



# Effect of financial literacy and risk aversion on the relationship between self-control and financial security of individual investors in Tehran Stock Exchange

Manizheh Mohammadi<sup>a</sup>, Arash Naderian<sup>a,\*</sup>, Majid Ashrafi<sup>a</sup>, Jamadori Gorganli Doji<sup>a</sup>

<sup>a</sup>Department of Accounting, Aliabad Katoul Branch, Islamic Azad University, Aliabad Katoul, Iran

(Communicated by Madjid Eshaghi Gordji)

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## Abstract

Capital markets play an important role in the economy and naturally, the proper functioning of the capital market will play a key role in ensuring economic growth. So, if capital markets are efficient, economic development will be ensured. On the other hand, since the Iranian stock market is currently very popular among investors, it is undoubtedly important to examine the behavioral biases of individual investors. Therefore, in this study, the effect of positive self-control behavioral bias on financial security was investigated with the moderating role of financial literacy and risk aversion of individual investors. For this purpose, the statistical population consisted of individual investors, traders and brokers of Tehran Stock Exchange who are directly participating in the market. Also, the statistical sample was calculated to be 421 using Cochran's formula. A structural equation model using PLS method was used to analyze the data. The results showed that the self-control variable has a significant positive effect on risk aversion and financial security. Also, by using the financial literacy variable as a moderating variable, the intensity of the relationship between self-control and financial security of individual investors increases; that is, the financial literacy of individual stock market investors intensifies the positive relationship between self-control and security of their financial behavior. In addition, by using risk aversion as moderating variable, the intensity of the relationship between self-control and financial security of individual investors is reduced. This means that the risk aversion of individual stock market investors reduces the positive relationship between self-control and the security of their financial behavior.

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\*Corresponding author

Email addresses: [mohammadi\\_manizheh@yahoo.com](mailto:mohammadi_manizheh@yahoo.com) (Manizheh Mohammadi), [arashnaderian@yahoo.com](mailto:arashnaderian@yahoo.com) (Arash Naderian), [mjd\\_ashrafi@yahoo.com](mailto:mjd_ashrafi@yahoo.com) (Majid Ashrafi), [jgorganli@yahoo.com](mailto:jgorganli@yahoo.com) (Jamadori Gorganli Doji)

Received: August 2021 Accepted: October 2021

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*Keywords:* Behavioral finance, self-control, financial security, financial literacy, risk aversion.

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## 1. Introduction

Behavioral finance has been the most important financial issue in the last two decades and has become an interesting research subject for financial researchers. In this area, the concepts of financial economics and psychology are integrated to create more accurate models of human behavior in financial markets. Behavioral financial management also examines how managers collect, interpret, and process information. In particular, this field of study focuses on cognitive and perceptual biases. In this discipline, it is assumed that models can influence behavior and shape decisions. These biases can disrupt the decision-making process and lead to suboptimal results, because emotions overcome personal control and shape human behavior [1]. Therefore, errors and biases overshadow the decision making, and its knowledge is fruitful for investors. These biases occur due to the tendency to take shortcuts and overemphasize experience, unfounded feelings, delusions and ambiguous calculations, and generally, being far away from reality. Although these biases may provide positive results in some cases, the probability of negative results is high [15]. On the other hand, to better understand how individuals make financial decisions and what is important for making these decisions, it is necessary to consider the psychological characteristics that affect individuals' financial security, including self-control, financial literacy, and risk-aversion. In our country, due to the lack of financial education, people do not act as reasonable as required, and many people, despite their intelligence and effort, do not gain any achievements in terms of financial conditions, and sometimes make inappropriate financial decisions. People usually do not save enough for their retirement and spend too much, and sometimes buy things that they later regret. In addition, some people may feel more or less anxious about the result of financial behavior, which is due to their behavioral heterogeneity [3]. Recent studies have focused on cognitive factors such as financial literacy. Financial literacy is the ability to make informed judgments and effective decisions in using and management of monetary resources. Today, only a few studies have been performed on the behavioral characteristics of individuals. One of these behavioral characteristics is self-control. Self-control means one's ability to limit oneself, i.e. one with a low level of self-control is unable to resist temptation in the short term. That is, he/she does not have the ability to control himself/herself against temptations. Individuals with better self-control are more likely to save money and have better financial security. It means that they feel less risky about financial issues and have a higher level of certainty about their future conditions [2]. Another behavioral bias is risk aversion. Risk aversion is an economic and financial concept based on the behavior of customers and investors in the face of uncertainty. In other words, a risk-averse person is not willing to make a profit in return for accepting possible conditions [22]. Finally, capital markets play an important role in the economy because they direct the cash in the hands of those who are unable to use their funds toward those who are able to do so. Naturally, the good performance of these markets will play a key role in ensuring economic growth, so if capital markets are efficient, economic development will be achieved. On the other hand, due to the irrational decision-making of investors in the capital market, systematic errors may occur, which causes inefficiency in the market [4]. Since the stock market is now very popular among investors, undoubtedly, examining the effect of investors' behavioral biases can reduce its effects on the capital market. Therefore, in this study, the effect of positive self-control behavioral bias on financial security is investigated with the moderating role of financial literacy and risk aversion of individual investors in the Tehran Stock Exchange.

## 2. Research literature background

### 2.1. Behavioral financial approaches, behavioral biases

Behavioral sciences are among the applied disciplines that have taken a specialized field in the realm of psychology. The basic foundation of this knowledge is human beings and their inherent complexities, behaviors and personalities, which require understanding and cognition in a scientific framework called psychology. The historical study of psychological knowledge has revealed the fact that in interaction with other sciences, behavioral science has promoted psychological knowledge on the one hand and provided the ground for interaction with other humanities on the other while providing practical answers to the problems faced by human beings [8]. Behavioral finance is a branch of behavioral science that examines financial issues from a broader socio-scientific perspective, including attention to psychology and sociology, as well as the elimination of mere rational and intellectual frameworks. Accordingly, in the last two decades, the focus of many financial topics has shifted from statistical analysis and econometrics on prices and profits to human psychology. And using a wider viewpoint and more realistic assumptions about modern financial management explains the behavior of financial markets. The behavioral finance school or viewpoint, arising from the combination of psychology and finance, indicate that psychology plays a role in financial decision making. Just as cognitive errors and deviations affect investment theories, they also affect financial options [23]. Behavioral finance is the study of how individuals analyze and interpret information to make informed investment decisions. In other words, behavioral finance seeks to influence the psychological processes in decision making. Today, the idea of perfect rational behavior of investors, who are always seeking to maximize their profits, is not enough to justify the behavior and reaction of markets, so financial behavior can be considered a paradigm according to which financial markets are studied using models that put aside the two main and limiting assumptions of the traditional paradigm, namely, maximizing the expected profit and perfect rationality. In order to find an answer to the empirical dilemmas in the financial field, it is argued that sometimes, in the field of behavioral finance, it is necessary to accept the possibility that some economic factors do not behave quite rationally. But according to Robert Olsen, behavioral finance does not try to show that rational behavior is wrong, but rather tries to show the application of psychological decision-making processes in recognizing and predicting financial markets [5].

Behavioral finance advocates firmly believe that awareness of the psychological tendencies in investment is absolutely necessary and requires huge development of the scope of research. Those who see the role of psychology in financial knowledge as a factor influencing securities markets and investor decisions obviously know that it is difficult to observe uncertainties in the financial validity of a behavior. The success of behavioral finance as an independent academic discipline owes much to Professor Daniel Kahneman and Professor Vernon Smith, who jointly won the Nobel Prize in Economics in 2002. The Nobel Prize was awarded to Kahneman for introducing psychological insights into economics, and in particular, for paying attention to the judgment and decision-making of individuals under uncertainty. Smith is also acknowledged due to using laboratory experiences as a tool in empirical economic analysis [19]. The history of behavioral finance dates back to the early 1970s. This hybrid discipline of financial sciences, actually using the sciences of psychology and sometimes sociology to better analyze financial markets, often examines the decision-making process of investors and their reaction to different financial market conditions. And its emphasis is mostly on the impact of investors' personality, culture and judgments on investment decisions [23].

Specific cultural structures in Iran and their impact on individual and group behaviors, especially in the capital market, disclose that there is an inevitable need to know theories and analytical and cognitive models of behavioral finance for market participants and practitioners. The fact that

in the market, sometimes we are faced with one-sided demand and buy or sell queues instead of two-way demand including both buyers and sellers at the same time is undoubtedly an example of specific behavioral patterns in the market. Behavioral finance helps to better understand the capital market by formulating behavioral models and to better address, some of the bottlenecks caused by behavioral patterns [8]. In behavioral finance, behavioral characteristics that influence individuals' decision-making processes are studied. These characteristics are called "behavioral biases". Various studies have been conducted on the types of perceptual errors and how these errors affect the financial decisions of investors in financial markets. These studies have concluded that the decisions of investors are affected by several mistakes. Among the most prominent researchers in this field were Kahneman and Torsky, who contributed significantly to the development of this knowledge by proposing the theory of expectation. Also, Ashen Eider, Weiss, Budesco and Thomas were researchers who played an important role in financial management by presenting articles in behavioral finance. They had a huge contribution to helping investors make financial decisions [9]. Pompian [18] identified 22 behavioral biases in his study, including 1. Herd Behavior 2. Narrow Framing 3. Under reaction 4. Cognitive dissonance 5. Overreaction 6. Self-Attribution 7. Representativeness 8. Hindsight 9. Overconfidence 10. Ambiguity Aversion 11. Paying attention to rumours 12. Endowment 13. Anchoring 14. Recency 15. Availability 16. Status Quo 17. Self-control 18. Risk Aversion 19. The illusion of control 20. Regret Aversion 21. Optimism 22. Mental Accounting.

## 2.2. Research background

So far various studies have been conducted on the effect of behavioral bias on investor and stock market decisions. However, limited studies have been conducted on the effect of self-control behavioral bias and its effects. Therefore, some domestic and foreign studies conducted on the financial behavioral bias, self-control, financial literacy and risk aversion are described in Table 1.

Table 1: Summary of studies related to the subject

| Year | Researcher(s)    | Title                                                                                  | Conclusion                                                                                                                                                                                                                                       |
|------|------------------|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2015 | Ohans et al.     | The Relationship between Financial Literacy and Behavioral Bias in US College Students | The results suggest that the primary reason for suboptimal savings and retirement planning is behavioral bias and lack of financial literacy                                                                                                     |
| 2016 | Hayat & Anwar    | Impact of Behavioral Bias on Pakistani Financial Education                             | Halo effect biases, over-confidence and herd behavior have a significant positive effect on investment decisions and financial literacy plays a negative moderating role in herd behavior and a positive modulator role in over-confidence bias. |
| 2017 | Coşkuner         | Linking financial management practices to financial literacy: Evidence from Turkey     | Explanatory variables other than non-investment lending are related to financial literacy. The findings also highlighted the importance of financial literacy as an input to financial success and favorable financial results.                  |
| 2017 | Strömbäck et al. | Could self-control predict the financial behavior and financial well-being?            | People with high self-control, save more money on their monthly salaries, have better general financial behavior, feel less worried about financial issues, and feel more secure in their current and future situation.                          |

|      |                       |                                                                                                                         |                                                                                                                                                                                                                                        |
|------|-----------------------|-------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2018 | Gill et al.           | Factors affecting investment decision behavior with the mediating role of information searching                         | There is a positive and significant relationship between overconfidence and investment decision behavior and information seeking has a significant effect on the relationship between overconfidence and investment decision behavior. |
| 2019 | Jain et al.           | Effects of behavioral bias on investment decisions in India                                                             | The results showed that the most important behavioral biases are: herd behavior, risk-aversion and overconfidence                                                                                                                      |
| 2011 | Eskandarian           | Investigating the relationship between behavioral bias and risk taking capacity with investors' personality             | The results indicate that there is a significant and positive relationship between behavioral biases and investors' personality and there is no relationship between personality type and investors' risk-taking capacity              |
| 2016 | Ghalmegh et al.       | Effect of financial literacy on behavioral biases of investors                                                          | There is a significant relationship between the level of financial literacy of investors and their behavioral biases in a positive direction                                                                                           |
| 2016 | Mohammadi and Fakhari | Effect of self-control and observance of religious obligations of financial managers of companies                       | The level of self-control of financial managers has a positive effect on the quality of information disclosure, but compliance with religious obligations does not affect the quality of information disclosure.                       |
| 2018 | Shirazian             | The role of financial literacy and money management on personal financial management of Tehran Stock Exchange investors | In this study, the findings confirm the positive and significant effect of financial literacy and money management and their components on personal financial management of stock market investors of Tehran.                          |
| 2020 | Moinuddin et al.      | Investigating the relationship between self-control, financial literacy and over-debt of consumers                      | There is a negative or inverse effect of self-control on over-debt of consumers. From a financial perspective, financial literacy has a negative effect on over-debt and a positive effect on self-control of the study sample         |

### 3. Research methodology

The present study seeks to test the following hypotheses:

1. Self-control has a significant effect on financial security.
2. Self-control has a significant effect on risk aversion.
3. Financial literacy has a significant moderating role between self-control and financial security.
4. Risk aversion has a significant moderating role between self-control and financial security.

Also, the variables and the conceptual model of the research are as shown in Figure 1.

To measure the financial security (SW), items 1 to 7 and to measure the self-control (SC), items 8 to 16 of the Strömbäck et al questionnaire were used [22]. To measure the risk aversion (RA), Lincoln's (2012) 8-item questionnaire was used. And to measure financial literacy, [6]. The 10-item questionnaire was utilized. In addition, the population of this study includes the investors of Tehran Stock Exchange who are directly active in the market. These investors have different characteristics

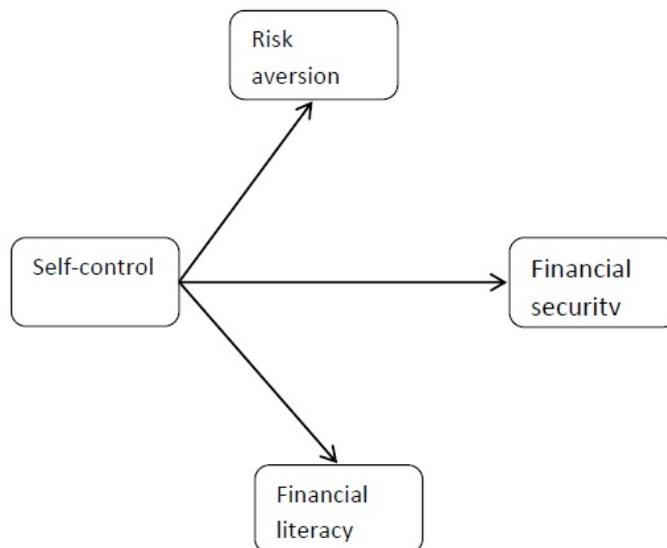


Figure 1: Conceptual model and relationship between research variables

and an attempt will be made to select the sample randomly in a way that includes different types of characteristics of investors. So, all investors are Iranian nationals and act as individual investors, traders and brokers in the Iranian capital market and have interests in gaining profit and investment. Cochran’s formula was also used to determine the sample size as follows:

$$n = \frac{t^2 \cdot s^2}{d^2} \rightarrow n = \frac{1.96^2 \times 0.274}{(0.05)^2} \cong 421$$

Finally, structural equation modeling with partial least squares (PLS) method was used to analyze the data and test the research hypotheses.

#### 4. Results and discussion

Table 2 indicates the statistical description of the study sample.

Table 2: Characteristics of the studied sample

| Gender |            | Age     |            | Education    |            | Engagement in stock market |            |
|--------|------------|---------|------------|--------------|------------|----------------------------|------------|
| Gender | Percentage | Years   | Percentage | Level        | Percentage | Years                      | Percentage |
| Female | 12.5       | 20 <    | 1.5        | High school  | 8.5        | 2 – 3                      | 27.0       |
| Male   | 87.5       | 20 – 30 | 25.5       | Diploma      | 17.5       | 3 – 5                      | 31.0       |
|        |            | 30 – 40 | 41.5       | Associate    | 21         | 5 – 10                     | 22.0       |
|        |            | 40 – 50 | 26         | Bachelor     | 28.5       | > 10                       | 20.0       |
|        |            | > 50    | 5.5        | MA and above | 24.5       |                            |            |

Source: Research Findings

The above table shows that most of the studied shareholders are male (87.5%), in the age group of 30-40 years (41.5%), have a bachelor’s degree (28.5%) and on average, they had an experience of between 3 to 5 years in the stock market (31.0%).

After measuring the research variables, a structural model was obtained that shows the relationship between the latent variables of the research. Figure 2 uses the partial least squares (PLS) method to show the general model of the relationship between research variables and the effect of self-control behavioral bias on financial behavior and financial well-being through the moderating role of risk aversion in Tehran Stock Exchange.

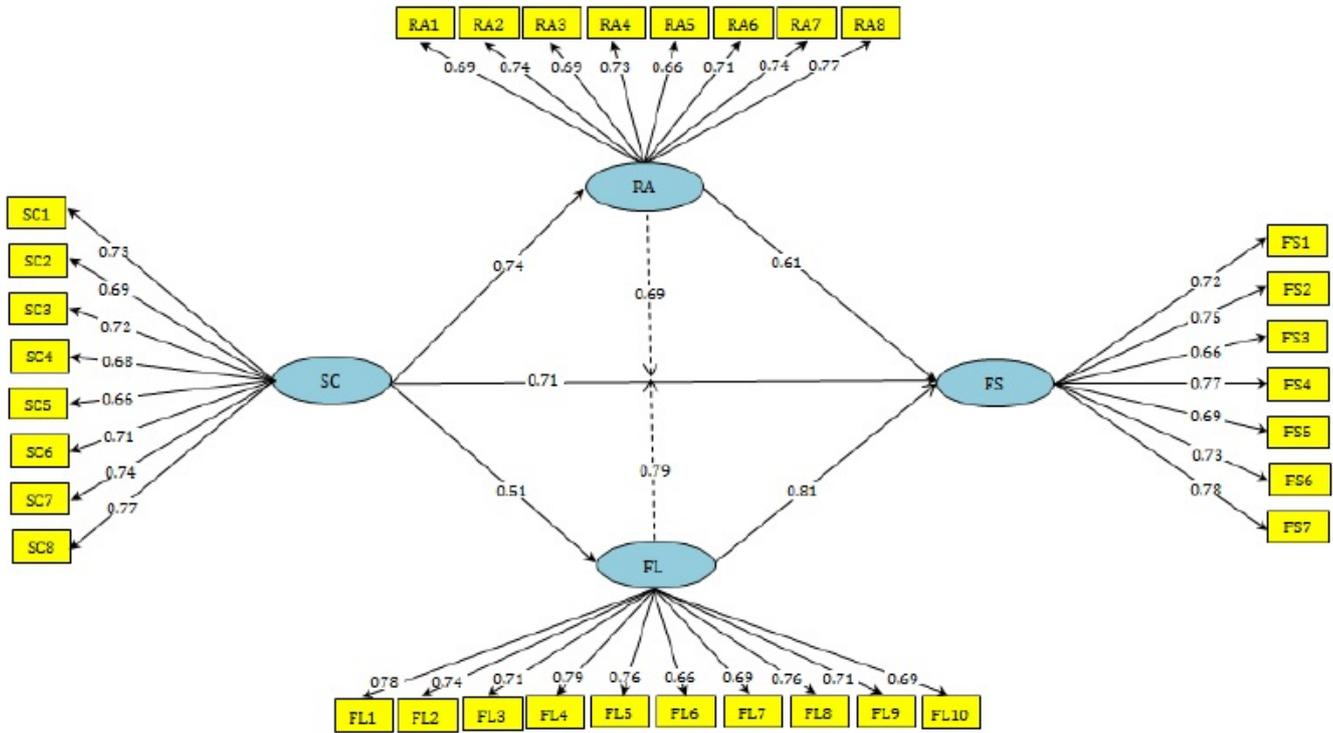


Figure 2: General model of structural equations and the relationship between research variables

Table 3: Model fit indices

| Statistic | $\chi^2/df$ | P-Value | RMSEA | GFI    | AGFI   |
|-----------|-------------|---------|-------|--------|--------|
| Value     | 2.94        | 0.026   | 0.011 | 94.713 | 92.516 |

Source: Research Findings

The  $\chi^2$  test shows whether the model describes the relationship between the observed variables. The smaller the value of  $\chi^2$ , the better.  $\chi^2/df$ , which is the modified form of  $\chi^2$ , is also a measure of the appropriateness of match and moderation with the sample size, the value of which should be less than 3. Good Fit Index (GFI) and the Adjusted Good Fit Index (AGFI) are not affected by the sample size and are very strong against deviation from the normality assumption. Also, their desired values are more than 90%. Finally, the RMSR index is the measure of the mean difference between the data and the reproduced variance-covariance matrix. The smaller the index, the better the fit of the model with the data. Therefore, based on the values of the obtained fit index, the model measurement could be taken as appropriate and all numbers and parameters of the model are significant.

Also, based on the modelling of structural equations in Figure 2, the following relationships can be extracted:

Table 4: Estimation of the effect of latent variables on each other using structural equation modeling

| Type of effect | Latent variables                                                                               | Coefficient      | T statistic         |
|----------------|------------------------------------------------------------------------------------------------|------------------|---------------------|
| Direct         | Effect of self-control on financial security (SC→FS)                                           | $\gamma = 0.711$ | 2.250**             |
|                | Effect of self-control on financial literacy (SC→FL)                                           | $\gamma = 0.512$ | <sup>NS</sup> 1.616 |
|                | Effect of self-control on risk aversion (SC→RA)                                                | $\gamma = 0.743$ | 2.345**             |
|                | Effect of risk aversion on financial security (RA→FS)                                          | $\gamma = 0.613$ | 1.933*              |
|                | Effect of Financial Literacy on Financial Security (FL→FS)                                     | $\gamma = 0.813$ | 2.576**             |
| Indirect       | Moderating effect of risk aversion between self-control and financial security (SC→RA→FS)      | $\beta = 0.691$  | 1.187*              |
|                | Moderating effect of financial literacy between self-control and financial security (FL→RA→FS) | $\beta = 0.791$  | 2.504**             |

Source: Research Findings - NS insignificant - \* Significant at 10% level - \*\* Significant at 5% level - \*\*\* Significant at 1% level

The above table indicates that self-control has a significant positive effect on financial security at the level of 95%. This means that with increasing self-control of individual stock market investors, their financial security improves. Hence, the first hypothesis of the research is confirmed. Also, self-control does not have a significant positive effect on financial literacy at the 95% level. In addition, self-control has a significant positive effect on risk aversion at the 95% level. This means that by increasing the self-control of individual stock market investors, the risk aversion also increases. Hence, the second hypothesis of the research is confirmed. Also, risk aversion has a significant positive effect on financial security at the level of 90%. This means that as the risk aversion of individual stock market investors increases, their financial security will slightly increase. In addition, financial literacy has a significant positive effect on security at the 95% level. This means that as the financial literacy of individual stock market investors increases, their financial security increases. On the other hand, risk aversion has a significant positive but weak moderating role on the relationship between self-control and financial security at the 90% level. Also, by using risk aversion as a moderating variable, the intensity of the relationship between self-control and financial security is reduced from 0.71 to 0.69. This means that the risk aversion of individual stock market investors reduces the positive relationship between self-control and their financial security. Hence, the third hypothesis of the research is confirmed. Finally, financial literacy has a significant positive moderating role in the relationship between self-control and financial security at the 95% level. Also, by using financial literacy as a moderating variable, the intensity of the relationship between self-control and financial security increases from 0.71 to 0.79. This means that the financial literacy of individual stock market investors intensifies the positive relationship between self-control and their financial security. Hence, the fourth hypothesis of the research is confirmed.

## 5. Conclusion and recommendations

In this study, the effect of positive self-control behavioral bias on the financial security of individual investors was investigated in Tehran Stock Exchange based on the moderating role of risk aversion and financial literacy. For this purpose, the statistical population consisted of individual investors, traders and brokers who were directly engaging in Tehran Stock Exchange. Also, the statistical sample was determined to be 421 using Cochran's formula. To measure the financial security (SW), items 1 to 7 and to measure the self-control (SC), items 8 to 16 of the Strömbäck et al. (2017) questionnaire were used. To measure the risk aversion (RA), Lincoln's (2012) 8-item questionnaire was used. And to measure financial literacy, Candiya Bongomin's et al. (2016) 10-item questionnaire was utilized. A structural equation model with the PLS method was used to analyze the data and test the research hypotheses. The results showed that most of the surveyed shareholders were male (87.5%), aged 30-40 years (41.5%), with a bachelor's degree (28.5%) and an average of 3 to 5 years (31%) experience in the stock market. Also, the self-control variable has a significant positive effect on financial security and risk aversion. This means that with increasing self-control in stock market investors, their financial security and risk aversion increase. Also, by using the risk aversion variable as a moderating variable, the intensity of the relationship between self-control and financial security is reduced from 0.71 to 0.69. This means that risk aversion of stock market investors intensifies the positive relationship between self-control and their financial security. Finally, by using financial literacy as the moderator variable, the intensity of the relationship between self-control and financial security increases from 0.71 to 0.79. This means that the financial literacy of stock market investors intensifies the positive relationship between self-control and their financial security.

Iran's stock market reacts to the behavior of investors and, as a result, sometimes it loses its rational performance. Therefore, recognizing these behaviors can be important for market policy-makers to drive the market towards rationality on the one hand, and to act as a basis for designing investment strategies for investment managers on the other. Also, due to the effect of shareholders' behavior on the stock market, investors are advised to buy and sell stocks more carefully and use the opinions of experts when there is emotional news in the market. In addition, since behavioral financial knowledge is a nascent type of knowledge throughout the world and the number of studies conducted in Iran is small, researchers are recommended to investigate the effect of other behavioral factors such as overconfidence, narrow framing, and herd behavior, regret aversion etc on the financing and investment policies of companies.

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