Int. J. Nonlinear Anal. Appl. 14 (2023) 1, 2901–2914
ISSN: 2008-6822 (electronic)
http://dx.doi.org/10.22075/ijnaa.2022.27500.3625

Identification and screening of psychological factors affecting the financial behavior of investors for providing a structural model: A capital efficiency approach

Mohammad Ali Dehestani[a], Hassan Ghodrati[a,*], Meysam Arabzadeh[a], Hossein Panahian[a], Mohammad Alipour[b]

[a]*Department of Accounting, Kashan Branch, Islamic Azad University, Kashan, Iran*

[b]*Department of Accounting, Khalkhal Branch, Islamic Azad University, Khalkhal, Iran*

(Communicated by Mohammad Bagher Ghaemi)

Abstract

In this article, based on the content analysis technique and using an interview tool, we identified the factors affecting the financial behavior model based on psychological factors with the approach of capital efficiency. The identified agents were screened using the fuzzy Delphi technique. Finally, the relevant structural model was presented. The statistical population includes professors and experts in the field of accounting, of which 12 people were sampled through the snowball technique. To collect data, the field method was used with the help of specialized interviews with experts and the fuzzy Delphi questionnaire. Data were analyzed by theme analysis method using MAXQDA software. Based on the library studies of scientific articles and books and reflection on past research, it seems that two categories of internal and external factors (dimensions) can affect the behavioral process of individual investors in the stock market. Three economic, political, and psychological components in the external dimension and two components of the stock market and company conditions were expressed as factors of the internal dimension. Accordingly, it seems that these are the main influencing factors. Psychological characteristics (optimism, overconfidence, risk aversion, and emotion) were identified in this section. The Personality factor was added to the model based on theoretical foundations and studies. According to modern behavioral finance theories, many behavioral issues are involved in investors' decision-making, the most important of which are psychological and Personality factors. People do not always act rationally and often behave unexpectedly and unpredictably. Personal characteristics play an important role in decision-making.

Keywords: Financial Behavior, Psychological Factors, Capital Efficiency, Content Analysis, Fuzzy Delphi
2020 MSC: 91G80, 62P15, 90C70

1 Introduction

As the presence of different people in the stock market and investors are faced with different options for investing, different behaviors of investors occur. For this reason, it is necessary to examine these behaviors among investors

*Corresponding author
Email addresses: Dehestani.yazd@iauyazd.ac.ir (Mohammad Ali Dehestani), h.Ghodrati@iaukashan.ac.ir (Hassan Ghodrati), m.arabzadeh@iaukashan.ac.ir (Meysam Arabzadeh), H.panahian@iaukashan.ac.ir (Hossein Panahian), Uniclass.alipoor@aukh.ac.ir (Mohammad Alipour)

Received: April 2022 *Accepted:* June 2022

and examine the factors affecting them in the stock market. This study tries to investigate the relationship between financial information acquisition and investors' behavior with the mediating role of their personality traits by using the knowledge of psychology and introducing psychological factors into financial knowledge, and by explaining what is happening in this regard in the Tehran Stock Exchange, to provide a plausible explanation for the behavior of investors. The purpose of this study is to help investors in applying the right investment behaviors by informing them about Personality traits. Real people are becoming more active in the financial markets every day. This activity is becoming more widespread day by day with the advent of new financial products and services [29]. Due to the instability of the environment and the increasing changes in society and unexpected events, the category of risk always exists. The category of risk has been one of the main and important aspects in the survival of human life cycles, especially in management. One of the important factors that affect people's financial decisions is the degree of their risk-taking [2].

The issue of financial behavior has been the most important financial issue in the last two decades, and the attention of financial and economic researchers to this field is increasing. In this area, the concepts of financial economics and psychology are integrated to create more accurate models of human behavior in financial markets [21]. Thinkers in the field of financial studies, who were always trying to identify and explain the behaviors and causes of financial market events, tried to explain the behavior of financial market decision-makers with the help of behavioral sciences. The prevailing paradigm in financial theories is based on maximizing expected utility and risk aversion, while empirical studies of the real world have brought many attacks in recent seals to modern financial theories and the rational human assumption [1]. Studies by psychologists show that human beings exhibit behavior in practice different from what modern financial theories portray as rational human beings. Discussing the behavior of investors in financial markets and understanding the reasons for their behavior in these markets is something that has attracted the attention of scientists in recent decades. Among these, many findings show that the decisions and behavior of investors are under their specific characteristics. The specific characteristics of each person are an important factor in how he or she makes decisions [22].

Researchers in recent decades have analyzed the behavior of investors and tried to understand why people invest in different ways. There are articles explaining how the transparency of financial information and personalities affect the way they invest, but an article that explains the simultaneous effect of these two variables on the behavior of investors is rarely found [18]. If it is provable that certain groups of investors are prone to some tendencies in buying and selling stocks, then market participants can identify their tendencies before investing behaviors and achieve better results and achievements in terms of investment and market dynamics. Achieve stock exchanges. According to the studies, evaluating the factors affecting the financial behavior of investors in financial decisions is very important [29]. The special characteristics of the market and the lack of sufficient knowledge of investors about the market and behavioral biases have caused the country's capital market, which is supposedly the heart of the economy, to have not sufficient efficiency and dynamism. Investors make mistakes in making their investment decision due to insufficient knowledge of the correctness and reliability of the investment. This prepares them to leave the capital market, and this may have adverse consequences for the country.

The relationship between investor perceptions and financial behaviors in developed markets has a strong history. Despite the ability to predict market investment behavior, the relevant literature has mainly examined the portfolio returns or past market returns with financial behaviors [31]. What has been learned from past research is that sustainable psychological mechanisms as a moderating factor can link the returns from a past portfolio to the volume of stock exchanges and future risk-taking. The purpose of this study is to identify the factors affecting the financial behavior model of investors based on psychological factors with a capital efficiency approach and finally to present the relevant structural model.

2 Literature review

Rocky et al. presented research entitled Modeling the Effect of Behavioral Avoidance Bias on Price Dynamics and Stock Market Returns (Application of Factor-Based Modeling in Behavioral Economics). The results of artificial stock market simulations, including two groups of fundamental and non-fundamental traders with behavioral avoidance bias, show that behavioral bias of loss avoidance explains some of the dynamics of financial markets and plays an important role in shaping financial market prices [27]. Tohidi has presented research [30]. Finally, according to the specific value of the first common component and the factor load (coefficients) of the variables, three variables were used in the final index. These three variables are the Monthly volume of retail transactions to the total volume of stock transactions, the Monthly volume of online transactions to the total volume of stock transactions and the monthly volume of stock transactions by funds and portfolio companies to the total volume of market transactions [30].

Adel et al. presented a study entitled Investor Angels: Evaluating Financial Behavioral Factors Affecting Investment Selection. The collected data were first analyzed using heuristic factor analysis; at this stage, seven hidden factors were identified, including Hope, retrospect, superstition, simplicity, risk-taking, psychological accounting and self-attribution as behavioral financial factors influencing angels' decisions [14]. Jamshidi and Ghalibaf provided evidence from the Tehran Stock Exchange. The results showed that the frequency of people trading with the external control center, type A behavior and the tendency to maximize is higher (they buy and sell more) [18]. Ebrahimi et al. presented research entitled Assessing the Importance of personality traits of Capital Market Analysts as the Third Dimension of Their Success. The results showed a significant relationship between the characteristics of extraversion, adaptability, responsibility and personal control with the degree of risk aversion of analysts. But no significant relationship was observed between Personality traits and analysts' portfolio returns [6].

Bucaro results show that the emphasis on using professional judgment is not enough to reduce the mechanical mindset of auditors. Auditors are expected to have to adopt an effective systemic thinking approach to better assess the complexity of the situation and professional judgment [3]. Shu conducted a study entitled: The mental state of the investor and the capital market. This article seeks to bridge the gap between empirical findings and economic theory. The results obtained from the analysis show that both the price of securities and the price of capital are directly related to the investor's mood. In this regard, the higher price of the asset is related to the better mood of the investor. Conversely, the expected rate of return on stocks is inversely related to the investor's mood [28]. Ham et al. conducted a study entitled Managers' Overconfidence, Domestic Financing, and Investment Returns: Evidence from China. The results showed that domestic financing could improve business opportunities and reduce capital shortages. It can lead to overinvestment, especially in companies with overconfident managers [13]. In the study, Khan et al. examined the effect of past portfolio returns based on underlying psychological mechanisms on the financial behavior of stock traders at the Malaysian Stock Exchange. The results showed that: A. In the case of simple reinforcement learning, errors in information manipulation lead to the components of optimism, self-confidence, and a risk-taking attitude. B. Psychological biases, in turn, lead to portfolio turnover of higher trading volumes, correct stock selection, and willingness to take risks [19]. Tauni et al. conducted a study entitled The Mediating Role of Investor Personality Traits with Information Sources and Financial Behavior. Among these, the role of psychological and Personality traits of investors has been considered as an intermediary variable. Among these, the structural equation model with PLS software is presented, and the research hypotheses are examined. The effect of demographic characteristics on investors' financial behavior has also been assessed [29].

3 Theoretical framework of research

3.1 Behavioral finance

The perspective of cognitive psychology has been considered in many fields such as economics, political science and management. From this point of view, decision-making is considered the result of information processing. The limitation of the cognitive perspective is that individuals may not be able to process all the information, nor is the decision-maker's initiative, interests, or personal characteristics taken into account. The social psychology approach also includes research on how justice, emotion, and self-control affect choices. The study of neuropsychology and decision-making is a growing field. The advantage of neuropsychology is that it provides a purposeful standard for mental processes. This method is limited to the fact that the structure and function of the human brain are full of unknown secrets [10].

In the realm of behavioral science, in financial decisions usually, a variety of factors is examined that shape investor behavior. It shows that investment decisions are not only influenced by economic indicators and rationality. They also are affected by the categories such as investment horizon, risk tolerance, self-confidence and confidence the investor has about the option and process of investing in the market. Hence, the field of the emergence of behavioral sciences in financial issues is a new approach to the study of financial markets [12].

3.2 Financial behavior of investors

Investors should pay close attention to the rules and regulations governing corporate reporting because they play a significant role in the reporting and accounting process [15]. Daniel et al. Conducted research on behavioral finance. They found that investors generally tended to be biased in judgment and decision-making, confident investors were confident, lacked skepticism and information, and had limited processing capacity. These characteristics affect how investors process information and perceptions about a particular stock. They conclude that "financial reporting and disclosure laws are necessary to protect naive investors." "Because of their biases, investors are unable to interpret

accounting figures, especially footnotes, and company events such as new leases in a way that leads to rational investment decisions. In addition, corroborative evidence shows that "the presentation of financial information and the choice of accounting methods affect the perception of investors" [4].

Jeff Skilling told the US Congress that their dealings with derivatives are so complex that they themselves do not understand how auditors and, ultimately, users of financial statements can understand them. Ethical values need to be instilled in these people gradually through the learning process and its continuity. There should be some legal liability for intentionally organizing events to deceive users of financial statements. The audit committee should have the highest level of accountability for all types of corporate events and ensure the transparency of the transmission of economic reality content to investors [26]. Financial theories are all based on the rationality of investor behavior. In other words, investors are assumed to be rational human beings who always make rational decisions. According to this theory, people's perception of the future is based on all available information and their inference from the functioning of the economy [15]. However, this is not always the case, and the behavior of investors is affected by behavioral variables.

3.3 Components of investors' financial behavior

Based on the library studies of scientific articles and books, reflection on past research and study, and critique of the background of theoretical foundations and existing scientific literature, two categories of internal (external) factors (dimension) can be effective. Behavioral process of individual investors in the stock exchange. Three components of economic, political and psychological in the external dimension and two components of the stock market and company conditions have been expressed as factors of the internal dimension, based on which it seems that these are the main influential factors [7].

Moreover, the non-repetitive indicators explained in the theoretical foundations and scientific background, the five components of the research amount to 99 indicators, as described in Table 1. Accordingly, the subset of economic factors from the external dimension of factors affecting the behavior of micro-investors depends on ten indicators: inflation rate, Bank interest and interest rates, Industry type, Desirability and sensitivity of stray capital to other markets, international economic developments, Return on investment of other economic sectors that are alternatives to investing in the stock market, Recession or economic prosperity, Liquidity index, Per capita household income and purchasing power, Fluctuations in the price of cash, gold, currency, etc. The component of political factors from the external dimension is also related to 5 indicators, which include: Comments of political officials, Political conditions governing the executive branch, Subject laws and their changes, Domestic political news and developments, International political news and developments, Impacts of International Organizations on Market Flow, Iran's political relations with other countries, Social and cultural developments and security and stability of the region. The component of psychological factors from the external dimension can also be explained in the form of 11 indicators. Market rumors, Brokers recommend, Imitation of others, Common interests, Risk level, Psychological effect of past changes in stock prices, News published in newspapers and magazines, Unofficial news from corporate meetings, Institutional and major investment flow, the recommendations of friends and advisors and the movement of shareholders' flocks towards the shares constitute these indicators. Factors related to the stock exchange organization, which is one of the components of the internal dimension of factors affecting the behavior of individual investors, also depend on nine indicators: Production and creation of specialized knowledge, Information mechanisms, Information storage mechanisms, The volume of transactions on the stock exchange, Comments of stock exchange officials on the current market situation, return on investment in the stock market compared to other markets and informal relations of stock exchange managers with shareholders. Factors related to the company, which is another component of the internal dimension, can be explained by 20 indicators. These indicators are Transparency of available financial information, Share trading volume, Price to profit ratio, Share risk, share earnings forecast, Share price fluctuations, Share cash profit, trend stability, Delay in dividend payment, Equity rate of return, Stock liquidity, Type of ownership of the company, Company management, Increase the company's capital, Programs stated by the managers and officials of the company, there is a relationship between balance sheet items and company returns, Confidence in the published financial information of the company, Past performance of the company, Competitive position of the company, Reputation and reputation of the company's brand and products [11].

4 Research methodology

The present study is basic research in terms of the purpose. Considering that in this research, library study methods, as well as field methods such as interviews, have been used, based on the data collection method, it is cross-sectional research. Based on library studies, specialized interviews and questionnaires, it was attempted to identify and

Table 1: Indicators affecting the financial behavior of investors [6]

Internal dimension		**External dimension**		
Factors related to the company	Stock market factors	Economic factors	Psychological factors	Political factors
• Transparency of financial information • Share trading volume • Price to profit ratio • Share risk • Share earnings forecast • Type of company ownership • Cash dividend share • Delay in payment of interest • Capital Increase • Return on equity • Programs announced by managers and officials of the company • Confidence in the published financial data of the company • Past performance of the company • Competitive position of the company • Reputation of well-known brands and products of the company	• Help to produce and create specialized knowledge • Information mechanisms • Information storage mechanisms • The volume of transactions on the stock exchange • Comments of stock exchange officials on the current situation of the market • Return on investment in the stock market compared to other markets • Informal relations of stock exchange managers with shareholders	• Inflation • Interest rates and bank interest • Type of industry • Desirability and sensitivity of stray capital to other markets • International economic developments • Profit from investing in other economic sectors • Recession or economic prosperity • The amount of liquidity • Per capita income and purchasing power • Fluctuations in oil, gold and currency prices	• Rumors • Recommendation of brokers • Imitation of others • Common interests • Risk-taking • The psychological effects of past stock price changes • News published in newspapers and magazines • Unofficial news from corporate meetings • Institutional and major investment flows • Recommending friends and advisors • The movement of herds of small shareholders towards stocks	• Political conditions governing the executive branch • Its laws and its changes • Domestic political news and developments • International political news and developments • The impact of international organizations on market flow • Iran's political relations with other countries • Social and cultural developments • Security and stability of the region

screen the indicators of the financial behavior model based on psychological factors with a capital efficiency approach. The statistical population includes professors and experts in the field of accounting, of which 12 people were considered as a sample by the snowball technique.

In this research, in order to study theoretical issues related to the research topic and also to review the literature on the subject and research background, written information in this regard, including specialized books in the field of financial behavior model based on psychological factors with capital efficiency approach and articles related with the subject of research. Interviews were used to collect research data. In order to get acquainted with the financial behavior model based on psychological factors with the capitalist approach, as well as more coordination and identification of research variables, interviews have been conducted with a number of professors and experts in the field of accounting. In this method, acceptable and effective results were obtained in order to identify the components.

In confirming the validity and reliability of the research instrument, Lincoln and Guba introduced the concepts of validity and transferability as an alternative to the concept of validity and the concept of reliability as an alternative

to the concept of reliability by introducing the concept of reliability of qualitative research. The results of the study of these concepts and the requirements adopted based on them in qualitative research (phenomenological strategy, conducting interviews, analysis of qualitative results) led to the implementation of the following measures to ensure the accuracy and quality of qualitative research results:

- In extracting the components in each dimension, the statements of the interviewees are quoted so that the audience who sees the results can refer to the text and the context of its inference.

  At the request of the researcher, in several stages of the data collection and interpretation process, other people who had theoretical knowledge and experience related to financial behavioral issues were present, and their results were compared and confirmed with the research results.

- The extracted components and their definitions, along with the evidence and examples of each after the researcher's analysis, were provided to the interviewees to comment clearly and explicitly on the perceptions and analyzes. In some cases, it was difficult to distinguish between some of the concepts, which was confirmed after the explanations.

- Discuss interpretations and inferences with other experts, which in some cases, after challenging discussions, improved qualitative analysis and increased its validity (improving the reliability of qualitative research).

- In coordination with stock exchange officials, capital market experts met in a meeting and were presented with behavioral findings and the results of the research in general.

- Using external experts to evaluate the results (improving the credibility of qualitative research).

- Using professors with knowledge of behavioral topics and topics related to the capital market in qualitative analysis (enhancing the credibility of qualitative research).

- Determining accurate criteria for interviewees (improving the quality of research).

- Expressing the main research propositions (main assumptions) as a result of which the questions and analyzes were guided more accurately (increasing the transferability of qualitative research).

- Exploratory factor analysis in relation to the constituent components of structures, in fact, shows the accuracy and validity of structures (dimensions) derived from qualitative research.

- Accurate explanation of philosophical assumptions also helped to validate the paradigm of the research and thus the result-oriented orientation in the interviews (promoting the confidence of qualitative research).

Data analysis was performed by theme analysis method using MAXQDA software.

5 Analyzing the interviews conducted with experts

5.1 Identified components

Inspired by the article by Khan et al. [19], behavioral perception with dimensions of optimistic behavior, overconfidence behavior and risk-taking behavior affects investors' perception of stock portfolio returns. Personality and time factors also affect this perception and financial behavior of investors.

To explain the financial behavior of investors, we considered four dimensions of portfolio turnover, trading volume, risk sharing and willingness to take risks, which were inspired by the article of Khan et al. [19]. In relation to behavioral components, the following were identified for optimistic behavior: Ideology, empiricism, and event orientation. Dimensions were identified for overconfidence behavior: adaptation, familiarity, representation and short-sightedness; dimensions were identified for risk aversion behavior: ambiguity avoidance, retardation, remorse avoidance and metamorphosis; dimensions were identified for emotional behavior: self-attribution, optimism and modernism. Identified components of the data presented in the interviews, which are the basis for designing the questionnaire along with the categories obtained from the literature review. The following are examined in detail:

Optimistic behavior:

Definition: Optimistic behavior in the field of investment reflects the positive expectations of the investor from his portfolio.

Component 1- Ideology: Conceptually, in Ideology, emphasis is placed on ideas that support the beliefs of individuals and in the face of anything that contradicts the opinions of individuals. (Related interviews from the opinions of stockbrokers: interview number one, interview number four, interview number five, interview number seven, interview number nine).

Component 2- Power thinking: Conceptually, Power thinking is the expectation of a personal success that is disproportionately higher than its objective and justified probability. Power thinking allows investors to have a diverse portfolio. Research has shown that investors create centralized investment opportunities. Because they are attracted to companies that feel they can have some control over these companies. (Related interviews from the opinions of stockbrokers: interview number eight, interview number ten, interview number fourteen).

Component 3- Eventism: Eventually, event orientation means being predictable, describing an event in order to cover unreasonable reasons. Sometimes people tend to believe that they can accurately predict the outcome of an event, but only after the time, it happened. (Related interviews from the opinions of stockbrokers: interview number two, interview number four, interview number seven).

Table 2: Components of optimistic behavior

Dimensions	Components	Evidence
Optimistic behavior	Ideology	Directional judgments, Toughness against certain criteria, Judgment based on false criteria, Failure to review complete information
	Power thinking	High confidence in your judgment, Too much confidence, Do not accept the opinion of others, Advise others to follow him
	Eventism	Refusal to accept information contrary to your opinion, Doubting information he does not believe, Orientation to your accepted information

Overconfidence behavior:

Definition: Excessive self-confidence indicates the investor's sensitivity to maintaining certain views regarding the performance, skills, experience and quality of personal information.

Component 1- Compatibilism: When people are confronted with new information that conflicts with their previous perceptions, they often feel a kind of mental distress, which is actually a psychological phenomenon and is called Compatibilism. (Related interviews from the opinions of stockbrokers: interview number two, interview number five, interview number nine).

Component 2- Familiarity: Usually, people pay attention to some of its features and characteristics in the initial encounter with different topics. These specifications and features are the same dimensions available Which first attract the attention of the viewer or listener (Related interviews from the opinions of stockbrokers: interview number one, interview number four, interview number six).

Component 3- View attitude: This concept implies that people make decisions based on stereotypes. In fact, people estimate the probability of a phenomenon occurring to the extent that it is similar to previously observed events. (Related interviews from the opinions of stockbrokers: interview number three, interview number four, interview number seven, interview number eight).

Component 4- Short-sightedness: It is a habit to spend savings for tomorrow, today; usually, people fail to achieve their long-term goals of achieving fleeting satisfaction (Related interviews from the opinions of stockbrokers: interview number one, interview number five, interview number eight).

Table 3: Components of overconfidence behavior

Dimensions	Components	Evidence and instances
overconfidence behavior	Compatibilism	Stubbornness in the face of new information, repetitive mistakes in decision making
	Familiarity	Loss of opportunity, lack of memory in transactions, being a follower
	View attitude	Lack of financial planning, lack of records
	Short-sightedness	Over-investing, over-trading

Risk aversion behavior

Definition: People tend to avoid losses more than they tend to make a profit; it prevents one from getting rid of unprofitable investments even when one does not expect fundamental change and improvement in them.

Component 1- Ambiguity Avoidance: In the face of the distribution of unknown possibilities, humans show no willingness to take risks. People often have doubts in ambiguous situations, and a tendency is formed in them that ambiguity overshadows the problem of insufficient diversification. (Related interviews from the opinions of stockbrokers: interview number one, interview number six, interview number ten, interview number thirteen, interview number fifteen).

Component 2- Delayability: Delayability is a kind of understeer. It is a mental process that causes people to cling to their previous views or predictions and ignore new information or react less than necessary. Delayability behavior can cause the investor to react to new information less than necessary and, instead of acting on updated information, retain their previous perceptions and mindsets (Related interviews with the opinions of stockbrokers: interview number three, interview number six, interview number eight).

Component 3- Remorse Avoidance: It happens that even though an investment looks good, the investor avoids it and shows a kind of fear of entering that particular investment. In such a case, the investor's risk aversion is due to escaping regret or regret in the future. (Related interviews from the opinions of stockbrokers: interview number six, interview number nine, interview number eleven).

Component 4- Status quo bias: Status quo bias refers to the fact that an option looks more pleasant when designed while maintaining its current position than when it is not. Status quo bias encourages investors to hold securities they have become familiar with (Related interviews from the opinions of stockbrokers: interview number four, interview number eight, interview number eleven)

Table 4: Components of risk aversion behavior

Dimensions	Components	Evidence and instances
overconfidence behavior	Ambiguity Avoidance	Excessive search, doubt and hesitation about the situation, review of people's opinions
	delay ability	Great importance to the past and ignoring the present and the future, paying too much attention to your information and experiences, making late decisions
	Remorse Avoidance	Great patience in buying and selling, maintaining personal interests and assets rather than making a profit.
	Status quo bias	Resist change, act independently

Emotional behavior

Definition: The ability to recognize emotions in oneself and others. Processing existing situations and relating decision reasons to cross-sectional attitudes. The individual's ability to review events.

Component 1- Self-attribution: This behavior, which is one of the main causes of investors' self-deception, is due to the theory of relativity in psychology. In this theory, individuals attribute events that confirm the validity of their actions to their high abilities and attribute events that do not conform their actions to their own bad luck and external factors (Related interviews from the opinions of stockbrokers: interview number five, interview number six, interview number twelve, interview number fifteen).

Component 2- Optimization: The tendency of people to believe that they are better than average and the belief that bad luck is more likely to happen to other people (Related interviews from the opinions of stockbrokers: interview number three, interview number four, interview number eight).

Component 3- Modernism: Modernity causes people to remember and focus on recent events and observations significantly more than in the past. This bias forces investors to focus more on recently collected data Instead of reviewing the relevant data set, which often spans a much wider period of time (Related interviews from the opinions of stockbrokers: interview number two, interview number seven, interview number.

Table 5: Components of emotional behavior

Dimensions	Components	Evidence
emotional behavior	Self-attribution	Self-aggrandizement, high self-confidence, blaming external factors being the reason for the success
	Optimization	Positive thinking, optimism in trading, positive attitude toward stock market events
	Modernism	Importance to the events of the day, followers, Pay attention to new events

Based on the literature, the subject category of Personality including 4 components and the category of capital efficiency with four components, were identified. Based on the content analysis of the specialized interviews, four categories were finally identified in the form of 14 components (a conceptual model of Figure 1).

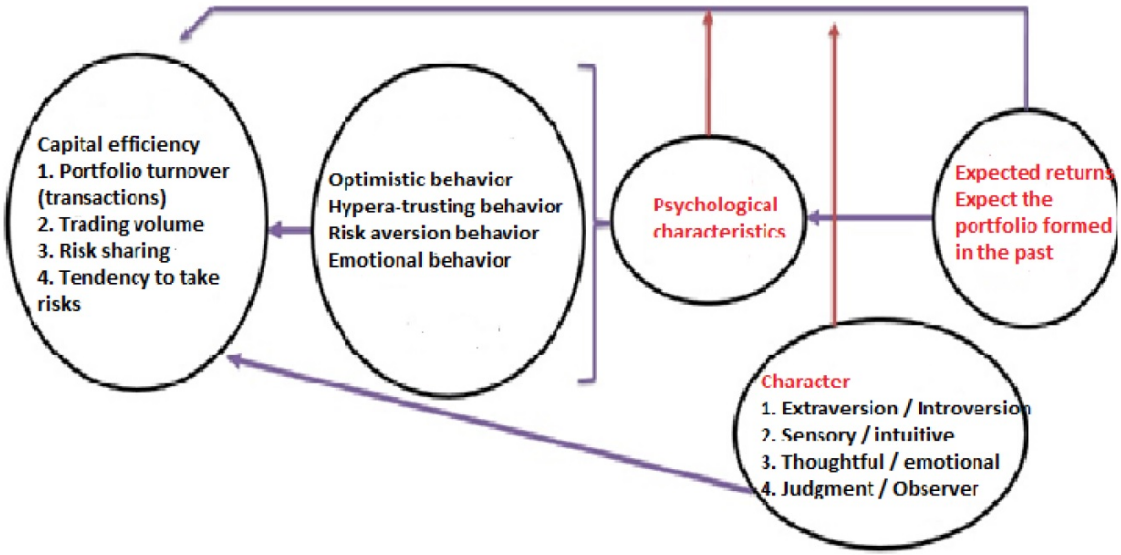

Figure 1: Conceptual model of identified indicators

5.2 Screening components and model presentation

The fuzzy Delphi method was used to screen and ensure the importance of the identified indicators and to select the final indicators; twenty indicators were finally identified. Experts' perspectives have been used to assess the importance of the indicators. Triangular fuzzy numbers have been used to fuzz the experts' point of view. Experts' views on the importance of each indicator are collected with a 7-degree fuzzy spectrum. The views of 12 experts on each index were studied. Various methods have been proposed to aggregate the views of n respondents. In fact, these aggregation methods are experimental methods that have been proposed by various researchers. For example, a conventional method for aggregating a set of fuzzy triangular numbers is the minimum l, the geometric mean m, and the maximum u.

$$F_{AGR} = \left(\min\{l\}, \prod\{m\}, \max\{u\}\right) \tag{5.1}$$

$$F_{AGR} = \left(\min\{l\}, \left\{\frac{\sum m}{n}\right\}, \max\{u\}\right) \tag{5.2}$$

$$F_{AGR} = \left(\left\{\frac{\sum l}{n}\right\}, \left\{\frac{\sum m}{n}\right\}, \left\{\frac{\sum u}{n}\right\}\right) \tag{5.3}$$

Each triangular fuzzy number resulting from the aggregation of experts' views for the j^{th} index is represented as follows:

$$\tau_j = (L_j, M_j, U_j)$$

$$L_j = \min(X_{ij})$$

$$M_j = \sqrt[n]{\prod_{i=1}^{n} X_{ij}}$$

$$U_j = \max(X_{ij})$$

Index i refers to an expert. So that

X_{ij}: The value of the i^{th} expert evaluation of the j^{th} criterion

L_j: The minimum value of evaluations for the criterion j

M_j: The geometric mean of the experts' assessment of the performance of the standard j

U_j: The maximum value of evaluations for the criterion j

In this study, the fuzzy mean method is used. It can usually be summed up as the sum of the mean of triangular and trapezoidal fuzzy numbers by a definite value which is the best corresponding mean. This operation is called de-fuzzing. There are several methods for de-fuzzing. In most cases, the following simple method is used for de-fuzzing:

$$x_m^1 = \frac{L + M + U}{3} \tag{5.4}$$

Another simple method to de-fuzzy the mean of fuzzy triangular numbers is as follows:

$$\begin{aligned} F_{ave} &= (L, M, U) \\ x_m^1 = \frac{L + M + U}{3};\ x_m^2 &= \frac{L + 2M + U}{4};\ x_m^3 = \frac{L + 4M + U}{6} \\ \text{Crisp number} = Z* &= \max(x_{\max}^1, x_{\max}^2, x_{\max}^3) \end{aligned} \tag{5.5}$$

The values of $x_{\max}^i$ are not much different and are always a number close to M. M is the mean of the sum of possible values of m from different triangular fuzzy numbers. However, the definite value of the largest calculated $x_{\max}^i$ is considered. In this study, the surface center method is used for de-fuzzing as follows:

$$DF_{ij} = \frac{[(u_{ij} - l_{ij}) + (m_{ij} - l_{ij})]}{3} + l_{ij} \tag{5.6}$$

Fuzzy mean and de-fuzzy output The values for all indices were greater than 0.7 and were accepted for all items. After the first and second stages of fuzzy Delphi, no questions were eliminated in the third round, which is a sign that the Delphi stages are over. In general, one approach to the end of Delphi is to compare the average scores of the last two rounds of questions. If the difference between the two stages is much smaller than the threshold (0.2), then it will stop the polling process.

Table 6: Difference between the results of the third and second rounds

	Results of the third rounds	**Results of the second rounds**	**Difference**	**Result**
A1	0.904	0.872	0.032	reception
A2	0.738	0.778	0.04	reception
A3	0.928	0.761	0.167	reception
A4	0.777	0.744	0.033	reception
A5	0.803	0.925	0.122	reception
A6	0.890	0.741	0.149	reception
A7	0.918	0.781	0.137	reception
A8	0.866	0.904	0.038	reception
A9	0.932	0.890	0.042	reception
A10	0.847	0.866	0.019	reception
A11	0.896	0.847	0.049	reception
A12	0.778	0.778	0	reception

Based on the results in the table, it was found that in all cases, the difference is less than 0.2, so the Delphi rounds can be completed. Figure 2 clearly shows the model of the identified components.

A13	0.741	0.738	0.003	reception
A14	0.813	0.777	0.036	reception
A15	0.928	0.813	0.115	reception
A16	0.778	0.803	0.025	reception
A17	0.731	0.928	0.197	reception
A18	0.708	0.890	0.182	reception
A19	0.932	0.778	0.154	reception
A20	0.827	0.813	0.014	reception

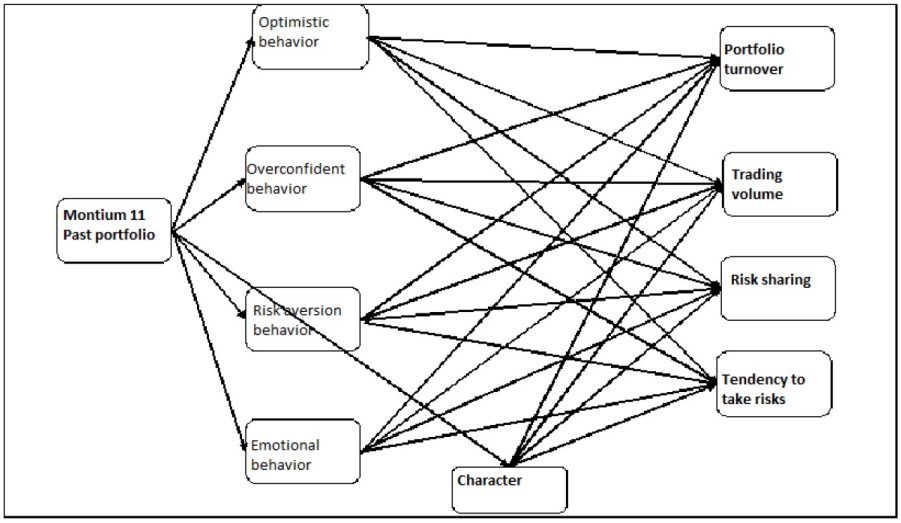

Figure 2:

The results show that the exploratory classification of the research has a high factor load for the components that constitute the research categories. And the placement of the relevant components in a general category is approved. The components related to each category are listed in the below table:

Table 7: Classification of identified categories and components

Category	**Component**
Character	Extraversion / Introversion
	Sensory / intuitive
	Thoughtful / emotional
	Judgment / Observer
Optimistic behavior	Beliefism
	Power perception
	Eventism
Hyper-trusting behavior	Adaptability
	Familiarity
	View
	Short-sightedness
Risk aversion behavior	Avoid ambiguity
	Delay ability
	Repentance
	Transformation
Emotional behavior	Self-attribution
	Optimize
	Novelty

6 Discussion and conclusion

Based on library studies, scientific articles and books, and reflection on past research and the study and critique of the background of theoretical foundations and existing scientific literature, two categories of internal and external factors (dimensions) can be effective in the Behavioral Processes of Individual Investors in the Stock Exchange. Three components of economic, political and psychological in the external dimension and two components of the stock market and company conditions were expressed as factors of the internal dimension that seem to be the main factors influencing these cases. Also, the non-repetitive indicators explained in the theoretical foundations, and scientific background in the continuation of the five components of the research were 99 indicators. Due to the dispersion and breadth of studies in areas related to decision making, optimistic behavior in research [9, 19, 20] expressed in the financial behavior model, and overconfidence in research [5, 8], the degree of risk-taking has been mentioned. Hoffman and Poset pointed to the importance of overconfidence in investor decisions [16]. Patel points to the importance of risk aversion and optimism [24]. Pech and Milan indicated optimism in turnover [25]. Past portfolio returns and existing experiences obtain based on the article by Khan et al., Create financial behaviors and financial decisions [19]. According to research by Fiksenbaum et al., Personality has also been added to the model [7]. Emotional behavior is also adapted from the article by Tauni et al. [29].

According to modern behavioral finance theories, many behavioral issues are involved in investor decision-making, the most important of which are psychological and personality factors. People do not always act rationally and often behave unexpectedly and unpredictably. Individual characteristics play an important role in decision-making. Many investment decisions are not only influenced by economic indicators and rationality but also categories such as work experience, social effects, risk level, investor self-confidence, etc. affect investor behavior and their decisions. Investors' knowledge of behavioral biases and personality and job characteristics influences their financial decisions and makes them aware of these factors and be able to overcome them. The special characteristics of the market and the lack of sufficient knowledge of investors about the market and behavioral biases have caused the capital market of the country, which is considered the heart of the economy, to not have sufficient efficiency and dynamism. Investors make mistakes in making their investment decision due to insufficient knowledge of the correctness and reliability of the investment. This, in turn, prepares them to leave the capital market, and this may have adverse consequences for the country. If it is proven that certain groups of investors are prone to some tendencies in buying and selling stocks, in this case, market participants can identify the tendencies of investors before the occurrence of behaviors and achieve better results and achievements in the field of investment and the dynamics of the stock market.

Many researches support the theory that investors are not rational or that markets cannot be efficient. In their view, in the stock market, prices are very far from real values, and this is due to the presence of irrational investors [23]. Recent research has shown that metrics such as mental risk perception can be a better indicator of investors' intuitive understanding of financial risks so that for understanding the risk, criteria such as variance and standard deviation be used. To improve understanding of how people make financial decisions, it should be possible to examine the psychological characteristics that affect their financial behavior and wealth. Behavioral finance examines the psychological effect on the behavior of financial market participants and the effect of this behavior on financial markets. Behavioral finance knowledge believes in the existence of traces of psychological bias in the market and among investors [17]. One of these biases can be seen in investors' reference to past perceived returns to decide to buy stocks in the future. Reviewing the good returns of the past provides good investment opportunities in terms of returns. The past bakers are explainable by investors with rules relying on their mental state. The small results of the research show that psychological bias is the link between perceived portfolio returns in the past and trading and risk-taking and plays an important mediating role.

References

[1] S. Aghasi, E. Aghasi and S. Biglary, *Examine the relationship between financial risk tolerance and investment properties (financial intelligence, skills, financial management, and wealth) based on native donald-case study of the Tehran Stock Exchange*, Secur. Anal. J. **9** (2016), no. 31, 21–33.

[2] S. Aydemir and S. Aren, *Do the effects of individual factors on financial risk-taking behavior diversify with financial literacy?*, Emerlad Pub. Limited **281** (2017), 368–492.

[3] A. Bucaro, *Enhancing auditors' critical thinking in audits of complex estimates*, Account. Organ. Soc. **73** (2019), 35–49.

[4] K.D. Daniel, D. Hirshleifer and A. Subrahmanyam, *Overconfidence, arbitrage, and equilibrium asset pricing*, J. Finance **56** (2001), no. 3, 921–965.

[5] W.P.M. De Bondt, *Betting on trends: intuitive forecasts of financial risk and return*, Int. J. Forecast. **9** (1993), no. 3, 355–371.

[6] K. Ebrahimi, M. Dastgir and Z. Latifi, *Evaluate capital market analyst's personality traits as a third dimension to their success*, Invest. Knowledge **6** (2017), no. 22, 87–100.

[7] L. Fiksenbaum, Z. Marijovanic and E. Greenglass, *Financial threat and individuals' willingness to change financial behavior*, Rev. Behav. Financ. **9** (2017), 290–331.

[8] Y. Ganzach, *Parents' education, cognitive ability, educational expectations and educational attainment: interactive effects*, Br. J. Educ. Psycho. **70** (2000), no. 3, 419–441.

[9] S. Gervais and T. Odean, *Learning to be overconfident*, Rev. Financ. Stud. **14** (2001), no. 1, 1–27.

[10] M. Glaser and M. Weber, *Overconfidence and trading volume*, Geneva Risk Insurance Rev. **32** (2007), no. 1, 1–36.

[11] E. Greenglass, Z. Marjanovic and L. Fiksenbaum, *The impact of the recession and its aftermath on individual health and well-being*, Psycho. Recession Workplace, Edward Elgar Publishing, 2013, pp. 42–58.

[12] M.S. Guo and R.E. Wood, *Unpacking mental models through laboratory experiments*, Syst. Dynamics Rev. **32** (2017), no. 2, 101–129.

[13] C. Ham, N. Seybert and S. Wang, *Narcissism is a bad sign: CEO signature size, investment, and performance*, Rev. Account. Stud. **23** (2018), no. 1, 234–264.

[14] Y. Hassas-Yeganeh, M.H. Ebrahimi-Sarvolia, S. Ghazinouri and A. Afkhami, *Angel investors: Examining behavioral finance factors influencing investment selection*, Sci. J. Financ. Knowledge Secur. Anal. **12** (2019), no. 43, 41–58.

[15] F. Hijroudi, M. Doustar and M. Moradi, *Analysis of the role of five factor model of personality on the effect of financial information acquisition on behavior of investors in the Tehran Stock Exchange*, Invest. Knowledge **7** (2018), no. 25, 39–59.

[16] A.O.I. Hoffmann and T. Post, *How return and risk experiences shape investor beliefs and preferences*, Account. Finance **57** (2015), no. 3, 759–788.

[17] M. Jahangiri Rad, M. Marfou and M.J. Salimi, *Investigation of herding behavior in Tehran Stock Exchange*, J. Manag. Account. School **11** (2014), no. 42, 139–156.

[18] N. Jamshidi and H. Ghalibaf Asl, *Studying the effect of investors' personality on their business behavior and investment performance, evidences from Tehran Stock Exchange*, Financ. Res. J. **20** (2018), no. 1, 75–90.

[19] M.T.I. Khan, S.H. Tan and L.L. Chong, *How past perceived portfolio returns affect financial behaviors–The underlying psychological mechanism*, Res. Int. Bus. Financ. **42** (2017), 1478–1488.

[20] C. Merkle, *Financial overconfidence over time: Foresight, hindsight, and insight of investors*, J. Bank. Finance **84** (2017), 68–87.

[21] C. Newton, K. Irving and D. Thomas, *The value of financial planning advice: process and outcome effects on consumer well-being*, Bus. School **2** (2015), 1–12.

[22] L. Nguyen, *The influence of financial risk tolerance and risk perception on individual investment decision-making in a financial advice context*, Master Thesis, Australian Research Council, 2015.

[23] A. Nosic and M. Weber, *How riskily do I invest? The role of risk attitudes, risk perceptions, and overconfidence*, Decision Anal. **7** (2010), no. 3, 282–301.

[24] S. Patel, *Economic optimism, information uncertainty and future investment decisions: evidence from the mutual fund industry*, Information Uncertainty and Future Investment Decisions: Evidence from the Mutual Fund Industry, 2012.

[25] W. Pech and M. Milan, *Behavioral economics and the economics of Keynes*, Journal of Socio-Economics, 38 (2009), no. 6, 891–902.

[26] M. Richardson and A. Prinz, *Behavioral dynamics of tax evasion–a survey*, J. Econ. Psycho. Behav. **40** (2014), 1–19.

[27] M. Rocky, M. Mehrara, H. Abasnejad and A. Suri, *Modeling the effect of loss averse bias on return rate and stock price dynamics (application of agent-based modeling in behavioral finance)*, Sci. J. Financ. Knowledge Secur. Anal. **13** (2020), no. 45, 1–16.

[28] H. Shu, *Investor mood and financial markets*, J. Econ. Behav. Organ. **76** (2019), 267–282.

[29] M. Tauni, Z. Rao, H. Fang and M. Gao, *Does investor personality moderate the relationship between information sources and trading behavior? Evidence from Chinese stock market*, Manag. Finance **43** (2017), 1–38.

[30] M. Tohidi, *Extracting composite sentiment index for Tehran Stock Exchange*, J. Asset Manag. Financ. **29** (2020), 49–68.

[31] M. Weber, E.U. Weber and A. Nosić, *Who takes risks when and why: determinants of changes in investor risk taking*, Rev. Finance **17** (2013), no. 3, 847–883.