



Impact of Loss Aversion and Overconfidence Biases on Investor Decision-Making:

The Mediating Role of Risk Tolerance

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Abstract

The purpose of this study is to investigate how risk tolerance functions as a mediator between overconfidence and loss aversion in the decision-making process of individual investors. A structured questionnaire with multiple-choice and Likert scale items was used to gather data using a quantitative methodology. Responses were obtained by convenience sampling, and multiple regression analysis was performed on the data. Using Andrew F. Hayes' Process V4.2 Macro, the mediating effect of risk tolerance was quantified. With a correlation coefficient of 0.623, the results show a moderately favorable association between investment decisions, loss aversion, and overconfidence. When risk tolerance is not present, overconfidence and loss aversion together explain 38.8% of the variance in investing choices. The study discovered that overconfidence and investment decision-making behavior are partially mediated by risk tolerance, with both direct and indirect effects being statistically significant. Similarly, the study discovered that while loss aversion's direct impact on investment choices is statistically negligible, its indirect impact through risk tolerance is statistically substantial. While risk tolerance entirely mediates the association between loss aversion and investment decision-making behavior, it only partially mediates the relationship between overconfidence and investment decision-making behavior, according to the study. In order to promote logical decision-making, the study proposes including psychology and risk tolerance education into investor training programs, highlighting psychological biases and risk tolerance as mediators in investment behavior.

Keywords: Overconfidence, Loss aversion, Risk tolerance, Investment decision

Introduction

Behavioral finance studies how individuals acquire and manage financial assets, focusing on psychological and sociological factors influencing investment decisions. It explores behavioral biases, systematic deviations from rational decision-making, which can significantly impact investment decisions, consumer behavior, and market trends (Sharma & Firoz, 2020).

Kahneman and Tversky (1979) explored decision-making under risk and uncertainty, highlighting that people evaluate outcomes relative to a reference point, are loss averse, and become less sensitive to wealth changes. They identified behaviors such as framing effects and differing risk attitudes in gains and losses, providing a more realistic decision-making model than classical theories. Thaler (1980) noted that behavioral biases affect investors' judgments, leading to suboptimal outcomes, while his 1999 work suggested that behavioral finance assumptions can address issues that modern finance theories cannot. He identified five areas where investor behavior deviates from classic finance theory: dividends, predictability, equity premium, volume, and volatility. Ricciardi and Simon (2000) examined the psychological and emotional influences on investors. Scholars and professionals are advancing behavioral finance, which challenges traditional rational investor assumptions (Charles & Kasilingam, 2016). Mittal (2022) studied the impact of behavioral biases on investment decisions, noting overconfidence and herd behavior as significant biases. Overconfidence leads to underestimating risks, overestimating knowledge, and excessive trading, while herd behavior results in capital allocation herding and asset price bubbles. Bailey et al. (2011) emphasized the relationship between various biases in financial decision-making, with overconfidence and the need to avoid regret being common, both leading to ineffective investment behaviors (Baker et al., 2014).

Fama (1970) asserts that financial markets are efficient, with all information reflected in prices, making it impossible to consistently outperform the market, thus recommending passive investment strategies. In contrast, Yildirim (2017) highlights the influence of psychological and emotional tendencies on investor decisions, driven by emotions like greed and fear. Chaudhary (2013) and Kafayat (2014) identify key behavioral finance

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factors such as loss aversion, overconfidence, herd mentality, and self-attribution that impact investment decisions. Safaie et al. (2024) emphasize the negative impact of these biases on market efficiency, particularly in the Tehran Stock Exchange. Xu (2023) discusses how biases like noise trading and loss aversion affect market dynamics. There's a notable gap in research on the specific impact of these biases in the Pakistani market, where limited financial education may lead to poor investment choices.

This study's main objective is to gain understanding of investor decision-making. The study specifically intends to address how risk tolerance mediates the relationship between these behavioral biases and the investment decision behavior of individual investors, as well as the impact of overconfidence and loss aversion biases on investors' investment decision behavior in the context of Nepalese individual investors.

This research on investor behavioral biases, including loss aversion and overconfidence, has a significant influence on financial market decision-making. It highlighted the importance of awareness and information in promoting reasoned decision-making. Since more informed persons were better able to identify and reduce their preconceptions, it was found that financial literacy was crucial in reducing these biases. The research also provided management expertise on managing biases such as anchoring and regret aversion. The study improved our understanding of behavioral finance and how it affects market stability and efficiency. It suggested cross-national comparisons to understand cultural variations and provided a solid foundation for further study. Individual investors, financial experts, and legislators all profited from the study's link between behavioral finance and traditional finance theories.

Literature Review

Behavioral finance explores how individual preferences, cognitive processes, and emotional factors impact decision-making, integrating insights from psychology, sociology, and finance. This field challenges conventional financial economics by recognizing systematic deviations from rationality in market models. Barber and Odean (1999) highlighted overconfidence and regret avoidance as significant investor biases. Prior to behavioral finance, traditional theories such as expected utility theory,

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Markowitz's portfolio theory, and the efficient market hypothesis were prominent. Markowitz's theory, introduced in 1952, underpins modern portfolio theory (MPT) by establishing the minimum risk for a given expected return. CAPM and EMH are key theories within traditional finance, with the former linking systematic risk to expected returns (Mcclure, 2010) and the latter positing that stock prices reflect all available information (Fama, 1970). Kahneman, Tversky, and Thaler, pioneers in behavioral finance, expanded the field by examining heuristic behaviors and biases like representativeness, availability, and anchoring (Tversky and Kahneman, 1974). They introduced prospect theory, detailing risk attitudes and decision-making psychology (Kahneman and Tversky, 1979). Shleifer and Vishny (1997) explored the Limits of Arbitrage, explaining why market anomalies persist. Ricciardi and Simon (2000) examined behavioral finance concepts such as prospect theory, regret theory, cognitive dissonance, and overconfidence, advising investors to be aware of their own and others' mistakes.

Johnsson et al. (2002) studied investor behavior during the 1990s speculative bubble, attributing market declines post-2000 to overconfidence, earnings, and profitability issues. Massa and Simonov (2005) focused on risk-taking behaviors and stock selection, highlighting the influence of previous gains or losses. Barberis and Thaler (2003) discussed prospect theory, market efficiency, limits to arbitrage, and investor psychology, applying behavioral finance to various contexts. Pompian (2006) identified 20 cognitive and emotional biases through case studies, while Schindler (2007) integrated sociology, psychology, and finance to elaborate on behavioral finance. Kannadhasan (2015) emphasized the relevance of behavioral finance to investment decision-making, noting the impact of behavioral factors on investor judgments.

Overconfidence

Research links overconfidence with investment behavior, suggesting it influences decisions more than actual financial knowledge (Pikulina et al., 2017). Overconfidence leads to increased investment, while under confidence results in insufficient investment. Kumar and Prince (2022) noted investor overconfidence before market crashes in 2008

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and 2020, but not after. Zuraidah et al. (2024) confirmed a strong link between overconfidence and investment decisions. Odean (1998) identified the disposition effect, where investors sell winners and hold losers, reducing returns. Statman et al. (2006) observed that positive returns boost confidence in active trading, while Fagerström et al. (2008) found S&P 500 analysts prone to overconfidence and overoptimism. Deaves et al. (2009) showed overconfidence increases trading activity across genders, and Khan and Waheed Khan (2017) found it positively impacts investor returns. Thus, the hypothesis of effect of overconfidence of investors' while making investment decision is formed as:
H1: Overconfidence has a significant impact on individual investors' investment behavior.

Loss Aversion

Hwang and Satchell (2010) found that investors are more risk-averse than previously thought, with loss aversion varying by market conditions—higher in bull markets than in bear markets. Arora and Kumari (2015) noted that investors aged 41-55 exhibit greater loss aversion than those aged 25-40, and females show more loss aversion and regret than males. Lee and Veld-Merkoulova (2016) observed that highly loss-averse investors allocate a smaller portion of their portfolio to stocks and often exhibit myopic loss aversion by frequently monitoring their portfolio. Kumar et al. (2018) highlighted that gender significantly impacts loss aversion, affecting investment decisions. Thus, the hypothesis statement to test impact of loss aversion on investors' decision making is formed as:

H3: Loss aversion has a significant impact on individual investors' investment behavior.
Risk Tolerance

Hussain and Rasheed (2022) found that risk tolerance significantly affects financial literacy, investor personality, overconfidence bias, and investment decisions. Khan (2022) demonstrated that past perceived losses, mediated by loss aversion, indirectly influence investing objectives, such as aiming for higher returns and accumulating cash for future expenses. For high-risk investors with low loss aversion, past losses indirectly affect their decision to invest more for higher returns and less for financial reserves. This

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indicates that risk-tolerant investors continue to invest despite previous losses to achieve higher expected returns.

H3: Risk tolerance mediate the relationship between overconfidence and individual investors' investment behavior.

H4: Risk tolerance mediate the relationship between loss aversion and individual investors' investment behavior.

Various studies have explored behavioral biases in investment decisions. Dittrich et al. (2005) found overconfidence decreases with uncertainty and increases with task complexity. Chen et al. (2007) identified overconfidence, frequent trading, and representativeness bias among Chinese investors. Parveen et al. (2020) highlighted different impacts of behavioral heuristics in developing countries, with a focus on overconfidence in Pakistan. Shams et al. (2012) observed mental accounting principles in Tehran's investors. Medhioub and Chaffai (2018) noted herding behavior in Gulf Islamic stock markets. Oehler et al. (2018) linked personality traits like extraversion and neuroticism to investment choices. Madaan and Singh (2019) emphasized the influence of overconfidence and herding on investors in India, recommending addressing these biases. Katper et al. (2019) examined cognitive and emotional biases in Pakistan, finding significant effects on decision-making. Jain et al. (2020) rated herding, loss aversion, and overconfidence as the most impactful biases among Indian investors. Atif Sattar et al. (2020) focused on the role of behavioral biases under uncertainty, highlighting the importance of psychological factors in investment decisions.

Parveen et al. (2020) found that investor overconfidence and representational heuristics significantly impact investment decisions in Pakistan, suggesting that results from developed countries may not apply to emerging markets due to differences in cultural and financial factors. Armansyah (2021) highlighted the influence of mental accounting and overconfidence on investment choices in Indonesia. Commer et al. (2021) showed that information gathering can moderate the negative impact of overconfidence and self-attribution biases on investor decisions in Pakistan. Svoboda (2022) provided a comprehensive review of behavioral biases and their influence on investor behavior and risk perception, advocating for future research. Kumar and Prince (2022) examined the

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fluctuation of overconfidence bias in Indian investors across different market phases, noting its decline during and after financial crises. Ahmed et al. (2022) and Almansour et al. (2023) highlighted the role of individual judgment and cultural contexts in investment decisions, emphasizing the need for education to mitigate biases. Abideen et al. (2023) investigated cognitive biases in Pakistan, revealing the moderating role of financial literacy in mitigating market irregularities.

Dita et al. (2023) investigated how risk perception mediates the relationship between heuristic biases and investment decision-making among individual investors on India's NSE, revealing partial mediation for most biases and full mediation for representativeness bias. Purwidiyanti et al. (2023) found that risk perception mediates the impact of overconfidence and herding bias on investment decisions by SME owners in Banyumas Regency, though not between herd mentality and overconfidence. Wang (2023) explored four behavioral biases—endowment, loss aversion, framing, and overconfidence—on investment decisions, proposing mitigation strategies but lacking empirical validation. Shandu & Alagidede (2024) identified the disposition effect among South African investor teams, noting that lack of female representation worsens this bias. Zuraidah et al. (2024) examined optimism bias and overconfidence among Acehnese investors, emphasizing the importance of herding behavior in decision-making. Additionally, the study calls for empirical research on behavioral biases in Nepal's stock market, highlighting the need to understand how risk perception and sociodemographic factors influence investment decisions to provide better insights for policymakers, regulators, and investors.

Conceptual framework

The study's conceptual framework was focus on the influence of overconfidence and loss aversion on individual investor decision-making behavior. Statistical models were evaluating the psychological factors influencing risk tolerance and its impact on investor decisions. Iram et al. (2023) found that availability heuristics and overconfidence positively affect investment decision-making, with financial literacy playing a crucial intermediary role. Ahmed et al. (2022) highlighted the mediating role of risk perception

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in investment decisions, particularly with blue-chip stocks, but not with herding bias or the disposition effect. The study emphasizes the importance of understanding risk perception and its direct relationship with the disposition effect, advocating for individual judgment over herd mentality and suggesting education and training to moderate biases. Svoboda (2022) identified behavioral biases like overconfidence, the disposition effect, and loss aversion, along with the impact of demographics on investor behavior and variations in risk perception among investors.

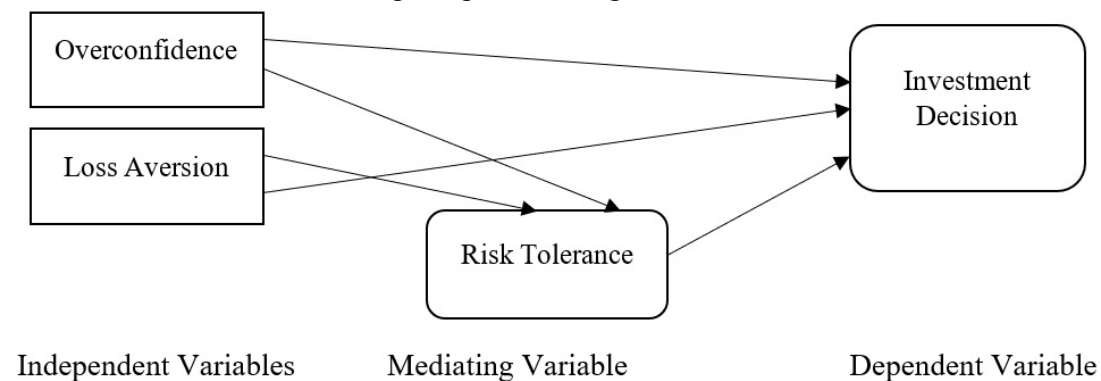


Figure 1: Conceptual Framework

The restricted analysis of the relationship between gender, age, and behavioral biases such as loss aversion and overconfidence in the context of investment decisions in Nepal represents the study's research gap. There may be a chance to look more closely at the underlying causes of these disparities, even though the study offers insightful information about how age affects these biases and how gender variations in risk preferences and investment decisions differ. Understanding behavioral finance in the Nepalese context may be improved by more research on the precise causes of age and gender differences in overconfidence and loss aversion, as well as the consequences for investment results. Furthermore, investigating the role that risk tolerance plays in mediating the connection between these biases and investment behavior of individual investor in Nepal.

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Methods

This research adopts a quantitative approach to explore how two common behavioral biases—overconfidence and loss aversion—affect the investment decisions of individual investors in Nepal's financial market. Risk tolerance is incorporated as a mediating variable to test the study's hypotheses and gather supporting empirical data. Given the broad target population, convenience sampling was employed, selecting 324 stock market investors from Nepal to investigate how these biases influence their decision-making. The data collection process targeted specific behavioral traits and levels of risk tolerance, allowing for an in-depth analysis of how such psychological factors impact investment choices.

Structured questionnaires, comprising multiple-choice and Likert-scale items, were distributed to investors at the Nepal Stock Exchange. These surveys followed ethical guidelines, ensuring participants' anonymity and data confidentiality. To ensure the tool's reliability, statistical validation was conducted, followed by multiple regression analysis to measure the effects of overconfidence and loss aversion. Data were processed using SPSS version 27, while the Process Macro (v4.2) by Andrew F. Hayes was utilized to assess mediation effects.

The initial regression model used to analyze the influence of overconfidence (OC) and loss aversion (LA) on investment decisions (ID) was as follows:

$$ID = \alpha + \beta_1 OC + \beta_2 LA + \varepsilon_i$$

To examine the mediating effect of risk tolerance (RT) in the relationships between the behavioral biases and investment decisions, the following models were applied:

$$ID = \alpha + \beta_1 OC + \beta_2 (RT \times OC) + \varepsilon_i$$

$$ID = \alpha + \beta_1 LA + \beta_2 (RT \times LA) + \varepsilon_i$$

Descriptive Statistics

Out of the 324 participants, 244 were male (75.3%) and 80 were female (24.7%). Marital status was almost evenly split, with 52.2% single and 47.8% married. Educational background varied, with most participants holding a bachelor's degree (42.6%), followed by intermediate (23.8%), master's (24.1%), SEE/SLC (5.6%), and MPhil/PhD (4%).

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Age-wise, the largest group was aged 26–35 (42%), followed by those aged 18–25 (20.1%), 36–45 (19.1%), 46–55 (11.4%), and above 55 (7.4%).

Table 1 *Respondents Characteristics*

Description	Gender	No. of Respondent	Percentage
Gender	Male	244	75.30%
	Female	80	24.70%
Age	18-25	65	20.10%
	26-35	136	42.00%
	36-45	62	19.10%
	46-55	37	11.40%
	Above 55	24	7.4%
Marital Status	Single	169	52.20%
	Married	155	47.80%
Academic Qualification	SEE/SLC	18	5.60%
	Intermediate	77	23.80%
	Bachelor	138	42.60%
	Master's	78	24.10%
	MPhil/PhD	13	4.00%

Regression Findings

The regression analysis revealed a moderate positive correlation between the independent variables (OC and LA) and the dependent variable (ID), with a correlation coefficient (R) of 0.623 and R^2 of 0.388. This suggests that 38.8% of the variation in investment decisions can be explained by these behavioral biases. The adjusted R^2 was 0.384, indicating a well-fitting model. A standard error of 0.43925 demonstrated reasonable predictive accuracy, and the Durbin-Watson statistic of 2.465 indicated minimal autocorrelation, confirming that residuals were independent.

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Table 2 Model Summary of Independent variables (OC and LA) and Dependent variable Investment Decision:

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin- Watson
1	.623a	.388	.384	.43925	2.465

a. Predictors: (Constant), LA, OC

b. Dependent Variable: ID

The regression coefficients showed that:

- The intercept value was 1.092 ($p < 0.001$), representing the baseline investment decision level when both biases are absent.
- Overconfidence had a coefficient of 0.086 and a p-value of 0.137, indicating its effect was statistically insignificant.
- Loss aversion had a much stronger and significant impact, with a coefficient of 0.680 ($p < 0.001$), suggesting a notable influence on investment decisions.
- The standardized beta for loss aversion (0.559) further confirmed its significant role.

Table 3 Coefficient from Multiple Regression Model of Overconfidence, Loss Aversion and Investment Decision

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1(Constant)	1.092	.198		5.527	.000
OC	.086	.058	.089	1.490	.137
LA	.680	.073	.559	9.342	.000

a. Dependent Variable: ID

Thus, the regression equation derived was:

$$ID = 1.092 + 0.086(OC) + 0.680(LA)$$

Mediation Analysis

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Overconfidence and Investment Decisions (Mediated by Risk Tolerance):

Using the mediation framework:

- Overconfidence significantly influenced investment decisions indirectly through risk tolerance (indirect effect: $b = 0.3288$, $t = 7.7547$).
- The direct effect also remained statistically significant ($b = 0.1275$, $p = 0.0008$).
- Because both effects were significant, risk tolerance is considered a partial mediator. The confidence interval did not include zero, confirming this mediation.

Table 4 *Mediation Analysis Summary*

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
Overconfidence --> Risk Tolerance --> Investment Decision	0.4563 (0.0000)	0.1275 (0.0008)	0.3288	0.2399	0.4092	7.7547	Partial Mediation

Loss Aversion and Investment Decisions (Mediated by Risk Tolerance):

- The indirect effect of loss aversion on investment decisions through risk tolerance was also significant ($b = 0.6528$, $t = 10.9714$).
- However, the direct effect became statistically insignificant ($b = 0.1017$, $p = 0.1098$), suggesting that risk tolerance fully mediates this relationship.

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Table 5 *Mediation Analysis Summary*

Relationship	Total Effect	Direct Effect	Indirect Effect	Confidence Interval		t-statistics	Conclusion
				Lower Bound	Upper Bound		
Loss Aversion -> Risk Tolerance -> Investment Decision	0.7545 (0.0000)	0.1017 (0.1098)	0.6528	0.5340	0.7670	10.9714	Full Mediation

Discussion

The study sheds light on how investor demographics and psychological traits influence financial decision-making. The majority of the sample was male and relatively young, with a range of educational backgrounds. The regression analysis confirmed a moderate positive relationship between both behavioral biases and investment behavior, though only loss aversion had a significant direct effect. Overconfidence's impact was only significant when considering the role of risk tolerance, implying that this bias indirectly affects decision-making through an individual's willingness to take risks. Conversely, risk tolerance fully explains the influence of loss aversion, making it a key factor in understanding investor behavior. These insights underscore the importance of considering both emotional and cognitive factors when advising investors.

Conclusion

This study advances the understanding of how psychological biases and individual risk preferences interact to shape investment decisions. It presents a validated framework for assessing the effects of overconfidence and loss aversion, highlighting the central mediating role of risk tolerance. While the direct influence of these biases on investment decisions may not always be significant, their indirect effects—channeled through risk tolerance—are both meaningful and statistically supported. These findings offer practical

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implications for investors and financial professionals, suggesting that acknowledging and managing psychological biases can lead to more rational and risk-aligned investment choices.

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