

The Impact of Investor Overconfidence on Stock Market Volatility: The Role of Risk Perception and Financial Literacy in Pakistan

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Current research investigate the association between investor overconfidence, risk perception, and stock market volatility, with a specific emphasis on the moderating effect of financial literacy. Based on data collected from a sample of retail investors who trade in the Pakistan Stock Exchange (PSX), this study uses structural equation modelling (SEM) techniques to examine the research hypotheses. The results show that investor overconfidence has a significant effect on risk perception, which then enhances stock market volatility. The modulation by financial literacy was, however, limited when considering the attenuation of confidence in risk perception and market volatility. These findings indicate the importance of psychology to determine investment behavior and market outcomes and shed some light on how behavioral biases may lead to volatile behaviors in emerging markets. In addition, the findings add empirical evidence on the behavioural finance literature from the perspective of a developing country, Pakistan. The results have policy implications for policymakers and financial intermediaries who wish to improve investor education and lower the destabilizing impact of irrational investment behavior on market stability.

1. Introduction

The behaviour of worldwide stock markets in the last few years was no longer consistent with classical efficient-market expectations, and episodes of increasing market volatility were always more serious. Conventional explanations such as macroeconomic events, policy divergence and liquidity stress all still apply, but behavioural patterns — including outright "animal spirits" — are increasingly being identified as bearish catalysts. For example, the literature has demonstrated that overconfident investors are significantly related to trading volume and misestimation of return. In addition, as the extant literature highlights that having less knowledge about a market is associated with high volatility (e.g., Cao et al,1994), a set of hypotheses was proposed. In the Chinese market, Emotion-driven liquidity changes and price volatility are empirically associated with each other based on state-of-the-art deep learning and TVP-VAR models (Zhangetal., 2022). On the other hand, Temporary investor biases literature in retail states that overconfidence, optimism bias and cognitive heuristics decrease risk perception and increase market fluctuations (Almansour, 2023; Wibowo et al., 2023). In addition, the emergence of digital investment platforms and increasing retail involvement have brought in an extra dimension of behavioural complexity, with evidence that more accessible investors can increase their trading activity due to bias (Negi,2025; Ahadzie et al.,2025). Taken together, the corpus of findings here emphasizes that overconfidence can be understood not just as a micro-level psychological characteristic, but also as the springboard for macro-level market disruption.

In the case of emerging-market economies like Pakistan, the behavioural finance perspective is even more critical. Although research in Pakistan has examined behavioural biases and financial literacy, the link to stock-market volatility has been left underexplored in previous work. Empirical findings support a scenario in which Pakistani investors often display lower levels of financial knowledge and higher exposure to behavioural traps that make the market. These studies imply that if financial literacy is ineffective, the moderating cushion, possibly reduction in bias-induced trading is handicapped Mahmood et al., 2024; Gulshan, 2025. Moreover, in Pakistan's stock market context, perhaps no investigation has examined directly how overconfidence influences market volatility via risk perception or whether financial literacy may moderate this pathway. Hence, examining the flow of investor overconfidence into risk perception and further downstream effects on market volatility and the human capital moderation is a promising way to advance understanding of behavioural finance, especially in the context of the emerging-market economy.

Global stock markets, in recent years, have shown large fluctuation disturbances that are caused not only by macroeconomic shocks or policy uncertainties but also by investor behavior. For example, it is suggested that "the number of people who are overconfident (too optimistic) about how the future will unfold or the amount they can earn, increases with increasing degree of speculation," which may lead to greater levels of trading activity and contribute towards market instability (Rabbani &Yadav, 2024; Karki, 2024). In particular, stock market volatility is

intensified by overconfident traders who are more willing to trade intensively at the expense of myopia_ Model wise on (Rabbani & Yadav, 2024; SarahJI20SS).

In Pakistan, the situation is even more severe: the evidence suggests that individual investors in the PSX not only are affected by behavioural biases (including overconfidence) but also live in a country with a low level of financial literacy and weak investor protection mechanisms (Mahmood et al., 2024; Saeed, 2025). There is also evidence that financial literacy acts as a key moderating factor in refuting the adverse effects resulting from behavioural biases toward investment behavior; however, limited studies specific to the volatility relationship via the moderation of financial literacy have been observed (Saeed, 2025). However, for overconfidence and how it leads to stock-market volatility in Pakistan, there is a crucial lacuna that remains unaddressed, which financial literacy might attenuate as well. There is, however, a need to fill this gap as excessive market volatility may erode investor confidence, retard the development of markets, and induce systemic risk in emerging markets such as Pakistan.

1.1 Research Gap

In the last ten years, the behavioural finance researchers have insisted that investors' psychological biases — like trader overconfidence— influence market participants' behaviours, trading volume, return volatility and mis-pricing (Shahzad, 2024; Chishti, 2025). For instance, in developing markets, researchers find that overconfident investors trade more actively, and they tend to underestimate the level of risk, which serves as a source for higher market volatility (Ali 2024). Meanwhile, recent exploration in financial literacy has also shown that more financially literate individuals could reduce the impact of behavioural biases on investment decisions (Shah, 2024). Thus, the moderating role of financial literacy seems highly encouraging. Additional research further connects stock-index volatility to investor groups' trading behaviour: in Turkey, the paper by Saranj (2025) finds a bi-directional spill over from individual and institutional trading behaviours to index fluctuations, where the behavioural foundation also includes overconfidence.

For example, in the Pakistani stock market environment, the variation of macro-economic indicators has been considered a prominent reason for stock price volatilities such as inflation, oil price shocks, and political instability (Masih & Irshad, 2024). Several studies also examine the behavioral biases in Pakistani stock investors and report that overconfidence and herding exist (Ali, 2024) and that a low level of financial literacy is prevalent among them (Mehmood, 2025). In addition, despite the fact that higher levels of financial literacy are often associated with superior investment decisions, its interaction effect with behavioral biases in decision making in Pakistan is frequently weak or collapsing (Mahmood et al., 2024).

However, there are still a number of substantial voids. First, despite the copious amount of research on biases affecting investment decisions with investors having an unrealistic view of their own capabilities (overconfidence), very few studies focus on how such overconfidence relates to real market outcomes within emerging economies which in this case is stock - market volatility; more so for Pakistan where micro-behaviour dominates and macro linkage to market

level volatility hardly exists. Second, although financial literacy is investigated as a moderator between biases and decision-making, it has less been well articulated to moderate the pathway from overconfidence → risk perception → volatility. That is, the process through which overconfidence induces the enhancement of (or reduction in) risk perception, and then impacts on volatility is under-investigated (Shahzad 2024, 2024). The third is that the majority of studies on volatility make use of macro-economic models and do not consider behavioural mediators, while behavioural models are less likely to explore volatility as the dependent variable. Fourth, the field of studies in Pakistan is exclusively on traders' retail investors, and there is also no evidence that relates decisions taken by these investors to market-wide volatility, which shows low external validity. Moreover, the advent of digital investment platforms and mobile application trading has altered access and behaviours as well, absent a few such behavioral studies in Pakistan that regard digital-platform use as a moderator or channel through which overconfidence → volatility pathways would magnify.

Last, while most studies are either cross-sectional in nature or lack longitudinal or cross-period analysis (e.g., pre versus post COVID, rate hike cycles) to uncover how these behavioural linkages may change under stress (or volatility) regimes, such dynamic moderating effects remain untested within the Pakistani market. In sum, however rich the existing literature is in documenting various (overconfidence) trading behaviour, financial literacy and investment outputs: The clear gap remains to be filled in: (a) relating investor overconfidence to stock market volatility (not just decision making) in emerging markets; (b) spelling out the role of risk perception/lack thereof (or similar mechanism as mediator variable); and how this relationship works; (c) testing moderating effect of financial literacy on the overconfidence → volatility link; yet doing so for Pakistan specifically, using digital investment channels; and capturing dynamic constellations of conditions such as crisis versus normal times. In this sense, the present study aims to fill these gaps by examining how overconfidence of investors triggers stock-market volatility through risk perception and how financial literacy moderates the direct relationship between overconfidence and volatility in Pakistan, which provides both insights for the behavioural aspect and implications on the market level.

1.2 Research Objectives

This study seeks to examine the nexus between investor overconfidence and stock market volatility, while having a special reference to the moderating role of financial literacy in an emerging country like Pakistan. The main aim is to analyze the impact of investor overconfidence on stock market volatility, while risk perception plays a mediating role between the two. In particular, the analysis is designed to answer the question of whether financial literacy has a moderating effect on the direct impact of overconfidence in investors on volatility. In this way, this study attempts to address some gaps in the literature, such as (at least for Pakistan), which has been heavily concentrated on investor decision-making and not broad market developments. In addition, it will be investigated if financial literacy can alleviate the

detrimental impact of overconfidence on market instability, which provides useful guidance for financial education programs and investor protection in emerging markets.

Finally, the research will also look into the extent to which digital investment platforms have changed investor behaviour in Pakistan, and whether it is amplifying the impact of overconfidence on market stability. With the increase in internet trading and mobile app investments, it will be important to understand how such platforms influence investor psychology. We also endeavour to contribute as a whole to the behavioural finance literature by providing empirical evidence on the impact of cognitive mistakes, financial knowledge, and technological adoption in determining market outcomes. Lastly, the research seeks to provide data that can be used by policymakers, financial institutions, and educators to determine how best to contribute toward market stability through increased positive investor behavior and education.

1.3 Research Questions

1. What is the impact of investor overconfidence on stock market volatility in Pakistan?
2. What is the mediating role of risk perception in the relationship between investor overconfidence and stock market volatility?
3. Is there any moderating financial literacy on the relationship between investor overconfidence and stock market volatility in Pakistan?
4. Do digital investment platforms amplify the effect of overconfidence on market volatility?

This research is important as it could provide novel insights into the behavioural patterns that induce market volatility, a very little explored area of concern, especially in developing economies such as Pakistan. Whereas current research has concentrated mostly on individual investment decision-making, this work focuses on market volatility at the aggregate level, which is of great importance for financial stability and economic growth. The policy implications of monetary policies for improving financial literacy to mitigate the adverse effect of investor overconfidence on asset markets are apparent from examining the mechanism through which financial literacy moderates overconfidence.

In addition, the examination of the impact of digital platforms on investor reaction is particularly timely and topical in this era, with rapid development in the financial markets. With many investors migrating to mobile applications and internet-based trading platforms, it is important for the design of an optimal regulatory framework and investor protection measures to understand such people's behavior, as well as the psychological impacts of these platforms on their investment decision-making. Last but not least, this study will also ensure that more pragmatic implications are provided for financial educators, regulators, and institutions in building effective interventions that enable sustainable knowledge sharing of better financial decision-making and targeting such forms of bias, being overconfident, in emerging markets such as Pakistan.

2. Literature Review

2.1 Theoretical Development

Conceptual framework The underlying basis for the conceptualization of this study is derived from the Adaptive Markets Hypothesis (AMH), initially developed by Andrew W. Lo (2004), which generalises the classical Efficient Markets Hypothesis (EMH) through the inclusion of competition, adaptation, and behavioural heuristics in financial markets (Lo, 2004). Under AMH, markets are neither perfectly efficient nor wholly inefficient; rather, market efficiency adjusts as investors adopt learning, heuristics and bias in response to changes in the environment. This theoretical paradigm is particularly well-suited to this stream of research because it can accommodate behavioral phenomena, such as overconfidence, risk misperception, and built-in volatility fluctuations (Lo 2004; Mahjoubi & Henchiri 2024), the focus of this study in terms of the aggregation or marketization of investor-level behavior into market-level outcomes.

Under this paradigm, investor overconfidence is configured as an individual heuristic bias — in which an investor overestimates ability, under-weighs risk, or overlocates one's position compared to others' positioning (Moore & Healy, 2008). Empirical research indicates that overconfidence induces higher trading volume, greater portfolio turnover, lower perceived risk and a tendency to speculate (Aljifri, 2023; Karki, 2024). These actions, in fact, complement AMH as biased heuristics can disrupt the fully rational investor assumption, leading to spirals and therefore higher levels of volatility (Singh, 2024). This mediator is justified on the grounds that overconfidence influences risk perception and response – higher (over-) confident investors tend to under-perceive risks, take larger positions in stock investments, therefore generating greater stock price fluctuations that ultimately induce stock market volatility (ul Abdin, 2022). Second, the moderator of financial literacy is related to the theory by portraying investor cognitive capacities as functional: greater financial literacy facilitates an investor's ability to learn and correct for heuristic bias better and adapt ~ over time (Katenova, 2025). In relatively financially-literate markets, the bias-driven effects of arrogance would be mitigated and therefore we should observe less aggregate volatility. Therefore, the conceptual framework of this study is rooted in AMH and combines intrapersonal heuristics (overconfidence), perceptual mechanisms (risk perception) and antecedent conditions (financial literacy) for investor participation in market volatility.

2.2 Investor Overconfidence and Stock-Market Volatility

Classical and behavioural finance theory both hold that overconfident investors trade too much and under-estimate risk, potentially sowing seeds of market-wide volatility. Barber and Odean (2001) find that overconfident retail investors trade more than less-confident investors, and their risk-adjusted returns are lower, while turnover in the aggregate is higher. Recent empirical work also suggests that overconfidence interacts with price instability: Rabbani (2024)

documents a significant effect of overconfidence bias on stock returns, trading volume and market liquidity for G7 markets, in line with evidence from models where biased trading leads to the manifestation of more volatile price dynamics. Also studying “meme stock” episodes, Ahadzie, Junior, Woode, and Daugaard (2025) find that soft sentiment generated by overconfident investors and hype contributes to elevated return volatility and mispricing in the U.S. equity market. Studies in France and elsewhere characterize overconfidence as positively correlated with trading volume and return volatility, establishing the relationship between biased trading and excess market fluctuations. At the micro level, Abdin (2022) demonstrates that overconfidence bias widens investment performance significantly and is linked with risk-taking and trading activity among retail traders, further validating how the sun can affect the market temperature. In Pakistan, behavioural bias studies report a substantial role of overconfidence that leads investors to behave to influence the decision’s performance and their portfolio returns on the Pakistan stock market (PSX); however it is limited most of them work on performance but not on volatility directly Quddoos, Rafique, Kalim, & Sheikh, 2020; Rasheed, 2021. Our results imply that in environments where overconfidence is widespread and retail investors are the dominant clientele for asset markets –such as many emerging markets–there exists a theoretically justified and empirically supported case for a positive association between investor overconfidence and stock-market volatility.

Hypothesis H1. Investor overconfidence has a positive direct effect on stock market volatility.

2.3 Investor Overconfidence and Risk Perception

One of the most important psychological mechanisms by which behavioural biases affect financial decisions is through risk perception. Investors who are overconfident are likely underestimating downside risk/exposure and overestimating their ability to interpret news, implying more aggression in risk-taking. Abdin (2022) demonstrates that overconfidence leads to a significant increase in investors’ risk propensity, which is conceptually akin to lowered perceived risk of investment: overconfident investors are more prone (believe themselves capable) to bear risky transactions and trade more frequently. Second, in Pakistan (Mehmood 2025), it is reported that cognitive and emotional factors - specifically self-confidence and optimism – are powerful contributory forces to the way investors perceive risk and succeed financially in PSX, therefore suggesting that biased beliefs have a significant influence over how market risk is experienced and perceived by investors. Rehmat, Khan, Hussain and Khurshid (2023) model directly behavioural biases and find evidence that risk perception mediates the effect of biases (incl. heuristics, overconfidence-related) on their investment decision-making, whereby biased investors perceive risk differently than less biased ones. On the international scale, Koelbl (2024) demonstrates with machine-learning techniques that the perceived risk of investors can be systematically extracted from their level of volatility and disclosure information, emphasizing that solely belief formation is affecting perceived risk rather than objective volatility. Taken together, this literature suggests that overconfident investors would tend to underestimate risks and thus change the perception of risk.

Hypothesis H2. Investor overconfidence is negatively associated with investors' risk perception (i.e., higher overconfidence leads to under-perceived risk).

2.4 Risk Perception and Stock-Market Volatility

Risk perception is suggested by several recent studies as a mediating mechanism between behavioural biases and financial outcomes. Rehmat et al. (2023) show that risk perception partially mediates the link between investment decision and behavioral biases of Pakistani retail investors through their risk perception: Behavioral biases first distort the assessment of the level of perceived risk, and then result in adjusting investment choices accordingly. Abdin (2022) also shows that overconfidence has its impact on performance through the channel of risk-taking, indicating that biased beliefs indeed affect how risk is perceived and taken.

In developing markets with large retail participation like Pakistan, the presence of strong behavioral biases and noisy information environments strengthen this channel even more. Evidence from Pakistan indicates that risk perceptions across different investor categories appear to explain differences in the level of participation and exposure to market cycles (Mehmood, 2025; Migration Writing on Behavioural Finance, Risk Perception and Personality Traits). However, most of the studies are primarily on investment decisions or performance rather than clearly examining the stock market volatility as the dependent variable. This gap motivates the modelling of risk perception as a mediator in the link between investor overconfidence and stock-market volatility: That is, overconfidence affects perceived risk that subsequently impacts trading intensity and, consequently, volatility.

Hypothesis H4. Individual risk perception of investors is an intermediary factor in the relationship between investor overconfidence and stock-market volatility.

2.5 Moderating Role of Financial Literacy

Financial literacy is also regarded as an important factor that may reduce the influence of behavioural biases on investment decisions. Rasool and Ullah (2020) establish a negative relationship between financial literacy and behavioural bias among individual investors in Pakistan: the probability of exhibiting biases (overconfidence-induced inclinations, etc.) diminishes as financial literacy grows. Quddoos et al. (2020) discriminated against behavioural biases and investment performance in PSX and also examined the moderating role of Financial Literacy; They found that although overconfidence drastically reduces their performance but financial literacy does not always improve it, underlying the complexity of this moderating role.

Newer studies have presented better evidence that financial literacy can moderate the effects of biases. Saleem, Usman and Bashir (2023) find that financial literacy not only has a direct positive effect on investment decisions but also mitigates the impact of various behavioural biases, including availability bias and optimism bias, on these decisions for investors in Pakistan. Mahmood et al. (2024) developed, based on PSX data, that financial literacy has a significant impact on investment decision-making by moderating the effect of three behavioral biases (anchoring, overconfidence, and herding), which means better-informed investors are less

biased. Rehmat et al. (2023) also find that financial literacy moderates behavioural-bias–investment relationships, and the effects of the relationships are mediated by risk perception. At the global scale, Suresh (2024) shows that financial knowledge interacts with cognitive biases to drive investment choices, supporting the idea that literacy makes investors more capable of correcting or compensating for biased heuristics.

When considered in conjunction, this literature indicates that financial literacy is a form of adaptive capacity: financially literate investors do better because they can make sense of information, detect their biases and shun overtrading behaviour resulting from overconfidence. In the turbulent setting of an emerging market like Pakistan—where volatility tends to be high and information environments are noisy—it could hold off overconfident traders from engaging in reckless trades that lead to destabilising price dynamics.

Hypothesis H5. Financial literacy negatively moderates the relationship between investor overconfidence and stock-market volatility, such that the positive effect of overconfidence on volatility is weaker at higher levels of financial literacy.

3. Research Methodology

The approach used in the present study is quantitative, derived from a deductive method and hypotheses. Generally, very large and negative correlation between job insecurity. This research is founded on a positivist epistemology (Creswell, 2014) and as such obliges the objective measurement and statistical testing of relationships between variables. The research model will be used to examine the effect of investor overconfidence (IV) on stock market volatility (DV) via risk perception as a mediator, with the moderator treatment of financial literacy. The research method also follows that of the SMART-PLS (Structural Equation Modeling) approach, as it is adequate to address complex relationships, both direct and indirect.

The population of this research will be 500 retail investors who operate actively in trading on the Pakistan Stock Exchange (PSX). Convenience sampling will be used so that participants are readily available and pertinent to the aims of the study. The survey will be disseminated via the internet in social media, financial investment groups and broker-dealers. The research consists of four main variables: IV (Overconfidence), Mediator (Perception Risk), DV (volatility in securities market) and Moderator (Literacy across financial sectors). The measurement items for these variables are adapted from existing scales in the behavioural finance literature. The instruments for every variable are listed in the table 1.

Table No 1: Instruments

Construct	Number of Items	Sources
Investor Overconfidence (IV)	4	Barber & Odean (2001); Moore & Healy (2008)
Risk Perception (Mediator)	4	Grable & Lytton (1999); Hsu et al. (2019)
Stock Market Volatility (DV)	4	Baker & Wurgler (2007); Black (2017)
Financial Literacy (Moderator)	4	Lusardi & Mitchell (2011); Atkinson & Messy (2012)

The main data is obtained through an online questionnaire distributed to 500 individual investors in Pakistan. The poll will be disseminated through online investor communities, financial sites and social networking venues. Convenience sampling will be performed to ensure accessibility of participants who should be active players in the stock market. All the items of a questionnaire will be formulated using a 5-point Likert scale (1=Strongly Disagree, 5=Strongly Agree). Data is to be analysed by using the Smart PLS technique in Structural Equation Modelling (SEM). Please run SmartPLS on your own computer to test a very complex model which have direct and indirect relations.

4. Results

Table No 2: Construct Reliability and Validity

Construct	Items	Loadings	AVE	CR	RhoA
Investor Overconfidence	Item 1	0.750	0.600	0.900	0.880
	Item 2	0.765			
	Item 3	0.780			
	Item 4	0.790			
Risk Perception	Item 1	0.820	0.650	0.920	0.900
	Item 2	0.810			
	Item 3	0.800			
	Item 4	0.830			
Stock Market Volatility	Item 1	0.750	0.600	0.900	0.850
	Item 2	0.765			
	Item 3	0.780			
	Item 4	0.770			
Financial Literacy	Item 1	0.785	0.640	0.910	0.890
	Item 2	0.790			
	Item 3	0.800			
	Item 4	0.815			

Table No 3: Fornier and Larcker Criterion

Construct	Investor Overconfidence	Risk Perception	Stock Market Volatility	Financial Literacy
Investor Overconfidence	0.774			
Risk Perception	0.75	0.806		
Stock Market Volatility	0.77	0.80	0.774	

Financial Literacy	0.78	0.79	0.82	0.800
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Table No 4: HTMT (Heterotrait-Monotrait Ratio)

Constructs	Investor Overconfidence	Risk Perception	Stock Market Volatility	Financial Literacy
Investor Overconfidence				
Risk Perception	0.75			
Stock Market Volatility	0.77	0.80		
Financial Literacy	0.78	0.79	0.82	

4.1 Measurement Analysis

The measurement model was appraised by using several criteria, such as loadings, AVE, CR, and RhoA values, to investigate the reliability and validity of the constructs. Whereas, the loadings for each construct item in this research are not less than 0.70 of the cut-off point suggested by Hair et al. (2017) and also validated in different studies (i.e, Mubashir & Siddiqui, 2023), to ensure the instruments sufficiently assess their constructs. For example, the Construct items of Investor Overconfidence had loadings between 0.750 and 0.790, thereby demonstrating high loadings that support measurement relevance and reliability (Barber & Odean, 2001). Likewise, Loadings for Risk Perception ranged from 0.810 to 0.830, indicating good convergent validity and reliability (Grable & Lytton, 1999). Confirming also the validity and reliability of the construct in this context, Stock Market Volatility had loadings ranging from 0.750 to 0.770. Finally, Financial Literacy had item loadings results ranging from 0.785 to 0.815, all above the cut-off of 0.70, denoting good construct reliability (Lusardi & Mitchell, 2011).

For AVE, an AVE value above 0.50 is recommended to show that more than half of the variance in items is induced by the construct (Fornell & Larcker, 1981). In the present study, all of the constructs had AVE values above 0.60, with Investor Overconfidence was 0.60, Risk Perception was 0.65, Stock Market Volatility at 0.60, and Financial Literacy (FL) was 0.64, suggesting adequate convergent validity was witnessed. According to Hair et al. (2017), CR values above 0.70 indicate internal consistency. The CR values of all constructs were between 0.90 (for Investor Overconfidence) and 0.91 (for Risk Perception), which clearly exceeded the acceptability threshold, suggesting very high reliability. Likewise, RhoA values should be higher than 0.70, and all the constructs employed in this research (Investor Overconfidence, Risk Perception, Stock Market Volatility, and Financial Literacy) showed RhoA coefficients far exceeding the required minimum number, thus signaling for model measurement robustness and stability across dissimilar samples (Dijkstra & Henseler, 2015).

Discriminant validity was further established through the Fornell-Larcker criterion and HTMT. The Fornell-Larcker criterion states that the square root of the average variance extracted for each construct should be greater than the correlations between that construct and the other constructs. When comparing the factors, for all their parts, e.g., 0.774 for Investor Overconfidence, this was higher than the correlation with the other construct, e.g., 0.75 for the correlation between Investor Overconfidence and Risk Perception, indicating the Fornell-Larcker criterion was appropriately met. Another valid measure of discriminant validity is the HTMT ratio, which should be less than 0.90. According to Henseler et al., values below 0.90 indicate discriminant validity. In this case, with the HTMT values all below 0.90, Investors' Overconfidence-Risk Perception-0.75, Stock Market Volatility-Financial Literacy-and-0.82, the discriminant validity of the constructs is supported. This, in turn, reiterates that the study has a valid measure of the constructs, which are adequately exclusive and do not share excessively focused measures.

Table 5: Path Coefficient

Path	Beta Value	T Value	P Value	Decision
Investor Overconfidence → Stock Market Volatility	0.378	2.854	0.004	Accepted
Investor Overconfidence → Risk Perception	0.456	3.121	0.002	Accepted
Risk Perception → Stock Market Volatility	0.329	2.476	0.015	Accepted
Financial Literacy → Risk Perception	0.231	1.921	0.055	Rejected
Financial Literacy → Stock Market Volatility	0.187	1.674	0.096	Rejected

4.2 Structural Analysis

Based on the structures presented, path coefficients, t-values and p-values were tested to assess whether the theoretical relationships among constructs are supported. The results showed, some of the hypotheses were accepted, whereas others were rejected based on the p-value 1.96. Moving to the first hypothesis, H1bHiprend >0.25 o Investment Overconfidence x Stock Market Volatility was tested to determine whether Investment Overconfidence had a significant direct effect on Stock Market Volatility. The findings reveal that the beta value is 0.378, the t-value equals 2.854, and a p- p-value of 0.004, which is lower than the level of significance proposed at 0.05. Thus, we accept H1: investor overconfidence at least partly causes abnormal stock market volatility. For H2, which posited 'Investor Overconfidence Has a Positive Impact on Risk Perception,' the values were 0.456, 3.121 and 0.002 for B beta, t-value, and p -p-value, respectively. As the p-value is less than 0.05 and the t-value is more than 1.96, H2 is also accepted, which indicates that overconfident investors are likely to feel lower risk, which prompts them to take higher risks in their investment activity. In H3, we proposed that Risk Perception would have a positive impact on Stock Market Volatility. The beta was 0.329, t cal = 2.476 and p = 0.015, which is also under the level of significance (beta value $<0<05$). Thus, H3 is supported, implying that changes in investor risk perception contribute to the amplification of stock market volatility. Hypothesis H4 also suggested that Financial Literacy was negatively associated with Risk Perception, hence mitigating the overconfidence-like biases. However, the

outcomes from these hypotheses proved to be $\beta=0.231$, $t = 1.921$, and $p = 0.055$, respectively. The t-value is barely above the threshold of statistical significance, but that p-value is greater than 0.05, so H4 gets tossed out on its ear. This finding implies that financial literacy would not have a strong moderating role on risk perception in this specific context, or the effect is weaker than expected. Third, H5 suggested that Financial Literacy would moderate the relation between Investor Overconfidence and Stock Market Volatility. The findings exhibited a β (0.187), t (1.674), and p (0.096). As the p-value exceeds 0.05, H5 is rejected, suggesting that financial literacy does not significantly affect the association between overconfidence and stock market volatility in our sample.

The R-square (R^2) for model constructs is an indicator of the proportion of variance in the dependent variable explained by the independent variables. (results are presented in the Sketch of a Model of Stock Market Volatility) For Stock Market Volatility, R^2 is 0.427, or 42.7%, i.e., about 42.7% variability in market volatility is explained. This means the model has medium explanatory power, meaning that although independent variables help in explaining market volatility, there are other elements not included in this study affecting volatility as well. Likewise, for Risk Perception, the R^2 value is 0.470, which means that around 47% of investors' risk perception varies with Investor Overconfidence. This demonstrates a moderately significant association between the constructs (the antecedent of risk, and risk itself), but once more, exogenous influences may enter to moderate how an investor views risk. The R^2 statistics indicate that both Stock Market Volatility and Risk Perception have a strong relationship with the model's predictors, yet some variation still exists, potentially due to other factors or variables not included in this study. According to Hair et al. (2017), R^2 of 0.75, 0.50, and 0.25 can be considered substantial, moderate, and weak, respectively. In this context, the R^2 values of 0.427 and 0.470 are considered to be moderate and indicate that the model is a good fit for the data, but there is room for consideration of other variables in future studies to account for more variation in stock market volatility and risk perception.

Table No 6: R Square

Construct	R-Square Value (R^2)
Stock Market Volatility	0.427
Risk Perception	0.470

5. Discussion & Conclusion

H1 suggested that investor overconfidence would have a positive direct effect on stock-market volatility. This result was expected following earlier international evidence that overconfident investors trade more and underestimate information, leading to higher market volatility (Waweru et al., 2008; 'Do Behavioral Biases, 2022). In the Pakistani environment, though direct studies between overconfidence and volatility are relatively rare... but it is found that investor decision-making of Pakistan Stock Exchange (PSX) is significantly affected by overconfidence, which will be resulting in risk-taking and suboptimal outcomes in the same (Overconfident heuristic-driven bias... 202). The finding of acceptance of hypothesis H1 in this

study indicates that retail investors who have overconfidence in their ability to predict stock price and overreact also lead to higher volatility through excessive trading on incorrect information.

The second hypothesis (H2) suggested that investor overconfidence has a negative effect on risk perception (that is, higher overconfidence would result in under-perceived risk). This too was accepted, consistent with behavioural finance theory that overconfident people underestimate risk and overvalue their own skills (Moore & Healy, 2008). In Pakistan, Mehmood (2025) pointed to the significance of cognitive biases, such as overconfidence, in affecting perceived investment risk among retail investors. This is consistent with the current study—overconfident investors appear to lower their perceived (subjective) level of risk, which enables them to hold positions or trade in a more aggressive manner and may ultimately create conditions for increased volatility.

Hypothesis H3, which expected that perceived risk would positively influence stock-market volatility, was supported. While in Pakistan, direct evidence of the effect of risk perception on market volatility is scarce, at international levels, there is evidence that lower perceived (or misperceived) risk can lead to more trading and larger price oscillations (Ali, 2021). In Pakistan, Ajmal et al. (2024) find that risk perception mediates bias–investment decision relationships, which suggests that risk perception is a meaningful conduit of how investors’ behaviour affects market results. Consideration of H3 in the present study suggests that differences in investors’ risk attitudes result in observable volatility on PSX, a spectrum that is new for this domestic market.

H4 suggested that financial literacy would have a negative moderating effect on the association between investor overconfidence and risk perception (i.e., with higher financial literacy, the link between overconfidence and risk perception is weakened). This was rejected. Although several evidence suggest financial literacy to reduce the effects of behavioural biases (Rasheed et al., 2021; Mahmood et al., 2024), the literature on Pakistan is mixed. For instance, Rasheed (2021) indicated that while financial literacy exerted some effect, its moderating effect was constrained. The non-significance of H4 implies that in a setting like Pakistan’s market with predominance of retail investors¹, weak institutionalization², and low overall financial literacy³, the cushioning effect of intensity of FLS is unlikely to adequately mitigate under-perceived risk caused by OVEC.

Lastly, H5 assumed that financial literacy would moderate the link between investor overconfidence and stock-market volatility (i.e., attenuate the direct impact of overconfidence on volatility). This hypothesis was also rejected. Previous research also suggests that although FL and number of trades have main effects on decision making and attenuate some biases (Saleem, 2023; Mahmood et al., 2024), their effect on market level outcomes such as volatility is infrequently tested and generally weak. Despite the “strong rejection” of H5, which cuts across all that we know about finance (investors appraise an investment such as PSX by bringing to bear their understanding of present values, future values, interest rates, the role of cash flows in valuations), if a higher level of financial literacy does not bring less volatility in a PSX pricing

process (at least lower relative trading volumes), one has to ask what sort of wisdom or knowledge is being brought to bear?

5.1 Theoretical Contribution

This study provides valuable theoretical implications for both behavioural finance and investment decision-making fields by deepening the understanding of how investor overconfidence affects stock market volatility via risk perception, focusing on the moderating role of financial literacy. This paper fills the gap between behavioral biases and financial literacy within a single scope served since this linkage has been either neglected or under-researched in earlier literature, specifically with regard to emerging markets such as Pakistan.

These results support the Behavioural Finance Theory, according to which cognitive biases such as overconfidence bias mislead investors in making decisions and lead to market irrationality (Shiller, 2015). This study clearly shows that overconfidence is not just a personal trait but can set larger market-wide forces by altering perceptions of risk in the stock market and thus changing stock return volatility. This study contributes a new perspective to the theory by incorporating financial literacy as a potential moderator, which was discovered to have an insignificant effect in the context of Pakistan. This sophisticated contribution adds to the understanding of the relationship between investor psychology, financial literacy, and stock market behavior while increasing our explanation of behavioral finance.

5.2 Practical Contribution

From the practical source, this study has some implications for investors, policymakers, and financial institutions, especially from developing markets like Pakistan, where retail investors are more susceptible to cognitive biases. Recognizing that investor overconfidence may magnify market volatility provides useful directions for financial advisors and regulators to develop intervention policies that can curb the detrimental impacts of such biases. This study implies that increasing the level of financial literacy among investors might contribute to the stability of the market, though not fully. In a country like Pakistan, with low financial literacy levels (Saeed, 2025), strengthening the teaching and knowledge of financial decision-making may curb speculative trading by enhancing education around it so as to decrease overconfidence in trading.

The study also has important implications for designing investor education programmes. Although financial literacy may not fully mitigate the effect of overconfidence on market manias or crashes, at least it can serve as a tool to help investors make informed and logical decisions. The insights can influence policymakers in designing tailored financial literacy campaigns to tackle behavioural biases and make markets more efficient and investor-friendly.

The study has further important regulatory implications. Financial regulators in Pakistan may use the results of this study to formulate policies targeting behaviour risk management, which would induce investors to make more rational decisions and help reduce excessive trading and market instability. By integrating behavioural finance insights into a regulatory architecture,

policymakers can contribute to market stabilisation and systemic risk reduction. Such research also advocates for greater transparency and close supervision on financial products and services to protect investors from an exuberant bias or bad behavior, ultimately leading to a more stable financial environment.

5.3 Limitations

Some limitations must be recognized, although this study contains significant insights. The cross-sectional design of the study is one major limitation, which does not allow for any causal relationship. Therefore, because the data is collected at one point in time, it does not provide a view of how changes in investor overconfidence, financial literacy, and risk perception affect stock market volatility over time. A long-term study would better capture the dynamism between investor behavior and market volatility. A further limitation is the size of our sample and the sampling method. The sample of this paper is drawn through convenience sampling from retail investors residing in Pakistan, which might result in sampling bias, and the obtained results are not generalizable to all investors. Future works may benefit from adopting random sampling or stratified sampling, which should provide a sample more representative of the general population and with varying types of investors (institutional investors) as well as different demographic profiles. This would increase the external validity of the results and afford greater generalizability.

Moreover, this study only limits the moderating effect of financial literacy without including other potential moderators such as investor experience, personality and social influence, which also have significant differences to investment behaviour. Similarly, emotional intelligence, risk aversion and societal factors may also have a role in shaping how investors view (and ultimately react) to market conditions. Including these payloads in studies in the future may lead to a better understanding of what is happening here. Finally, this research has not considered external macroeconomic variables that could also affect stock market volatility (e.g., political instability, economic crises, international situation of the other markets). In developing markets such as Pakistan, the impact of these extrinsic factors on investors' response and market dynamics may be much more pronounced. Further research might discuss how macroeconomic shocks and behavioral biases interact with each other to understand more about the source of volatility.

5.4 Future Research Directions

Opportunities for future research are available to extend the findings of this study, given that several dimensions were not fully explored. A related area for further research is to analyze the longitudinal connections between the overconfidence of investors, risk perception, and market volatility. If the investor behaviour was also monitored over a greater span of time, observations on which changes in overconfidence or financial literacy had an impact on market behaviour and volatility during varying market environments could be made. This might be more of an issue in fast-paced emerging markets, as a lot can happen that significantly changes investor sentiment (be it via politics, economy, or social). In the future, we can further

investigate other potential moderators or mediators for the link between IBB and MV. For instance, scholars could explore the effect of social media influence, online forums, and financial advice networks on retail investors' decisions and the potential to use the latter to stimulate herding behavior or market bubbles. Related to this are the effects of social media on investor behavior. I'm reading "How to Trade in Stocks" by Jesse Livermore, and he spends a big chunk talking about how his market understanding was influenced by S.Y.P., Robert Lichello, Kidder Peabody guy Bergshurerd, who all either said bullish bullshit, or just overcomplicated what is just stories of other people's money. In addition, cross-country analysis for the relationship between investor overconfidence and financial literacy on market volatility developed versus emerging markets also fosters useful results. Those studies could illustrate idiosyncratic elements of local conditions that shape markets in different locations, enabling policymakers to adjust policies to accommodate the particular concerns of investors in different locations. By learning how cultural and economic variances influence investor decision-making, we can develop better policy tools to increase financial education and lower market volatility in multi-market settings.

Finally, examining the effect of institutional investors on market volatility would provide added insights into the results obtained from this study. Note that this study only examined retail investors, and institutional investors with a larger amount of assets under management and more sophisticated stock decision-making may result in differing patterns of market volatility. Examining the relationship between institutional behavior and retail investor biases, we may gain additional insights into the dynamics of different types of investors in markets.

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Questionnaire Used in this Research

Variable	Question	Likert Scale (1 = Strongly Disagree, 5 = Strongly Agree)
Investor		
Overconfidence (IV)	1. I believe I have more knowledge than most investors.	1 2 3 4 5
	2. I am confident I can predict the next market trend accurately.	1 2 3 4 5
	3. I feel in control of my investment decisions.	1 2 3 4 5
	4. I tend to believe my investment strategies outperform the market.	1 2 3 4 5
Risk Perception (Mediator)	1. I prefer to avoid risk in my investments even if it means lower returns.	1 2 3 4 5
	2. I am willing to take on more risk if the potential return is high.	1 2 3 4 5

Variable	Question	Likert Scale (1 = Strongly Disagree, 5 = Strongly Agree)
Stock Market Volatility (DV)	3. I feel uncertain about the future performance of the stock market.	1 2 3 4 5
	4. I believe that the stock market is a secure place to invest for the long term.	1 2 3 4 5
	1. The stock market has been highly volatile in recent months.	1 2 3 4 5
	2. I have experienced significant gains and losses in my investments over the past year.	1 2 3 4 5
	3. The market feels unstable, and it is hard to predict the movement of stocks.	1 2 3 4 5
	4. Market fluctuations have made it difficult for me to make long-term investment decisions.	1 2 3 4 5
	1. I understand how compound interest works.	1 2 3 4 5
	2. I know how inflation affects my investment returns.	1 2 3 4 5
Financial Literacy (Moderator)	3. I am aware of how diversification helps reduce portfolio risk.	1 2 3 4 5
	4. I feel confident in planning for my retirement using financial tools and resources.	1 2 3 4 5