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The Impact of Cognitive and Emotional Biases on Individual Investor's Investment Decision: Mediating Role of Risk Perception

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ABSTRACT

This study aims to clarify the mechanisms by which cognitive and emotional biases influence the investment choices of retail investors who trade on the Pakistan Stock Exchange (PSX), in addition to mediation of risk perception. The behavior of retail investors in the least developing or emerging financial markets is not generally recognized, with most studies concentrating on well-developed financial markets. Utilizing a sample of 385 traders who are investors in the PSX, data was gathered through a purposive sampling technique. The descriptive analysis was conducted using IBM SPSS 27, while the measurement model and SEM assessments were conducted through SmartPLS 4.1.0.3. The findings reveal that biases, including representativeness bias ($\beta = -0.185$, $p < .05$), availability bias ($\beta = -0.223$, $p < .000$), and regret aversion bias ($\beta = -0.494$, $p < .000$), negatively affect investment choices made by retail investors on the PSX, with risk perception ($\beta = 0.302$, $p < .000$) mediating these relationships. This study, recommended for stock exchange investors and policymakers in collectivist cultures and least developed markets, provides original insights into the mediating role of risk perception, a context often overlooked in research focused on developed markets.

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1. Introduction

The goal of any investor is to make the best possible investments (Sharpe, 1964). Researchers have concentrated on behavioral finance reactions to investor profit variations to explain investor decisions in line with the conventional financial paradigm. According to Afriani and Halmawati (2019), behavioral finance studies various presumptions that cause people to act irrationally. According to Cohen and Kudryavtsev (2012), investor's choices are impacted by their expectations, past experiences, and level of knowledge. The difference within cognitive and emotional biases was made by Pompian (2012), emotional biases are defined as biases which occur automatically when an individual acts, while leaning on their own emotions at that point regarding choices or establishing an investment. Investment decision-making based on established concepts or rules of thumb that may or may not be accurate or factual in the real world is known as cognitive bias (Bell, 1982). Representativeness is a cognitive behavioral bias associated with heuristics and making decisions based on stereotypes that exist naturally in mind (Shefrin, 1999). Availability bias refers to the ease with which information may be accessible, allowing investors to base their decisions on it without further research or data collection to confirm its accuracy (Siraji, 2019). Frehen et al. (2008) describe a situation known as regret aversion, which occurs when people choose not to make a potentially bad investment choice to protect themselves from unpleasant emotions that could surface. Prospect theory (Kahneman & Tversky, 1979) demonstrates a negative emotional bias that encourages investors to avoid feeling regret by incorporating this idea—even if it means making bad decisions. According to

the behavioural finance perspective, investors' beliefs about the attributes and significance of a risk are known as risk perception (Ricciardi, 2008).

The influence of psychological elements on investor conduct needs to be more adequately recognized in developing nations such as Pakistan, where financial literacy is low and markets are still expanding. Existing research has frequently examined risk perception as a moderator or a standalone variable, yet its role as a mediator in the complex interplay of cognitive biases and emotional biases remains limited (Ahmad, 2020; Ahmad & Shah, 2022). This study aims to investigate how representativeness bias, availability bias, and regret aversion bias influence individual investors' investment decisions, focusing on the mediating role of risk perception. The knowledge gained can be used to improve the financial stability and functioning of the market in Pakistan and similar economies, which would benefit individual investors and the economies themselves. The study's objectives are:

1. To examine the influence of cognitive biases (representativeness and availability) on individual investor's investment decision.
2. To scrutinize the impact of emotional bias (regret aversion) on investment decision.
3. To investigate the function of risk perception as a mediator in the complex interactions among biases and investment decision.

2. Literature Review

2.1. Investment Decision

When making investment decisions uncertainly, irrational behavior frequently manifests as inconsistency, incapacity, or incompetence. Their biased actions cause the market to diverge from its true position due to irrational behavior (Ballis & Verousis, 2022). The decision-making process of investors is closely associated with behavioral biases, such as anchoring, mental accounting, overconfidence, and herd bias (Ullah Malik et al., 2022). Numerous investors need basic technical skills and knowledge of the stock market. Due to information generalizations and investors' failure to engage in additional trading, these investors consistently follow other investors or brokers while making investing decisions (Mirza et al., 2022).

2.2. Biases and Investment Decision

Three factors have been linked to irrational investment decisions: overconfidence, representativeness, and anchoring (Weixiang et al., 2022). In the study of Baidoun and Salem (2024), the horizon was expanded to consider other kinds of biases, such as regret-aversion bias. In their research, the authors discerned that the other biases are anchoring, availability, herding, switching cost, sunk cost, representativeness, and perceived threat, which affect retail investors' intentions. According to Sood et al. (2023), the availability bias significantly affects the investment choices made by cryptocurrency investors.

H1: Representativeness bias has a negative and significant influence on investment decisions.

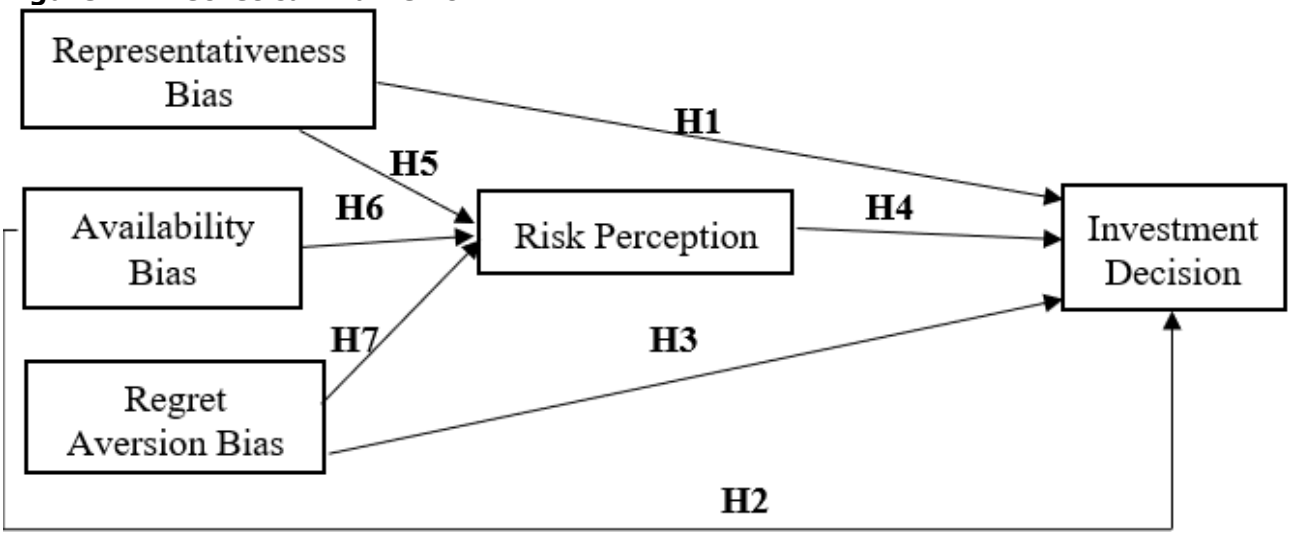
The research examines whether investors in the debt securities market are affected by heuristic-driven thinking as they process new information (Tin & Hii, 2020). They discovered that inherited prejudices of cognitive heuristics in terms of availability and representativeness take a lot out of investment decision-making. A link shows that when these biases of representativeness and availability heuristics are applied, people tend to be presented with irrational decisions regarding finance (Ahmad & Wu, 2023; Dangol & Manandhar, 2020).

H2: Availability bias has a negative and significant influence on investment decisions.

As Khajavi, Kiamehr and Bayazidi (2023) stated, regret aversion was listed as a behavioral characteristic that directly influences an investor's financial behavior. Mamidala, Kumari and Singh (2024) expanded on this by looking at different biases in general. They confirmed that self-related and situational regret aversion anticipations, decisional self-inflation and deflation, self-presentational concerns, and perceived threat cause anchoring, availability, herding, switching cost, and sunk cost on the retail investors' investing intention. The analysis by Ermulyawati, Hariyanto and Safitri (2024) suggested that "regret aversion" bias and "risk preferences" had a negative connection, which meant that investors may be afraid to invest in risky options when they have faced losses before.

H3: Regret aversion bias negatively and significantly influences investment decisions.

Figure 1: Theoretical Framework



Alrawad et al. (2023) emphasize that understanding risk perception remains significant for investment decisions, providing insights into their effects in various forms in different financial settings. Baidoun and Salem (2024) analyzed the factors affecting perceived risk and how this perception influences investment decisions to explain investors' behaviors.

H4: Risk perception significantly influences investment decisions.

Representativeness and availability are two crucial mental biases that affect the dependence of these investment securities on financing, as reported by (Tin & Hii, 2020). Further, they discovered that risk perception can function as a channel between these cognitive biases and high-risk investment decisions. Research by Jain, Walia and Gupta (2019) shows that availability and representativeness biases greatly enhance investment decisions.

H5: Risk perception serves as a mediator between representativeness bias and investment decisions.

The study by (Kishor, 2022) considered grasping the bias generation process by using heuristics profoundly for the investment return on debt securities. They studied how biases driven by cognitive heuristics influenced investment performance, with representativeness and availability being the most influential factors. They also investigated the possibility that risk perception functions as a moderator.

H6: Risk perception serves as a mediator between availability bias and investment decisions.

The research carried out by Wangzhou et al. (2021) hypothesizes that not only behavioral bias causes these individuals to be more risk-averse and make bad financial decisions. Therefore, in this relationship, financial literacy is the mediator of the process, while risk perception is handled as the moderator.

H7: Risk perception serves as a mediator between regret aversion bias and investment decisions.

Figure 1 presents the theoretical framework supported by Herbert Simon's Theory of Bounded Rationality, proposed in 1955. This hypothesis acknowledges that investors have a limited window of opportunity to make decisions because they lack the necessary information, and that their limited time and mental perception problems make matters worse. These individuals follow the "rule of thumb" as well (Simon, 1955).

3. Methodology

3.1. Sampling Technique

Purposive sampling was chosen for its ability to produce accurate and reliable results (Denzin & Lincoln, 2008). Similarly, a study by Shiva and Singh (2019), who share a contextual similarity to the current research, also employed purposive sampling. As a result, a structured questionnaire was given to Pakistani retail investors.

3.2. Data Collection Procedure

According to Cochran (1977), when dealing with an unknown population where the probability is equally distributed at 50 percent and a margin of error of 5 percent is permissible, the recommended sample size is 385. Consequently, this study enrolled 385 investors. Several authors, including (Sapkota, 2023), have also utilized similar sample sizes in their research endeavors. Initially, 50 questionnaires were tested in the pilot study. Based on the pilot test results, 440 questionnaires were then distributed. This distribution resulted in 410 responses, 93.18% of responses. The final dataset of 385 responses was used for the study. The data was securely stored, accessible only to the research team, and the findings were presented in aggregate form to safeguard individual responses.

3.3. Measures

The target audience responded to the survey's closed-ended questions. Every response, unless specified otherwise, was scored using the Likert scale. To measure availability bias, a cognitive heuristic, five questions were adopted from Waweru, Munyoki and Uliana (2008). The representativeness bias, i.e., cognitive heuristic, was measured using four items adopted from (Le Luong & Thi Thu Ha, 2011). The regret aversion bias, which is emotional bias, was measured using six items adopted from Schwartz et al. (2002) and Waweru, Munyoki and Uliana (2008). Six components were utilized to measure risk perception, which was developed by Weber, Blais and Betz (2002). The investment decision, was measured using three survey components adopted from Scott and Bruce (1995). These measurement instruments have previously been validated in similar studies; for instance, Ishfaq et al. (2020) also employed these questions to assess biases in their research.

4. Data Analysis and Results

SPSS version 27 was the chosen tool for descriptive analysis. Besides that, structural equation modeling (SEM) was used in the study due to its capacity to create intricate path models and provide the opportunity to execute them simultaneously (Hair et al., 2012). 10.2% of respondents were between 18 and 22, while 30.6% were between 23 and 32. 10.6% were 43 or older, and 48.3% were between 33 and 42. Additionally, the results showed that 71.7% of respondents were male. The breakdown of respondents' educational attainment is that 1.8% have an intermediate degree, 43.6% have a bachelor's degree, and 54.5% have a master's degree or higher. The frequency of experience is that 13.5% of respondents have less than a year's financial experience, 10.1% have between one and three years' worth, 59.5% have between four and five years' worth, and 16.9% have more than five years' worth. 59.5% of respondents have 4-5 years of financial experience. Table 1 presents the descriptive statistics. A greater mean value indicates agreement regarding preference, whereas a lower mean value indicates disagreement.

Table 1: Descriptive Analysis

	N	Min	Max	Mean	Std. D	Skewness	Kurtosis
RB	385	1	5.00	2.8149	.94563	.241	-.649
AB	385	1	4.60	2.6374	.97802	.341	-.907
RA	385	1	5.00	2.8788	.84678	.330	-.576
RP	385	1	5.00	3.1788	.87838	-.485	-.150
ID	385	1	5.00	3.2476	1.26742	-.414	-1.607

Source: Authors' Estimation

Factor loading for every item in the study was greater than the suggested level of 0.50 (Hair et al., 2019). The factor loading is displayed in Table 2 and has values ranging from 0.716 to 0.894. Reliability was evaluated using Cronbach's alpha and composite reliability, which should be above 0.70 and not higher than 0.95, as per Hair et al. (2019). The requirements are met. Consequently, the construct reliability is proved. Table 2 demonstrates that all constructs have significant Cronbach Alpha and CR values greater than 0.7. While the CR varied from 0.826 to 0.882, the Cronbach Alpha ranged from 0.730 to 0.797. As a result, both reliability indicators

(CR and Cronbach Alpha) have reliability statistics above the necessary 0.70 threshold (Hair et al., 2006). Construct reliability is thus proven. Convergent validity is verified; AB=0.676, ID=0.700, RA=0.720, RB=0.687, and RP=0.706 have AVE values greater than 0.50 (Fornell & Larcker, 1981).

Table 2: Model

Constructs	Loadings	Cronbach's Alpha	CR	AVE
AB1	0.825	0.880	0.912	0.676
AB2	0.843			
AB3	0.857			
AB4	0.782			
AB5	0.802			
ID1	0.793	0.785	0.875	0.700
ID2	0.812			
ID3	0.901			
RB1	0.831	0.922	0.898	0.687
RB2	0.804			
RB3	0.850			
RB4	0.830			
RA1	0.857	0.848	0.939	0.720
RA2	0.826			
RA3	0.833			
RA4	0.854			
RA5	0.855			
RA6	0.866			
RP1	0.882	0.917	0.935	0.706
RP2	0.851			
RP3	0.879			
RP4	0.833			
RP5	0.844			
RP6	0.745			

Source: Authors' Estimation

4.1. Hypotheses Testing

H1 was accepted since representativeness bias significantly and negatively impacted investment decisions (refer to Table 3). The indirect effect of representativeness bias was found positive and significant (see Table 4). Thus, H5 was accepted. This demonstrates how risk perception plays a competitive partial mediating role. The direct impact of availability bias on investment decisions was negative and significant (see Table 3), thus accepting H2. The results of path analysis showed that risk perception has a positive and significant relationship with investment decisions. Thus, H4 is accepted (refer to Table 3). The indirect effect of availability bias was positive and significant (see Table 3). Thus, H6 was accepted. This demonstrates how risk perception plays a competitive partial mediating role. The direct impact of regret aversion bias on investment decisions was negative and significant (Table 3). Thus, H3 was accepted. A mediation analysis was carried out to evaluate the mediating effect of risk perception on the relationship between regret aversion bias and retail investors' investment decisions. The indirect effect of regret aversion bias on investment decisions through risk perception was positive and significant (see Table 4), H7 accepted. This demonstrates how risk perception plays a competitive partial mediating role.

Table 3: Direct Relationship - Path Coefficient

Hypothesis	Beta (B)	Sample Mean	Standard Deviation	T Statistics	P Values
AB -> ID	-0.223	-0.222	0.063	3.561	0.000
AB -> RP	0.179	0.180	0.073	2.456	0.014
RB -> ID	-0.185	-0.186	0.061	3.022	0.003
RB -> RP	0.176	0.175	0.070	2.512	0.012
RA -> ID	-0.494	-0.495	0.065	7.604	0.000
RA -> RP	0.191	0.190	0.075	2.550	0.011
RP -> ID	0.302	0.302	0.040	7.650	0.000

Source: Authors' Estimation

Table 4: Indirect Effect- Mediating Effect

Hypothesis	Beta (B)	Sample Mean	Standard Deviation	T Statistics	P Values
AB -> RP -> ID	0.054	0.055	0.023	2.328	0.010

RA -> RP -> ID	0.058	0.058	0.026	2.240	0.013
RB -> RP -> ID	0.053	0.053	0.022	2.422	0.008

Source: Authors' Estimation

5. Discussion

A hypothesis stated as Hypothesis 1 is that the representativeness bias negatively and significantly affects the decision of PSX investors is validated. According to psychology, this means that representativeness bias negatively affects the process of making decisions that let the investors be away from rational actions in trading, which is like the choice of purchases or sale of shares brings market inefficiency just because of such mistakes in trading. Individual Pakistan Stock Exchange investors relying too heavily on stereotypes risk overlooking crucial information and taking mental shortcuts that lead to poor decision-making. The results find a similar trend that Bihari et al. (2023) discover that representativeness is a factor that brings down growth in investment choices. In addition, the investor inquiry model has also confirmed negative effects on investment decision-making through the availability heuristic (supporting H2). The availability bias leaves investors with a limited range of possible plans, making them choose between them haphazardly or wrongly. Hence, investors miss the chance to use favorable opportunities to profit, undermining the market efficiency. From this perspective, those retail investors on the PSX, especially those who are based in Islamabad and Rawalpindi, are at risk of following faulty decision-making processes if they overly rely on what the general public can easily get into, which means there is no guarantee that the performance of the market will be positive. The findings coincide with a study by Ahmad and Wu (2023) and Wangzhou et al. (2021).

Discoveries brought to light by Ermulyawati, Hariyanto and Safitri (2024) and Edison and Aisyah (2023) show that the investing mentality is affected negatively and significantly under the influence of regret aversion bias (supporting H3). Consequently, retail investors in the Pakistan Stock Exchange could feel hesitancy and regret, affecting rational thinking and leading to missing out on valuable investment opportunities. Getting rid of regret is considered one of the cognitions typical of pessimism, according to Shimanoff (1984). As Frehen et al. (2008) and Kahneman and Tversky (1979) explain, our research supports the above hypotheses that regret aversion is linked to the predominant effect of investment decisions. This study demonstrates decisively how risk perception acts as a mediator between cognitive and emotional biases and investment choices of PSX traders, specifically from the twin cities of Islamabad and Rawalpindi. Apart from that, risk perception was also affected by these behavioral biases, and they, as a result, could change investment choices in the future. Thus, it will be consistent with the understanding that the function of risk perception as a mediator of influence has been robustly documented in the paradigm of behavioral finance by studies of both Ahmad and Shah (2022) and Wangzhou et al. (2021). Furthermore, it has been discovered that the association between representativeness bias, availability bias, regret aversion, and retail investor investment decision-making is competitively partially mediated by risk perception. However, it also positively affects investment choices by mediating risk perception (supporting H5).

Conversely, Pakistan's condition, being a developing nation in the context of competitive partial mediation, captures the intricate interplay that influences the individual's perceptions about risk, availability bias, and other market variables (supporting H6). In this puzzling situation, risk perceptions interact with other market dynamics and emerging regulation-specific market frameworks as well as the economy, which impact the decision-making of investment equally. In the context of the Pakistan Stock Exchange (PSX) and its least developed market dynamics, the model of competitive partial mediation reveals that representativeness bias exerts a positive indirect effect on investment choices through the mediation of risk perception (supporting H7). In collectivist cultures, communal values often influence individual risk assessments and can moderate the effects of biases on investment behaviors. This cultural perspective would enrich our understanding of the PSX investor psyche, adding a nuanced dimension to behavioral finance within the context of Pakistan.

5.1. Implication

5.1.1. Theoretical Implication

This study contributes substantially to the theoretical understanding of the interplay between emotional and cognitive biases and investor decision-making, thereby providing a robust explanation for deviations from prudent behavior predicted by traditional financial models. This research significantly enriches the behavioral finance literature by empirically validating Shefrin (1999) claim that biases cause investors to deviate from optimal decision-making(Ijaz et al., 2022;). It addresses critical gaps in standard finance theories by elucidating the mechanisms behind phenomena such as overpricing, underpricing, herding behavior, and the tendency of investors to concentrate on well-liked stocks.

5.1.2. Practical Implication

This study's profound practical implications encompass individual investors and broader financial policy frameworks. The study emphasizes how crucial it is for investors and investment managers to understand and lessen the influence of behavioural and emotional biases on finance. Moreover, this study's findings can enhance financial literacy programs and investor counseling initiatives by highlighting the importance of recognizing and managing behavioral biases. By addressing biases such as representativeness and regret aversion, these programs can help investors make more informed, rational decisions in emerging markets like Pakistan.

6. Conclusion

The study aimed to enhance comprehension of the various errors that ordinary investors make and how those mistakes impact their ability to perform in the Pakistani stock market, particularly in the context of a collectivist culture and least-developed market setting. Heuristics that negatively affect investment decisions have been discovered to include regret aversion bias, representativeness bias, and availability bias, but risk perception partially mitigates these effects. This demonstrates the significance of risk knowledge in assisting investors in reaching more deliberate and comprehensive decisions. These findings align with behavioral portfolio theory and prospect theory, which postulate that irrational investor decisions cause the market as a whole to either overreact or underreact, which, in either case, renders the market inefficient. Decision-makers employ intuition in uncertain situations to reduce the chance of losses, but doing so leads to judgment errors. People are more prone to heuristic biases in a collectivist culture like Pakistan, where social norms and group influences are important in decision-making because of the impact of social comparisons and pressures to conform. In this cultural context, identifying and addressing biases in investment decision-making is even more critical because of the potential detrimental effects on individual investors and more extensive social and economic networks.

6.1. Limitations and Future Research Recommendations

It is noted that the research under study was designed as a quantitative study using survey questionnaires for data gathering. This study used purposive sampling, which may limit the generalizability of the results. Future research should consider using representative sampling techniques, such as stratified random sampling, to enhance the applicability of findings across diverse investor populations. Also, the study was confined to a limited set of cognitive and emotional biases such as representativeness, availability, and regret aversion. This might not necessarily cover all the possible determinants of investment decisions. Future research could expand the scope by examining other biases, such as loss aversion and anchoring or external factors like regulatory changes, political stability, and economic trends. However, the sample was drawn from the population of retail investors trading in PSX only. To extend the factors of financial investment decisions, future research can focus on overreaction, underreaction, dark traits, and investors' attitudes. These factors can give a better understanding of the factors that influence investments. In addition, cross-sectional studies comparing the current situation of the individual commodities sector with that of real estate and exchanges can be of great importance. This study only focuses on mediators, while in future research, we can take investor types as the moderators.

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