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Conflict of Interest

The author (s) declared no conflict of interest and have not received any funds for the project.

Behaviour Biases and Investor Investment Decisions in Pakistan Foreign Exchange Market

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Abstract

Many investors in developing countries, including Pakistan, make incorrect decisions due to behavioral biases. Thus, this study examines the relationship between behavioral biases and investment decisions and the moderating role of “financial literacy on investment decisions.” Using a predeveloped questionnaire, we collected 419 responses by focusing on the respondents who trade extensively in the foreign exchange market. The data analysis includes descriptive analysis, correlation, reliability, validity, and hypotheses testing using Smart PLS. The study found herding bias, overconfidence, and representativeness significantly affect the investment decision. Risk tolerance insignificantly affects investment decisions. We also found that financial literacy has a moderating effect on investment decisions. The study recommends that policymakers arrange seminars and workshops for investors on financial literacy. Such measures may reduce the investors’ decisions based on behavioral biases.

Keywords: *Herding bias, overconfidence, risk tolerance, representativeness, financial literacy and investment decision.*

Introduction

Due to technology diffusion, investors worldwide have access to the internet, enabling them to invest in various options. Many investors invest in fixed deposits, which are less risky, while others invest in the stock market and have a higher return

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and risk element (Jia, Jin, & Wagman, 2021). Nipa, Kermanshachi, and Karthick (2022) define investment decision as a process in which investors invest in high-risk assets such as real estate and gold and stocks or low-investment portfolios, including savings and deposits. Investment decisions can be rational or irrational. Most investment decisions are not rational. Many investors make investment decisions based on their psychological and financial behavior (Walczak et al., 2021). Cognitive psychology deals with how an individual thinks while responding to a stimulus (Simon, Houghton, & Aquino, 2000). Many researchers believe that consumers' cognitive decisions are inappropriate and risky (Quaicoe & Eleke-Aboagye, 2021). Investors' investment decisions significantly depend on return and risk in an investment. (Hildebrand & Bergner, 2021). Investors who perceive the investment as high risk may invest in low-risk portfolios, while others may still invest in high-risk ventures with high returns. Risk tolerance is also essential to investment decisions (Defrizal, Romli, Purnomo, & Subing, 2021). Risk tolerance relates to the threshold of a consumer's risk perception. A consumer with a high-risk tolerance makes investments in high-risk and high-return ventures. At the same time, investors whose risk tolerance levels are low invest in portfolios having low returns and low risk (Grable, Heo, & Rabbani, 2021). Overconfident investors often exaggerate their ability to assess the risk and return associated with an investment rationally. As a result, they make poor investment decisions. Piehlmaier (2022) believes many investors lack confidence due to the non-availability of related information and adopt herding behavior. Financial literacy has direct and indirect effects on investment decisions. Representativeness bias occurs when a investors makes a stereotypical decision. Past literature found an inconclusive association between herding bias and investment decisions. Also, a few studies have used financial literacy as a moderator on investment decisions. Given these gaps and others discussed in the forthcoming section, the study aims to:

1. Examine the effect of herding bias, over-confidence, risk tolerance, and representativeness on investment decision.
2. Examine the moderating effect of financial literacy on (i) herding bias and investment decision, (ii) overconfidence and investment decision, and (iii) risk tolerance and investment decision.

Hypothesis Development

In this study, we have articulated four direct and three moderating hypotheses, which we have discussed in the following sections.

Herding Bias and Investment Decision

Herding behaviors occur when investors make decisions by following the investment trends of others, ignoring relevant financial data and information (Rahayu, Rohman, &

Harto, 2021). Many factors contribute to such behavior. Investors have little confidence in their decisions and want to reduce investment risk elements. This trend is common in emerging stock markets where financial-related data are unavailable (Ahmad & Wu, 2022).

The herding trend is contagious. It also motivates rational investors to invest in shares that most people choose to invest (Kartini & Nahda, 2021). Many studies have documented a positive correlation between herding behavior and investment decisions (Yadav & Narayanan, 2021). For example, a study in the US examined the association between herding bias, risk, and uncertainty. The study found the presence of herd behavior in the US stock market. The study concluded that the trend of herding behavior in the US was low when the stock market was comparatively stable but significantly higher during uncertainty and crisis (Quaicoe & Eleke-Aboagye, 2021). Many studies have documented that when investors see most people are selling or buying a certain stock, they adopt the same behavior leading to herd behavior (Sattar, Toseef, & Sattar, 2020). Herd behavior often contributes to the volatility of stock markets, which often hurts rational decision-makers (Rahayu, Rohman, & Harto, 2021). Generally, investors adopt herding biases since they are not sure of investment returns. Financial literacy may reduce herding biases. Thus, based on the above discussions, we argue that:

H1A: Herding bias affects investment decision.

H1B: Financial literacy moderates the relationship between herding bias and investment decision.

Overconfidence and Investment Decision

Researchers, apart from other behavioral finance aspects, have given more importance to confidence bias (Fitri & Cahyaningdyah, 2021). Overconfidence develops in consumers due to their unreasonable “self-belief based on exaggerated self-assessment and cognitive ability” (Nguyen et al., 2020). Overconfident persons have the necessary information and relevant data for making rational decisions, but often their decisions are incorrect (Smii, Kouki, & Soltani, 2021). Due to high self-confidence, such persons ignore the advice and information of others resulting in a bad investment. Fitri and Cahyaningdyah (2021) assert that overconfident persons believe that their judgments are rational and their predictions about investments have more certainty and accuracy than others (Zaludin et al., 2021). Overconfident persons believe their investment decisions may yield higher returns with little risk. Although, it is not guaranteed and does not happen most of the time. Many studies based on empirical evidence have documented that overconfident persons make excessive investments

resulting in low or negative returns (Adil, Sing, & Ansari, 2021).

Persons with such traits often advise others to invest in high-risk portfolios, which often results in bad investments. Overconfident people often retain the stocks they should disinvest. Thus they end up with portfolios whose market values are significantly lesser than the market and do not own stocks whose market values have profoundly increased (Shukla et al., 2020). Financial literacy can enhance investors' confidence levels, affecting the "association between overconfidence and investment decisions." Thus we postulate that:

H2A: Overconfidence affects investment decision.

H2B: Financial literacy moderates the relationship between overconfidence and investment decision.

Risk Tolerance and Investment Decision

Risk tolerance is investors' threshold level of risk. Risk tolerance levels vary from one individual to another. Some investors take a little risk, some take no risk, and some are not even bothered (Naiwen et al., 2021). Many researchers have grouped individuals based on their risk tolerance perception into three groups, which are "risk-seeker, neutral to risk, and risk averter." Risk tolerance helps investors align their investment decisions with their risk threshold level (Hendrawaty, Irawati, & Sadalia, 2020). Risk tolerance helps investors to choose different investment options (Nosita et al., 2020). Individuals with high-risk tolerance invest in high-risk portfolios, while individuals with low-risk tolerance avoid investing in high-risk assets (Shah et al., 2020). Age life cycle also influences risk threshold level. For example, a person at retirement age becomes more conservative and avoids high-risk ventures (Thanki, Karani, & Goyal, 2020; Salman et al., 2021). Risk tolerance, financial literacy, and investment decisions are correlated. Therefore, we argue that:

H3A: Risk tolerance affects an investment decision.

H3B: Financial literacy moderates risk tolerance and investment decision.

Representativeness Bias and Investment Decision

Past studies report inconclusive results on the "association between representativeness bias and investment decisions." A few studies have documented that representativeness bias positively affects investment decisions, while others found an insignificant association between the two (Kartini & Nahda, 2021). For example, Yousbardini and Natsir (2022) concluded that representative bias positively affects

investment decisions. They found that individuals with representativeness bias had a higher return than those without it. Many studies in Pakistan have also validated this association (Salman, Khan, & Javed, 2020; Yusbardini & Natsir, 2022).

Contrarily, many researchers have different opinions on this issue. They believe that representativeness bias insignificantly affects investment decisions (Mahadevi & Haryono, 2021). For example, Dangol and Manandhar (2020) found that investor returns on the investments were insignificant due to their over-reliance on representativeness. Similarly, Fitri and Cahyaningdyah (2021) also concluded investment decision making and representativeness are negatively associated. Based on study in the Nairobi Stock Exchange, Onsomu (2014) found that representativeness positively affects investment. While other studies documented a negative association between representativeness and investment decision making. One of the disadvantages of representativeness is that it does not allow investors to make rational decisions.

H4: Representativeness bias significantly affects investment decision.

Conceptual Framework

Based on the above theoretical discussions, this study has developed a novel model containing four direct and three moderating relationships, depicted in Figure 1.

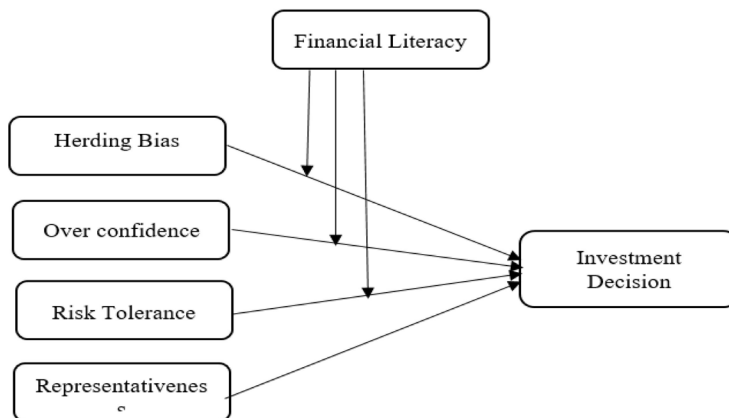


Figure 1: Conceptual Framework

Methodology

Population and Sampling

This study has a quantitative and exploratory design. The target population is individual investors in the foreign exchange market. Since the target population is large,

we estimated that a sample size of 385 would be appropriate, which many researchers have suggested for a large population. However, we distributed 435 questionnaires and received 419 questionnaires. For probability sampling, the sample frame is needed. Since it was not available, we used non-random sampling.

Scales and Measures

We used a self-administered questionnaire to collect the data from the target population. It has two parts. One was related to the demographic profile, and the second part was related to the context of the study. Before administering the survey, the study conducted a pilot study to assess the reliability of the constructs. For the pilot study, we collected a sample of 35 respondents and found the reliability of all the variables used in the study had acceptable reliability.

The study has presented the details in Table 1. The questionnaire used in the study has six latent variables and 26 indicators. We measured the responses on a “five-point Likert scale, one suggesting a low agreement and five a high agreement.

Table 1: Scale and Measures

Constructs	Sources	Reliability in Past Studies	Number of Items
Investment Decision	Khan (2017)	0.765 to 0.787	8
Overconfidence	Firah (2017)	0.807 to 0.877	3
Herding Bias	Waweru et al. (2008)	0.789 to 0.888	4
Financial Literacy	Baker et al. (2018)	0.824 to 0.865	5
Representativeness	Baker et al. (2018)	0.765 to 0.777	3
Risk Tolerance	Yao et al. (2004)	0.766 to 0.777	3

Demographics Details

Table 2 provides a demographic profile of investors (respondents), while Table 3 provides the investment profile of investors (respondents).

Table 2: Demographic Details of Respondents

Demographics Variables	Category	Percentage (%)
Gender	Male	67.3%
	Female	32.7%
Marital Status	Married	57.3%
	Non- married	42.7%
Age	20-30	5.3%
	31-40	6.7%

	41-50	20.7%
	51-60	32.7%
	Above 60	34.6%
Qualification	Undergraduate	25.7%
	Graduate	31.3%
	Postgraduate	34.7%
	Any other	8.3%
Occupation	Student	25.0%
	Businessman	37.7%
	Salaried person	25.3%
	Any other	12.0%
Annual Income	Under Rs. 30,000	16.0%
	Rs. 31,000-60,000	28.7%
	Rs. 61,000-90,000	20.7%
	Above Rs. 90,000	34.6%

Table 2 shows the demographic details of the respondents. The male respondents are 67.3%, while the female respondents are 32.7%. However, the proportion of married investors is 57.3%, and non-married investors are 42.7%. The age profile suggests 32.7% of respondents are in the age strata of 51- 60 years, 34.6% are above 60 years, and the rest fall in other age categories. The profession profile shows 25% of the respondents are students, 37.7% are business professional, and 25.3% are salaried person and 12% are in other categories. Salary profile suggests that 16% of respondents' monthly incomes are less than Rs. 30K, 28.7% of respondents' monthly incomes range from Rs. 31K to Rs. 60K, 20.79% of respondents income bracket is from Rs. 61K to Rs. 90K and 34.7% respondents incomes are higher than Rs. 90K.

Table 3: Investment Details of Respondents

Investment Details	Category	Percentage (%)
Experience in Investment/ Trading	Less than a year	0%
	3-5 years	15.3%
	5-7 years	38%
	7-10years	46.7%
Course Attended in PFEM	Yes	48%
	No	52%
Objective of Investment	Capital appreciation	14.7%
	Good returns	29.3%
	Tax benefits	32%
	Any Other	24%

Regarding financial literacy, we found that 48% have attended some courses related to financial investment, and the rest, 52%, have not attended any financial investment-related courses. In terms of investment-related experience, we found all respondents' investment experience is more than one year. 15.3% of respondents' investment experience range from 3 to 5 years, 38% of the respondents' investment experience range between 5 to 7 years, and 46.7% of respondents' experience is between 7 to 10 years. Respondents' investment objective shows that 14.7% of respondents invest for capital appreciation, 29.3% for a good return, 32% for tax benefit, and 24% for other reasons.

Results and Findings

Measurement Model

We have presented the measurement model in Figure 2, followed by the related results.

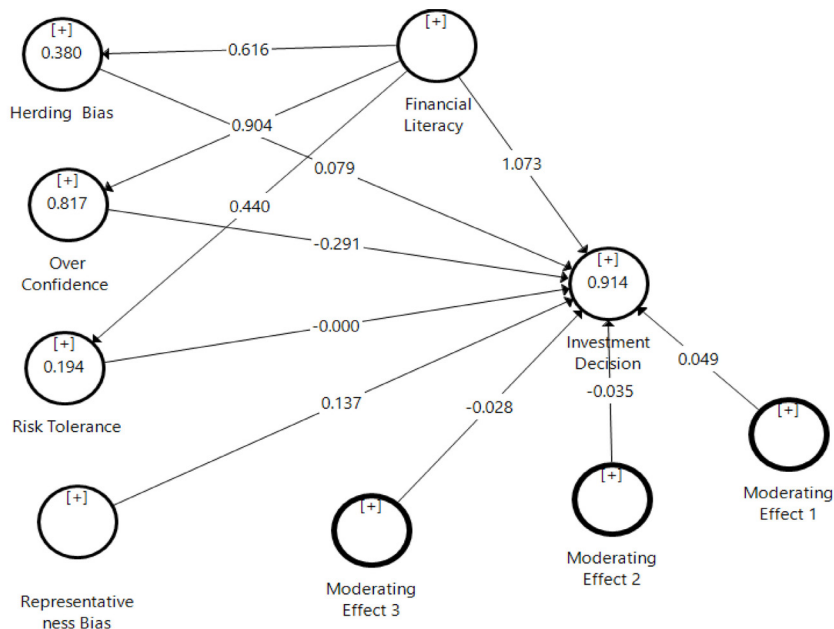


Figure 2: Measurement Model

Descriptive Analysis

In descriptive data analysis, we assessed the “normality and reliability” of the data. The study reports the descriptive analysis in Table 4.

Table 4: Descriptive Analysis of Behavioral Factors

Constructs	Cronbach's Alpha	Mean	SD	Skewness	Kurtosis
Herding Bias	0.864	3.500	1.468	-0.747	-0.829
Over Confidence	0.789	3.906	1.051	-0.654	-0.477
Risk Tolerance	0.848	3.360	1.243	-0.247	-1.027
Representativeness Bias	0.842	3.906	1.051	-0.654	-0.478
Financial Literacy	0.804	3.160	1.479	-0.280	-1.339
Investment Decision	0.795	3.750	1.560	-1.345	-1.657

The results show that the “highest Skewness value” is for investment decisions (Mean=3.750, SD=1.560, SK=-1.345), and the “lowest is for risk tolerance” (Mean=3.360, SD=1.243, SK=-0.247). We found that the “lowest Kurtosis value” is for overconfidence (Mean=3.906, SD=1.051, KR=-0.477), and the highest is for investment decision (Mean=3.750, SD=1.560, KR=-1.657). All the “Skewness and Kurtosis values ranged between ± 3.5 ,” suggesting the constructs based on the data collected from the investors of Pakistan have univariate normality.

Table 4 also shows Cronbach's Alpha ranging from 0.804 to 0.864. The lowest Cronbach's Alpha value is for overconfidence (Mean=3.906, SD=1.051, α = 0.789), and the highest is for herding bias (Mean=3.500, SD=1.468, α = 0.864). All Cronbach's Alpha values are within the acceptable range. Therefore, we conclude that the latent variables using the data set collected from the Pakistan have acceptable internal consistency.

Convergent Analysis

The study has examined the association of each construct used in the study with their respective indicators. The study has reported the summary in Table 5.

Table 5: Convergent Validity

Constructs	Mean	SD	Composite Reliability	AVE
Herding Bias	3.500	1.468	0.907	0.710
Over Confidence	3.906	1.051	0.862	0.611
Risk Tolerance	3.360	1.243	0.908	0.767
Representativeness Bias	3.906	1.051	0.895	0.682
Financial Literacy	3.160	1.479	0.933	0.778
Investment Decision	3.750	1.560	0.876	0.708

Results in Table 5 show that all “AVE values are greater than 0.60 and all the composite reliability values are greater than 0.70.” Thus we conclude that all the latent variables using the data collected from the Pakistan’s investors do not “deviate from the requirements of convergent validity.”

Discriminant Validity

If the latent variables used in a study are “not unique and distinct,” it will distort the results. This study has used Fornel and Larcker’s (1981) criteria for assessing discriminant validity. Table 6 presents the results.

Table 6: Discriminant Validity

	FL	RP	RTT	HB	ID	OC
Financial Literacy	0.882					
Representativeness Bias	0.591	0.826				
Risk Tolerance	0.440	0.458	0.876			
Herding Bias	0.616	0.654	0.591	0.842		
Investment Decision	0.741	0.649	0.440	0.635	0.841	
Over Confidence	0.704	0.602	0.476	0.664	0.816	0.781

Results in Table 6 show that “AVE square values depicted in horizontal lines are greater than the Pearson correlation values, suggesting that all the constructs used in the study are unique and distinct.”

Predictive Power of the Measurement Model

An important aspect of Smart PLS is that it has the option to generate the “predictive power of the measurement model,” giving more authenticity to regressions values. This study assessed the predictive power of the measurement model based on R^2 and Q^2 values presented in Tables 7 and 8, respectively. The measurement model has adequate predictive power: “ R^2 values are greater than 0.10 and Q^2 values are greater than 0.00.”

Table 7: Measurement Model’s Predictive Power

	R Square	R Square Adjusted
Risk Tolerance	0.194	0.193
Herding Bias	0.38	0.379
Investment Decision	0.914	0.913
Over Confidence	0.817	0.817

Table 8: Q Square Values

	SSO	SSE	Q² (1-SSE/SSO)
Risk Tolerance	3594	3068.939	0.146
Herding Bias	4792	3512.339	0.267
Investment Decision	3594	1318.912	0.633
Over Confidence	4792	2555.405	0.467

Fit Indices of the Model

Fit indices in a measurement model show how the observed data fit in the model. The results related to fit indices are depicted in Table 9.

Table 9: Fitness of the Model

	Saturated Model	Estimated Model
SRMR	0.077	0.078
d_ULS	2.116	3.727
NFI	0.801	0.802

Hypothesis Results

The study has tested four direct and three moderating hypotheses using bootstrapping, presented in Table 10. Also present in Figure 3 is the structural model showing t values.

Table 10: Hypothesis Results

		β	T Stat.	P Values	Results
H1	Herding Bias -> Invest. Decision	0.079	6.207	0.000	Accepted
H1A	Moderating Effect 1 -> Invest. Decision	0.049	4.996	0.000	Accepted
H2	Over confidence -> Invest. Decision	-0.291	11.733	0.000	Accepted
H2A	Moderating Effect 2 -> Invest. Decision	-0.035	3.571	0.000	Accepted
H3	Risk Tolerance -> Invest. Decision	0.000	0.021	0.492	Rejected
H3A	Moderating Effect 3 -> Invest. Decision	-0.028	2.780	0.003	Accepted
H4	Representativeness Bias -> Invest. Decision	0.137	10.418	0.000	Accepted

Based on the generated results presented in Table 10, we accepted all the direct and indirect hypotheses except the association of risk tolerance and investment decision.

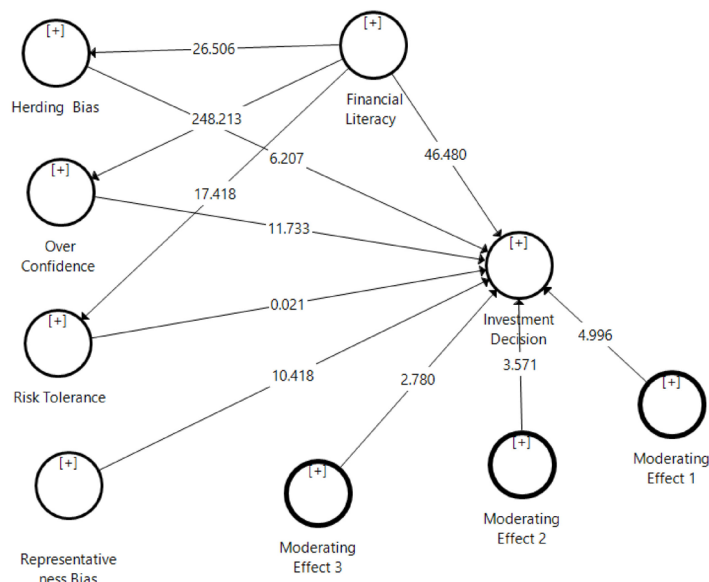


Figure 3: Structural Model

Discussion and Conclusion

Discussion

The following sections discuss the results and their relevance to past studies. The study has proposed that “herding bias positively affects investment decisions and “financial literacy moderates herding bias and investment decision.” The study supports the proposition and validates past studies. Many studies have documented that when investors see most people are selling or buying a certain stock, they adopt the same behavior leading to herd behavior (Sattar, Toseef, & Sattar, 2020). Herd behavior often contributes to the volatility of stock markets, which often hurts rational decision-makers (Rahayu, Rohman, & Harto, 2021). Generally, investors adopt herding biases since they are not sure of investment returns. Financial literacy may reduce herding biases.

We found that “overconfidence significantly affects investment decision” and “financial literacy moderates overconfidence and investment decision.” These results have validated many past studies. Overconfident persons believe their investment decisions may yield higher returns with little risk. Although, it is not guaranteed and does not happen most of the time. Many studies based on empirical evidence have documented that overconfident persons make excessive investments resulting in low or negative returns (Adil, Sing, & Ansari, 2021).

Financial literacy can enhance investors' confidence levels, affecting the "association between overconfidence and investment decisions." Overconfident people often retain the stocks they should disinvest. Thus they end up with portfolios whose market values are significantly lesser than the market and do not own stocks whose market values have profoundly increased (Shukla et al., 2020). Persons with such traits often advise others to invest in high-risk portfolios, resulting in bad investments.

We also found that "risk tolerance insignificantly affects investment decision" and "financial literacy moderates risk tolerance and investment decision." Risk tolerance helps investors to choose different investment options (Nosita et al., 2020). Individuals with "high-risk tolerance invest in high-risk portfolios," and "individuals with low-risk tolerance avoid investing in high-risk assets" (Shah et al., 2020). Age life cycle also influences risk threshold level. For example, a person at retirement age becomes more conservative and avoids high-risk ventures (Thanki, Karani, & Goyal, 2020; Salman et al., 2021). Risk tolerance, financial literacy, and investment decisions are correlated.

The study also found that "representativeness bias significantly affects an investment decision." Past studies report inconclusive results on the "association between representativeness bias investment decisions." A few studies have documented that representativeness bias positively affects investment decisions, while others found an insignificant association between the two (Kartini & Nahda, 2021). For example, Yusbardini and Natsir (2022) found representative bias positively affects investment decisions. They assert that individuals with representativeness bias had a higher return than those without it. Many studies in Pakistan have also validated this association (Salman, Khan, & Javed, 2020; Yusbardini & Natsir, 2022).

Conclusion and Implications

This study has examined how herding bias, overconfidence, and representativeness affect individuals' investment decision. And the moderating roles of financial literacy. We collected a sample of 419 from local investors in Pakistan. The study found that herding bias, overconfidence, and representativeness significantly affect the investment decision. Risk tolerance insignificantly affects investment decision. We also found that financial literacy has a moderating effect on investment decision.

The findings will help individual investors to make appropriate investment decision. The study suggests that policymakers must educate individual investors on financial literacy, as it moderates investment decision. They should seek the advice of agents, brokers, and financial consultants before investing. All investment plans are not unique

and vary from the investors' requirements, age, gender, and income. While developing investment plans, investors must keep these aspects in mind. The study recommends that policymakers arrange seminars and short courses related to the financial analysis of portfolios. These courses will reduce behavioral biases (overconfidence, herding, risk tolerance, and representativeness).

Limitations and Future Research

We have focused on the behavioral biases of individual investors. Future studies can also examine them in the agents, brokers, and investment firms. The study has only focused on four behavioral biases. Other researchers can examine other behavioral biases not covered in this study. Demographic factors can moderate behavioral biases and investment decision, which others may incorporate in their studies. The study assumes that the antecedents and consequences have a linear relationship, which may not be true in all cases. We have collected the data based on a rating scale which leads to generalized complications. Given this limitation, we suggest future researchers adopt mixed methods or qualitative research design. This study has focused on the investors of one city. Future studies may extend it to other cities. Cultural aspects are important in investment decision, which we did not consider. Future studies may incorporate cultural aspects in their conceptual framework.

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