



## Pathology of research on the evaluation of financing behavioral biases by Meta method

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### Abstract

Decision-making on financing methods is one of the most important decisions of managers that can be affected by their behavioral biases. Behavioral biases can cause managers to make irrational decisions and select the optimal financing method with difficulty. Recognizing and evaluating biases is an important step to control them and improve decision making. Given the importance of this issue, the present study has analyzed the pathology of evaluation methods of behavioral biases, specifically in research on financing methods. In this study, for the first time, research onion is used to review studies on evaluation of behavioral biases by research onion. In order to select the articles, related keywords such as behavioral finance, evaluation of behavioral biases, and financing methods were searched in reliable databases and articles related to the research topic were collected. More than 200 articles have been studied and 33 related articles have been selected to examine the methods of evaluating behavioral biases. The study results showed the low variety of statistical analysis methods for evaluating behavioral biases in financing. The application of research onion shows that the methodology of these studies was mainly based on the philosophy of positivism, practical orientation, and comparative approach. Also, it was mainly conducted by the quantitative research and survey strategy, and the data was collected by the library documents.

### Highlights

- In a decision-making process, the financing method is selected. According to the principles of behavioral finance, people's decision-making is sometimes irrational and behavioral biases affect a person's choice.
- No research has been conducted in the field of pathology of behavioral bias evaluation methods, specifically in research related to financing methods.
- According to the study results, research problems and gaps are observed in this field.

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## 1. Introduction

Consumers, firms and governments usually do not have available and sufficient financial resources to achieve their goals, pay debts and carry out transactions, and they try different ways to achieve these resources. Financial decisions that seek to create, collect and increase financial or capital resources for any type of expenditure and are announced by the firm at a point in time are called financing (Brennan and Kraus, 1987). The way of financing is also effective on other issues such as profit, efficiency and expansion of production. The issue of financing in Iran is faced with deficiencies such as disproportionate distribution of risk, lack of a proper regulatory system, lack of relationships between the real and credit sectors of the economy, and the existence of unused capacities (Mousavi, 2017). Managers play an effective role in this regard, and usually have their own styles when making decisions about financing (Bertrand and Schoar, 2003).

Managers have specific behaviors and preferences in financial decisions, including financing decisions, which are affected by internal and external factors in their decision-making. In the theories of capital structure, the internal factors of companies such as accounting variables, management method and similar issues that increase the value of the company are emphasized. In these theories, less attention is paid to the external factors of companies. External influencing factors can be divided into two categories: psychological factors and demographic factors. Psychological factors include mental attitudes, lifestyle, values and personality of people and demographic factors include gender, age, level of education, income, and type of job (Abdolmaleki, 2017). One of the most important external factors is the behavioral biases of managers in predictions and decisions (Bokpin, 2009). Some studies have found evidence of managers' behavioral biases in corporate decisions (Lee and Piqueira, 2019).

Managers' behavioral biases influence their decision-making in using financing methods. Studies have shown that people repeatedly move away from the traditional model based on the rationality of firms, and management traits such as behavioral biases are important factors for capital structure decisions such as mix of debt and equity issuance (Hackbarth, 2008). Behavioral biases that influence people, and limit or distort their information. Therefore, they may cause them to reach incorrect results and decisions despite the fact that the information is correct (Sabeti, 2016). Therefore, psychological phenomena, including behavioral biases, play an important role in determining financial behaviors. Behavioral finance by combining psychology and finance, helps people become aware of their behavioral biases and try to correct and control them. Review of the research conducted in the field of financing methods shows that the common theories such as capital structure theory are not enough to understand the factors affecting the choice of financing methods and the behavioral financial capacity can be used to better understand these factors.

In the field of behavioral finance, many studies have measured biases and investigated behavioral models in different fields, but these studies are few in the

field of financing model and this issue has been mainly addressed by common methods. Also, researchers have investigated a limited number of behavioral biases in the field of financing decisions. There have been many studies in the field of bias evaluation, but none of them have specifically and comprehensively investigated the bias evaluation research methods. The research methods in a scientific field or discipline show the common beliefs among the researchers of that field about important questions and how to answer them. By adopting an inappropriate research method, reaching the research goal is delayed or impossible. Meta method examines the appropriateness and correctness of research methods in primary studies. This method includes analysis of approach, sampling methods, writing hypothesis, variables, population, sample, and issues related to the methodology (Ferdosi et al, 2019).

In general, the study with the behavioral finance approach and the evaluation of biases in the field of financial decisions, especially regarding financing methods, has been done less, especially in Iran. The methods of measuring the biases have not been examined in the researches and on the other hand, in the studies, the meta-analysis has not been used in this field. Considering that in various researches, behavioral biases have been categorized and introduced in different ways and there is no single source for identifying biases evaluation methods, this research introduces behavioral finance, biased classifications. Behavioral methods and methods of evaluating behavioral biases are specifically discussed in researches related to financing methods. The present study, as the first study in this field, can be a foundation for future researches; which doubles the importance and necessity of doing this research.

The objective of this study was to analyze the pathology of the methods of evaluating behavioral biases, specifically in studies on financing methods. This article has analyzed the methodology of the studies in this field by Meta method. Meta method is used in selected studies using the research onion. "Research Onion" is a framework for separating and categorizing different studies and a guide for selecting the most appropriate research methodology (Malalgoda, Amaratunga, and Haigh, 2018). Given that so far, no research has been conducted in the field of pathology of behavioral bias evaluation methods, specifically in research related to financing methods, the study results are considered as novel achievements. The present research analyzes the evaluation methods of behavioral biases in studies related to financing methods using meta-analysis; Therefore, in terms of the topic and research method, this research is innovative and as the first study in this field, it can be the foundation for future research. In this study, after presenting the theoretical principles, the literature and then the research method, results and finally the conclusion will be discussed.

## 2. Theoretical principles

**The efficient-market hypothesis** believes that the financial market provides all the information related to a share to all investors, and investors have the same profitable opportunities, but there are many examples of irrational behavior and

successive mistakes in judgment and decision recorded in academic studies (Kahneman et al, 1982). Behavioral finance seeks to describe financial phenomena for economic factors with non-rational minds and explores the psychological factors affecting investment decisions.

In behavioral finance literature, behavioral biases are defined as systematic mistakes in judgment (Pompian, 2012). Baddeley and Hitch (1974) stated that temporary memory plays an important role in human information processing, that sometimes this memory suffers from mistakes and therefore information processing becomes biased. Mistakes in decision-making can lead to mistakes in people's behaviors. Researchers in the field of behavioral finance have presented different classifications of behavioral biases. Some of them have defined behavioral biases as "rules of thumb" (Pompian, 2009), but some like Thaler called them "beliefs" and "preferences". Kammerer referred to them as "judgments" and "preferences". Kahneman used two terms "intuition" and "reasoning".

Researchers have categorized behavioral biases in different ways. Some researchers, such as Fernandez, classify biases into two "emotional" and "cognitive" types. Emotional bias is the result of "intuition" and cognitive bias is the result of "reasoning". Here, the division of behavior biases into two emotional and cognitive biases is used. Although the two emotional and cognitive biases have fundamental differences with each other, a behavior cannot be considered completely emotional and cognitive. Because these two biases are intertwined and inseparable. To study behavioral biases, these biases will be examined in the form of emotional and cognitive biases. Given that these two biases are defined and explained in different ways, the relatively complete classification of Pompian (2011) will be used:

**A. Emotional Biases:** Sometimes a person's feelings are mistaken and make a mistake in processing, which leads to a wrong decision. Emotional biases usually occur spontaneously based on a person's personal feelings at the time of decision making. They may also be deeply rooted in personal experiences that also affect decision making. Emotional biases are usually not based on reasoning, so it is generally more difficult to overcome than cognitive biases. Table 1, in the appendix, shows the definition of emotional biases.

**B. Cognitive biases:** Cognitive biases are a set of deviations that cause errors in cognition based on experiences, attitudes, beliefs, and information and can cause deviations from reality and therefore in decision making, reasoning, and correct perception. This issue can cause irrational conclusions in the decision-making process of the person due to the lack of use or insufficient and inappropriate use of information. A number of cognitive biases will be discussed in Table 2 in the attachment.

In the present research, meta method is used to investigate the methods of evaluating behavioral biases in the field of financing. This method is a subset of the meta study method, which will be explained in the following. **Meta study** has been introduced as one of the methods of literature review in various research

fields in methodological references. In fact, it is a deep analysis of research conducted in a certain field of study, which includes four sub-sections of Meta analysis, Meta synthesis, Meta theory and Meta method. A Meta study is called a Meta-analysis<sup>1</sup> if it examines the results of previous studies quantitatively, and a Meta-synthesis<sup>2</sup> if it examines the results of previous studies qualitative. If it is only in the field of previous models and frameworks, it is called Meta theory<sup>3</sup>, and if it is in the field of methodology of previous studies, it is known as Meta method (Patterson et al, 2001).

**Meta method** examines research methods in primary studies. This section includes the analysis of the approach, sampling methods, the method of hypothesizing, variables, population and sample and other issues related to the discussion of methodology (Ferdosi et al, 2019). Meta method is one of the methods of analyzing past studies in terms of methodology, which is emphasized by scholars and researchers (Sanaeepour, 2021). Therefore, it can be used as a basis for investigating the methods of evaluating behavioral biases in behavioral finance research in this study.

### 3. Literature review

Since the present study investigated the behavioral finance and the methods of measuring biases using Meta method, literature is reviewed in three parts. First, studies conducted on behavioral biases by financing methods are presented, then studies conducted on the evaluation of the biases are given, and finally, studies on Meta method in behavioral finance and the evaluation of the biases are presented. The topic of the research has been examined during the past years and the most relevant studies with the present study have been selected and, in the section "Bias Evaluation" the "thematic" strategy has been used.

#### 3.1 Review of literature on behavioral biases in financing methods

Economists such as Thorstein Veblen and John Maynard Keynes criticized the economic rationalist and claimed that no human can know all the future events. The background of behavioral finance studies was provided with the beginning of the classical period in economics within the 18th century as well as the role of personal traits in human economic behavior was raised. Of course, it faced a decline in some eras, until in the 20th century, the neoclassicists brought

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<sup>1</sup> Meta analysis is a statistical method that is used to combine the results of independent studies that have tested a common hypothesis and used inferential statistics to draw conclusions. By Meta-analysis, the results are combined and new relationships between phenomena are obtained (Qorbanizadeh, Hasan-Nangir & Roudsaz, 2013).

<sup>2</sup> Meta synthesis is a type of qualitative study that examines the information and results extracted from other qualitative studies with a related and similar topic. In this method, current knowledge is improving and a comprehensive and broad view of issues is provided (Saleh-nejad et al., 2018).

<sup>3</sup> Meta theory investigates paradigms and schools used in research and theoretical framework, the theoretical assumptions presented, the historical trend of the studies and the theoretical evolution over time, the analysis of the political, social and cultural content of the studies and the evaluation of the theoretical quality of the previous studies (Mohammednejad Shurkai, Jashni Arani & Yazdani, 2011).

up psychology as a factor affecting economic discussions. At this time, the research of Kahneman, Tversky and Riepe led to the development of behavioral finance and its use in research. However, many studies still use common methods to investigate the reasons of financial decisions, such as the decision on the choice of financing method, and use behavioral finance less. In the following, some studies conducted on behavioral biases in financing methods will be mentioned.

many articles have focused especially on the influence of managerial overconfidence and managerial optimism on the investment decisions of companies [Carlin, Gervais and Manso \(2009\)](#) model shows that managerial overconfidence will often lead to overinvestment. [Hackbarth \(2008\)](#) has shown that managers with biases select higher debt levels than rational managers. [Heaton \(2002\)](#) showed using the two-period model that optimistic managers sometimes reduce the positive NPV investment that should be financed from outside, or vice versa a negative NPV.

The study results of [Ishikawa and Takahashi \(2010\)](#) show that managerial overconfidence is an important factor in corporate financial decisions. For example, [Heaton \(2002\)](#) and [Hackbarth \(2008\)](#) show that managers who overestimate their profitability feel that their stocks are undervalued, so in cases where the firm needs financing. Managers prefer financing by issuing debt securities to issuing shares. Ishikawa and Takahashi used proxy using multinomial logit model to investigate the relationship between overconfidence and managers' financing decisions and concluded that overconfident managers prefer debt to equity issuance.

[Kahneman and Lovallo \(1993\)](#) also argue that managers usually adopt a biased perspective in order to achieve the desired result. [Malmendier, Tate and Yan \(2005\)](#) show the importance of managerial biases such as overconfidence and conservatism for financial decisions. In an article, [Olsen and Cox \(2001\)](#) investigated the effect of gender on the perception and response to investment risk. Using the coefficients obtained from the regression test, they stated that even with equal education, experience and information, professional investment managers make different decisions based on cultural differences. They also found that female financial professionals give more weight to the potential for loss or negative risk than men and are more sensitive to uncertainty or ambiguity.

In their study, [Pompian and Longo \(2004\)](#) investigated the effect of gender and personality on the investor's aptitude for behavioral biases. They used a questionnaire that was largely derived from a study by [Kahneman and Riepe \(1998\)](#). The results showed that many personality types and both genders were differently prone to many behavioral biases. In his study, [Montier \(2006\)](#) investigated behavioral biases in a sample of professional mutual fund managers from the United States, Europe, Asia, and the United Kingdom through a questionnaire and the results obtained from the questionnaire and categorized and expressed the results as percentage. They observed that the results are not geographically distinct, but there are some distinguishable differences between different groups.

Also, [Mittal and Vyas \(2008\)](#) classified Indian investors into different personality types and investigated the relationship between various ecological factors and investors' personality. They showed that Indian investors can be classified into four personality categories and concluded that people tend to behave normally and not rationally when making investment decisions. They stated that factors such as age, level of education, income and marital status are effective on a person's decisions.

[Mahzoun \(2010\)](#) has studied the effect of behavioral biases on the decisions of managers and specialists of financial institutions in the capital market of Iran by the chi-square test of independence with the data from the questionnaire. The results showed that professional investors in financial institutions were not immune to the influence of behavioral biases in their decisions and their personality type had a significant effect on the occurrence of some behavioral biases. Also, [Heydari \(2011\)](#) in a study named three main mental shortcuts and examined the biases resulting from in terms of frequency in the statistical sample of the managers of the eastern municipalities of Tehran Province. Binomial test was used for the relationship between the variables and the required data was prepared by the questionnaire. The results showed that more than half of managers' decisions are biased.

In another study, [Chavoshi, Rastgar and Mirzaei \(2015\)](#) investigated the relationship between managers' overconfidence and the choice of financing policies by proxy using a multiple regression model with mixed data. The results showed no relationship between managers' overconfidence and financial decisions. In another study, [Salami, Aslizadeh and Asgari \(2017\)](#) investigated the effect of managerial overconfidence and government intervention on the decision of financing companies using regression model and panel data. The results showed that managerial overconfidence, as well as the variables of CEO's experience, CEO's relationship, previous CEO's performance and government endowment influence the company's financing decision.

### 3.2. Review of literature on bias evaluation

The presence or absence of bias in people's perception and behavior has been tested by different methods in different studies. According to the studies on bias evaluation, the studies can be reviewed in terms of the research method and study objectives.

• **In terms of the research method**, studies can be divided into two general categories:

1. Some studies have examined only one or more biases and used a separate method for each one. It can be said that they have mainly used proxies to evaluate biases or questionnaires.

2. Some studies have examined a large number of biases (for example, about 20 biases), and most of them used questionnaires and proved the biases through reasoning.

• **In terms of the research objective**, studies can be divided in two general categories:

1. Some studies have been conducted just to verify the biases in the target population or to theoretically prove the biases.
2. Some studies have examined the relationship between the biases and other variables.

Various studies have been conducted to evaluate biases, but no study that collects all measurement methods in an integrated manner was found. In order to select the studies in this section, the thematic strategy has been used in such a way that the valid studies on the subject of evaluation and measurement of biases in the field of behavioral finance inside and outside Iran have been reviewed. According to the large number of these studies, finally, 33 studies that are more similar to the subject of research and include different methods of evaluating biases, are selected and presented briefly for the better use of researchers in Table 3 in the appendix. The first and third columns are the names of the biases and the second and fourth columns are the selected studies that have investigated that bias.

### **3.3. Meta method in studies on behavioral finance and bias evaluation**

According to the review of economic literature in the past years, it seems that Meta method in this field has been neglected and despite its importance in the progress of the research, it has not been used much. Among the four parts of Meta study, most economic researchers have used Meta analysis. Meta study has been used very little in the field of financial economics and behavioral finance, and especially for the evaluation of biases. A small number of studies have been conducted with the Meta-analysis method, but no study has been conducted with the Meta-method.

Many studies have measured biases and investigated behavioral models in different fields, but these studies are few on financing model and mostly this issue has been addressed by common methods. Therefore, a limited number of biases defined in behavioral finance have been considered by researchers in the field of investment decisions. There have been many studies in the field of bias evaluation, but none of them have investigated these methods specifically and comprehensively. In general, few studies have been conducted by the behavioral finance approach and the evaluation of biases in the field of financial decisions, especially regarding financing methods, especially in Iran. The methods of measuring the biases have not been investigated in studies, and on the other hand, in studies, the extrapolation has not been used in this field. Therefore, this study can be a foundation for future research.

## **4. Research method**

This study is developmental in terms of objective. Because it examines the methodology of studies in the field of evaluating behavioral biases, it is of the content analysis type. Content analysis is a research method for quantitative, systematic, and objective description and statistical semantics of the apparent



content of the message (Khaki, 2010). For data collection, library study and document review were used. The statistical population of the present study is articles in the field of behavioral finance, behavioral biases in financing methods and evaluation of behavioral biases. The research method in this study is Meta method.

Meta analysis is one of the types of Meta study methods that addresses the methodological components of the conducted studies. It also examines the correctness of research methods in previous studies and includes analysis of approach, sampling methods, hypotheses, variables, population, sample and other components related to methodology (Aliakbari, Marsousi and Akbari, 2020). The review of related articles in this field shows that despite the same meaning and concept of Meta analysis for researchers, each of them has used a different framework and process to perform Meta analysis in this field. In the present study, according to the objective of the research, the research onion model has been used in selected studies.

Given that the objective of this study was to investigate the methods of evaluating behavioral biases in research related to financing methods, keywords such as behavioral finance, evaluation of behavioral biases, and financing methods were used to select articles. After searching in reliable databases, and reviewing the studies, articles related to the subject of the research were collected. To investigate the methods of evaluating behavioral biases, more than 200 articles have been studied, of which 33 related articles have been selected because some articles have used similar methods. The screening process of the articles was done as follows:

1. First, valid scientific databases were selected to select articles. In this study, valid and related researches have been selected. The criterion of validity of researches in this study is the place of publication of these researches. Articles published in Science Direct, Wiley Online Library, Springer Link, and Social Science Research Network (SSRN) databases have been used. Considering that the present research examines the methods of evaluating biases specifically in the field of financing; Valid researches (based on the mentioned criteria) that have evaluated biases in the field of financing have been selected.

2. In the next step, using the keywords of behavioral finance, assessment of behavioral bias and financing methods, the articles published in Science Direct, Wiley Online Library, Springer Link, SSRN databases were examined. At this stage, the title and keywords of the articles were checked. After studying the researches, 200 articles related to the subject of research were collected.

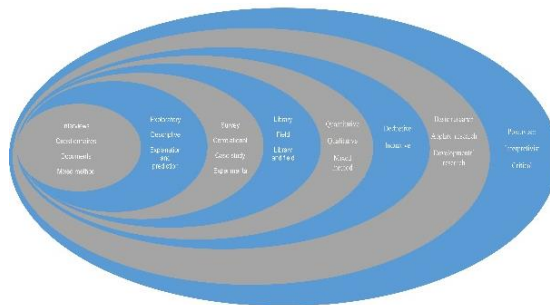
3. At this stage, the abstracts of the articles were reviewed. The studies that had less thematic connection with the subject investigated in this research were excluded. At this stage, 85 articles with more thematic relevance were identified.

4. In the next step, biases evaluation methods and data collection methods were examined and categorized. Due to the repetition of research methods and data collection methods in some articles, repeated and similar studies were

excluded. In this section, to remove duplicate articles, we tried to remove studies with fewer citations. At this stage, 33 articles were collected.

In various studies in the field of Meta method, researchers have used different innovative methods, but according to the studies conducted, the "onion research" is a framework for the separation and typology of different studies. It is also a guide for selecting the most appropriate research methodology. By reviewing the studies conducted by Meta method, it seems that the use of research onion is a suitable framework for this research method. In this way, the research method in the selected articles was examined using the method of Danaiefard, Alvani and Azar (2004) in the form of the research onion, in 8 layers, the results of which are shown in Figs. 2 to 9. The investigated levels in the research onion and their sub-sections are shown in Figure 1. Given the choice of this method for the review of the selected studies in the present study, this model will be discussed in the following.

The multilayer model of research onion based on Danaiefard et al. (2004) research shows the processes of conducting research. Accordingly, research consists of different layers where each layer is affected by the higher layer. These layers are: philosophical principles of research, research orientations, research approaches, research methodology, data collection method, research strategies, research objectives, data collection tools. The research onion model presented by Danaiefard et al. (2004) is shown in Figs. 1.



**Figure 1. The research onion model**

*Source: Danaiefard et al (2004)*

In this model, Layer 1 of the research onion is the determination of the research philosophy or paradigm that indicates the researcher's worldview and outlook. The three philosophies mentioned in the model of Danaiefard et al. (Table 4) are Positivism (1-a): positivist philosophy is based on the principles of empirical sciences and an objective approach; Interpretivism (1-b): this philosophy is based on interpretive paradigm and subjectivist approach and Criticism (1-c): the application of critical theory along with the interpretive paradigm leads to a kind of synergy. Criticism claims that research should lead to change. Layer 2 refers to the orientation of research: basic research (2-a), applied research (2-b) and developmental research (2-c).

In Layer 3, the research approach is determined based on the researcher's philosophical worldview. Accordingly, there are two deductive (3-a) and inductive (3-b) Layer. Deductive reasoning means reaching from whole to part and is the basis of rationalistic philosophy, and inductive reasoning means reaching from part to whole and is the basis of empirical philosophy. In Layer 4, the researcher can select any of the quantitative (4-a), qualitative (4-b) or mixed (4-c) methods. In Layer 5, the researcher can conduct the research in terms of research site in the form of library (5-a), field (5-b) and library and field (5-c). In Layer 6, the research strategies are survey (6-a), correlational (6-b), case study (6-c) and experimental (6-d).

In Layer 7, each of these strategies pursues specific objectives such as exploratory (7-a), descriptive (7-b), and explanation and prediction (7-c) at the same time (Habibi, 2021). In Layer 8, depending on the approach, strategy and method used by the researcher in the higher layers, different methods such as interviews (8-a), questionnaires (8-b), documents (8-c) and mixed method (8-d) are used to collect and analyze research data. Of course, several methods may be used simultaneously for data collection. In the study results section, the results of using this research onion model are given.

## 5. Results

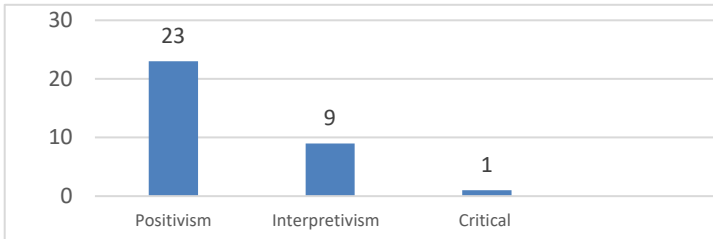
Given that the objective of this study was to investigate the methods of evaluating biases in studies on financing methods, the studies related to the subject of the research have been selected and reviewed. In this section, using the description of the research method as shown in Figure 1, the analysis method of the selected studies using the research onion of Danaiefard, Alvani and Azar (2004) is examined in 8 layers.

### Layer 1: review studies for research philosophy

For research philosophy, which reflects the researcher's worldview, the research methodology is divided into critical, positivist, and interpretive categories. Accordingly, the critical researcher's view of the studied phenomenon will be different from the positivist and interpretive researcher's view. Criticism is based on the assumption that the realities of society are historically placed next to each other and produced and reproduced by people. Positivism is based on observable and testable facts, and in interpretive philosophy, relationships with numbers are not expressed and methods are exploratory.

Accordingly, the results showed that most studies conducted on the evaluation of biases used positivist methodology, followed by interpretive and then critical methodology, the results of which are shown in Figure 2. More studies have used positivist philosophy. On the one hand, this philosophy tries to know the objective facts, and on the other hand, according to the studies, most of the researches have only tried to prove the existence of biases and the relationship of biases with other variables. Therefore, they have observed the realities of the society quantitatively and have neglected the qualitative aspects that indicate

interpretative philosophy. In order to help reduce the biases in society, more researches are needed on the causes of biases and their solutions; Therefore, there is a need to deal with critical philosophy more than in the past.



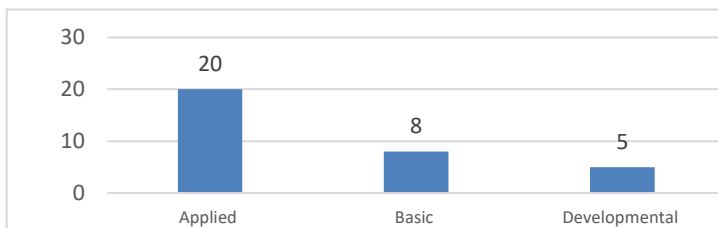
**Figure 2. review studies for research philosophy**

*Source: Research findings*

### Layer 2: review studies for research orientation

For research orientation, research methodology is divided into three basic, applied and developmental categories. The objective of basic research is to develop knowledge through the acquisition of new theories and the modification of previous theories. But the objective of applied research is to find solutions for certain problems by analyzing empirical evidence. On the other hand, developmental research is conducted in a special situation without the intention of general application of the results, beyond the studied situation to use the scientific method to solve problems in a specific location and time.

The results showed that most studies conducted on the evaluation of biases were applied, then basic and finally developmental, the results of which are shown in Figure 3. According to the fact that most of the researches have focused on confirming the biases and checking their relationship with other variables, it can be said that most of the researches have focused on their observations and analysis. Therefore, the orientation of most of the researches is of applied type. Despite the high capacity of behavioral finance in describing phenomena, its use has been neglected among researchers and they have not made sufficient use of its capacities. Therefore, it is necessary to make more efforts to use behavioral finance and develop its boundaries. Therefore, researches should take more advantage of fundamental and developmental orientation.

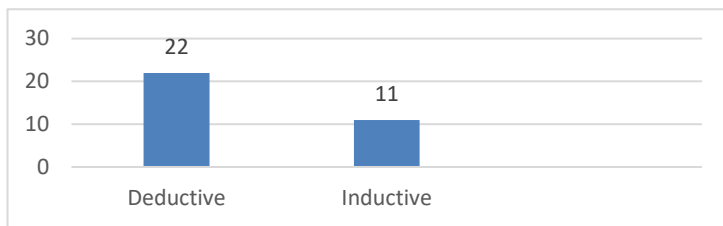


**Figure 3. review studies for research orientation**

*Source: Research findings*

### Layer 3: review studies for research approaches

For research approaches, the research methodology is divided into two deductive and inductive approaches. In deductive approach, partial unknowns are discovered through general information, i.e., a result is obtained by putting together accepted facts and inference. On the opposite point, in the inductive approach, a general sentence is deduced by partial information and communicating. Accordingly, the results showed that most studies conducted on the evaluation of biases were deductive and then inductive, the results of which are shown in Figure 4. In most of the selected researches, using the information obtained from people, they tested the behavioral biases when making decisions about financial issues and as a result, they rejected or accepted the biases. Therefore, it can be seen that most of these researches have used the deductive approach. In this approach, the existing theory is verified. In order to strengthen behavioral financial knowledge, it is necessary to conduct more researches with an inductive approach in the future.



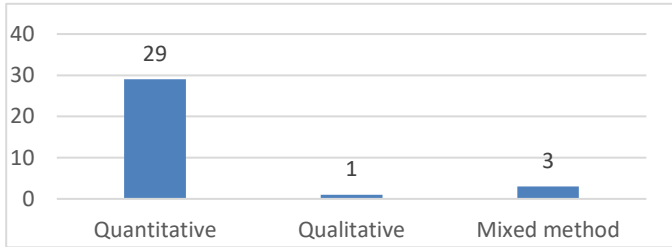
**Figure 4. review studies for research approaches**

*Source: Research findings*

### Layer 4: review studies for research methods

For research methods, based on the quantification of the behavior of the given phenomenon, researchers can use any of the quantitative, qualitative or mixed methods. In the quantitative method, the data relevant to the subject are converted numerically and usually collected through a questionnaire. In the qualitative method, data are less able to be converted into numbers. Therefore, they are analyzed in the same way they were collected, and data are usually collected by methods such as interviews and observations. In the mixed methods, both qualitative and quantitative methods should be used according to the subject of the research. Accordingly, the results showed that most studies conducted on the evaluation of biases used the quantitative method, then mixed method and finally qualitative method, the results of which are shown in Figure 5. In most of the investigated researches, statistical methods have been used to evaluate behavioral biases in people's decision-making and this issue has been analyzed in the form of numbers. Statistical description of this phenomenon is needed to analyze the behavior of people in society and express deviations in their decision-making; But qualitative methods are needed to explain the reason and how of this

phenomenon, and qualitative research methods should be used more to solve this problem.

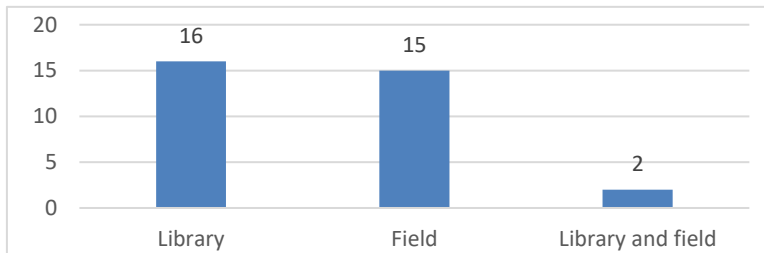


**Figure 5. review studies for research methods**

*Source: Research findings*

### Layer 5: review studies for data collection method

For data collection method, the research methodology is divided into three categories: field, library and library and field. The results showed that most studies conducted on bias evaluation used the library method, followed by the field method, and finally the library and field method, the results of which are shown in Figure 6. Due to the nature of biases that are related to human characteristics, in order to deepen the studies, it is necessary to use the field method to communicate more with people.



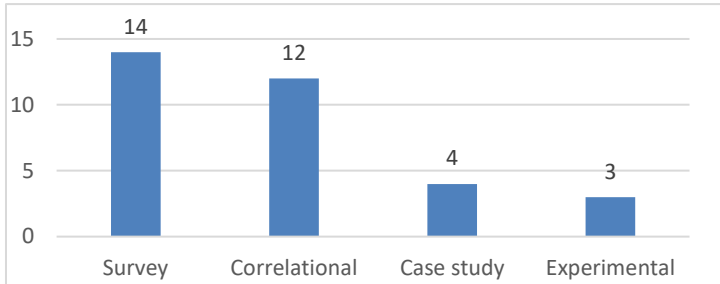
**Figure 6. review studies for data collection method**

*Source: Research findings*

### Layer 6: review studies for research strategy

For the research strategy, the research methodology is divided into survey, correlational, experimental and case study. The results showed that most studies conducted on the evaluation of biases used the survey method (a method to obtain information about views, beliefs and opinions in a statistical population) followed by correlation (examination of the relationship between variables based on the purpose of the research), then a case study (an in-depth and extensive study of a case in a certain period of time) and finally an experimental study (examining the effect of conditions and methods on the subject group), the results of which are shown in Figure 7. According to the goals of most of the researches, which is to provide information about the existence of bias in the decision-making of people in the society, the survey strategy has been used more. The correlational strategy

has been used almost the same as the survey strategy. Case study and experimental strategies have been used less. In order to find a broader and more comprehensive view of behavioral finance, these two strategies should be used more.

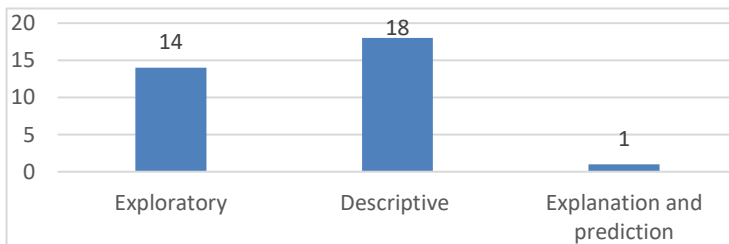


**Figure 7. review studies for research strategy**

*Source: Research findings*

### Layer 7: review studies for the objective of the research

For the objective of the research, the research methodology is divided into three exploratory, descriptive, explanatory and predictive categories. The results showed that most studies conducted on the evaluation of biases used descriptive method (which aims to classify and use observations to describe phenomena), then exploratory method (which have a random aspect, and the subject of the problem is not clearly defined, and the researcher starts with an initial research idea) and finally explanatory and predictive method (to answer the reason for the occurrence of phenomena), the results of which are shown in Figure 8. As can be seen, in most of the researches, biases have been described. In order to know about the existing conditions of the society, the use of this method is required; But in order to find the reason for the occurrence of the phenomena, more research is needed with the purpose of explanation and prediction.



**Figure 8. review studies for the objective of the research**

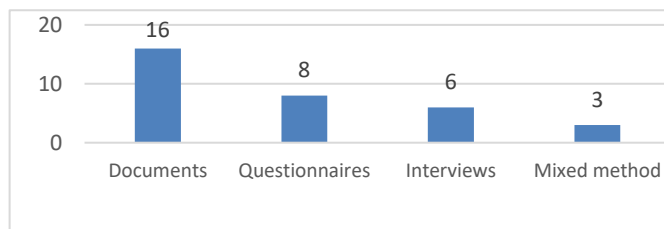
*Source: Research findings*

### Layer 8: review studies for data collection tools

For data collection tools, the research methodology is divided into several categories of observation, interview, questionnaire, documents and a combination. The results showed that most studies conducted on the evaluation of

biases used documents, followed by questionnaires, then interviews, and finally a combination, the results of which are shown in Figure 9. In general, in some selected studies, proxies have been used to evaluate biases using available data. On the contrary, biases have been investigated in some others through questionnaires and interviews. The amount of use of document tools has been higher due to the wider use of proxies. To better understand people's behavior in behavioral finance, it is better to use more interview and observation tools.

In appendix in Table 4, the research onion layers are given in the selected articles and the code is used to summarize. In the first row, there is the code of the articles and in the first column, there is the number of the layers. The code of the articles is shown in appendix in Table 3, and the code related to the layers is given in the research method section.



**Figure 9. review studies for data collection tools**

*Source: Research findings*

## 6. Discussion and conclusion

In this study, studies on behavioral biases in financing were reviewed by Meta method. Many studies have measured biases and investigated behavioral models in different fields. But the studies in the field of financing model are few and mostly use common methods, so a limited number of biases defined in behavioral finance have been considered by researchers in the field of investment decisions. On the one hand, few studies have been conducted by the behavioral finance approach and the evaluation of biases in the field of financial decisions, especially in Iran, and on the other hand, in studies, Meta method has not been used in this regard. Since Meta method helps to clarify methodological problems of social studies, this study can be the basis for the future research.

The review of related articles in this field shows that despite the same meaning and concept of Meta method for researchers, each has used a different framework and process to perform Meta method in this field. According to many researchers' claims, there is no specific framework for the review of articles in terms of methodology, and few studies conducted in the field of Metaphysics have used innovative frameworks for this purpose (Sanaeepour, 2021). In this study, using the innovative framework according to the objective of the research, articles related to the subject of the research were collected and 33 related articles were selected from more than 200 studied articles. In the research method section, previous studies were reviewed.



The selected research methods have been investigated using the method of Danaiefard, Alvani and Azar (2004) in the form of research onion, in 8 layers. The results of using this method are as follows: for research philosophy, studies are divided into critical, positivist and interpretive categories. The results showed that most studies conducted on the evaluation of biases used the positivist method (70%), followed by the interpretive method (27%) and then the critical method (3%). Since most of the selected studies have sought to verify biases or examine the relationship between biases and other variables, they have used the positivist method. Positivism tries to achieve an objective knowledge of reality and these studies have also sought to quantify behavioral biases. Given that more researches have focused on quantitative aspects, the interpretive method that focuses on qualitative aspects has been neglected.

In most of the selected studies, only the proof of the biases and the relationship between the variables and the biases have been addressed, and the reasons and solutions of the behavioral biases have rarely been addressed. Criticism has been considered little in these studies. For bias evaluation methods, there has not been a study by Meta method, with which the study results can be compared. But unfortunately, this paradigm is less used in other fields of research. For example, we can refer to studies by Abbasi and Sharifianjazi (2020) and Zare Shahabadi and Bonyad (2021). Behavioral biases disrupt the decision-making process of managers and move away from the goals of economic enterprises. Therefore, finding a solution to reduce these biases is essential. The critical paradigm seeks to solve problems and create change, and for this reason, there is a need for more researches to use this paradigm. Reducing the bias in managers' decisions can help the growth of firms.

For research orientation, research methodology is divided into three basic, applied and developmental categories. The results showed that most studies conducted on bias evaluation were applied (60%), followed by basic (25%) and finally developmental (15%). Theorists have different opinions about the research orientation. Some like Simon (1945) agree with applied research. Some others criticize the excessive emphasis on the implementation of purely applied research and believe that the discovery and production of new science should be started (Torabi and Fathi, 2022). Since behavioral biases have been less addressed in research on financing, it is necessary to pay more attention to this research field. Given the novelty of this research field, it seems that basic researches whose goal is to develop the frontiers of knowledge should be paid more attention.

For research approaches, studies are divided into two deductive and inductive categories. The results showed that most studies conducted on the evaluation of biases had a comparative orientation (67%) followed by inductive orientation (33%). Deductive approach confirms the theory or hypothesis and does not allow the development of knowledge and strengthens the existing knowledge. In the inductive approach, data are collected and theories are developed using data analysis. Given the novelty of the issue of behavioral biases

in financing research, it is suggested to use the inductive approach to develop the frontiers of knowledge.

For research methods, studies are divided into three quantitative, qualitative and mixed categories. The results showed that most studies conducted on the evaluation of biases used quantitative method (88%), followed by mixed method (9%) and finally qualitative method (3%). Perhaps the reason is that the procedures of journals for accepting articles are mainly quantitative-oriented and less attention is paid to qualitative studies. This is despite the fact that many researchers, including [Perry and Kraemer \(1986\)](#), believe given that qualitative methods play an essential role in the meaning and interpretation of data, qualitative methods can be used to improve research methodology in different fields ([Torabi and Fathi, 2022](#)). Accordingly, in selected studies, the reasons and solutions of behavioral biases have rarely been discussed. Given that whenever the objective of the research is to state a problem, the qualitative research method is used, it is better to use this method to discuss the reasons for behavioral biases.

For the site of the research, the studies are divided into three categories: field, library, and library and field. The results showed that most studies conducted on the evaluation of biases used the library method (49%), followed by the field method (45%) and finally the library and field method (6%). Both library and field methods have been used almost equally.

For research strategies, studies are divided into survey, correlational, experimental and case study. The results showed that most studies conducted on the evaluation of biases used the survey method (43%) followed by correlational method (36%), then case study (12%) and finally experimental method (9%). By the survey strategy, the researchers obtain the main data by determining the sample of the population to describe the vast statistical population. This strategy is one of the most widely used strategies, but it cannot be said that one strategy is the best for all studies. According to the field and topic of the research and the perspective of the researcher, different strategies can be used to achieve the objective of the research. Given the complexity of behavioral finance, it is suggested to use different strategies to have a broader view of the subject and obtain better results. Viewing the subject from different aspects, the results will be more generalizable.

According to the objective of the research, the studies are divided into three exploratory, descriptive, and predictive categories. The results showed that most studies conducted on the evaluation of biases used descriptive method (55%), followed by exploratory method (42%) and finally predictive method (3%). Given few studies on the explanation and prediction and the reasons for the occurrence of phenomena, it is suggested to investigate the reasons for the biases.

For data collection tools, studies are divided into several categories of observation, interview, questionnaire, documents and/ or mixed method. The results showed that most studies conducted on the evaluation of biases used documents (49%), followed by questionnaire (24%), interview (18%) and finally, mixed method (9%). Sometimes researchers select common tools in similar

studies disregarding all data collection tools. It is better to select the appropriate tool according to the research objectives after evaluating all the data collection tools and avoid selecting common tools disregarding the quality. In behavioral financial research, it is better to use interview and observation to better understand people's behavior.

With the studies conducted on bias evaluation in the field of financing researches, it can be said that most of studies in this field are applied and few studies had fundamental and developmental orientations. Given that the number of studies in this field is not very large and it is still considered a new topic, it is necessary for future studies to theorize more and use the fundamental method for the development of knowledge. Also, quantitative studies using the library documents have been assigned the largest number of studies in this field. It is suggested that due to the nature of biases that are related to human features, qualitative and mixed methods should be used more in research. Given that in order to deepen the studies, there is a need for more qualitative research and the use of the field method to communicate more with people, it is suggested to use data collection methods such as questionnaires and interviews more in future studies.

Most of the studies on the investigated field have a deductive approach and less studies have used the inductive approach. Also, descriptive studies with a survey strategy and the use of positivism paradigm have the largest number of studies in this field. It is suggested that future studies use more the inductive approach, exploratory method, explanation and prediction more. It is also necessary for researchers to act with exploratory, explanatory and predictive goals in order to find new problems and their solutions. Since the paradigm of most studies is positivism and given that behavioral bias is related to the features of humans and should be addressed beyond numerical propositions, there is a need for further studies using interpretive and critical philosophy. It is suggested to use these two paradigms more in future studies. Also, to discover the hidden aspects of the subject, it is better to use more diverse strategies for research.

The present study has addressed the pathology of behavioral bias evaluation methods in research related to financing methods. According to the study results, research problems and gaps are observed in this field. Given that so far, there has been no research in this field with a Meta method approach, so it is not possible to compare the results of this research with other research. In this section, according to the results of applying the meta method with the research onion approach, suggestions for future studies were given separately for each layer. By the research onion model, studies using critical philosophy, fundamental orientation, inductive approach, qualitative method, diverse strategies, explanation and prediction, and interview and observation for data collection in the fields have little place and it is necessary to conduct these studies. Reasons for the mentioned research gaps can be mentioned: lack of training research methods in universities, the reluctance of researchers to select uncommon research methods, and the procedure of journals to accept articles. It is recommended that

research centers, universities and scientific and research journals provide grounds for solving these problems so that studies benefit from more richness.

It is suggested to investigate the meta-method for other areas of research in future researches. For example, studies can be examined in different time periods. Also, researches published in a group of magazines or a specific magazine can be checked. In addition to reviewing articles, it is possible to specifically analyze Theses with a meta method. In this research, the methods of evaluating behavioral biases in the field of financing have been investigated. It is suggested to contribute to the expansion and richness of this research field by making changes in the subject area. For example, instead of financing, other areas such as investment should be investigated. Considering that the meta method in behavioral finance has received less attention, the use of this method will contribute more to the pathology of research methods in this field.

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Conceptualization, methodology, validation, formal analysis, resources, writing—original draft preparation, writing—review and editing: all authors. All authors have read and agreed to the published version of the manuscript.

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#### **Conflicts of Interest:**

The authors declare no conflict of interest.

#### **Data Availability Statement:**

The information used in the study was taken from scientific sites such as Google Scholar.

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<sup>1</sup> To distinguish Persian sources from Latin sources, Persian studies are marked with an asterisk.

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## Appendix

**Table 1. Definition of emotional biases**

The name of the biases	Definition of biases
Loss Aversion Bias	People's desire to avoid loss is more than their desire to gain profit (Kahneman and Tversky, 1991).
Regret Aversion Bias	Humans are more affected by their bitter experiences than by their good experiences (Fairchild, 2007).
Status Quo Bias	People sort the solutions in such a way that an option is selected that confirms the current situation (Hirshleifer, 2015).
Self-Control Bias	Instead of saving for tomorrow, people spend today (Pompian, 2009).
Endowment Bias	When people possess an asset, they value it more than when they do not possess the asset (Kahneman, Knetsch and Thaler, 1991).
Optimism Bias	People overestimate their successes and underestimate their failures. They rate themselves as better than average (Lovallo and Kahneman, 2003).

*Source: Research findings*

**Table 2. Definition of cognitive biases**

<b>The name of the biases</b>	<b>Definition of biases</b>
Overconfidence Bias	People tend to overestimate their beliefs, abilities and predictions ( <a href="#">Bodie, Kane and Marcus, 2016</a> ).
Representativeness Bias	The mind tries to match the new phenomenon with its previous categories and uses its previous experiences to understand the new phenomenon ( <a href="#">Pompian, 2012</a> ).
Anchoring and Adjustment Bias	People focuses on a certain feature and do not consider other features, so they have difficulty in fully understanding and recognizing the phenomena ( <a href="#">Pompian, 2009</a> ).
Cognitive Dissonance Bias	People try to avoid incompatible situations. Therefore, in order to avoid psychological incompatibility, they ignore relevant potential information ( <a href="#">Pompian, 2009</a> ).
Availability Bias	It is a rule of thumb that makes judgments based on available information and not complete and real information ( <a href="#">Tversky and Kahneman, 1973</a> ).
Self-Attribution Bias	Success for people with self-certification bias makes them overconfident and suffer loss in the future ( <a href="#">Billett and Qian, 2008</a> ).
Illusion of Control Bias	People consider the probability of their expected success inappropriately higher than the actual probability of that success ( <a href="#">Langer and Roth, 1975</a> ).
Conservatism Bias	When faced with new evidence and information, people have no desire to correct or reject their previous beliefs, or they react less than enough to this information and change their opinions slowly ( <a href="#">Edwards, 1968</a> ).
Framing Bias	People show different reactions to a specific situation based on the way it is presented. They may also focus on one or two aspects of a situation and ignore other important aspects ( <a href="#">Tversky and Kahneman, 1981</a> ).
Ambiguity Aversion Bias	People often have doubts in ambiguous situations and show no desire to accept risks ( <a href="#">Richard, Harris and Zhan, 2015</a> ).
Mental Accounting Bias	Instead of paying attention to all mental accounts and making a general decision, people pay attention to each mental account separately and make a partial decision. These partial decisions sometimes contradict each other ( <a href="#">Barberis and Huang, 2001</a> ).
Confirmation Bias	People try to accept an idea that is in accordance with his beliefs among different ideas and considers ideas that are in contradiction with his beliefs to be of low value ( <a href="#">Saeedi and Farhaniyan, 2015</a> ).
Hindsight Bias	People are overconfident about their ability to predict and sometimes to reduce the shame caused by making a wrong decision, they claim that they have predicted this event in advance ( <a href="#">Camerer and Loewenstein, 2003</a> ).
Recency Bias	People remember and focus on recent events and observations more than the past ( <a href="#">Damke, Junior and Rochman, 2014</a> ).

*Source: Research findings*

The name of the biases	Related studies	The name of the biases	Related studies
(1) Framing Bias	Tversky and Kahneman, 1981 (Code 1)- Kahneman and Tversky, 1984 (Code 2)- Kahneman and Riepe, 1998 (Code 3)- Hammond et al, 2001 (Code 4)- Pompian and Longo, 2004 (Code 5)- Montier, 2006 (Code 6)- Korniotis and Kumar, 2008 (Code 7)- Damke, Junior and Rochman, 2014 (Code 8)- Mahzoun, 2010 (Code 9).	(١١) Self-Attribution Bias	Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Abdorrahimiyani et al, 2018.
(٧) Overconfidence Bias	Kahneman and Riepe, 1998- Pompian and Longo, 2004- Montier, 2006- Statman, Thorley and Vorkink, 2006 (Code 10)- Korniotis and Kumar, 2008- Kumar, 2009 (Code 11)- Chen et al, 2007 (Code 12)- Doukas and Petmezas, 2007 (Code 13)- Ishikawa and Takahashi, 2010 (Code 14)- Damke, Junior and Rochman, 2014- Fan and Zhou, 2014 (Code 15)- Mahzoun, 2010- Abdorrahimiyani et al, 2018 (Code 16).	(١٢) Ambiguity Aversion Bias	Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Richard, Harris and Zhan, 2015 (Code 30).
(٣) Conservatism Bias	Montier, 2006- Barberis and Thaler, 2002 (Code 17)- Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Haghgou, 2012 (Code 18)- Mahzoun, 2010- Abdorrahimiyani et al, 2018.	(١٣) Endowment Bias	Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Kahneman, Knetsch and Thaler, 1991- Haghgou, 2012.
(٤) Anchoring and Adjustment Bias	Tversky and Kahneman, 1981- Montier, 2006- Barberis and Thaler, 2002- Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Abdorrahimiyani et al, 2018- Lee and Piqueira, 2019 (Code 19)- Tversky and Kahneman, 1974 (Code 20)- Oechssler, Roeder and Schmitz, 2009 (Code 21).	(١٤) Hindsight Bias	Damke, Junior and Rochman, 2014- Mahzoun, 2010- Kahneman and Riepe, 1998.
(٥) Mental Accounting Bias	Kiyan, Pourheydari and Kamyabi, 2017 (Code 22)- Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010.	(١٥) Cognitive Dissonance Bias	Damke, Junior and Rochman, 2014- Mahzoun, 2010- Tajmiriyahi and Dezhdar, 2017 (Code 31).

**Table 3. Related studies to evaluate biases**

(6) Loss Aversion Bias	Kahneman, Knetsch and Thaler, 1991 (Code 23)- Kahneman and Tversky, 1991 (Code 24)- Pompian and Longo, 2004- Montier, 2006- Damke, Junior and Rochman, 2014- Mahzoun, 2010- Abdorrahimiyan et al, 2018.	(16) Recency Bias	Damke, Junior and Rochman, 2014- Mahzoun, 2010.
(7) Self-Control Bias	Pompian and Longo, 2004- Damke, Junior and Rochman, 2014- Mahzoun, 2010- Hoch and Lowenstein, 1991 (Code 25)- Puri, 1996 (Code 26)- Bertrand and Morse, 2010 (Code 27).	(17) Status Quo Bias	Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Kahneman, Knetsch and Thaler, 1991.
(8) Optimism Bias	Pompian and Longo, 2004- Montier, 2006- Damke, Junior and Rochman, 2014- Mahzoun, 2010- Abdorrahimiyan et al, 2018- Kahneman and Riepe, 1998- Fan and Zhou, 2014.	(18) Availability Bias	Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Abdorrahimiyan et al, 2018.
(9) Regret Aversion Bias	Pompian and Longo, 2004- Damke, Junior and Rochman, 2014- Mahzoun, 2010- Solnik, 2008 (Code 28).	(19) Confirmation Bias	Pompian and Longo, 2004- Montier, 2006- Damke, Junior and Rochman, 2014- Mahzoun, 2010- Samuelson and Zeckhauser, 1988 (Code 32).
(10) Representativeness Bias	Pompian and Longo, 2004- Montier, 2006- Damke, Junior and Rochman, 2014- Mahzoun, 2010- Tversky and Kahneman, 1974- Chen et al, 2007- Kahneman and Tversky, 1973 (Code 29).	(20) Illusion of Control Bias	Damke, Junior and Rochman, 2014- Pompian and Longo, 2004- Mahzoun, 2010- Abdorrahimiyan et al, 2018- Haghgou, 2012- Tversky and Kahneman, 1973; 1974- Langer and Roth, 1975 (Code 33).

**Source:** Research findings





