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Influence of Overconfidence and Loss Aversion Biases on Investment Decision: The Mediating Effect of Risk Tolerance

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Abstract

This study aims to examine the effects of overconfidence and loss aversion on Investing behavior with the mediating role of risk tolerance. Employing a quantitative methodology, data was collected using a structured questionnaire featuring multiple-choice and Likert scale questions. Convenience sampling was used to gather responses, and the data was analyzed through multiple regression techniques. The mediating effect of risk tolerance was measured using Andrew F. Hayes' Process V4.2 Macro. The study found that risk tolerance partially mediates the relationship between overconfidence and investment decision-making behavior, with both direct and indirect effects being statistically significant. Similarly, the study found that loss aversion has a statistically insignificant direct effect on investment decisions, while its indirect effect through risk tolerance is statistically significant. The study discloses that risk tolerance partially mediates the relationship between overconfidence and investment decision behavior, while it fully mediates the relationship between loss aversion and investment decision-making behavior. Risk tolerance significantly influences investment decisions, influencing both overconfidence and loss aversion, while loss aversion's influence is partially explained by risk tolerance.

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) identified key behavioral finance factors such as loss aversion, overconfidence, herd mentality, and self-attribution that impact investment decision. Safaie et al. (2024) emphasize the negative impact of these biases on market efficiency in Tehran Stock Exchange.,. Xu (2023) discusses how biases like noise trading and loss aversion affect market dynamics. The study points up significant gaps in the knowledge about investment behavior, especially with regard to the little-known ways in which behavioral biases such as loss aversion and overconfidence influence investment decisions when risk is perceived. The study also

aims to provide light on how risk perception functions as a mediator between investment decisions and biases. The study intends to close these gaps and improve knowledge about emerging market investment behavior.

The primary goal of this study is to uncover insights into investor decisions. Specifically, the study aims to address the influence of overconfidence and loss aversion biases on investment decision behavior in the context of Nepali individual investors and how risk tolerance mediates the relationship between these behavioral biases and the investment decision behavior of individual investors.

Financial market decision-making was greatly impacted by the study on behavioral biases in investors, such as overconfidence and loss aversion. To further understand the impact of these and other variables on investment decisions, future study should examine human capital, technology literacy, and market anomalies. research that compares cultures would highlight the influence of cultural influences, while longitudinal research might monitor the evolution of biases and risk perception over time. Creating instruments to assist investors in identifying and reducing their biases, as well as broadening demographic research to encompass a range of populations, would contribute to our understanding of investment behavior and provide useful information for professionals and individuals alike.

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, 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). Tversky and Kahneman (1974), pioneers in behavioral finance, expanded the field by examining heuristic behaviors and biases like representativeness, availability, and anchoring. They introduced prospect theory, detailing risk attitudes and decision-making psychology (Kahneman & Tversky, 2013). 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 Simkonov (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 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 positive 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:

H2: Loss aversion has a significant positive 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 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 such as 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 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. Purwidianti 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.

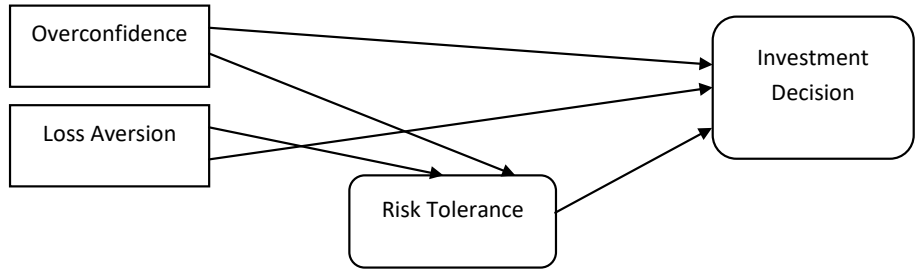
Conceptual Framework

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 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. 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.

Figure 1

Conceptual Framework



The research gap in this study lies in the limited examination of the interaction between gender, age, and behavioral biases such as overconfidence and loss aversion in the context of investment decisions in Nepal. While the study provides valuable insights into the differences in risk preferences and investment choices between genders, as well as the impact of age on these biases, there is a potential opportunity to investigate deeper into the underlying factors driving these differences. Further investigation into the specific reasons behind gender and age disparities in overconfidence and loss aversion, as well as the implications for investment outcomes, could enhance the understanding of behavioral finance in the Nepali context. Additionally, exploring how risk tolerance mediates the relationship between these biases and investment behavior of individual investor in Nepal.

Research Methodology

The study uses quantitative methodology to examine the influence of overconfidence and loss-aversion biases on individual investors' investment behavior in the Nepali financial market. It uses risk tolerance as a mediating variable to test hypotheses and gather empirical evidence. Due to the large size of the population, convenience sampling was used to select 324 investors from Nepali stock market investors to analyze biases in investment decision behavior. This method was gathering data on specific behavioral biases and risk tolerance, allowing for a comprehensive analysis of biases' impact on decision-making processes. This study used questionnaires distributed to investors at the Nepal Stock Exchange to assess their responses to biases and decision-making performance. The structured questionnaires were multiple-choice and Likert scale, adhering to ethical guidelines and confidentiality, with identifying data anonymized or removed. The data analysis process used reliability tests for questionnaire validation and multiple regression to analyze the effect of overconfidence and loss aversion on investment decisions. For future analysis, SPSS 27 and to measure the

mediation effect Andrew F. Hayes Process V 4.2 Macro software was used.

The following model was used to ascertain the effect of overconfidence (OC) and loss aversion (LA) on Individual Investor's investment decision-making (ID).

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

Similarly, to evaluate the mediating role of risk tolerance (RT) in the relationship between Overconfidence (OC), Loss aversion (LA) and investment decision making (ID) in Nepal Stock Exchange, following regression model will be expressed.

$$ID = \alpha + \beta_1 OC + \beta_2 OCxRT + \varepsilon$$

$$ID = \alpha + \beta_1 LA + \beta_2 LAxRT + \varepsilon$$

Results and Discussion

Results

The respondents' summary data is shown in Table 1. According to the descriptive data, 244 male and 80 female respondents make up our sample, representing 75.30% and 24.70% of the sample population, respectively. 52.20% of the respondents are single, compared to 47.80% of married respondents. Regarding "qualification," it's important to note that 42.60% of respondents have bachelor's degrees, compared to 23.80%, 24.10%, 5.60%, and 4.00% of respondents with intermediate, master's, SEE/SLC, and MPhil/PhD degrees, respectively. Regarding "age," the largest group of respondents (42.00%) reported having the age of 26–35 years, which was followed by 18–25 years of 20.10%, 36–45 years having 19.10%. The 46–55-year age of respondents is 11.40%, and only 7.40% of respondents have an age above 55 years. The sample is primarily male, with a notable gender gap. The respondents' demographics are split nearly evenly between single people and married people. The majority of the sample is highly educated; they hold bachelor's degrees, with smaller numbers having master's, intermediate, or higher degrees. The age distribution of the respondents reveals that the majority are young adults between the ages of 26 and 35, with fewer elderly respondents. Those between the ages of 18 and 25 and 36 and 45 are next in line. This implies that young, educated men make up the majority of the sample.

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%
	Marter's	78	24.10%
	MPhil/PhD	13	4.00%

The regression model shows a moderate positive correlation between the independent variables (LA and OC) and the dependent variable (ID), with a correlation coefficient of 0.623, The Adjusted R Square of 0.384 indicate that 38.4 percent of the variation in investment decision is explained by loss aversion and overconfidence, indicating a good fit even after accounting for the number of predictors. The standard error of 0.43925 reflects the typical deviation of predicted investment decision (ID) values from actual values, while the Durbin-Watson statistic of 2.465 suggests minimal autocorrelation, confirming the independence of residuals.

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	.623[a]	.388	.384	.43925	2.465

a. Predictors: (Constant), LA, OC

b. Dependent Variable: ID

The intercept value of 1.092 shows that the predicted value of investment decision is 1.092 with a statistically significant p-value of 0.000 when over confidence and loss aversion are zero. The regression coefficient of loss aversion is positive (0.680) and

statistically significant at 5 percent level of significance (P = 0.000). The significant positive regression coefficient confirmed that loss aversion has the significant positive impact on investment decision. More clearly, higher the loss aversion level of the investors, the higher would be the investing decision. Similarly, the regression coefficient of overconfidence is positive (0.086) and statistically insignificant at the 5 percent level of significance which indicate that over confidence does not have relationship with investment decision. A standardized coefficient (Beta) of 0.559 highlights the significant influence of loss aversion (LA) on investment decision (ID).

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

Therefore, based on above table, multiple regression model is

ID = 1.092+ 0.086OC +0.68LA

Where,

ID = Investment Decision

OC= Overconfidence

LA= Loss Aversion

Overconfidence- Investment Decisions Relationship is Mediated by Risk Tolerance

In this context, X represents Overconfidence (independent variable), Y represents investment decisions (dependent variable), and M represents risk tolerance (mediating variable). All conditions of the process macro have been examined.

The study assessed the mediating role of Risk tolerance on the relationship between Overconfidence and Investment decision making. The results revealed a significant indirect effect of Overconfidence on Investment decision making (b = 0.3288, t=7.7547), supporting alternative hypothesis. Further, the direct effect of Overconfidence on Investment decision in the presence of the mediator was also significant (b= 0.1275, p = 0.0008). Since the direct and indirect effects were statistically significant and substantial, this suggests that risk tolerance partially mediates the relationship between overconfidence and investment decisions. Similarly, zero does not exist in between

lower bound and upper bound of confidence interval, so there is a mediating effect of risk tolerance. Hence, risk tolerance partially mediates the relationship between Overconfidence and Investment decision making. Mediation analysis summary is presented in Table 4.

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- Investment Decisions Relationship is Mediated by Risk Tolerance

In this context, X represents loss aversion (independent variable), Y represents investment decisions (dependent variable), and M represents risk tolerance (mediating variable). All conditions of the process macro have been examined.

The study assessed the mediating role of Risk tolerance on the relationship between Loss aversion and Investment decision making. The results revealed a significant indirect effect of Loss aversion on Investment decision making (b = 0.6528, t=10.9714), supporting alternative hypothesis. Further, the direct effect of Loss aversion on Investment decision in the presence of the mediator was insignificant (b= 0.1017, p = 0.1098). Hence, risk tolerance full mediated the relationship between loss aversion and investment decision making. Mediation analysis summary is presented in Table 5.

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 results highlight key insights into the demographics, statistical relationships, and mediating role of risk tolerance in investment decision-making. The sample of 324 respondents most of the respondents are male (73.30%) and only 24.70% was female

and marital status of respondents were balanced (52.20% single, 47.80% married), with diverse educational backgrounds and age groups. Regression analysis showed that there was moderate positive correlation between loss aversion, overconfidence, and investment decisions (correlation coefficient 0.623), it means that investment decision increase due the increase in overconfidence and loss aversion, R square 0.388 indicate that 38.8% of the variation in investment decisions is explain by overconfidence and loss aversion of investors. The model had good predictive accuracy (standard error 0.43925) and minimal autocorrelation (Durbin-Watson 2.465). The relationship between overconfidence and investment decision was insignificant having coefficient of 0.086 and p-value of 0.137, while loss aversion had a significant positive effect in investment decision (coefficient 0.680, $p = 0.000$). Risk tolerance was found to partially mediate the relationship between overconfidence and investment decision, which indicate that in the presence of mediating variable risk tolerance, overconfidence have significant direct and indirect relation with investment decision. Similarly, in the presence of mediating variable risk tolerance, direct effect of loss aversion on investment decision is statistically insignificant but indirect effect is statistically significant, which indicate that risk tolerance fully mediation the relation between loss aversion and investment decision making. These findings underscore the importance of psychological traits and the critical mediating role of risk tolerance in shaping investment behaviors, providing valuable insights for financial advisors and investors aiming to develop informed and effective investment strategies.

Conclusion

This research breaks new ground in understanding how investors make decisions and manage risk. The study provides valuable tools by developing reliable scales to measure the effect of psychological biases such as overconfidence and loss aversion on the investment decision behavior of individual investors, with the mediating role of risk tolerance. Their findings highlight a clear indirect connection between behavioral biases (such as overconfidence and loss aversion), risk tolerance, and investment decision behavior, which is statistically significant but whose direct effect on behavioral biases and investment decisions is statistically insignificant. It means the risk tolerance has fully moderated the relationship between behavioral biases such as overconfidence and loss aversion and investment decision-making. Ultimately, this research empowers individual investors by showing how addressing these biases can help them make informed decisions that better align with their risk tolerance and psychological tendencies.

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