A Comparative Study on Financial Performance of Selected Public Sector Banks in India Using CAMEL Indicators

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1.Abstract

The financial health of public sector banks plays a critical role in the stability of India's banking sector and its broader economy. This study evaluates the financial performance of five leading public sector banks—State Bank of India (SBI), Punjab National Bank (PNB), Bank of Baroda (BOB), Canara Bank, and Indian Overseas Bank (IOB)—for the period 2016 to 2025 using the CAMELS framework. The components analyzed include Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity.

Secondary data collected from annual reports and RBI publications is subjected to descriptive analysis, graphical representation, and inferential statistics through One-Way ANOVA. Key financial indicators such as Capital Adequacy Ratio (CAR), Net NPA to Total Assets, Return on Assets (ROA), Return on Net Worth (RONW), Credit-Deposit Ratio, and Operating and Net Profit Margins are used to assess performance.

The results reveal that Bank of Baroda and Canara Bank have demonstrated relatively strong and stable financial performance, while Indian Overseas Bank and Punjab National Bank have faced considerable challenges, particularly in terms of asset quality and earnings. ANOVA findings indicate statistically significant differences across banks for most indicators, except CAR and Net Profit Margin. The study concludes with strategic recommendations to improve asset quality, adopt technological innovation, and strengthen managerial efficiency, aiming to enhance the overall performance of public sector banks in India.

2.Introduction

Public sector banks are the backbone of the Indian banking system, playing a pivotal role in financial inclusion, credit disbursement, and economic development. However, the performance of these institutions has varied significantly over time due to factors such as rising non-performing assets (NPAs), economic slowdowns, policy shifts, and evolving regulatory norms. In this context, assessing their financial health using a structured and multi-dimensional approach becomes essential for stakeholders, including regulators, policymakers, and investors.

The CAMELS framework—an acronym for Capital Adequacy, Asset Quality, Management Efficiency, Earnings, Liquidity, and Sensitivity to Market Risk—has emerged as a widely accepted tool for evaluating the financial and operational soundness of banks. This study adopts the CAMELS framework (excluding 'Sensitivity' due to data constraints) to analyze the performance of five major public sector banks in India: SBI, PNB, BOB, Canara Bank, and IOB.

By analyzing key financial indicators over ten years from 2016 to 2025, the study aims to uncover performance trends, assess inter-bank differences, and identify areas for strategic improvement. It further employs statistical tools like descriptive analysis and ANOVA to determine whether observed differences in performance are statistically significant. The research contributes to a deeper understanding of how India's public sector banks are evolving and responding to challenges, and offers insights that can help in driving sustainable reforms and improvements in the banking sector.

3. Statement of the Problem

Public sector banks in India have faced ongoing challenges related to rising NPAs, inconsistent profitability, and pressure to meet capital adequacy norms. Despite regulatory reforms and capital infusion efforts, performance across banks remains uneven. There is a lack of comprehensive, comparative analysis to assess whether these banks have achieved financial stability uniformly. This study addresses this gap by evaluating the capital adequacy, asset quality, and profitability of five major PSBs over the period 2016–2025 using key financial indicators. The goal is to identify trends, performance gaps, and statistically significant differences among the banks.

4. Need of the Study

Public sector banks play a vital role in India's economic development, yet they continue to face challenges such as rising NPAs, profitability pressures, and operational inefficiencies. A structured evaluation of their financial performance is essential to understand their stability and growth prospects. The CAMELS framework offers a comprehensive method to assess key financial indicators across banks. This study is needed to identify performance gaps, benchmark strengths, and provide data-driven insights for policy improvement. It also aims to support strategic decisions that enhance the efficiency and resilience of the public banking sector.

5.Scope of the Study

The scope of this study is limited to evaluating the financial performance of five major public sector banks in India—State Bank of India, Punjab National Bank, Bank of Baroda, Canara Bank, and Indian Overseas Bank—over a ten-year period from 2016 to 2025. The analysis is based on the CAMELS framework, focusing on five key dimensions: Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity. The study utilizes secondary data from published sources such as annual reports, RBI databases, and financial statements. It aims to provide comparative insights into the strengths and weaknesses of each bank using descriptive statistics and ANOVA tests. The findings are expected to assist policymakers, regulators, and bank management in making informed strategic and operational decisions.

6.Objectives of the Study:

1. To evaluate the capital adequacy of selected public sector banks using the Capital Adequacy Ratio (CAR).
2. To analyze the asset quality of banks through the Net NPA to Total Assets ratio.
3. To assess profitability and operational efficiency using Return on Assets (ROA).
4. To apply statistical tools like ANOVA to determine if the differences among the banks are statistically significant.

7.Research Methodology:

1. **Research Design:**
   The study adopts a **descriptive and analytical research design** aimed at evaluating and comparing the financial performance of five major public sector banks using secondary data.
2. **Sample Selection:**
   The study focuses on **five leading public sector banks** in India:
   State Bank of India (SBI), Punjab National Bank (PNB), Bank of Baroda (BOB), Canara Bank, and Indian Overseas Bank (IOB).
3. **Data Collection:**
   Secondary data has been collected from published annual reports, RBI bulletins, bank websites, and financial statements for the period **2016 to 2025**.
4. **Framework Used:**
   The analysis is based on the **CAMELS Framework**, evaluating:
   - **C**apital Adequacy
   - **A**sset Quality
   - **M**anagement Efficiency
   - **E**arnings
   - **L**iquidity
   - **S**ensitivity (excluded in current scope due to data limitation)
5. **Statistical Tools:**
   - **Descriptive Statistics:** Mean and Standard Deviation are used to summarize the performance metrics.
   - **Graphical Analysis:** Line and bar charts visualize the performance trends.
   - **Inferential Statistics: One-Way ANOVA** is employed to test whether the differences in financial performance across banks are statistically significant.
6. **Period of Study:**
   The time frame of the study spans **10 years, from 2016 to 2025**.

7. **Limitations:**

- The study is limited to five public sector banks and excludes private sector and foreign banks.
- Sensitivity to market risk (the 'S' component of CAMELS) has not been evaluated due to unavailability of consistent data.

8. **Data Analysis**

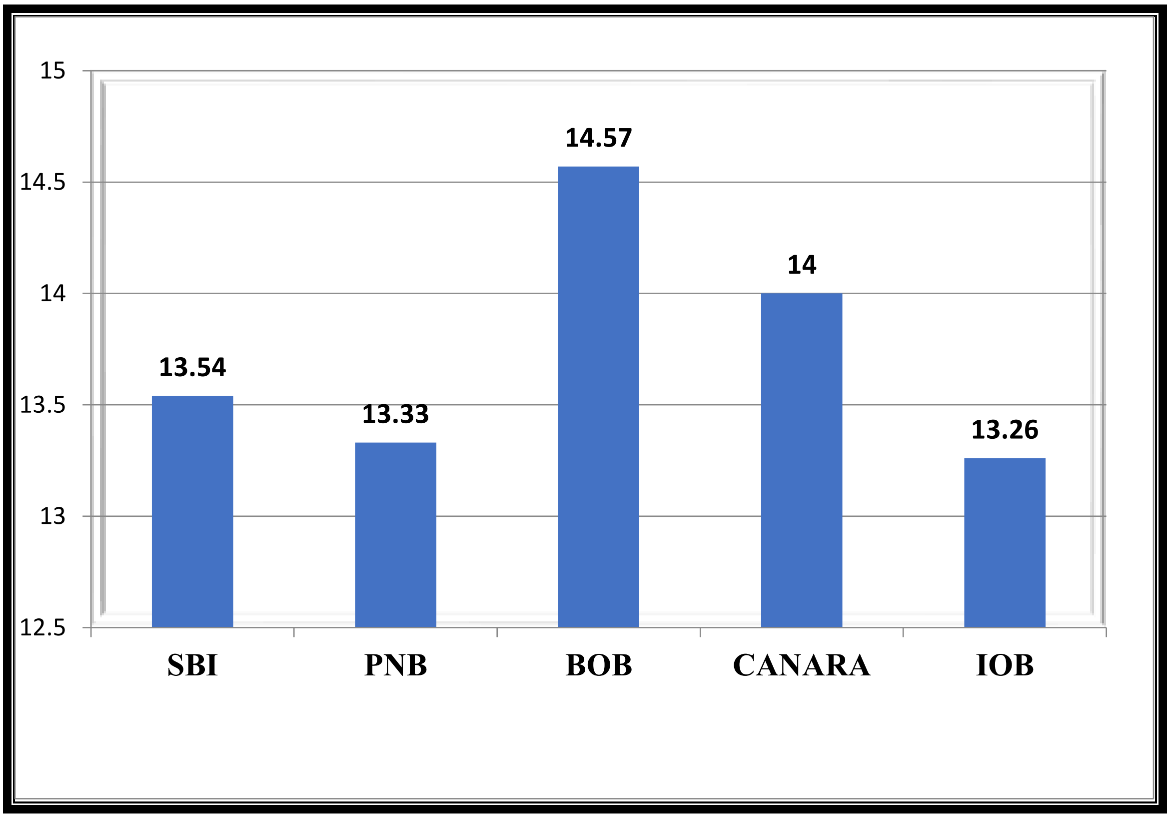
Table No: 1

A Statement of Capital Adequacy Ratio (CAR) of Selected Public Sector Banks in India During the Period 2016 to 2025

Year	SBI	PNB	BOB	CANARA	IOB
2016	13.12	11.28	13.17	11.08	9.66
2017	13.11	11.66	13.17	12.86	10.5
2018	12.6	9.2	12.13	13.22	9.25
2019	12.72	9.73	13.42	11.9	10.21
2020	13.13	14.14	13.3	13.65	10.72
2021	13.74	14.32	14.99	13.18	15.32
2022	13.85	14.5	15.84	14.9	13.83
2023	14.68	15.5	16.24	16.68	16.1
2024	14.28	15.97	16.31	16.28	17.28
2025	14.25	17.01	17.19	16.33	19.74
MEAN	**13.54**	**13.33**	**14.57**	**14**	**13.26**
SD	**0.58**	**2.45**	**3.72**	**2.55**	**3.68**

Graph: 1

A Graph of Capital Adequacy Ratio (CAR) of Selected Public Sector Banks in India During the Period 2016 to 2025



Interpretation

The Capital Adequacy Ratio (CAR) is a vital financial metric that indicates the bank's capacity to absorb potential losses, maintain depositor confidence, and comply with regulatory requirements. The higher the CAR, the stronger the bank's capital position.

1. Overall Trends:

- All five banks show a general **upward trend** in CAR from 2016 to 2025, suggesting **improved capitalization** and stronger compliance with Basel norms over time.
- The **mean CAR values** for all banks are above the regulatory minimum (usually around 10.5% including the capital conservation buffer), which implies overall financial soundness.

2. Bank-wise Insights:

- **Bank of Baroda (BOB):**
  - ➢ Has the **highest average CAR** (14.57%), indicating a consistently strong capital position.
  - ➢ CAR rose from 13.17% in 2016 to 17.19% in 2025, showing progressive strengthening.
  - ➢ Standard deviation (SD = 3.72) indicates **moderate fluctuation**, mostly due to significant growth in later years.
- **Canara Bank:**
  - ➢ Maintains a solid mean CAR of **14.00%**, indicating financial stability.
  - ➢ CAR increased steadily, peaking at **16.68% in 2023**, with moderate fluctuations (SD = 2.55).
- **State Bank of India (SBI):**
  - ➢ Shows a **moderate CAR level** with a mean of **13.54%**.
  - ➢ Its CAR is relatively stable across the years, with the **lowest variability** (SD = 0.58), which reflects **strong and consistent capital management**.
- **Punjab National Bank (PNB):**
  - ➢ Starts with a lower CAR in earlier years (as low as 9.20% in 2018) but shows **notable improvement**, reaching **17.01% in 2025**.
  - ➢ Mean CAR is **13.33%**, and a relatively high SD of **2.45**, indicating **greater year-to-year variation**, possibly due to recapitalization and merger impacts.
- **Indian Overseas Bank (IOB):**
  - ➢ Has the **lowest average CAR** at **13.26%**, though it showed the **most significant growth**, from **9.66% in 2016** to **19.74% in 2025**.
  - ➢ SD of **3.68** shows substantial volatility, reflecting restructuring efforts and recapitalization.

3. Key Observations:

- ➢ **Improvement Across All Banks**: All banks improved their CAR from 2016 to 2025, highlighting effective capital infusion and regulatory compliance efforts.
- ➢ **IOB's Turnaround**: Indian Overseas Bank, which started with the weakest CAR, shows **the most dramatic recovery** by 2025.

Table No: 2

A Statement of Anova for Capital Adequacy Ratio of Selected Public Sector Banks in India During the Period 2016 to 2025

Source of Variation	SS	df	MS	F	F-critical
Between Groups	28.837	4	7.209	1.35	2.28
Within Group	240.457	45	5.344		
Total	269.294	49			

Hypotheses

- ➢ **Null Hypothesis (H_0):** There is **no significant difference** in the mean CAR among SBI, PNB, BOB, Canara, and IOB.
- ➢ **Alternative Hypothesis (H_1):** There is a **significant difference** in the mean CAR among at least one of the banks.

Interpretation

- **F (calculated) = 1.35**
- **F-critical (at α = 0.05, df_1 = 4, df_2 = 45) = 2.28**

Since **F < F-critical**, we **fail to reject the null hypothesis**.
Since the **p-value > 0.05**, we **fail to reject the null hypothesis**, confirming that there is **no statistically significant difference** in the mean CAR among the five public sector banks from 2016 to 2025.
There is **no statistically significant difference** in the mean Capital Adequacy Ratios (CAR) among the five public sector banks from 2016 to 2025. This implies that despite slight variations in year-wise performance, the banks have maintained **comparable levels of capital adequacy** over the long term—likely due to common regulatory norms and recapitalization policies mandated by the Reserve Bank of India and the Government of India.

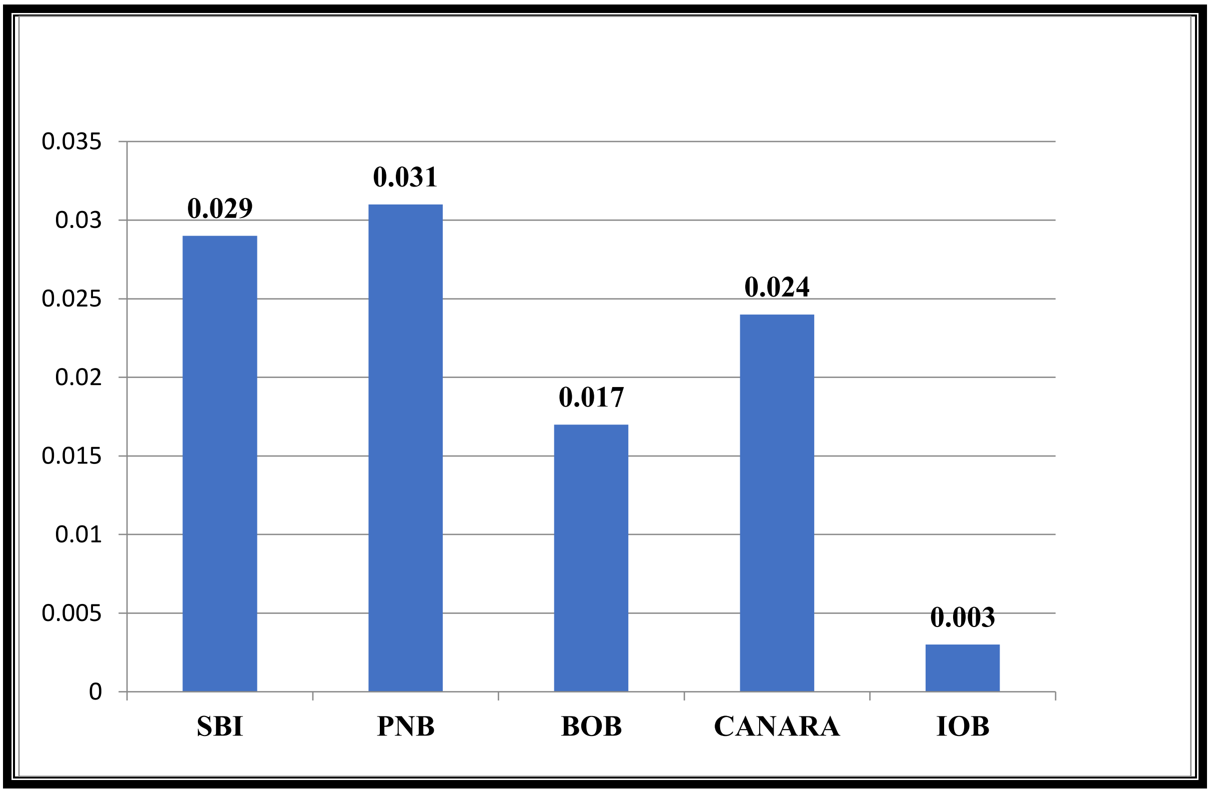
Table No: 3

A Statement of NET NPA To Total Assets of Selected Public Sector Banks in India During the Period 2016 to 2025

Year	SBI	PNB	BOB	CANARA	IOB
2016	0.003	0.002	0.004	0.004	0.002
2017	0.022	0.045	0.026	0.037	0.080
2018	0.032	0.064	0.033	0.046	0.082
2019	0.179	0.039	0.020	0.033	0.001
2020	0.013	0.033	0.019	0.025	0.025
2021	0.008	0.031	0.019	0.021	0.017
2022	0.006	0.027	0.010	0.015	0.013
2023	0.004	0.015	0.006	0.011	0.010
2024	0.003	0.004	0.005	0.008	0.003
2025	0.003	0.002	0.004	0.004	0.002
MEAN	**0.029**	**0.031**	**0.017**	**0.024**	**0.003**
SD	**0.0514**	**0.0195**	**0.0092**	**0.0125**	**0.0301**

Graph No: 02

A Graph of NET NPA To Total Assets of Selected Public Sector Banks in India During the Period 2016 to 2025



interpretation of the data on Net NPA to Total Assets of selected public sector banks in India during the period 2016 to 2025:

- BOB emerges as the most stable and consistently low-risk bank in terms of Net NPA to Total Assets.
- IOB, despite a rocky start, has shown remarkable recovery, outperforming others by 2025.
- SBI and PNB had relatively higher risk exposures, especially in the mid-period, but both improved by 2025.
- PNB's average remains the highest, showing that chronic asset quality issues persisted longer than in other banks.

While **all banks show significant improvement** in asset quality in the later years, especially from 2020 to 2025, there is a clear difference in their journeys. Banks like BOB and Canara maintained better control over NPAs, while SBI, PNB, and IOB had to overcome periods of high stress. IOB's turnaround is particularly noteworthy.

Table No: 04

ANOVA Table: Net NPA to Total Assets (2016–2025)

Source of Variation	**Sum of Squares (SS)**	**Degrees of Freedom (df)**	**Mean Square (MS)**	**F**	**F-Critical (α = 0.05)**
Between Groups	0.008535	4	0.002134	0.281	2.58
Within Groups	0.341201	45	0.007582		
Total	0.349736	49			

Interpretation:

- **Null Hypothesis (H_0):** There is no significant difference in mean Net NPA to Total Assets among the five banks.
- **F = 0.281 < F-critical = 2.58**, and the **p-value = 0.889**
→ **Fail to reject H_0.**

There is **no statistically significant difference** in the average Net NPA to Total Assets ratios among the five public sector banks over the study period. This suggests that while performance varied, the differences were not large enough to be statistically meaningful.

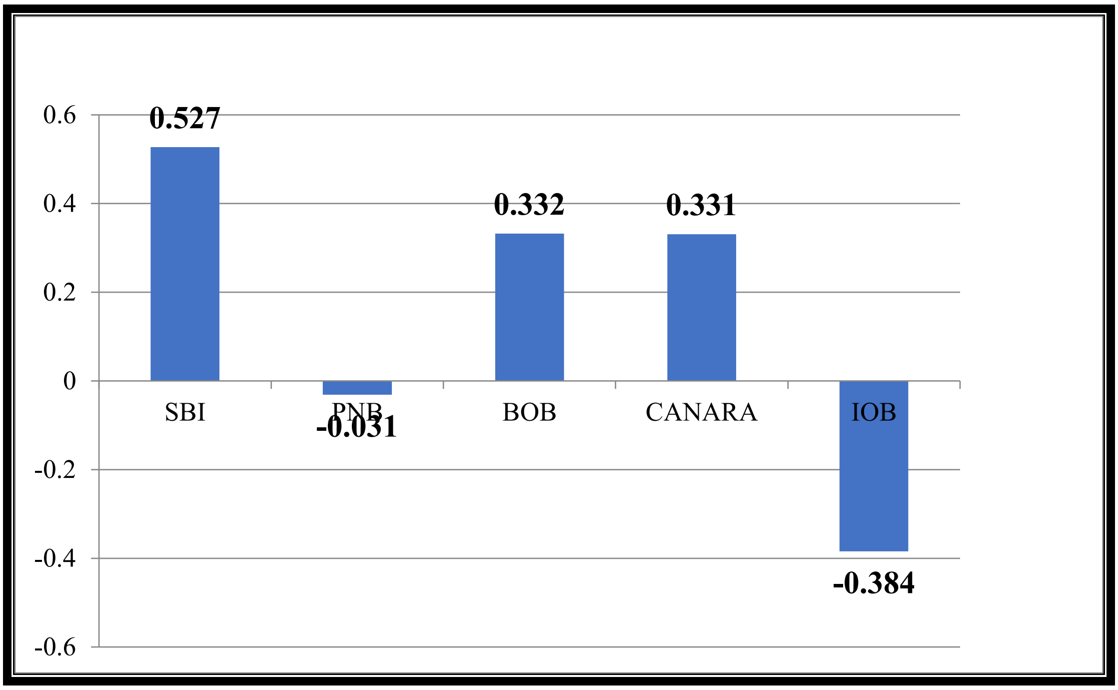
Table No:05

A Statement of Return on Assets (ROA) of Selected Public Sector Banks in India During the Period 2016 to 2025

Year	**SBI**	**PNB**	**BOB**	**CANARA**	**IOB**
2016	0.42	0.04	-0.78	0.26	-1.2
2017	0.38	-1.28	0.2	0.2	-1.21
2018	-0.18	-1.6	-0.34	-0.75	-2.33
2019	0.02	0.18	0.07	0.2	-1.5
2020	0.38	0.05	0.09	-0.28	-0.8
2021	0.48	0.2	0.12	0.28	0.3
2022	0.67	0.29	0.61	0.48	0.57
2023	0.96	0.22	1.02	0.82	0.66
2024	1.04	0.57	1.17	1.01	0.75
2025	1.1	1.02	1.16	1.09	0.92
MEAN	**0.527**	**-0.031**	**0.332**	**0.331**	**-0.384**
SD	**0.443**	**0.659**	**0.613**	**0.466**	**0.937**

Graph No:03

A Graph of Return on Assets (ROA) of Selected Public Sector Banks in India During the Period 2016 to 2025



The Return on Assets (ROA) ratio gauges a bank's ability to generate profit from its total assets and is a key indicator of operational efficiency and profitability. Among the five public sector banks analyzed, the State Bank of India (SBI) consistently shows the strongest performance, with an average ROA of 0.527%, rising steadily from a negative dip in 2018 to 1.10% in 2025, and with a relatively low standard deviation (0.443), indicating stable profitability. Bank of Baroda (BOB) and Canara Bank also display moderate and improving performance, maintaining average ROAs of 0.332% and 0.331%, respectively. These two banks reflect a healthy recovery from earlier losses, with ROAs exceeding 1% by 2025, demonstrating a strong operational turnaround. Punjab National Bank (PNB), however, shows a slightly negative average ROA (-0.031%) with high volatility (SD = 0.659), indicating unstable performance and recovery efforts, especially between 2017 and 2018 when ROAs were significantly negative. The most concerning trend is observed in Indian Overseas Bank (IOB), which reports the lowest mean ROA of -0.384% and the highest variability (SD = 0.937), signaling persistent financial stress and unstable profitability despite slight improvement in the last three years. Overall, SBI, BOB, and Canara demonstrate steady growth and resilience, while PNB and particularly IOB continue to face profitability challenges throughout the period.

Table No: 06

ANOVA Table: Return on Assets (ROA) of Selected Public Sector Banks (2016–2025)

Source of Variation	Sum of Squares (SS)	Degrees of Freedom (df)	Mean Square (MS)	F
Between Groups	5.2581	4	1.3145	2.268
Within Groups	26.0826	45	0.5796	
Total	31.3406	49		

Interpretation:

- **Null Hypothesis (H_0):** There is no significant difference in mean ROA among the five banks.
- **F = 2.27**
- **F-critical (at $\alpha = 0.05$, $df_1 = 4$, $df_2 = 45$) ≈ 2.58**

Since **F < F-critical**, we **fail to reject the null hypothesis** at the 5% significance level.

There is **no statistically significant difference** in the mean Return on Assets (ROA) among the selected public sector banks from 2016 to 2025. While numerically some banks like SBI show better performance, the differences are not statistically significant.

9.Findings:

1. **Capital Adequacy (CAR):**
   - All banks improved their CAR from 2016 to 2025.
   - BOB had the highest average CAR (14.57%), while IOB showed the greatest improvement.
   - ANOVA results showed no significant difference in CAR across the banks (F = 1.35 < F-critical).
2. **Asset Quality (Net NPA to Total Assets):**
   - BOB maintained the lowest and most stable NPAs.
   - IOB, though initially weak, demonstrated a strong recovery by 2025.
   - ANOVA confirmed no significant differences in mean NPA ratios (F = 0.281, p > 0.05).
3. **Profitability (ROA):**
   - SBI showed the highest and most consistent profitability.
   - PNB and IOB had negative or unstable ROAs.
   - Despite numerical differences, ANOVA showed no statistically significant difference in ROA among banks (F = 2.27 < F-critical).

10.Suggestions:

1. **Improve Asset Quality:**
   Banks like PNB and IOB should strengthen loan appraisal, monitoring, and recovery mechanisms to control NPAs.
2. **Capitalize on Technology:**
   Embrace AI-driven analytics for credit risk assessment and fraud detection.
3. **Enhance Profitability:**
   Diversify income streams by focusing on fee-based services and treasury operations.
4. **Strengthen Governance:**
   Introduce performance-based accountability and training to boost managerial efficiency.
5. **Capital Optimization:**
   Banks should balance risk and return by strategically allocating capital to less risky, high-yielding assets.

11.Conclusion:

The financial performance of selected public sector banks from 2016 to 2025 shows encouraging trends in capital adequacy, asset quality, and profitability. While banks like SBI and BOB lead in stability and returns, PNB and IOB face challenges, particularly in managing NPAs and ensuring consistent profits. However, the statistical analysis using ANOVA reveals that the differences in performance metrics among banks are not significant, indicating an overall convergence in financial health, likely driven by uniform regulatory frameworks and systemic reforms. Continued focus on innovation, asset quality, and operational efficiency will be essential for sustaining long-term growth and competitiveness in India's public sector banking landscape.

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