Behavioral Biases and Investment Decisions: The Mediating Role of Risk Perception Through the Lens of Prospect Theory

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Abstract

This study investigates the intricate relationships between behavioral biases, risk perception, and investment decision-making through the lens of Prospect Theory. It aims to assess how cognitive and psychological factors influence financial decisions, focusing on individual investors in Pakistan's stock market. A quantitative approach was employed using survey data collected from 500 investors. Validated scales were used to measure behavioral biases, risk perception, and investment decision-making. Structural Equation Modeling (SEM) was applied to evaluate direct and mediated effects within the proposed framework. The findings reveal that behavioral biases significantly impact both risk perception and investment decision-making. Risk perception mediates the relationship between biases and decisions, emphasizing its role as a critical intermediary. The model demonstrated robust explanatory power and excellent fit indices, confirming its validity. These results align with established behavioral finance theories, such as Prospect Theory, highlighting the interplay between cognitive biases and subjective risk assessments. The study contributes to existing literature by addressing gaps in understanding how these factors operate in emerging markets. The study validates the proposed model and achieves its objectives, offering insights for investors, policymakers, and financial advisors. Future research should explore cultural and technological influences on decision-making and develop interventions to reduce cognitive biases.

Keywords: Investor, Behavioral Biases, Risk Perception, Investment Decision-Making, PSX

Background

Financial markets demand rational decision-making processes coupled with psychological factors. The traditional economic theories contend that decisions are made rationally by evaluating the information available; however, behavioral finance places greater importance on the significant influence of psychological biases on financial behavior. These include overconfidence, loss aversion, herding behavior, and anchoring, which play a highly influential role in investment decisions and market outcomes. For instance, overconfidence makes investors overestimate their abilities and, thus, make less-than-optimal choices. Loss aversion—the tendency to lose more sharply than gain the

same amount—drives investors to take too much risk or avoid too much risk (Ahmed et al., 2023). Herding, the tendency to follow the crowd, and anchoring, overemphasizing the first information, also distort the investment choice process. While these biases are recognized, the unique effects of these biases on investment choices need further analysis.

In their endeavor to make the right decision, rationality and behavior characterize investment decisions. This subsequently has significant implications for how markets work and financial welfare. The Efficient Market Hypothesis posits that due to rationality, behavior, and information maximize investment returns, yet evidence still exists that systematic deviations by psychological factors influence investment outcomes. Behavioral Finance fills up this gap as it comprises psychology in the economic model and explains how biases cause decisions (Zhang et al., 2023). Risk perception, being an individual's subjective evaluation of potential risks, acts as a mediator between behavioral biases and investment decision-making. Influenced by personal experiences and cognitive constraints, distorted risk perceptions can lead to misguided choices. This research explores the impact of risk perception on behavioral biases and investment decision-making, focusing specifically on individual investors in the Pakistani stock market. It is essential to understand these dynamics to improve financial decision-making, especially in uncertain market conditions.

Literature Review

Investment Decision-Making

Investment decision-making is a complex process shaped by psychological biases, market conditions, and individual risk perceptions. Traditional finance theories, such as the Efficient Market Hypothesis (EMH), assume that investors acted rationally to maximize returns. However, behavioral finance highlighted the significant role of psychological factors in influencing investment decisions. Overconfidence often leads to excessive trading and poor outcomes. Barber and Odean (2020) showed that overconfident investors traded more frequently, resulting in higher costs and lower returns. Loss aversion, a key principle of Prospect Theory, explained why investors feared losses more than they valued equivalent gains. This bias contributed to the disposition effect, where investors held losing stocks for too long or sold profitable ones too early (Chen et al., 2023). Risk perception played a crucial role in how investors evaluated potential outcomes. It was subjective and influenced by framing, personal experiences, and emotions. High-risk perception often pushed investors toward conservative choices, while low-risk perception encouraged risk-taking (Liu et al., 2023).

Behavioral Biases and Risk Perception

Behavioral biases frequently cause investors to deviate from rational decision-making. Biases such as overconfidence, loss aversion, herding, and anchoring significantly impacted investment behavior. Ahmed et al. (2023) found that overconfidence led to suboptimal decisions in uncertain markets. Loss aversion, as described by Odean (2021), drove investors to prioritize avoiding losses over seeking gains. Herding behavior, driven by social pressures and fear of missing out, often creates market bubbles or crashes (Baddeley, 2022).Behavioral biases also influence risk perception. Slovic (1987) revealed that subjective risk assessments often conflicted with objective ones, leading to varied investment behaviors. Studies showed that high-risk perception correlated with conservative decisions, while low-risk perception was linked to more aggressive strategies (Chen et al., 2022).

Prospect Theory

Kahneman and Tversky's (1979) Prospect Theory provided a framework for understanding investment decisions under uncertainty. The theory suggested that individuals evaluated outcomes based on reference points, with loss aversion and framing effects shaping their risk preferences. Recent studies expanded on Prospect Theory, particularly in times of economic crises. Zhang et al. (2023) highlighted how loss aversion intensified during uncertain periods, influencing investors' behavior. Cross-cultural research also demonstrated differences in how investors applied Prospect Theory. Liu et al. (2023) found that collectivist cultures were more loss-averse than individualistic ones, showing how cultural factors shaped investment decisions. These findings emphasized the importance of studying investment behavior in specific contexts.

Research Gap

The existing literature focused on direct relationships between biases and investment decision-making but somehow overlooked the mediating effect of risk perception. In general, most studies relate to developed economies and fail to focus on emerging markets like Pakistan (Ahmad et al., 2022). Thus, this study addresses the gaps by establishing a comprehensive framework to explain behavioral biases, risk perception, and investment decision-making in Pakistan's financial landscape.
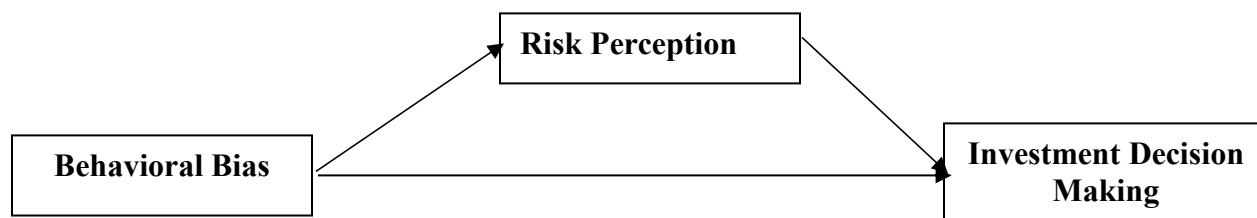

Figure-1: Research Model

Research Model and Hypotheses

1. Behavioral biases significantly influence risk perception.

2. Risk perception significantly affects investment decision-making.

3. Risk perception mediates the relationship between behavioral biases and investment decision-making.

Methodology

Utilizing the Research Onion framework by Saunders, the current research adopts a positivist approach and applies a systematic approach to examine the mediating role of risk perception. The study uses a deductive approach to test the already existing theories on behavioral biases and investment decision-making by individual investors in Pakistan. The survey method using structured questionnaires was applied by spreading these to 500 active investors on the Pakistan Stock Exchange. Tools have been taken from pre-developed scales: behavioral biases by Barberis & Thaler, 2003, risk perception by Slovic, 1987 and investment decision-making by Odean, 2021. Convenience sampling technique was applied for relevance purpose and SEM has been applied to conduct data analysis. Validity and reliability have been tested by applying Cronbach's alpha and confirmatory factor analysis.

Results and Analysis

The study ensured the data was clean and reliable before testing the hypotheses. Behavioral biases, risk perception, and investment decision-making were analyzed by checking for missing values and multicollinearity. All VIF values were below the threshold of 5, confirming no significant issues and stable results. This process aligns with best practices from previous studies, ensuring the findings are accurate and trustworthy.
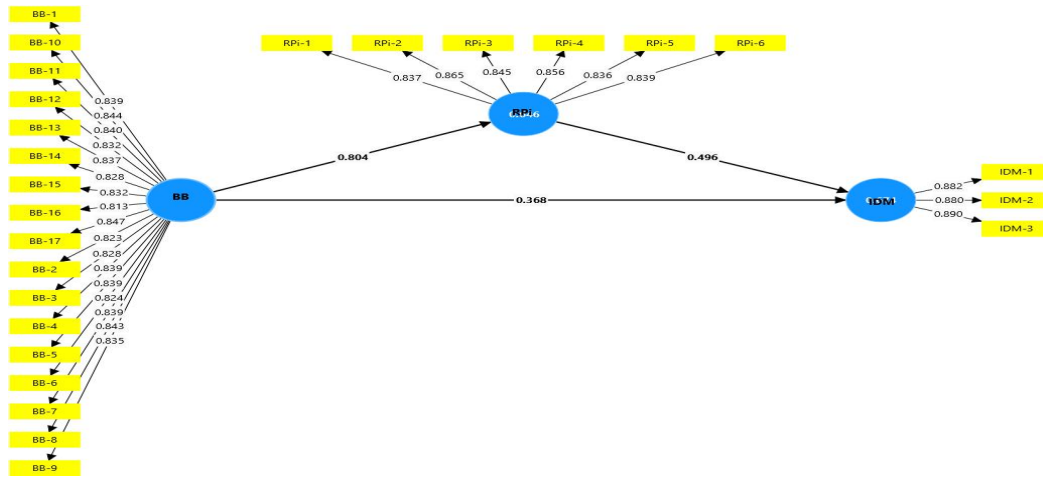
Figure-1: Confirmatory Analysis

After data cleaning, the constructs were tested - Behavioral Biases, Risk Perception, Risk Propensity, and Investment Decision-Making - to establish their validity and reliability before hypothesis testing. Internal consistency was evaluated using Cronbach's Alpha and composite reliability (rho_A) as both are above 0.7.

Table 1: Factor Loading

Variable	Factor Load	Cronbach's Alpha	rho_A	AVE	VIF
Behavioral Biases		0.973	0.973	0.696	
BB-1	0.839				3.204
BB-2	0.823				2.873
BB-3	0.828				3.000
BB-4	0.839				3.130
BB-5	0.839				3.203
BB-6	0.824				2.954
BB-7	0.839				3.237
BB-8	0.843				3.366
BB-9	0.835				3.111
BB-10	0.844				3.289
BB-11	0.840				3.137
BB-12	0.832				3.087
BB-13	0.837				3.135
BB-14	0.828				3.177

BB-15	0.832			3.093
BB-16	0.813			2.812
BB-17	0.847			3.231
Risk Perception		0.921	0.921	0.716
RPi-1	0.837			2.407
RPi-2	0.865			2.807
RPi-3	0.845			2.493
RPi-4	0.856			2.631
RPi-5	0.835			2.404
RPi-6	0.839			2.484
Investment Decision Making		0.932	0.932	0.747
IDM-1	0.881			2.141
IDM-2	0.881			2.141
IDM-3	0.890			2.260

Source: Author Calculation

Validity was achieved by factor loading, Average Variance Extracted (AVE), and Heterotrait-Monotrait ratio (HTMT). Factor loadings were greater than 0.7, and AVE values were greater than 0.5, thus achieving convergent validity. HTMT values were less than 0.90, hence showing strong discriminant validity. These strong measures validate the constructs and provide reliable data for hypothesis testing.

Table 2: Heterotrait-monotrait (HTMT)

	BB	IDM	RP$_i$
BB			
IDM	0.837		
RP$_i$	0.849	0.827	

Source: Author Calculation

Table 3: Fornell-Larcker Criterition

	BB	IDM	RP$_i$

BB	0.834		
IDM	0.766	0.884	
RP$_i$	0.804	0.791	0.846

Source: Author Calculation

After ascertaining the reliability and validation of data, the model was evaluated for its fitness in its adequacy to represent data. Fit indices, in this regard, were divided as per Hair et al. (2019) in absolute, comparative, and parsimony indices.

Table 4 is the evaluation of how apt the model is for explaining construct relationships. With an R-squared value of 0.674, in tandem with an Adjusted R-squared value of 0.673, 67% variation in the Investment Decision-Making independent variables can explain this change. Thus, there are strong explanatory powers for robustness of the proposed framework.

Table 4: Model Fitness Indices

Model Fit Criteria	Fit summary	Estimated model
SRMR	0.030	0.030
d_ULS	0.315	0.315
d_G	0.281	0.281
Chi-square	692.579	692.579
NFI	0.936	0.936

Source: Author calculations

Additional verification of the appropriateness is seen with indices on the goodness-of-fit. The SRMR score, for instance, is at 0.030, indicating that it is much less than the threshold of 0.08. In this case, it demonstrates a good fit between actual and predicted data. Again, d_ULS with a score of 0.315 and d_G at 0.281 indicate that there is still a little deviation in this model as these scores are within allowed limits. Finally, a Chi-square statistic of 692.579 indicates a well-fitted model with respect to the sample and complexity. Finally, the NFI of 0.936 exceeds the recommended threshold of 0.90, which implies that this correspondence between the proposed model and actual configurations is sturdy. In a nutshell, such results show that the proposed model is well-specified and may be used for reliable exploration of hypotheses that may shed light on some relationships among behavioral biases and risk perception and investment decisions.
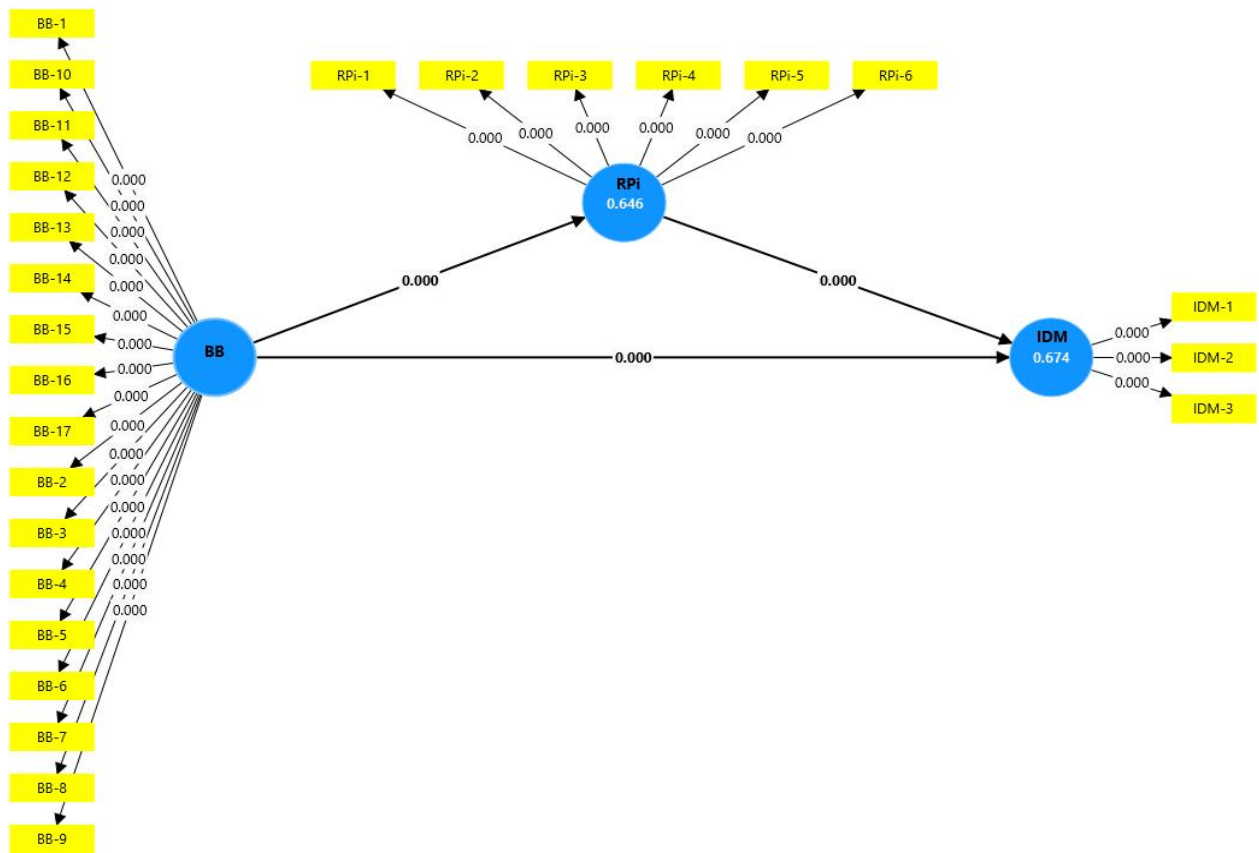
Figure 2: Path Analysis

Table 5 and Figure 2 explain the relationships between behavioral biases, risk perception, and investment decision-making. The direct path of behavioral biases to investment decision-making is very highly positive; its path coefficient, β, is 0.36, t-statistic 6.799, and p-value 0.000. This indicates that the influence of behavioral biases is rather direct on investment decision-making, which supports the role of the model as an important predictor.

Table 5: Path Coefficients, t values and p-values

Path	β	Standard Error	t Statistics	p-Values
BB --> IDM	0.36	0.054	6.799	0.000
BB -->RPi	0.28	0..042	10.771	0.000
RPi --> IDM	0.49	0.056	8.901	0.000
BB --->RPi --> IDM	0.39	0.047	8.446	0.000

Source: Author calculations

The association between behavioral biases and risk perception is strongly marked, with a β of 0.28, a t-statistic of 10.77, and a p-value of 0.000. This means the connection is robust; behavioral biases

have a considerable effect on the perception of risk. Similarly, the risk perception effect on investment decision-making is also strong and is shown by a β of 0.49, t-statistic of 8.901, and a p-value of 0.000. This underlines that the perception of risk is not only crucial in the context of investment decision-making but also serves as an intermediary. The indirect influence of behavioral biases in investment decision-making is, in fact, quite pronounced. Risk perception β= 0.39; t = 8.446 and p = 0.000. The outcome reveals that the relationship between behavioral biases and investment decision-making is mediated by Risk perception. The collective finding establishes that though behavioral biases indeed directly influence investment decisions, the influence of risk perception on the former constructs highlights a relation of interdependence among them. The graphical representation in the figure depicts robust and statistically significant pathways along with their respective path coefficients. In addition, high R-squared values for Risk perception (0.646) and investment decision-making (0.674) further depict the strength of the model and its ability to account for a significant portion of the variability in the dependent variables. It depicts the need to understand behavioral biases and Risk perception that would help improve investment decision-making within decision-making frameworks.

Discussion and Conclusion

Discussion

This research demonstrates that there is a strong link between behavioral biases and the investment decision-making process, which verifies the critical role of cognitive and emotional distortions in the formation of financial behavior. The results are consistent with Prospect Theory by Kahneman and Tversky (1979), where overconfidence and loss aversion, among other biases, affect decisions under uncertainty. Behavioral biases interfere with rational cognitive processes and produce systematic deviations from ideal decision-making. This is supported by Lo et al. (2021), who argue that such biases might lead to less than best investment practices, especially in uncertain financial markets. Hence, the findings support the theoretical hypothesis that behavioral biases directly impact investment decision-making, thereby achieving one of the major objectives of the study. The research further underscores the significant influence of behavioral biases on the perception of risk. Aligning with earlier studies, the findings indicate that individuals affected by cognitive biases frequently demonstrate skewed assessments of risk. Xu and Cheng (2021) underscore that biases, including availability heuristics and representativeness, can result in either an overvaluation or undervaluation of risks, subsequently affecting financial behaviors.

Similarly, Baker et al. (2022) argue that these heuristic-driven distortions are particularly pronounced in uncertain market conditions, reinforcing the psychological lens through which investors perceive risk. This relationship supports the study's objective of exploring how behavioral biases serve as a key determinant of risk perception. It acts as an intermediary in the investment decision-making process between behavioral biases and investment decisions. Risk perception is crucial in acting as an intermediary in the relationship between behavioral biases and investment decisions. Chua et al. (2023) and Li et al. (2022) postulate that the people who have high risk awareness embrace conservative investment strategies, whereas those who have low risk perceptions tend to involve in risky activities. The current study supports these conclusions, indicating the influence of behavioral biases in the perception of risk, and that it plays a pivotal role in the decision-making process. Furthermore, this mediating function of risk perception offers a comprehensive view of the relationship between cognitive distortions and financial behaviors.

The endorsement of risk perception as a mediating factor between behavioral biases and investment decision-making goes along the finding of Ahmed et al. (2020), where they emphasized that the psychological constructs are critical components within predictive models of behavioral finance. Similarly, Arifin et al. (2023) also argue that understanding such mediating influences is required to develop interventions that improve investment outcomes. Hence, this study adds to the existing scholarly literature as it explains the interaction of behavioral biases and risk perception in influencing investment decisions. The structural model is robust, hence lending support to these theoretical constructs. The greater R-squared values for risk perception and investment decision-making indicate that the model correctly explains the variation in these dimensions. This is consistent with the assertion by Zhao et al. (2022) that behavioral and psychological factors are needed for raising the reliability of models. Furthermore, the model fit indices, such as SRMR and NFI, meet known standards (Hair et al., 2021), which indicates the methodological robustness of the research.

In relation to correlating the results with already established literature, this study satisfies the purposes of theoretically establishing associations among behavioral biases, risk perception, and investment decisions. The current analysis demonstrates that it would be important to reduce the psychological distortions toward even better decision-making in finance and lays down a base for further studies that bring into consideration contextual or moderation variables such as cultural

influence and specific market situations so that the connections in question are understood more appropriately.

Conclusions

This research examines the complex interaction between behavioral biases, risk perception, and the decision-making process of investment, making a point that psychological and cognitive factors affect investment choices. Behavioral biases play an important role in shaping the risk perception, which again affects the decision-making procedure. The findings of the study highlight how cognitive errors and individual risk perceptions may lead to different investment choices. The proposed conceptual model is consistent with current scholarship in behavioral finance, establishing a theoretical framework that enhances comprehension of the interactions among these constructs. This research fulfills its aims by presenting significant insights and actionable recommendations aimed at improving investment behaviors within volatile financial contexts.

This has important practical implications. The study gives investors the chance to enhance their decision-making processes by recognizing and mitigating the effects of behavioral biases, which may lead to more rational and better-informed investment strategies. Financial institutions may consider developing educational programs and resources aimed at assisting investors in better understanding risk perception, thereby reducing the impact of cognitive distortions and more stable financial results. Policy-makers can create open regulatory frameworks that make evidence-based decision-making easier while reducing the influence of psychological biases in financial markets. In addition, financial consultants can apply behavioral finance approaches in their professional lives, which can help clients overcome psychological hurdles and achieve better investment performance. This research addresses how behavioral biases relate to assessing risk and the investment-decision-making process, which offers a foundation for the use of practical strategies to aid in informed financial decisions as well as enriches understanding of investment behaviors within the framework of behavioral finance.

Limitations and Future Implications:

The study addresses a few limitations that will have to be considered while making recommendations. Self-reported data could carry the risk of response biases, such as social desirability or recall error, which compromise the reliability and accuracy of findings. Besides, the study conducts in one particular geographic and cultural context makes the generalisability of the findings harder for wider populations or alternate contexts. The cross-sectional design may be

appropriate for preliminary investigation, but it limits the capability of inferring causality between behavioral biases, risk perception, and investment decision-making. Furthermore, this study is based only on these three constructs and leaves aside other major determinants, such as macroeconomic conditions, market volatility, or institutional frameworks, that would also have a large impact. Finally, the static attributes of the model cannot capture the dynamic and progressive aspects of investor behavior, which develop over time. This can lead to much deeper understandings of how decisions are made.

Further studies could address such limitations in a number of ways. Conducting longitudinal research may allow the researcher to better understand patterns of behavior and how such patterns may change over time. The broadening of the study's scope, thereby considering different regions, along with external factors, like economic volatility, regulatory frameworks, or institutional traits, will increase the richness of the analysis. Considering how the interaction of behavioral biases is shaping decision-making tools under contemporary influences of technology, like artificial intelligence, would yield deep insights into financial practices evolution. In addition, empirical studies assessing interventions such as targeted investor education programs or policy reforms may present viable routes to reducing cognitive biases and improving investment decision-making processes. These potential areas of study would contribute to a more holistic and advanced understanding of investor behavior within complex financial settings.

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