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Identifying and Evaluating Effective Factors and Behavioral Consequences of Investors for Risk Management of Investment Portfolio

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ABSTRACT

Background: The present study aimed to identify and evaluate the effective factors and behavioral consequences of investors for risk management of investment portfolio.

Methodology: The research method is applied in terms of purpose and descriptive-survey in terms of research type. The statistical population of the research consists of 384 managers of investment companies in financial markets who were selected using the Cochran formula and stratified cluster sampling method. In this research, a researcher-made questionnaire was used to collect data, and the reliability and validity of the questionnaire were also investigated and confirmed. Statistical tests and measurement models were used to analyze the data. The software used in descriptive and inferential statistics and SPSS and SmartPLS software were used.

Findings: Based on the obtained results, the axial phenomenon includes the components of the tendency to deviate from rational behavior, the tendency to take risks, the tendency to monopolize, and the tendency to self-misunderstanding. Also, the causal conditions include the components of social factors, technical factors, financial factors, psychological factors and legal factors.

Conclusion: Consequences include components of financial consequences and non-financial consequences. All relationships between model components are also significant.

Keywords: Behavior, Investment, Investment Behavior, Financial Markets.

1. Introduction

In recent years, the financial markets and especially the capital market have expanded significantly in Iran, and sudden changes at the international and national levels have influenced the economic behavior of individuals and investors' thinking about the status of the markets (Abdulrahimian & Khalilzadeh, 2018). In this regard, one of the major issues of the third world countries is the struggle for the right path and structure for the capitals of individuals and organizations. On the other hand, the active participation of investors in the stock market is so important that the existential nature of the stock market depends on the decisions of the investors. Therefore, one of the most sensitive and vital actions of managers and investors is the portfolio formation, and since investors are risk-averse and seek to increase their investment returns, using the portfolio is one of the most appropriate and low-risk investment method due to its diverse nature (Qamari et al., 2016). When forming an investment portfolio, each individual considers two very important components, which are the expected return of the portfolio formed over time and the risk he/she takes by choosing a financial asset. How investors can determine the balance between the expected rate of return and risk has always been one of the important questions of investment management discussion (Nekuiee & Eshqali, 2020). There is a fixed principle in investment culture that capital is risk-averse and tends towards return and profit; it is for this reason that risk-averse investors refuse to invest their capital where there is risk or there is not a certain horizon for the profit and their capital (Family, 2019). Meanwhile, in traditional financial theories, how people make decisions is ignored, but in the behavioral financial paradigm, the decisions and quality of people's decisions are considered (Faraji & Cheraghi, 2021).

Studies on the behavioral economics have a special place. Behavioral economics focuses on the systematic deviations from rationality observed by investors. Because in the literal sense, decision-making is a process to choose the best option among the possible options available in complex conditions and its complexity makes the investor simplify the decision-making process to some extent in order to achieve the desired results. For example, people are sacrificed by their cognitive bias, leading to the inefficiencies and anomalies in the financial market (Al-Mansour, 2020). Therefore, the information obtained and the level of the investor's ability to process information are greatly influenced by the quality of the decisions made. Additionally, Shefrin (2007) states that a wide range of behavioral biases or irrational behaviors are mainly caused by the investor's limited ability to analyze information and emotional factors in decision-making (Ullah et al., 2017). For individuals and organizations, investment decisions are an important part of the strategic decision-making, because investment projects basically affect future economic results and significantly contribute to the growth of a company or individuals. It should be noted that the quality of investment decisions is influenced by many factors, but the most important of them is the choice of investment project (Mwangi, 2017).

Portfolio optimization and behavioral finance are two important areas in financial sciences that focus on the analysis and management of investment risk and return. Portfolio optimization refers to the process of selecting a combination of assets aimed at maximizing returns and minimizing risk. This process is typically based on classical theories such as Markowitz's portfolio theory, which emphasizes asset diversification. On the other hand, behavioral finance examines the impact of psychological factors on financial decision-making and demonstrates that investors are often influenced by cognitive and emotional biases, which can lead to irrational behaviors in the market. These two fields are increasingly converging, as understanding investor behavior can enhance portfolio optimization and risk management (Mehrani et al., 2019).

Portfolio diversification and capital market integration are two key concepts in risk management and investment optimization that have been extensively studied in the financial literature. Portfolio diversification refers to the process of distributing capital among various assets to reduce unsystematic risk and is based on Markowitz's theory (1952), which emphasizes that by combining uncorrelated assets, the overall risk of the portfolio can be reduced. On the other hand, capital market integration refers to the relationships and correlations between different financial markets, demonstrating how changes in one market can affect others (Razin, 2018). Research indicates that market integration can create new opportunities for investment diversification, but it may also introduce new risks, especially during economic crises when correlations between markets increase.

Consequently, understanding the relationship between portfolio diversification and capital market integration is crucial for investors and financial managers.

Portfolio optimization using metaheuristic algorithms, particularly the black hole algorithm, has emerged as an innovative method in investment management. The black hole algorithm, designed based on physical principles and the characteristics of black holes, is specifically used to solve complex optimization problems and can be effectively applied in optimizing asset combinations within portfolios (Mehrani et al., 2018). This algorithm has garnered significant attention due to its ability to effectively search the solution space and find optimal points under conditions of uncertainty and complexity, especially when compared to classical methods. Research has shown that the use of the black hole algorithm can lead to improved portfolio performance and reduced risk compared to traditional optimization methods like Markowitz's theory (Mehrani et al., 2018). These advancements highlight the high potential of metaheuristic algorithms in portfolio optimization and risk management in financial markets. Portfolio selection is one of the key topics in investment management, referring to the process of choosing a combination of assets to maximize returns and minimize risk. The theory of portfolio selection primarily began with the work of Harry Markowitz in the 1950s, who introduced the concept of asset diversification and its impact on reducing unsystematic risk (Markowitz, 1952). He demonstrated that by combining uncorrelated assets, the overall risk of the portfolio could be reduced without sacrificing expected returns. Since then, further research has been conducted in the area of portfolio selection, including the development of the Capital Asset Pricing Model (CAPM) and multifactor models that analyze the impact of various factors on asset returns. Additionally, with the emergence of behavioral finance theories, there has been an increased focus on the psychological effects on investment decisions and portfolio selection, indicating that investors may be influenced by cognitive and emotional biases. These advancements highlight the importance of a deeper understanding of the portfolio selection process and the factors affecting it. Investment decisions and financial performance are among the key topics in financial research that examine how assets are selected and the impact of these choices on financial outcomes. Research indicates that investment decisions are influenced by various factors, including market information, financial analyses, and behavioral factors. In particular, classical financial theories, such as the Efficient Market Hypothesis, state that asset prices should reflect all available information and that investors cannot consistently outperform the market. However, empirical evidence shows that many investors make irrational decisions due to cognitive and emotional biases, such as loss aversion and overconfidence, which can lead to poor investment performance. This research underscores the importance of understanding investor behavior and its impact on investment performance, demonstrating that combining financial analyses with an understanding of human behavior can enhance investment decision-making (Choudhary, 2020). Economic uncertainty is recognized as a key factor in determining asset pricing, particularly in the context of stock returns. Research indicates that economic uncertainty can have a significant impact on investor behavior and their investment decisions. For example, Bali et al. (2019) demonstrated in a study that economic uncertainty significantly affects stock returns, with investors tending to accept less risk during times of uncertainty, which can lead to decreased stock prices and increased market volatility. Additionally, this uncertainty can influence investors' expectations regarding future returns, resulting in more conservative investment behaviors. Overall, understanding the impact of economic uncertainty on stock pricing helps investors and analysts develop better strategies for risk management and market volatility forecasting. Cross-sectional and time-series factor models are important tools in financial analysis that examine and explain the factors influencing asset returns. Cross-sectional factor models, such as the Capital Asset Pricing Model (CAPM), analyze the impact of risk factors on asset returns at a specific point in time and assume that an asset's return is only related to its systematic risk. In contrast, time-series models, such as ARIMA and GARCH models, investigate changes and patterns in returns over time and can analyze historical volatility and trends. Research indicates that combining these two types of models can enhance the understanding of market behavior and improve predictions of future returns, as each of these models has its own strengths and weaknesses, and using them together can lead to more comprehensive analyses (Fama & French, 1993).

Prospect theory, introduced by Daniel Kahneman and Amos Tversky in 1979, is recognized as an analytical framework for understanding how individuals make decisions under conditions of risk and uncertainty. This theory challenges traditional assumptions of classical economics, which posit that investors act rationally based on their expectations. Kahneman and Tversky demonstrated that individuals are generally more sensitive to losses than to gains, which can lead to behaviors that contradict classical theories, such as a tendency to take risks when facing losses and risk aversion when facing gains (Kahneman & Tversky, 1979). Prospect theory consists of two main stages: evaluation and weighting of outcomes, where individuals assess potential outcomes and their values based on a nonlinear value function. This theory has been widely applied in financial and economic research, enhancing the understanding of investor behavior and financial decision-making. Behavioral finance theory, as an emerging research field, examines the psychological influences on financial decisions and investor behavior. In this context, surveys and empirical studies have been conducted to better understand the cognitive and emotional biases that affect financial choices. Barberis and Thaler (2003) conducted a comprehensive survey exploring how biases such as optimism, loss aversion, and social behaviors impact investment decisions, demonstrating that these biases can lead to irrational behaviors and unnecessary volatility in financial markets. This research highlights the importance of understanding psychological factors in analyzing market behavior and investment decisions, helping investors and financial advisors identify these biases to adopt better strategies for risk management and portfolio optimization (Barberis & Thaler, 2003). The book "Homo Heuristicus: Why Biased Minds Make Better Inferences" by Gigerenzer and Brighton (2009) explores how cognitive biases can, in some cases, enhance the processes of reasoning and decision-making. This research emphasizes that the human mind naturally tends to rely on simpler rules and heuristics, known as "rules of thumb." These heuristics can assist individuals in making quick and efficient decisions in conditions of uncertainty and complexity, even if these decisions are influenced by cognitive biases. For example, when complete information is not available, using these rules can help individuals effectively process the available information and arrive at more reasonable conclusions. This research indicates that, in some instances, biases and heuristics may serve as useful strategies in decision-making, helping individuals navigate the complex financial and economic world more effectively (Gigerenzer & Brighton, 2009).

Undoubtedly, the efficiency of the financial system of a country as a subset of the economic system of that country and considering the mutual relations with other components can affect the efficiency of the economic system significantly. Providing desirable conditions for investors in the financial markets results in the prosperity of industries and creation of employment and exit from economic crises. Considering the importance of this issue, preventing the obstacles threatening this market and discovering its current inadequacies as well as trying to solve these problems is considered necessary (Aghajani et al., 2020). As mentioned earlier, one of the most important factors playing an effective role in the success of investment and often seen today in the matter of investment is risk. Given the importance of behavior and decision-making, if people can use the correct behavior in managing the existing risks, they can have a successful investment. This investment in organizational dimensions can have important achievements for individuals, organizations and the economic cycle of the country. Accordingly, in this research, the effective factors and consequences of investors' behavior for risk management of the investment portfolio have been identified and evaluated.

Methodology

The research is applied in terms of purpose and also quantitative in terms of data type. The statistical population includes managers of the investment companies in financial markets. Cochran formula is used to determine the sample size of the quantitative part:

Where:

t = percentage of the standard error of acceptable confidence coefficient

d = desired confidence level or possible precision

s = proportion of the population without a certain attribute

N = population size

Considering that the number of these people is unlimited, based on Cochran formula, 384 people have

been selected as a sample using simple random sampling method.

Field and library methods have been used to collect data. Questionnaire and field method have been used to collect the required data with the necessary coordination. Questionnaires were administered and collected among the statistical samples and the collected data were entered into the system and analyzed. The research questionnaire consists of two sections of demographic information and a researcher-made questionnaire of the behavioral model of investors for risk management of the investment portfolio. In the following, these three sections are explained:

A: Demographic information: In general questions (demographic information), the aim is to obtain general and demographic information of the respondents. This section contains four items and features such as gender, educational level and work experience are included in it.

B: Researcher-made questionnaire: This questionnaire includes 42 items with a five-point Likert scale, which was developed by reviewing the theoretical and practical principles and the results of semi-structured interviews (with open and axial coding of exploratory interview texts). The characteristics of the questionnaire are represented in Table 1:

Table 1: Information related to the research questionnaire

Number of items	Component	Dimensions
3 items	Tendency to deviate from rational behavior	**Axial phenomenon**
3 items	Tendency to take risks	
4 items	Tendency to monopolize	
3 items	Tendency to self-misunderstanding	
5 items	Social factors	**Causal conditions**
3 items	Technical factors	
3 items	Financial factors	
6 items	Psychological factors	
4 items	Legal factors	
3 items	Financial consequences	**Consequences**
5 items	Non-financial consequences	

Faced, content and construct validity were used to determine the validity of the questionnaire. In faced validity, the questionnaires were investigated by the researcher, several members of the sample and some academic experts and financial market experts before administration. In content validity, the content of the questionnaire was examined in terms of additional questions or the modification of the questions using Delphi method and CVR and CVI forms by ten experts including interviewees, academic experts, several subjects and etc. The CVI form showed that everyone has a good situation on it from the point of view of simplicity, clarity and relevance (this coefficient was higher than 0.79 for each question); moreover, given that the CVR value for all questions was above 0.62, no question needed to be deleted. Regarding construct validity, two types of convergent and divergent validity were used with the help of Smart-Pls 2 software. Findings of the convergent validity analysis indicated that the significance coefficients of all factor loadings were greater than 2.58 (t-statistic), meaning that all factor loadings were significant with a 99% confidence level; values of all factor loadings were also above 0.5 (relationship between observable and latent variables); the average variance extracted (AVE) of all components was above 0.5, and the composite reliability of all components was greater than AVE; therefore, it can be said that the convergent validity of the model constructs is confirmed. The Fornell-Larcker test (measuring the divergent (discriminant) validity at the level of latent variables using the module defined in the Smart-Pls 3 software) and the cross-loadings test (measuring the divergent validity at the level of observable variables using the module defined in Smart-Pls3 software) were used to check the divergent validity. Findings of the Fornell-Larcker test showed that the root mean of the average variance extracted of each latent variable was greater than the

maximum correlation of that variable with other latent variables of the model; also, the results of the cross-loadings test indicated that the factor loadings of each of the research variables were greater than the factor loadings of the observable variables in the other measurement models, and on the other hand, the factor loading of each observable variable on its corresponding latent variable was at least 0.1 greater than the factor loadings of the same observable variable on the other latent variables, so the results of these two tests showed divergent validity. In this research, reliability is calculated through Cronbach's alpha coefficient and composite reliability. The values of these two coefficients for all research variables were above 0.7, indicating the reliability of the measurement tool. The reliability and validity coefficients mentioned for the research questionnaire are provided in Table 2.

Descriptive and inferential statistics have been used in this research.

Table 2: Questionnaire information and calculating the validity and reliability of the tool

11	10	9	8	7	6	5	4	3	2	1	AVE	CR	Cronbach's alpha	Component
										0.325	0.512	0.721	0.732	**Tendency to deviate from rational behavior**
									0.415	0.324	0.532	0.758	0.789	**Tendency to take risks**
								0.254	0.256	0.358	0.574	0.769	0.741	**Tendency to monopolize**
							0.315	0.265	0.325	0.415	0.598	0.814	0.766	**Tendency to self-misunderstanding**
						0.254	0.25	0.247	0.415	0.146	0.53	0.721	0.798	**Social factors**
					0.325	0.365	0.366	0.365	0.478	0.254	0.562	0.765	0.895	**Technical factors**
				0.214	0.345	0.211	0.248	0.315	0.469	0.247	0.514	0.741	0.785	**Financial factors**
			0.222	0.298	0.325	0.287	0.265	0.257	0.238	0.368	0.598	0.789	0.866	**Psychological factors**
		0.365	0.241	033	0.415	0.246	0.214	0.269	0.366	0.419	0.526	0.765	0.841	**Legal factors**
	0.298	0.321	0.369	0.314	0.469	0.235	0.239	0.214	0.354	0.387	0.541	0.721	0.836	**Financial consequences**
0.415	0.298	0335	0.257	0.354	0.247	0.247	0.214	0.365	0.316	0.354	0.569	0.741	0.874	**Non-financial consequences**

Descriptive statistics

Mean, standard deviation, percentage, frequency, table and graph are used to describe the respondents and research variables using SPSS software.

Inferential statistics

In the following, using confirmatory factor analysis method and PLS3 software, construct validity is checked. Finally, one-sample t-test is used to check the status and fit of the model.

Results

In the first part of the analysis, the demographic characteristics of the respondents have been investigated. According to the results, 213 people are men and 171 people women. 159 people are 31 to 40 years old, 187 people 41 to 50 years old, and 38 people over 50 years old. 21 people have a bachelor's degree, 169 people a master's degree, and 194 people a doctorate or higher. Based on the obtained results, 152 people are 1 to 10 years old, 122 people 11 to 15 years old, 89 people 16 to 20 years old, and 21 people over 20 years old. In the table below, the central tendency and dispersion measures related to the research variables are shown. It should be noted that the minimum and maximum of each of the following variables are 1 and 5, respectively.

The information provided in the above table shows the statistical characteristics such as mean, standard deviation, skewness and kurtosis for the research variables. Based on the results, all the variables of the model have a mean above 3.

The normality of the data related to the research variables was checked using the Kolmogorov-Smirnov test, the results of which are shown in the table below.

Table 3: Statistical characteristics of the research model

Kurtosis	Skewness	Standard deviation	Mean	Component
1.043	-1.547	0.583	3.932	Tendency to deviate from rational behavior
.552	-.657	.838	3.577	Tendency to take risks
1.794	-1.003	.724	3.757	Tendency to monopolize
1.346	-.798	.730	3.719	Tendency to self-misunderstanding
1.016	-1.165	.642	4.045	Social factors
.780	-.807	.743	4.084	Technical factors
1.685	-1.457	.673	4.065	Financial factors
0.893	-0.780	0.798	3.617	Psychological factors
-.011	-.762	1.090	3.599	Legal factors
.459	-.744	.947	3.634	Financial consequences
.125	-.358	.398	3.735	Non-financial consequences

Table 4: Summary of the Kolmogorov-Smirnov test

Significance	Component
0.000	Tendency to deviate from rational behavior
0.000	Tendency to take risks
0.000	Tendency to monopolize
0.000	Tendency to self-misunderstanding
0.000	Social factors
0.000	Technical factors
0.000	Financial factors
0.000	Psychological factors
0.000	Legal factors
0.000	Financial consequences
0.000	Non-financial consequences

As seen in the table above, the significance level of the statistic of Kolmogorov-Smirnov test is below 0.05 for all the majority, so the null hypothesis (data normality) is rejected. That is, the data does not have a normal distribution.

In the following, confirmatory factor analysis is used to check the validity of the constructs as well as the significance of the model. Because the data did not follow a normal distribution, partial least squares method and smartPLS software have been used in this research.

The confirmatory factor analysis of the axial phenomenon model is as follows.

Coefficient of determination (R^2) index of dependent variables

The coefficient R^2 is related to endogenous (dependent) latent variables and shows the impact of an independent variable on a dependent variable, with three values of 0.19, 0.33, and 0.67 as criteria for weak, medium, and strong values. The R^2 value for the constructs of the axial phenomenon model has been calculated as 0.647, 0.570, 0.379, and 0.392.

Predictive correlation index Q^2

This index shows the predictive power of the model in the dependent variables. The criterion of interpretation of Q^2 is three values of 0.02, 0.15 and 0.35 as the low, medium and strong predictive power. If this index is positive, it is desirable. The value of Q^2 for research variables is 0.299, 0.214, 0.268, and 0.255, which is positive and at the desired level. Therefore, it can be said that the predictive power of the model regarding the variables is desirable.

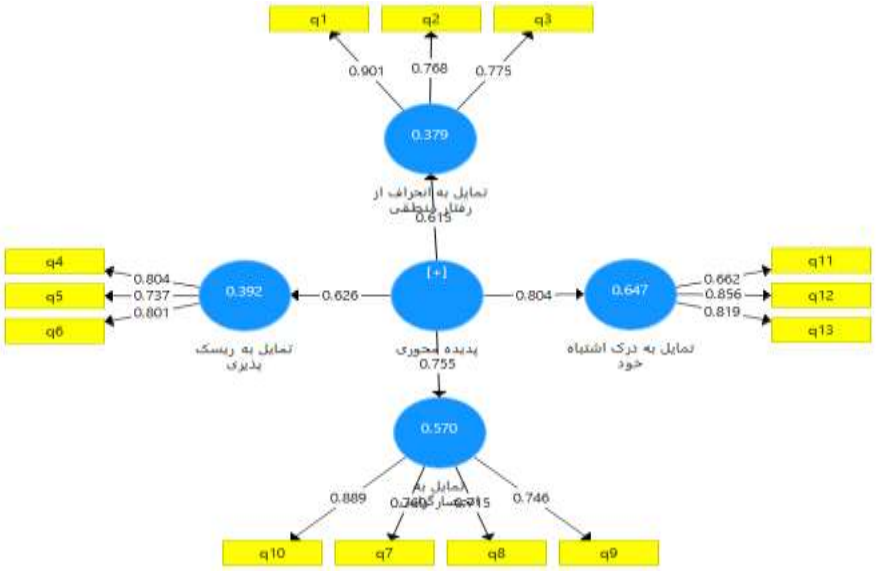

Figure 1: Path coefficients and factor loadings of the axial phenomenon model

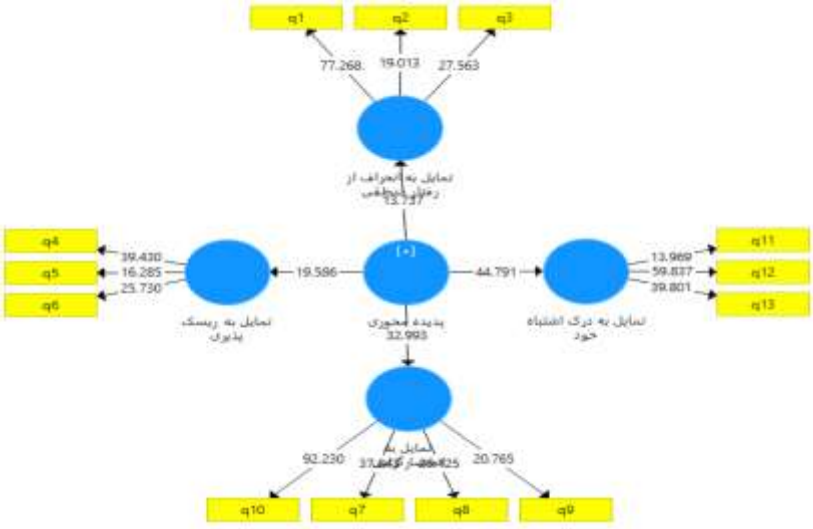

Figure 2: Significance of the axial phenomenon model

GOF index

The index introduced for fit by Tennen House et al. (2005) is the goodness of fit (GOF) index, which is calculated by obtaining the geometric mean of communality and R^2 as follows.

$$GOF = \sqrt{\overline{communality} \times \overline{R^2}}$$

This index is also similar to the fit indices of the Lisrel model and its value is between 0 and 1, and the values close to 1 indicate the appropriate quality of the model. Of course, it should be noted that this index, like the chi-squared-based indices in Lisrel models, does not check the fit of the theoretical model with the collected data. Rather, it checks the overall predictive power of the model and that whether the tested model is

successful in predicting the endogenous latent variables or not.

$$GOF = \sqrt{\overline{communality} \times \overline{R^2}} = \sqrt{0.555 \times 0.497} = .525$$

PLS structural modeling experts consider GOF index less than 0.1 as small, between 0.1 and 0.25 as medium and above 0.36 as large. Given these criteria, the considered sample model fit index is 0.525, which is large. According to these findings, it can be concluded that the tested model has a good fit in the studied sample.

The factor analysis model of causal conditions is as follows:

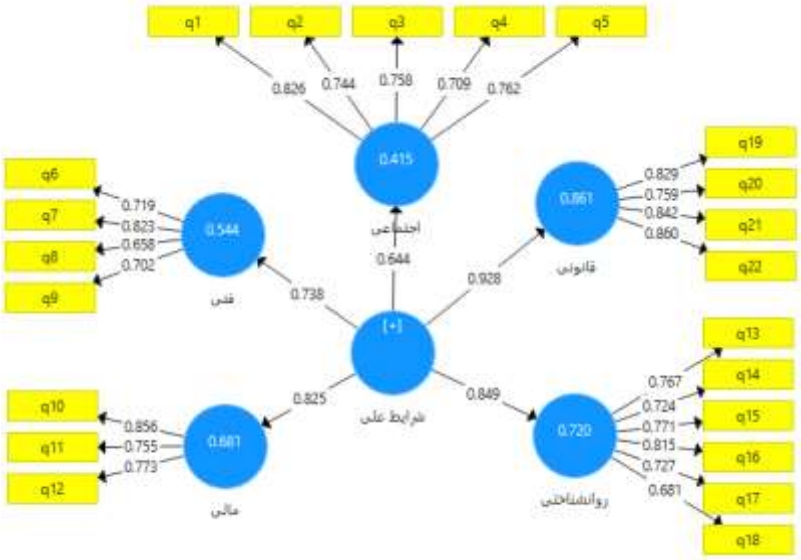

Figure 3: Path coefficients and factor loadings of the causal condition model

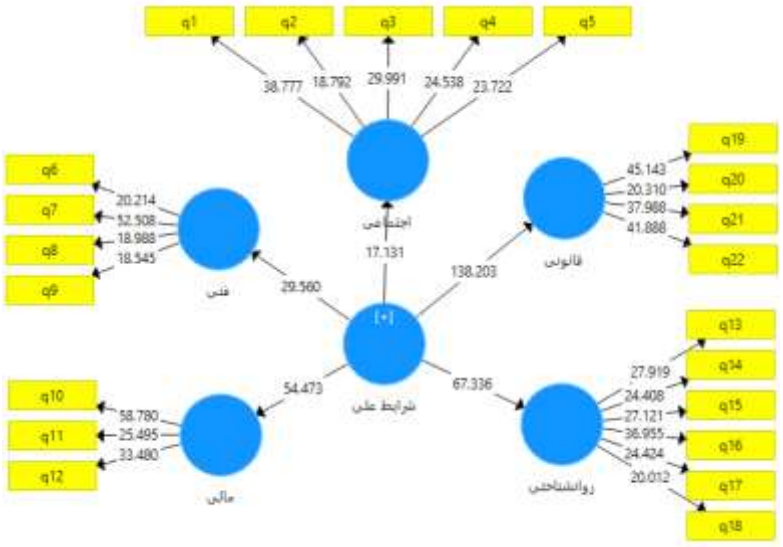

Figure 4: Significance of the causal condition model

The R^2 value for the model constructs is calculated as 0.861, 0.720, 0.415, 0.544, and 0.681.
The Q^2 value for the research variables is 0.312, 0.298, 0.244, 0.314, 0.288, and 0.216, which is positive and at the desired level. Accordingly, it can be said that the predictive power of the model regarding the variables is desirable.

$$GOF = \sqrt{\overline{communality} \times \overline{R^2}} = \sqrt{0.555 \times 0.644} = .597$$

The model fit index of the considered sample is 0.597, which is large. Based on these findings, it can be concluded that the tested model has a good fit in the considered sample.
The factor analysis model of the consequences is as follows:

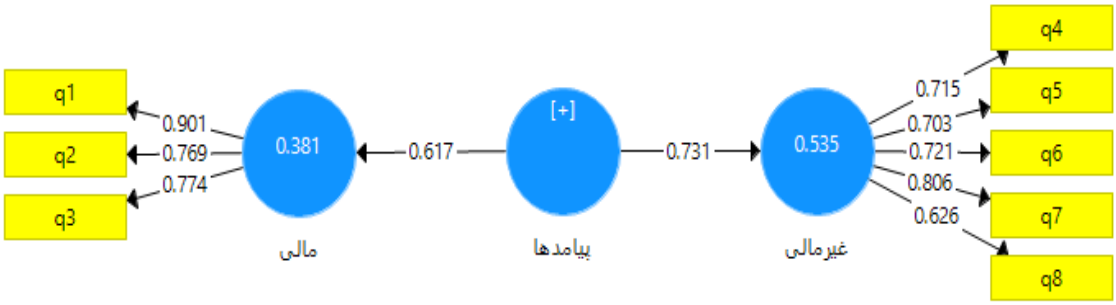

Figure 5: Path coefficients and factor loadings of the model of consequences

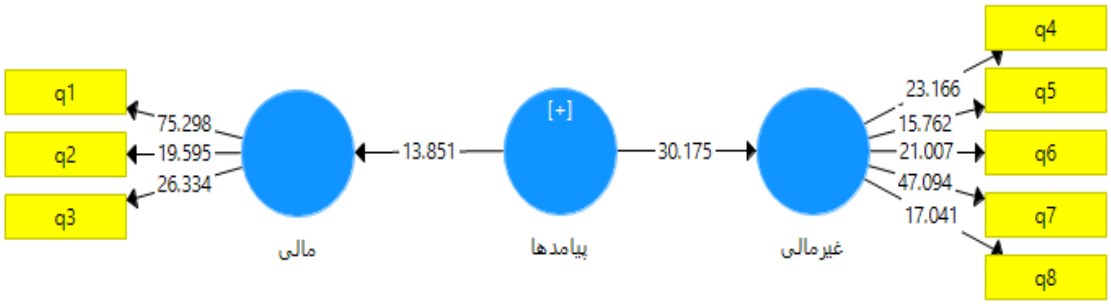

Figure 6: Significance of the model of consequences

The R^2 value for the model constructs is calculated as 0.535 and 0.381.
The Q^2 value for the research variables is 0.251, 0.264, and 0.241, which is positive and at the desired level. Accordingly, it can be said that the predictive power of the model regarding the variables is desirable.

$$GOF = \sqrt{\overline{communality} \times \overline{R^2}} = \sqrt{0.555 \times 0.422} = .484$$

The model fit index of the considered sample is 0.484, which is large. Based on these findings, it can be concluded that the tested model has a good fit in the considered sample.

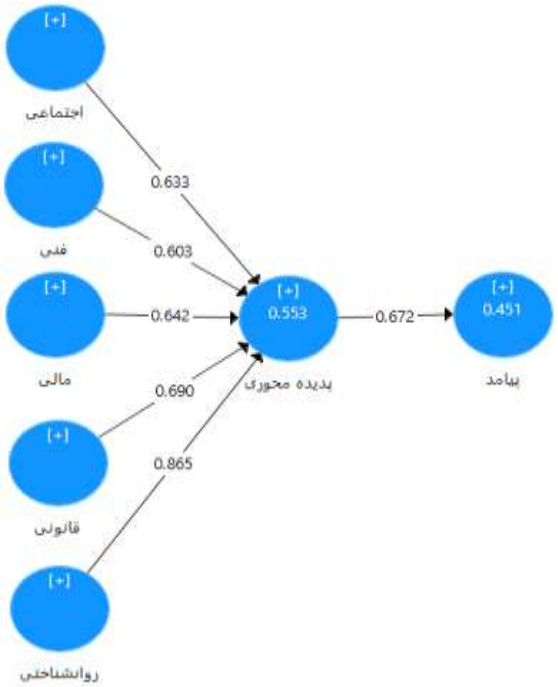

Figure 7: Path coefficients and factor loadings of the model

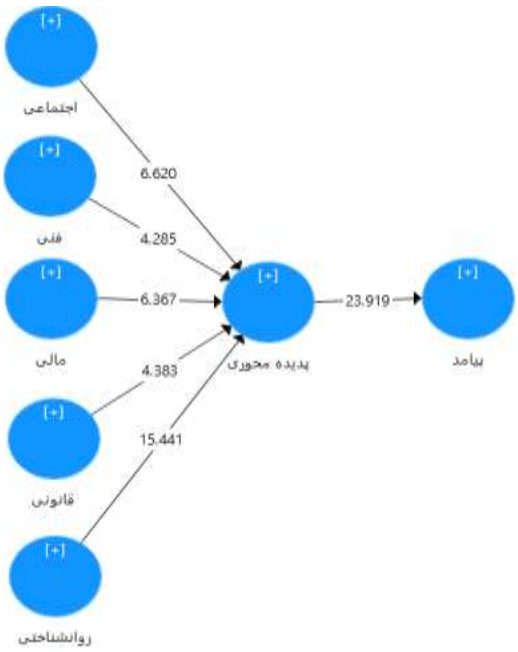

Figure 8: Significance of the model

The R^2 value for the model constructs is calculated as 0.553 and 0.541.

The Q^2 value for the research variables is 0.295, 0.235, and 0.217, which is positive and at the desired level. Accordingly, it can be said that the predictive power of the model regarding the variables is desirable.

$$GOF = \sqrt{\overline{communality} \times \overline{R^2}} = \sqrt{0.541 \times 0.547} = .543$$

The model fit index of the considered sample is 0.543, which is large. Based on these findings, it can be concluded that the tested model has a good fit in the considered sample.

The relations are also as follows:

Table 5: Model relations

Result	Path coefficient	Significance	Path
Confirmed	6.620	0.633	Social factors – Axial phenomenon
Confirmed	4.285	0.603	Technical factors - Axial phenomenon
Confirmed	6.367	0.642	Financial factors - Axial phenomenon
Confirmed	15.441	0.865	Psychological factors - Axial phenomenon
Confirmed	4.383	0.690	Legal factors - Axial phenomenon
Confirmed	23.919	0.672	Axial phenomenon-consequences

Conclusion and suggestions

Regarding the research questions, the results are as follows:

- What are the investors' behavioral dimensions, components and indices for risk management of the investment portfolio (axial phenomenon)?

Based on the results, the main components and indices of the axial phenomenon are as follows:

Tendency to deviate from rational behavior: This component includes indicators of personal emotions, extremism, and severe fluctuations in market factors. Our findings indicate that investors, by being aware of behavioral biases, can improve their decision-making processes and prevent deviations. This aligns with prospect theory (Kahneman & Tversky, 1979), which shows that individuals are more sensitive to losses, and this sensitivity can lead to irrational decisions in the market. Additionally, Nazari and Khosravi (1398) have also pointed out the impact of

personal emotions and fluctuations, which is consistent with this context.

Tendency to take risks: This component includes indicators of personality traits, investment goals, and investor experience. The results indicate that the level of risk tolerance helps investors perform better in their financial planning and investment activities. These findings align with the Efficient Market Hypothesis (Fama, 1970), which posits that investors should assess risk rationally.

Tendency to monopolize: This component includes indicators of familiarity with specific companies and dependence on them. Our results indicate that managers may make incorrect investment decisions due to shareholder expectations. This relates to theories associated with collective behavior and herding behavior, which have been widely discussed in the financial literature.

Tendency to the self-misunderstanding: This component includes indices of acceptance of uncertainty, education and use of financial advisors. The financing advisors perform the necessary checks and identify the needs of the project and all the project items needed to be presented to the audience. And according to the existing needs, they identify the available financing tools for these needs and design a complete plan for financing. This plan, which is considered as a consultation to meet the needs and necessary measures for the project, introduces all the financial needs and presents the existing solutions before the project is launched and continues. In this regard, Khosravi and Nazari (2019) in a similar study mentioned the acceptance of uncertainty, education and the use of financial advisors.

The effective factors in this research are as follows:

Social factors: This component includes indices of other people's opinions, social networks, business environment, society's culture and economy, and advertisements and rumors. Others may have information about investment returns that their performance conveys this information. Another reason can be the innate willingness of people to be with the crowd. Also, today, everyone knows the importance and place of information in investment decisions. Hence, the function of mass media by emphasizing the two main elements of awareness and information can play a significant role in stock price changes and investors' decision-making. Social media has created a huge revolution in the area of business and internet marketing. These media have not only attracted many customers in the virtual world and given a new life to industries and products, but they are also a place for companies to advertise. However, no one can claim that social media has advantages and benefits only in the field of marketing, but the focus of these media is also on the individuals. In this regard, Nazari and Khosravi (2019) mentioned other people's opinions and rumors. Also, Higgins et al. (2021) pointed to the social networks, business environment and culture and economy of society in their research.

Technical factors: This component includes indices of new technologies in capital markets, investment knowledge and technological business systems. One of the most important applications of the algorithms designed in artificial intelligence technology is related to data analysis, especially big data. This issue is well used in data mining today. But in the field of financial investment and trading, artificial intelligence (AI) can analyze a large amount of data and use it to predict future market trends and investment opportunities. This application of artificial intelligence is very strange in itself and may have a mafia structure at first glance. Based on this capability, using its predetermined algorithms, AI starts analyzing news articles and social media posts to measure the market sentiment, and then based on its analysis, it predicts market movements. One of the important points in trading is to know the market trends, collective behaviors, etc. Now artificial intelligence examines the pulse of the market and attitudes with reason and argument and draws conclusions. In this regard, Gal (2021) in his research pointed to new technologies in capital markets and technological business systems. Also, Satyamoorthy et al. (2021) mentioned investment knowledge in a similar study.

Financial factors: This component includes indices of interest rate, risk and return on investment, and stock price. If an investor, before investing in a certain stock, predicts that this stock will be profitable and its price will increase, and then invests in it, two situations will occur. Either the stock price will increase as much as he/she predicted or more, or it will not grow as much as he/she expected, or it may even have a decreasing trend. Therefore, if the probability of not fulfilling the prediction of this investor is high, the risk of his/her investment is also high. And if the probability of his/her prediction being realized is high, his/her investment risk is low, because he/she will reach

his/her investment expectations. High risk does not mean that every time an investor fails, he/she has taken a lot of risk. Rather, most high-risk stocks bring high returns. So the risk of a stock depends on its return. In this regard, Moradi et al. (2021) in their research stated the interest rate, risk and return on investment and stock price.

Psychological factors: This component contains indices of personality traits, risk tolerance, investor's effort, entrepreneurial spirit, personal perceptions and previous experiences. One of the well-established topics in psychology is the effect of people's emotions on their decision-making and judgment process regarding future events. So that when people have positive feelings, they make optimistic choices and when they have negative feelings, they make pessimistic choices. So, the emotional tendencies of investors indicate the margin of optimism and pessimism of shareholders towards a stock. Many investors are emotional and reactive. For this group of investors, fear and greed are their most important weaknesses. According to some research in this field, fear and greed are factors having a great power to affect our brain. These factors have a significant negative impact on our self-control and logical thinking. In this regard, Cordovai et al. (2021), Darmayanti et al. (2022), Akhtart et al. (2018), Gambetti and Gisberti (2019), Anja and Yen (2013) mentioned the personality traits of the investor. Also, Darmayanti et al. (2022), Zuna and Zamarian (2021), Nguyen et al. (2019), Fisher (2020), Rahman (2020), Fisher and Yao (2017), Noor Eini and Lotfi (2019) stated risk tolerance.

Legal factors: This component includes indices of capital market laws and regulations, taxes, intellectual property rights and investment rights. The necessity of formulating rules and regulations related to the stock exchange is to protect the rights of investors, and organize, maintain and develop the capital market. By institutionalizing mandatory disclosure regulations, information asymmetry can be reduced. The capital market law has transformed the capital market of Iran. This law has paid considerable attention to transparency and information disclosure in the capital market, and the guarantee of its implementation is the sentencing of the violators to the punishments prescribed in the Islamic Penal Code. In this regard, Eric E. Bernstein et al. (2020) also mentioned in their research the rules and regulations of the capital market, taxes, intellectual property rights and investment rights.

- What are the behavioral consequences of investors for risk management of the investment portfolio (consequence)?

The consequences of the model are as follows:

Financial consequences: This component includes indices of increasing return, efficiency and reducing transaction costs. The rate of return on investment is an important criterion for evaluating the performance of a project or an investment situation, which measures the amount of profit obtained from the investment compared to the total investment amount. When you enter a specific investment, you have a specific prediction in mind about the future of the asset in question and expect a good return from it. If the desired investment cannot achieve the return you want, you will probably go for better investment opportunities. In other words, the return on investment is used as a measure of the effectiveness of an investment. In this regard, Asgari and Alizadeh (2019) pointed out to the increase in return in their research. Nikumaram et al. (2016) also mentioned efficiency.

Practical consequences

The findings of this research can assist investment firms and financial advisors in providing more effective risk management strategies by gaining a better understanding of investor 2behavior. For example, by identifying investors' tendencies to deviate from rational behavior, financial advisors can design educational programs that help investors recognize and manage their behavioral biases. Additionally, understanding risk tolerance can enable financial advisors to engage more effectively with their clients regarding investment strategies and asset allocation. **Non-financial consequences:** This component consists of the indices of balance in the investment portfolio, return on equity, innovative investments, increasing investors' confidence in the market and reducing risk. Equity shows the business owners' ownership. Equity is a type of ownership in the assets of a company. Equity is the amount of a company's value that belongs to a natural or legal person. If a company is liquidated, after deducting the debts from the assets of that company, the equity will be paid from the remaining assets of the company based on the share of the shareholders. Equity may

increase by doing profitable activities in a company or it may decrease due to business mistakes of that company. In addition, if a company does not distribute annual profits from the sale of products or services among shareholders, the equity in that company will increase. Therefore, the issue that in which company you invest and which securities you receive from the stock market is very important. In this regard, Odat and Ali (2021) mentioned the return on equity in their research. Also, Zuna and Zamarian (2021) stated innovative investments. Asgari and Alizadeh (2019) also pointed to the increase in the investors' confidence in the market.

According to the results, all relations of the model were significant. Therefore, it can be said that social, technical, financial, psychological, and legal factors can lead to behavioral changes in investors as the effective factors. In this regard, Nazari and Khosravi (2019), Higgins et al. (2021), Gal (2021), Satyamoorthy et al. (2021) and Moradi et al. (2021) also obtained similar results in their research. The studies also showed that the tendency to deviate from rational behavior, the tendency to take risks, the tendency to monopolize, and the tendency to self-misunderstanding as the axial phenomenon result in the creation of behavioral and educational strategies. With the implementation of these strategies, the investments made for organizations and individuals have financial and non-financial consequences, and Asgari and Alizadeh (2019), Nikumaram et al. (2016), Odat and Ali (2022), Zuna and Zamarian (2021) also achieved similar results in their research.

Consistent with the results obtained:

- Companies and individuals are suggested to control their investment process in order to gain experience in investment. It is recommended that they start with short-term and low-risk investments and choose long-term and high-risk investments over time.
- Detailed research is needed before any investment. Indeed, increasing knowledge and skills is a way to control all types of investment risk in the markets. Moreover, the investor must determine the required time period considering his/her expectations from the investment.
- It is suggested that the individuals providing services as experts in investment consulting units, in addition to mastering financial sciences, must also have sufficient mastery in the field of behavioral sciences so that they can give them advice appropriate to each of the investors. Providing the mentioned services will make investors to reduce their absolute reliance on hearsay, rumors and unscientific and unreliable materials and to make the right decision.
- It is suggested that people join training groups through social networks in order to get correct information about financial markets. In these groups, you can experience low-risk investment by learning investment methods and communicating with experienced people.
- It is suggested that companies use financial technology (FinTech). FinTech means the innovative application of technology in providing financial services. FinTech is an industry in the economic space and refers to companies using technology to make financial services more efficient.
- It is better for the audit organization and other legislative and regulatory institutions to pay more attention to the category of profit manipulation in regulating accounting standards and financial laws and, by providing the necessary guidelines (to limit managers in the implementation of profit management), to help users of financial information in order to make optimal and informed decisions.

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