



Impact of behavioral biases on investment decision making and mediating effect of risk perception

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The purpose of the study is to analyze the impact of behavioral biases—anchoring, loss aversion, overconfidence, disposition and regret aversion—on investment decision making, and the mediating role of risk perception between the biases and investment decisions. Using data from over 500 retail investors trading in the stock and FOREX market, multiple hypotheses were tested. The results indicate that the anchoring effect, availability heuristics, disposition effect, and overconfidence significantly impact investment decisions, whereas loss aversion and regret aversion have a significant adverse impact on investment decisions. Further, risk perception serves as a complete mediator between the overconfidence heuristic and investing decisions. Implication for investors is that behavioral biases can impair the quality of investment decisions, and risk perception can improve their quality.

Keywords: anchoring effect, behavioral biases, decision-making, loss aversion, overconfidence

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Introduction

The traditional theory focused on psychological attributes that influenced the investors' decision-making behavior. For instance, Sanfey et al. (2003) investigated and established the impact of emotions on investment decision making. Investors tended to show irrational behavior based on situations and differing perceptions. Empirical studies did not support these behavioral traits of investors. Behavioral biases are the manifestations of an individual to overestimate his/her knowledge and cognitive abilities (Bhandari & Deaves 2006). As such, human psychology plays a vital role while making investment choices. Behavioral bias can change a person from rational to irrational due to illogical decisions. An investor makes erroneous investment decisions influenced by behavioral biases leading to substantial financial sufferings. The new dimensions of behavioral biases needing further investigation are anchoring effect

(Lin 2011), availability heuristics (Odean 1988), disposition effect (Frydman & Rangel 2014), loss aversion (Hassan et al. 2014), overconfidence (Hassan et al. 2014) and regret aversion bias (Wood & Zaichkowsky 2004). With this backdrop, the study focuses on only the behavioral preferences mainly due to anchoring effect, availability heuristics, disposition effect, loss aversion, overconfidence, and regret aversion bias.

Most people tend to forget the general principles of investment theory and take decisions guided by intuition and other criteria that conflict with the rational approach (De Bondt 1998). The accumulated investment experience of the investor seems to have no value as the number of errors still persists. Psychological research on intuitive judgment confirms that investors' predictions are optimistically biased (Armor & Taylor 2002). Over-optimism tends to overestimate the likelihood of desired outcomes on analysts' forecasts and recommendations (Ramnath et al. 2008) and investors exhibit typically overconfidence when the issues are complex (Shefrin 2008). To be a successful long-term investor, it's vital to recognize and overcome fundamental human cognitive and emotional biases that contribute to bad judgments and financial blunders. Due to cognitive biases, most investors are susceptible to oversimplification of complicated issues and become overconfident in decision-making. Understanding cognitive biases may lead to improved decision making, which is critical to minimizing risk and enhancing long-term investment results. The past researches discussed suggest that behavioral finance is mainly concerned with examining non-separable market effects and personal psychological aspects that determine treatment in financial markets. In the last decade, there has been a surge in the profits made from financial transactions, which has sparked interest in this area. This paper discusses some of the most common cognitive and emotional biases that might contribute to bad financial choices. The purpose of the study is to examine the effect of behavioral biases on financial investment decision making in stock market. This study would also analyze how risk perception acts as a moderator in investment decision making.

In what follows, the paper presents the proposed research model with supported hypotheses, methods adopted, and findings and discusses the role of different behavioral biases on investors' decision-making through risk perception.

Theory and Hypotheses Development

The Behavioral finance, which describes how cognition and emotions influence financial decision-making, has emerged with a paradigm shift in traditional finance. There are two categories of investors regarding behavioral financial decisions based on psychological factors: rational and irrational. Rational investors make decisions based on logical reasoning and knowledge regarding the investment opportunity. Figure 1 represents the conceptual framework linking the variables and generating the hypotheses.

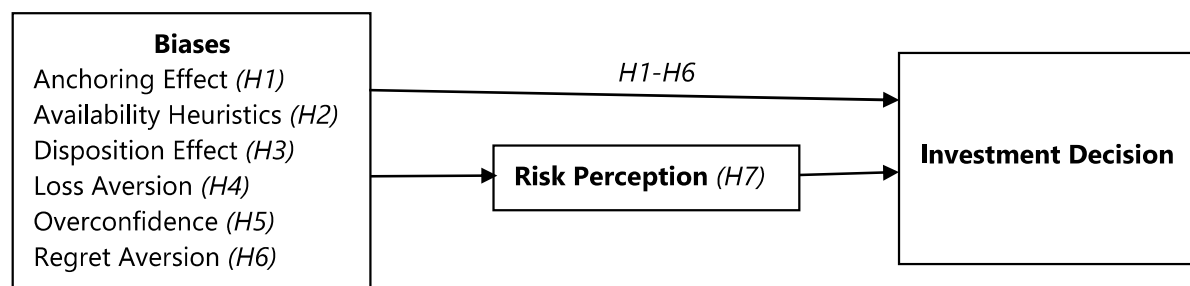


Figure 1. The Conceptual Framework

Source: the authors

Irrational investors make judgments based on heuristics that often lead to biases in investing decisions. We consider both heuristics and prospect theories as discussed earlier in various pieces of literature (Frydman & Rangel 2014, Goo et al. 2010, Hassan et al. 2014, Kahneman & Tversky 1979, Lin 2011, Odean 1998, Wood & Zaichkowsky 2004) to develop the research framework and hypotheses for this research. A brief review of some prominent biases leading to hypotheses formulation is mentioned in the next section.

Anchoring Effect (AE)

As Slovic (1967) introduced and adopted by cognitive psychologists, the anchoring effect is a cognitive bias that eventually distorts an investor's decision-making capacity by considering a single and first source of information, overlooking all other sources and kinds. Subsequent decisions followed on that available piece of information lead to undue financial risks. Many studies have also proved the implication of this cognitive heuristic in the decision-making process. Kahneman and Tversky (1979) explored that investors often make wrong estimates by adopting an initially available reference value and later adjusting the weight. Research revealed that individuals failed to adapt their final assessments judiciously based on the starting point ("anchor"). Of late, researchers like Qu et al. (2008) provide evidence of the anchoring bias based on perception. Judicial decisions (Englich et al. 2006), personal injury (Chapman & Bornstein 1996), and the likelihood of diseases (Brewer et al. 2007) are some of the other areas where one can find anchoring biases. The other biases seen are performance evaluation (Latham et al. 2008), competitions (Ginsburgh & van Ours 2003), and real estate (Northcraft & Neale 1987). The analysis of the anchoring effect suggests the following hypothesis:

H1. The anchoring effect has a positive influence on investment decisions.

Availability Heuristics (AH)

The availability heuristic propounded by Tversky and Kahneman (1973) assumes that investors make decisions based on the frequency of events by exploring the availability of instances. Investment decisions are subject to various biases and distortion (Kudryavtsev et al. 2013). Oppenheimer (2004) has already highlighted the role of availability heuristic in decision-making. However, Goodwin (2020) has tested the impact of this type of heuristic in the case of judgmental risk and viewed that investment decisions depend on balancing biases, distortions and risk. With this backdrop, it is pertinent to explore further the impact of the availability heuristic on investment behavior of investors. The reason is that the availability heuristic has important implications in most professional domains and many facets of everyday life. Every day, people make hundreds of decisions. Heuristics are crucial in making judgments and responding to information in our environment. Availability heuristic is a valuable tool, but it is vital to recognize that it may lead to inaccurate evaluations. Being aware of inherent prejudices may protect investors from erroneous thinking, unintentional discrimination, and expensive blunders in investments and commercial choices. Hence, the study proposes the following hypothesis.

H2. Availability heuristics has a positive influence on investment decisions.

Disposition Effect (DE)

Investment decisions are complex and challenging as it involves money and can impact the quality of life. In investment decisions, the disposition effect plays a crucial role (Rubaltelli et al. 2010). Investors tend to retain financial assets that have lost their value and sell them out when the value of those assets increases. Kahneman and Tversky (1979) have explained the concept and termed it one of the most "irrational" behaviors. Later on, Jin and Scherbina (2011) tested the impact of disposition effects concerning retail investors. Besides, Rubaltelli et al. (2010) investigated the implications of the disposition effect and the

status quo bias among students in investment decision-making. The outcome was that, though there were huge choices, investors tended to stick to recent options for investment decision-making, due to which they suffered losses. Individuals who are risk-averse and invest in investment funds and investors who trade often are more likely to sell winning assets while holding on to losing ones (Oreng et al. 2021). Given these propositions, understanding the disposition effect can help investors, financial institutions, and policymakers mitigate the negative impact of this bias in investment decisions. Therefore, the objective is to gain a more comprehensive knowledge of the disposition effect and its tendencies. Thus, the inference that the effect of disposition biases impacts investors' decision-making leads to the following hypothesis:

H3. Disposition effect bias is positively associated with investment decisions.

Loss Aversion (LA)

Investors are more prone to becoming loss averse than other individuals. Lee and Veld-Merkoulova (2016) examined that investors highly impacted by loss aversion generally have lower stock investments as they observe their stock portfolio performance too often, contributing to myopic loss aversion prevalence. Mahina et al. (2017) analyzed that loss aversion bias highly affected investment in the Rwanda stock market. Arora and Kumari (2015) examined whether investors aged 41-55 years show high impact loss aversion bias compared to individuals aged 25-40 years. The result also indicates that females had more loss aversion and regret as compared to males. The prospect theory assumes that investors tend to choose possible gain over possible loss if they decide to offer. Thus, studies suggest that loss aversion bias is related to risk aversion (Koszegi & Rabin 2006). The inference of this research is that investors do not like integrating the decision at hand with any other decision or event. Still, the attitude of loss aversion of investors affects their investment decisions in the financial market. Therefore, the next hypothesis is:

H4. Loss aversion has a positive impact on investment decisions.

Overconfidence (OC)

Overconfidence is the unwarranted faith in intuitive reasoning, cognitive abilities, and judgment (Pompian 2011), and it creates life-cycle consumption profiles and macro-indicators consistent with the market rate of return on savings and investment (Bagchi 2011). Past research has also found the effect of optimism and overconfidence on investment decision-making. Fairchild (2005) examined the impact of overconfidence on funding decisions where there is no asymmetry of knowledge or moral hazard. Since the manager is overconfident, they believe that the market undervalues his equity. Hackbarth (2002) employed the link between management overconfidence, investment, and debt using a simple options framework with an earnings-based capital structure model. Additionally, Hackbarth (2009) followed Fairchild (2005), who discovered a positive link between management overconfidence and debt by providing two models of managerial overconfidence and capital structure. Overconfident people become too confident about their skills and knowledge while underestimating the various risks associated with the investment. Generally, overconfident investors overreact to private information signals while ignoring publicly available information. So we propose the next hypothesis:

H5. Overconfidence has a positive impact on investment decisions.

Regret Aversion (RA)

The regret theory assumes that the utility of a choice option also depends on the feelings evoked by the outcomes of rejected options. People compare the actual result with what the expected work has had a

different choice and experience emotions. People experience regret when the foregone outcome would have been better and rejoice when the foregone outcome would have been worse. Previous studies have held that people are regret averse in investment decision making. In other words, regret aversion can select either the option with the highest or the lowest risk. Lebaron (1999) examined whether investors tend to sell shares at a higher value and avoid selling those shares at a lower discount. Similarly, Fogel and Berry (2006) studied that investors often express regret holding loss prone stocks for quite a long period rather than selling them too early. Therefore, regret aversion is an emotional factor that influences investors when they are scared of losing an asset due to a wrong investment decision, thus exhibiting regret aversion. The hypothesis, therefore, is:

H6. Regret aversion has a positive impact on investment decisions.

Role of Risk Perception (RP) between the Biases and Investment Decision (ID)

The decision-making behavior of an individual is affected by the attitude and perception toward risk and how the individual subjectively perceives the risky investment risk. Biases influence the decision-making behavior of an investor. Sitkin and Weingart (1995) discussed how taking action on risk affects risk perceptions and attitudes towards risk. Several empirical pieces of research have been conducted on this bond and concluded that the investment decision-making process, according to many investors, is majorly affected by risk perception (Weber & Hsee 1998). Chen and Tsai (2010) investigated the relationship between perception of risk and decision making of investment empirically, particularly considering individual investor factors. Investment decision-making is critical for a particular investor who requires more return with loss aversion and availability bias (Frings 2012). In behavioral finance, risk is one of the critical variables observed, measured, and analyzed. If investors are affected by available biases, the decision may be irrational (Baker & Ricciardi 2014). The earlier studies focused on the relationship between risk perception, attitude towards risk, and investment decisions. Behavioral Finance literature assumes that the decision of asset allocation depends on the risk-taking attitude of investors (Nasic & Weber 2010). The research determines the moderating role of risk perception in the relationship between behavioral biases and individual investor decision making. So the hypothesis formulated is:

H7. Risk perception mediates the relationship between the biases and investment decisions.

Methodology

Measurement of Variables

The study analyzed primary data gathered via a structured questionnaire comprising two sections with 35 questions on a five-point Likert scale. While the first section asks questions about investors' demographic details, the second seeks answers to all investment biases and decision-related questions. The scale ranged from 1 to 5, where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree. Anchoring effect, availability heuristics, disposition effect, loss aversion, overconfidence, and regret aversion were independent factors in this study. The anchoring effect had four scale items (Lin 2011), and availability heuristics had three scale items (Goo et al. 2010). Further, the disposition effect had three scale items (Wang et al. 2010). At the same time, loss aversion had a four-item scale (Hassan et al. 2014). While overconfidence had six scale items (Simon et al. 2000), the regret aversion bias had five scale items (Wood & Zaichkowsky 2004). On the other hand, the dependent variable considered for the study was investment decision. Hira and Loibl (2008) identified five factors: investing is exciting, investing is stressful; investing is satisfying; investing is complex; and time-consuming and adopted to measure the investment decisions. These factors formed the basis for the data collection on various behavioral biases for the study.

Data Collection

Convenient sampling techniques formed the basis for sample selection. The respondents selected were from the stock-broking firms as those having knowledge and experience in investing. A total of 579 respondents was chosen offline through various broking firms and investment banks. Besides, 105 prospective respondents were approached online through different social media blogs and postings. The researchers took the utmost care while explaining the meaning of each question item for better data access. Out of 688 samples, received responses were 563 (493 offline and 70 online) replies. However, the researchers retained 536 responses (95%), complete in all respects, used for analysis and interpretation.

Sample Characteristics

The study gathered responses from both Indian (82%) and NRI (18%) investors having a minimum of 2 years of experience in stock and FOREX trading. Respondents included both males (74%) and females (25%) from different age groups, where young investors (less than 30=52%; between 30 and 40=35%). The education qualifications of the maximum respondents ranged from high school (22%) to graduate (61%). About 66% of the respondents desired to invest in the stock and FOREX market due to high-risk tolerance. Investors tended to invest to avoid loss (44%) or maximize profit (46%) during the COVID-19 pandemic.

Analyses

We used multivariate technique-Structural Equation Modelling (SEM) based on the Partial Least Square (PLS) method. SEM is a suitable method in our study as detects the composite relationship between known variables. It is a blend of factor and multiple regression analyses that detects direct and indirect relationships between the variables of interests (Hair et al. 2006). The ability to deal with observed, unobserved, and hard to handle latent variables makes this method particularly useful in business applications. Before the structural path analysis, we tested the reliability and validity of the measurement model. The reliability test of all the study variables, average variance extracted (AVE), Cronbach's alpha, composite reliability (CR) and standard error (SE) is presented in Table 1. Cronbach's alpha and composite reliability values are above .7, indicating reliability of the scales. All factor loading were above .5. A variable is said to be discriminated validate if the square root of AVE is higher than its latent variable correlation with other variables. Our study meets this criterion. Further, VIF is found to be less than 2, indicating multicollinearity was not an issue for the data analysis.

Table 1. Reliability and Validity

<i>Variables</i>	<i>Alpha</i>	<i>CR</i>	<i>AVE</i>	<i>SE</i>
Anchoring Effects (AE)	.83	.83	.54	.11
Availability Heuristics (AH)	.74	.75	.58	.04
Disposition Effect (DE)	.76	.79	.55	.16
Loss Aversion (LA)	.75	.84	.63	.05
Overconfidence (OC)	.79	.85	.65	.00
Regret Aversion (RA)	.73	.81	.55	.07
Risk Perception (RP)	.82	.86	.58	.00
Investment Decision (ID)	.85	.87	.57	.00

Table 2 represents the Path Coefficient of all independent variables for the dependent variable. Further, it can be observed that the critical ratio being more than 1.96 in all cases the behavioral biases under study

in this research such as anchoring effect, availability bias, disposition effect, and overconfidence, loss aversion and regret aversion are significant.

Table 2. Regression Path Coefficients

<i>Hypothesis</i>	<i>Reg. path</i>	<i>Estimates</i>	<i>SE</i>	<i>CR</i>	<i>p</i>	<i>Result</i>
<i>H1</i>	AE → ID	.26	.05	4.38	.00	Accepted
<i>H2</i>	AH → ID	.19	.05	3.25	.00	Accepted
<i>H3</i>	DE → ID	.29	.04	5.25	.00	Accepted
<i>H4</i>	LA → ID	.26	.04	4.54	.00	Accepted
<i>H5</i>	OC → ID	.12	.03	2.51	.01	Accepted
<i>H6</i>	RA → ID	.14	.05	2.32	.00	Accepted

Mediating Effects

Table 3 reports the mediating effects of all the independent variables towards investment decisions through risk perception. It indicates that risk perception has a partial mediating effect between anchoring effects and investment decisions, availability heuristics and investment decisions, and disposition effects and investment decisions. Similarly, risk perception does not influence on the relationship between loss aversion and investment decisions, nor does it affect regret aversion. Additionally, risk perception acts as a complete mediator between overconfidence and investing decisions. Therefore, we accept Hypothesis 7.

Table 3. Mediating Effects (H7)

<i>Variables</i>			<i>p</i>	<i>IV→M</i>	<i>M→DV</i>	<i>IV→DV</i>	<i>IV+M→DV</i>		<i>Mediation</i>
<i>IV</i>	<i>M</i>	<i>DV</i>					<i>IV</i>	<i>M</i>	
AE	RP	ID	.00	.43***	.34***	.31***	.19***	.36***	partial
AH	RP	ID	.00	.33**	.24**	.11**	.29*	.23**	partial
DE	RP	ID	.00	.23**	.14***	.12**	.31*	.16**	partial
LA	RP	ID	.08	.13	.01	.11	.11	.02	no
OC	RP	ID	.00	.23**	.27**	.21***	.10	.36**	full
RA	RP	ID	.09	.03	.14*	.01	.06	.13	no

IV: Independent variable, M: Mediation, DV: Dependent variable. * $p < .05$. ** $p < .01$, *** $p < .001$

Discussion

This study examines the role of different behavioral biases on investors' decision-making through risk perception as a mediating variable. Suppose we consider the traditional theory of finance. In that case, investors decide after evaluating and assessing all the available information relating to the stock, and then they make investments and maximize their wealth. While behavioral finance is the opposite of the traditional finance theory, it also implicates that it is impossible to have a market as rational as there is no strong form of efficiency in the market, where all the different types of investors have the same knowledge and information. Behavioral finance has identified some psychological biases and their impact on the decision-making of investors. The analysis and findings of the study give us an insight into the rapid development and progress in behavioral economics and finance compared to financial management.

The first hypothesis was accepted, where anchoring effect bias is positively associated with an investment decision. Other hypotheses concerning biases like availability heuristic, disposition effect, and overconfidence are accepted as the result shows significant positive impact on their investment decisions. Further, loss aversion and regret aversion have a significant negative influence on investment decisions. In

the financial market, the retail investors exhibit behavior what they consider most appropriate on the moment. They tend to be inflicted with such biases which lead them to generate lesser revenue.

Risk perception has a partial mediating effect between anchoring effects and investment decisions, availability heuristics and investment decisions, and disposition effects and investment decisions. Similarly, risk perception has no mediation effect between loss aversion and investment decisions and regret aversion and investment decisions. Further, risk perception has a full mediation effect between overconfidence and investment decisions. The analysis suggests that investors behave irrationally and invest more without considering the market. They suffer from behavioral biases like overconfidence, availability heuristic, anchoring, and disposition. Similarly, regret aversion bias and loss aversion make the investor step back from a sound investment decision. Their risk perceptions also get blurred and are driven to take suboptimal decisions. Investors need to take appropriate decision while investing in the stock market. Their decisions should rely on the fundamental analysis to generate profit from their investments. They need to compare stock performance with other investment avenues and channelize investment strategically.

Conclusion, Limitations and Direction for Future Research

The study's objective was to explore the impact of behavioral biases such as availability heuristic, disposition effect, overconfidence, regret aversion, and loss aversion on investment decisions, with the mediating result of risk perception. The finding proved that individual investors behave irrationally due to behavioral biases supported by the adaptive market hypothesis. The study findings indicate that the anchoring effect, availability heuristics, disposition effect, and overconfidence motivate investors to make investment decisions. Further, loss aversion and regret aversion impair investment decisions. Risk perception has a full mediation effect between overconfidence and investment decision, and partial mediation between anchoring effect, availability heuristics, disposition effect and the investment decision. The study also finds that risk perception has no mediation effect between biases such as loss aversion, regret aversion and investment decisions. The current research seems to be the first of its kind, focusing on the link between heuristic-driven biases and investment decisions with a mediating role of risk perception.

All researchers have their limitations, so does this research. Since the scope of the study is confined to the small retail investors trading in the stock and FOREX market to find their behavioral biases in investment decision-making, the results have limitations in generalization. Therefore, there is a broader spectrum for the validity of the degree of behavioral biases in investment decision-making with a larger sample size from diverse backgrounds of industries and investors/potential investors from other trading markets. Future research may cover all these factors for a rigorous examination of behavioral biases and mediating factors benefitting profitable investments. Besides, the prospective researchers may include other behavioral biases and psychological factors and moderation effects of demographical factors such as gender, income, and age.

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