The Effect of Managers' Perception Bias Model on Earnings Management

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ABSTRACT

This study evaluated the relationship between behavioral bias with an emphasis on perception bias and earnings management incentives among financial analysts, accountants, and auditors. The sample of this study included 10 experts in the fields of accounting and auditing. In terms of the technical dimension, the fuzzy method was used to include uncertainty in the research. Instead of using a pairwise comparison of factors, the non-rank comparison of the ELECTRE III method with a systematic review was used to study and rank the different dimensions of perception bias factors affecting the types of earnings management through the Delphi method and the opinion of the elite. The results of the study indicated that out of 65 variables of perception bias affecting the role of earnings management, 27 top biases were identified and prioritized. The obtained results showed that the highest effect on earnings management types was related to overconfidence bias, regret aversion, and self-serving bias being at the first to third ranks. Besides, based on the scenario-building in developing an optimal model, the model with a significant relationship between perception bias and all types of earnings management (real, accrual, efficient, and opportunistic earnings management) significantly was more accurate than those in which the relationship between perception bias with some types of earnings management was considered.

Keywords: Behavioral finance, Perception bias, Attribution bias, Earnings management.

1. Introduction

The concepts of risk and return are among the key concepts in financial management. People tend to invest in affairs which have high expected returns to maximize their desirability. On the other hand, achieving high returns requires relevant risk-taking. Most economic and financial theories assume that investors act completely rational in decision-making (Kim et al., 2008). This meaning is based on the theory of "rational economic man"[1]. Investors consider all dimensions at the time of investment and make the most rational decision. However, sometimes some factors cause irrational behavior and affect their decision-making method because of the weak efficiency of financial markets (Liang et al., 2010). Sometimes, some conditions deprive the decision-maker of the possibility of rational behavior. A lot of studies were conducted on investor behavior and the factors which may affect their interests. Such studies concluded that if traders could manage well (i.e, sell at high prices and then purchase at low prices), it would be claimed that the behavior is rational (Montier et al., 2008). The paradigm of financial psychology believes that perspectives such as complete forecasting, flexible prices, and complete knowledge on investment decision making seem unreal. In other words, financial psychology is a new paradigm in theories that understands and predicts financial decision-making mechanisms systematically and emphasizes the behavioral principles to analyze the market behavior with classical financial models (Olsson, 1995). The basis of behavioral finance is the compatibility between the emotions and decision making of the investor. Behavioral finance deals with the questions that whether individual investors behave rationally or affect the perception and emotional biases of their decisions? Meanwhile, in macro behavioral finance, the question is how much the efficient hypothesis explains the financial market behavior addressed and market failures? (Eslami Bidgoli et al. 2010). These sort of theories are presented in financial economics are based on the assumption that one individual in economics is rational in two ways. Earnings management is one of the most critical topics in accounting studies and agency theory. Agency theory is a contract on which base one or more owners make an agent or manager perform a specific operation. By establishing the agency theory, each party seeks to maximize his interests. Since the desirability function

of managers is not equal to owners, a conflict of interests and consequently agency costs is created between them (Jensen and McKellan, 1976). Based on the agency theory, managers, like other people in society, seek to maximize their interests, while managers may not focus on improving the real performance of the business unit for the present conflicts of interests and may seek to manipulate the profit-generating activities (real earnings management) or manipulate the results and reports (earnings management accounting) In general, earnings management occurs when managers mislead some of the stakeholders (creditors, shareholders, employees, government, investors, etc.) about the economic performance level of the firm in financial reporting and structure of transactions by using personal judgment to change financial reports or affect the contracts which depend on reported accounting figures. Such personal judgment often leads to a perception bias in managers' decision making (Hili & Wallen, 1999).

As a result, earnings management is one of the biggest concerns of accounting because it can affect the capital cost and resource allocation efficiency (Dayanandan et al., 2012).Previous studies on earnings management indicated that managers manipulate earnings including remuneration, reduction of debt ratios, a decrease of production costs, reduction of tax, changing management, public supply of stocks for the first time, and so on for the first time. Some studies on earnings management only examined the subject of earnings management incentives and did not go further. Concerning the above-mentioned explanations, recognition is one of the topics which have been considered in various fields. In the decision-making process, the most significant step is to identify and receive information about a topic correctly. As this recognition is made better and be more complete, the decision-making process will be followed better, otherwise, the decision-making process will not have a good result. Studies by psychology researchers showed that the process of recognition is not performed appropriately for different reasons. For this reason, a set of cognitive biases which means distortion from reality is a subject under study. Human is exposed to such biases due to psychological basics affecting his reactions to the phenomena and decisions which must be made; however, such biases may occur more or less under different conditions. However, when "the

distortion of cognition" is raised, it is argued that if the person feels himself out of the story, he will have another adjudication and judgment and now that is subject to bias under certain circumstances, his adjudication and recognition has been affected (Saeedi & Farhadnian, 2012). Accordingly, accountants and auditors are not an exemption and any distortion from cognition by them causes perception bias behaviors in decision making and recording of events and then earnings management in the organization.

When the mental and consciousness limitations of the decision-maker appear in the full analysis of problems and when his inability with the full use of information in the combining and processing this information is recognized, when it is found that most problems are of a complex and complex nature, and finally, when we find that collecting and acquiring information requires large costs, the question that naturally comes to mind is how can a person make the best decision under these circumstances. The main problem in this study was the development of a model that can formulate a real representation of earnings management by accountants, auditors, and investors based on perception bias theory.

Previous studies on behavioral bias have dealt with the behavioral bias and affective feelings and emotions of investors while making investment decisions. The important point is whether the feelings and perceptions of accountants, auditors, and active people in finance and analysis also affect their financial and accounting decisions? Do they have behavioral bias and judgmental and mental biases while making decisions? For example, do personal feelings and adjudications as well as the personality traits of accountants, auditors, and managers affect their behavior and decision making when deciding for earnings management? Are their behavioral-personality biases and their incentives for managing earnings interacting with each other? This study aimed to address these research gaps. The present study has significance in terms of three dimensions. Development of results: In most domestic and foreign studies, the effect of perception biases on optimal portfolio formation and stock returns were investigated while its effectiveness on real and accrual earnings management was not considered. Generalization of results: In most conducted studies, the effect of perception biases on investors was investigated and the role of these biases was not much considered by accountants and auditors. Research

estimation and modeling: All domestic studies studied the extent and severity of effect by perception biases on accounting variables but did not attempt to model these behaviors. Accordingly, this study attempted to model the factors affecting perception biases on earnings management by accountants and auditors.

2. Theoretical foundations

The subject of the effect of psychological problems on economic behavior dates back to the early years of the 20th century. Selden (1912) introduced psychological factors in the stock market for the first time. In the book, "Stock market psychology," he stated securities price movements highly depend on the thoughts of the investor and the trader community (Soel, 2010). In the 40s and 50s, the rational market theories which were based on the rational behaviors of individuals re-emerged. Until the 1950s, Simon raised the concept of economic man and designed a model for decision making. Simon mentioned that people's decision-making is based on a series of limitations that may question the concept of rational choice and not let this choice be based on the desirability curve. Besides, Simon pointed out that such limitations may be external or come from the investor inner biases. Such biases also come from the investor's decision-making point or his knowledge. The behavioral financial emergence of financial irregularities peaked in the late 1980s.

Early 21st century, studies on finance have developed behavioral finance knowledge. Among the prominent researchers in this field was Robert Schiller, a professor at Yale University who published his famous book entitled "non-rational plurality" which significantly helped all users of financial knowledge (Moniter, 2002). Perhaps the biggest realization of behavioral finance as a unique academic and professional discipline is found in the studies by Daniel Kahneman and Vernon Smith (Farlin 2006). Kahneman's fame was for "involving psychological research insights into economics especially about human judgment and decision-making in uncertainty". The topic of the involvement of individuals' psychological and behavioral traits in purchasing decisions goes back to earlier periods. When the modern financial theories had no progress, some famous such as Adam Smith, Irving Fisher, John Maynard Keynes, and Harry Markowitz believed that the phenomena related to individual psychology affect

prices. Line et al. (2010) conducted some studies on different types of perception bias and how these biases affect the financial decision-making of investors in financial markets. They concluded that investors suffer from several biases (Kim et al). It should be noted that the information inefficiencies affect the decisions of millions of people in the world, thus the perception that all players in the financial markets have complete information is not true (Badri, 2009).

As mentioned in the efficient markets, full rationality rarely emerges as completely black or white. It is better to raise this model in the gray spectrum; people are neither completely rational nor completely non-rational. They have different traits of rational and non-rational personality. In modeling the multifunctional phenomenon in financial markets, the decisions by investors were considered as a combination of rational and behavioral demands. Bias refers to any distortion from the right decisions and people act completely rational and all information is optimal. Behavioral biases were defined as systematic biases in adjudication. Different studies were conducted on the types of perception biases and how these biases affect financial decision making and concluded that financial decisions are affected by several biases. Researchers identified and provided a list of different types of behavioral biases. Recent studies introduced more than fifty types of behavioral biases about investors, while many behavioral tendencies have not been identified yet; the findings indicated that behavioral biases cause challenge and bias in forecasting financial decisions (Ritter, 2003).
There are various definitions of earnings management and here are some of them:

Scott: Earnings management refers to the selection of accounting policies by the manager to achieve his goals by these choices. Jackson and Pittman: Earnings management refers to the selection of a special method of reporting to affect the result. Earnings management is manipulating earnings intentionally to achieve a predetermined goal (Davidson et al. 2004; Angie et al., 2009). Managers may manage earnings with different goals such as competition, increasing capital, achieving rewards, maintaining jobs, reducing earnings distortions, etc, (Greenfield, 2005). Managers typically use the flexibility of accounting principles and manipulate the earnings by personal adjudication and interpretation (Patak, 2014). Perception biases affect efficient earnings management and opportunistic

earnings management and such changes in earnings management lead to manipulation of accrual and real earnings management. Efficient earnings management: based on this approach, earnings management decreases information asymmetry and improves earnings information content. In this perspective, earnings management is a beneficial phenomenon for external users of accounting information. Inefficient earnings management, the goal is increasing the desirability of shareholders and users of financial statements (Giraporen et al., 2008; Sirgar et al., 2008). Opportunistic earnings management: It means that the manager reports his earnings opportunistically to maximize his desirability. Balsam et al. (2002) provided some evidence on the opportunistic nature of earnings management. Bergstaller (2007) indicated that managers use earnings management to gain more rewards for avoiding the reporting of losses or reduction of earnings.

3. Research background

Ahmad Zaher (2019) studied the effect of false self-confidence of a manager on the activities based on reality and found that overconfidence has a positive effect on real earnings management and accruals. Heidari and Abdoli (2019) showed the effect of the CEO perception bias on economic decision making and financial reporting quality level and also indicated that reliability and competitiveness affect financial decision making and quality of reporting so that the difference between the current value and future value of investment projects may show lower future returns and uncertainty causes the lack of competition and comparability, and in fact, it leads to earnings management and changes in return on capital. Mehdi Salehi et al. (2018) examined narcissism in managers and its effect on financial reporting quality and found that managers' narcissism has a significant relationship with reward, management, and earnings quality causing the increase of earnings management and reduction of earnings quality.

Khan Mohammadi and Gorgizadeh (2017) evaluated the financial behavioral factors on the decisions of individual investors on the Tehran Stock Exchange and indicated that current returns, savings, income, and investment horizon had the maximum effect on the volume of investment by individuals in the stock market. Arup Kamar (2017) studied the factors affecting the behavior of investors in the stock

market and indicated that perceived risk attitude of investors is in good relation with the lack of stressors and is mainly based on recognition in comparison to the effective component from perceived risk-taking perspective which means that the perceived risk attitude is based on the mental process which is involved in acquiring and understanding that knowledge such as thinking, knowing, remembering, judging, and solving problems which refer to of feeling of the person about something or someone instead of being the emotional component of the attitude. The dimensions of exploration, the dimensions of prospect, and the dimensions of investment behavior in the stock market are very strong while they are not very strong after the emergence of investment behavior in the stock market. Ham et al. (2017) found the relationship between signature size, narcissism, and fraudulent financial reporting and also found that individuals with big signatures are more attracted to their signatures and are more narcissist and more willing to ignore other people's rights to earn more benefits. Becker and Choi Yi (2016) studied the effect of mental factors on decision making of investors in Malaysia stock market and indicated that overconfidence, conservatism, and availability bias have significant effects on investor decision making while herding behavior has no significant effect on investor decision making; Also, the results showed that psychological factors are affected by gender. Yahya Zadeh et al (2015), reviewed the literature of earnings smoothing in companies and a better understanding of these differences by considering the behavioral factor of managers' optimism. They found that optimistic managers perform earnings smoothing more than rational managers. Ardakani et al. (2015) studied the reaction of investors to unexpected events of receiving and found that return fluctuations increase with the occurrence of unexpected events. In the relationships between five personality traits with perception biases in decision making, Khorasgani and Shahraki (2015) found that each personality type should take responsibility and in this way the probability of halo effect and stereotyping will be higher. Rahnamay Roodposhti and Karimi (2015) examined the relationship between behavioral bias and earnings management incentives among the financial analysts, accountants, and auditors and found that there was a direct relationship between Machiavellianism and

opportunistic earnings management and opportunistic earnings management. The more opportunistic is a person, the more he will use opportunistic and efficient earnings management; auditors are more loss-averted than financial analysts while financial analysts are more optimistic than auditors. Auditors are less willing to earnings management than other examined jobs.

Kordlouie and Seifollahi (2014) compared the behavioral factors in investing financial assets and showed that all factors except "overconfidence" affect investment and the extent of this effect differs for each of them and the relationship between these factors in terms of the extent of effectiveness includes relative earnings and loss (mental accounting), disposition effect, conservatism herding behavior, representativeness heuristic, endowment effect, and avoidance regret... Frino et al (2014) studied the institutional shareholders' behavior on bankruptcy statements and showed that institutional shareholders begin to withdraw from the company about 220 days before the bankruptcy statement. They showed that such a withdrawal from stock is considerable two days before the release of financial statements. In addition, they argued that there is high information asymmetry in crisis-stricken companies. Ramalinguda (2014) studied the behavior of institutional investors of the companies on the verge of bankruptcy. Such shareholders can forecast this phenomenon at least one season earlier and sell a large portion of their stock and this forecasting is higher than the companies with similar distress. Demirjian (2014) found that managers with more ability are less willing to manage earnings and manipulate fewer earnings to earn personal interests. Since the present study aimed to discover and present the model, this study had no hypothesis.

4. Method

This study was applied in terms of purpose and was a survey in terms of the data collection method. Besides, it was descriptive in terms of nature and method. Interview, library studies, and questionnaires were used in this study to collect data. A questionnaire was designed to collect the required data then distributed among the statistical samples. The questionnaire in the present study was of closed type. The research questionnaires had a Likert scale of 1-5. The period of this study was from 2018 to 2019. The statistical population of this research included some experts (auditors, accountants, and managers) in the

field of capital and behavioral finance. The statistical sample included ten experts (auditors, accountants, and managers) in the field of capital and behavioral finance. In this way, the snowball effect method was used. The process of the research is presented in Figure 1.

Since the objective of the present study was modeling, it was necessary to identify all indicators of perception bias based on theoretical and experimental foundations. Then, it was tried to localize the model according to the specific conditions of the capital market in Iran using the Delphi method. Based on the results of this section, the most critical perception biases were selected and the most important perception biases were prioritized based on ELECTRE III and Type 2 fuzzy approach. Based on the results of prioritization and elimination of non-significant perception biases, the conceptual model of the research was drawn.
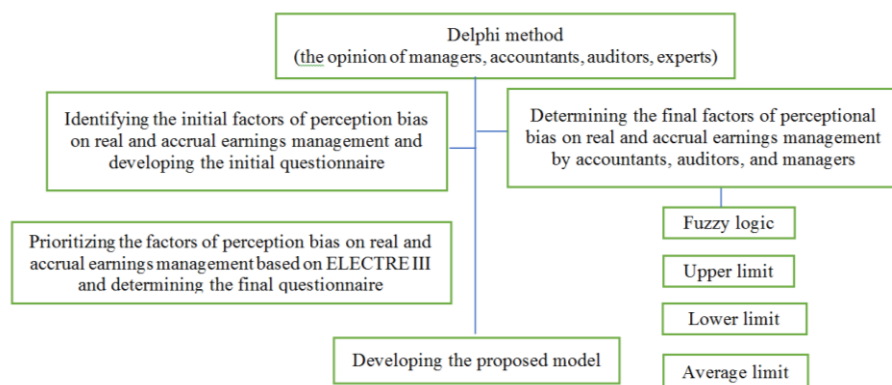

Figure 1. Research process

5. Modeling and model estimation

This section includes three main parts. The first part presents the results of the Delphi output. The output of this method eliminates unimportant indicators according to experts. In the second part, the results of Fuzzy 2 and ELECTRE III methods are presented. The output of this method is prioritizing the most important indicators affecting earnings management. The biases studied in the present study are shown in Table 1.

- **Delphi method**

In the present study, the key factors affecting the types of earnings management were determined using 10 expert surveys. In the following table, the Delphi method was stopped based on a survey from experts to reach key factors of attribution bias affecting the types of earnings management at a point where the mean difference reaches below 10% and from the outputs of these methods, the Ais were determined for entering the fuzzy model. The Delphi method was performed in two rounds. In this section, the final findings were presented due to a large number of components. The questionnaire was distributed based on the Delphi method in two steps and at each stop, the items with a condition of $M \geq 5$ were brought in the next round or the components with a mean less than 5 were eliminated and not included in the next round of the questionnaire.

First round

In this round, the panel members were provided with a set of factors affecting earnings management from previous studies by the researcher. In this section, the factors affecting earnings management are identified to understand the most important indicators affecting earnings management and model the relationship between earnings management variables and perception biases. Accordingly, 65 factors affecting earnings management being identified by theoretical foundations were identified and included in Delphi and fuzzy type II and ELECTRE III models to identify the most important factors affecting earnings management.

Second round

In this round, panel members identified 39 factors being presented in the first round of previous studies or by members, which had significant effects on the types of earnings management. The factor was eliminated from the structural and content factors having an average less than 5 in the Likert scale. Here is a summary of these results in Table 2 in the Appendix.

- **Fuzzy method**

In this section, the criteria of measuring the perception bias indicators affecting the types of earnings management are identified based on the opinions collected from experts and presented in Appendix C. These indicators will indicate our xj in the fuzzy method. Computability: An indicator should be computable in addition to being useful because even if an indicator is useful based on theoretical foundations but cannot be computable, it will not be useful. Ability and availability to the required of computation: A criterion will not be desirable criterion even if it is computable but cannot collect data for its computation. The purpose of this criterion is measuring the applicability of the information in the desired activity and does not refer to the amount of transferred information. Accuracy of a criterion: if a criterion is not accurate in forecasting, it will be useless and even its use can be sometimes ineffective and mislead decision-makers. Understandability: A criterion should be understandable; this indicator makes decision-makers know when and where each indicator should be used and for what purpose. At the same time, all experts should have a common understanding and avoid personal perceptions. Cost-effectiveness of collecting the required data: This indicator refers to the financial cost and opportunity cost of computing an indicator measurement, in other words, to what extent a criterion can be useful in transferring information on perception bias. Information value: A criterion should have information value beyond the above –mentioned criteria to create a new perspective on the status of the company by obtaining information from it.

Analyzability: A criterion should be able to be analyzed, which means that the increase or decrease of the criterion should be able to analyze the future status of the company. Applicability: This criterion refers to the degree of relevance of the criterion to achieve the desired goals. In other words, the ability of the criterion to measure the applicability of the transferred information to the desired goal is high and does not refer to the amount of transferred information. Based on the results of Table (3) (Appendix), the criteria below and equal to the mean of 5 are eliminated. As a result, the indicators of computability, information availability, comprehensibility, indicator accuracy in forecasting the effect of different types of perception bias on earnings management, and indicator applicability will be used as the main criteria for prioritizing the investigated indicators. ELECTRE method is used to prioritize the perception bias factors affecting the types of earnings management. After adjusting and multiplying the weights in factors, all the options were compared to all the indicators and the set of " coordination and non- coordination matrices" was formed. The coordination set of options k and I shown by Ski will include all indicators where Ai is more desirable than Ak.

To find this desirability, the type of decision indicators should be considered in terms of positive or negative aspects. In other words, it is necessary to determine the coordination and non- coordination sets. Then, the upper and lower domains of the perception bias variables affecting the types of earnings management were calculated using the type 2 fuzzy. Since higher uncertainty is covered in Type II fuzzy than type 1 fuzzy, the input functions which can cover a higher uncertainty range are used. Accordingly, the fuzzy input functions were selected from the Triangular-Gaussian combination to have the highest uncertainty coverage. fuzzy type II was computed using coding in MATLAB. In this method, a lower limit and an upper limit are determined. The following table shows the information from the 10 questionnaires taken from the elite active in accounting, auditing, and behavioral finance. In this table, the average opinions of these 10 experts were considered as input data of t type two fuzzy logic method (the method proposed by Buckley 1985). According to the experts and determined criteria, the upper and lower limits were determined for each criterion according to Table 4 using the fuzzy model. Then, the following equation was used using the concepts of fuzzy logic for the defuzzification of the decision-making matrix, because it does not require the personal judgment of the analyst. Since in some studies, the lower or upper limits of the criterion were investigated and in some

studies, the average of these two criteria was the criterion limit for the decision of the researcher, the following formula was virtually eliminated from the researcher's judgment. The center of triangular fuzzy number

$$CA = \left(\frac{(\beta - \alpha) + (m - \alpha)}{3} \right) + \alpha$$

In the above-mentioned equation, alpha is the lower limit, beta is the upper limit and M is the mean fuzzy number. After obtaining the definitive decision matrix in Table 5, the numbers corresponding to each fuzzy number in Table 5 were computed for the defuzzification of the matrix. The opposite of type two fuzzy relations was used for this purpose. The results of these calculations are presented in Table 6.

The results of ELECTRE III

The score of evaluating each strategy was obtained so far based on each indicator. Considering the other inputs of ELECTRE III, it is necessary to determine the importance or weight of each indicator and the threshold value of each one fo them. Determining the importance of the weight of indicators in ELECTRE III is sometimes critical and sensitive. Determining the superiority of options to each other is somehow difficult, and when there are several decision-makers, the situation becomes more complex due to various preferences and even conflicting preferences; thus, some external techniques should be used to weight the indicators. In this study, ten questionnaires from ten experts active in accounting, auditing, and behavioral finance were completed. By assuming the homogeneity of experts using simple averaging, the opinions of experts were converted into a single number. In this table, the paired matrix was introduced among the criteria for measuring knowledge sharing methods based on the experts' opinions. A summary of these results was presented in Table 8. Based on the above-mentioned matrix, the highest weight was assigned to the applicability of the indicator. Then, the importance of each definite matrix will be obtained by multiplying the weight of each factor by the average. The indicators, including the indifference threshold (q), the veto threshold (v) and the threshold of superiority (p), were directly determined by the experts as described in the table (questionnaire in Appendix

"F"). Now, the weights were obtained according to normalize the decision-making matrix.

$$C_J (a.b) = j \begin{cases} 1 & g_j (a) - q_j \geq g_j(b) \\ 0 & g_j (a) + p_j \leq g_j(b) \\ \dfrac{p_j (a) - g_j - g_j(b)}{p_j - q_j} \\ j1.2 \ldots \ldots r \end{cases}$$

Since all the considered criteria were positive, the matrix of coordination and coordination matrices was calculated, which were not presented because of the very high volume of computation. Accordingly, the coordination matrix was determined:

$$J \text{ € ski} \qquad IKI = \sum_j W$$

To form on the "coordination matrix", we worked based on the coordination sets. For example, to calculate the degree of consistency of the first-to-second preference, based on S12 = (1,2,3,4), the weights of the first, second, third, and fourth indicators were added to each other and then the threshold limit of the coordination matrix was calculated.

$$\bar{I} = (\text{sum of values} \div \text{the number of coordination matrix values}) \text{Coordination matrix}$$

Since the sum of numbers in the above-mentioned matrix was 711.36 and the number of elements in the matrix was 1482, thus the threshold limit in this matrix would be 0.48, now using this threshold limit the higher numbers were considered as one and the remainder was considered as zero to obtain the effective coordination matrix based. In the following, the effective and ineffective non-coordination matrix is calculated based on Table 13, and then the threshold limit of the non- coordination matrix is calculated.

$$\overline{NI} = (\text{sum of values} \div \text{the number of non-coordination matrix values})$$

Non-Coordination matrix

Since the sum of the numbers in the above-mentioned matrix was 1318.98 and the number of elements in the matrix was 1482, thus the threshold limit of this matrix would be 0.89, now using this threshold limit, we set the upper numbers as one and the others as zero to calculate the effective non-

coordination matrix based. Based on the following equation, the validity matrix is studied as follows:

$$S(a,b) = \begin{cases} C(a,b) & d_j(a,b) \leq C(a,b) \\ C(a,b) \cdot \prod_{j \in X(a,b)} \dfrac{1 - dj(a,b)}{1 - C(a,b)} \end{cases}$$

The validity matrix will be obtained through multiplying the effective coordination matrix and effective non-coordination matrix. Based on the sum of the numbers one of each row, the factors of perception bias affecting different types of earnings management was prioritized as shown in Table 11.

Based on the results obtained from Delphi, type 2 fuzzy and ELECTRE III, the most important factors affecting perception bias were identified. The selected indicators (27 variables: two-thirds plus one selected variable by type 2 fuzzy and ELECTRE III) were used to estimate the model of the relationship between perception bias and earnings management.

The results of the partial least squares method

In this section, it is necessary to develop an optimal model. For this reason, first, the initial model was drawn and finally, based on the results of the Delphi, Fuzzy type 2 model, and ELECTRE III the final model was developed. Finally, after determining the model, the model validity was studied based on the structural equation method. The opinions of different professors and experts were used to ensure the validity of the questionnaire. Cronbach's alpha coefficient and composite reliability (Table 12) were used to evaluate the reliability of the questionnaire. Since Cronbach's alpha coefficient was more than 0.7 and the load factor indicator was more than 0.3, thus, the research indicatiors had high validity and reliability. After evaluating the validity and reliability of the questionnaire, the model was estimated using the path analysis. Since there was no specific model in the study, the model was estimated in four different modes.
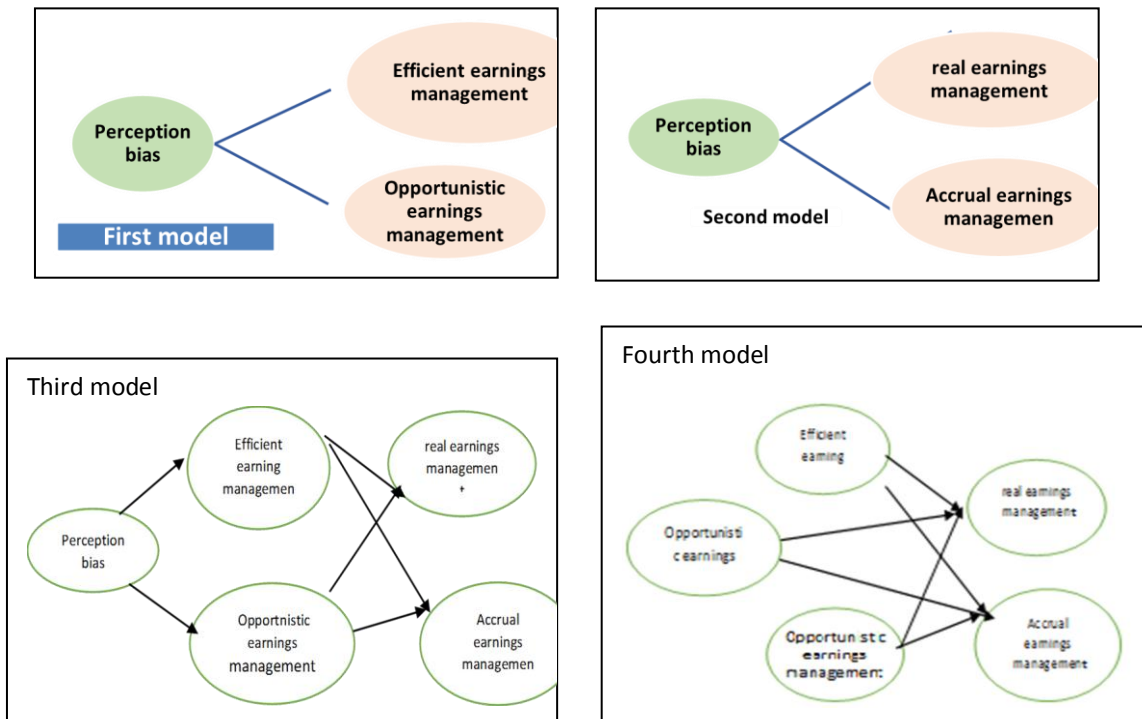

Figure 4. Different models of the relationship between variables

The goodness of fit indicators

Identifying the degree of consistency between experimental data with conceptual and theoretical models is one of the main goals of using structural equation modeling. Experimental data and conceptual model are used to identify the degree of consistency which is called goodness of fit.Different indicators are used in structural equation modeling to ensure the goodness of fit of the model. Table 13 indicates the most important goodness-of-fit indicators of different models.Due to the goodness of fit indices (GFIs) above 70% of the model, the estimation model had a desirable level above 70% and the root mean square error of estimation (RMSEA) below 8% obtained from the results of the study were highly reliable. The results indicated that the fourth model was more accurate, thus the second model can be used if the hypotheses are presented and the results are developed in further studies.

6. Discussion and Conclusions

Based on the results of the study, the following suggestions can be presented:

Cognitive science has identified many of these mental biases and studied different aspects of their emergence which everyone can be captured by mental biases. Decision making, selection, and adjudication are the results of a mental process enabling the person to make a decision. To create a desirable accounting information environment and enhance the reporting and transfer of corporate information, the more justly distribution of this information among market participants, reduction of uncertainty, and elimination of further ambiguity will reduce opportunistic behaviors. Besides, the increase of communication understanding, planning for self-knowledge tools, better understanding of news and information, and development of a system of accountability and leadership elements, as well as the design of controlling the behavior of financial reporters can affect managing earnings management. It is suggested to use them as intra-organizational monitoring factors in the form of the audit committee, internal audit, etc. as the limiting factors of earnings management.

Since overconfidence bias was considered as the most important variable affecting perception bias, this factor had destructive effects on financial decisions and financial analysts are more susceptible to this bias than other businesses, it is suggested to consider limiting factors on the mental biases of those active in finance.

All perception, mental, cognitive, decision-making biases can have a destructive effect on the decision-making and performance of companies. The best method of dealing with it is finding a complete recognition about biases, create an appropriate structure for decision making, explain the step-like process, develop and explain the alternatives, and create commitment against decisions.

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Table 1. Research variables

Bias type	Bias	Symbol
Dimensions of perceptual errors	Overconfidence bias.	x1
	Availability bias: (Johansson et al., 2002).	x2
	Escalation of commitment bias:	x3
	Randomness bias:.	x4
	Illusion bias:	x5
	Stereotyping perception: (Johansson et al., 2002).	x6
	Halo effect:	x7
	Neuroticism bias:	x8
	Tendency to confirmation bias:.	x9
	Anchoring Adjustment Bias:.	x10
	Fundamental Attribution Bias:.	x11
	Illusion bias:	x12
	Central tendency:	x13
	Pygmalion Effect:	x14
	Galatea Effect:.	x15
	Golam Effect:	x16
Personality type in creating decision-making biases	Personality five-factor model	x17
Dimensions of decision errors	Anchoring bias:	x18
	Information bias:	x19
	Hidsight bias:	x20
	Reflection error:	x21
	Timidity:	x22
	A lack of time drift	x23
	Neglecting to separate the symptoms from the issues:	x24
	Failure to define terms and conditions:	x25
	Inference from unreliable sources:	x26
	Lack of awareness of the factors affecting our adjudication:	x27
	Emotional bias:.	x28
	Bias failure to execute the decision:	x29
	Deciding making at the time of hunger, thirst, fatigue, and anger:	x30

Bias type	Bias	Symbol
	Loss aversion: (Suresh. 2013)	x31
	Regret aversion: (Stetman & Shaferin, 1984)..	x32
	Idea bias origin:.	x33
	Ambiguity effect:.	x34
	Cognitive dissonance:.	x35
	Contrast effect:	x36
	Optimism bias: (Luvalvo Conman 2003).	x37
	Attribution theory:.	x38
	Attribution bias: (Win et al. 1999).	x39
	Self-serving bias: (Khorakian 2016).	x40
	Projection bias:	x41
Dimensions of cognitive erros	Self-fulfilling prophecy: (Khorakian)	x42
	False consensus effect: (Khorakian).	x43
	Implicit personality theory:	x44
	Choice-supportive bias:	x45
	Availability heuristic:	x46
	Conservatism bias: (Mantier, 2002).	x47
	Dichotomized thinking:	x48
	Flexible thinking:.	x49
	Representativeness heuristic: .	x50
	Global or undifferentiated thinking:	x51
	The illusion of control bias: (Longo, 1975).	x52
Pattern compliance biases	Incorrect comparison:	x53
Bias tends to stabilize	Status quo bias: (Katman, Taler, 1991).	x54
Social biases	Herding behavior:	x55
Judgemental biases	Extreme reaction bias to judicial events:	x56
	Avoidance ambiguity bias: (Graham, Harvey, & Hang, 2003).	x57
Preferential biases	Purchase price priority bias as a reference point:.	x58
	Bias tends to repeat risk and betting:	x59
	Closed framework bias:	x60
Biases of apocalyptic behaviors	Gambling sophistry:	x61
	Self-serving bias:	x62
	Mental accounting:	x63
Formatting bias	Anomalous phenomena of economic behavior:	x64
	Anomalous phenomena in price and market returns:	x65

Table 2. The results of the Delphi method

Bias type	symbol	First round			Second round		
		mean	Standard deviation	result	mean	Standard deviation	result
	x1	5.9	1.82		5.8	1.87	
	x2	5.7	2.63		5.4	2.66	
	x3	5.8	2.19		5.5	2.22	
	x4	6.9	1.55		5.9	1.66	
	x5	7.4	2.74		5.5	2.80	
	x6	8.1	1.38		5.8	1.35	
	x7	6.5	1.52		7.2	1.48	
Dimensions of perception bias	x8	4.4	1.69	deleted	-	-	
	x9	4.5	1.59	deleted	-	-	
	x10	7.1	1.44		6.8	1.51	
	x11	4.8	1.17	deleted	-	-	
	x12	5.4	1.68		4.5	1.58	deleted
	x13	7.1	1.17		6.7	1.07	
	x14	7.6	1.33		6.4	1.51	
	x15	7.1	1.91		6.7	1.89	
	x16	6.2	1.55		6.1	1.43	

Bias type	symbol	First round		result	Second round		result
		mean	Standard deviation		mean	Standard deviation	
Personality type in creating decision bias	x17	6.3	1.27		5.8	1.32	
Dimensions of decision bias	x18	4.1	1.45	deleted	-	-	
	x19	5.4	1.83		5.2	1.81	
	x20	5.7	1.68		5.3	1.70	
	x21	4.7	1.24	deleted	-	-	
	x22	4.8	2.72	deleted	-	-	
	x23	8.1	3.44		4.4	3.36	deleted
	x24	4.4	2.87	deleted	-	-	
	x25	4.6	2.42	deleted	-	-	
	x26	5.9	1.46		6.4	1.40	
	x27	6.4	2.57		6.1	2.64	
	x28	6.1	2.88		4.3	3.03	deleted
	x29	6.3	1.79		4.8	1.81	deleted
	x30	3.7	2.31	deleted	-	-	
	x31	8.4	1.32		7.1	1.29	
	x32	5.9	0.99		6.6	0.97	
	x33	4.3	1.17	deleted	-	-	
Dimensions of cognitive bias	x34	8.7	0.81		8.1	0.74	
	x35	7.2	1.03		8.4	0.97	
	x36	5.5	1.18		4.4	1.35	deleted
	x37	4.8	1.41	deleted	-	-	
	x38	7.7	1.92		5.8	1.87	
	x39	7.9	2.31		7.6	2.22	
	x40	5.9	1.82		5.8	1.87	
	x41	5.7	2.63		4.4	2.66	deleted
	x42	5.8	2.19		5.5	2.22	
	x43	4.9	1.55	deleted	-	-	
	x44	4.4	2.74	deleted	-	-	
	x45	8.1	1.38		5.8	1.35	
	x46	4.5	1.52	deleted	-	-	
	x47	5.4	1.69		4.1	1.71	deleted
	x48	6.5	1.59		6.4	1.60	
	x49	7.1	1.44		6.8	1.51	
	x50	5.8	1.17		4.4	1.07	deleted
	x51	4.4	1.68	deleted	-	-	
	x52	4.1	1.17	deleted	-	-	
Pattern compliance biases	x53	4.6	1.33	deleted	-	-	
Judgmental biases	x54	7.1	1.91		6.7	1.89	
Social bias	x55	6.2	1.55		6.1	1.43	
Judgmental biases	x56	6.3	1.27		5.8	1.32	
Biases of apocalyptic behaviors	x57	6.1	1.45		6	1.41	
	x58	5.4	1.83		5.2	1.81	
	x59	5.7	1.68		5.3	1.70	
	x60	7.7	1.24		4.6	1.26	deleted
Biases of apocalyptic behaviors	x61	5.8	2.72		5.7	2.67	
	x62	8.1	3.44		7.4	3.36	
Formatting bias	x63	6.4	2.87		6.4	2.95	
	x64	6.6	2.42		6.5	2.37	
	x65	5.9	1.46		6.4	1.40	
Mean standard deviation	1.67		1.74				
Kendall Index	0.789		0.812				

Table 3. Criteria for measuring the factors affecting earnings management

Number of experts	factor	Row
8	Computability	1
8	Ability and availability to the required of computation	2
8	Accuracy of a criterion	3
7	Understandability	4
3	Cost-effectiveness of collecting the required data	5
5	Information value	6
4	Analyzability	7
9	Applicability	8

Source: Researcher's calculations and experts' opinions

Table 4. The results of fuzzy matrix

factors	Computability			Ability and availability to the required of computation			Understandability			Accuracy of a criterion			Applicability		
Limit	Upper limit	Lower limit	mean	Upper limit	Lower limit	mean	Upper limit	Lower limit	mean	Upper limit	Lower limit	mean	Upper limit	Lower limit	mean
x1	0.39	0.38	0.385	0.09	0.06	0.075	0.32	0.45	0.385	0.52	0.29	0.405	0.24	0.22	0.23
x2	0.25	0.07	0.16	0.46	0.15	0.305	0.41	0.55	0.48	0.04	0.03	0.035	0.25	0.24	0.245
x3	0.07	0.03	0.05	0.1	0.05	0.075	0.4	0.58	0.49	0.43	0.53	0.48	0.39	0.35	0.37
x4	0.06	0.11	0.085	0.3	0.17	0.235	0.15	0.09	0.12	0.54	0.53	0.535	0.43	0.54	0.485
x5	0.3	0.06	0.18	0.05	0.17	0.11	0.29	0.35	0.32	0.3	0.27	0.285	0.6	0.27	0.435
x6	0.42	0.1	0.26	0.01	0	0.005	0.43	0.42	0.425	0.21	0.3	0.255	0.52	0.55	0.535
x7	0.19	0.02	0.105	0.42	0.07	0.245	0.17	0.31	0.24	0.34	0.15	0.245	0.13	0.33	0.23
x10	0.19	0.12	0.155	0.04	0.24	0.14	0.3	0.25	0.275	0.63	0.51	0.57	0.24	0.19	0.215
x13	0.45	0.19	0.32	0.35	0.51	0.43	0.19	0.26	0.225	0.07	0	0.035	0.25	0.03	0.14
x14	0.17	0.01	0.09	0.39	0.54	0.465	0.29	0.25	0.27	0.15	0.17	0.16	0.08	0.05	0.065
x15	0.16	0.31	0.48	0.04	0.25	0.17	0.04	0.16	0.31	0.48	0.04	0.25	0.17	0.04	0.13
x16	0.05	0.08	0.49	0.48	0.37	0.20	0.32	0.05	0.08	0.49	0.48	0.37	0.20	0.32	0.08
x17	0.09	0.24	0.12	0.54	0.49	0.18	0.18	0.09	0.24	0.12	0.54	0.49	0.18	0.18	0.19
x19	0.18	0.11	0.32	0.29	0.44	0.19	0.08	0.18	0.11	0.32	0.29	0.44	0.19	0.08	0.38
x20	0.26	0.01	0.43	0.26	0.54	0.06	0.10	0.26	0.01	0.43	0.26	0.54	0.06	0.10	0.28
x26	0.11	0.25	0.24	0.25	0.23	0.38	0.08	0.11	0.25	0.24	0.25	0.23	0.38	0.08	0.19
x27	0.16	0.14	0.28	0.57	0.22	0.07	0.12	0.16	0.14	0.28	0.57	0.22	0.07	0.12	0.18
x31	0.32	0.43	0.23	0.04	0.14	0.49	0.05	0.32	0.43	0.23	0.04	0.14	0.49	0.05	0.45
x32	0.02	0.02	0.08	0.32	0.05	0.00	0.01	0.02	0.02	0.08	0.32	0.05	0.00	0.01	0.08
x34	0.41	0.39	0.40	0.13	0.07	0.10	0.35	0.49	0.42	0.52	0.29	0.41	0.26	0.24	0.25
x35	0.26	0.07	0.16	0.47	0.15	0.31	0.44	0.59	0.52	0.07	0.07	0.07	0.28	0.27	0.27
x38	0.07	0.04	0.06	0.12	0.06	0.09	0.41	0.59	0.50	0.47	0.57	0.52	0.42	0.39	0.41
x39	0.08	0.11	0.10	0.30	0.18	0.24	0.17	0.12	0.14	0.56	0.55	0.56	0.48	0.56	0.52
x40	0.33	0.07	0.20	0.05	0.17	0.11	0.32	0.38	0.35	0.32	0.29	0.30	0.64	0.31	0.48
x42	0.43	0.10	0.27	0.04	0.01	0.02	0.44	0.44	0.44	0.24	0.31	0.27	0.53	0.58	0.55
x45	0.20	0.03	0.12	0.42	0.09	0.26	0.19	0.33	0.26	0.39	0.19	0.29	0.15	0.34	0.25
x48	0.22	0.13	0.18	0.07	0.28	0.17	0.31	0.27	0.29	0.64	0.51	0.57	0.26	0.19	0.23
x49	0.46	0.19	0.33	0.38	0.55	0.47	0.21	0.28	0.25	0.08	0.01	0.05	0.26	0.03	0.15
x54	0.18	0.03	0.11	0.39	0.56	0.48	0.29	0.26	0.28	0.19	0.17	0.18	0.09	0.05	0.07
x55	0.16	0.32	0.24	0.08	0.28	0.18	0.06	0.16	0.11	0.52	0.08	0.30	0.19	0.06	0.13
x56	0.06	0.10	0.08	0.52	0.41	0.46	0.33	0.06	0.20	0.50	0.52	0.51	0.21	0.33	0.27
x57	0.10	0.25	0.18	0.56	0.52	0.54	0.19	0.10	0.15	0.14	0.56	0.35	0.19	0.19	0.19
x58	0.20	0.11	0.16	0.31	0.48	0.40	0.09	0.20	0.14	0.35	0.31	0.33	0.19	0.09	0.14
x59	0.27	0.03	0.15	0.28	0.56	0.42	0.11	0.27	0.19	0.45	0.28	0.36	0.09	0.11	0.10
x61	0.12	0.26	0.19	0.29	0.25	0.27	0.09	0.12	0.11	0.26	0.29	0.28	0.39	0.09	0.24
x62	0.18	0.17	0.18	0.57	0.23	0.40	0.12	0.18	0.15	0.30	0.57	0.44	0.11	0.12	0.12
x63	0.32	0.43	0.38	0.06	0.14	0.10	0.05	0.32	0.19	0.24	0.06	0.15	0.49	0.05	0.27
x64	0.04	0.05	0.05	0.32	0.06	0.19	0.01	0.04	0.03	0.10	0.32	0.21	0.04	0.01	0.03
x65	0.42	0.38	0.39	0.14	0.08	0.11	0.36	0.48	0.43	0.51	0.30	0.42	0.27	0.25	0.26

Source: researcher's calculations

Table 5. Weighted fuzzy decision matrix

Factors	Computability	Ability and availability to the required of computation	Understandability	Accuracy of a criterion	Applicability
x1	0.39	0.08	0.39	0.41	0.23
x2	0.16	0.31	0.48	0.04	0.25
x3	0.05	0.08	0.49	0.48	0.37
x4	0.09	0.24	0.12	0.54	0.49
x5	0.18	0.11	0.32	0.29	0.44
x6	0.26	0.01	0.43	0.26	0.54
x7	0.11	0.25	0.24	0.25	0.23
x10	0.16	0.14	0.28	0.57	0.22
x13	0.32	0.43	0.23	0.04	0.14
x14	0.09	0.47	0.27	0.16	0.07
x15	0.32	0.15	0.17	0.26	0.11
x16	0.21	0.35	0.15	0.45	0.20
x17	0.15	0.40	0.17	0.38	0.18
x19	0.20	0.31	0.12	0.35	0.22
x20	0.23	0.29	0.12	0.41	0.15
x26	0.20	0.29	0.15	0.24	0.22
x27	0.19	0.29	0.14	0.36	0.12
x31	0.33	0.22	0.27	0.14	0.33
x32	0.04	0.12	0.02	0.15	0.03
x34	0.40	0.10	0.42	0.41	0.25
x35	0.16	0.31	0.52	0.07	0.27
x38	0.06	0.09	0.50	0.52	0.41
x39	0.10	0.24	0.14	0.56	0.52
x40	0.20	0.11	0.35	0.30	0.48
x42	0.27	0.02	0.44	0.27	0.55
x45	0.12	0.26	0.26	0.29	0.25
x48	0.18	0.17	0.29	0.57	0.23
x49	0.33	0.47	0.25	0.05	0.15
x54	0.11	0.48	0.28	0.18	0.07
x55	0.24	0.18	0.11	0.30	0.13
x56	0.08	0.46	0.20	0.51	0.27
x57	0.18	0.54	0.15	0.35	0.19
x58	0.16	0.40	0.14	0.33	0.14
x59	0.15	0.42	0.19	0.36	0.10
x61	0.19	0.27	0.11	0.28	0.24
x62	0.18	0.40	0.15	0.44	0.12
x63	0.38	0.10	0.19	0.15	0.27
x64	0.05	0.19	0.03	0.21	0.03
x65	0.42	0.13	0.41	0.42	0.27

Table 6. Non-fuzzy decision matrix

Factors	Computability	Ability and availability to the required of computation	Understandability	Accuracy of a criterion	Applicability
x1	2.6	7.8	2.6	2.4	4.3
x2	6.3	3.2	2.1	4.7	4.0
x3	2.1	8.1	2.0	2.1	2.7
x4	4.9	4.2	8.3	1.9	2.0
x5	5.6	5.2	3.1	3.4	2.3
x6	3.8	7.5	2.3	3.8	1.9
x7	7.2	4.0	4.2	4.0	4.3
x10	6.3	7.1	3.6	1.8	4.5
x13	3.1	2.3	4.3	5.9	7.1
x14	6.8	2.1	3.7	6.3	7.1
x15	3.1	6.7	5.9	3.8	8.3
x16	4.8	2.9	6.7	2.2	5.0
x17	6.7	2.5	5.9	2.6	5.6
x19	5.0	3.2	8.3	2.9	4.5

Factors	Computability	Ability and availability to the required of computation	Understandability	Accuracy of a criterion	Applicability
x20	4.3	3.4	8.3	2.4	6.7
x26	5.0	3.4	6.7	4.2	4.5
x27	5.3	3.4	7.1	2.8	8.3
x31	3.0	4.5	3.7	7.1	3.0
x32	5.6	8.3	7.1	6.7	4.5
x34	2.5	7.8	2.4	2.5	4.0
x35	6.1	3.2	1.9	4.7	3.7
x38	2.1	8.1	2.0	1.9	2.5
x39	4.9	4.1	6.9	1.8	1.9
x40	5.0	5.2	2.8	3.3	2.1
x42	3.7	7.5	2.3	3.7	1.8
x45	7.2	3.9	3.8	3.5	4.1
x48	5.6	5.8	3.4	1.7	4.4
x49	3.1	2.1	4.1	5.9	6.9
x54	6.8	2.1	3.6	5.6	7.1
x55	4.2	5.6	8.8	3.4	8.3
x56	8.1	2.2	5.1	2.0	3.7
x57	5.7	1.8	6.9	2.8	5.3
x58	6.4	2.5	7.0	3.0	7.1
x59	6.7	2.4	5.3	2.7	8.6
x61	5.2	3.7	8.1	3.6	4.2
x62	5.6	2.5	6.5	2.3	8.6
x63	2.7	8.2	5.4	6.6	3.7
x64	5.6	5.2	7.1	4.8	4.5
x65	2.6	7.9	2.3	2.6	4.1

Table 7. Score of different indicators based on experts' opinion

Factors	Computability	Ability and availability to the required of computation	Understandability	Accuracy of a criterion	Applicability
Computability	1	2	1	4	5
Ability and availability to the required of computation	0.50	1	2	5	6
Understandability	1.00	0.50	1	6	7
Accuracy of a criterion	0.25	0.20	0.17	1	4
Applicability	0.20	0.17	0.14	0.25	1

Source: Researcher's calculations

Table 8. Normalized matrix

Factors	Ease of calculating the indicator	Availability of information	Familiarity of elite with earnings management and behavioral finance	The accuracy of the indicator in forecasting earnings management	Applicability
Computability	0.65	0.87	0.41	0.45	0.44
Ability and availability to the required of computatuion	0.33	0.43	0.81	0.57	0.53
Understandability	0.65	0.22	0.41	0.68	0.62
Accuracy of a criterion	0.16	0.09	0.07	0.11	0.35
Applicability	0.13	0.07	0.06	0.03	0.09
Weight of factors	0.208	0.181	0.189	0.199	0.221

Source: researcher's calculations

Table 9. Definite matrix

factors	Ease of calculating the indicator	Availability of information	Familiarity of elite with earnings management and behavioral finance	The accuracy of the indicator in forecasting earnings management	Applicability
number	1	2	3	4	5
x1	0.54	1.42	0.49	0.48	0.95
x2	1.31	0.58	0.40	0.94	0.88

factors	Ease of calculating the indicator	Availability of information	Familiarity of elite with earnings management and behavioral finance	The accuracy of the indicator in forecasting earnings management	Applicability
x3	0.44	1.47	0.38	0.42	0.60
x4	1.02	0.76	1.58	0.38	0.44
x5	1.17	0.94	0.59	0.68	0.51
x6	0.79	1.36	0.44	0.76	0.42
x7	1.50	0.73	0.80	0.80	0.95
x10	1.31	1.29	0.68	0.36	0.99
x13	0.65	0.42	0.82	1.18	1.57
x14	1.42	0.38	0.70	1.26	1.57
x15	0.65	1.22	1.12	0.76	1.83
x16	1.00	0.53	1.27	0.44	1.11
x17	1.40	0.45	1.12	0.52	1.24
x19	1.04	0.58	1.58	0.58	0.99
x20	0.90	0.62	1.58	0.48	1.48
x26	1.04	0.62	1.27	0.84	0.99
x27	1.10	0.62	1.35	0.56	1.83
x31	0.62	0.82	0.70	1.41	0.66
x32	1.17	1.51	1.35	1.33	0.99
x34	0.52	1.30	0.46	0.49	0.92
x35	1.27	0.54	0.38	0.94	0.83
x38	0.44	1.36	0.39	0.39	0.56
x39	1.02	0.69	1.35	0.36	0.44
x40	1.04	0.86	0.56	0.66	0.48
x42	0.78	1.25	0.44	0.73	0.41
x45	1.50	0.65	0.75	0.69	0.93
x48	1.16	0.97	0.67	0.35	1.01
x49	0.64	0.36	0.80	1.18	1.57
x54	1.42	0.35	0.71	1.12	1.62
x55	0.87	0.94	1.71	0.68	1.89
x56	1.69	0.36	1.00	0.39	0.83
x57	1.18	0.31	1.35	0.57	1.20
x58	1.34	0.42	1.36	0.61	1.62
x59	1.40	0.40	1.05	0.55	1.96
x61	1.09	0.62	1.59	0.72	0.96
x62	1.16	0.42	1.27	0.46	1.97
x63	0.55	1.37	1.05	1.33	0.84
x64	1.17	0.87	1.39	0.95	1.03
x65	0.53	1.33	0.48	0.53	0.96

Table 10: Threshold values of superiority, indifference, and Veto decision-making indicators

	Applicability	The accuracy of indicator in forecasting earnings management	Familiarity of elite with earnings management and behavioral finance	Availability of information	Ease of calculating the indicator
Threshold limit q	0.5	1	0.5	0.5	1
Threshold limit of superiority p	3	3	2	1.5	1.5
Threshold limit of veto V	6	5	5	6	7
Nature of indicator	Positive	Positive	Positive	Positive	Positive

Table 11. Validity matrix

Rank	Bias	Symbol	Rank
Dimensions of perceptual errors	Overconfidence bias	x1	1
	Availability Bias	x2	21
	Escalation of commitment	x3	32
	Randomness Bias	x4	31
	Illusion Bias	x5	22
	Stereotyping	x6	30
	Halo effect	x7	10
	Anchoring Adjustment Bias	x10	29

Rank	Bias	Symbol	Rank
	Central Tendency	x13	28
	Pygmalion Effect	x14	12
	Galatea Effect	x15	8
	Golam Effect	x16	23
Personality type in creating decision making bias	Personality	x17	6
	Information bias	x19	7
	Hidsight bias	x20	5
	Inference from unreliable sources	x26	18
Dimensions of decision errors	Lack of awareness on the factors affecting our adjudication	x27	9
	Loss aversion	x31	24
	Regret aversion	x32	2
	Ambiguity effect	x34	25
	Cognitive dissonance	x35	33
	Attribution theory	x38	27
	Attribution bias	x39	26
	The self-serving bias	x40	20
Dimensions of cognitive errors	Self-fulfilling prophecy	x42	19
	Choice –supportive bias	x45	4
	Dichotomized thinking	x48	38
	Flexible thinking	x49	39
	Status quo bias	x54	11
Bais tends to stabilize	Herding behavior	x55	15
Social bias	Extreme reaction bias to judicial events	x56	16
Judgmental biases	Avoidance ambiguity bias	x57	14
	Purchase price priority bias as a reference point	x58	28
Preferential biases	Bias tends to repeat risk and betting	x59	13
	Gambling sophistry	x61	37
Biases of apocalyptic behaviors	Self- serving bias	x62	3
	Mental accounting	x63	17
Formatting bias	Anomalous phenomena of economic behavior	x64	36
	Anomalous phenomena in price and market returns	x65	35

Table 12. Validity and reliability indicators

Indicator	Cronbach's alpha	Factor load
Perception bias	0.919	0.934
Accrual earnings management	0.865	0.918
Accrual earnings management	0.858	0.898
Efficient earnings management	0.83	0.898
Conservative earnings management	0.755	0.833

Table 13. Goodness of fit indicators of the model

Indicator		value	result	rank	model
GFI	Goodness of fit	0.78	Desirable	2	first
RMSEA	The root mean square error of estimation	0.041	Desirable		
GFI	Goodness of fit	0.89	Desirable	1	second
RMSEA	The root mean square error of estimation	0.019	Desirable		
GFI	Goodness of fit	0.62	Relatively desirable	4	third
RMSEA	The root mean square error of estimation	0.079	Relatively desirable		
GFI	Goodness of fit	0.59	Undesirable	3	Fourth
RMSEA	The root mean square error of estimation	0.119	Undesirable		

Notes

[1] Rational behavior plays a significant role in (neoclassical) economics, which indicates that every act of human being aims to satisfy his utmost desirability may even he enjoys the annoyance of himself