Identification and Modeling of Cognitive Biases Affecting Institutional Investors' Preferences in Iran's Financial Markets

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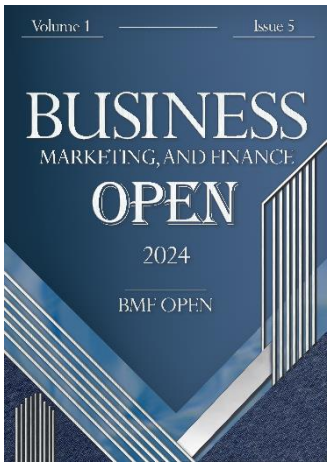

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Abstract: The present study aims to identify and model the cognitive biases affecting institutional investors' preferences in Iran's financial markets. This research is applied in terms of its objective and descriptive-analytical in nature. The research methodology is mixed and conducted in both qualitative and quantitative phases. The qualitative population consists of academic experts and managers of investment firms listed on the stock exchange, selected through the snowball sampling method until theoretical saturation was achieved, resulting in a sample size of 12 participants. The data collection tool for the qualitative phase was a semi-structured interview based on theoretical foundations. Data analysis in this phase was conducted using thematic analysis. The findings of the qualitative phase were categorized into four main themes and their subcategories. The identified cognitive and psychological factors include "overconfidence, disposition effect, herding behavior, information bias, and mental accounting." Intensifying factors include "macroeconomic decisions, information asymmetry, and information accumulation." Identified strategies include "reviewing and accepting mistakes, adhering to a trading plan, and avoiding bias toward specific stocks or characteristics." Identified outcomes include "better performance, greater investor attraction, and capital market efficiency." In the quantitative phase, a researcher-developed questionnaire derived from the qualitative findings was validated for reliability and distributed to a quantitative population, estimated to include 240 participants. The causal paths and relationships between exogenous and endogenous constructs in the structural model were confirmed using confirmatory factor analysis. Path coefficients greater than 0.3 and corresponding t-values exceeding 1.96 confirmed all hypothesized paths.

Keywords: cognitive biases, investor preferences, institutional investors, Iran's financial markets

1. Introduction

A fundamental question raised by behavioral finance theorists is, "Are investors always rational?" They argue that the assumption of investor rationality is not easily realized because investors make decisions in contexts where other options involving risk, probability, and uncertainty exist. Individuals determine the desirability of these options (prospects) based on their estimation, which can be biased or inaccurate [1-3]. Furthermore, financial decision-makers are influenced not only by rational and logical considerations but also by psychological factors that are sometimes irrational and intuitive [4]. Consequently, studies related to behavioral finance have gained significant importance. Behavioral finance focuses on systematic deviations from rationality observed among

investors [5-7]. Decision-making is essentially a process of selecting the best option among the available ones under complex conditions. This complexity often compels investors to simplify their decision-making process to achieve favorable outcomes. For instance, individuals fall victim to their cognitive biases, leading to inefficiencies and anomalies in financial markets [8]. The quality of decisions made is significantly influenced by the information available and the investor's ability to process it. Additionally, a wide range of behavioral biases or irrational behaviors stem primarily from investors' limited ability to analyze information and emotional factors in decision-making [9].

With the increasing presence of various companies in the stock market, investors face a myriad of investment options, making the decision-making process more challenging and complex. Thus, understanding investors' behavioral patterns in the capital market has become increasingly critical. As previously noted, behavioral biases or irrational investor behaviors can sometimes lead to market inefficiencies and discrepancies between the intrinsic value and the market price of stocks [10-13]. One such irrational behavior is herding behavior. Herding behavior, as a form of abnormal behavior, refers to situations where investors disregard their analyses and personal beliefs and instead follow others' decisions in the market, resulting in similar behaviors. This phenomenon can lead to market anomalies, such as price bubbles and crashes, increased market volatility, and general market disequilibrium. Identifying and examining this phenomenon not only sheds light on one aspect of the behavioral patterns in Iran's capital market but also helps create conditions for making optimal decisions for investors and market stakeholders [14].

A prevalent issue in Iran's capital market, and the foundation of this study, is the emotional behavior of investors. Certain shareholders, especially those with frequent presence and an exclusive outlook, create excitement in the market, which influences others to engage in herding behavior. Among these, institutional investors play a critical role due to their higher financial power and bulk stock purchases. Their behavioral biases significantly influence other investors and the overall capital market [15]. If behaviors are not rational, signs of emotional decision-making among institutional investors can be observed in the capital market [2, 16].

The significance of this research lies in several aspects. Since the behavior of institutional investors is one of the main factors influencing capital flow and the overall movement of the capital market, designing a model for institutional investors' decisions seems necessary. This model would identify the key factors affecting their decisions [17]. Recognizing these influencing factors can help stock prices move closer to their intrinsic values and prevent the formation of price bubbles.

Institutional investors hold significant importance in the capital market for various reasons. At times, individual investors act based on the behavior of institutional investors. For example, if institutional investors are selling a particular stock, individual investors may think they should also sell it, or vice versa. In this scenario, institutional investors can encourage individual investors toward emotional behaviors. Sometimes, an institutional investor may trade a stock based on its perceived value, but their analysis may not necessarily be correct. Human error is inevitable and a part of the capital market. Therefore, it is not entirely reliable to base decisions solely on institutional investors' actions. Nonetheless, the behavioral biases of institutional investors impact various aspects of the capital market, leaving a significant mark on its trajectory. This study seeks to identify and model cognitive biases affecting institutional investors' preferences in Iran's financial markets.

2. Methodology

This research is applied in terms of its objective and descriptive-analytical in nature. The methodology is mixed, comprising both qualitative and quantitative sections. In the qualitative phase, purposive and snowball sampling methods were used to select 12 participants, including academic experts and managers of investment companies. Data collection in the qualitative phase involved semi-structured interviews based on theoretical foundations. The data were analyzed using thematic analysis.

In the quantitative phase, the statistical population consisted of experts from stock market investment companies. The sampling method was purposive, and based on the structural equation modeling approach, a minimum of 200 samples was required. In this study, 240 participants were included in the sample.

The data collection process occurred in three stages. In the first stage, information was gathered through library research using note-taking methods. In the second stage, the fieldwork phase, interviews were used as the data collection tool. These interviews were designed to gather the necessary data based on the study variables and their relationships. In the third stage, a researcher-developed questionnaire was employed to collect data for evaluating the qualitative model of the research.

The questionnaire consisted of two main sections. The first section included demographic variables (gender, age, educational qualifications, and field of study), while the second section comprised items related to the primary research topic. To ensure the validity and reliability of the questionnaire and the internal consistency of the items, the instrument was pilot-tested on a preliminary sample of 20 executive managers in the education sector.

After the pilot test, Cronbach's alpha coefficients were calculated using SPSS software. The alpha values for all indices exceeded 0.70, confirming the reliability and trustworthiness of the instrument. Since the alpha values approached 1.0, the questionnaire was deemed highly reliable. For validity confirmation, the questionnaire was reviewed and approved by academic experts and specialists, receiving formal approval for face validity.

Data analysis in the quantitative phase was conducted using the structural equation modeling approach.

3. Findings

Based on demographic data, the research experts included 73% male and 27% female interviewees. Regarding work experience, 9% had 5-10 years, 64% had 11-20 years, and 27% had more than 20 years of experience. In terms of education, 91% held a Ph.D., and 9% had a master's degree.

The purpose of the thematic network is to establish relationships between the generated categories. This process is typically conducted based on the research framework and aids theorists in facilitating the theory-building process. The following table presents the basic, organizing, and overarching themes under four main categories. Irrelevant themes were eliminated, and related themes were merged, resulting in 14 final organizing themes.

Table 1. Presentation of Basic, Organizing, and Overarching Themes

Overarching Themes	Organizing Themes	Basic Themes
Cognitive and Psychological Factors	Overconfidence	Relative certainty about future conditions and circumstances - Extreme judgment about the level of information - Overconfidence in the validity of knowledge - Excessive confidence in selected options - Assigning greater weight to personal analyses over others
	Disposition Effect	Premature exit from stocks before the planned time - Unrealistic hope during losses - Greater emotional response to profits compared to similar losses - Fear that gained profits might lead to losses - Delayed exit from stocks against pre-planned strategies - Justifying losses with persuasive reasoning
	Herding Behavior	Modeling specific individuals when making decisions - Interacting with colleagues in other companies and institutions - Following powerful individuals in the market - Over-reliance on reputable analytical websites

	Information Bias	Availability of extensive and vast amounts of information - Limited time for analyzing this abundance of data - Multiple impactful analyses received from employees
	Mental Accounting	Creating different mental classifications - Exhibiting distinct behavior for various available resources - Perceived differences in monetary value based on subjective criteria - Irrational behavior based on existing mental structures
Intensifying Factors	Macroeconomic Decisions	Increased expectations due to government policies - Changes in risk-free interest rates - Special profit-making plans by some banks - Lack of clear and transparent plans for the country's economic future - Decisions made by senior managers without considering consequences
	Information Asymmetry	Non-disclosure of significant information by some companies - Providing certain information to specific individuals - Doubt about critical and vital information - Untimely release of information - Power imbalance in information dissemination
	Information Overload	Excessive parameters and criteria for decision-making - Large volume of employees in companies - Receiving a vast amount of information in a short time - Conflicts between analyses received from different departments
Strategies	Acceptance and Review of Mistakes	Reviewing the entire decision-making process - Accepting mistakes made during buying or selling - Identifying factors that led to decision-making - Greater scrutiny after completing a trade
	Commitment to Trading Plans	Adhering to all elements of the trading plan - Penalizing deviations from the plan - Recalling emotions resulting from plan violations - Pursuing better trades rather than simply avoiding losses - Accepting losses to maintain adherence to principles
	Avoiding Bias Toward Specific Stocks	Avoiding attachment to certain industries due to past success - Ignoring past profits or losses when making decisions - Not letting external environments affect stock choices - Avoiding generalizing past results to future performance
Outcomes	Improved Performance	Enhanced performance of investment companies - Increased confidence across the organization - Identifying oneself as a professional trader - Receiving rewards for desirable performance and avoiding emotional trading - Building a strong résumé for investment company managers
	Attracting More Investors	Achieving logical profits and losses for better financial performance - Influencing individual and small-scale investors - Highlighting profitability compared to risk-free returns - Building trust among investors and market participants
	Capital Market Efficiency	Preventing price bubbles - Avoiding discrepancies between intrinsic and market stock prices - Guiding the capital market toward a logical trajectory - Preventing emotional market rises and falls - Becoming a model for small-scale investors - Aligning stock prices closer to their intrinsic and fundamental values

Among the respondents, 68% were male, and 32% were female. Regarding age distribution, 18% of respondents were between 30 and 35 years old, 43% were between 36 and 45 years old, 35% were between 46 and 50 years old, and 4% were above 50 years old. In terms of educational qualifications, 5% held a bachelor's degree, while 27.5% held master's or doctoral degrees.

To proceed with structural equation modeling, the research tools must first undergo confirmatory analysis to determine construct validity. CFA was used to validate the variables and their respective items.

To assess the validity of variables related to cognitive and psychological factors, CFA was performed. The AMOS software output showed that all factor loadings exceeded 0.60. According to the AMOS output, the calculated χ^2/df value was 3.11, which is less than 5, indicating good model fit. Additionally, the root mean square error of approximation (RMSEA) was 0.052, below the acceptable threshold of 0.08. Goodness-of-fit indices (GFI, AGFI, CFI, and NFI) were all above 0.90, further confirming the model's fit. These results indicate alignment between the items and the variables in this category.

Figure 1. Path Analysis of Cognitive and Psychological Factors

Table 2. Fit Indices for Cognitive and Psychological Variables

Metric	Estimate	Criterion
χ^2/df	3.11	< 5
RMSEA	0.052	< 0.08
Goodness-of-Fit Index (GFI)	0.94	> 0.90
Adjusted Goodness-of-Fit Index (AGFI)	0.91	> 0.90
Comparative Fit Index (CFI)	0.93	> 0.90
Normed Fit Index (NFI)	0.92	> 0.90

CFA was conducted to assess the validity of variables related to intensifying factors. All factor loadings exceeded 0.60. According to the AMOS output, the calculated χ^2/df value was 1.014, indicating good model fit. The RMSEA was 0.039, below the acceptable threshold of 0.08. Other fit indices (GFI, AGFI, CFI, and NFI) were all above 0.90,

confirming the model's fit. These findings demonstrate alignment between the items and the variables in this category.

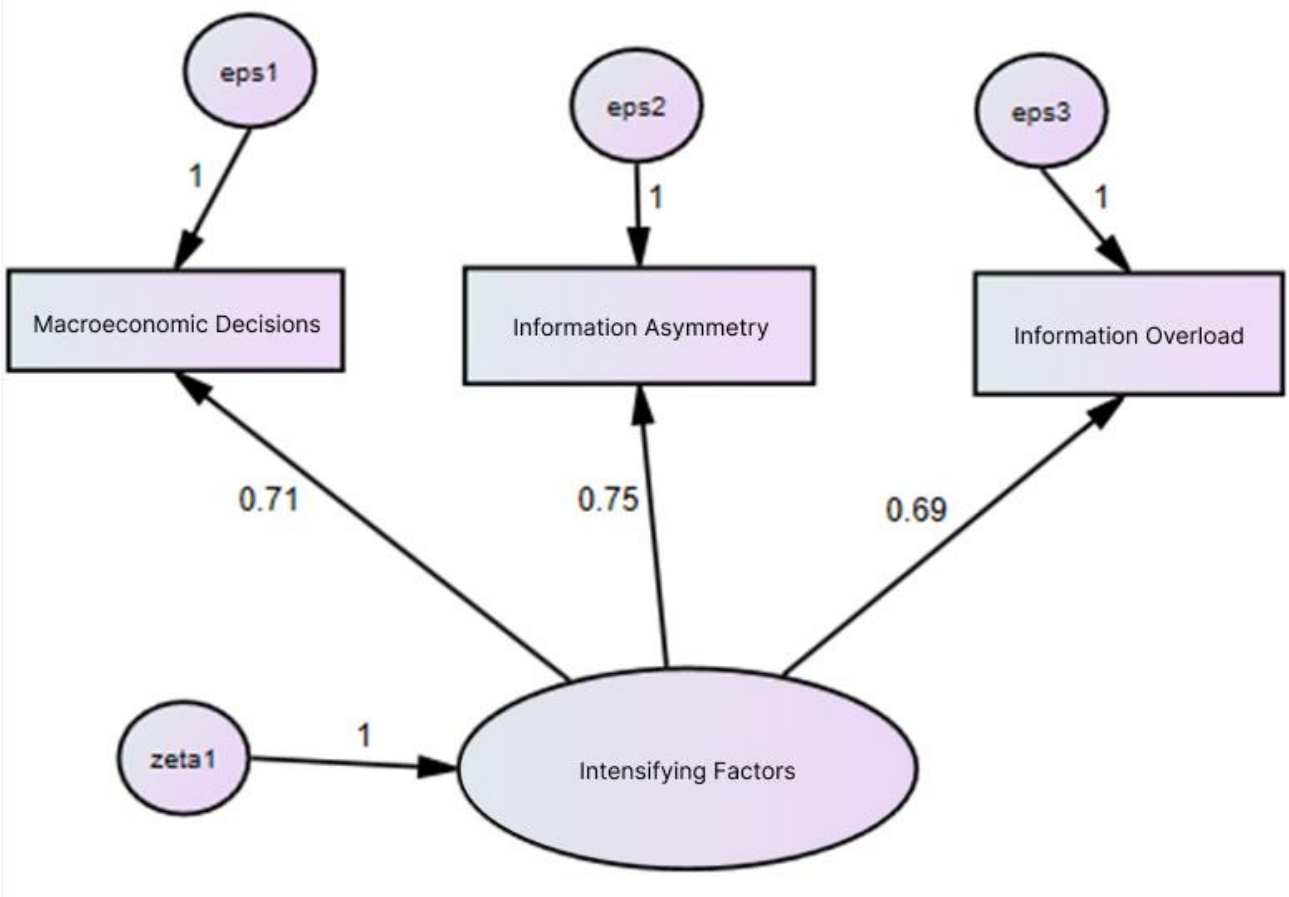

Figure 2: Path Analysis of Intensifying Factors

Table 3. Fit Indices for Intensifying Factors

Metric	Estimate	Criterion
χ^2/df	1.014	< 5
RMSEA	0.039	< 0.08
Goodness-of-Fit Index (GFI)	0.91	> 0.90
Adjusted Goodness-of-Fit Index (AGFI)	0.92	> 0.90
Comparative Fit Index (CFI)	0.95	> 0.90
Normed Fit Index (NFI)	0.94	> 0.90

Factor loadings on the paths exceeded 0.60. According to the AMOS output, the calculated χ^2/df value was 2.39, indicating good model fit. The RMSEA was 0.014, below the acceptable threshold of 0.08. Fit indices (GFI, AGFI, CFI, and NFI) were all above 0.90, confirming the alignment of items with variables in this category.

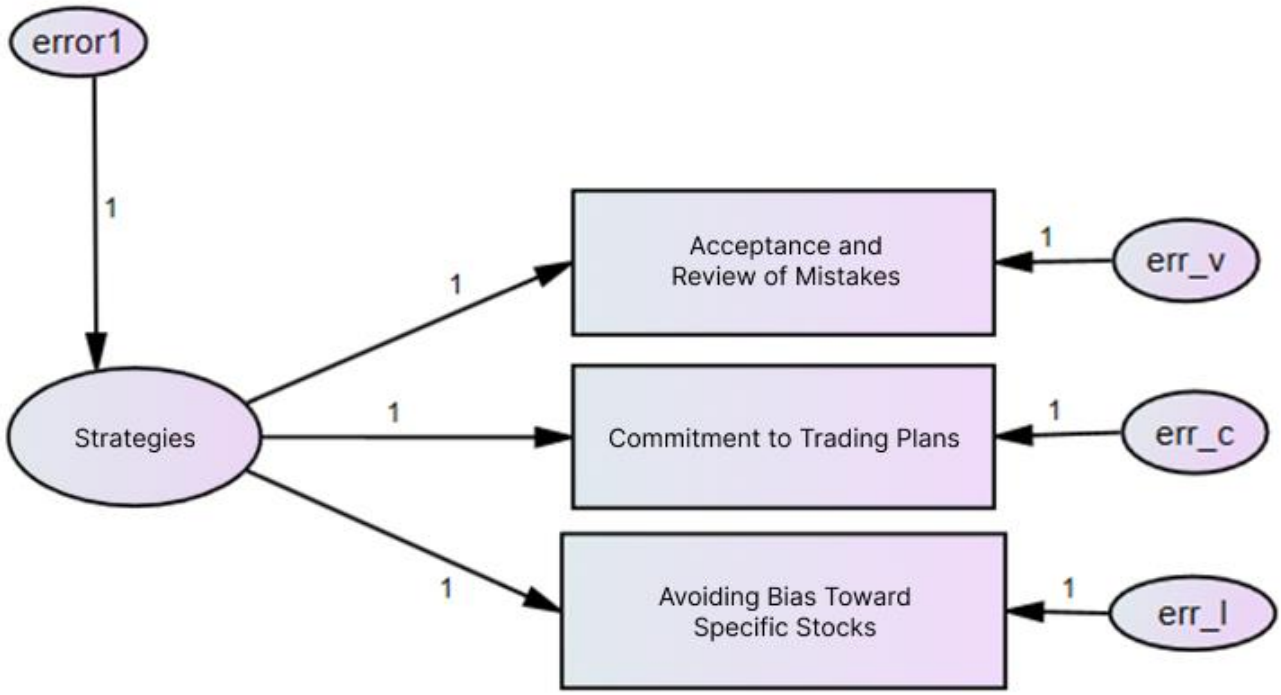

Figure 3. Path Analysis of Strategies

Table 4. Fit Indices for Strategies

Metric	Estimate	Criterion
χ^2/df	2.39	< 5
RMSEA	0.014	< 0.08
Goodness-of-Fit Index (GFI)	0.94	> 0.90
Adjusted Goodness-of-Fit Index (AGFI)	0.95	> 0.90
Comparative Fit Index (CFI)	0.96	> 0.90
Normed Fit Index (NFI)	0.93	> 0.90

To assess the validity of variables related to outcomes, CFA was performed. All factor loadings exceeded 0.60. The fit indices, as shown in Table 5, indicate that CFI, GFI, NFI, RMR, and RMSEA were within acceptable ranges. These results confirm the alignment between the items and variables in this category.

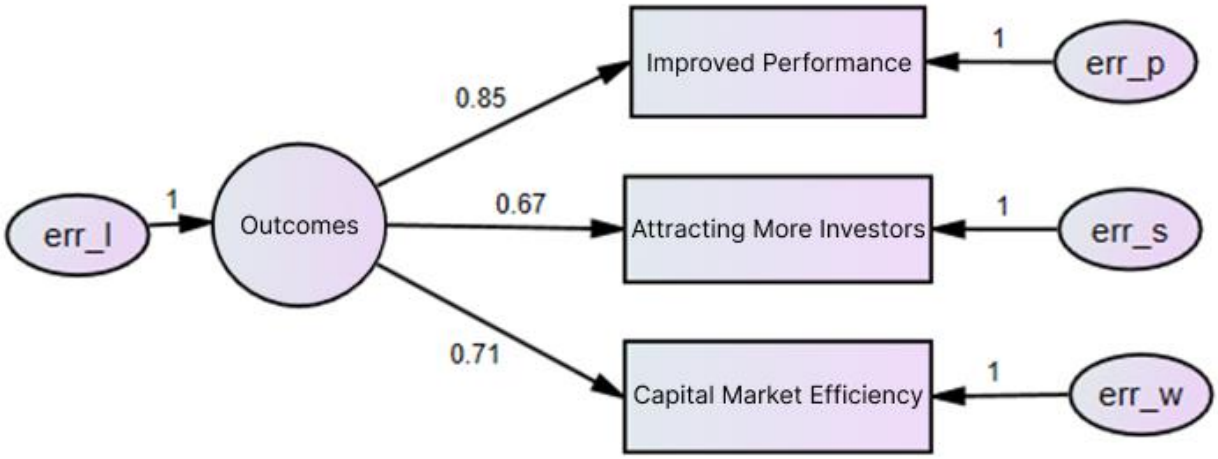

Figure 4: Path Analysis of Outcomes

Table 5. Fit Indices for Outcomes

Metric	Estimate	Criterion
χ^2/df	2.59	< 5
RMSEA	0.045	< 0.08
Goodness-of-Fit Index (GFI)	0.95	> 0.90
Adjusted Goodness-of-Fit Index (AGFI)	0.96	> 0.90
Comparative Fit Index (CFI)	0.98	> 0.90
Normed Fit Index (NFI)	0.91	> 0.90

Using the data collected via a questionnaire designed based on qualitative findings, the quantitative analysis of components was conducted. The results of the model fit indices are shown in Table 6.

Table 6. Model Fit Indices for the Research Model

RMSEA	RMR	CFI	NFI	AGFI	GFI	χ^2/df
0.089	0.114	0.92	0.93	0.911	0.921	1.69

The results indicate a good fit for the proposed model. After testing the measurement models, the structural model illustrating the relationships between latent variables was developed. Structural equation modeling using AMOS software was employed to test the hypotheses. The critical ratio (CR) value must be greater than ±1.96 to confirm the relationships. Values outside this range indicate no significant differences in the computed regression weights from zero at a 95% confidence level. The results are presented in Figure 5 and Table 7.

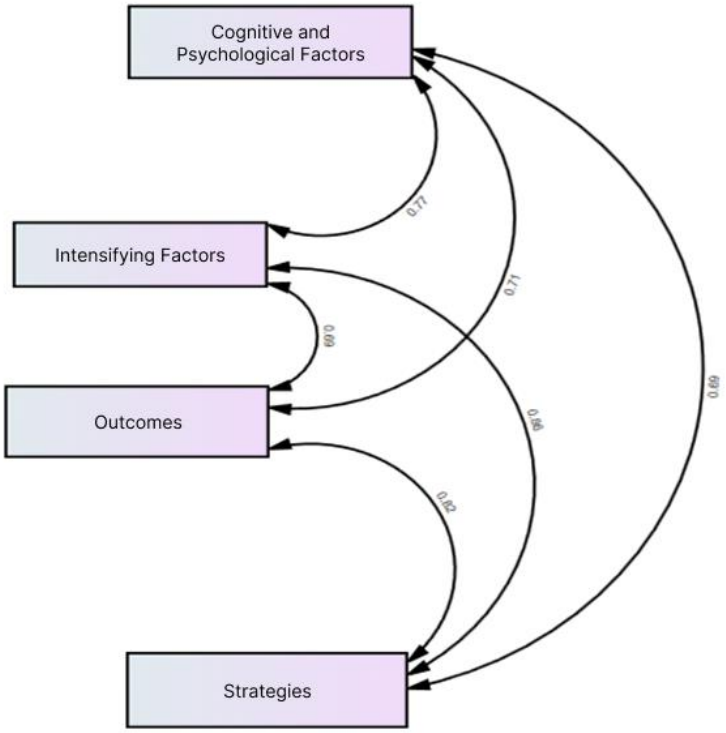

Figure 5. Path Analysis of the Full Model and Its Implementation

Table 7. Results of the Structural Model for Cognitive Biases on Institutional Investors' Preferences in Iran's Financial Markets

Relationships	Standard Estimate	Standard Error	Critical Ratio	Significance Level
Drivers → Model of Cognitive Biases	0.69	0.014	6.29	*< 0.001
Strategies → Model of Cognitive Biases	0.74	0.025	12.36	*< 0.001
Outcomes → Model of Cognitive Biases	0.71	0.021	9.39	*< 0.001
Cognitive and Psychological Factors → Model of Cognitive Biases	0.83	0.039	21.39	*< 0.001

The structural model was finalized using AMOS software. All relationships were confirmed at a 95% confidence level based on the path coefficients. The final model of cognitive biases on institutional investors' preferences in Iran's financial markets, as shown in Table 7, highlights the influential components in the proposed framework.

4. Discussion and Conclusion

This study was conducted using a mixed-methods approach, encompassing both qualitative and quantitative sections. The findings from the qualitative phase were categorized into four main themes and their subcategories. The identified cognitive and psychological factors include: "overconfidence, disposition effect, herding behavior, information bias, and mental accounting." The intensifying factors include: "macroeconomic decisions, information asymmetry, and information overload." The identified strategies include: "reviewing and accepting mistakes, adherence to trading plans, and avoiding biases toward specific stocks or characteristics." The identified outcomes include: "improved performance, attracting more investors, and enhancing capital market efficiency."

The results from the model fit, using confirmatory factor analysis and path coefficients, demonstrated that the proposed model is valid and reliable.

Cognitive biases are a critical focus of psychological studies, particularly in the field of behavioral finance. The impact of these biases on how individuals perceive surrounding issues, process data through biased lenses, and make decisions—specifically financial decisions—affects market trends. Behavioral finance seeks to understand these biases to elucidate the risk equation, which reflects the asymmetry in how people perceive gains versus losses. Applying behavioral finance concepts to explain price trends is a key step in understanding how markets operate and how prices are determined. Whether behavioral finance can mitigate market anomalies through awareness and root-cause analysis remains a separate debate. However, pricing anomalies continually occur, and behavioral explanations and statistics are used to interpret them. The extent to which human behavior impacts market efficiency is a central subject in behavioral finance.

When the efficient market hypothesis is considered, it assumes that market prices reach equilibrium as they are based on efficient information. However, behavioral finance argues that despite access to accurate information, investors' psychological and emotional biases can lead to irrational pricing trends.

The findings of this study suggest that institutional investors' cognitive biases stem from drivers, strategies, cognitive and psychological factors, and outcomes, which collectively influence the development of cognitive biases among individual investors. Based on these findings, several recommendations are proposed for institutional investors:

- Seek information from diverse and independent sources and consider opposing viewpoints.
- Conduct in-depth analyses of data and specific conditions before making decisions, utilizing historical patterns for forecasting.
- Perform independent research and make decisions based on technical analysis rather than following others.
- Use past data and analyses to develop a more realistic perspective on risks and opportunities.
- Base decisions on logical analysis and data to minimize the influence of emotions.

Authors' Contributions

Authors equally contributed to this article.

Ethical Considerations

All procedures performed in this study were under the ethical standards.

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Conflict of Interest

The authors report no conflict of interest.

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