Bank Parikrama – A Journal of Banking & Finance
Volume 50, No. 2, December 2025 (pp. 5-24)
ISSN: 1019-7044
DOI: http://doi.org/10.64204/BP1019-7044/50(2)/A20251

A Comparative Analysis of Asset Quality and Profitability between Public and Private Banks Listed in Nifty Bank Index in India

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Abstract

The financial domain between public and private banks has shifted, raising a fundamental question: Why are public banks lagging while private institutions succeed? This study analyses the comparative financial performance of public and private banks listed in bank nifty in terms of asset quality and profitability over the period of ten years (2014-2023) using the accounting ranking method and Analysis of Variance (ANOVA). In this study, three private sector bank (HDFC, AXIS, ICICI) and three public sector banks (SBI, BOB, PNB) has been selected based on market capitalization out of nine banks that was continued during study period. The findings reveal that private banks consistently outperform public banks. Analysis of Variance (ANOVA) results confirmed statistically significant differences in asset quality and profitability between the two sectors ($p < 0.05$). These results underscore the urgent need for public banks to enhance their risk management strategies, operational efficiency, and overall competitiveness in the banking sector. The insights provided are crucial for stakeholders and policymakers to strengthen resilience in public banking.

Keywords: Asset Quality, Profitability, Bank Nifty, Public Banks, Private Banks, Analysis of Variance
JEL Classification: G21

1. Introduction

Finance Minister of India (Press Information Bureau 2024, August 19) expressed a positive view of the performance of Public Sector Banks (PSBs), particularly regarding their asset quality and profitability. She also recognizes the improvement made by PSBs in a significant reduction in NPAs for the fiscal year 2023-24 during the review meeting of public sector banks on 19 AUG 2024 in New Delhi. As India strives to become the third-largest economy in the world, the banking industry is seeing a ten-year-high performance in financial measures,

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according to Deputy Governor of the Reserve Bank of India (Press Information Bureau 2024, August 19). As we are aware, the banking industry plays a vital role in shaping a country's economy. Hence, banks' financial health is of utmost importance, as it facilitates the flow of money, promotes savings, channelizes credit to individuals, businesses, and governments, and provides financial services to run the economy. After the 1990s, the Indian banking sector underwent meaningful change. Private banks started evolving as the main players, and among them, the competitive environment started alongside public-sector banks. "Researchers like Das and Ghosh (2006) have observed that after post-liberalization period private banks of their aggressive market strategies and technological adoption have frequently surpassed their public counterparts in terms of efficiency and profitability." As the banking industry continues to evolve, it is important to assess the performance of public and private sector banks to understand their relative strengths, weaknesses, and impacts on the overall financial system. Hence, it is important to assess banks' financial performance as they play a key role in shaping and contributing to economic growth. Asset quality shows the overall health and risk management of the assets they hold on to their balance sheet. It acts as an important indicator of a bank's understanding of financial stability and ability to endure potential losses. It is mandatory for banks to maintain high asset quality to understand and manage the quality of assets and to ensure their growth, financial stability, and compliance with regulatory requirements, not only for banking sector performance, but also for the economy. For instance, Non-performing Assets (NPA) are key indicators of bank asset quality. If a higher level of NPA persists for a longer period, it impacts profitability and increases potential risk, and banks need to increase provisioning, which affects their overall performance. Profitability in the banking sector refers to the banks' ability to generate profits from their operations, assets, and equity. This is an important indicator of banks' financial health. Banks want to maximize profitability by maintaining adequate capital levels and managing risk. However, in the last decade, the banking sector has witnessed both public and private banks take more risk by providing more loans to generate more profit. Consequently, asset quality has declined, although profitability is good. Hence, this study focuses on comparing both asset quality and profitability to understand

the actual performance of public and private banks and to provide insights into the competitive landscape of the Indian banking industry. This study is comprised of four sections. The first section presents a literature review of national and international studies that examine banks' asset quality and profitability. This section discusses the research methodology and the data collection. The third section of this paper dictates the research hypothesis, and the last section analyses the data by employing the accounting rank method and ANOVA.

2. Literature Review

2.1 Asset Quality

Mohanty and Mehrotra (2021) looked at how Non-performing Assets (NPAs) affected Indian banks' performance. For the years 2007–08 and 2017–18, they selected 21 private banks and 27 state banks. According to the study, NPAs had a negative effect on public banks' performance when compared to private banks. Tanted and Mathkari (2020) study five private and five public banks in India. Regression analyses were employed, and the results showed that public banks had higher levels of NPAs than private banks did. They also found that private banks set up new businesses compared to public banks, which also helps private banks perform well. The rising Non-performing Assets (NPA) of Indian commercial banks can be attributed to a combination of macroeconomic, industry, and bank-specific variables, according to Arrawatia et al. (2019) analysis of 47 commercial banks from 2000 to 2014.

2.2. Profitability

Pillai and Dam (2019) study 5 private banks and 5 public banks of India using panel data regression for the period of 10 years found that private banks earn higher profit than public banks and have perform good in terms of profitability than public banks. Poudel (2012) assessed the impact of loan management on bank financial performance in Nepal using time-series data spanning 2001 to 2011. The study's findings demonstrate the importance of credit risk management in forecasting bank financial success and profitability. As Fredrick (2010) finds, credit risk management significantly impacts banks' financial performance in Kenya. Jackson (2011) utilized return on equity as a stand-in for bank performance, and CAMEL

indicators were employed as independent variables. He discovered that these factors affected the financial performance of commercial banks. This study investigates the CAMELS criteria for commercial bank profitability, which none of the above conclusions truly address. Muneer et al. (2017) employed the panel data analysis on 25 Pakistani commercial banks for the period of 2006 to 2014 found that bank asset, cost of fund, credit to deposit ratio, bank lending has a significant impact on non-performing asset and capital adequacy ratio, GNPs also impact the profitability of the banks. Kakkar and Sharma (2016) use the financial ratio as a proxy for bank performance and profitability for the period 2010-11 to 2014-15 and a regression technique and selecting four public banks based on market capitalization. They found a significant relationship between bank performance and profitability.

3. Research Gap

A comparative analysis of asset quality and profitability between public and private banks over the last decade reveals several significant research gaps that warrant further investigation. First, while some studies have explored the financial performance of these banking sectors, there is a notable lack of comprehensive longitudinal analyses spanning a full decade. Many of the existing research on banking financial performance focuses on the brief time horizon as a result is failed to capture regulatory changes and economic instabilities. Furthermore, most of the studies focused on basic statistical method like simple t-test or averages rather than using the recent tools such as ANOVA. Additionally, the most important gap that how non-performing asset influence the performance of banks in terms of profitability. Finally, many studies employ ranking methods to assess the banks performance but fail to understand which sectors perform better in terms of asset quality and profitability. Hence, to address these gaps a comprehensive study employing accounting ranking methods and ANOVA test provide an in-depth understanding of how private and public sector banks have directed challenges over the past decade, resulting in offering the valuable insight for banking sector stakeholders.

4. Objectives

The objective is to evaluate the performance of private and public banks with respect to asset quality and profitability.

5. Hypothesis Statements

5.1 Asset Quality

H_{1a}: There is a significant difference between the non-performing asset ratio of private and public banks.

H_{1b}: There is a significant difference between the interest coverage ratio (ICR)of public and private banks.

H_{1c}: There is a significant difference between the provision coverage ratio (PCR) of public and private banks.

H_{1d}: There is a significant difference between the capital adequacy ratio (CAR) of public and private banks.

5.2 Profitability

H_{1a}: There is a significant difference between the Return on Assets (ROA) ratio of public banks and private banks.

H_{1b}: There is a significant difference between the Return on Equity (ROE) ratio of public and private banks.

H_{1c}: There is a significant difference between the Net Interest Margin (NIM) ratios of public and private banks.

H_{1d}: There is a significant difference between the Cost-to-Income Ratio (CIR) of public and private banks.

6. Data Source and Methodology

This study utilized secondary data sourced from the annual reports of the selected banks and the Reserve Bank of India. The analysis included three public banks and three private banks, all listed on the Bank Nifty Index, according to their

market capitalizations from 2014 to 2023. Specifically, the public banks selected were the State Bank of India (SBI), Bank of Baroda (BOB), and Punjab National Bank (PNB), whereas the private banks included HDFC Bank, Axis Bank, and ICICI Bank. This selection was made to provide a balanced and representative comparison of the Indian banking sector. By choosing an equal number of banks from both the public and private sectors, this study ensures fair representation and mitigates bias towards either sector. This approach also facilitates comparability and aids in drawing meaningful conclusions regarding their financial performance. The accounting ranking method and ANOVA were employed to analyse the variables.

7. Observed Results

a) Asset Quality

Table 1: Asset Quality and Group Ranking of Selected Banks for 2014-2023

	Provision Coverage Ratio				Interest Coverage Ratio			
Banks	**Mean (M)**	**MRANK**	**STDEV**	**STDEV-RANK**	**Mean(M)**	**MRANK**	**STDEV**	**STDEV-RANK**
SBI	75.70	2	12.06	4	1.61	4	0.10	2
PNB	68.62	5	12.76	5	1.54	6	0.07	**1**
BOB	74.75	3	11.21	3	1.59	5	0.16	5
HDFC	71.65	4	2.18	**1**	1.99	**1**	0.15	4
AXIS	79.286	**1**	10.15	2	1.75	3	0.13	3
ICICI	65.16	6	14.90	6	1.83	2	0.25	6

Source*:* Compiled by researchers from the annual report of banks

Table 1.1: Asset Quality and Group Ranking of Selected Banks for 2014-2023.

	Capital Adequacy Ratio				Non-Performing Asset Ratio					Group Rank		Group Rank
Banks	**Mean (M)**	**MRANK**	**STDEV**	**STDEV-RANK**	**Mean (M)**	**MRANK**	**STDEV**	**STDEV-RANK**	**Mean**	**Rank**	**STDEV**	**Rank**
SBI	13.13	5	0.78	**1**	2.64	4	1.51	3	3.75	4	2.50	**1**
PNB	12.40	6	2.13	6	6.02	6	2.66	6	5.75	6	4.50	5
BOB	13.60	4	1.50	4	3.08	5	1.60	4	4.25	5	4.00	4
HDFC	17.03	2	1.76	5	0.33	**1**	0.06	**1**	2.00	**1**	2.75	3
AXIS	16.66	3	1.47	3	1.28	2	0.99	2	2.25	2	2.50	**1**
ICICI	17.67	**1**	1.051	2	2.05	3	1.60	5	3.00	3	4.75	6

Source*:* Compiled by researchers from the annual report of banks

The average mean asset quality ratios of public and private banks from 2013 to 14 to 2022–23 is show in Tables 1 and 1.1, respectively, for the last ten years. In Table-1, Provision Coverage Ratio (PCR) indicates How many funds are set aside to cover potential losses from bad loans. The study shows that among both public and private banks, AXIS banks top the list with 79% and with Standard Deviation (STDEV) of 10%, which means that the banks maintain a healthy level of provision to cover their potential losses, and standard deviation of 10% suggests that some variation in the PCR over the years, but overall, it has remained relatively stable. However, on the other hand, ICICI banks bottom the list with 65% with standard deviation of 14% indicates its ability to cover potential losses from bad loans is not robust, as it ideally Should be, and standard deviation of 14% reflects significant fluctuations in PCR indicates inconsistency in managing stability.

Interest Coverage Ratio (ICR) is used to assess a bank's ability to meet its interest obligation on outstanding debts with its earnings. The study shows that HDFC tops the list with an ICR of approximately 2% (approx.) and a standard deviation of 0.15% indicates that it has enough earnings to cover its interest obligation, and a standard deviation of 0.15% indicates that banks' ability to cover their interest expenses has been relatively stable over the past decade. PNB Holds the lowest rank with an ICR of 1.5% and a standard deviation of 0.07%, indicating that it has insufficient earnings to cover its interest obligation, although the standard deviation is stable.

Likewise, as we observe in Table-1.1 Capital Adequacy Ratio (the CAR) determines the adequacy of their capital in relation to their risk-weighted assets. Here, HDFC ranks with a CAR of 17.67% and standard deviation of 1%, which indicates that a capital adequacy ratio of over 17% is significantly higher than the regulatory minimum (9%), showing that the bank is well capitalized and capable of absorbing losses. The low standard deviation of 1% suggests minimal fluctuations in CAR, which reflects consistent risk management practices. In contrast, Punjab Nation Bank (PNB) Holds the lowest rank with a CAR of 12.4% and a standard deviation of 2.13%. Even though PNB satisfies more than the regulatory requirement of 9%, a higher standard deviation affects its performance over time.

Table-1.1 shows the non-performing of individual banks, the prime objective of NPAR is to determine the asset quality and risk associated with credit management. HDFC bank ranked first with a minimum NPA of 0.33%, with a lower variation of 0.06% over the last decade and talked about its efficient management of credit risk compared to its counterparts. PNB ranked the lowest with an NPAR of 6.02%, with a variation of 2.66%. It means that PNB asset and credit risk management is not in good condition and signal bankruptcies in future years if it does not manage its non-performing asset. Its standard deviation is 2.66% highest among its counterparts, which means that the PNB fails to maintain stability in terms of the loan portfolio.

Table-1.1 also shows the group ranking of asset quality among the six banks listed in the bank nifty index over the ten years. With a mean score of 5.75 and a standard deviation of 4.5 for important metrics such as PCR, ICR, CAR, and NPA ratio, the Punjab National Bank (PNB) is ranked lowest. This suggests that PNB is not only a weaker asset quality but is also significantly volatile. This high mean and standard deviation points towards a troubling combination of inadequate provisioning, poor earning relationships to interest obligation, failing potential capital inadequacy, and high levels of non-performing assets. Such performance indicates that Punjab National Bank faces considerable financial distress, with high instability and risk asset management practices that could result in insolvency in the future. In contrast, the HDFC bank Holds the top position with a mean value of 2 and a standard deviation of 2.75, indicating excellent asset quality management with high PCR, strong ICR, over-compliance with CAR, and a minimal NPA ratio. HDFC banks reflect prudent lending, robust risk management, and financial stability, thereby providing confidence to investors, depositors, and regulators.

b) Profitability

Table 2: Profitability and Group Ranking of Selected Banks for 2014-2023

	Return on Asset				Return on Equity			
Banks	**Mean(M)**	**MRANK**	**STDEV**	**STDEV RANK**	**Mean(M)**	**MRANK**	**STDEV**	**STDEV RANK**
SBI	0.45	4	0.33	2	7.46	4	5.63	3
PNB	-0.15	6	0.75	6	-3.26	6	13.37	6

	Return on Asset				Return on Equity			
Banks	**Mean(M)**	**MRANK**	**STDEV**	**STDEV RANK**	**Mean(M)**	**MRANK**	**STDEV**	**STDEV RANK**
BOB	0.21	5	0.53	3	3.36	5	8.76	5
HDFC	1.97	**1**	0.07	**1**	17.78	**1**	1.56	**1**
AXIS	0.96	3	0.65	5	9.56	3	6.22	4
ICICI	1.40	2	0.56	4	11.13	2	4.37	2

Source*:* Compiled by researchers from the annual report of banks

Table 2.1: Profitability and Group Ranking of Selected Banks for 2014-2023

	Cost to Income Ratio				Net Interest Margin				Group Rank		Group Rank	
Banks	**Mean (M)**	**MRANK**	**STDEV**	**STDEV RANK**	**Mean (M)**	**MRANK**	**STDEV**	**STDEV RANK**	**Mean**	**Rank**	**STDEV**	**Rank**
SBI	51.77	6	2.58	**1**	3.05	4	0.25	3	4.50	4	2.250	2
PNB	47.53	5	4.60	6	2.71	5	0.42	6	5.50	6	6.000	6
BOB	47.15	4	2.63	2	2.58	6	0.39	5	5.00	5	3.750	4
HDFC	41.08	2	3.29	4	4.24	**1**	0.13	**1**	1.25	**1**	1.750	**1**
AXIS	43.29	3	3.38	5	3.67	2	0.22	2	2.75	3	4.000	5
ICICI	38.92	**1**	3.02	3	3.61	3	0.38	4	2.00	2	3.250	3

Source*:* Compiled by researchers from the annual report of banks

Table-2 shows the banks' profitability performance over the last ten years. Return of Asset (ROA) measures a bank's profitability relative to its total assets. HDFC bank topped the list with a mean value of 1.97% and standard deviation of 0.07%, which means that banks have consistently achieved a healthy level of profitability relative to their assets. The low standard deviation suggests that the bank has remained stable over time. On the other hand, Punjab national banks Hold the lowest rank, with a mean value of -0.15% and a standard deviation of 0.75%. A negative ROA suggests that banks have been unable to generate profits from their assets, leading to potential losses over a period of 10 years. A high standard deviation of .75% implies significant volatility in bank performance. Table 2 shows the (ROE) of banks over the period of 10 years. ROE refers to How efficiently a bank uses shareholder funds to generate profits. Here, HDFC ranks with a mean value of 17.78% and a standard deviation of 1.56%, indicating that the bank has consistently provided a good return to its investor. A standard deviation of 1.56% indicates that the ROE has been stable over the past decade. In contrast, PNB ranked last with -3.26 a mean value of and 13.37% standard

deviation. A negative ROE means that the bank has been losing, and it does not use shareholder funds to generate profit. Additionally, the high standard deviation of 13.37% implies financial performance instability.

Table-2.1 shows the cost-to-income ratio of banks for the last 10 years. The cost-to-income ratio is used to evaluate a bank's operational efficiency by comparing its operating costs to its income. Here, the ICICI bank ranks the highest among the other banks with a mean value of 38.92% and a standard deviation of 3.02, indicating that the bank can manage its operating costs effectively, and a standard deviation of 3% shows that bank cost management is relatively stable over the period. On the other hand, PNB ranks last with 47.53% mean value and standard deviation of 4.60%, which means that compared to other banks, PNB spends 47 paisa to earn one rupee, which is higher than other banks and standard deviations of 4.5% relative stable cost structure. Table-2.1 shows the Net Interest Margin (NIM) of banks over the last 10 years. NIM measures the difference between the income generated from interest-earning assets and the expenses related to interest-bearing liabilities. The HDFC bank tops the list with a 4.24% mean value and 0.13% standard deviation. This means that a bank shows effective management of its interest income with respect to its interest expenses, and a standard deviation of 0.13% suggests that this margin is reasonably stable. On the other hand, the Bank of Baroda (BOB) has a lower rank with 2 mean values of 2.58 % and a standard deviation of 0.39, indicating moderate profitability in its interest generation process. A standard deviation of 0.39% showed some variability over the years. Table-2.1 shows the group ranking of the profitability of public and private banks listed in the bank nifty index for the last 10 years. Within the group of six banks, Punjab National Banks Hold the last rank with 5.5 mean value and a standard deviation of 6. This implies that the PNB is concerned about instability and inefficiency in generating profit. A lower return on assets, potentially poor return on equity, high cost to income, and possibly a narrow net interest margin all suggests operational inefficiencies, higher costs, or ineffective asset utilization. In contrast, HDFC topped the position with a mean value of 1.25 and a standard deviation of 1.75. This indicates effective management with higher ROA, robust ROE, an optimized cost-to-income ratio, and healthy NIM, reflecting the efficient use of assets, better cost management, and a strong ability to generate profit from its operations and investment.

c) Asset Quality and Profitability

Table 2.2 Overall 10 Years of Asset Quality and Profitability and Ranking of Selected Banks

	Asset Quality				Profitability					
BANKS	**Provision Coverage Ratio**	**Interest Coverage Ratio**	**Capital Adequacy Ratio**	**Non-Performing Asset Ratio**	**Return on Asset**	**Return on Equity**	**Cost to Income Ratio**	**Net Interest Margin**	**Average or Mean**	**Rank**
SBI	2	4	5	4	4	4	6	4	**4.13**	**4**
PNB	5	6	6	6	6	6	5	5	**5.63**	**6**
BOB	3	5	4	5	5	5	4	6	**4.63**	**5**
HDFC	4	**1**	2	**1**	**1**	**1**	2	**1**	**1.63**	**1**
AXIS	**1**	3	3	2	3	3	3	2	**2.50**	**2**
ICICI	6	2	**1**	3	2	2	**1**	3	**2.50**	**2**

Source*:* Compiled by researchers from the annual report of banks

Table-2.2 shows the combined ranking of both asset quality and profitability of public and private banks listed on the bank nifty index over a period of 10 years. HDFC bank rank 1st among banks in terms of asset quality and profitability. This indicates strong overall financial health. It likely depicts a low NPA ratio, high PCR, ICR, and CAR, along with robust ROA, ROE, favourable cost-to-income ratio, and NIM, indicating effective management and efficient operation. On the other hand, Punjab National Bank Holds the last rank among other banks in both asset quality and profitability. This describes significant challenges, such as poor risk management and inability to maintain the quality of its assets, which depicts high NPA, struggling with a low PCR, inadequate ICR, possibly falling short on CAR, and inefficient profitability metrics such as low ROE, ROA, a high cost-to-income ratio, and a narrow NIM.

Table 3: Year-wise NPA Ratio for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	2.57	2.85	1.52	0.27	0.40	0.82	**2.31**	**0.50**
2015	2.12	4.06	1.89	0.25	0.44	1.40	**2.69**	**0.70**
2016	3.81	8.61	5.06	0.28	0.70	2.67	**5.83**	**1.22**
2017	3.71	7.81	4.72	0.33	2.11	4.89	**5.41**	**2.44**
2018	5.73	11.24	5.49	0.40	3.40	4.77	**7.49**	**2.86**
2019	3.01	6.56	3.33	0.39	2.06	2.10	**4.30**	**1.52**
2020	2.23	5.78	3.13	0.36	1.56	1.40	**3.71**	**1.11**
2021	1.50	5.73	3.09	0.40	1.05	1.10	**3.44**	**0.85**

2022	1.02	4.80	1.72	0.32	0.73	0.80	**2.51**	**0.62**
2023	0.67	2.72	0.89	0.27	0.39	0.50	**1.43**	**0.39**

Source*:* Compiled by researchers from the annual report of banks

Table 3.1: ANOVA of NPA Ratio

Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	35.05636	1	35.05636	16.4287	0.000923	4.493998
Within Groups	34.14158	16	2.133849			
Total	69.19793	17				

As shown in Table-3.1, the P value is less than the significant level of 0.05 hence, there is a significant difference between public banks and private banks over the 10 years in the NPA ratio dimension. This means that the type of bank ownership (public vs. private) affects the NPA ratio. Private banks managed to keep their NPA ratios significantly lower, reflecting differences in credit risk management, lending policies, and recovery mechanisms.

Table 4: Year-wise Interest Coverage Ratio (ICR) for Public and Private Banks

Year	**SBI**	**PNB**	**BOB**	**HDFC**	**AXIS**	**ICICI**	**Public**	**Private**
2014	1.57	1.60	1.44	1.82	1.64	1.59	**1.54**	**1.68**
2015	1.56	1.56	1.44	1.86	1.67	1.63	**1.52**	**1.72**
2016	1.54	1.48	1.41	1.85	1.70	1.67	**1.47**	**1.74**
2017	1.54	1.46	1.47	1.92	1.68	1.67	**1.49**	**1.76**
2018	1.51	1.45	1.55	2.00	1.69	1.72	**1.51**	**1.80**
2019	1.57	1.50	1.60	1.95	1.65	1.74	**1.56**	**1.78**
2020	1.62	1.48	1.57	1.96	1.67	1.80	**1.55**	**1.81**
2021	1.72	1.61	1.69	2.16	1.85	1.97	**1.67**	**1.99**
2022	1.78	1.62	1.88	2.29	1.97	2.22	**1.76**	**2.16**
2023	1.77	1.68	1.86	2.16	2.02	2.32	**1.77**	**2.17**

Source*:* Compiled by researchers from the annual report of banks

Table 4.1: ANOVA of ICR Ratio

Source of Variation	***SS***	***df***	***MS***	***F***	***P-value***	***F crit***
Between Groups	0.382795	1	0.382795	17.05779	0.000785	4.493998
Within Groups	0.359057	16	0.022441			
Total	0.741853	17				

As shown in Table-4.1, the P value is less than the significant level of 0.05; hence, there is a significant difference between public banks and private banks over the 10 years in the interest coverage ratio dimension. This suggests that banks' ability to cover their interest expenses with their earnings varies, depending on whether they are publicly or privately owned. This difference could be due to different cost structures, interest rate environments, capital structures, etc.

Table 5: Year-wise Provision Coverage Ratio (PCR) for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	62.86	59.07	65.45	72.57	78.10	68.60	**62.46**	**73.09**
2015	69.13	58.21	64.99	73.93	77.73	58.60	**64.11**	**70.09**
2016	60.69	51.06	60.09	69.94	72.27	50.60	**57.28**	**64.27**
2017	65.95	58.57	66.83	68.67	64.79	40.20	**63.78**	**57.89**
2018	66.17	58.42	67.21	69.78	65.05	47.70	**63.93**	**60.84**
2019	78.73	74.50	78.68	71.36	76.78	70.60	**77.30**	**72.91**
2020	83.62	77.79	81.33	72.00	86.29	75.70	**80.91**	**78.00**
2021	87.75	80.14	81.80	69.81	87.20	77.70	**83.23**	**78.24**
2022	90.20	81.6	88.71	75.76	90.94	79.18	**86.84**	**81.96**
2023	91.91	86.90	92.43	72.69	93.71	82.80	**90.41**	**83.07**

Source*:* Compiled by researchers from the annual report of banks

Table 5.1: ANOVA of PCR Ratio

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	23.44603	1	23.44603	0.203306	0.658116	4.493998
Within Groups	1845.177	16	115.3236			
Total	1868.623	17				

As in Table-5.1, the P value is greater than the significant level of 0.05; hence, there is no significant difference between public banks and private banks over the 10 years in the Provision coverage ratio dimension. The results show that both types of banks, whether public or private, have similar approaches and effectiveness in setting aside funds to cover potential loan losses.

Table 6: Year-wise Capital Adequacy Ratio (CAR) for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	12.44	11.52	12.28	16.07	16.07	17.70	**12.08**	**16.61**
2015	12.00	12.21	12.61	16.79	15.09	17.02	**12.27**	**16.30**
2016	13.12	11.28	13.18	15.53	15.29	16.64	**12.53**	**15.82**
2017	13.11	11.66	12.24	14.55	14.95	17.39	**12.34**	**15.63**
2018	12.60	9.20	12.13	14.82	16.57	18.42	**11.31**	**16.60**
2019	12.72	9.73	13.42	17.11	15.84	16.89	**11.96**	**16.61**
2020	13.06	14.15	13.30	18.52	17.53	16.11	**13.50**	**17.39**
2021	13.74	14.32	14.99	18.79	19.12	19.12	**14.35**	**19.01**
2022	13.83	14.50	15.68	18.90	18.54	19.16	**14.67**	**18.87**
2023	14.68	15.50	16.24	19.26	17.64	18.34	**15.47**	**18.41**

Source*:* Compiled by researchers from the annual report of banks

Table 6.1: ANOVA of CAR Ratio

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	72.97662	1	72.97662	39.79808	1.04E-05	4.493998
Within Groups	29.33875	16	1.833672			
Total	102.3154	17				

As in Table-6.1, the P value is less than the significant level of 0.05; hence, there is a significant difference between public banks and private banks over the 10 years in terms of the capital adequacy ratio. This indicates that ownership structure plays an important role in influencing capital adequacy. Private banks usually maintain higher CAR due to regulatory norms whereas public banks depend more on government support to meet capital requirement.

Table 7: Year-wise Return on Asset Ratio (ROA) for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	0.65	0.64	0.75	2.00	1.78	1.78	**0.68**	**1.85**
2015	0.68	0.53	0.49	2.02	1.83	1.86	**0.57**	**1.90**
2016	0.46	-0.61	-0.78	1.89	1.72	1.49	**-0.31**	**1.70**
2017	0.41	0.19	0.20	1.88	0.65	1.35	**0.27**	**1.29**
2018	-0.19	-1.60	-0.34	1.93	0.04	0.87	**-0.71**	**0.95**
2019	0.02	-1.25	0.06	1.90	0.63	0.39	**-0.39**	**0.97**
2020	0.38	0.04	0.06	2.01	0.20	0.81	**0.16**	**1.01**
2021	0.48	0.15	0.07	1.97	0.70	1.42	**0.23**	**1.36**
2022	0.67	0.26	0.60	2.03	1.21	1.84	**0.51**	**1.69**
2023	0.96	0.18	1.03	2.07	0.80	2.16	**0.72**	**1.68**

Source*:* Compiled by researchers from the annual report of banks

Table 7.1: ANOVA of ROA Ratio

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	7.355743	1	7.355743	39.94849	1.02E-05	4.493998
Within Groups	2.946091	16	0.184131			
Total	10.30183	17				

As shown in Table-7.1, the P value is less than the significant level of 0.05; therefore, we reject the null hypothesis and conclude that hence, there is a significant difference between public banks and private banks over the 10 years in the dimension of the return on asset ratio. The results also highlight that private banks effectively utilize their assets to generate income as compared to public banks.

Table 8: Year-wise Return on Equity Ratio (ROE) for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	10.03	9.75	13.36	21.28	17.43	14.02	**11.05**	**17.58**
2015	10.62	8.17	8.96	19.37	17.75	14.55	**9.25**	**17.22**
2016	7.30	-10.27	-13.48	18.26	16.81	11.43	**-5.49**	**15.50**
2017	6.31	3.30	3.44	17.95	6.76	10.33	**4.35**	**11.68**
2018	-3.21	-29.54	-5.81	17.87	0.46	6.61	**-12.85**	**8.31**
2019	0.39	-23.24	0.97	16.50	7.19	3.15	**-7.29**	**8.95**
2020	6.40	0.63	0.84	16.40	2.15	7.05	**2.62**	**8.53**
2021	8.40	2.29	1.11	16.61	7.06	12.27	**3.93**	**11.98**
2022	11.86	3.71	8.93	16.66	12.02	14.68	**8.17**	**14.45**
2023	16.53	2.57	15.33	16.96	7.96	17.18	**11.47**	**14.03**

Source*:* Compiled by researchers from the annual report of banks

Table 8.1: ANOVA of ROE Ratio

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	517.2863	1	517.2863	13.0281	0.002352	4.493998
Within Groups	635.2867	16	39.70542			
Total	1152.573	17				

As in Table-8.1, P value is less than the significant level of 0.05, there is a significant difference between public banks and private banks over the 10 years in dimension of return on equity ratio. This difference might be because public banks are restricted by broader economic mandates or less aggressive profit-seeking behaviours leading to lower ROE.

Table 9: Year-wise Net Interest Margin Ratio (NIM) for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	3.17	3.44	2.36	4.40	3.81	3.33	**2.99**	**3.85**
2015	3.16	3.15	2.31	4.40	3.92	3.48	**2.87**	**3.93**
2016	2.96	2.60	2.05	4.20	3.90	3.49	**2.54**	**3.86**
2017	2.84	2.38	2.19	4.30	3.67	3.25	**2.47**	**3.74**
2018	2.50	2.16	2.43	4.30	3.44	3.23	**2.36**	**3.66**
2019	2.95	2.41	2.72	4.30	3.43	3.42	**2.69**	**3.72**
2020	3.19	2.30	2.73	4.30	3.51	3.73	**2.74**	**3.85**
2021	3.26	2.88	2.71	4.10	3.53	3.69	**2.95**	**3.77**
2022	3.12	2.71	3.03	4.00	3.47	3.96	**2.95**	**3.81**
2023	3.37	3.06	3.31	4.10	4.02	4.48	**3.25**	**4.20**

Source*:* Compiled by researchers from the annual report of banks

Table 9.1: ANOVA of NIM Ratio

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	5.241602	1	5.241602	101.9847	2.4E-08	4.493998
Within Groups	0.822336	16	0.051396			
Total	6.063938	17				

As in Table-9.1, P-value is less than the significant level of 0.05 hence, we reject the null hypothesis and conclude that there is a significant difference between public banks and private banks over the 10 years in dimension of net interest margin ratio. The type of bank ownership appears to play a role in how effectively banks generate profits for their shareholders.

Table 10: Year-wise Cost to Income Ratio (CTIR) for Public and Private Banks

Year	SBI	PNB	BOB	HDFC	AXIS	ICICI	Public	Private
2014	52.67	45.06	43.44	45.60	40.82	38.20	**47.06**	**41.54**
2015	49.04	46.74	43.63	44.60	40.74	36.80	**46.47**	**40.71**
2016	49.13	46.79	50.30	44.30	38.55	34.70	**48.74**	**39.18**
2017	47.75	39.17	45.86	43.40	40.96	35.80	**44.26**	**40.05**
2018	50.18	56.75	45.84	41.00	47.29	38.83	**50.92**	**42.37**
2019	55.70	47.03	45.56	39.70	45.45	43.56	**49.43**	**42.90**
2020	52.46	44.82	49.97	38.60	42.47	43.50	**49.08**	**41.52**
2021	53.60	47.82	49.90	36.30	41.69	37.20	**50.44**	**38.40**

2022	53.31	49.38	49.24	36.90	48.83	40.51	**50.64**	**42.08**
2023	53.87	51.69	47.72	40.40	46.09	40.11	**51.09**	**42.20**

Source*:* Compiled by researchers from the annual report of banks

Table 10.1: ANOVA of CTIR Ratio

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	285.2599	1	285.2599	74.32596	2.07E-07	4.493998
Within Groups	61.40732	16	3.837958			
Total	346.6672	17				

As in Table-10.1, P value is less than the significant level of 0.05 hence, we reject the null hypothesis and conclude that there is a significant difference in ownership structure between public banks and private banks over the 10 years in dimension of cost to income ratio. This suggests that the operational cost relative to income generation is affected by the bank's ownership structure. Private banks are often driven by profit motives and shareholders scrutiny therefore they must maintain a lower cost-to-income ratio and public banks are often driven by social profit.

1. **Findings**: A comparative analysis of asset quality and profitability between public and private banks in India yields significant insights pertinent to the current regulatory and economic objectives. The performance of public banks is notably inferior in terms of asset quality and profitability. Among the six banks analysed, HDFC Bank demonstrated superior performance, exhibiting the lowest non-performing asset ratio of 0.33% and the highest return on assets at approximately 2% compared to its counterparts. Conversely, within the public banking sector, the Punjab National Bank (PNB) struggles to maintain asset quality and manage credit risk, as evidenced by a high non-performing asset ratio of 6%. Even when examining other metrics related to asset quality and profitability, public banks do not meet the standards set for private banks. This disparity raises questions regarding the operational efficiency and asset management strategies employed by private-sector banks. Notably, within the public banking sector, the State Bank of India outperforms the Punjab National Bank and Bank of Baroda in terms of asset quality and profitability. The Indian banking system is

currently undergoing several reforms initiated by the Central Bank (RBI) and the Finance Ministry to enhance the effectiveness and efficiency of public-sector banks. The current finance minister has acknowledged improvements in the asset quality of public banks in fiscal years 2023-24. However, this study presents a contrasting view of public sector banks' performance over the past decade, indicating that they continue to lag behind their private counterparts in terms of risk management and profitability. These findings underscore the need for public banks to align more closely with private banks to achieve economic objectives.

2. **Suggestion:** The aim of this study is to evaluate the asset quality and profitability of both private and public banks, as well as to assess the individual performance of these institutions. The findings indicate that private banks have outperformed public banks in the past decade. Several measures can be implemented to address the challenges faced by public sector banks and enhance their performance. First, public banks should invest more in advanced data analytics and digital platforms, such as artificial intelligence (AI), machine learning, and debt collection automation, to improve risk management and reduce non-performing assets (NPA). Second, streamlining operational processes and adopting a centralized management system can help reduce costs and increase profitability while maintaining high-quality customer service. Third, developing an efficient loan recovery mechanism is essential for the prompt recovery of distressed accounts, and digital communication tools should be employed to keep borrowers informed about their loan repayment schedules. Lastly, public sector banks should be monitored by regulatory bodies, such as the Reserve Bank of India, and undergo regular internal audits to ensure compliance with regulatory frameworks and the maintenance of asset quality standards. By implementing these recommendations, public banks can enhance their performance, improve asset quality and profitability, and thereby contribute more significantly to the economy, alongside private banks.

3. **Conclusion:** This study analyses the asset quality and profitability of three public banks and three private banks listed on a bank nifty as per market capitalization over a period of 10 years. In conclusion, this study reveals that private banks consistently outperform public banks in asset quality and profitability. Private banks better manage key financial indicators under asset quality, such as the Provision Coverage Ratio (PCR), Interest Coverage Ratio (ICR), Capital Adequacy Ratio (CAR), and non-performing assets (NPA). It also found that, under profitability, private banks outperform return on assets (ROA), Return on Equity (ROE), cost-to-income ratio (CIR), and Net Interest Margin (NIM). However, public banks struggled to match their performance because of inefficiencies and high-risk profiles. Public banks must implement better strategies to enhance their risk management, operational efficiency, and financial stability. This may also be the reason that public banks come under priority government banks, whose main objective is to develop the economy and not to focus on profit or commercial activities; However, private banks are open to doing business and their focus is on competing and engaging in commercial activities. The ANOVA results further confirm that ownership by private banks is a significant factor in superior performance. The actionable implication of this study stresses the urgent need for public banks in India to implement comprehensive reforms in risk management, operational efficiency and strategic planning to bridge the performance gap with private banks. The public banks must invest in technology and analytics to improve credit assessment processes to improve its operational efficiency and risk management.

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