

Volatility Analysis of Indian Banking Sector using **Bollinger Bands**

Sandeep Bhattacharjee, Moumita Saha



Abstract: This research paper aims to analyze the bank volatility in India by examining various factors that contribute to fluctuations in the Indian banking sector. The study investigates the impact of regulatory reforms, macroeconomic indicators, financial stability, and global factors on bank volatility. The research utilises a comprehensive dataset covering one year, i.e., (01-04-2022 to 31-03-2023), to provide an in-depth understanding of the dynamics of bank volatility in India. We have used Bollinger bands to understand the volatility of three premier banks in India, namely, HDFC Bank, ICICI Bank and the STATE BANK OF INDIA, in the Indian stock market. The findings of this study will contribute to the existing literature on banking in emerging markets, help understand the factor of volatility in present times, and provide valuable insights for policymakers and stakeholders in the Indian banking sector.

Keywords: Banks, Financial, India, Stocks, Volatility

INTRODUCTION

About Banks: A.

I.

Banking is a vital component of the modern economy, playing a crucial role in a country's economic growth and development. The banking sector in India has undergone significant changes over the years, evolving into one of the most robust banking systems globally. We have attempted to explore the banking sector in India, encompassing its history, structure, and role in the economy.

B. History of Banking in India:

Banking has its origin in the Vedic period in India, and it is believed that the transition from money lending to banking occurred even before Manu, the great Hindu Jurist, who laid down the laws for debts and credits. The first bank in India was established in 1786, and it was called the Bank of Hindustan. However, it failed after only a few years of operation. The next bank to be established was the General Bank of India in 1786, which also failed after a few years [19]. The State Bank of India was established in 1806 as the Bank of Calcutta, and it was later renamed as the Bank of Bengal.

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In 1921, these three banks were merged to form the Imperial Bank of India, which was later nationalised in 1955 and renamed as the State Bank of India. Structure of Banking System in India [19]. The Indian financial system comprises four segments or components: financial institutions, financial markets, financial instruments, and financial services. Banks come under the financial institutions segment. Financial institutions are intermediaries that mobilise savings and facilitate the allocation of funds to productive uses. There are different types of banks operating in India, including public sector banks (PSBs), private sector banks (PVBs), foreign banks, regional rural banks (RRBs), and cooperative banks [19].

C. **Structure of Banking in India:**

Public Sector Banks: Public sector banks (PSBs) are banks in which the government holds a majority stake. These banks have been working to provide banking services in urban and rural areas since 1970 [20]. These public sector banks account for nearly 70% of banking activity in India. PSBs have played a significant role in promoting financial inclusion by providing banking services to people who were previously excluded from formal banking channels [20].

Private sector banks (PVBs) are banks where most of the shares or value is not held by the government but by private shareholders. PVBs have been experiencing significant progress in internet banking, ATMs, and other technology advancements. They are likely to expand their operations further into rural areas. Foreign Banks: Foreign banks are banks that have their headquarters outside India but operate within the country. These banks have been playing an essential role in providing specialised services such as trade finance and foreign exchange transactions [20].

Regional Rural Banks (RRBs) were established to provide credit and other facilities to small farmers, agricultural labourers, artisans, and small entrepreneurs in rural areas. Cooperative Banks Cooperative banks are owned by their members, who are also their customers. These banks provide credit facilities to their members at reasonable rates [20].

D. **Role of Banking System in India**

The banking system plays a crucial role in promoting economic growth and development by mobilising savings and channelling them into productive investments. The Indian banking system has undergone significant changes over the years, evolving into one of the most robust banking systems globally.



The Reserve Bank of India (RBI) is the central bank of India, responsible for regulating and supervising all banks operating within its jurisdiction. The RBI has been instrumental in promoting financial inclusion by encouraging banks to open branches in rural areas [20].

A. About Stock Volatility:

Stock volatility is a measure of the degree of variation of stock prices over time. It is an essential concept in finance as it helps investors and traders to assess the risk associated with investing in a particular stock. In India, the stock market has been growing rapidly over the years, and with this growth, there has been an increase in stock volatility [21]. This essay will explore the concept of stock volatility in India, including its causes, effects, and measures to mitigate it.

B. Causes of Stock Volatility in India

- 1. Economic Factors: Economic factors, such as inflation, interest rates, and the GDP growth rate, have a significant impact on stock volatility in India. For instance, a rise in inflation or interest rates can lead to a decrease in stock prices, while an increase in GDP growth rate can lead to an increase in stock prices (Bansal and Kaushal,2019) [3].
- Political Factors: Political factors, including government policies and regulations, can also impact stock volatility in India. For example, changes in tax policies or trade agreements can have a significant impact on the stock market (Bansal and Kaushal,2019)
 [3].
- 3. Global Factors: Global factors, such as changes in oil prices or geopolitical tensions, can also impact stock volatility in India. For instance, a rise in oil prices can lead to an increase in inflation, which can negatively affect the stock market (Bansal and Kaushal,2019) [3].

C. Effects of Stock Volatility in India

- 1. Investor Confidence: High levels of stock volatility can lead to a decrease in investor confidence, which can result in a decrease in investment and trading activity (Goyal and Kumar, 2020) [6].
- 2. Market Instability: High levels of stock volatility can also lead to market instability, which can negatively impact the overall economy (Goyal and Kumar, 2020) [6].
- 3. Risk Management: High levels of stock volatility can make it difficult for investors and traders to manage risk effectively, which can result in significant losses (Goyal and Kumar, 2020) [6].

D. Measures to Mitigate Stock Volatility in India

- 1. Diversification: Diversification is one of the most effective ways to mitigate stock volatility. By investing in a variety of stocks across different sectors and industries, investors can reduce their exposure to any one stock or sector (Kumar and Tiwari,2018) [10].
- 2. Risk Management Strategies: Investors and traders can also use risk management strategies such as stop-loss orders or hedging to mitigate the impact of stock volatility (Kumar and Tiwari,2018) [10].

3. Government Policies: The government can also implement policies and regulations that promote stability and reduce volatility in the stock market (Kumar and Tiwari,2018) [10].

II. LITERATURE REVIEW

Bank volatility is a critical aspect of financial stability, as it directly affects the health of the banking sector and the overall economy. Understanding the factors influencing bank volatility in India is of utmost importance for policymakers, regulators, and market participants. This literature review aims to provide an overview of existing research on bank volatility in India, highlighting the key determinants, measurement techniques, and regulatory implications. Stock volatility refers to the degree of variation or fluctuation in the price of a stock over a specific period. Understanding stock volatility is crucial for investors, traders, and policymakers as it helps assess the risk associated with investment decisions and design appropriate strategies. This literature review aims to explore key studies and concepts related to stock volatility in India.

Several factors have been identified as drivers of stock volatility in India. One significant determinant is macroeconomic indicators. Research by Jain and Biswal (2018) found that variables such as interest rates, inflation, exchange rates, and industrial production significantly influence stock market volatility [8]. Additionally, global shocks, such as changes in international oil prices and financial crises, have been identified as influential factors (Srivastava & Arora, 2016) [18]. Market microstructure characteristics, including trading volume, bid-ask spread, and order flow, have also been found to impact stock volatility (Banerjee, 2019) [2].

Several studies have examined the relationship between macroeconomic factors and stock volatility in India. Patel and Mishra (2012) found that macroeconomic variables such as inflation, exchange rates, and interest rates significantly influence stock market volatility [15]. Similarly, Acharya and Rajput (2016) observed a significant impact of oil prices, exchange rates, and interest rates on stock market volatility in India [1]. Stock market volatility can vary across different sectors. Mishra and Mishra (2017) conducted a sector-wise analysis and found that the Information Technology (IT) sector in India exhibited higher volatility compared to other industries [13]. They attributed this to the IT sector's exposure to global factors and technological changes. In contrast, sectors such as Pharmaceuticals and Consumer Goods demonstrated lower volatility.

The introduction of financial derivatives, including futures and options, has had significant implications for stock market volatility in India. Mishra and Kumar (2014) examined the impact of stock index futures trading on the volatility of the underlying stocks in India and found a reduction in volatility after the introduction of stock index futures [12]. However, their study also highlighted the need

for continuous monitoring of the derivatives market to mitigate potential risks.



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Fundamental factors do not solely drive stock market volatility, but are also influenced by investor sentiment and behavioural biases. Behera and Tripathy (2018) investigated the impact of investor sentiment on stock market volatility in India and found a positive relationship [4]. They emphasised the role of sentiment indicators, such as investor surveys and media coverage, in predicting stock market volatility. Financial crises have a significant impact on stock market volatility. Kapoor and Kumar (2018) examined the effect of global economic crises on stock market volatility in India and found an increase in volatility during periods of crisis [9]. They emphasised the importance of policy measures and regulatory interventions in stabilising the market during turbulent times.

Various methodologies have been employed to measure stock volatility in India. One widely used method is the Generalized Autoregressive Conditional Heteroscedasticity (GARCH) model. Studies by Gupta, Jhunjhunwala, and Mishra (2017) and Kumari and Dhal (2018) [11] employed GARCH models to estimate volatility in the Indian stock market [7,11]. Volatility clustering and persistence were observed, indicating that stock returns in India exhibit significant patterns of volatility over time. Other techniques, such as the exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model and the stochastic volatility (SV) model, have also been utilized to capture the dynamics of stock volatility (Naidu, 2019; Sharma & Kumari, 2020) [14,17]. Understanding stock volatility has practical implications for market participants. High levels of volatility can indicate increased risk and uncertainty, leading to cautious investment behavior. Research by Bhattacharya and Kumar (2019) revealed that increased volatility adversely affects market liquidity and trading volume, indicating potential challenges for market participants [5]. Moreover, volatility clustering observed in the Indian stock market suggests the presence of nonlinearities and asymmetric responses to market shocks,

A. HDFC Bank

which investors and risk managers need to consider when formulating investment strategies (Sahoo & Mishra, 2017) [16].

As derived from the above literature study, we need to understand how some major bank stocks in India have behaved in recent times. Further, certain alternate hypotheses were considered:

a. The stock volatility of major Indian bank stocks remains less concerning over time. (H1)

b. Stocks in a similar cluster (Indian bank cluster) may behave similarly over time (H2).

III. DATA COLLECTION

The data analysis was conducted on the data retrieved using the stock history function in Microsoft Excel 365 Enterprise version (licensed version). We have collected data for three significant Bank stocks, including HDFC Bank, ICICI Bank, and State Bank of India, over approximately one year, i.e., between April 1, 2022, and March 31, 2023 (a period of 249 days of stock trading). Later, we used the Bollinger band for volatility analysis using the R console version 3.4.0 for all three stocks: HDFCBANK, ICICIBANK, and SBIN.

The Coding of the Stocks (As Per Availability in SENSEX) was:

STOCK NAMES	STOCK CODES
HDFC BANK	HDFCBANK
ICICI BANK	ICICIBANK
State Bank of India	SBIN

The formula used for the three bands in the Bollinger band: -

Middle Band = 20-day simple moving average (SMA)

Upper Band = 20-day SMA + (20-day standard deviation of price x 2) Lower Band = 20-day SMA - (20-day standard deviation of price

x 2)





Figure 1. Volatility Analysis and Volume of Trade for HDFC BANK

As seen in Figure 1, the Bollinger band for HDFC BANK appears to fluctuate between the 123rd day (28-09-2022) and the 171st day (08-12-2022) of stock trading. Therefore, a high amount of volatility existed during this period, when stocks traded varied between 59,08,066 and 74,01,817 units.



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B. ICICI Bank





As seen in Figure 1, the Bollinger band for ICICIBANK appears to fluctuate between the 64th day (04-07-2022) and the 107th day (06-09-2022) of stock trading. Therefore, a high amount of volatility existed during this period, when stocks traded varied between 83,03,732 and 98,79,326 units.

C. State Bank of India



Figure 3. Volatility Analysis and Volume of Trade for STATE BANK OF INDIA

As observed in Figure 3, the Bollinger band for the STATE BANK OF INDIA seems to fluctuate between the 208th day (31-01-2023) and the 222nd day (20-02-2023) of stock trading. Therefore, a high amount of volatility existed during this period, when stocks traded varied between 2,19,11,943 and 1,25,70,032 units.

V. RESULTS

The results can be summarised as:

- 1. The Bollinger band for HDFC BANK seems to fluctuate between the 123rd day (28-09-2022) and the 171st day (08-12-2022) of stock trade [see Figure 1].
- 2. The Bollinger band for ICICIBANK seems to fluctuate between the 64th day (04-07-2022) and the 107th day (06-09-2022) of stock trade [see Figure 2].
- 3. The Bollinger band for the STATE BANK OF INDIA seems to fluctuate between the 208th day (31-01-2023) and the 222nd day (20-02-2023) of stock trade [see Figure 3].

Additionally, the window period from 06-09-2022 to 20-02-2023 appears to be a region of volatility for all three stocks. Technically, prices are relatively high when above the upper band and relatively low when below the lower band. However, "relatively high" should not be regarded as bearish or as a sell signal. Likewise, "relatively low" should not be considered bullish or as a buy signal. Prices may be high or low for reasons unrelated to the economy.

VI. CONCLUSION

We can further interpret that the Stock volatility of major Indian Bank stocks remains less concerning the time factor. (H1). Additionally, Stocks in a similar cluster (the Banks cluster) may behave similarly with respect to the time factor (H2). Therefore, both of our hypotheses, i.e., H1 and H2, stand as accurate and can be considered a more common phenomenon in the present and future times. Our research was limited to a given time frame and was based on data collected over 249 days of the above-discussed stock prices. The results might vary if more or less time is considered, which remains another constraint of this research. Academics and policymakers can use the paper to determine how policies may be restructured or adjusted in response to prevailing future expectations of economic growth.





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Prof. Sandeep Bhattacharjee has been working as an Assistant Professor (Grade-II) in Applied Analytics at AMITY UNIVERSITY, KOLKATA, for more than eight years. He was previously working as an Assistant Professor of Marketing in the Usha Martin Education and Solutions group. He has over 14 years of experience, including more than 13 years in academia and a year of corporate experience. He

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Ms. Moumita Saha has been working as a Relationship Officer (Assistant Manager, Customer Relationship Officer) at Bandhan Bank for more than a year. She has been responsible for overseeing banking operations, with teamwork as a key factor in her approach. Her professional journey is defined by her unwavering commitment to client satisfaction and financial excellence. She excels at fostering

meaningful connections, ensuring that clients receive tailored financial solutions and exceptional service. Additionally, she has a keen interest in research on banking operations, particularly in the areas of portfolio management, financial derivatives, and stock market operations. She has made significant contributions to understanding the concepts related to Banking sector operations in this research paper.

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