

A Study of the Relationship between Behavioral Biases and Investor Decisions

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ABSTRACT

Introduction: *The idea of this study was to investigate the connection between behavioral biases and investor decisions.*

Method: *This research is a descriptive survey of correlation type and falls in the applied category in terms of objective. The statistical population incorporated all accounting students of master's and Ph.D. of Islamic Azad Universities of Lahijan and Rasht (in total, about 200 students). After the theoretical study, using the questionnaire taken from the base essay, the needed data were gathered in the field to analyze the research hypotheses. Eventually, eviews9 software was used to analyze the data.*

Findings: *According to the model results, behavioral biases with a coefficient of -0.84 and a calculated probability greater than 0.05 have no significant impact on investors' investment decisions. Therefore, the hypothesis of this research is not confirmed at the 95% confidence level.*

Conclusion: *Behavioral bias owing to being a function of the majority, seems to impact investment decisions positively. However, putting all the results together reveals the limited knowledge of micro-investors regarding the elements of investment decision-making, and the behavior of investors is so that they often vary from the process of a rational decision.*

Keywords: *Behavioral bias, Investor decisions, Regret, Conservatism.*

Introduction

In the present situation, money has a notable impact on everyone's life. To keep a strategic distance from different issues in everyday life, one has to spend cash in different ways. In the current adverse times, speculative ways are available to brokers. When things are done, financial professionals have the energy to put resources into those specific ways that, with minimal risk, avert the most extreme situations. Brokers make decisions based on different variables in investment options. Investment options for various

speculation procedures, repeat investment, timeframe, speculation goals, factors influencing speculation options, and more, recall that behavioral aptitudes are the most critical factor in deciding investment choices (Kemmer, 1997; Bailey, 2012; Breuer et al., 2014).

Knowing investors' behavioral biases will be valuable for financial advisors when deciding on an investment, so they can correctly advise investors to diminish such biases. This may help investors comprehend the mental aspect of their behavior and restrain their emotions when deciding to invest in stock market options.

People develop behavioral biases when making decisions. These predispositions prevent them from making reasonable (normal) decisions. Behavioral economists state that most people do not consciously decide by assessing all changes. Investors can seriously damage their wealth and allow behavioral prejudices to influence their decisions. As a result, humans make very optimal judgments based on the inherent biases that develop in our brains and bodies (Gordon, 2011).

Examining social funds centers is about how people create and trade with their financial resources. An account refers to the mental and psychological elements that affect the choice of financial professionals, whether individual, collective or others.

- Conservatism: This indicates that people are not ready to accept progress and will work harder to control changes.
- Overconfidence: Financial professionals are proud of predicting the future, which can better predict the future.
- Herding: The condition in which a person cannot make choices and does what most people do.
- Regret: A mourning hypothesis noting that people make predictions in events about an out-of-base judgment and think about that prediction while making choices in the future.

Behavioral finance indicates that the investment decision-making process is influenced by various behavioral orientations that lead investors to differ from rationality and make irrational investment decisions (Nihaus & Schreider, 2013).

The logical decision-making process for investors contains identifying demand, seeking data, and evaluating alternatives. The investment decision is then considered a rational investment decision.

We try to comprehend the connection between investors' investment decisions. One can say that people make distinct investment decisions depending on their behavioral predispositions. There is also an association between behavioral biases and investor investment decisions. Some dimensions of behavioral bias are directly related, while others are indirectly related to investors' investment decisions. Given the content of this research, we seek to answer the question, "Do behavioral biases influence the decisions of investors?"

Theoretical bases of study

Definition of behavioral biases

Thaler assumes that behavioral taxation is a kind of intellectual taxation. "Sometimes, to discover solutions to empirical puzzles, we ought to assume that specific factors in the economy do not act quite rationally," he claims. In a nutshell, it can be claimed that in behavioral finance discussions, behavioral attributes that impact individuals' decisions are examined (Rahnamaei, 2012). These elements are called "behavioral biases."

Bias refers to divergence from correct and optimal decisions. Owing to limited time and cognitive resources, the data gathered from the environment cannot be optimally analyzed. Therefore, the human

mind naturally utilizes finger calculations. If such innovative techniques are used suitably, they can be effective. Else, unavoidable biases will arise (Qalamagh et al., 2016).

Behavior control begins with awareness of one's behavioral prejudices. Behavioral biases refer to the tendency to think or feel in specific ways that can lead to systematic divergences from the standard of rationality or good judgment. Behavioral bias can be caused by internal or external factors.

Behavioral predispositions lead to restrained rationality in which investors can not estimate the available options to choose the optimal one. Because in this case, the decision is affected by feelings, emotions, and intuition instead of rational considerations. There are numerous behavioral biases that human beings demonstrate.

Behavioral investigations and what is addressed in cognitive psychology better introduce and states that no matter how reasonable human behavior is, in some cases, human beings suffer from behavioral prejudices. These biases bear limited knowledge or divergence from reality, and as a result, sometimes irrational or unreasonable reactions. The more we know of these possible human behavioral biases, the wiser we will ultimately make decisions (Vakilifard et al., 2013).

For analysts to deliver a proper analysis of investor behavior, they must determine all the factors that affect their decision. Identifying these factors assists analysts to take more accurate measures to attract investors to the stock market and, other than considering other financial, economic, and personal variables, to pay more attention to job and educational factors as critical and influential variables on investors' decisions (Ghahamagh et al., 2016).

Dimensions of Behavioral Bias

Behavioral finance investigation concentrates on creating and controlling human financial assets. Behavioral finance means psychological and sociological factors that affect investors' decisions, whether individual, group, or others.

- **Conservatism:** This indicates that people are not ready to accept progress and will work harder to control changes.
- **Overconfidence:** Financial professionals are proud of predicting the future, which can better predict the future.
- **Herding:** The condition in which a person cannot make choices and does what most people do.
- **Regret:** A mourning hypothesis noting that people make predictions in events about an out-of-base judgment and think about that prediction while making choices in the future.

Behavioral predispositions and investor decisions

Behavioral finance deals with the behavioral and psychological elements of investing decisions. Investigators have found different abnormalities in investors' behavior that deviate them from rational decisions and disregard standard financial theory.

These anomalies are cognitive errors or propensities that influence investment decisions. Kahneman and Torsky (1979) developed the theory of perspective, explaining the human assessment and decision-making at risk and uncertainty. Vision theory remarks that people are elusive in profit but seek risk in the loss.

A brief description of the sources of behavioral biases in decision making (Khajavi and Ghasemi, 2006):

- 1- Limited rationality and the fact that man suffers from prejudice in cognition.
2. Time constraints: People have to make many decisions in short periods, so there is not enough time to scrutinize.

3- Emotional factors impact human judgment.

4- Social factors and one's belonging to society cause him to consider some social variables in decisions, such as paying attention to group decisions.

Behavioral studies and what is discussed in psychology better introduce human behavior and state that no matter how rational human beings are, in some cases, they suffer from behavioral predispositions. Behavioral biases bear limited cognition or divergence from reality and lead to irrational or unreasonable reactions. Macro-level behavioral prejudices can influence the stock market and cause price fluctuations (bubbles) and market inefficiencies. On the other hand, these biases can yield a reduction in shareholder returns and losses at the micro-level. Hence, by identifying behavioral prejudices that influence individual stakeholder decisions, we can provide solutions and programs to decrease these biases. That is, mastering these predispositions causes investors to inspect their decision-making process with more attention and awareness, and in case of facing behavioral biases, they can demonstrate good behavior and prevent divergences in decision-making (Sohrabi et al., 2012).

Literature Review

Rahaja and Damen (2019) concentrated on the association between behavioral bias and investor risk tolerance and the relationship between behavioral predispositions and investor investment decisions. This study revealed that the affinity between risk tolerance, behavioral bias, and investment decisions is statistically significant.

Madan and Singh (2019) analyzed behavioral biases in the National Stock Exchange investment decisions. The overall findings suggest that individual investors have limited understanding and are more inclined to psychological errors. This study also proves the existence of these four behavioral biases in individual investment decisions.

Jane et al. (2019) ranked behavioral predispositions affecting investment decisions for individual equity investors from the Indian state of Punjab. The study results reveal that various behavioral biases affect the decisions of individual equity investors.

In a study, Rahim et al. (2019) analyzed the impact of conservative prejudice on investment decisions of Pakistan Stock Exchange investors. The results of this study offer that conservative bias has positive influences on the investment decisions of individual investors in the Pakistan Stock Exchange.

Jami Al-Ahmadi and Razdar (2015) investigated behavioral bias and its effect on investors' decisions in the stock market and concluded that several errors influence investors' judgments. Among the most notable researchers in this field were Kahneman and Torsky, who contributed greatly to developing this knowledge by presenting the theory of expectation. Also present were Ashen Eider, Weiss, Budesco, and Thomas, who have contributed to financial management by presenting papers on behavioral finance and have contributed to helping investors make financial decisions.

Gorjizadeh and Khan Mohammadi (2017) studied the consequences of behavioral financial factors on the decisions of individual investors. This research explores the factors affecting the amount of capital that investors invest in the capital market. The results also indicate that the current return on the investor in the stock market, savings, years of participation in the stock market, income, and investment horizon, respectively, have the highest effect on the volume of individuals' investments in the stock exchanges.

Methodology

The present research is descriptive-survey and correlation-applied. The statistical population included all accounting students of masters and Ph.D. grades of Islamic Azad University of Lahijan and Rasht (about 200 students). In this study, considering the number of community members and the sampling method of Morgan and others, it was expected that the sample had 132 associates. However, due to the current

restrictions regarding the coronavirus epidemic and the lack of students in the university, the questionnaire was provided to students online via a link. Of these, about 100 acceptable questionnaires were completed, and owing to the limitations of completing the questionnaire, the statistical sample was finally determined to include the same 100 people.

Methods and tools for gathering data and information

In this study, first by inspecting the research literature and based on the problem, the chief variables of the research were identified, and hypotheses were created based on the theoretical framework and research model. Next, the data required to measure the above variables were gathered using a questionnaire to analyze the research hypotheses. After compiling the data, some calculations about the variables were performed using Excel software. The final analysis was performed to test the research hypotheses using eviews9 software.

Concerning the questions of the questionnaire, according to the dimensions presented in the research of Rahaja and Diman (2019) and according to the views of professors and experts, the following has been done.

Behavioral Prejudice Questionnaire

Conservative tendencies, overconfidence, horde effect, and regret were selected to evaluate whether investors were struggling with these divergences in their decisions. A diagnostic question is used for each of the said tendencies (a total of four questions are related to behavioral biases).

The answers to the questions are arranged on a Likert distance scale on a five-point scale consisting of strongly agree, agree, somewhat disagree, and strongly disagree. The highest scores are assigned from strongly agree (5) to strongly disagree (1).

Ultimately, to measure the behavioral prejudice variable, each of its constituent elements will be set to 0 or 1. The sum of these numbers, which will eventually be between 0 and 4, will be considered the score of that behavioral bias.

Investor Decisions Questionnaire

To test investors' investment decisions, three questions are posed:

1. Investment period (a- less than one year, b- between 1 to 5 years, c- between 5 to 10 years, and d- more than ten years);
2. Type of investment (a- equity, b- debt, c- investment fund, d- commodity market and e- options and market futures);
3. Type of investor (a- more risk-averse audacity, b- moderate risk-taking audacity, c- less risk-averse conservatism, and d- diligent willingness to accept minimal risk).

The ascending order of the scores in the questions: 1 belongs to option a, up to 5 belongs to option e.

Eventually, to measure the variable of investors' decisions, each constituent component will be picked (as 0 or 1) based on the scores received. The sum of the numbers, which will eventually be a number between 0 and 3, will be considered the investment decisions' score.

Hypothesis and model

The hypothesis of this research is as follows:

Hypothesis. There is a significant relationship between behavioral biases and investors' investment decisions.

The following model is used to test research hypotheses:

$$\text{Investment Decisions} = \beta_0 + \beta_1 (\text{Behavioral Biases}) + \beta_2 (\text{Age}) + \beta_3 (\text{Gender}) + \beta_4 (\text{Education}) + \varepsilon$$

In this study, Behavioral Biases are independent variables, and Investment Decisions are dependent variables. The variables Age, Gender, and Education are included in the model as control variables.

In addition to estimating the hypotheses based on the above model, the question "Which of the components of measuring behavioral biases has a significant impact on investor investment decisions?" is answered in this study. Plus, the directions and impacts of these components are determined. Thus, the elements Conservatism, Overconfidence, Herding, and Regret have been studied as components of behavioral predispositions. Also, their relationship with investors' investment decisions in a side model will be explored as follows:

$$\text{Investment Decisions} = \beta_0 + \beta_1 (\text{Conservatism}) + \beta_2 (\text{Overconfidence}) + \beta_3 (\text{Herding}) + \beta_4 (\text{Regret}) + \beta_5 (\text{Age}) + \beta_6 (\text{Gender}) + \beta_7 (\text{Education}) + \varepsilon$$

Independent Variables

Behavioral Prejudices

- Conservatism: This indicates that people are not ready to accept progress and will work harder to control changes.
- Overconfidence: Financial professionals are proud of predicting the future, which can better predict the future.
- Herding: The condition in which a person cannot make choices and does what most people do.
- Regret: A mourning hypothesis noting that people make predictions in events about an out-of-base judgment and think about that prediction while making choices in the future.

The dependent variable

Jegango and Matswanjeh (2014) describe that investment decisions are very complicated and need notable brainstorming. Many investors have to make mistakes in their investment decisions since they want to minimize their losses. Several factors influence investment decisions: the goodwill of the company, the benefits of diversification by investing in different securities, the position and performance of the company, the return on investment, the withdrawal of investors from the company. Investors need to research in-depth and understand all the variables that can impact investments in securities.

Control variables

- Age: To check the variable according to the following numbering, numbers 1 to 5 are included:

1. Between 20-30: 1,
2. Between 30-40: 2,
3. Between 40-50: 3,
4. Above 50: 4

Gender: If the investor is a woman: 1, and otherwise: 0.

Education: Master's education: 0, and doctoral education: 1.

Finally, eviews9 software was used to analyze the data.

Findings

Description of research variables

Table (1) describes the descriptive statistics of research variables.

Table 1. Descriptive statistics of research variables

Variable	Symbol	Average	Median	Maximum	Minimum	SD	Skewness	Kurtosis
Investment decisions	Investment Decisions	1.12	1.00	3.00	0.00	0.74	0.10	2.46
Behavioral biases	Behavioral Biases	2.68	3.00	4.00	0.00	1.16	-0.36	2.08
Conservatism	Conservatism	4.31	4.00	5.00	2.00	0.74	-1.00	3.89
Overconfidence	Overconfidence	3.91	4.00	5.00	2.00	0.91	-0.38	2.25
Herding	Herding	3.63	4.00	5.00	1.00	0.97	-0.46	2.77
Regret	Regret	3.57	4.00	5.00	1.00	0.97	-0.46	2.77
Age	Age	1.63	1.00	4.00	1.00	0.79	0.88	2.51
Gender	Gender	0.54	1.00	1.00	0.00	0.50	-0.16	1.02
Education	Education	0.25	0.00	1.00	0.00	0.43	1.15	2.33

Studying the classical hypotheses of research models

1-3-4. Absence of multicollinearity between variables

In ordinary least squares regression analysis, the variance inflation factor (VIF) estimates the intensity of multicollinearity. This index indicates how much of the estimated coefficient variation is due to increased multicollinearity. Multiple alignment intensities can be analyzed by examining the magnitude of the VIF value. As an experimental rule, if the VIF value is greater than 10, the multicollinearity is high. The results of examining the hypotheses are listed in Table (2). This research indicates the absence of multicollinearity among the variables in both examined models.

Table 2. multicollinearity results of variables

Variable	Symbol	Side model VIF	Main model VIF
Behavioral Biases	Behavioral Biases	-	1.112
Conservatism	Conservatism	1.258	-
Overconfidence	Overconfidence	1.574	-
Herding	Herding	1.698	-
Regret	Regret	1.637	-
Age	Age	1.551	1.345
Gender	Gender	1.138	1.043
Education	Education	1.501	1.303

Error term variance heterogeneity test

One of the presuppositions of the regression model is that the variance of the errors is constant so that despite the variance heterogeneity in the model, or increase or decline in the independent variable, the variance of the dependent variable (equal to the residual variance) changes. In this research, the Arch method is employed to study the homogeneity of variances to guarantee the acquired results. In this method, the null hypothesis is the variance homogeneity, and the opposing hypothesis is the variance heterogeneity. Table (3) lists the heterogeneity test results of research models.

Table 3. Results of variance heterogeneity test

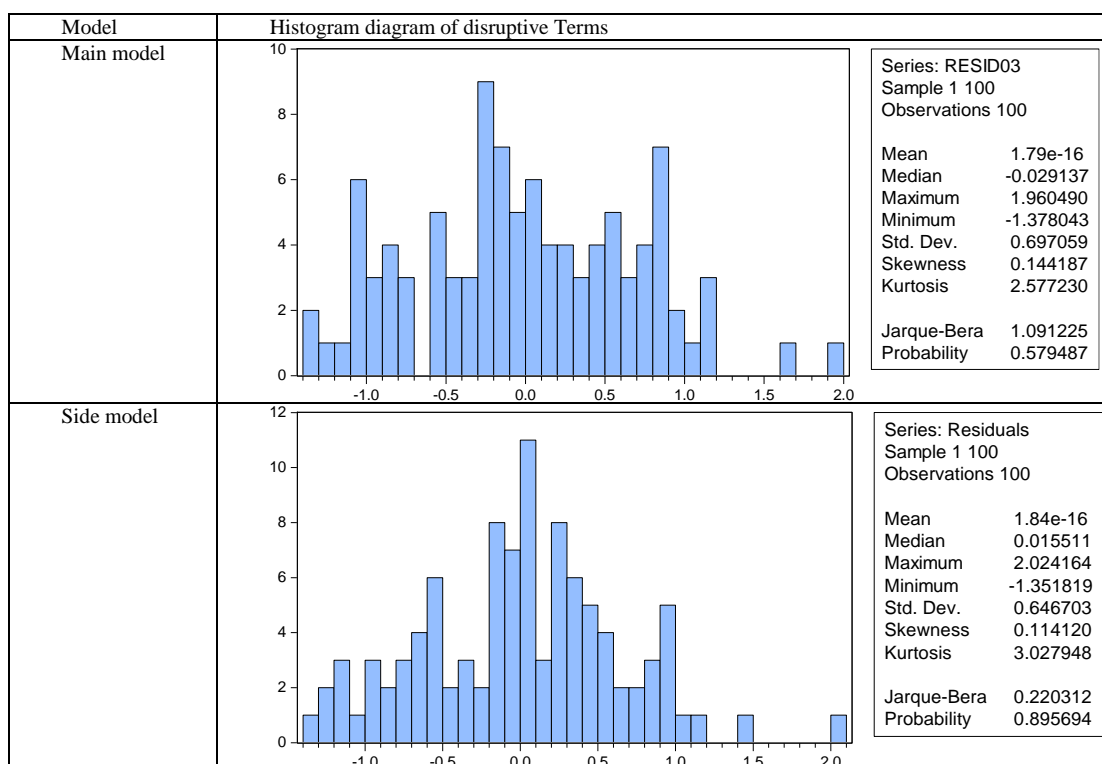
	Method	Value	Probability
Main model	Arch	0.00	0.95
Side model	Arch	1.20	0.27

As can be noticed, the calculated probability is higher than 0.05. This means the absence of variance heterogeneity in the model error sentences.

Error sentence normality test

The test is based on Jarque-Bera statistics. If the statistic is high or the probability level is low, the null hypothesis that the series is normal is rejected. Table (4) displays the normality test results of the research model disruption terms and their histogram diagram.

Table 4. Normality of disruptive sentences results



Given that the calculated probability of the Jarque-Bera test is greater than 0.05, the null hypothesis (normality of error statements) is accepted.

Investigation of research hypothesis

There is a significant relationship between behavioral biases and investors' investment decisions.

The results of cross-sectional model test are presented in Table (5):

Table 5. Results of estimating hypotheses

Investment Decisions = $\beta_0 + \beta_1(\text{Behavioral Biases}) + \beta_2(\text{Age}) + \beta_3(\text{Gender}) + \beta_4(\text{Education}) + \epsilon$					
Variable	Symbol	Coefficient	SD	t-Statistic	Prob
C	C	1.777	0.231	7.670	0.000
Behavioral Biases	Behavioral Biases	-0.079	0.058	-1.366	0.174
Age	Age	0.088	0.097	0.906	0.367
Gender	Gender	0.016	0.142	0.118	0.906
Education	Education	-0.246	0.174	-1.408	0.161
Test statistics = 2.523 Determination coefficient = 0.211 Test probability = 0.034 Modified determination coefficient = 0.171 Watson Camera Statistics = 2.158					

Given that the probability of deleting demographic variables is higher than 0.05, these variables are removed from the model, and the following results are obtained.

Table 6. Results of estimating hypotheses

Investment Decisions = $\beta_0 + \beta_1(\text{Behavioral Biases}) + \epsilon$					
Variable	Symbol	Coefficient	SD	t-Statistic	Prob
C	C	1.860	0.206	9.029	0.000
Behavioral Biases	Behavioral Biases	-0.084	0.059	-1.434	0.154
Test statistics = 5.490 Determination coefficient = 0.201 Test probability = 0.005 Modified determination coefficient = 0.183 Watson Camera Statistics = 2.2					

The purpose of specifying the above model is to study the relationship between emotional intelligence and behavioral biases with investors' investment decisions. As the results show, the variable Behavioral Biases (with a coefficient of -0.84) and the calculated probability higher than 0.05 have a negative relationship with investment decisions (Investment Decisions). Nevertheless, this relationship is not significant. Thus, the second hypothesis of this study is not confirmed at a confidence level above 0.05.

The numerical value \bar{R}^2 expresses what percentage of the dependent variable changes can be explained by the independent variables. If a high \bar{R}^2 is obtained during the estimation, it would be desirable. On the other hand, if \bar{R}^2 is low, this does not mean that the model is bad. In experimental analyzes, obtaining a very high \bar{R}^2 is not very common. Sometimes, some of the estimated regression coefficients are statistically insignificant or have signs contrary to previous expectations (Gujarati, 2009). In the present model, we have $R^2 = 0.20$ and $\bar{R}^2 = 0.18$. In other words, 0.18% of the dependent variable changes are explained by explanatory variables.

Meanwhile, the value of the Durbin-Watson statistic is 2.22, which is in the definite distance of 1.5 to 2.5. Therefore, the lack of self-correlation and the health of the model can be claimed. On the other hand, the F statistic is larger than the tabular value, and according to the total probability calculated for the model (0.005), the significance of the total regression can be concluded.

Lateral analysis

The results of the study are analyzed by cross-sectional linear regression in Table (7):

Considering that the probability value of deleting the calculated demographic variables is higher than 0.05, these variables are removed from the model, and the following results are obtained.

Table 7. Lateral model estimation results

Investment Decisions = $\beta_0 + \beta_1$ (Conservatism) + β_2 (Overconfidence) + β_3 (Herding) + β_4 (Regret) + β_5 (Age) + β_6 (Gender) + β_7 (Education) + ϵ					
Variable	Symbol	Coefficient	SD	t-Statistic	Prob
C	C	2.023	0.524	3.857	0.000
Conservatism	Conservatism	0.072	0.103	0.700	0.485
Overconfidence	Overconfidence	-0.043	0.080	-0.531	0.596
Herding	Herding	0.202	0.080	2.506	0.014
Regret	Regret	-0.246	0.075	-3.252	0.001
Test statistics = 2.303 Determination coefficient = 0.241 Test probability = 0.013 Modified determination coefficient = 0.136 Watson Camera Statistics = 2.072					

Among the components related to behavioral biases, Herding and Regret components with coefficients of 0.202 and -0.246, respectively, and a calculated probability of less than 0.05 have a significant relationship with investment decisions. In the present study, Herding increases, and Regret reduces the optimal investment decision. The components of conservatism and overconfidence with a calculated probability higher than 0.05 have no significant relationship with investors' investment decisions.

In the studied model, the numerical value of \bar{R}^2 is 0.14 showing that 14% of the changes of the dependent variable can be explained by independent variables. By the way, the value of the Durbin-Watson statistic is 2.04, which is in the definite distance of 1.5 to 2.5. Therefore, the lack of self-correlation and the health of the model can be claimed. On the other hand, the F statistic is larger than the table value, and according to the probability of the total calculated for the model (0.005), the significance of the total regression can be concluded.

Conclusion

Results reveal a significant association between behavioral prejudices and investors' investment decisions. According to the model results, behavioral predisposition with a coefficient of -0.84 and a probability calculated higher than 5% has no significant effect on investors' investment decisions. Therefore, the hypothesis of this research is not confirmed at the 95% confidence level. The findings of analyzing the components of behavioral biases concerning investor decisions indicated that among the elements of behavioral biases, self-awareness and empathy with coefficients of -0.73 and -0.246, respectively, and the calculated probability of less than 0.05 have negative and significant relationships with investors' investment decisions. The elements controlling emotions, motivation, and social talents with probabilities higher than 0.05 have no significant relationship with investors' investment decisions. The results of the study hypothesis indicated that behavioral biases have no significant relationship with investors' investment decisions. Nevertheless, the analysis of the elements of behavioral bias with investment decisions displayed that among the components related to behavioral bias, herding has a positive relationship, and regret has a negative and significant relationship with investment decisions. These results indicate that following the majority in investments has a more satisfactory result in making optimal investment decisions. While feeling regret for future decision results can adversely impact people's investment decisions. These results are somewhat different from the results of Madan and Singh (2019), Rahim et al. (2019), and Basil and Amer (2017) that this relationship is positive but is in line with the results of Bashir et al. (2013). In general, the results of this study show that investors are influenced by herding and regret as components of behavioral bias in their investment decisions. Herding had a positive effect, and regret harmed investment decisions in the sample. However, it should be noted that this type of prejudice can deviate people from the pillars of proper decision-making. As a result, it is recommended to consider acquiring correct information and an accurate understanding of investment cases and the optimal risk-return balance in decisions. Future studies can examine the effect of other variables on investment decisions.

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