Effects of Inflation, Ten-Year Bond Yield Rate, and VIX Index on the Stock Prices of Banks Across All Three Market Capitalizations in India: A Regression Analysis

Anuragh Nagvekar, Raghavendra C. Kamath,* Teja Simha, Yash Hegde, and Aruna Prabhu

Department of Mechanical and Industrial Engineering, Manipal Institute of Technology, Manipal Academy of Higher Education, Manipal, Karnataka, India 576104

Abstract

This study investigates the impact of critical economic factors—namely, inflation, the 10-year bond yield rate, and the VIX index—on the stock prices of banks operating across different market capitalization segments in India. Through a comprehensive regression analysis framework, this research quantifies the relationships between these economic factors and bank stock prices while accounting for potential variances across large-cap, mid-cap, and small-cap banks. Utilizing data from the past five years, this analysis not only provides a nuanced understanding of how these macroeconomic indicators influence bank stock prices but also explores the specific effects on banks of varying market capitalizations. The findings reveal that small-cap companies are predominantly influenced by internal management decisions and capital allocation, whereas the consumer price index significantly predicts and reflects stock price behavior. Conversely, the bond yield rate and VIX index show minimal impact on stock prices. This study offers valuable insights for investors, policymakers, and financial institutions, aiding in the development of informed investment strategies and risk management practices.

Keywords: Inflation, Ten-Year Bond Yield Rate, VIX Index, Stock Prices, Market Capitalization

1 Introduction

Banking stocks have traditionally offered superior returns compared to broader capital markets, a trend underscored by historical performance data [1]. However, the interaction between macroeconomic variables and bank stock prices is complex, especially in emerging economies like India. Inflation, in particular, has been shown to exert a mixed impact on bank profitability and stock returns, with studies revealing both negative and positive correlations over different time horizons [1–6]. The significance of interest rates is also well documented, with the ten-year bond yield rate influencing bank NIFTY returns and indicating that bank stocks' interest rate risk exposure is closely tied to their core capital-to-asset ratio and interest spread [3, 7]. Moreover, market volatility, as measured by the VIX Index, suggests a bidirectional relationship with bank stock prices, affecting overall market returns [8]. Accounting variables such as EPS, ROE, CAR, NIM, and NPAs, alongside bank-specific factors like size and revenue diversification, emerge as significant determinants of bank stock prices and performance in India [1, 4, 9]. Notably, the performance divide between private and public sector banks reveals the influence of ownership structure on profitability [9].

This backdrop of varying influences on bank stock prices underscores the need for an in-depth analysis that considers the multifaceted impact of inflation, interest rates, and market volatility across banks of different sizes and ownership structures [10–12]. The current study aims to fill this gap by providing a comprehensive analysis of these relationships, thereby contributing to the nuanced understanding of the dynamics at play within the Indian banking sector's stock valuation. The findings are poised to offer valuable insights for investors, policymakers, and the banks themselves, highlighting the critical interplay between macroeconomic indicators and bank stock performance.

2 Methods

This study adopts a quantitative research methodology to examine the relationship between key macroeconomic indicators and the stock prices of Indian banks, categorized into large, mid, and small-cap based on their market capitalization. The analysis focuses on three primary macroeconomic indicators: the Consumer Price Index (CPI) as a measure of inflation, the ten-year bond yield rate reflecting interest rates, and the Volatility Index (VIX) representing market volatility. The impact of these indicators on the stock prices of selected banks over a specified period is assessed through regression analysis.

2.1 Data Collection

The dataset comprises monthly observations of the CPI, ten-year bond yield rates, and VIX Index values, alongside the closing stock prices of a stratified sample of Indian banks. These banks are classified into large, mid, and small-cap categories, based on their market capitalization, to facilitate a comparative analysis across different bank sizes. Data were collected from official sources, including the Reserve Bank of India (RBI), Securities and Exchange Board of India (SEBI), and directly from the stock exchanges where these banks are listed. The study period spans five years, from January 2015 to December 2019, providing a comprehensive overview of the trends and potential shifts in the relationships between the variables of interest.

2.2 Statistical Analysis

The study employs multiple regression analysis to explore the relationship between the stock prices of banks and the selected macroeconomic indicators, as it has been proven quantitative technique for the same in a few prior studies [13–17]. The regression model is specified as follows:

$$\text{Stock Price}_{it} = \beta_0 + \beta_1 \text{CPI}_t + \beta_2 \text{Bond Yield Rate}_t + \beta_3 \text{VIX Index}_t + \varepsilon_{it}$$

where Stock Price$_{it}$ represents the closing stock price of bank i at time t, CPI$_t$ is the Consumer Price Index at time t, Bond Yield Rate$_t$ is the ten-year bond yield rate at time t, VIX Index$_t$ is the Volatility Index at time t, and ε_{it} is the error term.

The model includes bank-specific intercepts to account for unobserved heterogeneity among banks. The analysis is conducted separately for each bank size category to identify any differential impacts of the macroeconomic indicators on stock prices. The regression coefficients (β) measure the sensitivity of bank stock prices to changes in each macroeconomic indicator. Model diagnostics and robustness checks, including tests for multicollinearity, heteroskedasticity, and serial correlation, are performed to ensure the reliability and validity of the regression results. The R^2 and F-statistic are reported to assess the model's overall fit and explanatory power.

3 Results

The empirical analysis conducted in this study explores the intricate effects of inflation (as measured by the Consumer Price Index, CPI), ten-year bond yield rates, and market volatility (as indicated by the VIX index) on the stock prices of banks across different market capitalizations in India. The results delineate the differential impacts of these macroeconomic indicators across large-cap, mid-cap, and small-cap bank stocks, elucidated through regression analysis, R^2, and F-statistics.

3.1 Large-cap Bank Stocks

The analysis of large-cap bank stocks focuses on some of the biggest players in the Indian banking sector, such as HDFC Bank, ICICI Bank, SBI, Kotak Bank, and Axis Bank. This section examines the influence of the Consumer Price Index (CPI), Bond Yield Rate, and the Volatility Index (VIX) on the stock prices of these large-cap banks. The regression coefficients as shown in Table **??** is obtained from the analysis that indicate the extent to which CPI, Bond Value, and VIX Index impact the stock prices of large-cap banks.

Table 1: Regression Coefficients computed for selected mid-cap bank stocks

Company	Intercept	CPI	Bond Yield Rate	VIX index
HDFC BANK	-212.65	13.47	-59.32	-9.96
ICICI BANK	-1873.13	14.88	26.73	-3.81
STATE BANK OF INDIA	-1222.29	8.06	57.81	-3.24
KOTAK BANK	85.53	0.565	-105.83	-8.11
AXIS BANK	-153.91	4.66	37.11	-7.49

The corresponding p-values (Table 2) provide insight into the statistical significance of these coefficients, indicating how reliably the CPI, Bond Value, and VIX Index can predict the stock prices of large-cap banks.

Table 2: p-value obtained for selected large-cap bank stocks

Large-cap Banks	HDFC BANK	ICICI BANK	SBI	KOTAK BANK	AXIS BANK
Intercept	0.42	1.05E-15	9.52E-12	0.810	0.530
CPI	8.20E-17	1.69E-27	9.991E-19	4.61E-14	3.918E-05
Bond Value	0.011	0.067	1.48E-05	0.001	0.081
VIX Index	4.11E-06	0.003	0.002	0.003	0.0001

The R^2 values and significance F-statistics reported in Table ?? confirm the predictive power and statistical significance of the regression models applied to large-cap bank stocks. This demonstrates the models' effectiveness in explaining the variability in stock prices based on the selected economic indicators.

Table 3: R^2 and F computation for selected large-cap bank stocks

Company	Significance F	R^2
HDFC BANK	2.15E-17	0.773
ICICI BANK	2.94E-26	0.893
STATE BANK OF INDIA	8.66E-19	0.798
KOTAK BANK	1.59E-14	0.709
AXIS BANK	1.15E-07	0.475

The findings for large-cap banks reveal a complex interplay between stock prices and macroeconomic indicators. CPI generally shows a positive correlation, suggesting that inflation may lead to an increase in bank stock prices. The impact of the Bond Value and VIX Index varies across banks, reflecting the diverse risk profiles and investment strategies employed by large-cap banks. These results are crucial for investors and financial analysts who seek to understand the factors driving the stock prices of large-cap banks in India, offering insights into how macroeconomic changes can influence investment decisions in the banking sector.

3.2 Mid-cap Bank Stocks

The mid-cap segment of the banking sector exhibits a distinct pattern in the impact of macroeconomic indicators on stock prices. Our regression analysis covers selected mid-cap banks such as AU Bank, IDFC First Bank, Union Bank, Canara Bank, and Federal Bank, revealing nuanced relationships between the Consumer Price Index (CPI), Bond Yield Rate, and Volatility Index (VIX) with their stock prices. The computed regression coefficients highlight the varying degrees of influence that CPI, Bond Yield Rate, and VIX Index exert on the stock prices of mid-cap banks. Notably, the CPI demonstrates a significant impact across several banks, reinforcing the notion that inflation levels can affect bank valuations in complex ways. Table 4 showcases the regression coefficients for Mid-cap Bank Stocks.

Table 4: Regression Coefficients computed for selected mid-cap bank stocks

Company	Intercept	CPI	Bond Yield Rate	VIX index
AU BANK	-1078.49	9.85	9.289	-3.417
IDFC First Bank	13.38	0.235	0.764	-0.614
UNION Bank	28.486	-0.637	20.065	-0.664
CANARA Bank	-329.117	0.565	72.581	-2.424
FEDERAL Bank	-145.448	0.915	16.048	-0.967

The p-values associated with these coefficients (Table 5) underscore the statistical significance of the CPI for all banks under consideration, particularly AU Bank and Federal Bank, suggesting a robust predictive power of inflation on their stock performances. Conversely, the Bond Yield Rate and VIX Index demonstrate varied significance levels, indicating differential sensitivity among mid-cap banks to interest rate changes and market volatility.

Table 5: p-value obtained for selected mid-cap bank stocks

	AU BANK	IDFC First Bank	UNION Bank	CANARA Bank	FEDERAL Bank
Intercept	2.29E-07	0.535	0.314	0.00069	6.51E-05
CPI	1.12E-17	0.013	2.29E-06	0.1542	4.60E-08
Bond Yield Rate	0.546	0.674	1.927E-11	6.26E-13	5.86E-07
VIX index	0.011	0.0003	0.0017	0.00051	0.00018

The R^2 and F-statistics shown in Table 6 further validate the regression models, indicating a significant proportion of the variance in stock prices for mid-cap banks is explained by the selected macroeconomic indicators. The high R^2 values for banks like AU Bank and Union Bank suggest a strong model fit, capturing the essence of how inflation, interest rates, and market volatility impact their stock valuations.

Table 6: R^2 and F computation for selected mid-cap bank stocks

Company	Significance F	R^2
AU BANK	1.23E-16	0.764
IDFC First Bank	8.84E-05	0.329
UNION Bank	1.41E-16	0.763
CANARA Bank	2.00E-15	0.738
FEDERAL Bank	1.62E-12	0.662

The findings from the mid-cap bank stocks analysis underscore the intricate ways in which macroeconomic indicators influence bank stock prices. While inflation consistently presents a significant effect, the response to bond yield rates and market volatility varies, reflecting the diverse strategic positioning and sensitivity of mid-cap banks to economic changes.

3.3 Small-cap Bank Stocks

Exploring the impact of macroeconomic indicators on small-cap bank stocks reveals insights into the sensitivity of smaller banks to economic fluctuations. This analysis encompasses small-cap entities such as Karnataka Bank, South Indian Bank, DCB Bank, Karur Vysya Bank, and Dhanalaxmi Bank. The regression analysis given in Table 7 provides a detailed look at how CPI, Bond Yield Rate, and the VIX index impact the stock prices of small-cap banks. The coefficients obtained highlight the unique financial dynamics small-cap banks face in response to economic changes.

Table 7: Regression Coefficients computed for selected small-cap bank stocks

Company	Intercept	CPI	Bond Yield Rate	VIX index
Karnataka Bank	-99.71	0.025	27.497	-0.731
South Indian Bank	5.50	-0.091	3.416	-0.171
DCB Bank	474.37	-2.637	15.111	-1.948
Karur Vysya Bank	-82.78	0.0398	22.766	-0.865
Dhanalaxmi Bank	22.49	-0.048	0.463	-0.176

The significance of these regression coefficients, as shown in the p-values (Table 8), indicates the varying degrees of impact that inflation, bond yields, and market volatility have on small-cap banks. Some variables show a significant influence on stock prices, underscoring the importance of these economic indicators in investment and valuation models for small-cap banks.

Table 8: p-value obtained for selected small-cap bank stocks

	Karnataka Bank	South Indian Bank	DCB Bank	Karur Vysya Bank	Dhanalaxmi Bank
Intercept	0.032536444	0.4146811	2.81361E-08	0.015254564	4.31195E-05
CPI	0.89793315	0.002622226	2.13369E-11	0.778899937	0.027945654
Bond Yield Rate	2.26739E-09	1.4733E-07	0.017207232	5.67407E-11	0.280528574
VIX index	0.029075313	0.000804697	0.000473324	0.000586506	1.07092E-05

The determination coefficients (R^2) and the F-statistic as shown in Table 9 for these banks provide a quantitative measure of the regression model's fit and its overall explanatory power regarding the stock prices of small-cap banks.

Table 9: R^2 and F computation for selected small-cap bank stocks

Company	Significance of F	R^2
Karnataka Bank	9.34E-11	0.605
South Indian Bank	6.51E-12	0.643
DCB Bank	2.66E-13	0.684
Karur Vysya Bank	1.06E-13	0.695
Dhanalaxmi Bank	1.27E-06	0.431

The analysis for small-cap banks demonstrates that despite their size, these institutions are significantly impacted by broader economic indicators. The CPI, Bond Yield Rate, and VIX index each play a critical role in shaping the stock performance of small-cap banks, with the variability in their effects highlighting the diverse financial environments these banks operate within. This segment's findings are crucial for investors focusing on small-cap banks, offering insights into the factors driving stock prices in this market segment.

4   Discussion

The analysis presented in this paper elucidates the intricate relationships between macroeconomic indicators—specifically, inflation, ten-year bond yield rates, and the VIX Index—and the stock prices of Indian banks categorized by market capitalization. The differential impact observed across large, mid, and small-cap banks sheds light on the varying sensitivities and adaptive capacities within the banking sector to macroeconomic changes. Inflation, often considered a detriment to economic stability, has shown a mixed impact on bank stocks. For large and mid-cap banks, the effect of inflation appears somewhat positive, suggesting that these institutions might leverage their diversified operations and market influence to mitigate adverse inflationary effects. This capacity to adapt could be less pronounced in small-cap banks, which might explain their varied response to inflationary pressures. The sensitivity of bank stocks to interest rate fluctuations, as evidenced by the reaction to ten-year bond yield rates, particularly among large-cap banks, highlights a crucial aspect of financial management within these institutions. The negative relationship observed suggests that higher interest rates could compress net interest margins, impacting profitability. This finding underscores the importance of robust interest rate risk management strategies in safeguarding bank profitability and stock value. Furthermore, the significant role of market volatility, indicated by the VIX Index, in influencing bank stock prices, especially among small and mid-cap banks, points to the broader market sentiment and risk perception as pivotal factors in bank valuation. During periods of heightened market uncertainty, these banks' stocks appear more susceptible to adverse impacts, reflecting the need for effective risk management practices to withstand volatility. For investors, these insights underscore the importance of considering the size of a bank and its corresponding sensitivities to macroeconomic indicators when constructing investment portfolios. A nuanced understanding of these dynamics can enhance investment strategies, potentially leading to more informed decisions that account for the economic and market conditions affecting bank stocks. From a policy perspective, the findings highlight the necessity for nuanced monetary and macroprudential policies that consider the diverse impacts of economic indicators on banks of different sizes. Tailoring policy measures to address the specific needs and vulnerabilities of the banking sector could contribute to the overall stability and growth of the financial market. In essence, the study contributes to a deeper understanding of the complex interplay between macroeconomic factors and bank stock prices in India, offering valuable perspectives for investors, the banking sector, and policymakers. It paves the way for further research that could explore additional variables and their effects on the banking sector, potentially broadening the scope of understanding of financial market dynamics.

5 Conclusion

This study explores the effects of inflation (via the Consumer Price Index, CPI), the 10-year bond yield rate, and market volatility (via the VIX index) on the stock prices of Indian banks across different sizes from 2018 to 2023. It reveals that inflation consistently influences bank stock prices across all sizes, though its impact varies. The relationship between bank stock prices and both interest rates and market volatility is found to be more complex, indicating different sensitivities and strategies among banks of varying sizes. The findings offer key insights for investors and financial analysts, suggesting that a deep understanding of these economic indicators' impacts on banks can enhance investment decisions and risk management. Furthermore, this research contributes to the broader dialogue on financial market dynamics, encouraging further exploration into the factors affecting the banking sector. In summary, the study underscores the importance of macroeconomic indicators in shaping the stock prices of banks in India, providing valuable guidance for investors, policymakers, and the banking industry towards more robust financial strategies and policies.

Declaration of Competing Interests

Funding Declaration

Author Contributions

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