financing, which encompasses a broad range of such managerial specifications as risk-aversion and education, as well as perceptual and behavioral tendencies like risk-aversion and overconfidence. The literature has mostly focused on the psychological characteristics of CEOs given their role as a senior decision-maker and the availability of the information to investors and shareholders [5, 6, 7, 8]. Indeed, the CEO's role with the focus on his/her psychological attributes is vitally important in reducing agency costs. To put it differently, the present research zooms in on the CEO's perceptual biases with respect to his/her managerial characteristics, and, built upon the theoretical foundations of Roll [9] and Heaton [10], it aims to investigate to what extent perceptual biases influence corporate financial reporting quality. Malmendier et al [11], for instance, accentuates the effect of the CEO's perceptual biases on corporate cost of equity. Glasso and Simcoe [12] also verify the significant impact of managerial characteristics on innovation. Nevertheless, not much is known about the likely effect of the CEO's perceptual characteristics on financial reporting quality. Therefore, the current article not only is claimed to be a pioneer in the field, but also tries to extend the theoretical discussions on the CEOs' responsibility in leveling up corporate financial reporting quality. As a matter of fact, perceptual biases are attributable to CEOs' insight in conducting an educated estimate of corporate resources and configuring future financial policies, through which they eliminate or aggravate the gap resulting from agency costs. Reporting quality is characterized as one of the major consequences of the CEOs' perceptual biases and bring about a lot of benefits in the capital market. Lang and Lundholm [13] and Healy et al [14] propound the view that firms with highly quality disclosure act as a mutual benefit. This suggests that they not only improve the shareholders' decision-making quality through timely disclosure and reduced information asymmetry, but also rectify the CEOs' perceptual errors including lower expected earnings volatility, lower overconfidence error, lower myopia error, and lower overinvestment error. Given the above discussion, the extant literature on biased behaviors is proved to focus merely on investors' behavioral errors, affections, and feelings while making investment decisions. It is noteworthy to investigate whether CEOs' feelings and perceptions of financial and analytical affair influence financial and accounting stuff. Do they exhibit behavioral bias and perceptual and judgmental errors while making decisions? Do an individual feelings and judgments together with his/her personality traits matter in corporate performance and financial reporting quality? This study sets out to delve into the latest search to introduce the components and indices of perceptual biases, particularly CEOs' judgmental and behavioral biases. Afterwards, it has an important mission on the identification of the qualitative characteristics of financial reporting to discover if these CEOs' biases influence corporate financial reporting quality.

2 Theoretical Framework and Hypothesis Development

The school of behavioral finance, as a result of the combination of psychology and finance, is founded on the view that psychology plays an essential role in financial decision-making. As cognitive errors and deviations affect investment theories, they also exert the same effect on financial alternatives [15]. Behavioral finance is the science of studying how individuals analyze and interpret information to make informed investment decisions. To put it another way, behavioral finance seeks to examine the effect of psychological processes on decision-making. Nowadays, the perception of investors' fully rational behavior in pursuit of maximizing their benefits proves insufficient to justify market reaction and behavior. Therefore, behavioral finance is counted as a paradigm according to which financial markets are studied given certain models which, in turn, refute two fundamental and circumscribing assumptions of the traditional paradigms, namely maximization of the expected tendencies and full rationality. The theoretical underpinnings of behavioral finance lend support to the claim that experimental puzzles in the domain of finance are sometimes hard to solve as certain economic factors are likely to demonstrate less rational behavior [16].

However, Robert Olsen is inclined to believe that behavioral finance does not aim at propagating the idea of the inaccuracy of rational behavior, but tries to encourage discussions on the role of psychological decision-making processes in recognizing and predicting financial markets. The proponents of behavioral finance develop the claim that the subject of psychological tendencies within the realm of investment requires extensive research. Taking psychology into consideration as a fundamental factor influencing the financial knowledge of investors in stock exchanges makes it difficult to accept the presence of uncertainty towards the behavioral finance creditability [17, 18]. The history of behavioral finance dates back to the early 70s. This mixed branch of financial sciences in which psychological and sometimes sociological issues are employed to run a more thorough analysis of financial market problems mostly focus on investors' decision-making process and their reaction to various conditions of financial markets, and particularly accentuates the effect of investors' personality, culture, and judgment on their investment decisions. In actual fact, following Hirshleifer [15], Lovalla and Kahneman [19], Jones and Paulhus [20] and Murphy [21], if biased approaches are built upon the CEOs' psychological attributes, then socio-cultural characteristics need to be taken into account as important factors contributing to the CEOs' perceptual formations, which are included within the intermittent matrices of unbalanced economic infrastructures, and resulting in heterogeneity contradictions during the process of managing organizations and in the form of agency costs between CEOs and shareholders. Most of the behavioral characteristics including theatricality of behaviors, exaggerated expression of performance and reputation (management in favor of shareholders' interest and desires) have been notoriously salient in recent years, and not only have they scarcely been under transparent surveillance, but they have also gained more strength and consequently, have promoted biased behaviors [16]. Accordingly, directors believe that ensuring shareholders and investors in capital market is the only way to escape the difficulties unscathed. Lack of transparent regulations and guidelines for the evaluation and determination of CEOs' tenure is another factor which signals the increasing behavioral biases in their performance. Moreover, lack of alignment of psychology with economic issues, along with the political connections within financial markets and stock exchanges, has rendered the problem of CEOs' perceptual biases unsolved in the developing countries like Iran [22, 60]. In fact, in the sovereignty structure of Iran, CEOs are hired to retain the minority interests at the expense of majority

interests, which can exacerbate CEOs' perceptual biases. The idiosyncratically cultural, political, economic and social structure of Iran and its effect on individual and group behaviors, especially in the capital market thus urges the recognition of theories as well as the analytical and cognitive models of behavioral finance. Todays, accounting information systems play the leading role in the organizational workflow. Most of the economic decisions are made given the information collected from these systems. Furthermore, most of the stock exchange transactions are dedicated to corporate stock trading, which, in turn, is affected by accounting information and figures. Investigations into how accounting information influences the wide range of stakeholders across companies help us get a better understanding of its role and the urge of its disclosure [23].

Financial reporting quality demonstrates the accuracy of financial reports in stating the information concerning the corporate operations in general, and expected cash flows in particular to leave investors with an erudite arsenal of information. According to FASB concepts statement # 1, financial reporting needs to provide a wide range of investors with fruitful information to assist them in making informed financial decisions. In fall 2005, the Iranian financial reporting quality was aligned with the international standards such that statement #1 of the Iranian stock exchange regulations put a particular emphasis on the importance of disclosure, thereby leading to the approval of the disclosure guidelines imposed on the listed firms on the part of the stock exchange board of directors. Furthermore, the recent declaration entitled "the corporate requirement to meet International Financial Reporting Standards (IFRS) while preparing financial statements" has been issued by general assembly of the Iranian audit organization in November 2016 with the aim of improving the informational transparency and developing the capital market and its international position (Iranian Stock Exchange declaration, 2016). Though the changes in the nature of financial reporting in the Iranian capital market are not aligned and integrated as a result of lack of appropriate monitoring infrastructures, and many firms take advantage of legal gaps to lead stakeholders astray, they are important measures which need to be taken to solidify the foundation of corporate reporting. Ulupinar [24] investigates the effect of managerial stability on the CEO's perceptual biases over the period of 1994-2006. To measure managerial stability, the study employs CEO's tenure, managerial ownership and CEO's duality, and perceptual biases are peroxided by overconfidence and optimism. The results reveal that the three managerial stability variables exert significantly positive impact on the CEO's perceptual biases, and hence leading to increased biased behaviors as managerial position becomes stable. Carrying out a study entitled "behavioral biases in firms' growth expectations", Koga and Kato [25] examined 1000 firm-year observations from a sample of Japanese listed firms during the years 1989-2015. They document that optimistic and pessimistic biases are significantly influenced by financial market conditions and firm-specific characteristics like corporate history. Their findings also suggest that biases and partiality significantly affect corporate business decisions. Corporate fixed investment together with its research and development expenditures may exhibit kind of fluctuation given optimism and pessimism. The discussed findings imply that corporate perceptual biases prove to be an alternative mechanism to traditional optimization mechanism given the impact of financial position and macroeconomy on corporate investment behaviors. Chollet et al [21] undertakes a project on the association between market knowledge and CEOs' characteristics using a fuzzy approach. They examine such psychological characteristics of 409 CEOs of the small-to-medium sized firms in Haute-Savoie in France over a fiscal year as overconfidence, overinvestment (extraversion), and accuracy of processing (as a characteristic of emotional stability), and conclude that

market knowledge helps CEOs harness their likely perceptual biases, and hence more informed decisions. Bilgehan [27] conducts a survey on psychological biases and capital structure decisions. Following the literature on financial issues and capital structure, the study sets out to investigate whether CEOs are influenced by their psychological attributes during the process of making financing decisions. The experimental findings reveal that CEOs' perceptual biases play a pivotal role in explaining the logic behind the choice of a given capital structure. Mohammad Ali and Anis [28] examine the impact of emotional biases including CEO's overconfidence on corporate dividend policies using Bayesian network method. The emotional bias is measured using a questionnaire with multiple items. The statistical population consists of 100 CEOs in Tunisia. The study reports that CEOs are influenced by certain perceptual biases including optimism, loss aversion and overconfidence. It also reveals that CEOs' perceptual biases affect the dividend policies and value creation.

3 Research Methodology

As a developmental study, the current research aims to advance theorizing related to the topic under investigation, through identifying the components of CEOs' behavioral biases as well as the components of financial reporting quality in a sample of Iranian listed firms. It can also be characterized as a descriptive study as it seeks to explain and describe the recognized components via regression models. As such, the qualitative and quantitative characteristics of the research place it in the domain of inductive and deductive reasoning approaches, and hence a mixed method. The present research also adopts both library and Delphi methods to extract the required data through examining the financial statements of the Iranian listed firms. The first step to recognize the components of CEOs' perceptual biases and financial reporting quality is through critical evaluation. Accordingly, 10 various characteristics including research objective, methodology, and plan, sampling, data collection procedure, reflexivity, ethical considerations, the accuracy of analysis, theoretically transparent expression of the results, and research value, which are determined by the researcher through note-taking, are first examined and then valued from 0 to 50. Afterwards, 10 accounting experts (appendix 1) were invited to participate as the members of the panel and score the mentioned characteristics. Given the index of mode, those surveys which obtain a score of higher than 30 enter the second phase, namely critical evaluation, in which primary components are determined based on the index of frequency. In this stage, the researcher reorganizes the verified primary components into a table, and then those with the most frequency are transformed into certain checklists and then sent to the Delphi phase. In this phase, the indices of each component are confirmed or rejected based on two measures of Cohen's Kappa coefficient and mean, and eventually, in quantitative stage and based on the modeling of each verified index, the effect of CEO's perceptual biases on financial reporting quality is examined. The statistical population is composed of all firms listed on the Tehran Stock Exchange during the years 2010-2017. This sample needs to meet the following conditions:

1- They were listed on Tehran Stock Exchange prior to 31 March, 2010 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 intermediate and investment companies.

After applying the above limitations, a sample of 72 firms were selected. The research data were drawn from Stock Exchange websites and Rahavard Novin software. The final data were analyzed using Eviews software.

Table 1: The validity of the determined indices

CVR							
confirm/reject	computation method	result	C[3]	B[2]	A[1]		
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	overconfidence error	the CEO's perceptual bias in judgment
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	optimism error	
confirmed	$CVR = \frac{9 - \frac{10}{2}}{\frac{10}{2}} = 0/8 > 0/49$	0.8	9	1	-	earnings forecast error	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	myopia error	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	overinvestment error	the CEO's perceptual bias in economic decision-making
confirmed	$CVR = \frac{9 - \frac{10}{2}}{\frac{10}{2}} = 0/8 > 0/49$	0.8	9	1	-	investment inefficiency	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	financing constraints	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	Highly valued equity	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	financial statement comparability	financial reporting reliability
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	integrity of financial statement	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	information content of financial statement	
confirmed	$CVR = \frac{9 - \frac{10}{2}}{\frac{10}{2}} = 0/8 > 0/49$	0.8	9	1	-	financial statement timeliness	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	earnings persistence	competitiveness
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	accruals quality	
confirmed	$CVR = \frac{10 - \frac{10}{2}}{\frac{10}{2}} = 1 > 0/49$	1	10	-	-	financial flexibility	
confirmed	$CVR = \frac{9 - \frac{10}{2}}{\frac{10}{2}} = 0/8 > 0/49$	0.8	9	1	-	earnings persistence	

[1] Necessary
[2] Useful, but unnecessary
[3] Unnecessary

The Validity and reliability of the indices

To verify the validity of the researcher-made questionnaire, the present research adopts Content Validity Ration (CVR), according to which ten members of the panel were asked to rate each component presented in Table 1. Given the value of CVR>0.49, the content validity of the research components is confirmed. To determine the reliability of the questionnaires, the agreement coefficient of Delphi technique is employed.

The Operational definition of the verified indices in the qualitative stage

A) CEO's perceptual biases

1) CEO's perceptual bias in judgment

Building on the results of Delphi technique, four indices of overconfidence error, optimism error, eaings forecast error, and myopia error are adopted. They are computed based on the model as follows:

Overconfidence error

The extant literature introduces various measures for computation of overconfidence. Examples of these measures include CEOs' decisions on stock options [29], net purchases of the firm's shares by the CEO [30], CEOs' media reputation and relative compensation [29] and firm's investment decisions [31]. Since the Iranian listed firms do or do not disclose these data partially, two measures of (CAPEX) and (OVER_INVEST) developed by Ahmed and Duellman [30], and verified given their reliability by such Iranian studies as Hasanialghar and Rahimian [32] and Mehrani and Taheri [33] are adopted. The results of these studies reveal that corporate investment decisions are influenced by managerial overconfidence [33].

Variable #1 (CAPEX): as a dummy variable, if the capital expenditure ratio of firm i is higher than the median of that of the firms in the relevant industry in the same period, it implies overconfidence and hence takes the value of 1, 0 otherwise. The capital expenditure ratio of each firm per year is computed based on the equation (1) and through dividing capital expenditure by total assets of the firm at the end of the prior fiscal year:

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

where

CE_{it} indicates capital expenditure of firm i in year t, and, following Lewellen and Badrinath [34], is calculated via subtracting the beginning net book value of fixed assets from the ending net book value of fixed assets plus depreciation cost. TA_{it-1} also refers to the total assets of the firm at the end of the prior fiscal year.

Variable #2 (Over_Invest): it denotes overinvestment which is calculated through the regression of asset growth on sales growth in the industry level as described in the equation (2). If the regression has positive residual, it then implies overinvestment and hence, the variable takes the value of 1, 0 otherwise.

$$\text{ASSET GROWTH}_{it} = \beta_0 + \beta_1 \text{SALE GROWTH}_{it} + \varepsilon_{it} \quad (2)$$

where

ASSET GROWTHit accounts for the asset growth of firm i in year t, SALE GROWTHit refers to sales

growth of firm i in year t. Asset growth and sales growth are computed using the following equations (3) and (4):

$$\text{ASSET GROWTH}_{it} = \frac{\text{ASSETS}_{it} - \text{ASSETS}_{it-1}}{\text{ASSETS}_{it-1}} \quad (3)$$

$$\text{SALE GROWTH}_{it} = \frac{\text{SALE}_{it} - \text{SALE}_{it-1}}{\text{SALE}_{it-1}} \quad (4)$$

Optimism error

Following Campbell et al [35], the current research employs a dichotomous measure (0, 1) to calculate the managerial optimism error. As such, if the days with increased stock price outnumber those with decreased stock price, then the variable takes the value of 1, 0 otherwise.

Earnings forecast error

It is characterized as the managerial error in forecasting earnings in comparison to actual earnings, which ultimately results in lower earnings quality and hence, leading market astray and mitigating the coefficient of the reported earnings response [13, 36]. As managerial earnings forecast error hinders investors from having a sound understanding of the information content of earnings, it is predicted to reduce stock value. This study, in accordance with Chen and Firth [37] and Gelb and Zarowin [36], employs the absolute value of the deviation of actual earnings from expected earnings on the expected earnings per share as in the equation (5):

$$\text{EFE}_{it} = \frac{|\text{AE}_{it} - \text{FE}_{it}|}{\text{FE}_{it}} \quad (5)$$

where

EFE_{it} denotes the earnings forecast error of firm i in year t, AE_{it} refers to the actual earnings per share of firm i in year t, FE_{it} points to the forecasted earnings per share of firm i in year t.

Managerial myopia error

Managerial myopia is counted as a behavior based on CEOs' viewpoints towards corporate performance in the market place. Indeed, firms which simultaneously report higher-than-expected return on assets and less-than-expected development are liable to suffer from managerial myopia. To identify the myopic firms, the expected level of return on assets, marketing cost and R&D expenditures are calculated for each firm per period. In the pursuit of this goal, the following equations are adopted based on Adeson and Hsiao [38]:

$$\text{ROA}_{it} = \beta_0 + \beta_1 \text{ROA}_{it-1} + \varepsilon_{it} \quad (6)$$

$$\text{MKTG}_{it} = \beta_0 + \beta_1 \text{MKTG}_{it-1} + \varepsilon_{it} \quad (7)$$

$$\text{R\&D}_{it} = \beta_0 + \beta_1 \text{R\&D}_{it-1} + \varepsilon_{it} \quad (8)$$

where

ROA_{it} is the return on assets of firm i in year t, ROA_{it-1} refers to the return on assets of firm i in year t-1, $MKTG_{it,}$ indicates the marketing cost of firm i in year t, $MKTG_{it-1,}$ stands for the marketing cost of firm i in year t-1, $R\&D_{it,}$ is the R&D expenditures of firm i in year t, $R\&D_{it-1,}$ denotes the R&D expenditures of firm i in year t-1. The estimation of the values of return on assets, marketing cost and R&D expenditures is carried out using the above i-indexed model. Afterwards, the forecasted values are compared with the actual ones, and then the sample firms are classified into two groups given the forecast

errors of these three patterns. It is noteworthy that non-homogeneous data render the implementation of the model in the industry level unfeasible as all the sample firms abstain from disclosing their R&D expenditure information. The model is thus run for the whole sample of the firms. Regarding the forecast error of these three measures, the firms are divided into two groups as follows:

Table 2: Classification of the sample firms

group	Difference between returns on assets	Difference between marketing cost and R&D expenditures
group 1	the difference between forecasted return and positive actual values	the difference between forecasted marketing and R&D costs and negative actual values
group 2	the difference between forecasted return and positive actual values	the difference between forecasted marketing and R&D costs and negative actual values

Since the managerial myopia is measured qualitatively, firms with myopic CEOs are classified in group 1 and take the value of 1, 0 otherwise. This suggests that firms with myopic CEOs exhibit negative R&D expenditures, marketing cost and return on assets, though their performance is positive. To put it differently, although these firms try to show off their appropriate performance in terms of their proper return on assets, the difference between marketing and R&D costs and actual values implies their managerial myopia.

2) The CEO's Perceptual bias in economic decision-making

According to the results of Delphi method and Table 2, four components of overinvestment, investment inefficiency, financial constraint and highly valued equity are verified and measured as follows:

Overinvestment

The extant literature suggests that most scholars recommend the equation (9) to estimate the appropriate level of investment. Following Richardson [39] and Biddle and Hilary [40], Young and Jiang [41], for instance, adopt a multivariate regression model with multiple control variables to estimate the appropriate level of investment in the Chinese capital market. In Iran, Tehrani and Hesarzadeh [42] rely on the analysis of variables sensitivity to explain the investment conditions in the Iranian capital market. On similar grounds, the present study employs the following equation:

$$I_{it} = \beta_0 + \beta_1 Cash_{it} + \beta_2 Growth_{it} + \beta_3 ROA_{it} + \beta_4 Lev_{it} + \beta_5 Size_{it} + \varepsilon_{it} \quad (9)$$

where

I_{it} stands for the investments of firm i in year t, $Cash_{it}$ refers to the cash withheld by the firm i in year t (which is calculated as the sum of the cash and short-run investments of firm to total assets ratio for firm i in year t-1, implying the level of corporate cash holding and its ability in investment), $Growth_{it}$ points to the investment opportunities for firm i in year t (which is computed as the market value to book value ratio of the ending assets in firm i in year t-1), ROA_{it} refers to return on assets in firm i in year t (which is obtained from the operational earnings to total assets ratio of firm i in year t), Lev_{it} denotes the financial leverage of firm i in year t, $Size_{it}$ refers to the size of firm i in year t, and E_{it} points to the regression residual, which suggests overinvestment if it takes a positive value, underinvestment otherwise.

Investment inefficiency

According to Biddle et al [43], within the firm-specific experimental models of normal investment, the total asset is a function of corporate firm growth. They count the sales level as a good sign of investment

efficiency or inefficiency. In other words, investment is a function of growth opportunities, which is computed via the estimation of corporate sales level. Accordingly, this model is a good icon of the corporate sales and expected investment levels within an efficient market place. The equation (10) computes the investment inefficiency as follows:

$$\text{Investment}_{it} = \beta_o + \beta_1 \text{Sales Growth} + \varepsilon_{it} \quad (10)$$

where

Investment_{it} indicates the investment level of firm i in year t, Sales Growth refers to the sales growth of firm i in year t, E_{it} points to the regression residual, which implies the investment efficiency or inefficiency. That is to say that if $E_{it}>0$ (positive deviation from the expected investment), then it accounts for the choice of the projects with negative net present value or investment inefficiency, whereas, if $E_{it}<0$ (negative deviation from the expected investment), then it denotes the projects with positive net present value or investment efficiency.

Financing constraint

Financial constraint is a kind of performance error resulting from the CEOs' economic decisions and is a good indicator of corporate inappropriate performance in the competitive market [44]. KS index is used to measure the financial constraint. Degmi [4] advances the research conducted by Kaplan and Zingalas [21] and finally develops an index based on which one can identify the firms with financial constraints. Accordingly, firms which obtain higher values relative to this index are considered the most financially constrained ones. The equation (11) suggest a good way for the calculation of the corporate financial constraint:

$$KZ_{it} = -1.002 \times CF_{it} + 0.383 \times Q\ Tobin_{it} + 3.139 \times Lev_{it} - 39.368 \times DIV_{it} - 1.315 \times C_{it} \quad (11)$$

where

KZ_{it} denotes the financial constraint of firm i in year t, CF_{it} refers to the cash flow of firm i in year t, $Q\ Tobin_{it}$ points to the index of Q Tobin for firm i in year t, Lev_{it} stands for the financial leverage of firm i in year t, DIV_{it} is measured by dividing the earnings by the assets of firm i in year t, C_{it} denotes the cash of firm i in year t. However, given the fact that the mentioned equation is built upon the American economic environment, it thus needs to be modified according to the Iranian context, and hence the equation (12) as follows:

$$KZ_{it} = 17.330 - 37.486 \times \left(\frac{\text{Cash Holding}_{it}}{\text{Total Assets}_{it}}\right) - 15.216 \times \left(\frac{DIV_{it}}{\text{Total Assets}_{it}}\right) + 3.394 \times Lev_{it} - 1.402 \times Q\ Tobin_{it} \quad (12)$$

Highly valued equity

Following Houmes et al [45] the present study employs the ending stock price to earnings before unexpected items and ceased operation ratio to measure the valued equity. As such, if the ending price-to-earnings ratio is high, the firms are placed within the group of firms with highly valued equity, classified within that of firms with low valued equity otherwise.

B) Financial reporting quality

1) Financial reporting reliability

Financial statements comparability

To measure financial reporting comparability, the model developed by DeFranco et al [46] is adopted.

Accordingly, the corporate accounting system is a function in which economic events (stock return) are transformed into financial reports (accounting earnings) such that the more identical the accounting functions of either firms, the higher their financial statements comparability. Adopting this measure, the present study first employs the following regression model for each firm-year to measure the financial statements comparability of firm i and j, and then the recent three-year period (12 quarters) is estimated using time-series data:

$$\text{Earning}_{it} = \alpha_i + \beta_i \text{Return}_{it} + \varepsilon_{it} \quad (13)$$

where

Earning_{it} refers to the quarterly net earnings divided by the beginning market value of firm i in year t, Return_{it} denotes the quarterly stock return of firm i in year t. The estimated coefficients of the equation (13) are good indicators of the corporate accounting function, which converts the economic events (return) into the accounting reports (earnings). That is, a_i and b_i point to the accounting functions of firm i, whereas a_j and b_j refer to the accounting functions of firm j. The range of similarity between the accounting functions of either firms denotes the range of the comparability between the firms. Therefore, to estimate the difference between the accounting functions and operations of firm i and j per year, the earnings of firm i is separately computed using the accounting function of firm i itself, and then using the accounting function of firm j together with the return of firm i itself for the same period as the equation (13):

$$\text{E(Earning)}_{iit} = \hat{\alpha}_i + \hat{\beta}_i \text{Return}_{it} \quad (14)$$

$$\text{E(Earning)}_{iij} = \hat{\alpha}_j + \hat{\beta}_j \text{Return}_{jt} \quad (15)$$

where

$\text{E(Earning)}_{ij,t}$ refers to the forecasted earnings of firm i in year t using the accounting function of firm i, E(Earning)_{ijt} points to the forecasted earnings of firm i in year t using the accounting function of firm j. After computing the mentioned values, the obtained mean of the difference among the resulting forecasted earning values suggest a difference between the accounting functions of either firms. Therefore, its opposite denotes the level of similarity and comparability between the firms as follows:

$$\text{ComAcc}_{ijt} = \frac{-1}{12} \sum_{t-11}^{t} \left| \text{E(Earning)}_{iit} - \text{E(Earning)}_{ijt} \right| \quad (16)$$

where

CompAcc_{ijt} refers to the financial statements comparability of firms i and j in year t. Similarly, the CompAcc_{ijt} is computed for each pair of firm i and j in the same industry per year. Afterwards, the median of the calculated values for firm i in year t is adopted as a proxy for firm-specific comparability ($\text{Com}_{i,t}$).

Integrity of financial statements

Information is logically expected to disclose the outcomes of transactions and other economic events. Given that earnings are a major indicator of fluctuations in firm economic value [47], the present research adopts the equation (17) from Beaver [48] to measure the integrity of financial statements:

$$RET_{it} = \beta_0 + \beta_1 \Delta EARN_{it} + \beta_2 \Delta EARN_{it} \times INS_{it} + \beta_3 \Delta EARN_{it} \times CONS_{it} + \beta_4 MAN_{it} + \beta_5 \Delta Toatl\ Assetes_{it} + \beta_6 DEBT_{it} + \beta_7 LOSS_{it} + \varepsilon_{it} \quad (17)$$

where

RET_{it} stands for the annual stock return of firm i in year t, $\Delta EARN_{it}$ refers to the net earnings fluctuations of firm i in year t in comparison with year t-1, INS_{it} points to the institutional shareholders of firm i in year t, $CONS_{it}$ denotes the total stock of the controlling shareholders with more than 5 percent share in firm i in year t, MAN_{it} points to the CEO's total shares in firm i in year t, $\Delta Toatl\ Assetes_{it}$ refers to the changes in total assets of firm i in year t, $DEBT_{it}$ stands for the debt ratio of firm i in year t, $LOSS_{it}$ points to the loss of firm i in year t (if the firm is loss-making, it takes the value of 1, 0 otherwise).

Financial statements timeliness

The timely availability of the information to decision-makers is of paramount importance. This study adopts the approach developed by Chambers and Penman [49] to measure the financial statements timeliness as follows:

$$Reporting - Lag_{it} = \beta_0 + \beta_1 INS_{it} + \beta_2 CONS_{it} + \beta_4 MAN_{it} + \beta_5 \Delta Toatl\ Assetes_{it} + \beta_6 DEBT_{it} + \beta_7 LOSS_{it} + \varepsilon_{it} \quad (18)$$

where

Reporting-Lag_{it} represents the interval from the latest financial period to the reporting date of the financial statements of firm i in year t.

B) Financial reporting competitiveness

Information content of financial statements

The information content of financial statements represents the volume of the information disclosed through corporate financial statements, and hence the information advantage of disclosed financial statements. Adopting the model proposed by Ohlson and Feltham [50], the ongoing research employs the equation (19), which makes a linkage between market value and book value of capital and net income, to measure the information content of corporate financial statements:

$$MV_{it} = \beta_1 + \beta_2 BV_{it} + \beta_3 NI_{it} + \varepsilon_{it} \quad (19)$$

where

MV_{it} refers to the stock market value of firm i in year t, BV_{it} indicates the stock book value of firm i in year t, NI_{it} points to the net income of firm i in year t, E_{it} denotes the regression residual.

Earnings persistence

Earnings persistence is one of the proxies of measuring earnings quality. The more the earnings persistence, the higher its predictability and incentives [51]. Since unsustainable earnings fails to provide shareholders with valuable information, they rely on alternative types of information like free cash flow. To compute the earnings persistence, the present article employs the model introduced by Francis et al [51] as follows:

$$\frac{EARN_{it}}{Total\ Assets_{it-1}} = \beta_0 + \beta_1 \times \frac{EARN_{it}}{Total\ Assets_{it-1}} + \varepsilon_{it} \quad (20)$$

where

$EARN_{it}$ refers to net earnings before accrual items for firm i in year t, Total $Assets_{it-1}$ points to the total assets of firm i in year t. Earnings persistence is estimated using Beta coefficient for which the value of closer to 1 (or higher than 1) implies high persistence of earnings, whereas the value of less than 0 suggests unsustainability of earnings. To put it differently, sustainable earnings is a good indicator of high quality earnings, yet unsustainable implies low quality earnings.

Accruals quality

Accruals quality is adopted as a proxy of financial reporting competitiveness, and indicates the potential of the reported earnings of a firm relative to its other counterparts. According to Dechow and Dichev [52], the equation (20) is employed to measure accruals quality as follows:

$$\frac{\mathrm{TCA_{it}}}{\mathrm{Total\ Asset_{it-1}}} = \beta_1 + \beta_2 \frac{\mathrm{CFO_{it-1}}}{\mathrm{Total\ Asset_{it-1}}} + \beta_3 \frac{\mathrm{CFO_{it}}}{\mathrm{Total\ Asset_{it-1}}} + \beta_4 \frac{\mathrm{CFO_{it+1}}}{\mathrm{Total\ Asset_{it-1}}} + \varepsilon_{it} \quad (21)$$

where

TCA_{it} points to the total accruals of firm i in year t, Total $Asset_{it-1}$ stands for total assets of firm i in year t-1, CFO_{it-1} refers to the operational cash flow of firm i in year t-1, CFO_{it} indicates the operational cash flow of firm i in year t, CFO_{it+1} suggests the operational cash flow of firm i in year t+1, E_{it} denotes the regression residual. In addition, TCA_{it} is obtained through the following equation:

$$\mathrm{TCA_{it}} = (\Delta \mathrm{CA_{it}} - \Delta \mathrm{CL_{it}} - \Delta \mathrm{CASH_{it}} + \Delta \mathrm{STDEBT_{it}} + \Delta \mathrm{TP_{it}}) \quad (22)$$

where

$\Delta \mathrm{CA_{it}}$ refers to the changes in the assets of firm i in year t, $\Delta \mathrm{CL_{it}}$ stands for the current liabilities of firm i in year t, $\Delta \mathrm{CASH_{it}}$ points to the changes in the cash of firm i in year t, $\Delta \mathrm{STDEBT_{it}}$ indicates the current portion of received loans for firm i in year t, $\Delta \mathrm{TP_{it}}$ suggests the changes in payable taxes for firm i in year t. Interestingly, in equation (21), accruals quality is measured using standard deviation of regression residual error. This measure points to those current accruals which have been converted into the operational cash. Accordingly, the higher values the residual errors have, the lower quality the accruals and earnings have.

Financial flexibility

Financial flexibility is characterized as the ability of an economic entity to take an effective measure to effect certain changes in the volume and time of cash flows such that that it is allowed to demonstrate an appropriate reaction against unexpected opportunities and events [53]. Previous studies have not put forward practical definitions about financial flexibility, but have just developed some theoretical ones including the corporate capability to respond to future unexpected events [54, 55]. Therefore, most studies either rely on Byon's [54] concept of lifecycle to determine the financial flexibility or pursue the model of excess debt capacity introduced by Schoubben and Hulle [56] and Marchia and Mura [57], though they are not much practical given the structure and standards of the Iranian capital market. Following Faulkender and Wang [58], the present research lays its foundation on the concept of final cash value whose reliability is verified by Sherianaghiz et al [59]. This suggests that changes in corporate market value and regression residuals denote financial flexibility. This model is calculated based on the corporate stock return and expected stock return.

$$r_{it} - ER_{it} = a_{0+}a_1\frac{\Delta C_{it}}{M_{it-1}} + a_2\frac{\Delta E_{it}}{M_{it-1}} + a_3\frac{\Delta NA_{it}}{M_{it-1}} + a_4\frac{\Delta RD_{it}}{M_{it-1}} + a_5\frac{\Delta I_{it}}{M_{it-1}} + a_5\frac{\Delta D_{it}}{M_{it-1}} + a_7\frac{C_{it-1}}{M_{it-1}} + a_8L_{it-1} + a_9\frac{NF_{it}}{M_{it-1}} + a_{10}\frac{C_{it-1}}{M_{it-1}} \times \frac{\Delta C_{it}}{M_{it-1}} + a_{11}L_{it-1} \times \frac{\Delta C_{it}}{M_{it-1}} + \varepsilon_{it} \quad (23)$$

As indicated, all variables (except the financial leverage) are divided by the capital market value in prior year (M_{it-1}). This standardization wards off the influence of larger firms available in the sample on the research results. Moreover, the derivative of the changes in cash is also computed so that it shows to what extent firm value, i.e. excess stock return or final cash value (r_{it}-ER_{it}) change for a dollar of a change in cash balance. R_{it} denotes the stock return of firm i in year t, which is calculated as follows:

$$r_{it} = \frac{(\text{Price of the day} - \text{base price}) + \text{Dividend paying stocks} + \text{Priority} + \text{Bonus shares}}{\text{base price}} \times 100 \quad (24)$$

$ER_{it:}$ expected stock return of firm i in year t

$$ER_{it} = R_F + \beta_i(R_M - R_F) \quad (25)$$

R_F denotes the risk-free stock return rate of firm i in year t, which is determined based on the annual interest rate reported by the Iranian Central Bank. β_i is the coefficient of systematic risk

$$\beta_i = \frac{\sigma(r_i, R_M)}{\sigma^2(R_M)} \quad (26)$$

R_M indicates the market price index return, ΔC_{it} is the annual changes in cash balance, which is calculated through subtracting beginning cash balance form ending cash balance $C_{it} - C_{it-1}$. $\frac{C_{it-1}}{M_{it-1}} \times \frac{\Delta C_{it}}{M_{it-1}}$ refers to the mutual effect of cash balance and changes in cash. $L_{it-1} \times \frac{\Delta C_{it}}{M_{it-1}}$ points to the mutual effect of financial leverage and changes in cash balance, ΔE_{it} points to the annual changes in the earnings before interest and taxes $E_{it} - E_{it-1}$. ΔNA_{it} denotes the nnual changes in the net assets, which is computed by subtracting total assets from cash $NA_{it} - NA_{it-1}$. ΔRD_{it} stands for annual changes in R&D expenditures $RD_{it} - RD_{it-1}$. ΔI_{it} refers to the changes in the interest paid from year t-1 to year t $I_{it} - I_{it-1}$. ΔD_{it} suggests the changes in the dividend paid from year t-1 to year t $D_{it} - D_{it-1}$. C_{it-1} refers to the ending cash balance of firm i in year t-1. L_{it-1} indicates the ending financial leverage of firm i in year t. NF_{it} points to the net cash flows from financing in firm i in year

4 Empirical Results

4.1 Descriptive Statistics

As discussed before, the current research adopts a mixed method to test the hypotheses. Qualitatively, it attempts to determine the indices and components of CEO's perceptual biases and financial reporting quality using a critical appraisal method and Delphi technique. Afterwards, the identified indices are confirmed or rejected based on the values of mean and Cohen's Kappa coefficient computed given the panel members' opinions. Quantitatively, the research first represents the descriptive statistics of each index given the operational definitions of research variables, and then determines the classical assumptions test and panel data to finally test the research hypotheses using Eviews software.

Part I) Qualitative analysis

Step I) Critical appraisal

Characterized by critical nature, this method classifies the literature in terms of the mentioned characteristics. Accordingly, the researcher evaluates the methodological quality of the literature and then rates it based on the characteristics. In other words, the researcher rates each question using a quantitative measure and then creates a form. Following the 50-score scale of Critical Appraisal Skills Program (CASP), the research devises the following rating system and then, accordingly, eliminates the articles which are rated as lower-than-good (<30). This program helps the researcher pinpoint the accuracy, reliability and significance of the sample qualitative studies.

Table 3: Critical appraisal of the studies

Sum	research value	transparent and theoretical expression of	the accuracy of analysis	ethical considerations	reflexibility	data collection	sampling	research design	research methodology rationality	research objectives	**Reference**	**research domain**
43	5	5	4	3	4	3	5	5	5	4	[58]	external research
44	5	4	5	4	4	4	4	5	4	3	[56]	
43	4	4	4	3	4	4	4	4	4	4	[57]	
24	2	2	3	4	3	2	2	2	2	2	[2]	
22	2	2	2	2	2	2	2	2	3	3	[24]	
41	5	4	5	4	4	4	4	4	4	3	[31]	
40	4	3	4	5	4	4	4	3	5	4	[34]	
38	4	4	5	4	4	4	4	3	4	4	[40]	
25	2	3	2	3	3	3	2	2	3	2	[38]	
28	3	2	2	3	3	3	3	3	2	3	[54]	
43	5	5	5	4	5	3	3	4	4	5	[51]	
34	3	3	5	5	3	4	5	3	3	3	[23]	internal research
35	4	4	4	4	4	4	4	3	4	3	[53]	
43	4	4	4	3	4	4	4	4	4	4	[47]	
29	2	4	2	4	2	3	3	3	2	2	[3]	
38	4	4	4	4	2	3	4	3	5	5	42]	
34	3	5	4	3	3	3	3	3	4	3	[22]	

Owing to the shortage of space, only a part of evaluated articles is represented. In sum, a total of 21 internal and external studies are scrutinized, among which foreign books and journals enjoy the most frequency, and 4 Iranian articles and 1 textbook are also examined. The evaluated sample falls within the period of 1998-2018. The results reveal that five studies including [5, 8, 10, 11, 50] obtained a score of smaller than 30, and hence being excluded. To put it differently, having determined the studies scored higher than 30, the research seeks to screen the verified sample to prepare the checklists for Delphi analysis. Consequently, the output of CASP is closely dissected to identify the secondary components and indices of the research. Eventually, a synopsis of the studies displaying the characteristics described above is tabulated in Table 4. In this stage, the frequency of the behavioural biases is clarified via rating to spot the highly frequent components, which are, in turn, utilized for the preparation of the checklist. As illustrated, judgmental biases and economic biases are recognized as two primary components of the CEOs' behavioral biases. On similar grounds, the primary components and indices of financial reporting quality are also discovered, yet not tabulated owing to the spatial restrictions. Therefore, only

the checklist of Delphi analysis is presented.

Table 4: Primary components of the CEOs' behavioral biases

cognitive	idiosyncratic phenom-ena	economic behavior	exploratory behaviors	result-oriented biases	preferential biases	judgmental biases	primary components of the CEOs' behavioral biases / researchers
-	*	*	-	-	*	*	[4]
-	-	*	-	-	-	-	[7]
*	-	-	-	-	-	*	[13]
-	-	-	-	-	-	-	[23]
-	-	*	-	-	-	-	[15]
-	*	*	*	*	-	*	[19]
-	-	-	-	-	*	-	[23]
-	-	*	-	-	-	-	[45]
-	*	-	-	-	-	*	[43]
-	-	*	-	-	*	-	[52]
-	*	-	-	*	*	*	[37]
-	*	*	-	-	-	*	[26]
-	-	*	-	-	-	*	[21]
*	*	-	-	*	-	*	[31]
-	-	-	*	-	-	*	[48]
2	6	8	2	3	3	9	total

Table 5: Checklist of the primary components and indices of the research variables

Likert's scale							indices	components	measures
1	2	3	4	5	6	7			
							overconfidence error	CEO's perceptual-judgmental bias	CEO's perceptual biases
							optimism error		
							earnings forecast error		
							myopia error		
							overreaction to chance events error		
							overinvestment error	CEOs' economic-perceptual bias	
							investment inefficiency		
							financing constraint s		
							preferences with time constraint error		
							highly valued equity		
							accounts receivable recession		
							financial statements comparability	financial reporting reliability	financial reporting quality
							integrity of financial statements		
							information content of financial statements		
							disclosure rate promotion		
							Capability of Conservative financial statements		
							financial statements timeliness		
							earnings persistence	financial reporting competitiveness	
							accruals quality		
							financial flexibility		
							systematic risk mitigation		
							reducing modification and restatement of financial figures		

Step II) Delphi analysis

To verify the identified indices, Delphi technique is employed. As mentioned earlier, a number of 10 participants with accounting expertise are selected as the panel members to answer the Table 5. As such, the questionnaire is emailed to each participants, and they are asked to answer back within two weeks. The results of analysing their answers based on the mean and Cohen's Kappa coefficient are represented in Table 6.

Table 6: The analysis of the determined indices

confirmed/rejected	Cohen's Kappa coefficient	mean	indices	components
confirmed	0.76	5.261	overconfidence error	CEO's perceptual bias in judgment
confirmed	0.68	5.047	optimism error	
confirmed	0.71	5.112	earnings forecast error	
confirmed	0.7	5.104	myopia error	
excluded	0.34	3.784	overreaction to chance events error	
confirmed	0.69	5.051	overinvestment error	CEO's perceptual bias in economic decision-making
confirmed	0.71	5.118	investment inefficiency	
confirmed	0.74	5.172	financing constraints	
excluded	0.43	4.473	preferences with time constraint error	
confirmed	0.7	5.092	highly valued equity	
excluded	0.41	4.321	accounts receivable recession	
confirmed	0.69	5.021	financial statements comparability	financial reporting reliability
confirmed	0.82	5.326	integrity of financial statements	
confirmed	0.78	5.287	information content of financial statements	
excluded	0.29	3.089	disclosure rate promotion	
excluded	0.39	4.165	Capability of Conservative financial statements	
confirmed	0.71	5.116	financial statements timeliness	
confirmed	0.72	5.127	earnings persistence	financial reporting competitiveness
confirmed	0.86	5.489	accruals quality	
confirmed	0.7	5.034	financial flexibility	
excluded	0.041	4.387	systematic risk mitigation	
excluded	0.32	3.194	reducing modification and restatement of financial figures	

As tabulated, since a seven-point scale is used to examine the checklist, and given that Cohen's Kappa coefficient needs to be higher than 0.5, 6 indices out of 22 indices are eliminated. These indices include:

- Overreaction to chance events
- Preferences with time constraint error
- Receivable accounts recession
- Disclosure rate promotion
- Capability of Conservative financial statements
- Systematic risk mitigation

Having analysed the results of Delphi technique, the research propounds the following hypotheses to test the effect of CEOs' perceptual biases on the financial reporting quality of the firms listed on the Tehran Stock Exchange.

1- The CEO's perceptual bias in judgment exerts significant impact on the financial statements reliability.

2- The CEO's perceptual bias in judgment exerts significant impact on the financial statements competitiveness.
3- The CEO's perceptual bias in economic decision-making significantly influences the financial statements reliability.
4- The CEO's perceptual bias in economic decision–making significantly influences the financial statements competitiveness.

Descriptive statistics

To examine the general characteristics of the variables and to estimate the research model, the descriptive statistics of the variables of interest is implemented for a sample of 576 (72*8) firm-year observations during the years 2010-2017, and then the results of the mean, median, standard deviation, minimum and maximum estimation are presented in Table 7.

Table 7: Descriptive statistics of the research variables

maximum	minimum	standard deviation	median	mean	index		primary components
1.000	0.000	0.51	0.454	0.475	CAPEX	overconfidence error	judgmental bias
1.000	0.000	0.487	0.438	0.469	Over-Invest		
1.000	0.000	0.382	1.000	0.799	optimism error-(OPT)		
9.863	-7.032	0.094	0.055	0.073	earnings forecast error		
1.000	0.000	0.514	0.452	0.482	managerial myopia error		
5.589	-3.028	0.182	0.244	0.256	overinvestment error		economic decision-making bias
0.453	-0.001	0.086	0.138	0.152	investment inefficiency		
3021.362	-1017.281	121.326	12.473	12.682	financing constraint		
1.000	0.000	0.432	0.181	0.195	highly valued equity		
-0.003	-0.703	0.106	-0.039	-0.043	financial statements comparability		financial reporting reliability
6.791	0.932	0.287	-0.115	-0.042	financial statements integrity		
0.427	0.042	0.204	0.168	0.171	financial statements timeliness		
11.88	0.08	1.43	1.25	1.38	information content of financial statements		
6.108	-1.277	0.951	0.370	0.469	earnings persistence		financial reporting competitiveness
0.521	0.030	0.068	0.118	0.131	accruals quality		
0.211	0.004	0.512	0.041	0.049	financial flexibility		

As indicated in table 8, the means of overconfidence are obtained 0.475 and 0.454, respectively, and the mean of managerial optimism is 0.79, which, according to the economic structure of Iran and given the investment attractiveness of capital markets, is counted a high figure as more than half of the firms enjoy optimism. The mean of earnings forecast error is computed 0.073, suggesting that 7.3 percent of estimated earnings per share is the result of the subtraction of actual earnings from estimated earnings. Also, the price-to-earnings per share ratio is calculated 0.195, implying that the equity value is high, and hence managerial high valued equity error.

Testing the regression assumptions

One of the assumptions of the regression is the fixed variance of errors, which is also known as the homogeneity of variance. Breusch–Pagan-Godfrey test is a tool to test for the heteroskedasticity. Breusch-Godfrey is another research instrument used to check for Serial autocorrelation of error terms. Finally, Jarque and Bera test is also employed to examine the normality of error terms.

Examining the model using panel data

As mentioned earlier, the panel data is used in the ongoing research. F-Limer test is thus used to determine whether they are panel or pooled data. If pooled, Hausman test is employed to choose either fixed

effects or random effects of the research variables to estimate the model.

Table 8: Regression assumption tests

result	sig.	F-statistics / J-B	Test	Hypothesis
acceptance of H0, the presence of serial autocorrelation	0.000	10.217	Breusch-Godfrey test	Hypothesis 1
rejection of H0, lack of het-eroskedasticity	0.078	3.113	Breusch–Pagan-Godfrey test	
acceptance of H0, the abnormal distribution of error terms	0.002	70.415	Jarque and Bera test	
acceptance of H0, the presence of serial autocorrelation	0.000	11.156	Breusch-Godfrey test	Hypothesis 2
rejection of H0, lack of het-eroskedasticity	0.066	3.104	Breusch–Pagan-Godfrey test	
acceptance of H0, the abnormal distribution of error terms	0.001	68.554	Jarque and Bera test	
acceptance of H0, the presence of serial autocorrelation	0.001	9.893	Breusch-Godfrey test	Hypothesis 3
rejection of H0, lack of serial auto-correlation	0.054	2.862	Breusch–Pagan-Godfrey test	
acceptance of H0, the abnormal distribution of error terms	0.000	59.065	Jarque and Bera test	
acceptance of H0, the presence of serial autocorrelation	0.000	12.326	Breusch-Godfrey test	Hypothesis 4
rejection of H0, lack of het-eroskedasticity	0.084	3.766	Breusch–Pagan-Godfrey test	
acceptance of H0, the abnormal distribution of error terms	0.000	71.326	Jarque and Bera test	

As tabulated in table 3, the significance level of each model is estimated lower than 0.05. The results of Hausman test give priority to random effects model as the significance levels of the research regression models are greater than 5 percent. It is noteworthy that the serial autocorrelation of the models under investigation together with the application of random effects model lay the ground for testing the research hypotheses as Generalized Least Square method (GLS) is used in the random effects model.

Table 9: The results of testing the effects of panel data

Model	Results	Sig.	df	F-statistics / $^{2}\chi$	Test	hypothesis
panel	rejection of H0	0.000	(69.558)	1.613	fixed effects (F-limer)	hypothesis 1
random	acceptance of H0	0.079	5	6.401	random effects (Hausman)	
panel	rejection of H0	0.000	(69.558)	1.774	fixed effects (F-limer)	
random	acceptance of H0	0.126	4	7.552	random effects (Hausman)	hypothesis 2
panel	rejection of H0	0.000	(69.558)	1.781	fixed effects (F-limer)	hypothesis 3
random	acceptance of H0	0.135	4	7.614	random effects (Hausman)	
panel	rejection of H0	0.001	(69.558)	1.549	fixed effects (F-limer)	hypothesis 4
random	acceptance of H0	0.114	4	6.129	random effects (Hausman)	

Moreover, to ensure the lack of collinearity among explanatory variables, the collinearity was assessed using Variance Inflation Factor (VIF). As can be seen, the values of this statistics for the explanatory variables are less than 10, thereby confirming the lack of collinearity.

Testing the research hypotheses

Hypothesis 1

To test the hypothesis 1, which predicts the significantly positive effect of the CEO's perceptual bias in judgment on the financial statements reliability, the equations (27), (28) and (29), as well as Table 10 are employed.

$$\mathrm{ComAcc_{ijt}} = \beta_0 + \beta_1 \mathrm{CAPEX_{it}} + \beta_2 \mathrm{Over-Invest_{it}} + \beta_3 \mathrm{OPTIMISM_{it}} + \beta_4 \mathrm{EFE_{it}} + \beta_5 \mathrm{Myopia_{it}} + \varepsilon_{it} \quad (27)$$

$$\mathrm{RET_{it}} = \beta_0 + \beta_1 \mathrm{CAPEX_{it}} + \beta_2 \mathrm{Over-Invest_{it}} + \beta_3 \mathrm{OPTIMISM_{it}} + \beta_4 \mathrm{EFE_{it}} + \beta_5 \mathrm{Myopia_{it}} + \varepsilon_{it} \quad (28)$$

$$\mathrm{Reporting-Lag_{it}} = \beta_0 + \beta_1 \mathrm{CAPEX_{it}} + \beta_2 \mathrm{Over-Invest_{it}} + \beta_3 \mathrm{OPTIMISM_{it}} + \beta_4 \mathrm{EFE_{it}} + \beta_5 \mathrm{Myopia_{it}} + \varepsilon_{it} \quad (29)$$

Table 10: The results of testing hypothesis 1

Dependent variable: comparability (ComAcc)			Integrity (RET)			Timeliness (Reporting-Lag)			
Observations: 576			Period: 2010-2017			Firms : 72			
proxies of financial statements reliability									**variables**
Timeliness			**Integrity**			**Comparability**			
Reporting − Lag			RET			ComAcc			
t-statistics	coefficient	+/-	t-statistics	coefficient	+/-	t-statistics	coefficient	+/-	
4.483	0.102	؟	2.437	0.084	؟	2.110	0.077	؟	intercept
-2.284	-0.075**	-	-3.384	-0.094*	-	-2.085	-0.065**	-	measure 1 of overconfidence
-1.113	-0.052	؟/-	-1.102	-0.047	؟/-	-3.031	0.081*	-	measure 2 of overconfidence
-1.045	-0.046	؟/-	-5.321	-0.114*	-	-5.061	-0.103*	-	optimism
-2.645	-0.086**	-	-2.879	-0.08**	-	-5.412	-0.121*	-	earnings forecast error
-1.039	-0.048	؟/-	-1.211	-0.037	؟/-	-1.321	-0.053	؟/-	managerial myopia
0.701			0.732			0.843			R^2
0.683			0.708			0.815			adjusted R^2
21.092*			20.473*			23.382*			F-statistics
1.788			1.563			1.968			Durbin-Watson

note: * denotes 1% level of significance, ** denotes 5% level of significance

symbol: proxy 1 of overconfidence (CAPEX); proxy to of overconfidence (Over_Investment); optimism (OPTIMISM); earnings forecast error (EFE); managerial myopia (Myopia); coefficient of determination (R^2); adjusted coefficient of determination (adjusted R^2)

As represented in Table 10, the value of F-limer and its level of significance for all measures of financial reporting reliability, namely comparability, integrity and timeliness point to the general significance of the fitted regression model at 1% level of significance. Given the R^2 of the mentioned measures, furthermore, 84% of the changes in comparability, 73% of the changes in integrity and 70% of the changes in timelines are explained by the independent variable. As also tabulated, the estimated coefficient of the first measure of overconfidence (CAPEX), the second measure of overconfidence (Over_Invest), optimism (OPTIMISM) and earnings forecast error (EFE) exert significantly negative impact on the comparability (ComAcc) with respect to the error level of lower than 5% and 1%. Likewise, the first measure of overconfidence (CAPEX), optimism (OPTIMISM) and earnings forecast error (EFE) negatively influence integrity (RET) as the second measure of financial reporting reliability. Regarding the less-than-5% error level and t-statistics, finally, the first measure of overconfidence (CAPEX) and earnings forecast error (EFE) appear to have significantly negative impact on timeliness (Reporting_Log).

Hypothesis 2

Hypothesis 2, which assumes that the CEO's perceptual bias in judgment influences the financial statements competitiveness, is tested using the equations (30), (31) and (32), as well as Table 11 as follows.

$$\mathrm{r_{it}} - \mathrm{ER_{it}} = \beta_0 + \beta_1 \mathrm{CAPEX_{it}} + \beta_2 \mathrm{Over-Invest_{it}} + \beta_3 \mathrm{OPTIMISM_{it}} + \beta_4 \mathrm{EFE_{it}} + \beta_5 \mathrm{Myopia_{it}} + \varepsilon_{it} \quad (30)$$

$$\frac{\text{TCA}_{it}}{\text{Total Asset}_{it-1}} = \beta_0 + \beta_1 \text{CAPEX}_{it} + \beta_2 \text{Over} - \text{Invest}_{it} + \beta_3 \text{OPTIMISM}_{it} + \beta_4 \text{EFE}_{it} + \beta_5 \text{Myopia}_{it} + \varepsilon_{it} \quad (31)$$

$$\text{MV}_{it} = \beta_0 + \beta_1 \text{CAPEX}_{it} + \beta_2 \text{Over} - \text{Invest}_{it} + \beta_3 \text{OPTIMISM}_{it} + \beta_4 \text{EFE}_{it} + \beta_5 \text{Myopia}_{it} + \varepsilon_{it} \quad (32)$$

Table 11: The results of testing the second hypothesis

Dependent Variable: Financial flexibility (r-ER) Accruals Quality (AQ) Earnings Persistence (Persistence), Information Content (MV) Observations: 576 Period: 2010-2017 Firms : 72								
the measures of financial statements competitiveness								**variables**
information content		**earnings persis-tence**		**accruals quality**		**financial flexibility**		
MV		Persistence		AQ		r − ER		
t-statistics	coeffi-cient	t-statis-tics	coeffi-cient	t-statis-tics	coeffi-cient	t-statis-tics	coeffi-cient	
3.041	0.085	5.111	0.120	3.726	0.093	5.372	0.131	intercept
-5.127	-0.122*	-5.112	-0.106*	-5.208	-0.113*	-1.067	-0.043	measure 1 of overconfidence
-2.040	-0.083**	-4.987	-0.114*	-3.211	-0.099*	-2.943	-0.077**	measure 2 of overconfidence
0.989	0.032	1.121	0.057	1.098	0.044	-1.321	-0.056	optimism
-5.064	-0.109*	-2.777	-0.089*	-2.995	-0.096*	-5.267	-0.119*	earnings forecast er-ror
-1.271	-0.042	-2.765	-0.070**	-4.606	-0.102*	-2.780	-0.075**	managerial myopia
0.688		0.592		0.630		0.567		R^2
0.651		0.543		0.604		0.522		adjusted R^2
14.552*		20.439*		13.142*		10.212*		F-statistics
1.773		1.649		1.880		2.032		Durbin-Watson
note: * denotes 1% level of significance, ** denotes 5% level of significance symbol: the first measure of overconfidence (CAPEX); the second measure of overconfidence (Over_Investment); optimism (OPTIMISM); earnings forecast error (EFE); managerial myopia (Myopia); coefficient of determination (R^2); adjusted coefficient of determination (adjusted R^2)								

As can be seen in Table 11, the value of F-limer and its level of significance for all measures of financial reporting competitiveness, namely financial flexibility, accruals quality, earnings persistence and information content represents the general significance of the fitted regression model at 1% level of significance. Given the R^2 of the mentioned measures, furthermore, 56% of the changes in financial flexibility, 63% of the changes in accruals quality, 59% of the changes in earnings persistence and 68% of the changes in information content are explained by the independent variable. As also presented, the estimated coefficient of the second measure of overconfidence (Over_Invest) with t-statistics (-2.943), earnings forecast error (EFE) with t-statistics (-5.276) and managerial myopia (Myopia) with t-statistics (-2.780) exert significantly negative impact on the financial flexibility (r-ER) with respect to the error level of lower than 5% and 1%.

Likewise, the first measure of overconfidence (CAPEX) with t-statistics (-5.112), the second measure of overconfidence (Over_Invest) with t-statistics (-4.987), earnings forecast error (EFE) with t-statistics (-2.777) and managerial myopia (myopia) with t-statistics (-2.765) negatively influence earnings persistence (Persistence) as the third measure of financial reporting competitiveness. Taking into account the error level less than 5% and 1%, finally, the results reveal that the first measure of overconfidence (CAPEX) with t-statistics (-5.127), the second measure of overconfidence (Over_Invest) with t-statistics (-2.040), and earnings forecast error (EFE) with t-statistics (-5.706477) negatively influence the information content (MV) of financial reporting.

Hypothesis 3

Hypothesis 3, which predicts the significant impact of the CEO's perceptual bias in economic decision-making on the financial statements reliability, is tested using the equations (33), (34) and (35), as well as Table 12 as follows.

$$\mathbf{ComAcc_{ijt} = \beta_0 + \beta_1 I_{it} + \beta_2 Investment_{it} + \beta_3 KZ_{it} + \beta_4 Valued\ Equity + \varepsilon_{it}} \quad (33)$$

$$\mathbf{RET_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 Investment_{it} + \beta_3 KZ_{it} + \beta_4 Valued\ Equity + \varepsilon_{it}} \quad (34)$$

$$\mathbf{Reporting - Lag_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 Investment_{it} + \beta_3 KZ_{it} + \beta_4 Valued\ Equity + \varepsilon_{it}} \quad (35)$$

Table 12: The results of testing the third hypothesis

Dependent Variable: Comparability (ComAcc) Integrity (RET) Timeliness (Reporting-Lag) Observations: 576 Period: 2010-2017 Firms : 72									
the proxies of financial statements reliability									**variables**
timeliness			**integrity**			**comparability**			
Reporting − Lag			RET			ComAcc			
t-statistics	coefficient	type of relationship	t-statistics	coefficient	type of relationship	t-statistics	coefficient	type of relationship	
3.949	0.093		5.329	0.108		5.837	0.129		intercept
-2.319	-0.073**	-	-2.872	-0.078**	-	1.028	0.039	؟/-	overinvestment
-4.043	-0.098*	-	-2.950	-0.084**	-	-5.184	-0.111*	-	investment inefficiency
-5.330	-0.115*	-	-6.068	-0.132*	-	-5.032	-0.105*	-	financing constraint
0.728			0.589			0.707			R^2
0.704			0.550			0.682			adjusted R^2
10.948*			5.604*			8.252*			F-statistics
1.973			2.003			2.376			Durbin-Watson

note: * denotes 1% level of significance, ** denotes 5% level of significance
symbol: overinvestment (Over_I); Investment inefficiency (InefficiencyInvestment); financing constraint (KZ) coefficient of determination (R^2); adjusted coefficient of determination (adjusted R^2)

As illustrated in Table 12, the value of F-limer and its level of significance for all measures of financial reporting reliability, namely comparability, integrity and timeliness confirm the general significance of the fitted regression model at 1% level of significance. Given the R^2 of the mentioned measures, furthermore, 71% of the changes in comparability, 59% of the changes in integrity and 73% of the changes in timelines are explained by the independent variable.

As also indicated, the estimated coefficient of investment inefficiency (InefficiencyInvestment) with t-statistics (-5.184) and financing constraint (KZ) with t-statistics (-5.032) exert significantly negative impact on the comparability (ComAcc) with respect to the error level of lower than 5% and 1%. Furthermore, overinvestment (Over_I) with t-statistics (-2.872), investment inefficiency (InefficiencyInvestment) with t-statistics (-2.950) and financing constraint (KZ) with t-statistics (-6.068) negatively influence integrity (RET) as the second measure of financial reporting reliability. In the end, the findings suggest that overinvestment (Over_I) with t-statistics (-2.319), investment inefficiency (InefficiencyInvestment) with t-statistics (-4.043) and financing constraint (KZ) with t-statistics (-5.330) demonstrate a significantly negative influence on the third measure of financial reporting reliability, namely timeliness (Reporting_Log) with respect to the 5% and 1% error levels.

Hypothesis 4

To test hypothesis 4, which suggests that the CEO's perceptual bias in economic decision-making influences the financial statements competitiveness, is tested using the equations (36), (37), (38) and (39), as well as Table 13 as follows.

$$r_{it} - ER_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 \text{Investment}_{it} + \beta_3 KZ_{it} + \beta_4 \text{Valued Equity} + \varepsilon_{it} \quad (36)$$

$$\frac{\text{TCA}_{it}}{\text{Total Asset}_{it-1}} = \beta_0 + \beta_1 I_{it} + \beta_2 \text{Investment}_{it} + \beta_3 KZ_{it} + \beta_4 \text{Valued Equity} + \varepsilon_{it} \quad (37)$$

$$\frac{\text{EARN}_{it}}{\text{Total Assets}_{it-1}} = \beta_0 + \beta_1 I_{it} + \beta_2 \text{Investment}_{it} + \beta_3 KZ_{it} + \beta_4 \text{Valued Equity} + \varepsilon_{it} \quad (38)$$

$$MV_{it} = \beta_0 + \beta_1 I_{it} + \beta_2 \text{Investment}_{it} + \beta_3 KZ_{it} + \beta_4 \text{Valued Equity} + \varepsilon_{it} \quad (39)$$

Table 13: The results of testing the fourth hypothesis

Dependent Variable: Financial Flexibility (r-ER), Accruals Quality (AQ), Earnings Persistence (Persistence), Information Content (MV)
Observations: 576 Period: 2010-2017 Firms : 72

the measures of financial statements competitiveness								**variables**
information content		**earnings persistence**		**accruals quality**		**financial flexibility**		
MV		Persistence		AQ		r − ER		
t-statistics	coefficient	t-statistics	coefficient	t-statistics	coefficient	t-statistics	coefficient	
5.190	0.110	3.903	0.085	5.617	0.103	4.098	0.097	intercept
1.011	-0.022	-5.126	-0.109*	-3.415	-0.088**	-5.554	-0.129*	overinvestment
-1.983	-0.069**	-6.007	-0.132*	-3.219	-0.079**	-3.733	-0.09*	investment inefficiency
-1.006	-0.041	-3.052	-0.077**	-4.001	-0.099*	-6.172	0.138*	financing constraint
0.773		0.630		0.489		0.549		R^2
0.749		0.618		0.442		0.522		adjusted R^2
14.656*		6.564*		12.228*		6.480*		F-statistics
2.061		1.884		1.632		1.709		Durbin-Watson

note: * denotes 1% level of significance, ** denotes 5% level of significance
symbol: overinvestment (Over_I); Investment inefficiency (InefficiencyInvestment); financing constraint (KZ) coefficient of determination (R^2); adjusted coefficient of determination (adjusted R^2)

As tabulated in Table 13, the value of F-limer and its level of significance for all measures of financial reporting competitiveness, namely financial flexibility, accruals quality, earnings persistence and information content cnfirms the general significance of the fitted regression model at 1% level of significance. Given the R^2 of the mentioned measures, furthermore, 54.9% of the changes in financial flexibility, 48.9% of the changes in accruals quality, 63% of the changes in earnings persistence and 77.3% of the changes in information content are explained by the independent variable. Moreover, the estimated coefficient of overinvestment with t-statistics (-5.554), investment inefficiency (InefficiencyInvestment) with t-statistics (-3.733) and financing constraint (KZ) with t-statistics (-6.172) exert significantly negative impact on the financial flexibility (r-ER) with respect to the error level of lower than 1%. Likewise, given the 5% and 1% levels of error for t-statistics, overinvestment with t-statistics (-3.415), investment inefficiency (InefficiencyInvestment) with t-statistics (-3.219) and financing constraint (KZ) with t-statistics (-4.001) negatively affect the accruals quality as the second measure of financial reporting competitiveness. Also, overinvestment with t-statistics (-5.126), investment inefficiency (InefficiencyInvestment) with t-statistics (-6.007) and financing constraint (KZ) with t-statistics (-3.052) exhibit significantly negative impact on the third measure of competitiveness,

the so-called earnings persistence (Persistence) with respect to the error levels of lower than 1% and 5%. Considering the error level less than 5%, finally, the findings indicate that investment inefficiency (InefficiencyInvestment) with t-statistics (-1.983) negatively influences the information content (MV) of financial reporting.

5 Conclusions

Individual performance is influenced by psychological characteristics, particularly perceptual ones, which may divert the process of decision-making from its rational foundations into a biased phase. Perceptual bias is an inner state accompanied by wild estimation and biased judgment. The present study aims at identifying the effect of CEO's perceptual biases in judgment and economic decision-making within a sample of firms listed on the Tehran Stock Exchange during the years 2010-2017. To recognize the various dimensions of CEO's perceptual biases, the study adopts a critical appraisal approach to detect the measures and indices of perceptual biases and qualitative specifications of financial reporting. The identified items are then subject to Delphi analysis using panel members' opinions. Here a set of 16 indices out of 22 ones are verified, and consequently tested in the form of four research hypotheses using regression model. The results reveal that most measures of the CEO's perceptual bias in jusgment negatively influence the financial statements reliability. In fact, the CEO's judgmental biases imply that executives exhibit biases in making futuristic likelihood estimation as they lack either managerial insight into marketplace and its changes or enough technical qualifications in the field. Judgment-based biases are indeed derived from myopic, unrealistic and optimistic attributes, which hinder CEOs from making accurate predictions of such corporate future outputs as earnings and return. As a result, the quality of financial statements in disclosing timely information on the corporate financial information and operations is mitigated and hence lower financial statements comparability. Indeed, as reliability is counted as an advantage and strategy within a competitive marketplace, it points up the fact that stakeholders should avail themselves of quality reports to examine the similarities and differences amongst the elements of financial statements, and thus are no longer in need of further modifications in the information, thereby facilitating the external users' accessibility to the information. According to the results of testing the first hypothesis, increasing the CEO's judgmental biases can lead to the lowered financial statements quality, which, in turn, imposes the cost of data collection and analysis on investors and legal institutions, whilst at the same time causing firms to run the risk of losing their shareholders' trust. On the basis of the results obtained from testing the second hypothesis, the CEO's judgmental biases appear to reduce the corporate financial reporting competitiveness. If financial reporting competitiveness is proxied by the accuracy and information content of the reports, then firms with financial flexibility, accruals quality and high-quality information content can release more information to shareholders, investors, financial analysts and regulatory bodies to not only inspire more trust and credit from their shareholders and investors in the capital market, but also obtain higher disclosure rate assigned by monitoring organizations aiming at promoting competitive environment. The results, however, report that firms with the CEO's perceptual biases, which lead to making inaccurate predications about the future of the firm, experience lowered financial statements competitiveness. The analyses of the third and fourth hypotheses reveal that when the CEO's economic decisions are influenced by his/her biases or estimation errors, this may exert negative effects on the corporate financial statements reliability. Indeed, the CEOs' overestimation of their investment capacities, and their lack of

attention to the difference between the current value and the future value of the investment projects may result in lower future returns. On the other hand, the firms' investment inefficiency implies the absence of appropriate market recognition, and self-interested attitudes toward investment opportunities, which can ultimately lead to the corporate financing constraints owing to the lack of information transparency. This can cause a significant reduction in the corporate financial reporting reliability and competitiveness as not only are the financial reporting comparability, integrity and timeliness mitigated, but also its financial flexibility, accruals quality, earnings persistence and information content are beset with dangers. Under the conceptual framework, the obtained results are in accordance with those of Koga and Kato [25], Parsa & Saraf [61], Hoseini [62], Chollet et al [26] and Bilgehan [27].

Regarding the results, more dynamic monitoring mechanisms are recommended to be applied to control the CEOs' cognitive skills to finally hire the most competent one. These mechanisms may reduce the agency costs through controlling the CEOs' self-interested incentives, and protect the shareholders and investors' incentives to create an appealing marketplace to them. Likewise, such initiatives as the development of a financial performance evaluation system, which encompasses various dimensions including financing and trade credit, the development of monitoring mechanisms for choosing investment projects using expert consultants, the establishment of certain policies to attract external investments via solidifying the economic infrastructures, educating employees and giving periodical exams to make sound predictions about the future of the corporate decisions are suggested to be implemented to mitigate the CEO's perceptual biases in economic decision-making and judgment.

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