

Financial Literacy and FinTech in Biomathematical Modelling of Investor Response Dynamics to Equity Market Volatility: A Qualitative Study

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ABSTRACT

The increasing use of financial technology (FinTech) has changed the way retail investors engage in equity markets since access to information, digital trading platforms, and investment analytics has been improved. Moreover, the occurrence of high volatility in the market has increased the challenges in information processing, emotional regulation, and assessment of risk. Although a lot has been studied about financial literacy, FinTech, and investment behavior, it is still not clear how these factors interact in volatile market environments. The study investigated the dynamics of investor response to equity market volatility and created the biomathematical model, reflecting the experience of investors. The study used qualitative grounded theory, where semi-structured in-depth interviews with 35 retail equity investors actively using FinTech services and going through serious market fluctuations were conducted. The data was processed by means of open coding, axial coding, and selective coding using NVivo. The findings revealed that there are six key categories which influence investor behavior: financial literacy, the impact of FinTech, information overload, cognitive reaction, emotional reaction, and risk perception. The study also discovered three investor categories: resilient investors, adaptive investors, and reactive investors, and created a biomathematical model that characterizes the relationship between behavioral states and investment decisions in a volatile market.

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1. Introduction

Digitalization of financial services has altered the behavior of retail investors in the equity markets. The development of financial technology (FinTech), mobile trading apps, algorithmic recommendations, and instant access to news has lowered the barriers to entry into markets and opened up new investment opportunities for many groups of people (Kou & Lu, 2025). Recent studies indicate that over 60% of people globally use FinTech, and, as a result, the number of retail investors participating in stock markets is increasing, thanks to online and mobile trading applications (Jalal et al., 2023). Moreover, financial markets are becoming more sensitive to turbulent periods defined by geopolitical tensions, inflation, monetary policy changes, and global economic turmoil. New volatility in the market generates uncertainty and leads to information asymmetry, which makes investors collect and analyze a lot of information quickly and efficiently (Wang et al., 2025). In these moments of time, investors typically do not behave in a logically stable way according to classical theories of finance and show signs of cognitive biases and emotional reactions. FinTech projects become not only instruments for transaction but also create important information-based ecosystems, through which investors interact with market information (Khan et al., 2023). As a result, studying the relationship between financial literacy, FinTech usage, and the responses of investors to market fluctuations has become a major subject of research in finance and behavioral economics, as well as in decision-making sciences.

Even though financial information and investment technologies are now more accessible than ever, retail investors continue to show illogical behavior during market upheaval (Vinoth Balaji & Sriram, 2026). Market volatility usually causes fear, anxiety, overconfidence, crowd behavior, panic selling, excessive trading, and speculation. With the advent of FinTech platforms, investors are receiving tons of information from the market online in real-time, alerts, social trading offers, and recommendations, which creates another problem: information overload makes it impossible for investors to differentiate

valuable information from market noise and get appropriate investment strategies (Wang et al., 2024). Besides, it is believed that literate investors feel better under market volatility, however, the exploration of emotional aspects of the impact of market volatility shows that even experienced investors lose their rational thinking in case of sudden changes in the market. It has been clearly shown by several financial crises that investors' response to the changes can worsen the situation in the market (Abdullahi et al., 2024). Hence, the understanding of investors' perception of risk, information processing, emotional control, and decision making under volatile market conditions is extremely important for scientists and practitioners (Krishnamurthy & Muir, 2025). The lack of a holistic understanding of the correlation between these behavioral mechanisms hinders the capability of the regulators, educators, and fintech companies to devise effective tools that facilitate an informed investment decision-making process.

Despite the existence of extensive research on a number of relevant subjects, including financial literacy, behavioral finance, investor psychology, market fluctuations, and adoption of FinTech, some critical gaps can be identified (Suresh, 2024). To begin with, unlike many qualitative studies that aim to examine whether there is a direct relationship between variables by analyzing statistics and the data obtained through surveys, previous studies have little to offer in terms of information about the causes behind investors' reactions in the market (Schlütter et al., 2024). In addition, financial literacy research is focused on investment results and financial performance without examining the cognitive and emotional aspects of investors themselves (Tuffour et al., 2022). Furthermore, the research about FinTech is mainly focused on technological adoption and intention, as well as the quality of services without considering the influence of digital platforms on the information of its customers. Fourth, the relationships in cognition, emotion, information overload, and perception of risk remain unexplored within any framework. Although biomathematical models were widely used to describe complex adaptive systems, little research has been done to generate such models from qualitative evidence based on empirical facts that demonstrate real experience of investors. Filling in this gap could be beneficial in obtaining a more comprehensive understanding of investor behavioral dynamics by going beyond just static issues and considering the evolution of investor behaviors in times of market volatility.

From this point of view, the study intends to investigate investor experiences with market fluctuations and observe how financial literacy and the use of FinTech help influence investor behavior processes. Grounded theory analysis was adopted to identify cognition and emotions as well as other variables that determine the process of decision-making by investors in conditions of market volatility. This research was designed to address the following questions.

RQ1: How do retail investors experience and respond to changes in equity-market volatility?

RQ2: How does financial literacy shape investors' cognitive, emotional, and risk-perception responses to changing market volatility?

RQ3: How do FinTech platforms influence investors' information exposure, information processing, and behavioural responses during volatile market conditions?

RQ4: How do cognitive response, emotional response, information overload, and risk perception interact in shaping investors' investment decisions?

RQ5: What dynamic behavioural states, parameters, and relationships can be identified from investors' experiences to inform a biomathematical model of equity-market behaviour?

By answering these questions, this research contributes to the existing literature by giving a robust theoretical explanation of investor response dynamics and establishing a theoretical framework to use biomathematical modelling in investment behaviour studies. The results produce valuable insights for financial educationists, policy makers, FinTech developers and investors, because they highlight mechanisms affecting decision quality during the periods of uncertainty in financial markets.

2. Review of Literature

2.1 Financial Literacy and Investor Behaviour

The term financial literacy relates to the capacity of an individual to comprehend, assess and apply financial information while making wise financial choices (Adil et al., 2022). In finance, literacy encompasses the understanding of critical aspects such as investment principles, risk minimization, portfolio diversification, financial instruments, and market operations. Scholars in the finance area argue that financial literacy is crucial for rational decision-making in investments since it helps the parties to analyze the received information unconventionally and make decisions that conform to the goals of long-term financial gains (Rodrigues & Gopalakrishna, 2024). Previous explorations convincingly show that individuals with financial literacy are more apt to make investments and diversify their assets appropriately (Maheshwari et al., 2025). Financial literacy is an essential element in the study of the investment activity. Various studies reveal that financially literate investors are capable of analyzing situations better and do not tend to rely on biases and heuristics when making decisions regarding finances. Financial knowledge enables an investor to assess any information regarding the

market, which ultimately leads to higher chances of avoiding decisions based on gut feelings (Agarwal et al., 2025). On the contrary, lack of financial literacy will lead to excessive conjecture and wrong choices (Yadav & Banerji, 2025). Investors often misinterpret the connection between risk and return, and their reactions to market changes are excessive, resulting in increased risk of losses.

Financial literacy influences the perception of risk by investors during difficult times in the market (Ingale & Paluri, 2022). According to the theory, highly financially literate individuals interpret key economic factors, such as financial data released by companies. Financial literacy helps investor's view risks more realistic. Highly literate investors are expected to appropriately deal with challenging market situations. However, research shows that financial literacy does not protect individuals against irrationalities and illusions from psychological processes (Song et al., 2023). Research done on the issue indicates the significance of financial literacy; nevertheless, most studies verify its influence on outcomes by measuring factors such as investment rates, amount of money saved, investment results (Raut & Kumar, 2024). Little is provided about the particular psychological mechanisms of development of financial literacy and its influence on the process of perception of possibilities of investment.

2.2 FinTech and Digital Investment Ecosystems

The development of FinTech has revolutionized the entire investment market structure (Urikova et al., 2024). This term covers all digital innovations aimed at improving the provision of financial services, such as online trading platforms, mobile apps for making investments, advisors, artificial intelligence tools that provide recommendations (Alaassar et al., 2022). New technologies have drastically decreased transaction costs and undergone several improvements, making financial market participation more feasible and cost-effective for retail investors than ever before (Berman et al., 2022). This means that certain types of investment activities can now be performed by ordinary investors without having in-depth knowledge and receiving institutional assistance (Stein et al., 2026). Investment activities that used to necessitate special expertise and institutional support are now open to many investors. FinTech significantly contributes to promptness in dissemination of information. Investors receive real-time market information in the form of market or news data, technical indicators, analyst opinions, or material produced by other investors (Yáñez-Valdés & Guerrero, 2023). Accessibility of that information leads to transparency of the market and higher sophistication in making investment decisions. Functionality of a FinTech application includes agent technology concerned with visualizing data, learning tools, and alert systems.

In spite of the benefits FinTech platforms may confer upon investors, they pose multiple challenges. One such challenge is the excessive amount of information available for consideration, which leads to the phenomenon of information overload (Bokhari, 2026). Another challenge is constant access to market changes that can create excessive stress and stimulate impulsive actions (Ray et al., 2022). Furthermore, algorithmic suggestions and social trading tools may exacerbate herd behavior as they may lead thousands of investors to similar actions. Hence, in highly volatile markets, the technology may cause even stronger behavioral reactions and create an unstable market environment. At the moment, FinTech research tends to focus on the issues of technology acceptance, perceived ease-of-use, perceived trust, and service quality (Khatami et al., 2024). While these studies help to understand the reasons for turning to digital platforms, they do not offer enough information about how FinTech influences cognitive activity, emotions, and behavior in unstable markets (Moro-Visconti & Cesaretti, 2023). Hence, the role of FinTech as an intermediary between market information and the decision-making process of investors is still poorly understood. Understanding this relationship is vital to develop comprehensive knowledge about modern investor behavior.

2.3 Equity Market Volatility and Investor Responses

Market volatility indicates the fluctuations of asset prices over time and is perceived as a measure of uncertainty in financial markets (Ugras & Ritter, 2025). High volatility indicates that there are rapid asset price fluctuations, that market is often unpredictable, and that there are extra risks in investing. Issues which are responsible for volatility include macroeconomic conditions, geopolitical factors, policy changes, economic crises, and unexpected shocks (Dichev & Zheng, 2024). For investors, high volatility means the inability to predict future outcomes which complicates investment decisions. Traditional financial theories assume that investors respond rationally to market information, while their expectations are based on objective evidence. However, research in behavioral finance shows that investor behavior during the unpredictable times goes against these principles (Liu & Gupta, 2022). Market uncertainties trigger emotional reactions causing investors to base their decisions upon instinct rather than analysis (Dey et al., 2024). Investors are capable of panic selling due to fear associated with falling markets and taking too high risks due to the optimism of rising markets.

Investor behaviour in relation to market instability arises from both factual financial circumstances and personal characteristics and past experiences (Xie et al., 2023). Furthermore, some people may have more or less familiarity with financial matters, possess a variety of personality traits, have varying degrees of knowledge about information technologies.

While some people see volatility as an obstacle to escape from, others know how to take advantage of increasing uncertainty (Bakry et al., 2022). The ongoing diversity of investors' interpretations of market events indicates that investor behaviour is a dynamic process depending on the context and not a standard reaction of individuals to market conditions. Prior research has shown various factors affecting investors' actions in unstable markets; however, the majority of research relies on the use of quantitative research tools, which reflect behavioural results, but do not describe the processes of decision making that lead to specific behaviour (Dhingra et al., 2024). Thus, the understanding of investors' cognitive and emotional perceptions of market volatility is still insufficient, which creates a need for using qualitative research methods.

2.4 Cognitive Response, Emotional Response, and Risk Perception

Cognitive response is the process of perception, interpretation, evaluation and use of information by investors when making an investment decision (Xu et al., 2024). The cognitive processes include attention, reasoning, judgment, memory retrieval and integration of information. In the environment of market fluctuations investors analyze lots of complex information and make forecasts of uncertain outcomes (Poortinga et al., 2023). Therefore, cognitive processing is a key factor influencing investment behavior and decision making. Emotional response is another important factor determining investment behavior. Emotional aspects of investment decisions have been studied by behavioral finance researchers. Emotions like fear, anxiety, excitement, regret and confidence play an important role in processes of investment decision making. In fact emotional reactions are pronounced during volatile market conditions because due to uncertainty psychological stress becomes much higher (Almansour et al., 2023). Strong emotional responses can prevent rational analysis in form of impulsive behavior such as panic selling, speculative buying and unnecessary portfolio changes.

In the context of investing, risk perception is seen as an evaluator of the potential outcomes and risks that accompany an investment decision (Phamthi et al., 2024). Risk is considered to be a subjective measure of potential loss and uncertainty; its meaning may vary according to individuals due to their experience, knowledge, attitude towards investing, and mental state (Zhu et al., 2024). Market fluctuations raise the perception of risk thanks to the increase of uncertainty of future gains. Cognitive and affective state influence risk perception in an essential way. Financially literate investors perceive risk differently from those who do not have enough knowledge about the investment, while investors whose emotional state is in distress might perceive risk unrealistically regardless of the current market situation (Zeng et al., 2023). A lot of scientific studies center on the aspects of cognition, emotion, and risk perception separately but nevertheless investment decisions arise when all three components interact with one another. When investors react to fluctuating markets they process information, control their emotions and evaluate risk simultaneously. The lack of a cohesive perspective that explains the links between these issues is what prevents a deeper understanding of investing behavior.

2.5 Biomathematical Modelling of Investor Behaviour

Biomathematical modelling has always been used for explaining the operation and development of biological frameworks with the help of mathematical representations of their dynamic behaviour (Vyas et al., 2022). Recently, researchers have shown that many social and economic processes can be translated into biological systems based on the principles of the operation of complex adaptive systems (Maurya et al., 2026). Thus, financial markets consist of agents that interact, and their behaviour develops due to environmental pressure, feedbacks, and the process of adaptation. Moreover, biomathematical methods can turn out to be valuable for understanding the unique features of the investors' behaviour (Phan et al., 2023). The process of decision making for investors can be described as a continuous process, where an investor switches between different psychological states one of which can be confidence, caution, fear, or risk-seeking behaviour (You et al., 2026). These conditions are influenced by cognitive evaluation, emotional state, availability of information, and perceived level of risk (Chowdhury & Humaira, 2023). Thus, the biomathematical approach can manage to identify the basic parameters, mechanisms of switching between states, and feedback processes within the system.

In order to create significant biomathematical models, it is necessary to have a theoretical foundation that is based on actual behavior (Bin-Nashwan et al., 2022). Existing financial models mostly use quantitative conclusions and previously known variables which do not necessarily reflect the complex nature of human behavior (Maheshwari et al., 2025). Mathematically modeling behavior without empirically identifying the investor's behavior may lead to oversimplification of the underlying processes governing their actions in the market. This is why it is important to undertake qualitative research to figure out the behavioral patterns, methods and connections that lie behind investors' actions in volatile markets. By obtaining information from the experience of investors, this research provides information necessary for creating a biomathematical model of stock exchange behavior.

3. Methodology

In literature, research on how investors respond to fluctuations in the equity market in digital investment environments is said to be relatively limited particularly from the dual perspectives of financial literacy, FinTech practices, and

biomathematical models. The previous researchers have mostly used quantitative research methods to evaluate the relationship between financial literacy, investment decisions, and adoption of technology which led to generation of valuable empirical data but not enough insights into the behavior of investors affected by volatility in the market (Adil et al., 2022; Oppong et al., 2023). In that case, qualitative research methods were used to study the experiences of investors and find out the reasons that form their investment decisions (Ahmad & Shah, 2022). To achieve the aim of the study, the researchers used grounded theory which is, arguably, suitable for the analysis of qualitative data because it enables theorizing based on empirical data instead of pre-existing theoretical ideas. The study focused on how investors interpreted market volatility, analyzed information, perceived risks, controlled emotions, and made decisions about investments in FinTech platforms. Finally, the grounded theory allowed the researchers to identify such concepts as financial literacy, exposure to information, cognitive response, emotional response, information overload, and investment decisions.

The coding process was done utilizing NVivo software. The data analysis included 3 key stages, i.e., open coding, axial coding, and selective coding. During open coding, the interview scripts were thoroughly evaluated line by line to identify key concepts and patterns of behavior. Next came axial coding, during which relationships between the identified concepts were established and various higher order categories were created. Finally, selective coding allowed us to bring together the major categories into one theoretical framework for explaining investor behavior with regard to market volatility. Theoretical saturation test was also performed to ensure that no new categories appeared and the developed theory was adequate for explaining the studied phenomenon.

3.1 Data Collection

The research utilized semi-structured in-depth interviews, facilitating respondents to express their experiences without restraint yet addressing all themes relevant to the research purpose. The interview protocol included questions on the period of market volatility, knowledge of investment, use of FinTech services, investment risks, thinking and feeling processes, as well as their investment choices. Probing questions were introduced whenever relevant new issues were raised during the interview (Adeoye-Olatunde & Olenik, 2021).

The study was based on interviews with retail investors who participated in stock trading, analysis, financial information search, and portfolio management (Adams, 2015). Once the target population was defined through purposive sampling, the authors adopted theoretical categories through data collection and analysis. In order to ensure that all respondents were well-versed in investment theories and practices the minimum criterion was set to 1 year of experience in the field of stock trading.

Data collection took place from January to April 2026 using both conventional and online interviews. Interviews lasted from 35 – 70 minutes, and a total of 40 interviews were conducted, of which 35 were analyzed after assessing data quality. All interviews were audio-recorded with participants' consent and were later transcribed verbatim. The data was compared continuously during the data collection process until theoretical saturation was reached. The demographics of the respondents are presented in Table 1.

Table 1 (a): Interviewees' Demographics

Variable	Frequency	Percentage
Gender		
Male	20	57.10%
Female	15	42.90%
Age		
21-30 Years	10	28.60%
31-40 Years	13	37.10%
41-50 Years	8	22.90%
Above 50 Years	4	11.40%
Education		
Bachelor's Degree	16	45.70%
Master's Degree	14	40.00%
Doctoral Degree	5	14.30%
Investment Experience		
1-3 Years	9	25.70%
4-6 Years	12	34.30%
More than 6 Years	14	40.00%
FinTech Usage Frequency		
Daily	19	54.30%
Weekly	11	31.40%
Monthly	5	14.30%

Table 1 (b): Interviewees' Demographics

Variable	Frequency	Percentage
Investment Style		
Conservative	8	22.90%
Moderate	17	48.60%
Aggressive	10	28.50%

3.2 Data Analysis

3.2.1 Open Coding

The initial stage of the analysis was open coding (Qureshi & Ünlü, 2020). All transcripts of interviews were examined vertically with the use of NVivo software (Alam, 2021). The important comments on investment behaviour, data processing, feelings, risk perception, financial knowledge, and FinTech use were located and given the labels. Later, similar ideas were combined for the creation of basic categories. The present stage made it possible to elaborate patterns of behaviour based on data analyses rather than preconceived concepts. The findings are displayed in Table 2.

Table 2: Open Coding

Representative Quotations from the Interviews	Initial Concept
"When the Market Drops Sharply, I Usually Spend more Time Reviewing Company Fundamentals Before Making any Decision."	A1: Analytical evaluation
"My Financial Knowledge Helps Me Remain Calm when Prices Fluctuate Significantly."	A2: Financial confidence
"I Often Compare Multiple Information Sources Before Buying or Selling a Stock."	A3: Information verification
"Most of My Investment Decisions are Influenced by What I have Learned about Risk Management."	A4: Risk awareness
"The Trading App Provides Instant Alerts that Help Me React Quickly to Market Changes."	A5: Real time information access
"Fintech Platforms Make Investment Information Much Easier to Access than Before."	A6: Information accessibility
"Sometimes there is Simply too Much Information on the Platform and I do Not Know which One to Trust."	A7: Information overload
"I Receive Notifications Every Few Minutes During Volatile Periods."	A8: Excessive information exposure
"When Stock Prices Fall Rapidly, I Feel Anxious Even if I Know the Fundamentals Remain Strong."	A9: Market anxiety
"Large Market Declines Often Make Me Fear Losing My Investment Capital."	A10: Fear of loss
"When the Market Recovers, I Become More Optimistic and Willing to Invest."	A11: Market optimism
"I Occasionally Make Impulsive Decisions Because I Do Not Want to Miss Market Opportunities."	A12: Fear of missing out
"Volatile Markets Force Me to Continuously Reassess My Investment Risks."	A13: Risk reassessment
"My Perception of Risk Changes Depending on Market Conditions."	A14: Dynamic risk perception
"I am More Willing to Invest When I Understand the Risks Involved."	A15: Informed risk taking
"The Discussion Forums on Investment Platforms Often Influence My Views."	A16: Social influence
"Seeing Other Investors Panic Sometimes Affects My Own Confidence."	A17: Herd influence
"I Usually Use Charts and Technical Indicators Before Making Trading Decisions."	A18: Technical analysis usage
"Financial Literacy Helps Me Distinguish Useful Information from Market Noise."	A19: Information filtering capability
"During Highly Volatile Periods, I Check My Portfolio Much More Frequently."	A20: Increased monitoring behaviour
"Too Much Market News Can Make Investment Decisions More Difficult."	A21: Decision complexity
"Emotions And Logic Often Conflict when the Market Becomes Highly Volatile."	A22: Cognitive emotional conflict
"I Try to Follow My Investment Strategy Even when the Market Becomes Unstable."	A23: Self discipline
"Past Investment Experiences Help Me Manage Uncertainty Better."	A24: Experiential learning
"I Often Adjust My Portfolio Allocation When Market Risks Increase."	A25: Adaptive investment behaviour
"The More Knowledgeable I become; The Less Likely I am to Panic."	A26: Knowledge driven resilience
"Fintech Tools Provide Useful Analytics That Support My Investment Decisions."	A27: Decision support technology
"I Sometimes Feel Overwhelmed by Different Analyst Recommendations."	A28: Recommendation overload
"My Final Decision Depends on How I Interpret Market Risks and Opportunities."	A29: Integrated decision evaluation
"Successful Investing Requires Balancing Information, Emotions, And Risk."	A30: Behavioural decision balance

3.2.2 Axial Coding

Axial coding took place after the open coding phase to determine connections between initial categories (Cascio et al., 2019). Continuing with constant comparisons allowed for entities of related meaning to be combined into higher order categories that embody notable aspects of investor behavior. Remarkably, the effort to understand interaction between financial literacy and information exposure, information overload, cognitive response, emotional response, risk perception and investment decisions in times of volatility was highly emphasized in the research. The categorization process with initial category, sub category and core category are presented in Table 3.

Table 3: The Categorization Process

Initial Category	Sub Category	Core Category
A1: Analytical Evaluation	Analytical processing	Financial Literacy
A2: Financial Confidence		
A3: Information Verification		
A4: Risk Awareness		
A26: Knowledge Driven Resilience	Information accessibility	FinTech Influence
A5: Real Time Information Access		
A6: Information Accessibility		
A16: Social Influence		
A18: Technical Analysis Usage	Information burden	Information Overload
A27: Decision Support Technology		
A7: Information Overload		
A8: Excessive Information Exposure		
A21: Decision Complexity	Analytical reasoning	Cognitive Response
A28: Recommendation Overload		
A1: Analytical Evaluation		
A3: Information Verification		
A19: Information Filtering Capability	Anxiety	Emotional Response
A22: Cognitive Emotional Conflict		
A24: Experiential Learning		
A9: Market Anxiety		
A10: Fear of Loss	Fear	Risk Perception
A11: Market Optimism		
A12: Fear of Missing Out		
A17: Herd Influence		
A13: Risk Reassessment	Risk evaluation	Investment Decision Making
A14: Dynamic Risk Perception		
A15: Informed Risk Taking		
A23: Self Discipline		
A20: Increased Monitoring Behaviour	Investment monitoring	Investment Decision Making
A25: Adaptive Investment Behaviour		
A29: Integrated Decision Evaluation		
A30: Behavioural Decision Balance		

3.2.3 Selective Coding

Selective coding is the last and final stage in analysis. At this stage, the developing categories were grouped according to a central explanatory framework (Qureshi & Ünlü, 2020). Through this phase, the key categories were recognized and interconnected to demonstrate how the investors have perceived and reacted to volatile market environments. The resulting theoretical framework illustrates the relationships between financial literacy, use of fintech platforms, information processing, thinking, feeling, risk perception, and investment decision making. All these findings formed a basis for the development of a biomathematical investor model.

3.3 Saturation Test

A theoretical saturation test was performed based on several interview transcripts that were chosen after initial coding. Thus, the interviews were analyzed separately in order to find out whether there were new concepts or categories that would appear (Hennink et al., 2017). The analysis has shown that there have been no new categories apart from the ones discovered during the open, axial, and selective coding phases. Therefore, it was decided that theoretical saturation has already been achieved meaning that the theoretical model created explains how individuals respond to volatile periods in the market.

4. Results and Discussion

The above NVivo analysis has shown that the indicators of investor response to fluctuations of the equity market can be classified into six fundamental categories, namely: financial literacy, the impact of FinTech, information overload, cognitive response, emotional response, and risk perception. These categories have formed the basis of the investors' investment decision-making in unstable market conditions. Thus, it has been proven that investors' behaviour is a result of a multitude of various factors and arises from the interplay between knowledge, technology, information processing, emotions, and risk perception. Moreover, the grounded theory methodology indicates that financial literacy and FinTech

act as precursor factors whereas cognitive response, emotional response, information overload, and perceptions of risk appear to perform the role of behavioural mechanisms responsible for investment decisions.

4.1 Financial Literacy

The study has shown that financial knowledge plays an important role in how investors respond to sudden changes in the market. Many participants of the survey confirmed that financial education helped them in making sense of the information about the trends on the market, evaluate investment choices, and cope with uncertainty. Investors with higher financial literacy seem to be more certain in their decisions during periods of strong price fluctuations and are less likely to act impulsively during stressful times on the market. One respondent explained:

“My financial knowledge helps me understand that market corrections are normal. Instead of panicking, I usually review company fundamentals before making any decision.”

Another respondent noted:

“The more I learned about portfolio diversification and risk management, the less emotional my investment decisions became.”

The results show that financial literacy boosts the analytical abilities and effectiveness of investors when it comes to filtering useful information from market noise. In earlier studies on behavioural finance, it has been shown that well-informed investors relied on objective analysis instead of speculations or market gossip (Agarwal et al., 2025). Therefore, financial literacy has been an equalizing factor in turbulent conditions as it enhances the ability of an investor to analyze risks rationally. Nevertheless, financial knowledge does not completely get rid of the biases, since even those investors with a high level of knowledge feel stress and anxiety in extreme market conditions.

4.2 FinTech Influence

The study shows that FinTech systems have contributed substantially to providing useful information for investment decisions and their execution. According to the respondents, a number of services, such as mobile trading applications, analytical instruments, instant notifications, and social networks, have proved to be essential in the process of investing. One investor stated:

“I can monitor the market instantly through my trading app, and it provides useful insights that help me respond quickly.”

Another respondent explained:

“Most of my investment research starts with information available on FinTech platforms because everything is accessible in one place.”

In general, the respondents had a positive opinion about FinTech because it simplified the investment process and made information easily available, thus lowering entry barriers. The presence of real-time information helped them follow what was going on in the market. However, the interviewees also mentioned the problems associated with the use of FinTech services. Some investors noted that they received too many notifications, recommendations, and updates from social media making it difficult to make decisions during periods of high volatility. Thus, FinTech became both a facilitator of information and a source of information pressure in making choices. In this respect, the results show that the impact of FinTech is greater than technological functionality, as it influenced the way investors make sense of information and events in the market.

4.3 Information Overload

It is widely agreed that overload of information is a fundamental motive behind the actions of investors during the market volatility. The survey revealed that most respondents had faced a lot of information from various digital sources such as financial applications, media, social networking sites, and financial experts. One participant observed:

“There is too much information available. Sometimes different analysts provide completely opposite recommendations, and I do not know which one to trust.”

Another respondent stated:

“When markets become highly volatile, I receive constant alerts, notifications, and news updates. It becomes overwhelming.”

The study has found that excessive amounts of information have led to cognitive overload and inefficiency in making decisions among investors, who have frequently struggled to tell the information that matters from the information which is irrelevant, and that left them confused when making investment decisions. Participants have stated their difficulties in the identification of what information is true and how much time they spend verifying it before making any decision. The experience of information overload has been most evident among investors who depend a lot on FinTech solutions. Even though digital innovations allowed investors to access a lot of information, they also led to more confusion and contradictory

opinions concerning a lot of issues. Therefore, information overload plays an important role in the relationship between FinTech utilization and behavioral results.

4.4 Cognitive Response

The results indicated that cognitive factor was one of the most important factors contributing to making investment decisions. Respondents noted their engagement in numerous cognitive activities involving the analysis of financial statements, the research of market trends, the evaluation of economic indicators, and the study of fundamentals of the companies prior to making investment decisions. One respondent explained:

“When markets become volatile, I spend more time analyzing information rather than immediately buying or selling.”

Another participant noted:

“My decisions depend on how I interpret market conditions and future opportunities.”

Investors are able to make use of cognitive processes in order to analyze the information available to them and form expectations about future state of the market. Higher levels of financial literacy seem to be an advantage in cognitive processes as they improve information analysis and critical thinking process. Nevertheless, participants remembered cases when cognitive evaluation became more complicated because of information overload and emotional stress. For a few respondents the abundance of the information available and uncertainty at certain moments influenced their ability to evaluate the available information objectively. The results point to the ability of cognitive response to change in time and under the influence of emotional and informational situations. The results indicate that investment decisions made during the periods of market instability are constantly in the process of cognitive adjustment rather than simply being the results of rational thinking (Ahmad & Wu, 2024).

4.5 Emotional Response

Another essential aspect that contributed to the investor attitude was emotional responses. Most respondents stated they had feelings such as remorse, unease, unpredictability, hope, and enthusiasm in times of volatility on the market. One investor stated:

“When the market suddenly drops, my first reaction is fear, even if I believe the company remains fundamentally strong.”

Another respondent explained:

“When stock prices start rising quickly, I become excited and sometimes worry about missing opportunities.”

The research shows that emotional responses have an impact on investment decisions, especially in the situation of sudden shifts in the market. For example, when it comes to fear, it results in cautious actions such as decrease in portfolio and postponing the investment. Some respondents shared the contradictions existing inside them between emotions and logic. Despite the efforts made to act rationally, emotions were strong enough to override the analytical process. It was particularly true for the investors suffering from serious losses (Finet et al., 2025). The results of the research show that the influence of emotional response was strengthened by a great amount of information obtained.

4.6 Risk Perception

According to the analysis, it was found that the reaction of the investors to volatility was heavily affected by their perception of risk. A majority of respondents claimed that a lot depended on the market when they were estimating their risks and opportunities. One respondent explained:

“My risk tolerance changes depending on how uncertain the market becomes.”

Another participant stated:

“If I understand the risks, I am still willing to invest during volatility because opportunities also exist.”

According to the results, it was revealed that the risk assessment was not constant. Specifically, it was discovered that investors would change their perception of risks every time something new occurred with the economy or was advertised on the market. For example, financially knowledgeable investors tended to have a more realistic attitude towards risk, while less sophisticated investors were more likely to view volatility as a dangerous factor. It was also found out that emotional reactions could influence risk assessment. Those investors who experienced anxiety or fear usually evaluated risk levels higher than those investors who experienced less anxious feelings. An additional finding was that excessive information creates uncertainty and results in higher risk evaluation (Belabbes et al., 2023).

4.7 Investor Segmentation

According to the research results there are three investor categories: resilient, adaptive and reactive investors (see Table 4). Most of survey respondents belonged to the category of adaptive investors. Adaptive investors are characterized

by their average level of financial literacy and active use of FinTech tools, although they still take into account the changes in the market when making any decisions. Resilient investors, on the contrary, are equipped with some analytical skills and emotional stability, which allow them to cope with excess of information. Such investors use the market changes as an investment opportunity and prefer long-term approaches.

Discussing about reactive investors, they differ in low level of financial literacy and dependence on other sources of information. They reported high levels of anxiety and overload with information. In addition, such investors are very prone to impulsive behavior and consider market changes to be a threat. It can be assumed that it is the level of financial literacy and the use of FinTech tools that determine the investor's behavior.

Table 4: Investor Segmentation

Group	Naming	Features and Behaviour	Response to Market Volatility	Interviewees
Group 1	Resilient Investors	High financial literacy; strong analytical capability; effectively filter market information; maintain emotional control; use FinTech as a decision support tool rather than a decision substitute.	Remain relatively stable during volatile periods; perceive volatility as an investment opportunity; rely on long term strategies and fundamental analysis.	3, 7, 8, 12, 15, 18, 21, 27 (n=8)
Group 2	Adaptive Investors	Moderate to high financial literacy; frequent users of FinTech platforms; combine analytical reasoning with market sentiment; occasionally influenced by information overload and emotional fluctuations.	Continuously reassess risks and adjust portfolios according to market conditions; maintain flexibility while balancing opportunities and threats.	1, 2, 4, 5, 9, 10, 11, 13, 14, 17, 19, 20, 23, 24, 28, 29, 30, 31, 34 (n=19)
Group 3	Reactive Investors	Limited financial literacy; highly dependent on FinTech alerts, social media discussions, and peer recommendations; vulnerable to information overload, fear, and herd behaviour.	Frequently engage in panic selling, excessive trading, and reactive decision making; perceive volatility primarily as a threat rather than an opportunity.	6, 16, 22, 25, 26, 32, 33, 35 (n=8)

4.8 Investment Decision Making

In the final results, it was found that the process of making investment decisions was a blend of financial literacy, impact of FinTech, data overload, thought process, emotion reaction, and risk perception. Investors' decisions did not depend only on the info from the market or knowledge about finance; it was a continuous process consisting of assessing the data, regulating emotional state, assessing risks, and using technology. Therefore, the results showed that financial knowledge contributed to analytical thinking and less susceptibility to biases in behavior. On the other hand, the use of FinTech also helped make the information easier to reach, thereby enhancing the level of data overload. While cognitive response was associated with processing the data, emotions played a role in interpreting the market situation. Risk perception transformed that into actions concerned with investing, such as buying, holding, selling, or modifying one's portfolio. From the process of selective coding, a model was developed that showed that financial literacy and FinTech influence served as antecedent conditions, while information overload was a mediating factor, cognitive response, and emotional response were behavioral processes, while risk perception served as a mediator to come to the point of making a decision in investment.

4.9 Development of a Biomathematical Model of Investor Response Dynamics

Through grounded theory analysis, it was discovered that the behavior of an investor in volatile equity markets is governed by the interplay of several factors, including financial literacy, FinTech impact, information overload, cognitive process, emotional response, and risk perception. As regards Research Question 5, the results indicate that these components do not function in isolation, but rather have an influence on decision-making processes simultaneously. The conducted interviews showed that skilled investors better analyze the information they receive and are emotionally better adapted to the changing market. Besides, it has been established that receiving too much information from FinTech sources leads to an increase in information overload and emotions and changes risk perceptions of investors. Therefore, the behaviour of an investor can be seen as a dynamic adaptive system where different behavioral states are formed within the process.

Based on the selective coding results, six principal components were identified: financial literacy (FL), FinTech influence (FT), information overload (I), cognitive response (C), emotional response (E), and risk perception (R). These variables collectively determine investment decision behaviour, represented by $D(t)$. Financial literacy and FinTech influence function as exogenous drivers, while information overload, cognitive response, emotional response, and risk perception act as endogenous behavioural states. The resulting biomathematical framework explains how changes in these variables influence the evolution of investor decision making during periods of market volatility. The dynamic relationship can be represented by the following differential equation:

$$dD(t)/dt = \alpha C(t) - \beta E(t) - \gamma R(t) + \delta FL + \varepsilon FT - \zeta I(t)$$

where:

$D(t)$ = Investment decision behaviour at time t

$C(t)$ = Cognitive response

$E(t)$ = Emotional response

$R(t)$ = Risk perception

FL = Financial literacy

FT = FinTech influence

$I(t)$ = Information overload

$\alpha, \beta, \gamma, \delta, \varepsilon, \zeta$ = behavioural parameters measuring the strength of each effect

The model indicates that investment decision behaviour increases as cognitive response, financial literacy, and effective FinTech utilization improve. Conversely, emotional reactions, risk perception, and information overload negatively affect decision quality and may encourage defensive or irrational investment actions. The positive coefficient α represents the contribution of analytical reasoning to investment decisions, while the negative coefficients β , γ , and ζ capture the constraining effects of emotions, perceived risks, and information overload. The coefficients δ and ε represent the direct contributions of financial literacy and FinTech support to investment decision making. To explain how the behavioural states evolve, the interview findings further suggested four underlying state equations: where V represents equity market volatility.

$$\frac{dI(t)}{dt} = a_1 FTV - a_2 FL$$

$$\frac{dC(t)}{dt} = b_1 FL - b_2 I(t)$$

$$\frac{dE(t)}{dt} = c_1 V + c_2 I(t) - c_3 FL$$

$$\frac{dR(t)}{dt} = d_1 E(t) - d_2 C(t)$$

The findings show that the greater the number of FinTech facilitated information, the greater information overload during turbulent market phases; on the contrary, the higher the level of financial literacy, the lesser the amount of information overload. The level of cognitive activity depends on the level of financial literacy but decreases when the amount of information becomes too high. The emotional response is determined by increasing volatility of the market and information overload, while the financial literacy allows to control emotions. The risk perception, on the other hand, increases when emotional reactions take over and decreases when cognitive responses outweigh.

The biomathematical model presented proves that the behavior of the investors operates under a model of continuous feedback. Financial literacy decreases the amount of information overload, improves cognitive processes, and enhances emotional stability. The FinTech services ensure easier access to the relevant information and easier decision making since they provide a sufficient amount of background information for investors. However, sometimes they may cause information overload. Information overload affects both cognitive processes and emotional responses, which influence risk perception and decision making, thus establishing a feedback mechanism, which systematizes the process of human behavior.

$$FT, V \rightarrow I \rightarrow \{C, E\} \rightarrow R \rightarrow D$$

This model describes the investor behavior dynamics mathematically and theoretically, which solves Research Question 5 through defining the phases of behavior, transition processes and connections that affect investing decisions in times of high market instability. The described framework also lays the ground for further quantitative research that could allow for parameterization of the developed model and simulation of investor behavior.

5. Implications and Future Research

In literature, studies into investor behaviour in relation to the volatility of stock markets have mainly revolved around issues of financial knowledge, psychology, technology, and risk perception among other factors. There seems to be less increase in understanding of how these factors come together and interact in contemporary digital environments. The present study sought to address this gap and look at the interaction of financial literacy and FinTech and identify its influence on the dynamics of investors' responses. The findings of the study provided substantial contribution to the theories of behavioural finance due to the explanation of investor responses to volatility of stock markets. The study showed that investor behaviour is influenced by cognitive response, emotional response, information overload, risk perception, and financial knowledge and not just by the financial or stock market information. Instead of examining the constructions as

separate fields of knowledge as it was done by traditional studies, the present study looks into their relationships in the context of a comprehensive theoretical framework. Based on the findings, investors' decision making can be represented as a dynamic process that involves interplay of psychological, informational and technological factors.

In the next step, research continues to develop financial literacy literature by confirming that financial acumen impacts investment behaviour via various behavioural mechanisms. It has become clear that financially literate individuals were more resilient during market downturns due to having better analytical thinking, information filtering ability, and regulation of emotions. However, at the same time, we discovered that financial savvy does not completely mitigate behaviour biases because investors continue to experience emotions like fear, anxiety, and uncertainty, despite being financially competent in the market. Therefore, it is worth noting that cognitive and emotional elements are important when investigating the effect of financial literacy on investments. This study is another step in the development of the FinTech stream of research. Previous investigations mainly addressed the issues of adoption of technology, user acceptance, and the performance of the platform used. In comparison to those studies, it was revealed that FinTech platforms act as behavioural environments and affect investors via information availability/information exposure. Despite the positive effect of FinTech technologies on market participation, they also lead to the situation when investor experiences information overload and emotional stress during crises.

Next, the study has made a methodological contribution with the use of grounded theory in the research of investor behaviour. By making use of open coding, axial coding and selective coding processes the study founded the theory based on the experiences of the investors instead of testing the previously formed hypotheses. The approach made it possible to find out the behaviours and interrelations that could not be discovered or studied with the help of conventional techniques. At the same time, the received framework represented wider knowledge of accounting for decisions that investors make and created the base for using this theory in further studies. Finally, but most importantly, the study provided an innovative contribution with the creation of biomathematical model of dynamics of investor response. The findings of grounded theory indicated that there are financial literacy, influence of FinTech, information overload, cognitive response, emotional response and perception of risk that play the role of dynamic behavioural states and parameters of the investment process. The created mathematical framework explains the evolution and interaction of these factors over time which allows the research to go beyond the limits of purely static interpretation of behavioural finance.

The findings have practical implications for policymakers, financial educators, investors, and operators of financial technology platforms. As financial education programs currently do not address issues such as emotional management, information processing, and behavioral decision-making in volatile financial markets, such programs should be improved by incorporating these topics. Since the problem of information overload is one of the most relevant concerns for the investors, public authorities and regulators should also promote the development of various investor protection methods to improve the quality and transparency of the information available to investors. Besides, the findings may have significant implications for developers of FinTech platforms. It was found that an overload of informational messages causes high emotional pressure and great difficulties in making decisions. Therefore, the key task for FinTech companies is to find ways of filtering information efficiently and creating tools aimed at helping clients in processing data.

The research underscores the necessity of maintaining a delicate equilibrium between analytical thinking on one hand and emotional control on the other hand for those involved in investing in turbulent markets. Research has shown that people who possess adequate financial literacy and good self-regulation skills tend to react better when there is movement in the market. This means that individuals must focus on acquiring information about finance and also develop their behavior skills. From the practical point of view, the present research can be used as a starting point for future studies on investor behavior in unstable stock markets. Researchers can investigate the hypotheses formulated in the theoretical model presented in this paper using different quantitative methods. They may create research instruments based on the main categories identified through grounded theory, and the data they collect can be analyzed using other techniques.

Future studies will be able to verify the parameters of the proposed biomathematical model through quantitative data analysis. In order to test the behavioral parameters identified within the model, appropriate longitudinal studies or behavioral experiments with investors can be employed. Once the parameters have been calculated, they can be used for simulation studies aimed at understanding the behavior of investors under different market environments. This may provide valuable knowledge about financial markets and contribute into behavioral modeling. Also, prospective research may broaden the area of the research by means of studying investors from different countries, markets, age groups and degrees of investment knowledge. Comparative studies may show whether the same behavioral patterns can be revealed in the current study, as well as in the other economic, cultural and technological settings. Future researchers may also analyze the influence of new technologies such as AI advisor, algorithmic trading utilization and machine learning systems on the investor behavior during the period of destabilization.

To sum up, although the current study using a grounded theory method gives many valuable insights about investors' experiences, the fact that the conclusions are derived from a specific sample of retail investors makes them not reliable on other groups. The new studies which will use more diverse samples may help improve generalization of the results attained

and contribute to advancing the theoretical model created by the current study. This can improve the understanding of behavioral economics and development of the field of behavioral finance as well as contribute to the field of FinTech technologies and biomathematical modeling.

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