

## Significance of Non-Performing Assets (NPAs) on Volatility of Stock Price: A Study on Select Listed Private Banks in India

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### ABSTRACT

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This study focuses on a few listed Indian private banks to investigate the impact of non-performing assets on stock price volatility. Five private sector banks listed on the National Stock Exchange (NSE) are included in the analysis, which makes use of panel data methods. The banks were selected based on their market capitalization. The study period is from 2011–12 to 2021–22, and the quarterly data offers a thorough look at the patterns and trends over that time. To evaluate their effect on stock price volatility, bank-specific attributes including size, the ratio of net non-performing Assets (NNPAs), capital adequacy ratio (CAR), return on assets (ROA), and return on equity (ROE) are taken into account. The report also includes operational effectiveness and cost to income (CIP) as important factors influencing bank success. Macroeconomic elements, such as price inflation and monetary policy interest rate have also been taken into our study. The notable result of this study reveals that the asset quality of the selected banks has a statistically significant adverse effect on the volatility of share prices during the period of study. Conversely, the rate of inflation and repo rate affect the share prices meaningfully but in an opposing direction.

## 1. Introduction

Any economy needs the banking industry to gather funds and direct them toward profitable stock market investments. The efficiency of the industry is largely dependent on banks' asset management skills. Globally, non-performing assets (NPAs) have grown to be a significant issue, particularly in developing nations like India. Non-performing assets (NPAs) are loans that fail to provide income as a result of borrower defaults, resulting in significant losses and instability in the banking system. NPAs are acknowledged as posing a serious risk to the stability and financial health of banks. They have an effect on a number of components of the banking industry, such as profitability and adequate capital, liquidity, and credit excellence. Thus, the banking sector's stability and ability to grow sustainably depend on its ability to manage and resolve non-performing assets (NPAs) efficiently.

Indian private sector banks' volatility in stock price is influenced by several elements, which reflects the intricate interaction between internal and external dynamics within the banking industry and the larger economic environment. Firstly, the performance and financial health of individual banks, including factors such as profitability, asset quality, and capital adequacy, significantly impact stock price volatility. Non-performing assets (NPAs) represent a key determinant, with higher levels of NPAs often correlating with increased volatility due to concerns over asset quality and potential financial losses. Additionally, macroeconomic elements like interest rates, inflation, and growth rates in GDP exert substantial effect on stock price volatility, as they affect lending practices, borrowing costs, and overall market sentiment. Regulatory changes and government policies, including those related to banking regulations, taxation, and fiscal stimulus measures, can also induce fluctuations in stock prices by altering market expectations and risk perceptions. Moreover, because they create uncertainty and volatility in financial markets, geopolitical developments, world economic conditions, and investor mood all have a substantial impact on the degree of volatility in stock prices. Overall, a combination of internal bank-specific factors, macroeconomic indicators, regulatory policies, and external market dynamics collectively determine the volatility of the stock prices of Indian private sector banks.

This study observes the influence of NPAs on the volatility of stock prices of select listed Indian private sector banks. By analyzing the nexus between NPAs and stock price volatility, this research aims to provide insights into the underlying mechanisms driving market fluctuations and investor behavior. Such insights are crucial for formulating effective risk management strategies, enhancing market efficiency, and fostering sustainable economic development. Consequently, assessing the association between NPAs and volatility in stock prices holds significant implications for policymakers, bank management, investors, and other stakeholders in the Indian financial ecosystem

## 2. Review of Previous Study

The connection between stock price volatility and non-performing assets is critical in banking and financial markets, especially in India's growing economy. This literature review examines the bearing of

NPAs on the volatility of stock prices, with a focus on particular listed private banks in India. Plenty of studies have been done in the last few decades about the basic connection between non-performing assets and the banking sector's profitability across the globe. Various factors, categorized as either exogenous or macroeconomic variables, and indigenous or bank-specific factors, have influenced the banking sector's profitability worldwide. The studies of (Demirguc-Kunt & Huizinga, (1999); Pasiouras & Kosmidou, (2007); Flamini et al., (2009); Bertin et al., (2014); Petria et al., (2015), Ghosh, (2016); Caporale et al., (2017), considered the banking sector of different countries to analyze the determining factors of profitability (Sarkar & Rakshit, 2021), (Sarkar & Rakshit, 2023). Conversely, however, the studies of Athanasoglou et al., (2008); Alper & Anbar, (2011); Dietrich & Wanzenried, (2011); Ongore & Kusa, (2013); Owoputi et al., (2014); (Abel & Le Roux, (2016); Tan, (2016); Rashid & Jabeen, (2016); Ebenezer et al., (2017); Kassem & Sakr, (2018); Robin et al., (2018); have examined a single nation's banking industry to ascertain the factors influencing performance (Sarkar & Rakshit, 2021), (Sarkar & Rakshit, 2023).

The problem of NPAs has consistently been a major apprehension for banks, regulators, and investors. NPAs present significant financial risks to banking institutions and have widespread impacts on the broader economy, influencing investor confidence, credit availability, and market stability. Therefore, understanding the intricate connection between NPAs and the volatility of stock price is crucial, as it provides valuable insights into the fundamental mechanisms that drive market dynamics and investor behavior. An outline of the previous studies is listed in Table 1

Table 1 Summary of Past Studies

Sl No.	Author(s)/ Year	Perspective/ Period of Study	Methodology/ Variable Used	Major Findings
1	Rawlin & Shanmugam (2014)	National 2004-2013	Multiple regression analysis and ANOVA Share Price, Advances, Deposits, Profit and business per employee	The performance of the share price of the largest commercial banks was impacted by the indicators of productivity such as business and profit per employee
2	Ghauri, (2014)	International	Fixed effect model (Panel regression)	There was no substantial association of variables except size

		2008- 2011	Share price, Size, Dividend yield, Asset Growth and ROA.	with the share prices of the banks considered.
3	Rawlin et al., (2015)	National	Correlation, regression, and ANOVA	Different factors influenced the stock prices of the two banks. For SBI, stock price was driven by productivity measures rather than asset utilization efficiency. In contrast, HDFC Bank's stock price was influenced by its effectiveness in asset utilization. Furthermore, the capital adequacy ratio and gross and net non-performing assets were vital drivers of stock prices for both banks.
		2004- 2013	Share Price Deposits, Advances, total assets, GNPA, NNPA, capital adequacy, business per employee, profit per employee, ROA, interest Income /average working funds, non-interest income / average working funds, operating profit /average working funds	
4	Dubey & Kumari (2015)	National	Multiple regression analysis	GNPAs did not appear to impact the market capitalization of banks, but advances impact it except public sector banks. Equity market capitalisation had a demonstrated effect on bank market capitalisation though it reduced in post financial crisis period.
		2001-2015	Market capitalization, Gross NPA, Net NPA, Provisions, Advances, NPAT, BPE, PPE, EMCAP	
5	Arshad et al. (2015)	International	Multiple linear regression	The findings show that earnings per share drive share prices up, whereas interest rates and the book-to-market value ratio drag them down. Other variables such as GDP, the price-earnings ratio, dividend per share, and leverage did not affect share prices.
		2007-2013	Share price, GDP, Interest rate, DPS, Book to market ratio, P/E Ratio, Leverage, EPS	
6	Wachasunder (2015)	National	Bivariate correlation analysis.	The stock price of SBI was inversely correlated with NPAs

		2011-12 to 2015-16	Stock price, NPAs	
7	Chhipa & Nabi (2016)	International	Panel regression analysis.	The share price was positively impacted by each of the explanatory factors.
		2010-2017	Share price, Assets growth, ROA, Dividend yield, EPS	
8	Borse (2016)	National	Correlation analysis.	Bad loans hurt private banks' stock prices more than public banks' stock prices.
		2011-12 to 2014-15	Share price, NPAs	
9	Pradhan & Dahal (2016)	International	Multiple regression analysis with panel data methodology.	The study exposed that size was the most crucial bank-specific factor in determining the market price of shares. GDP had a greater impact on the share price among exogenous determinants.
		2003-04 to 2013-14	Share price DPS, EPS P/E ratio, book value per share ROA, Firm size (total assets), GDP, Inflation, Money supply	
10	Madhvi et al. (2017)	National	Random effect model (Panel regression)	Exhibit a significant negative relationship between explained and explanatory variables.
		2006 -2016	Share price, NPAs	
11	Saldanli et al. (2017)	International	Panel causality test.	The findings showed that the industrial production index does not influence the stock prices of the selected Turkish banks.
		2007-2016	Share price, industrial production index, exchange rates, money supply.	
12	Djamaluddin et al. (2018)	International	Random effect model (Panel regression)	Partially, NPLs, ROA, and the ratio of operating revenue to operating expenses had a significant negative impact on share prices. In contrast, the effects of CAR and EPS on share prices varied, with some being statistically insignificant and
		2013 -2015	Share price, NPLs, ROA, EPS, capital adequacy, operating cost to operating income, Loan to deposit ratio.	

				others significant. Overall, these factors collectively had a notable influence on share prices.
13	Oraby (2018)	International	Correlation and regression analysis using panel data methodology.	Neither non-performing loans nor provision for loan losses had a statistically significant impact on share price banks in Saudi Arabia. However, in the Jordanian capital market, PLL had a statistically significant impact on the share price.
		2011 - 2016	Share Price NPLs, Total Loan Portfolio, Provisions for loan Losses, Provisions to non-performing loan ratio.	
14	Philip & John, (2018)	National	Simple linear regression analysis.	A high volume of non-performing assets in the public sector banks did not have a significant effect on the share price of these banks, unlike the private sector banks, due to the unwavering faith in these banks.
		2006 -2016	Share price, NPAs	
15	Nureny (2019)	International	Multiple regression analysis.	Except CAR all other variables viz. NIM, NPL, ROA, and BOPO had an insignificant upshot on the stock price of state-owned Banks listed on the Indonesia stock exchange.
		2011 - 2016	Stock price CAR, NIM, NPL, LDR, ROA, and BOPO	
16	Tayal et al. (2019)	National	Regression analysis and ANOVA.	There was a noteworthy relationship between rising NPAs and the share price of selected banks.
		2013-14 to 2017-18	Stock price, GNPA's ratio.	
17	Djamaluddin et al. (2019)	International	Fixed effect model (Panel regression)	CAR had a significant positive impact on the stock prices of listed banks in the Indonesia Stock Exchange, while ROA, NIM, LDR,
		2013- 2018	Stock price CAR, ROA, Net NIM, LDR, NPL.	

				and NPL did not have any effect.
18	Safri et al. (2020)	International	Multiple regression analysis	CAR, ROE, and the operating costs to operating revenue ratio positively influence stock returns, whereas NPL has a significant negative impact. Additionally, ROA and LDR do not appear to affect stock returns.
		2013-2017	Return of stock CAR, NPLs, ROA, ROE, LDR, operating expense to operating revenue.	
19	Aswal & Sharma (2020)	National	Pooled OLS model (Panel regression)	DPS and ROE were positive and the NPAs ratio as expected hurt stock prices.
		2010-2019	Share return DPS, ROE, P/BV ratio, NIM, CAR, NNPA ratio.	
20	Hossain (2020)	International	Fixed effect model (Panel regression)	While ROE, assets growth, and CAR ratio did not have a significant impact on the market price of shares, bank size, EPS, DPS, and non-performing loan to total loan ratio all had an impact on the same.
		2014-2018	Market price of share, EPS, DPS, assets growth, bank size, capital to risk-weighted assets ratio, and non- performing loan to total loans	
21	Chadi & Rasha (2022)	International	Pooled OLS model (Panel regression)	Earnings per share (EPS) and dividend per share (DPS) positively influenced share prices in all markets, while DPS specifically impacted Abu Dhabi's market. Conversely, return on equity (ROE), dividend yield
		2004 - 2017	Market price of share, ROE, EPS, DPS, book value per share, Dividend yield, Price-earnings, Debt ratio	

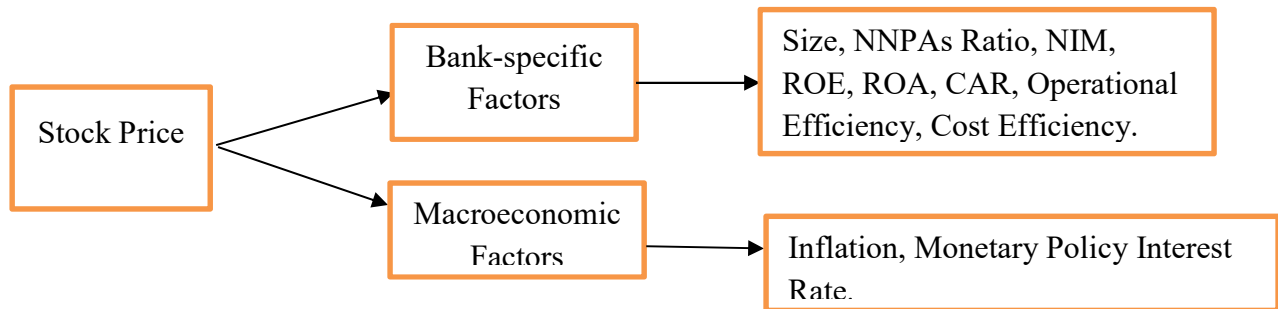
				(DY), and price-earnings (P/E) harmed share prices.
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Source: Authors’ compilation from respective sources.

This review synthesizes existing literature on the subject, drawing from a diverse range of scholarly research, empirical studies, and theoretical frameworks. By critically analyzing prior research endeavors, this review aims to elucidate the mechanisms through which NPAs impact stock price volatility and the factors contributing to the variability in this relationship. Furthermore, it seeks to identify gaps in the current understanding of NPAs and stock price volatility within the context of Indian private banks, thereby guiding future research directions in this domain.

### 3. Model of the Study

We have developed a pool of explanatory variables in accordance with the research reviewed in the preceding section in order to mitigate their influence on the stock price of particular private sector banks listed on the NSE of India. The movement of the stock prices of the banks under investigation is influenced by a mix of macroeconomic and bank-specific factors. Thus, the model of the study is presented below.



**Fig. 1 Model within the research**

### 4. An explanation of the variables

#### 4.1 Dependent Variable:

**Stock Price:** The stock price of a bank indicates the current market valuation of the bank's equity, reflecting investors' perceptions of its financial health, performance, growth prospects, and overall market conditions. Following the studies of Rawlin & Shanmugam (2014), Ghauri (2014), Rawlin et al., (2015), Arshad et al. (2015), Wachasunder (2015), Chhipa & Nabi (2016), Borse (2016), Pradhan & Dahal (2016), Madhvi et al. (2017), Saldanli et al. (2017), Djamaluddin et al. (2018), Hossain (2020), Chadi & Rasha (2022), we have selected the stock price as the response variable in our study.

#### 4.2 Explanatory Factors



### 4.2.1 Bank-related Factors

**Size:** A bank's size may be determined using a range of financial indicators, including total assets, total deposits, total outstanding loans, market capitalization, number of employees, and so on. In our study, the ln value of total assets has been employed as a proxy for the size of the selected bank (Ghauri (2014); Rawlin et al., (2015)). Higher asset values enable banks to operate more profitably and diversify their business. This diversification may result in increased stability and possibly higher profits, luring investors and raising share values.

**Assets Quality:** The NNPA ratio measures the percentage of defaulted loans about the net advances of a bank. High NNPA ratios indicate more credit risk and instability, which usually undermines investor confidence and share prices. On the other hand, low NNPA ratios signal good asset quality and financial stability, which generally supports share prices. In keeping with the earlier research of ( Rawlin et al., (2015), Dubey & Kumari (2015), Wachasunder (2015), Borse (2016), Madhvi et al. (2017), Djamaluddin et al. (2018), Oraby (2018), Philip & John, (2018), Nureny (2019), Djamaluddin et al. (2019), Safri et al. (2020), Aswal & Sharma (2020) the net non-performing assets ratio has been regarded as one of the key explanatory factors.

**Net Interest Margin (NIM):** The difference between interest earned and interest paid by banks is known as net interest margin. (Dietrich & Wanzenried (2011),(Hossain, 2021) The higher the NIM, the greater the banks' efficacy in generating profit.(Sarkar & Rakshit, 2023). NIM directly impacts a bank's earnings, and consequently, its share price. A bank with a higher NIM is regarded as very efficient and highly profitable, attracting investors' interest and leading to higher share prices. In this regard, the central bank's monetary policy is extremely important.. (Aswal & Sharma, 2020). Nureny (2019), Djamaluddin et al. (2019), Aswal & Sharma (2020) have considered NIM as an independent variable in their studies.

**Return on Equity (ROE):** A measure used to evaluate a company's profitability concerning shareholder equity is the ratio of net profit to total equity. (Athanasoglou et al., 2008; Sarkar & Rakshit, 2023). ROE significantly affects the share price of banks. Investors often view higher ROE positively, as it suggests that the bank is making effective use of its capital to generate profits. This perception of profitability can boost investor trust, potentially raising demand for the bank's shares and increasing its stock price. ROE is considered one of the aspects that affect share price following the studies of Safri et al. (2020), Aswal & Sharma (2020), Chadi & Rasha (2022).

**Return on Assets (ROA):** Ghauri (2014), Rawlin et al., (2015), Chhipa & Nabi (2016), Pradhan & Dahal (2016), Djamaluddin et al. (2018), Nureny (2019), Safri et al. (2020), have considered return on assets as one of the variables which impact banks' share prices. ROA indicates a firm's efficiency in utilizing its assets to generate profit. (Khrawish,(2011), Gaur & Mohapatra (2021). It guarantees a 'more resilient solvency ratio' in the face of a risky financial environment (Doyran (2013), (Gaur & Mohapatra, 2021).

Banks with steady and sustainable return on assets can gain investors' reliance leading to increased demand for the bank's shares and thus higher share prices. Thus, ROA is taken as another predictor variable in our study.

**Capital Adequacy Ratio (CAR):** The capital adequacy ratio assesses a bank's capacity to withstand potential losses, safeguard depositors, and ensure financial stability. It guarantees that banks possess enough capital to accommodate different kinds of risks, such as market, operational, and credit risks. A robust CAR strengthens a bank's capacity to expand and turn a profit, encourages adherence to legal requirements, and increases investor confidence. Recognizing its significance and adhering to the research findings of Rawlin et al., (2015), Djamaluddin et al. (2018), Nureny (2019), Djamaluddin et al. (2019), Safri et al. (2020), Aswal & Sharma (2020), Hossain (2020), CAR is also used as an independent variable in our study.

**Operational Efficiency:** In our study operating efficiency of banks under consideration is characterized by the operating income to total assets ratio. This ratio provides a more precise measurement of how successfully banks are using their total assets to generate operating income (Gaur & Mohapatra, 2021). We argue that using this ratio alongside Return on Assets (ROA) offers a more focused perspective on operating efficiency. Poudel, (2023) exhibited that operating efficiency positively influences the share price of banks under study.

**Cost Efficiency:** The cost-to-income ratio (CIR), also known as the operational revenue-to-operating costs ratio, is a crucial performance indicator that illustrates banks' efficiency in managing their expenses and generating profits. A low CIR shows that the bank is effectively controlling costs and maximizing revenue, while a high CIR suggests the opposite. Investors and stakeholders are usually more attracted to banks with lower CIRs as they are seen as more efficient, profitable, and stable. Conferring to research conducted by (Djamaluddin et al., (2018) (Nureny, (2019),(Safri et al., (2020), CIR is also used as an independent variable in our study.

#### 4.2.2 Macroeconomic Variables

**Inflation:** Inflation is the pace at which the overall prices of goods and services increase, diminishing the value of money and reducing purchasing power. The previous studies exhibited both significantly positive, significantly negative, and even insignificant impacts of inflation on the volatility of the share price of the banking industry of different countries. The studies of (Victor & Kuwornu, 2011), (Laichena & Obwogi, 2015) showed a significant positive effect on the stock price. On the other hand, Al-Albadi and Al-Sabbagh (2006) showed a significant adverse impact of inflation, and the studies of (Khan & Yosuf, 2013), (Kirui et al., 2014) explored the insignificant effects of inflation on stock price volatility. The quarterly consumer price index (CPI) has been used as a measure of inflation in our study.

**Monetary Policy Interest Rate (Repo rate):** According to the research of (Abadi & Sabbagh (2006), Alam & Uddin (2009). Saeed & Akhter (2012), (Mugambi & Okech (2016) (Abdullahi, 2020) monetary

policy interest rate has been considered another macroeconomic determinant of the volatility of share prices in our study. In general, a higher repo rate would lead to higher borrowing costs for companies, eating into profitability and eventually hurting investor sentiment, thus lowering share prices. A lower repo rate, on the other hand, would reduce borrowing costs for the company and could lift corporate earnings, therefore tending to increase investment and share prices.

Table 2 represents a an overview of the selected variables and their anticipated outcome on the volatility of stock price

**Table 2 Selected Variables and their Expected Impact**

Variables	Abbreviation	Measurement	Variable Type	Expected Impact
Stock Price	SP	Quarterly average stock Price	Dependent	-
Size of banks	Size	Ln of Total assets	Independent	Positive
Assets Quality	NNPAs Ratio	$\frac{(GrossNPAs - Provisions)}{Total\ advances} \times 100$	Independent	Negative
Net Interest Margin	NIM	Interest Earned- Interest expanded	Independent	Positive
Return on Assets	ROA	Net Income/ Total assets	Independent	Positive
Return on Equity	ROE	Net Income/ Shareholders' equity	Independent	Positive
Capital Adequacy Ratio	CAR	Total capital/ Rise weighted assets	Independent	Positive/Negative
Operational Efficiency	Op. Eff	Operating income/ Total assets	Independent	Positive
Cost Efficiency	CIR	Operating cost/ Operating income	Independent	Positive
Inflation	INF	Quarterly average inflation in India (CPI)	Independent	Positive/Negative
Monetary policy interest rate	INT	Repo rate of the RBI	Independent	Negative

Source: Authors' Compilation

## 5. Data and Methodology of the Study

### 5.1 Source of Data and Sample Selection

This study focuses on the top 5 private sector banks depending on their market valuation, listed on the National Stock Exchange (NSE) as of March 2021: Axis Bank, HDFC Bank, Kotak Mahindra Bank, ICICI Bank, and IndusInd Bank. The outcome variable in our study is the quarterly average stock price of these selected banks. Several macroeconomic and bank-specific factors, as outlined in Section 3, serve as the regressors in our model.

The analysis covers the period from 2011-12 to 2021-22. Quarterly data on bank-specific factors were sourced from the ProwssIQ database. The Central Bank of India (RBI) (<https://data.rbi.org.in>) and World Bank publications provided the data on inflation and the monetary policy interest rate (Repo rate), respectively.

## 5.2 Methodology

A panel regression approach has been used to ascertain the impacts of bank-related and macroeconomic parameters on the volatility of stock prices of selected private sector commercial banks listed at NSE. Cross-sectional and time-series data are combined in panel data regression analysis to provide more comprehensive insights into economic, financial, and social phenomena. One of the primary benefits of panel data regression is its capacity to control unobserved heterogeneity by accounting for individual-specific effects, thereby reducing omitted variable bias. This enhances the accuracy and reliability of the estimated coefficients. Three commonly used models in panel regression are pooled OLS, random-effect model, and fixed-effect model. The pooled OLS performs multiple regression analysis with panel data based on the assumption that the cross-section units are homogeneous. The estimate observed from the pooled model may be biased because of unobserved heterogeneity. This bias may be reduced or avoided by including time-specific cross-sections or errors in the panel data. When this error component is non-random, it is a fixed-effect model, and it is a random-effect model when this error component is random (Das, 2019). Fixed-effects estimation examines the association between explanatory variables and explained variables within an entity by eliminating the impact of the time-invariant unseen features. As a result, in the FE model, we estimate the net effect of the explanatory variables on the explained variable. In a random-effects model, the distribution of intercepts captures the random effects of the unnoticed heterogeneity. In the random-effects model, degrees of freedom are more and it is more suitable in the case of micro-panel or short panel. The Hausman test is used to determine whether to use a fixed-effects model or a random-effects model. A fixed-effects model is selected if the null hypothesis, which states that the individual effects are uncorrelated with other regressors, is rejected. (Das, 2019). To select the appropriate model out of these three, we follow the guidelines prescribed by (Park, 2009).

The functional form of the model that is to be estimated in this analysis can be expressed as follows.

### *Stock Price*

$= f(\text{Size}, \text{NNPAs Ratio}, \text{NIM}, \text{ROE}, \text{ROA}, \text{CAR}, \text{Operational Efficiency}, \text{Cost Efficiency}, \text{Inflation}, \text{Moneta})$

The regression equation following form 1 can be as under:

$$SP = \alpha_i + \beta_1 size + \beta_2 NNPR + \beta_3 NIM + \beta_4 ROE + \beta_5 ROA + \beta_6 CAR + \beta_7 Op. eff + \beta_8 CIR + \beta_9 INF + \beta_{10} INT + u_i t \quad 2$$

In equation (2)  $\beta_1$  to  $\beta_{10}$  are the coefficients of the independent variables,  $i$  represents individual banks,  $t$  denotes time and  $u$  is the error term.

## 6. Analysis and Outcomes

### Descriptive Statistics

**Table 3 Descriptive Statistics**

Variables	Obs.	Mean	Std. Dev.	Min	Max
Size	220	12.8186	0.8858	10.7758	14.5190
NNPR	220	0.9659	0.8340	0.0947	4.4358
NIM	220	4.1813	0.52281	2.8464	5.0010
ROE	220	13.3026	3.7505	2.7316	20.0213
ROA	220	1.5727	0.3928	0.2949	2.1118
CAR	220	2.3266	1.5856	0.4061	6.2792
Op. eff	220	1.8598	0.8836	0.4448	6.2859
CIR	220	44.5630	5.1808	29.5008	68.1377
INF	220	4.4302	4.3023	-4.5500	14.3300
INT	220	6.4304	1.4156	4.0000	8.5000

Source: Authors' Calculation

The above table (Table 3) depicts the descriptive information for the relevant variables. The size of these banks is found to have an average value of 12.8186 with a minimum value of 10.7758, and a maximum value of 14.5190 with a variability of 0.8858. The NNPA ratio ranges from 0.0947 to 4.4358 having a mean of 0.9659 with a standard deviation of less than unity. NIM also has a standard deviation of less than unity (0.5228) with an average of 4.1813 ranging between 2.8464 and 5.00. ROE has a mean value of 13.3026 and varies between 2.7316 and 20.0213 with a variability of 3.7505. The variability of ROA is less than one ranging between 0.2949 to 2.1118 with an average of 1.5727. The sample banks' capital adequacy ratio (CAR) has a mean of 2.3266, with a least value of 0.41 and a extreme value of 6.28 with a variability of 1.5856. The sample banks' operational efficiency varies from 0.4448 to 6.2859. Its mean value is 1.8598 with a standard deviation of less than unity. Table 3 also exhibits that the average CIR is 44.5630 with most ratios within 5.1808 of the mean. The lowest CIR is 29.5008, and the highest is 68.14. From the above table, it is observed that the two macroeconomic indicators inflation and Repo rate have 4.4302 and 6.4304 with a variability of 4.3023 and 1.4156 respectively.

**Relationship Matrix and Diagnostic of Multicollinearity**

**Table 4 Relationship Matrix**

	Stock price	Size	NNPR	NIM	ROE	ROA	CAR	Op. eff	CIR	INF	INT
Stock	1.000										

price	0										
Size	0.132 2	1.000 0									
NNP R	- 0.408 8	0.245 3	1.000 0								
NIM	0.323 7	- 0.088 2	- 0.434 7	1.000 0							
ROE	0.241 0	- 0.261 6	- 0.607 0	0.519 3	1.000 0						
ROA	0.342 5	- 0.205 1	- 0.417 5	0.548 6	0.697 5	1.000 0					
CAR	- 0.273 3	0.168 6	0.151 2	- 0.366 4	- 0.050 9	- 0.176 4	1.000 0				
Op. eff	0.047 2	0.088 7	- 0.029 0	0.173 7	0.118 2	0.204 0	- 0.106 9	1.000 0			
CIR	- 0.028 6	- 0.653 7	- 0.138 1	- 0.012 2	- 0.006 1	- 0.142 1	- 0.024 1	- 0.177 8	1.000 0		
INF	0.107 4	- 0.049 9	- 0.141 4	- 0.076 4	0.063 4	0.031 4	0.132 9	- 0.012 9	0.090 3	1.000 0	
INT	- 0.175 5	- 0.575 1	- 0.118 8	- 0.066 0	0.359 0	0.219 4	0.490 5	- 0.065 8	0.477 8	- 0.077 0	1.000 0

Source: Authors' Calculation

**Table 5 VIF Value**

Variables	VIF
INT	4.3600
ROE	4.4000
ROA	3.5800
Size	3.3500
CAR	3.2400
CIR	2.4900

NIM	1.8800
NNPR	1.8600
INF	1.3200
Op. eff	1.0900
Mean VIF	2.7570

Source: Authors' Calculation

The bivariate correlation between a set of input variables can be used to test the issue of multicollinearity among them. If the correlation coefficient between two explanatory variables is (-)0.80 or less, or 0.80 or higher, multicollinearity may be a problem. (Williams, 2015.), (Rahaman & Sur, 2021). The correlation matrix in Table 4 indicates that all the correlation coefficients between the chosen variables in the study are in the prescribed range. To achieve a more consistent outcome VIF value (Table 5) of the explanatory variables have been calculated. The highest VIF value is 4.3600 which safely indicates the absence of multicollinearity among the independent variables used in the study (Sarkar & Rakshit, 2023).

Equation (2) has been estimated using panel regression analysis to shed light on the importance of a collection of macroeconomic and bank-specific indicators in general and non-performing assets in particular concerning the volatility of the stock prices of selected private sector banks. Among the three commonly used models (Pooled OLS, Fixed Effect, and Random Effect) RE and pooled OLS models have both been employed. The most suitable model between these two has been selected by using the value of Breusch and Pagan Lagrangian multiplier. The findings of the test favour the pooled OLS model as the  $prob.> \chi^2 = 1.0000$ . The decision between FE and RE has been made using the Hausman specification test. Compared to the random-effect model, the fixed-effect model is more suitable as the  $prob.> \chi^2 = 0.0000$  (value of test statistic 52.54). By comparing pooled OLS and FE, the fixed-effect model is the most appropriate as  $Prob > F = 0.0000$  (value of test statistic 16.84). The result of fixed effect estimation has been shown in Table 6.

**TABLE 6: Regression Result (Fixed Effect)**

R-sq.: = 0.524		
Prob > F = 0.0000		
Stock Price	Coefficient	P value
Size	904.8318	0.0000***
NNPR	-188.2738	0.0000***
NIM	-114.7599	0.1090
ROE	42.8661	0.0250**
ROA	679.6750	0.0000***
CAR	5.3191	0.8630
Op. eff	57.1455	0.0390**

CIR	4.0292	0.6390
INF	20.9703	0.0010 <sup>***</sup>
INT	-240.8698	0.0000 <sup>***</sup>
Value of F Statistic = 16.84 Prob > F = 0.000		

**Source: Authors' Calculation**

Note: \*significant at 10%, \*\*significant at 5%; \*\*\*significant at 1%

## 7. Panel Regression Results

Table 6 explores the panel regression result of the best-fit model. It has been observed that risk-weighted assets ratio (CAR), NIM, and cost efficiency (CIR) have no impact on the volatility of stock prices of sample banks. This finding supports the previous study of (Aswal & Sharma (2020), Hossain (2020). In line with the studies of Ghauri (2014), Chhipa & Nabi (2016), Djamaluddin et al. (2018), Nureny (2019), Djamaluddin et al. (2019), Safri et al. (2020), ROA, and Size of the banks have impacted the volatility of their stock price in a highly significant positive way whereas ROE and operational efficiency impacted the same in a moderately significant way. It is also revealed that the net non-performing assets ratio has a significant negative impact on the volatility of stock prices of the banks under study. This finding of our study is in line with the studies of Djamaluddin et al. (2018), Tayal et al. (2019), Aswal & Sharma (2020), Hossain (2020), Safri et al. (2020) etc. Out of the two macroeconomic determinants, the rate of inflation has a significant positive impact but the Repo rate exhibits a significant negative impact on the response variable. The result of our study supports the findings of (Al-Abadi & Al-Sabbagh (2006), Alam & Uddin (2009). Saeed & Akhter (2012), (Mugambi & Okech (2016) (Abdullahi, 2020).

## 8. Conclusions

The substantial positive impact of Return on Assets (ROA) and Return on Equity (ROE) on the volatility of share prices in the banking sector underscores the critical importance of these financial metrics in evaluating banking performance and investor confidence. Our analysis demonstrates that banks with higher ROA and ROE tend to experience reduced volatility in their share prices, indicating stronger financial health and operational efficiency. This correlation highlights the value for investors in closely monitoring these metrics as key indicators of stability and profitability in the banking sector. The research of (Dietrich & Wanzenried, 2011) underscores how ROA impacts profitability and stability in Swiss banks. Further evidence from (Demirguc-Kunt & Huizinga, 1999) supports the notion that robust financial ratios contribute to lower risk and volatility in global banking.

The significant positive impact of bank size on the volatility of share prices in the banking sector underscores the intricate dynamics between a bank's scale and market behavior. Larger banks, due to their extensive operations and broader market influence, tend to exhibit higher volatility in their share prices



The pronounced negative effect of asset quality on share price volatility in the banking sector underscores the vital importance of maintaining high-quality assets to ensure financial stability and bolster investor confidence. The deterioration of asset quality leads to increased market perception of risk, thereby amplifying stock price volatility.

The dual impact of inflation rates and the Repo rate of the RBI on the volatility of share prices in the banking sector reveals the complex interplay between macroeconomic policies and market stability. Higher inflation rates contribute to increased volatility in bank share prices by fostering uncertainty and risk. Conversely, the Repo rate—a tool used by the RBI to control monetary policy—has a statistically significant negative impact on share price volatility. This indicates that higher Repo rates, which typically signal tightening monetary policy, can stabilize bank share prices by curbing inflationary pressures and reducing speculative activities.

## 9. Limitations

The investigation is restricted to the sample of five Indian private-sector banks based on their market capitalization. A comparative study between public and private sector banks may be undertaken, or all private sector banks may be included. Apart from inflation and monetary policy interest rate other external factors like GDP, and exchange rate may also be considered. Future studies may be conducted by incorporating these factors to have a more comprehensive understanding.

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