

# Analysis of the Mechanism by Which Investor Sentiment Affects Stock Market Volatility

**Junbin Liang\***

*School of Economics, Jinan University, Guangzhou, China*

*\*Corresponding author: Junbin Liang.*

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## Abstract

As a core topic in behavioral finance, investor sentiment and its impact mechanism on stock market volatility have always been a research hotspot in the financial field, serving as a key path to explaining market phenomena. Based on relevant empirical research in recent years, this article first systematically reviews the development process of investor sentiment and its impact on stock market volatility. On this basis, it focuses on analyzing the transmission pathways, boundary conditions, and heterogeneous effects of sentiment on stock market volatility. It also collates traditional econometric methods and text analysis techniques driven by large language models, clarifying the differentiated characteristics of investor sentiment under different market environments. Finally, this paper points out the deficiencies and limitations of current research on investor sentiment, and looks forward to the future where artificial intelligence technology empowers the study of investor sentiment towards high-frequency dynamics and multimodal fusion, aiming to provide theoretical references for risk management and investment decisions of market participants.

## Keywords

investor sentiment, stock market volatility, market mechanism, behavioral finance, heterogeneity effect

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## 1. Introduction

In recent years, with the rapid development of behavioral finance, it has been widely applied in investment analysis scenarios, breaking the limitations of traditional financial markets centered on the efficient market hypothesis and rational man. It holds significant importance for asset pricing, the development of investment decisions, and their practical applications [1]. Regarding the impact of investor sentiment on stock market volatility, scholars both domestically and internationally have conducted extensive empirical and theoretical research. In terms of sentiment measurement methods, three mainstream systems have emerged: the direct survey method, the indirect indicator method, and the text mining method [2]. At the level of impact mechanism, it reveals the transmission path through which emotions affect stock price volatility through multiple channels, such as investor trading behavior, market liquidity, and information transmission. At the application level, relevant findings have been widely integrated into investment practices and regulatory policy formulation, propelling behavioral finance from theory to application. They point out that investor sentiment plays a pivotal role in stock market volatility, and through stock market overreaction, investor decision-making behavior and information transmission significantly impact stock market volatility [2].

However, existing research often focuses on a single perspective, which has its limitations. On the one hand, there is a lack of systematic analysis on the research context, hot topics, and development trends among different types of investors. On the other hand, with the rapid development of artificial intelligence and large language model (LLM) technology, methods such as sentiment text mining, high-frequency sentiment measurement, and nonlinear modeling are undergoing paradigm innovation [3]. This makes it difficult for existing reviews to cover the latest advancements promptly.

Based on this, this paper systematically reviews relevant research literature, summarizes the current research status from four aspects: background, process, transmission mechanism, and future outlook, and concludes that investor sentiment causes stock market fluctuations by altering market supply and demand relationships and interfering with information. With the rapid development of artificial intelligence and large language models, sentiment measurement is moving towards high-frequency, dynamic, and multi-model development.

## **2. Background of the Stock Market and Investor Sentiment**

Traditional finance is based on the Efficient Market Hypothesis, which assumes that investors are fully rational, are not influenced by external factors when making investment decisions, and that stock market prices accurately reflect the fundamentals of the company. However, the frequent occurrence of asset bubbles in real capital markets, coupled with liquidity depletion and abnormal price fluctuations (such as IPO premiums and small-cap effects) [4], continuously challenges the assumptions of traditional finance. The rise and development of behavioral finance have integrated psychology into economics, pointing out three aspects: bounded rationality, bounded arbitrage, and emotions as systematic pricing factors, which investors often rely on emotional judgments and generate cognitive biases in an environment of uncertainty and information overload. Within this framework, investor sentiment is believed to have a significant impact on stock market volatility, with overconfidence, sentiment clustering effects, optimistic sentiment leading to high-risk investments, and pessimistic sentiment leading to risk-averse behaviors all significantly affecting stock market volatility.

Investor sentiment is not merely a simple accumulation of individual sentiments, but rather a combination of various factors such as trading behavior, information dissemination, and national institutional environment. In the stock market, sentiment not only affects the degree of asset pricing deviation but also directly shapes the characteristics of market volatility. Optimistic sentiment drives up valuations and trading activity, while pessimistic sentiment triggers panic selling and liquidity contraction. Based on this, academic research on investor sentiment has gradually shifted from theoretical exploration to empirical quantification, undergoing a development process from theoretical foundation, methodological maturity, to technological innovation.

## **3. Evolution and Cutting-edge Development of Investor Sentiment Research Methods**

### **3.1 Theoretical Foundation Period: Noise Trading Model**

In the early stage of investor sentiment research, DeLong proposed the DSSW model, indicating that noise traders would push up price risk, inhibit arbitrage, cause prices to deviate from fundamentals, and obtain higher returns by bearing self-induced risks, which could explain various financial anomalies. This research has propelled the accelerated development of behavioral finance and laid a foundation for the study of investor sentiment [5].

### **3.2 Method Maturity: Traditional Econometric Models and Proxy Indicator Methods**

With the continuous development of behavioral finance theory and financial econometric methods, scholars have adopted empirical verification methods to test the correlation between investor sentiment and stock market volatility, forming a mainstream research paradigm of “econometric model + proxy indicators”. In econometric models, numerous scholars have incorporated sentiment variables into GARCH-type models, stochastic volatility models (SV), and vector autoregressive models (VAR) to depict the volatility characteristics of the stock market. By introducing sentiment variables into these models, they aim to examine their impact on volatility [6]. Taking the closing prices of the Shanghai Composite Index from February 27,

2007, to May 14, 2008, as an example, we characterized the volatility features and conducted data fitting analysis on the sample data using five types of GARCH models and three types of SV models. It was found that these models could indeed effectively depict the volatility features of the stock market. The research perspective has shifted from a single emotional indicator to predicting market cycles (bull and bear markets) and examining the impact on different investors [4].

### **3.3 Period of Technological Innovation**

Nowadays, with the rapid development of artificial intelligence and large language model technology, text data has become the core source of sentiment measurement, including social media comments, financial news, stock forum comments, analyst research reports, corporate announcements, and so on. The early bag-of-words model has been replaced by today's large language models (GPT), significantly enhancing the ability to understand context and recognize and monitor complex information, pushing sentiment analysis into a new stage. Emotions have a significant impact on stock market return volatility, exhibiting heterogeneous and asymmetric effects. The sentiment of individual investors needs to be captured from social commentary, retail trading data, web searches, etc., to reflect short-term sentiment in the stock market. Institutional investors, on the other hand, need to measure sentiment from analyst research reports, changes in institutional holdings, etc., to reflect the long-term impact on the stock market. This heterogeneity analysis has been applied to future research on quantitative investment, focusing on corpus-based multivariate models and dedicated high-frequency indicators [7]. It has deeply integrated with macro-prudential management, algorithmic trading, and market microstructure, marking a new stage of refined, dynamic, and computable sentiment research. With the continuous improvement of measurement methods, scholars have been able to identify the pathways of sentiment effects more accurately and thus systematically reveal the core transmission mechanism of investor sentiment on stock market volatility.

## **4. Driving Mechanism of Investment Sentiment on Stock Market Volatility**

### **4.1 Direct Conduction Mechanism**

The direct driving mechanism of investor sentiment on stock market volatility lies in its ability to alter the balance between market supply and demand, thereby influencing stock prices and their volatility levels. The transmission logic is clear and intuitive. Specifically, when investor sentiment is optimistic, market demand increases, driving stock prices up; whereas when sentiment is pessimistic, demand decreases, triggering excessive selling behavior and leading to a decline in stock prices. Regarding the driving factors of investor sentiment, academia has drawn varying conclusions from different research perspectives [12].

### **4.2 Indirect Conduction Mechanism**

Investor sentiment not only directly affects stock market volatility, but also exerts influence on stock prices and the market through three indirect channels. Firstly, liquidity channel - optimistic sentiment enhances market activity and liquidity, reducing volatility; extreme optimism or pessimism leads to liquidity depletion, exacerbating sharp rises and falls [2]. Secondly, information transmission channels - emotions affect the efficiency of information interpretation and dissemination. When optimistic, negative information is ignored, while when pessimistic, negative signals are amplified, leading to overreaction [8]. Thirdly, arbitrage restriction channels - price deviations driven by sentiment will increase arbitrage risks, deterring arbitrageurs from entering the market, preventing prices from quickly returning to fundamentals, and perpetuating volatility [9].

### **4.3 Heterogeneity Effect**

Existing research has generally confirmed the driving effect of investor sentiment on stock market volatility, but this influence is not uniform, but rather varies depending on market conditions, investor groups, and company characteristics. With the deep penetration of digital technology and the widespread adoption of ESG (Environmental, Social, and Governance) principles, the degree of digital transformation and ESG performance of enterprises has become an important dimension for evaluating company quality. Both can mitigate stock market volatility through emotional channels. However, existing research primarily focuses on

static analysis, with insufficient exploration of the heterogeneity of economic cycles, industry differences, and ESG sub-categories (environment, society, governance). Cross-national comparisons and endogeneity handling need to be strengthened.

In terms of the heterogeneity of market environments, the impact of sentiment on stock market volatility varies across different market conditions: In terms of the differences between bull and bear markets, optimism in a bull market drives stock prices up, leading to market overheating; in a bear market, pessimism significantly magnifies the decline in stock prices, making it more prone to market panic. In the differences in market maturity, investor sentiment has a more significant impact on stock market volatility in emerging markets, where individual investors are the mainstay and irrational trading is more prevalent. In mature markets, institutional investors are the mainstay, and sentiment has a relatively weaker impact on stock market volatility. Yuan Shuyan and Peng Xiqiang took listed companies in Shanghai and Shenzhen stock markets from 2011 to 2021 as samples and found that good ESG performance can alleviate financing constraints by reducing information asymmetry and transmitting positive signals, while the surge of investor sentiment will further strengthen this effect [10]. However, the study remains confined to static analysis and fails to explore heterogeneity across different economic cycles and industry categories. In addition, Negi and other scholars explored the relationship between investor sentiment, market volatility, and the returns of the Indian ESG index, finding that sentiment and volatility significantly affect ESG performance, with a bidirectional causal relationship, providing empirical support from the perspective of behavioral finance. However, this study has several limitations, as it does not cover the global market [11].

In terms of the heterogeneity of the investor group, the impact of sentiment on stock market volatility varies. Individual investor sentiment can be captured through channels such as social media comments, retail trading data, and online search behavior, reflecting short-term sentiment changes in the stock market; institutional investor sentiment is measured based on data such as analysts' research reports and changes in institutional holdings, and its impact is more focused on the long-term trend of the stock market. These types of heterogeneous analysis results have been widely applied in quantitative investment practices. Deep learning models represented by LSTM and CNN, as well as hybrid models such as CEEMD-CNN-LSTM, have provided new tools for stock prediction and portfolio construction. Relevant research aims to elucidate the application logic of deep learning models in stock analysis [12]. In addition, company characteristics such as ESG performance and degree of digital transformation also affect the transmission effect of investor sentiment on volatility. Good ESG performance and digital transformation can reduce information asymmetry and weaken the impact of investor sentiment on stock price volatility. However, existing studies often fail to distinguish the independent roles of each sub-item of ESG (environmental, social, and governance) and do not incorporate key variables such as digital transformation into their analysis, making it difficult to comprehensively depict the regulatory mechanism of company characteristics on sentiment transmission.

## 5. Future Development and Challenges of Investor Sentiment Research

Despite the fruitful achievements in emotion research, there are still various deficiencies in current related research as a whole: there are defects in measurement methods, traditional text mining is prone to contextual bias and lag, and dynamic high-frequency emotion indicators have not been widely applied. The integration of research mechanisms is relatively lacking [7], with most research focusing on single-channel analysis and lacking systematic exploration of multi-channel interactive effects and the endogenous evolution process of emotions. The research on heterogeneity is insufficient, with inadequate coverage of analyses on differences among retail investors, institutional investors, and quantitative investors, as well as differences between bull and bear markets, different industries, and countries. The emerging research perspectives are relatively weak, and there is limited research combining large language models, digital development, and ESG directions [11]. Most models are set in a linear manner and have weak endogenous processing capabilities. Meanwhile, there is a lack of research on the transformation of research into practice, and research on the implementation and application of real-time monitoring, forward-looking predictions, and related policy tools is relatively scarce.

Future research needs to construct a dynamic sentiment measurement system that integrates large language models, multimodal data, and high-frequency trading data to achieve methodological innovation and enhance the accuracy and timeliness of measurements [7]. Theoretically internalize emotions, deeply explore the generation, dissemination, and evolution mechanisms of emotions within the market, and integrate

interdisciplinary perspectives such as neurofinance, cognitive psychology, and neurology [12]; expand heterogeneous research, systematically examine the differences in emotional effects under various contexts such as investor structure, market cycles, industry characteristics, and institutional environments; promote frontier integration, deepen the interaction mechanisms between environmental, social, and governance (ESG), digital transformation, and investor sentiment, and conduct nonlinear and high-dimensional empirical research. At the same time, regulators need to focus on norms and ethics, pay attention to data privacy and algorithm interpretability, establish a transparent and compliant sentiment analysis framework, and foster rational investment awareness through investor financial education to reduce market volatility driven by emotions and lay a solid foundation for long-term market stability [9].

In summary, investor sentiment, as a key factor affecting stock market volatility, still has vast room for further research. In the future, it is necessary to continuously deepen research at the methodological, theoretical, and application levels to better serve market stability and investment practices.

## 6. Conclusion

In summary, investor sentiment is a key variable in behavioral finance and a crucial factor influencing stock market volatility. This article reviews relevant research over the past decade and finds that investor sentiment primarily drives stock market volatility through three pathways: altering market supply and demand relationships, affecting market liquidity, and disrupting information transmission. This volatility exhibits significant heterogeneity and asymmetry. With the rapid development of artificial intelligence, large language models, and text mining technology, sentiment measurement has become more frequent, dynamic, and multi-model, contributing to future investment decisions and risk warnings. However, current research faces deficiencies in measurement accuracy and heterogeneity analysis, necessitating further refinement from an interdisciplinary perspective. Simultaneously, there is a need to promote the implementation of emotion monitoring tools and regulatory policies to ensure more stable market development.

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### **Funding**

This research received no external funding.

### **Conflicts of Interest**

The authors declare no conflict of interest.

### **Acknowledgment**

This paper is an output of the science project.

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