IMPACT OF MACROECONOMIC VARIABLES ON BANK PROFITABILITY: EVIDENCE FROM THE NIFTY BANK INDEX

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by

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April 2024

Examined by:

Seal of the school

DECLARATION

I hereby declare that the data presented in this Internship report entitled "· Impact of Macroeconomic Variableson Bank Profitability: Evidence from the Nifty bank Index" is based on the results of investigations carried out by me in the Discipline of Financial Services at Goa Business School, Goa University under the supervision of Mr. Jick Castanha and the same has not been submitted elsewhere for the award of a degree or diploma by me. Further, I understand that Goa University or its authorities will not be responsible for the correctness of observations or other findings given the dissertation.

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Date: 29th April 2024

Place: Goa University

Gulbuddin Muradi

22P300005

COMPLETION CERTIFICATE

This is to certify that the Internship "Impact of Macroeconomic Variables on Bank Profitability: Evidence from the Nifty Bank Index " is a bonafide work carried out by Mr. Gulbuddin Muradi under my supervision in partial fulfilment of the requirements for the award of the Degree Masters of Business Administration in Financial Services, Goa Business School, Goa University.

Mr. Jick Castanha

Date: 29th April 2024

Signature of the Dean of Goa Business School

Date: 29th April 2024

Place: Goa University

Goa Business School ★ Goa University ★

School Stamp

Model Infra Corporation Pvt. Ltd.

Date : 16/04/2024

INTERNSHIP CERTIFICATE

This is to certify that Mr. Gulbuddin Muradi Student of Goa Business School, undergoing MBA- in financial services has successfully completed Internship between 15th February 2024 till 12th April 2024 at Model Infra Corporation Pvt. Ltd. Plot No. L-13, Verna Industrial Estate ,Verna Salcette, South Goa, Goa-403722. He actively participated in the activities during the period of internship and learned the skills needed for various activities such as accounting entry passing in the navision system, issue of debit and credit note, sale invoice preparation issue of purchase order etc.

We wish him success in his future endeavours.

For Model Infra Corporation Pvt. Ltd.

(Navin Naik)

Manager HR & Admin.

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Gulbuddin Muradi

Model Infra Corporation Pvt. Ltd.

Date : 14/02/2024

To,

Mr. Gulbuddin Muradi,

C/o Goa Business School,

Goa University,

Taleigao Plateau, Goa 403206

Sub : Acceptance for Conducting Corporate Internship for MBA (Financial Services)

Dear Gulbuddin,

We are pleased to inform you that your request for doing Corporate Internship for MBA (Financial Services) Students wide letter No. GU/GBS/ Corp. Intern /MBA(FS)/2024/05 dated 12th February 2024 has been accepted . You can conduct your Internship from 15th February 2024 till 12th April 2024 at our factory.

For Model Infra Corporation Pvt. Ltd.

(Navin Naik)

Manager HR & Admin.

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Abstract

This study examines the impact of macroeconomic factors on the profitability of banks within the Nifty Bank Index. Using a panel dataset spanning 2016-2022 and a random effects regression model, we investigate the relationships between Return on Assets (ROA) and key indicators including real interest rates, GDP growth, foreign direct investment (FDI), inflation, and exchange rates. Findings reveal statistically significant associations between all macroeconomic variables and ROA. Real interest rates, GDP growth, inflation, and exchange rates demonstrate negative relationships with ROA, while FDI exhibits a positive association. These results highlight the sensitivity of bank profitability to the macroeconomic environment and offer insights for bank managers and policymakers.

Keywords: Bank Profitability, Return on Assets (ROA), Macroeconomic Factors, India, Nifty Bank Index

OVERVIEW OF MIC CONSTRUCTION COMPANY

MIC Construction Company is a leading player in the construction industry, specializing in the design and construction of commercial and residential properties. Established in 1985, the company has a strong reputation for delivering high-quality projects within stipulated timelines. With a diverse range of clients and projects, MIC Construction Company operates in multiple regions, making efficient inventory management crucial to its success.

MIC serves the biggest names in construction Equipment, mining, energy, Agriculture, Exports, Defense, Railways, and others. They are strategically located in 8 locations across India. Like, Pune Channa, Pune Alandi, Bangalore, Goa, Dharwad Unite 1, Dharwad Unit 2, Chennai-Pollivakkam, Chennai-Kandamangalam. They have 75000+ MT per annum capacity of Fabrication. MIC has 1,500+ Trained associates including certified Welders, Productions Design & Development, Quality, HR, and Procurement Professionals. MIC Professional Board and Management Team comprised of experienced Operational and Investor members. MIC has a proven track record of on-time delivery and quality among all clients.

The vision statement of the MIC is rebuilding the future of construction through innovation and technology.

The mission statement of the MIC states to build a trusted Brand by Integrating technology being people-centric focusing on execution excellence driving growth leading to profitability.

1. Introduction

The banking sector occupies a pivotal position within any modern economy, functioning as a catalyst for financial intermediation, economic development, and overall stability. India, as a rapidly developing nation, places great significance on the robustness and profitability of its banking industry. A bank's profitability serves as a critical indicator of its financial health, reflecting its ability to generate returns, attract investors, and sustain long-term operations. While the importance of bank profitability is well-established, the specific ways in which macroeconomic indicators shape this profitability within the Indian context warrant in-depth examination. Factors such as GDP growth, interest rates, inflation, exchange rates, and FDI can exert substantial influence on the environment within which Indian banks operate. Consequently, these factors can affect profitability outcomes. To fully comprehend the health and trajectory of the Indian banking sector, it is crucial to analyze the relationship between these critical macroeconomic indicators and bank profitability. This dissertation aims to systematically dissect the complex relationship between key macroeconomic indicators and the profitability of Indian banks. The research will illuminate the nature and extent of the impact that these macroeconomic variables have on the financial performance of banks in India, enabling stakeholders to make informed decisions based on a deeper understanding of these relationships. This introductory chapter will begin with a background discussion surrounding the nexus between macroeconomic forces and bank profitability within the Indian context. It will delineate the specific research questions addressed by the dissertation. The scope of the research will be outlined, alongside a strong emphasis on the significance of this investigation for academics, practitioners, and policymakers within the Indian banking landscape.

1.2 Background of the Study

The Indian banking sector has undergone significant development and transformation in recent decades. Comprising public sector banks, private sector banks, foreign banks, and regional rural banks, the Indian banking system plays a vital role in mobilizing savings, facilitating financial intermediation, and promoting economic growth (Reserve Bank of India, 2023). Bank profitability is a key performance metric that measures the efficiency and effectiveness of a bank in generating returns from its operations. Commonly used profitability ratios include Return on Assets (ROA) and Return on Equity (ROE). ROA reflects a bank's ability to utilize its assets to generate profits, while ROE indicates the return earned on shareholder investments. Profitability is an indispensable factor for the long-term viability and sustainability of banks.

1.3 Research Problem

Existing literature underscores that macroeconomic indicators hold sway over bank profitability. Studies in various international contexts have investigated how dynamics such as GDP growth link to bank profitability (Tu DQ. Le & Dat T. Nguyen, 2020). The impact of interest rates (Nimrod Segev, 2022), inflation (Khalil Alnabulsi, 2023), and exchange rate fluctuations (Sapto Jumono, 2019) have been a subject of research focus as well. Despite the breadth of research, a comprehensive and focused analysis that exclusively examines the interconnections between the spectrum of macroeconomic indicators (GDP growth, interest rates, inflation, exchange rates, and FDI) and the profitability of the Indian banking sector is needed. Understanding the unique ways in which Indian banks are sensitive to shifts along these macroeconomic indicators is crucial for obtaining actionable insights that are particularly relevant to the Indian context. The lack of a

targeted study addressing the dynamics of the Indian banking landscape hinders an in-depth understanding of macroeconomic influences on banking profitability within India. This knowledge gap could impede strategic decision-making by both banks and policymakers, limiting their abilities to anticipate and respond effectively to macroeconomic fluctuations.

1.4 Scope of the Study

This research study will focus on the impact of specified macroeconomic indicators on the profitability of commercial banks operating in India. For a well-defined analysis, the scope will be delimited as follows:

Temporal Scope: The research will concentrate on a specific timeframe from 2016 to 2022. This period is selected based on the availability of reliable data.

Geographical Scope: The research will investigate banks operating within India. This approach allows for analyzing the unique dynamics of the Indian banking sector and macroeconomic indicators.

Types of Banks: The analysis will center primarily on Nifty Bank index, which include public sector banks, commercial sector banks, and foreign-owned banks in India.

Research Gap

This study aims to find what hasn't been fully explored yet in understanding how big economic changes affect how profitable banks in India are. Firstly, most research looks at other countries' banks, so we need to dig into what makes Indian banks unique, including their rules and how different economic factors affect how much money they make. Secondly, while we know foreign investment plays a role, we need to understand how it works, like how it affects how much money banks have, how much they compete with each other, and if it helps them use new technology. Also, we need to look more into bad loans in Indian banks and how the economy might make them better or worse. Lastly, we need to see how recent new rules in India about banks affect how much money they make, which is important for understanding what's happening right now.

Research Questions

RQ1: How does GDP growth rate volatility affect the profitability of Indian banks?

RQ2: Does the relationship between interest rates and bank profitability differ across various segments of the Indian banking sector?

RQ3: To what extent does inflation influence the profitability of Indian banks, and are there variations in this impact across different bank types?

RQ4: How do exchange rate fluctuations shape the profitability of Indian banks, and does this relationship vary depending on banks' exposure to foreign exchange activities?

RQ5: Does increased Foreign Direct Investment (FDI) lead to greater or reduced profitability for Indian banks, and how might this impact be moderated by factors such as bank size or market competition?

Objectives

Objective: To investigate the relationship between macroeconomic variables (GDP growth, inflation, interest rates, exchange rates, FDI) and the profitability of Indian banks listed on the Nifty Bank Index.

NULL Hypothesis

H1: - There exists no statistically significant relationship between the exchange rate and ROA of Nifty banks index constituents.

H2: - There exists no statistically significant relationship between the GDP growth and ROA of Nifty banks index constituents.

H3: - There exists no statistically significant relationship between the inflation and ROA of Nifty banks index constituents.

H4: - There exists no statistically significant relationship between the interest rate and ROA of Nifty banks index constituents.

H5: - There exists no statistically significant relationship between the FDI and ROA of Nifty banks index constituents.

Significance of the Study

This dissertation is anticipated to make substantial contributions to the existing body of knowledge and holds significance for a range of stakeholders:

Academics: This research will deepen the understanding of the relationship between macroeconomic indicators and bank profitability in the Indian context, broadening the academic discourse on banking studies.

Banking Practitioners: Banks can leverage the findings of this research to formulate strategies informed by how macroeconomic fluctuations may impact their profitability.

Policymakers: This study will furnish policymakers with valuable insights for crafting policies that aim to foster a stable and robust banking sector in India, conducive to financial stability and economic growth.

2. Literature Review

The profitability of commercial banks is a multifaceted issue influenced by a blend of internal (bank-specific) and external (macroeconomic) factors. This literature review explores the relationships between macroeconomic variables and their collective impact on commercial banks' profitability.

2.1-Macroeconomic Variables:

1- GDP

Gross domestic product (GDP) is the total monetary or market value of all the finished goods and services produced within a country’s borders in a specific period. Numerous studies establish that

macroeconomic variables exert a profound influence on bank profitability. Economic growth, as proxied by GDP, generally correlates with heightened bank profitability ((Adusei, 2015) (Yüksel et al., 2018) (Khan, 2022). This positive association stems from increased economic activity leading to higher demand for banking products and services. Conversely, economic downturns may affect consumer purchasing power, reduce investment potential, and dampen the demand for loans, thus affecting bank profitability (Apau & Sibindi, 2023),.

2- Inflation

Inflation is a measure of how quickly prices are increasing over time. In other words, inflation measures how quickly money loses its purchasing power. Inflation presents a mixed picture, with some studies indicating a positive relationship between inflation and bank profitability ((Yüksel et al., 2018), ; (Khan, 2022), and others suggesting a negative correlation ((Alnabulsi et al., 2023). This ambiguity underscores the complex mechanisms through which inflation can impact bank operations, asset valuations, and lending decisions.

3- Interest Rate

The interest rate is the amount a lender charges a borrower and is a percentage of the principal—the amount loaned. The interest rate on a loan is typically noted on an annual basis and expressed as an annual percentage rate (APR). Interest rates hold considerable fluctuation over bank profitability. Notably, a low-interest rate environment often compresses net interest margins (NIM), impacting bank profitability negatively (Segev et al., 2022); (Claessens et al., 2018) Moreover, the interaction between market concentration and interest rates adds a layer of complexity, with evidence suggesting that concentrated markets exhibit lower sensitivity of interest margins to interest rate fluctuations (Segev et al., 2022),

4- Foreign Direct Investment (FDI)

The impact of Foreign Direct Investment (FDI) on bank profitability presents a complex and nuanced picture. While some studies suggest potential benefits, the exact mechanisms and outcomes remain an area of active research. FDI can boost capital availability within the banking sector, facilitating expansion and potentially improving profitability (Al-Harbi, 2019). Moreover, foreign banks may introduce new technologies and managerial expertise, enhancing efficiency and competitiveness within the domestic market (Le & Nguyen, 2020; Ayalew, 2021). However, increased competition due to FDI could also pressure profit margins, and the specific impact likely depends on the overall regulatory environment and the specific characteristics of both domestic and foreign banks operating in the market.

5- Foreign Exchange (FOREX)

Fluctuations in foreign exchange (FOREX) rates hold significant implications for the profitability of banks, especially those with substantial international operations or exposure to foreign currency-denominated assets and liabilities. Exchange rate volatility can directly impact banks' revenues and expenses related to foreign transactions. Research suggests that the relationship between exchange rate dynamics and bank profitability is complex and potentially sensitive to the specific economic context (Jumono et al., 2019). Further investigation into how banks manage their forex

risks, and how varying exchange rate regimes affect profitability, would be important in gaining more clarity in this area.

6- Return on Assets (ROA)

Return on Assets (ROA) is a widely utilized metric to gauge bank profitability. It reflects how effectively a bank leverages its assets to generate income. A substantial body of research explores the determinants of ROA. Factors such as the bank's size, capital adequacy, asset quality, operational efficiency, and macroeconomic conditions such as GDP growth and inflation, have all been shown to influence ROA (Adusei, 2015; Khan, 2022; Yuksel et al., 2018; O'Connell, 2022). Interestingly, recent studies suggest a non-linear relationship between bank size and ROA, indicating that profitability may reach a plateau or even decline for extremely large institutions (Blatter & Fuster, 2022).

2.2-The Critical Role of Performing Assets and NPAs

The quality of a bank's asset portfolio, comprising performing and non-performing assets, is a vital determinant of its profitability. Across multiple studies, a consistently negative relationship emerges between NPAs and bank profitability (Belkhaoui et al., 2020); (Alnabulsi et al., 2023) (Thakur et al., 2023), NPAs signify impaired loans that do not generate interest income, leading to revenue loss and the need for increased loan loss provisions, which erode profitability. Conversely, performing assets bolster bank profitability. These loans generate a reliable stream of interest income, contributing positively to banks' financial health and resilience.

2.3-Bank-Specific Factors

Beyond macroeconomic factors and asset quality, several bank-specific characteristics shape profitability. Bank size surfaces as a prominent factor, though its direction of influence remains somewhat ambiguous. While some studies connect larger bank size with higher profitability (Adusei, 2015), (Khan, 2022), others warn of diminishing returns and reduced efficiency for excessively large (systemically important) banks (Blatter & Fuster, 2022).

Capital adequacy, representing a bank's buffer against unexpected losses, generally demonstrates a positive relationship with profitability (Adusei, 2015), (Radovanov et al., 2023), (Khan, 2022). Well-capitalized banks often enjoy higher investor confidence and can effectively navigate adverse economic conditions, sustaining their profitability.

Efficient management, encompassing cost control and operational optimization, is pivotal in driving profitability. Studies indicate a negative correlation between operational costs and bank profitability (Belkhaoui et al., 2020), (Amare, 2021). Banks that effectively streamline their processes and reduce unnecessary expenses stand to improve their bottom line.

2.4 The Evolving Role of Intellectual Capital

The growing relevance of intellectual capital (IC) in the banking landscape receives increasing attention in the literature. IC encompasses elements such as human capital, structural capital, and relational capital. Findings reveal that investments in IC generally bolster bank profitability and

efficiency (Le & Nguyen, 2020), (Barak & Sharma, 2023). However, potential diminishing returns and the need to tailor IC investments according to ownership structure (state-owned vs. private banks) warrant careful consideration (Le & Nguyen, 2020).

2.5- Non-Interest Income and Diversification

A shift away from traditional reliance on interest income and towards greater diversification is discernible, with researchers highlighting the potential for non-interest income sources to enhance bank profitability. Fees from services, commissions, and trading activities can augment banks' revenue streams and mitigate over-dependence on fluctuating interest rates (Mostak Ahamed, 2017), (Abu Khalaf et al., 2024)

3. Research Methodology

This chapter presents the methodology employed in this dissertation to systematically examine the impact of macroeconomic indicators on the profitability of the Indian banking sector. It outlines the research design, data collection and analysis methods, and sampling strategy employed in the investigation. This study aims to provide insights into the dynamic relationships between macroeconomic forces and bank profitability within India, aiding strategic decision-making for banks and policymakers.

Research Design

Research Philosophy: This research adopts a positivist research philosophy. Positivism assumes the existence of an objective reality that can be measured and analyzed through empirical data. This study utilizes quantitative data derived from reliable sources to investigate the correlations between macroeconomic indicators and bank profitability.

Research Type: This study employs a deductive research approach. A deductive approach begins with established theories or frameworks and tests these theories by analyzing relevant data. In this case, existing economic and financial theories guide the formulation of hypotheses regarding the relationships between the selected macroeconomic variables and bank profitability.

Research Strategy: The research strategy focuses on quantitative analysis. This strategy involves collecting numerical data and utilizing statistical techniques for analysis. Panel data regression analysis is the primary method employed to examine the relationships between the specified independent variables and the dependent variable.

Time Horizon: This research adopts a longitudinal time horizon, examining data from the period 2016-2022 for the Nifty Bank index. A longitudinal approach analyzes data over an extended period, allowing for the observation of trends, patterns, and changes in the relationships between variables over time.

Sampling Strategy: Since the Nifty Bank index comprises a representative sample of the top banks listed on the National Stock Exchange, it serves as an appropriate proxy for the Indian banking sector. The analysis utilizes the entire index, providing a comprehensive view of the sector's trends and responses to macroeconomic shifts.

Sr	Banks Name
1	A U Small Finance Bank Ltd.
2	Axis Bank Ltd.
3	Bandhan Bank Ltd.
4	Bank of Baroda
5	Federal Bank Ltd.
6	H D F C Bank Ltd.
7	I C I C I Bank Ltd.
8	I D F C First Bank Ltd.
9	IndusInd Bank Ltd.
10	Kotak Mahindra Bank Ltd.
11	Punjab National Bank
12	State Bank Of India

Data Collection: This study utilizes secondary data obtained from reputable sources:

Dependent Variable (Bank Profitability): Return on Assets (ROA) data is sourced from Prowess IQ.

Independent Variables: GDP growth rate, exchange rate, interest rates, inflation, and FDI data are retrieved from the World Bank's data repository.

Analysis Methods and Techniques: The collected data is prepared and analyzed using Microsoft Excel and EViews statistical software:

Data Preparation (Excel): Excel is used for data cleaning, organization, and preliminary calculations as needed.

Descriptive Statistics (EViews): EViews is used to compute descriptive statistics (e.g., mean, standard deviation, etc.) to summarize and explore the dataset's characteristics.

Inferential Statistics (EViews): Panel data regression analysis is performed in EViews to investigate the relationships between macroeconomic indicators and bank profitability. This analysis tests the formulated hypotheses and assesses the statistical significance and direction of these relationships.

4. Methodological Limitations

- **Data availability:** Data limitations for certain macroeconomic variables or bank-specific details might constrain the scope of the analysis.
- **Model assumptions:** The regression model relies on certain assumptions. If these assumptions are not fully met, the results may need to be interpreted with caution.

- **Generalizability:** While the Nifty Bank index provides a reasonably representative sample, findings may not perfectly generalize to every individual bank operating in India.

Rigorous data source selection: Data is obtained from reputable sources like Prowess IQ and the World Bank to ensure reliability.

Model diagnostics: Regression diagnostics are performed to assess model validity and address potential violations of assumptions.

Transparency: Limitations are acknowledged and their potential impact on the study's findings is discussed.

5. Model:

	Variables	Description
Dependent Variable:	ROA	Net Profit/Total Assets
Independent Variables:		
	Interest Rate	
	Inflation	
	FDI	
	Exchange Rate	
	GDP Growth Rate	

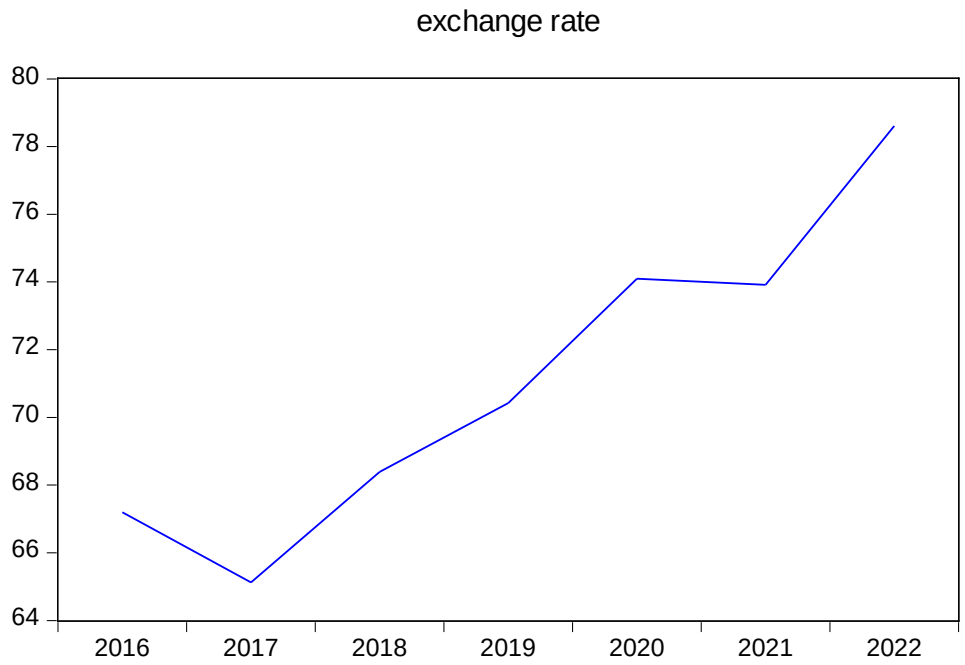
Estimation Equation:

ROA = C1 + C2 * EXCHANGE_RATE + C3 * FDI + C4 * INTEREST_RATE + C5 * GDP_GROWTH + C6*INFLATION + e

6. Data Analysis

6.1. Graphical Analysis

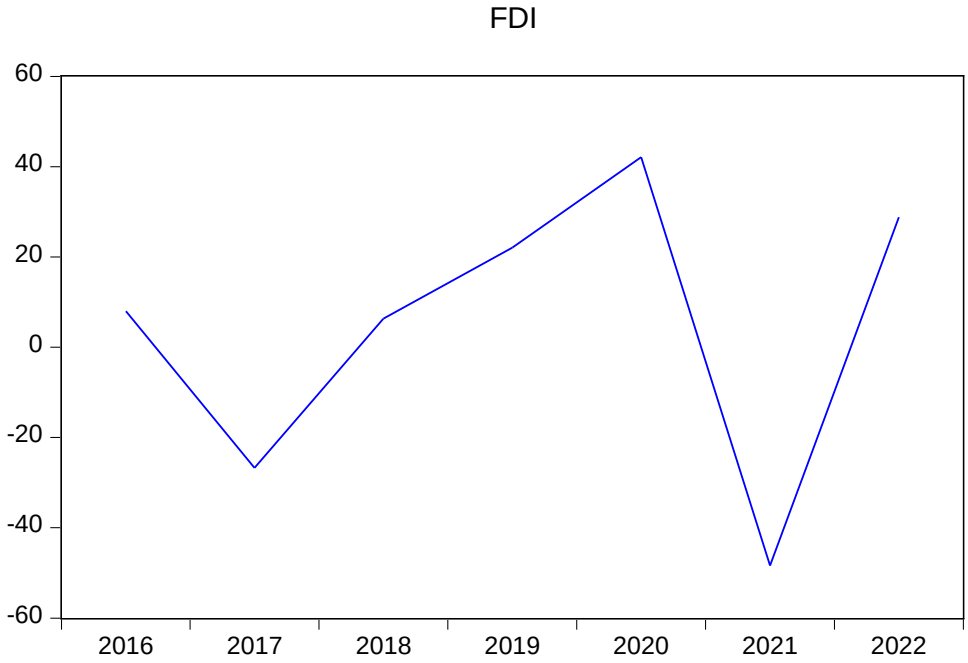
Figure-1



Source: EViews9

Figure 1 shows the Annual INR/USD Exchange rate fluctuation from 2016 to 2022.

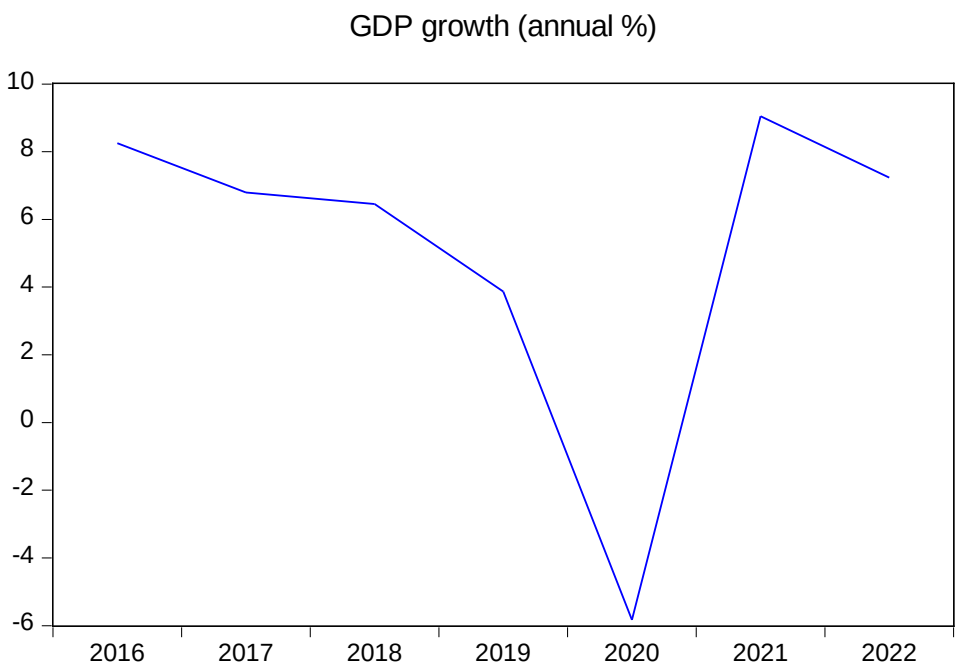
Figure-2



Source: EViews9

Figure 2 shows the net FID growth rate from 2016 to 2022. it is observed that in year 2021 Net FDI growth rate dropped by 40%.

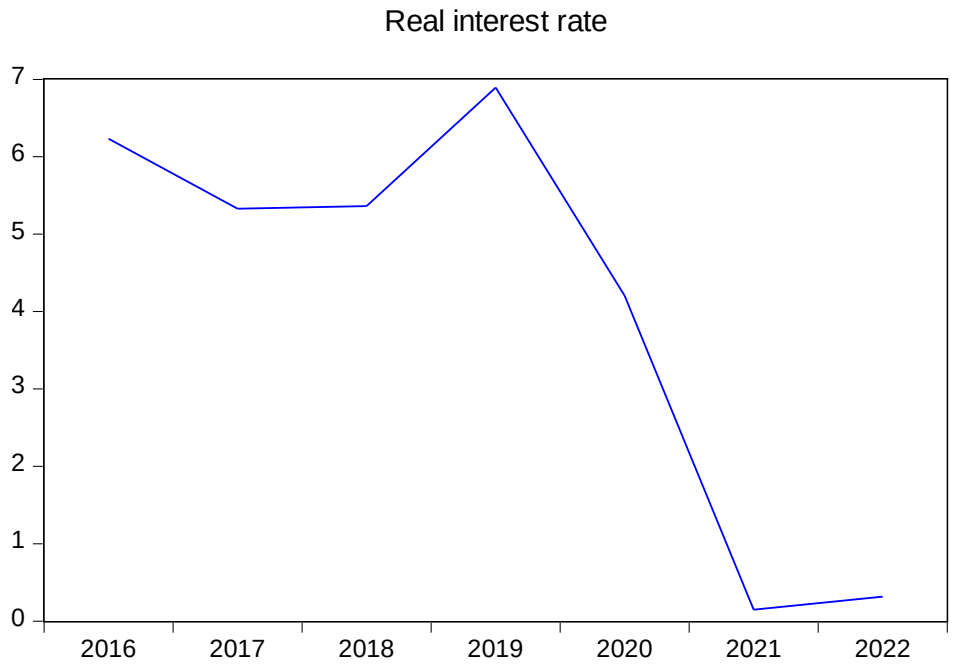
Figure-3



Source: EViews9

Figure 3 shows the GDP growth rate from 2016 to 2022, it is observed that during COVID-19 in the year 2020 GDP growth rate substantially dropped to -6%.

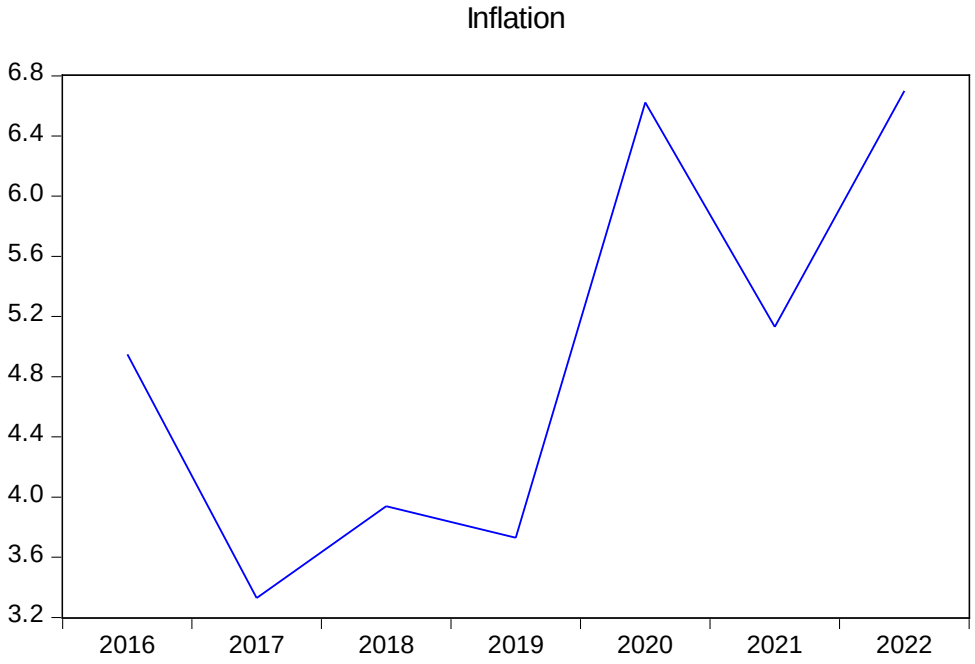
Figure-4



Source: EViews9

Shows the real interest rate which is adjusted with the inflation from 2016 to 2022.

Figure-5



Source: EViews9

Shows Inflation from 2016 to 2022.

6.2 Summary Statistics

Table 1

	EXCHANGE_RATE	FDI	GDP_GROWTH	INFLATION	INTEREST_RATE
Mean	71.10697	4.593657	5.119414	4.914086	4.069049
Median	70.42034	7.990259	6.795383	4.948216	5.327609
Maximum	78.60449	42.0864	9.050278	6.699034	6.894875
Minimum	65.12157	-48.3683	-5.831053	3.328173	0.147236
Std. Dev.	4.691354	31.8793	5.096521	1.355593	2.751083
Skewness	0.306512	-0.59467	-1.641134	0.297241	-0.660213
Kurtosis	1.956876	2.116765	4.250534	1.605931	1.785812
Jarque-Bera	0.426972	0.640106	3.598328	0.669911	0.938519
Probability	0.807763	0.726111	0.165437	0.71537	0.625465

The data in the image shows descriptive statistics for several macroeconomic variables. These statistics summarize the central tendency, dispersion, and shape of the data. Here's a breakdown of what each statistic tells us:

- **Mean:** This is the average value of each variable. For example, the mean exchange rate is 71.11.
- **Median:** This is the middle value when the data is ordered from least to greatest. The median exchange rate is 70.42.
- **Maximum:** This is the highest value observed for each variable. The maximum exchange rate was 78.60.
- **Minimum:** This is the lowest value observed for each variable. The minimum exchange rate was 65.12.
- **Std. Dev.:** This is the standard deviation, which tells us how much the data varies around the mean. A higher standard deviation indicates more variation. For example, the standard deviation of FDI is 31.88, which is much higher than the standard deviation of inflation (1.36).
- **Skewness:** This statistic tells us how symmetrical the distribution of the data is. A positive skew means the distribution has a longer tail on the right side, and a negative skew means the tail is longer on the left side. The skewness of GDP growth is -1.64, which means there is a longer tail on the left side, indicating that there may have been a few periods of much lower GDP growth.
- **Kurtosis:** This statistic tells us how peaked the distribution of the data is. A kurtosis of 3 indicates a more peaked distribution than a normal distribution, and a kurtosis of less than 3 indicates a flatter distribution than normal. The kurtosis of GDP growth is 4.25, which suggests that GDP growth tends to cluster around the average with less frequent extreme values.
- **Jarque-Bera:** This is a statistical test for normality. A high p-value (greater than 0.05) suggests that the data is likely from a normal distribution. All of the p-values in the table are greater than 0.05, so we can assume that the data is approximately normally distributed.

6.3 Model Estimation

Pooled OLS Model

Table 2

Dependent Variable: ROA
Method: Panel Least Squares
Date: 04/27/24 Time: 18:24
Sample: 2016 2022
Periods included: 7
Cross-sections included: 12
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	119.9231	13.31511	9.006542	0.0000
EXCHANGE_RATE	-1.436070	0.159330	-9.013172	0.0000
GDP_GROWTH__ANNUAL___	-0.187413	0.055527	-3.375187	0.0012
INFLATION	-0.952058	0.385255	-2.471244	0.0156
FDI	0.075199	0.019566	3.843420	0.0002
REAL_INTEREST_RATE	-2.246989	0.340722	-6.594791	0.0000

R-squared	0.699388	Mean dependent var	3.372857
Adjusted R-squared	0.680118	S.D. dependent var	2.894880
S.E. of regression	1.637288	Akaike info criterion	3.892709
Sum squared resid	209.0956	Schwarz criterion	4.066339
Log likelihood	-157.4938	Hannan-Quinn criter.	3.962506
F-statistic	36.29422	Durbin-Watson stat	3.601514
Prob(F-statistic)	0.000000		

Fixed Effect Model

Table 3

Dependent Variable: ROA
Method: Panel Least Squares
Date: 04/27/24 Time: 18:27
Sample: 2016 2022
Periods included: 7
Cross-sections included: 12
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	119.9231	14.36662	8.347342	0.0000
EXCHANGE_RATE	-1.436070	0.171913	-8.353486	0.0000
GDP_GROWTH__ANNUAL___	-0.187413	0.059912	-3.128153	0.0026
INFLATION	-0.952058	0.415679	-2.290370	0.0252
FDI	0.075199	0.021111	3.562115	0.0007
REAL_INTEREST_RATE	-2.246989	0.367629	-6.112109	0.0000

Effects Specification			
Cross-section fixed (dummy variables)			
R-squared	0.699388	Mean dependent var	3.372857
Adjusted R-squared	0.627601	S.D. dependent var	2.894880
S.E. of regression	1.766587	Akaike info criterion	4.154614
Sum squared resid	209.0956	Schwarz criterion	4.646565
Log likelihood	-157.4938	Hannan-Quinn criter.	4.352374
F-statistic	9.742438	Durbin-Watson stat	3.601514
Prob(F-statistic)	0.000000		

Random Effect Model

Table 4

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 04/27/24 Time: 18:28
Sample: 2016 2022
Periods included: 7
Cross-sections included: 12
Total panel (balanced) observations: 84
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	119.9231	14.36662	8.347342	0.0000
EXCHANGE_RATE	-1.436070	0.171913	-8.353486	0.0000
GDP_GROWTH__ANNUAL___	-0.187413	0.059912	-3.128153	0.0025
INFLATION	-0.952058	0.415679	-2.290370	0.0247
FDI	0.075199	0.021111	3.562115	0.0006
REAL_INTEREST_RATE	-2.246989	0.367629	-6.112109	0.0000

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	1.766587	1.0000

Weighted Statistics			
R-squared	0.699388	Mean dependent var	3.372857
Adjusted R-squared	0.680118	S.D. dependent var	2.894880
S.E. of regression	1.637288	Sum squared resid	209.0956
F-statistic	36.29422	Durbin-Watson stat	3.601514
Prob(F-statistic)	0.000000		

Unweighted Statistics			
R-squared	0.699388	Mean dependent var	3.372857
Sum squared resid	209.0956	Durbin-Watson stat	3.601514

Model Selection Criteria

Table 5

Redundant Fixed Effects Tests
Equation: Untitled
Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	0.000000	(11,67)	1.0000
Cross-section Chi-square	0.000000	11	1.0000

We run a Redundant Fixed Effect test to compare whether Pooled OLS is a better model or Fixed Effect model. Since the p-value is more than 0.05 we accept the null hypothesis that the fixed effect is redundant. So, in comparison between pooled and fixed effect models, we choose the pooled OLS model. now we compare pooled OLS with the Random effect model for that we Omitted the Random effect test

Table 6

Lagrange Multiplier Tests for Random Effects
Null hypotheses: No effects
Alternative hypotheses: Two-sided (Breusch-Pagan) and one-sided (all others) alternatives

	Test Hypothesis		
	Cross-section	Time	Both
Breusch-Pagan	7.000000 (0.0082)	462.0000 (0.0000)	469.0000 (0.0000)
Honda	-2.645751 --	21.49419 (0.0000)	13.32786 (0.0000)

Table 6 shows the result of the Omitted Random effect model which compares Pooled OLS with the Random effect model. Since the P value of Breusch-Pagan is less than 0.05 we reject the Null hypothesis which says no random effect. The final model would be the Random effect model.

Table 7

Correlated Random Effects - Hausman Test
Equation: Untitled
Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	5	1.0000

* Cross-section test variance is invalid. Hausman statistic set to zero.
** WARNING: estimated cross-section random effects variance is zero.

Table 7 shows the Human test result in which the p-value is more than 0.05 we accept the null hypothesis that the random effect model is good. So, the final model is the Random effect model which will be interpreted.

Final Output of Random Effect Model

Table 8

Dependent Variable: ROA
Method: Panel EGLS (Cross-section random effects)
Date: 04/26/24 Time: 10:23
Sample: 2016 2022
Periods included: 7
Cross-sections included: 12
Total panel (balanced) observations: 84
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	119.9231	14.36662	8.347342	0.0000
REAL_INTEREST_RATE	-2.246989	0.367629	-6.112109	0.0000
GDP_GROWTH__ANNUAL___	-0.187413	0.059912	-3.128153	0.0025
FDI	0.075199	0.021111	3.562115	0.0006
INFLATION	-0.952058	0.415679	-2.290370	0.0247
EXCHANGE_RATE	-1.436070	0.171913	-8.353486	0.0000

Effects Specification	S.D.	Rho
Cross-section random	0.000000	0.0000
Idiosyncratic random	1.766587	1.0000

Weighted Statistics

R-squared	0.699388	Mean dependent var	3.372857
Adjusted R-squared	0.680118	S.D. dependent var	2.894880
S.E. of regression	1.637288	Sum squared resid	209.0956
F-statistic	36.29422	Durbin-Watson stat	3.601514
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.699388	Mean dependent var	3.372857
Sum squared resid	209.0956	Durbin-Watson stat	3.601514

6.4 Interpretation

The output represents the results of a panel data regression analysis examining the impact of macroeconomic indicators on the Return on Assets (ROA) of the Nifty Bank Index constituents from 2016 to 2022.

Independent variables: Return on Assets of Nifty Bank Index constituents.

Since the p-value for real interest rate is less than 0.05, we reject the null hypothesis(H4) and conclude a statistically significant association exists between real interest rate and return on assets nifty bank constituents. A one percent increase in the real interest rate is associated with a decrease in ROA by approximately 2.22 percent, holding other variables constant.

Since the p-value for GDP growth is less than 0.05, we reject the null hypothesis (H2) and conclude a statistically significant association exists between GDP growth and return on assets nifty bank constituents. A one percent increase in GDP growth rate is associated with a decrease in ROA by approximately 0.19 percent, holding other variables constant.

Since the p-value for FDI growth is less than 0.05, we reject the null hypothesis (H5), and conclude a statistically significant association exists between FDI growth and return on assets nifty bank constituents. A one percent increase in FDI is associated with an increase in ROA by approximately 0.08 percent, holding other variables constant.

Since the p-value for Inflation is less than 0.05 we reject the null hypothesis (H3), and conclude there exists a statistically significant association between Inflation and return on assets nifty bank constituents. A one percent increase in inflation is associated with a decrease in ROA by approximately 0.95 percent, holding other variables constant.

Since the P-value is less than 0.05 we reject the null hypothesis (H1), A one percent increase in the exchange rate is associated with a decrease in ROA by approximately 1.44 percent, holding other variables constant.

Model Fit information:

R-squared: The proportion of the variance in ROA explained by the independent variables is about 70%, indicating a good fit.

Adjusted R-squared: A similar measure to R-squared, adjusted for the number of predictors in the model, also indicating a good fit.

F-statistic: Tests the overall significance of the model, and the low p-value (0.000) suggests that at least one independent variable is significantly related to ROA.

Durbin-Watson Statistic: Tests for autocorrelation in the residuals. A value around 2 suggests no autocorrelation, and 3.60 indicates no significant autocorrelation.

Prob (F-statistic): The probability associated with the F-statistic, indicates that the model is statistically significant.

Effects Specification

Cross-section Random Effects: Indicates that the model accounts for random effects across different entities in the panel (in this case, different banks in the Nifty Bank Index).

Overall, the penal data regression analysis results suggest that real interest rate, GDP growth rate, FDI, inflation, and exchange rate significantly influence the Return on Assets of Nifty Bank Index constituents.

Findings and Discussions

Real Interest Rate: A statistically significant negative relationship exists between real interest rates and ROA. An increase in real interest rates is associated with a decrease in ROA for banks within the Nifty Bank Index. GDP growth also exhibits a statistically significant relationship with ROA. Foreign Direct Investment shows a statistically significant positive relationship with ROA. Increases in FDI are associated with increases in ROA for banks in the index. a statistically significant negative relationship exists between inflation and ROA. Rising inflation corresponds to lower ROA levels. The exchange rate also demonstrates a statistically significant negative association with ROA. As the exchange rate increases, ROA tends to decrease.

These findings suggest that macroeconomic factors play a crucial role in influencing the profitability of banks within the Nifty Bank Index. Here are some potential discussion points:

Interest Rates and Lending Margins: Higher real interest rates could increase banks' borrowing costs and potentially decrease lending margins, leading to lower ROA.

GDP Growth and Economic Activity: Counterintuitively, increased GDP growth might represent a more competitive environment or changing borrower profiles, potentially impacting ROA negatively in the short term. This warrants further investigation.

FDI and Economic Stimulus: FDI inflows could signal economic opportunities and increase demand for financial services, potentially boosting bank profitability.

Inflation and Operating Costs: Rising inflation could increase bank operational expenses, eroding profit margins and impacting ROA negatively.

Exchange Rate Volatility: Changes in the exchange rate might make international transactions and hedging more complex for banks, potentially affecting ROA.

Managerial Implications:

Interest Rate Sensitivity: Managers should actively monitor interest rate movements and develop strategies to mitigate the negative impact of rising rates on ROA. This could involve adjusting lending rates, managing the maturity structure of assets and liabilities, or using interest rate derivatives.

Economic Growth Focus: While GDP growth might negatively impact ROA in the short term, managers, should position their banks to benefit from long-term economic expansion. This could entail developing products and services tailored to a growing economy or focusing on lending to sectors likely to benefit the most.

FDI Opportunities: Bank managers should seek ways to capitalize on increased FDI flows. Developing expertise in financing foreign-owned businesses, offering tailored financial products, or partnering with foreign banks could be beneficial.

Inflationary Pressures: Implement strategies to control operating costs in an inflationary environment. This could include streamlining processes, negotiating better supplier contracts, or investing in cost-saving technologies.

Exchange Rate Management: Develop expertise in managing foreign exchange risk. This includes hedging strategies, offering currency risk management products to clients, or diversifying income streams internationally.

Conclusion

This study provides compelling evidence that macroeconomic factors significantly influence the profitability of banks within the Nifty Bank Index, carrying important managerial implications. Bank managers are advised to proactively manage risk by developing strategies to mitigate the adverse effects of rising interest rates, inflation, and exchange rate fluctuations on ROA. Furthermore, they should seize opportunities presented by favorable economic conditions, such as increased FDI inflows, to enhance profitability. Remaining agile in response to economic cycles, adjusting strategies and business models accordingly, is also emphasized. Additionally, the study underscores the need for future research to delve deeper into the mechanisms driving the observed relationships, particularly the counterintuitive short-term impact of GDP growth. Exploring bank-specific factors and employing a blend of quantitative and qualitative methods could further enrich our understanding of bank performance in a constantly evolving macroeconomic environment.

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