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A COMPARATIVE STUDY OF PUBLIC AND PRIVATE SECTOR BANKS IN INDIA USING THE CAMEL MODEL

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ABSTRACT

This research paper compares the performance of selected public and private sector banks in India using the CAMEL model, which evaluates banks based on Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity. Data for four banks (two public and two private) were collected over a five-year period from 2020 to 2024. Descriptive statistics, ranking, and the Mann-Whitney U Test were applied using SPSS to analyze and compare the financial indicators. The results reveal significant differences between the two sectors on several performance parameters, offering insights into the relative strengths of public and private sector banks.

KEYWORDS: *CAMEL approach, Public Sector Banks, Private sector banks, Banking Performance, Capital Adequacy.*

1. INTRODUCTION

The Indian financial sector has long been regarded as the backbone of the Indian economy. The financial sector plays a crucial role in India's economic growth and development. The banking institutions act as key players in the financial system, which mobilise the savings from the household sector and channelise them into productive investment (Naushad, 2021). The growth and development of the banking sector is regarded as an indicator of the economic growth of an economy. The measurement of financial performance of the Indian banking sector is crucial for understanding the growth structure of the financial market as well as the whole economy (Sah & Pokharel, 2023). Since the liberalisation of the Indian economy in the early 1990s, the banking sector has undergone a profound transformation. Once dominated by government-owned public sector banks, today it features a growing and increasingly competitive cohort of private sector banks. Following the recommendation of Narasimham Committees (1991, 1998), RBI introduced key reforms, especially capital adequacy norms, provisioning standards, and consolidation of public banks, etc., to enhance stability, efficiency, and financial inclusion.

In India, there are different categories of banking institutions, but the two main categories are public sector banks and private sector banks. With liberalization, private banks have been gaining ground in efficiency and innovation, whereas public sector banks continue to command a substantial customer base and asset size. Within this shifting landscape, comparing performance across ownership types using sound analytical frameworks has become an essential scholarly and policy pursuit. The CAMEL model, consisting of five dimensions of capital adequacy, asset quality, management efficiency, earnings quality, and liquidity, provides a well-established framework for the measurement of bank performance. The RBI formally adopted CAMEL in 1996, following recommendations of the Padmanabhan Working Group (1995), making it an integral tool of supervisory oversight and internal performance benchmarking (Nidhi & Tyagi, 2018). Since then, numerous empirical studies have leveraged CAMEL to compare Indian banks, often yielding insights into differential strengths across public and private sector institutions. Despite the growing body of literature, there remains a need for updated comparative analysis covering both sectors under current competitive conditions. Some studies prior to 2020 found that public sector banks often ranked highly on CAMEL parameters such as earnings capacity and liquidity, while private sector banks dominated in capital adequacy and management efficiency.

Limbasiya and Chaudhary (2018) examined five public sector banks (SBI, Bank of Baroda, Bank of India, Central Bank, and Indian Bank) versus five private banks (HDFC, ICICI, Kotak Mahindra, Yes Bank, and IDFC) for 2016 -17, applying composite rankings and two-sample t-tests. They reported public banks occupying top CAMEL

positions overall among public banks, while private banks held leadership in capital adequacy and earnings among their peers; the t-tests confirmed statistically significant differences between sectors (R Limbasiya & Chaudhary, 2018). Similarly, Hymavathi (2021) compared SBI, Bank of Baroda, and Union Bank (public) with HDFC, ICICI, and Axis Bank (private) over selected recent years and found that private banks generally outperformed public ones in most CAMEL dimensions, though the studies noted variations within each group (Hymavathi, 2021).

Larger samples, such as Dubey and Puri (2021), who analysed five public and five private banks between 2015-20, consistently ranked Kotak Mahindra Bank at the top overall and Punjab National Bank among the lower performers-even within the public sector, highlighting intra-group heterogeneity (Dubey & Puri, 2021). More recent longitudinal studies also reaffirm these patterns: (Kantharaju & Shubha, 2024) assessed SBI and Canara Bank against Kotak Mahindra and ICICI for 2011-12 to 2020-21. They observed that while Kotak Mahindra (private) led overall CAMELS ranking, SBI (public) performed strongly in certain earnings and liquidity metrics. They concluded that there was no significant difference between public and private banks at the aggregate level - suggesting convergence over time (Kantharaju & Shubha, 2024).

These empirical findings reflect not only structural differences in ownership but also governance practices, risk management frameworks, operational efficiency, and technological adoption. Private sector banks, especially the well-capitalised ones like HDFC, ICICI, Kotak Mahindra, have invested significantly in digital infrastructure, automated credit appraisal, recovery mechanisms, and agile customer service models-leading to stronger management efficiency and earnings performance. Public sector banks, while benefiting from government support and mandates for financial inclusion, have historically struggled with higher non-performing assets, relatively rigid processes, and managerial inertia, though this has markedly improved in recent years following aggressive recapitalisation and governance reforms (Mehta & Mascarenhas, 2025). Indeed, the latest industry data from RBI and press reports demonstrates a turning point. In fiscal year 2025 (ended March 31 2025), public sector banks achieved record profits of ₹3.71 lakh crore, driven by improved asset quality, higher lending yields, treasury gains, and reduced provisioning requirements-a near-14-fold increase over a decade. In a newly remarkable development, public sector banks outpaced private banks in loan growth for the first time in 14 years: PSBs grew credit at about 13.1 per cent year-on-year versus 9 per cent for private banks in 2025 (Shukla, 2025). This reversal highlights the growing capability and competitiveness of public banks. Moreover, following RBI's 100-bps repo rate cuts since February 2025, public sector banks have transmitted policy more aggressively than private banks, lowering both lending and deposit rates more substantially-a sign of improved monetary transmission and responsiveness aligned with central objectives of credit growth and financial inclusion (*Public Sector Banks Slashed Key Rates More than Private Ones: RBI Monthly Bulletin - The Economic Times*, 2025).

The results of several previous studies often concluded in favour of private banks overall, but the latest data suggest that public sector banks have closed performance gaps and even surpassed private peers on key metrics. This prompts a reconsideration of earlier conclusions and provides fresh impetus for academic exploration using the CAMEL framework. Therefore, this study is an attempt to fill the gap using the latest data of selected private and public sector banks in India. By selecting a representative sample of leading banks, State Bank of India, Punjab National Bank, HDFC Bank and ICICI Bank, and by applying CAMEL ratio analysis along with hypothesis testing (such as independent t-tests or ANOVA), this study aims to produce fresh comparative evidence.

2. LITERATURE REVIEW

Numerous studies have applied the CAMEL framework to assess bank performance. Previous research suggests that private banks often outperform public banks in terms of profitability and efficiency, while public banks show resilience due to government backing. However, comparative studies that integrate recent post-COVID data are limited. This study fills that gap by incorporating data from 2020 to 2024.

- **(Kulshrestha & Srivastava, 2022)** conducted a longitudinal CAMEL-based study covering fourteen major Indian commercial banks (seven public, seven private) for the period 2011–18. They computed ratios for capital adequacy, asset quality, management soundness, earnings, and liquidity, then produced composite CAMEL rankings. A one-way ANOVA revealed statistically significant differences between the public and private group averages. Private banks consistently secured higher rankings, attributed to stronger technological deployment, efficient recovery systems, and superior profitability.
- **(K & Pradhan, 2023**) evaluated selected public sector banks (e.g. SBI, BOB, Indian Bank, CBI, UCO) over 2017-2021 using CAMEL ratios. They highlighted improvements in asset quality and liquidity among PSBs, but noted that earnings quality and net interest margins remained lower compared to private banks. Their analysis included a trend-wise decline in NPA ratios and cost-income ratios.

- **(Hymavathi, 2021)** compared three public banks (State Bank of India, Bank of Baroda, Union Bank) with three private banks (HDFC, ICICI, Axis) for recent years. Employing CAMEL ratios and ranking methodology, the study confirmed that private banks generally outperform public ones across most metrics, though public banks sometimes had competitive liquidity indicators.
- **(Dubey & Puri, 2021)** analyzed five public and five private banks (top by assets) during 2015–20 using CAMEL variables. Their composite ranking placed Kotak Mahindra Bank first—as a private bank—while Punjab National Bank ranked lowest overall, indicating a clear performance gap. The result emphasized that private banks led in earnings and managerial efficiency.
- **(Kantharaju & Shubha, 2024)** carried out a longitudinal CAMELS comparison between two public banks (SBI, Canara Bank) and two private banks (Kotak Mahindra, ICICI) from 2011–12 through 2020–21. The study found Kotak Mahindra leading overall, with SBI showing strength in earnings and liquidity. Interestingly, hypothesis testing indicated that overall differences between sectors were not statistically significant—suggesting convergence over time.
- **(R Limbasiya & Chaudhary, 2018)** focused on CAMEL performance of five public banks and five private banks for fiscal 2016–17. They used composite ranking and t-tests and discovered that public banks scored better on some metrics like liquidity and earnings among their peers, but private banks led on capital adequacy and management efficiency. Statistical significance was robust.
- **(Garg, 2022)** studied ICICI, HDFC, and Yes Bank over 2017–21 using CAMEL and one-way ANOVA. The paper demonstrated that ICICI ranked highest consistently, while Yes Bank lagged, especially in NPA and profitability measures. The analysis confirmed that private banks vary significantly among themselves, influenced by governance and asset quality dynamics.
- (Biswas & Bhattacharya, 2020) analysed ten new-generation private banks (including ICICI, HDFC, Kotak Mahindra, Bandhan, IndusInd) for 2014–15 to 2018–19. They applied CAMEL ratios and ranked the banks using a composite score. Bandhan Bank and HDFC proved strongest, highlighting heterogeneity within the private sector and the benefits of digital and retail-led business models.
- **(Koshti & Rathod, 2023)** extended CAMEL-based analysis across selected public and private banks spanning 2005-06 to 2021-22. Using regression techniques to examine how individual CAMEL ratios influenced banks' operational efficiency, they found that HDFC Bank exhibited outstanding overall soundness. The study recommended that public banks focus on NPAs, liquidity, and earnings compression while private banks should boost interest income and operating profit.
- **(Suba, 2023)** concentrated on two CAMEL dimensions—capital adequacy and earnings capacity—for five public and five private banks covering 2008–09 to 2012–13. The t-test results underscored that private banks outperform public ones for both variables, while public banks tended to have higher net worth contributions to shareholders. Net profit margins and CAR were significantly higher in the private sector group.

3. RESEARCH METHODOLOGY

This study adopts a quantitative and comparative research design to evaluate the performance of selected public and private sector banks in India using the CAMEL model. The methodology is structured to assess the financial soundness and efficiency of banks based on five key dimensions: Capital Adequacy, Asset Quality, Management Efficiency, Earnings, and Liquidity.

3.1 Objectives

The primary objective of this study is to assess and compare the financial performance of selected public and private sector banks using the CAMEL framework. Specifically, the study aims:

- To evaluate the performance of selected banks under each CAMEL parameter for the period 2020 to 2024.
- To statistically compare the performance of public and private sector banks across the CAMEL dimensions.
- To determine whether the observed differences between public and private sector banks are statistically significant.

3.2 Hypothesis

To address the objectives, the following null hypotheses were formulated and tested:

H01: There is no significant difference between public and private sector banks in terms of Capital Adequacy Ratio.

H02: There is no significant difference between public and private sector banks in terms of Net NPA (%).

H03: There is no significant difference between public and private sector banks in terms of Net Profit Margin (%).

H04: There is no significant difference between public and private sector banks in terms of Return on Assets (%).

H05: There is no significant difference between public and private sector banks in terms of CASA (%).

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3.3 Sample and Data

This study has used the data of four banks, i.e., two from the private sector and two from the public sector. These are the State Bank of India, Punjab National Bank, HDFC Bank and ICICI Bank, selected on the basis of consistent availability of financial data and relevance in the Indian banking industry. The study has used secondary data collected from annual reports of the selected banks, official bank websites and other online sources. Care was taken to ensure the accuracy and consistency of the data across all sources. The study covers the period of five years from 2020 to 2024 to capture the recent trends, including the post-pandemic economic environment, and provides a contemporary view of banking performance.

3.4 CAMEL Parameters and Indicators

Each component of the CAMEL model is represented by specific financial ratios as follows:

- Capital Adequacy: Capital Adequacy Ratio (%)
- Asset Quality: Net NPA (%)
- Management Efficiency: Net Profit Margin (%)
- Earnings: Return on Assets (%)
- Liquidity: CASA (Current and Savings Account) Ratio (%)

3.5 Data Analysis Tools and Techniques

Data analysis was conducted using IBM SPSS Version 26. Descriptive Statistics has been used to compute the mean, standard deviation values for each bank under each CAMEL parameter, providing an overview of performance trends. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to assess whether the data followed a normal distribution. The results guided the selection of appropriate statistical tests. As most of the variables did not follow a normal distribution, the Mann-Whitney U Test, a non-parametric alternative to the independent t-test, was used to compare the mean ranks of public and private sector banks. A dummy variable named "Sector_Code" was created in SPSS, with the value '1' assigned to public sector banks and '2' to private sector banks. This enabled effective comparison across the two groups. Given the small sample size (n = 4 banks over 5 years) and the lack of normality in the data distribution, non-parametric tests, such as the Mann-Whitney U Test, were deemed more suitable than parametric alternatives, such as ANOVA or t-tests. This ensures that the statistical analysis remains robust and reliable despite data constraints.

4. DATA ANALYSIS AND INTERPRETATION

The comparison of public sector banks and private sector banks has been done in different stages. First, the parameters of comparison for all aspects of the CAMEL approach are illustrated in the tables and graphs. Then, to compare the performance of private and public sector banks, the Mann-Whitney U test has been used.

4.1 Analysis of CAMEL Indicators

1) Capital Adequacy Rate

The Capital Adequacy Ratio (CAR) is a crucial indicator of a bank's financial stability, reflecting its ability to absorb potential losses and protect depositors' interests. The CAR for all banks has been given in Table 1 and Figure 1.

Table 1: Capital Adequacy Ratio (CAR)

Year	SBI	PNB	HDFC	ICICI
2020	13.06	14.14	18.5	16.11
2021	13.74	14.32	18.8	19.12
2022	13.83	14.5	18.9	19.2
2023	14.68	15.5	19.3	18.3
2024	14.28	15.97	18.8	16.33

Source: Author's compilation using bank reports.

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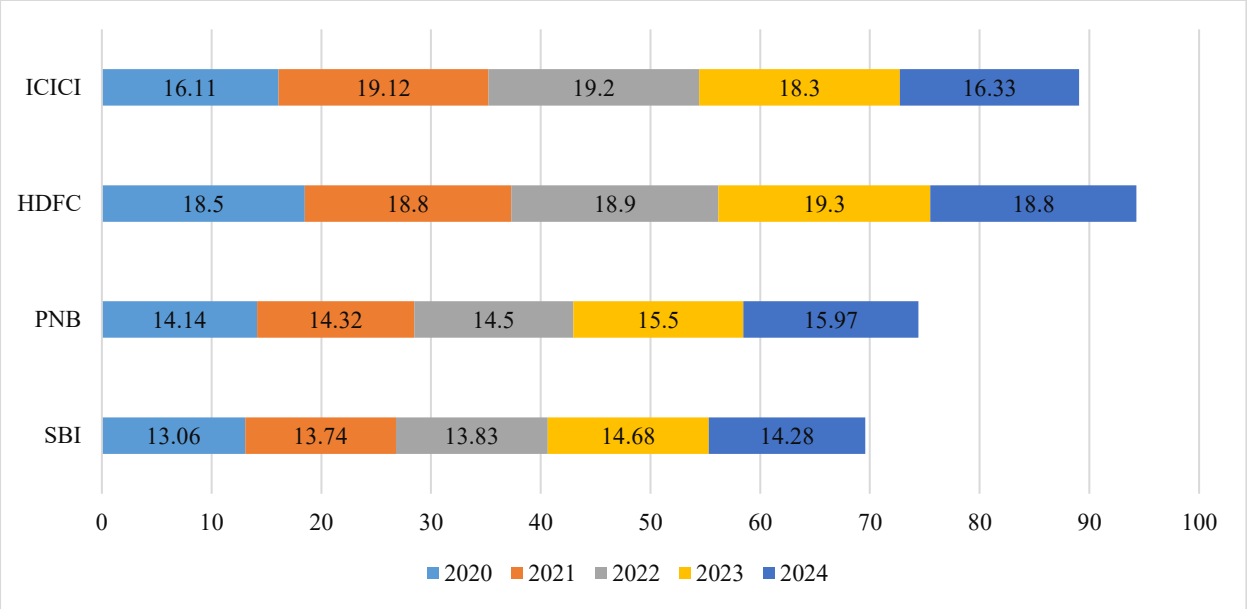
Figure 1: Capital Adequacy Ratio (CAR)



Source: Author's compilation using bank reports.

Over the five years from 2020 to 2024, the CAR data of four selected banks-SBI, PNB, HDFC, and ICICI-reveal significant insights into their capital strength and risk management practices. Among the banks studied, HDFC Bank consistently maintained the highest CAR, ranging from 18.5% in 2020 to 19.3% in 2023, slightly declining to 18.8% in 2024. This stability highlights HDFC's strong capital base and sound risk management. Similarly, ICICI Bank demonstrated a steady increase in CAR from 16.11% in 2020 to 19.2% in 2022, although it recorded a slight decline to 16.33% in 2024. Despite the dip, ICICI's CAR remained at a comfortable level, indicating its overall capital health. In contrast, State Bank of India (SBI), while showing gradual improvement from 13.06% in 2020 to 14.68% in 2023, saw a slight reduction to 14.28% in 2024. SBI's CAR, although above the regulatory minimum, remained relatively lower than its private sector counterparts. Punjab National Bank (PNB), another public sector bank, improved its CAR from 14.14% in 2020 to 15.97% in 2024, signalling efforts to strengthen its capital position, especially after its merger and restructuring phase. However, it still trails behind private banks in terms of capital adequacy. Overall, the trend reveals that private sector banks like HDFC and ICICI maintained stronger capital positions compared to public sector banks like SBI and PNB. This underscores the better capital planning, profitability, and risk-weighted asset management of private banks. The gradual improvement in CAR by public sector banks reflects positive developments, though they still have room to enhance their capital buffers for greater resilience in a dynamic economic environment.

2) Net NPA to Asset

The Net Non-Performing Assets (Net NPA) ratio is a critical measure of a bank's asset quality and its efficiency in managing credit risk. A lower Net NPA ratio indicates a healthier loan portfolio and better recovery mechanisms. The analysis of Net NPA ratios for SBI, PNB, HDFC, and ICICI over the five years from 2020 to 2024 reveals substantial differences in performance between public and private sector banks, and it is given in Table 2 and Figure 2.

Table 2: Net NPA to Asset

Year	SBI	PNB	HDFC	ICICI
2020	2.23	6	0.36	1.41
2021	1.5	6	0.4	1.14
2022	1.02	5	0.32	0.76
2023	0.67	2.72	0.27	0.48
2024	0.57	0.73	0.33	0.42

Source: Author's compilation using bank reports.

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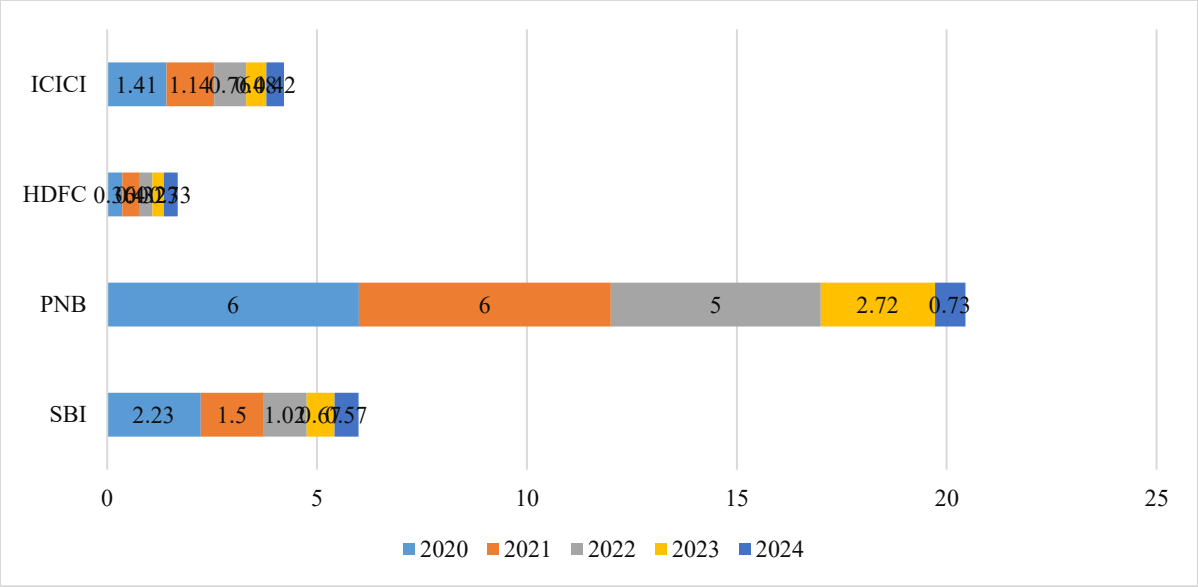
Figure 2: Net NPA



Source: Author's compilation using bank reports.

Among all the banks, HDFC Bank consistently maintained the lowest Net NPA ratio, ranging between 0.27% and 0.4% throughout the period. This reflects the bank's superior credit appraisal process, effective risk management, and strong asset quality. Similarly, ICICI Bank also demonstrated a significant reduction in Net NPAs from 1.41% in 2020 to 0.42% in 2024, highlighting improved recovery mechanisms and tighter credit controls. State Bank of India (SBI) showed remarkable improvement in its Net NPA levels, declining steadily from 2.23% in 2020 to just 0.57% in 2024. This suggests focused efforts on reducing stressed assets and strengthening loan monitoring systems. However, the most significant turnaround was observed in Punjab National Bank (PNB). In 2020 and 2021, PNB had a very high Net NPA of 6%, indicating severe asset quality stress. Yet, by 2024, its Net NPA had reduced sharply to 0.73%, likely due to aggressive recovery initiatives, write-offs, and improved credit practices following restructuring and merger-related reforms. Overall, the trend indicates that private banks like HDFC and ICICI maintained much better asset quality throughout the period, while public sector banks like SBI and especially PNB made noticeable improvements in reducing their NPAs over time. The narrowing gap in Net NPA levels across public and private sector banks reflects the impact of tighter regulations, better provisioning norms, and enhanced risk governance in India's banking system.

3) Net Profit Margin

The Net Profit Margin is a key indicator of a bank's profitability, reflecting the percentage of net profit earned from total income. A higher NPM suggests greater efficiency in cost management and revenue generation, making it an important metric under the Earnings component of the CAMEL framework. It has been given in Table 3 and Figure 3.

Table 3: Net Profit Margin

Year	SBI	PNB	HDFC	ICICI
2020	2.48	2.09	3.67	3.02
2021	2.44	2.41	3.71	3.16
2022	2.42	2.18	3.48	3.36
2023	2.62	2.35	3.52	3.92
2024	2.58	2.56	3	3.97

Source: Author's compilation using bank reports.

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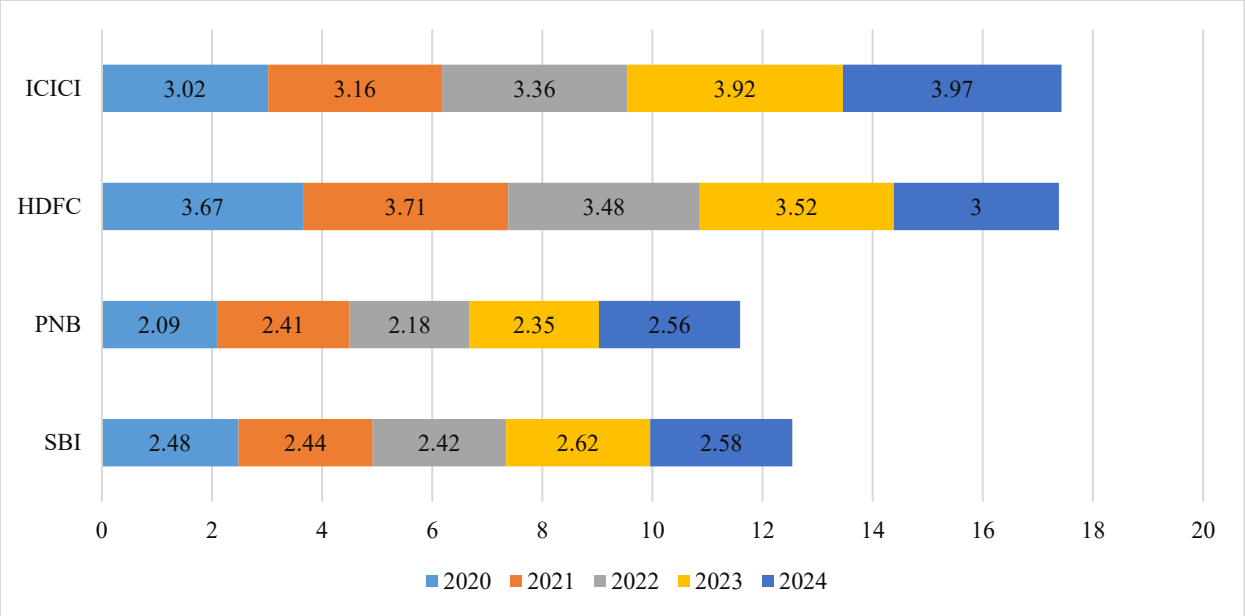
Figure 3: Net Profit Margin (%)



Source: Author's compilation using bank reports.

During the five years from 2020 to 2024, HDFC Bank consistently recorded the highest Net Profit Margins, ranging from 3.48% to 3.71%. This consistency highlights the bank's strong operational performance, efficient cost control, and robust income generation capabilities. ICICI Bank also showed a positive and improving trend, with its NPM increasing from 3.02% in 2020 to 3.97% in 2024, indicating enhanced profitability and operational efficiency over the years. In contrast, public sector banks showed comparatively lower margins. State Bank of India (SBI) maintained a relatively stable NPM between 2.42% and 2.62%, which, although consistent, was below the levels of its private peers. This could be attributed to its larger public responsibilities, higher provisioning needs, and cost structures. Punjab National Bank (PNB) exhibited gradual improvement, rising from 2.09% in 2020 to 2.56% in 2024. While the progress is commendable, its profitability still lags behind the private sector banks. Overall, the analysis indicates that private banks (HDFC and ICICI) outperform public banks (SBI and PNB) in terms of profit margins, signifying better financial management, revenue strategies, and operational efficiency. However, the upward trend in public banks' margins, especially in PNB, signals a positive direction toward financial health and competitiveness.

4) Return on Assets

Return on Assets (ROA) measures how efficiently a bank utilises its total assets to generate net profit. A higher ROA indicates better asset efficiency and profitability, making it a vital indicator under the Earnings component of the CAMEL model. It has been given in Table 4 and Figure 4.

Table 4: Return on Assets

Year	SBI	PNB	HDFC	ICICI
2020	0.38	0.04	1.71	0.72
2021	0.45	0.16	1.78	1.31
2022	0.53	0.26	1.78	1.65
2023	0.91	0.17	1.78	2.01
2024	0.98	0.52	1.68	2.08

Source: Author's compilation using bank reports.

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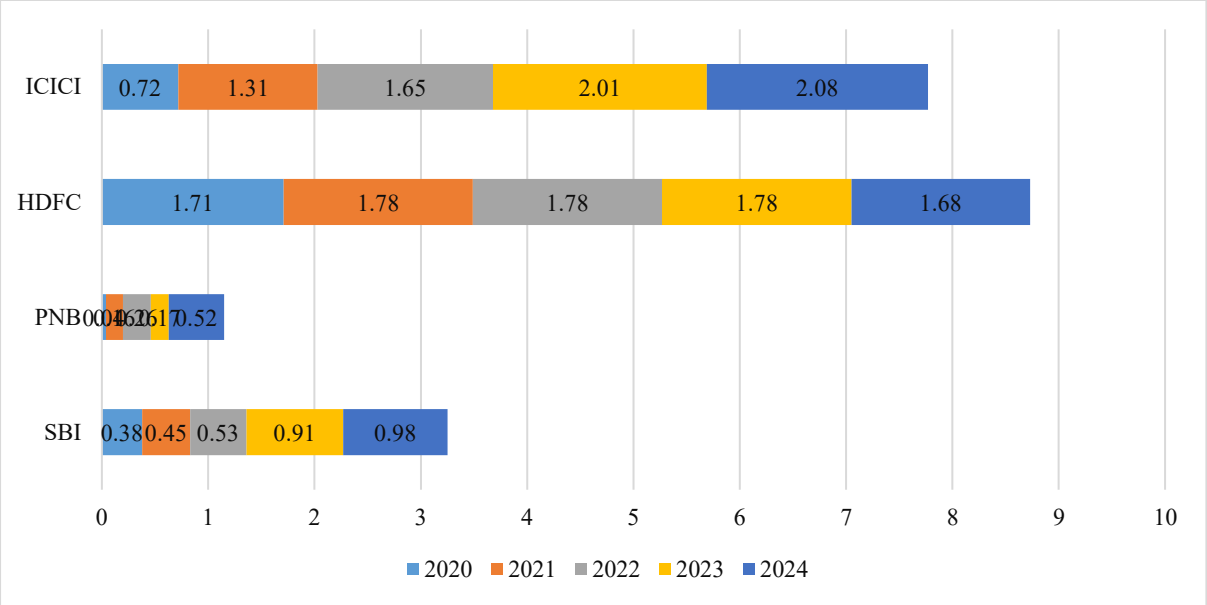
Figure 4: Return on Assets



Source: Author's compilation using bank reports.

The analysis of ROA over the five years shows that HDFC Bank consistently outperformed its peers, maintaining a strong and steady ROA of around 1.68% to 1.78%. This reflects HDFC's effective utilisation of its asset base to generate stable profits, indicating high operational efficiency. ICICI Bank also demonstrated notable improvement in ROA, rising from 0.72% in 2020 to 2.08% in 2024. This significant growth suggests that ICICI has become increasingly efficient in converting its assets into profits, possibly due to better credit quality, digital innovation, and improved cost control. On the other hand, State Bank of India (SBI) started at a lower ROA of 0.38% in 2020 but showed continuous improvement, reaching 0.98% in 2024. This upward trend indicates strengthening profitability and better asset management, reflecting positively on SBI's financial health. Punjab National Bank (PNB) lagged behind other banks with a very low ROA throughout the period. Starting at just 0.04% in 2020 and improving to 0.52% in 2024, PNB's performance indicates that while profitability is improving, its asset utilisation remains relatively weak compared to peers. In summary, private sector banks (HDFC and ICICI) showed superior performance in ROA, reflecting stronger profitability and efficient asset deployment. Public sector banks (SBI and especially PNB), though improving, continue to trail, highlighting the need for further reforms and operational efficiency.

5) CASA (Current Account and Savings Account) Ratio

CASA (Current Account and Savings Account) Ratio reflects the proportion of deposits in a bank that come from current and savings accounts. A higher CASA ratio is favourable as these accounts provide low-cost funds, improving the bank's net interest margin and overall profitability. It is commonly analysed under the Liquidity or Earnings component of the CAMEL model.

Table 5: CASA Ratio

Year	SBI	PNB	HDFC	ICICI
2020	44.22	42.97	42.23	45.11
2021	45.39	44.54	46.11	46.28
2022	44.51	46.55	48.16	48.69
2023	42.66	41.99	44.38	45.83
2024	39.89	40.33	38.18	42.17

Source: Author's compilation using bank reports.

During the five years from 2020 to 2024, HDFC Bank and ICICI Bank maintained relatively higher CASA ratios compared to their public sector counterparts. HDFC Bank's CASA ratio increased steadily from 42.23% in 2020 to a peak of 48.16% in 2022, before slightly declining to 38.18% in 2024. Similarly, ICICI Bank saw a rise from 45.11% in 2020 to 48.69% in 2022, eventually declining to 42.17% in 2024. The high ratios in the mid-period indicate strong deposit mobilisation and customer trust, though the slight dip in 2024 may suggest increased competition or a shift in deposit mix.

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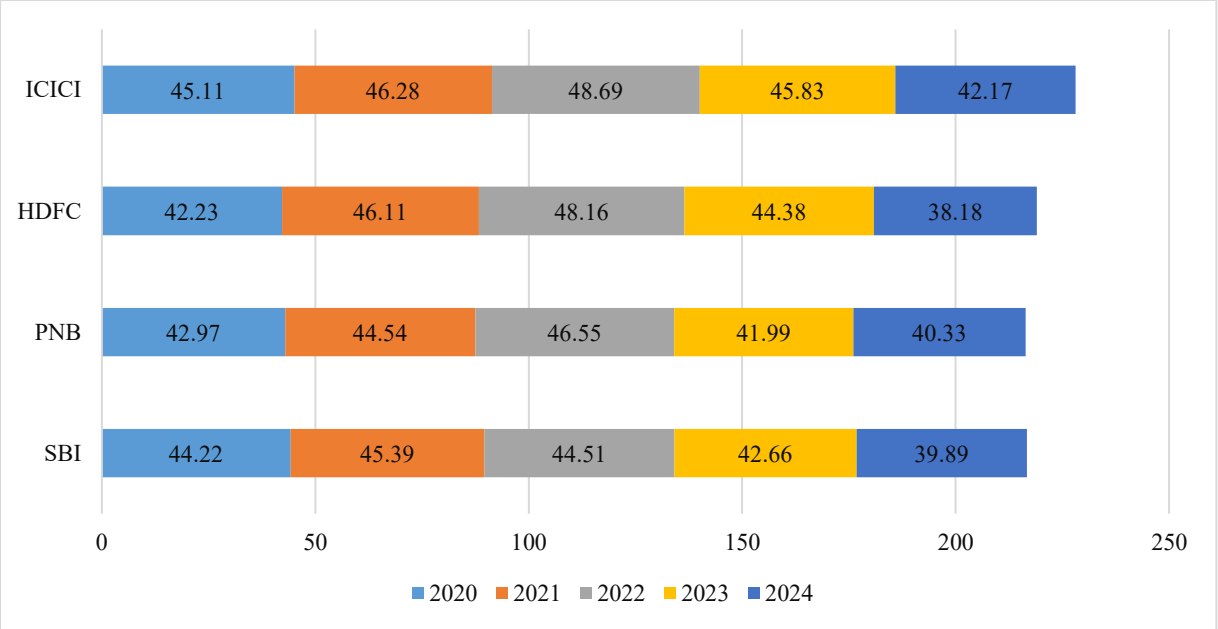
Figure 5: Return on Assets



Source: Author's compilation using bank reports.

State Bank of India (SBI) and Punjab National Bank (PNB) also showed fluctuations in CASA ratios. SBI recorded a rise from 44.22% in 2020 to 45.39% in 2021, followed by a gradual decline to 39.89% in 2024. PNB followed a similar trend, peaking at 46.55% in 2022 and then falling to 40.33% in 2024. These changes may indicate a shift towards higher interest-bearing term deposits or evolving customer preferences. Overall, all four banks exhibited a downward trend in CASA ratios after 2022, potentially reflecting market conditions, customer behaviour changes, or increased interest rate competition. However, private sector banks continued to maintain an edge in attracting low-cost deposits, which contributes positively to their profitability and liquidity management.

6) Five-Year Average of CAMEL Indicators

An analysis of the average values of CAMEL parameters over five years reveals clear differences in the financial performance of the selected banks. HDFC Bank recorded the highest average Capital Adequacy Ratio (CAR) at 18.86%, followed by ICICI Bank at 17.812%, indicating a strong capital position for both private sector banks. In contrast, public sector banks lagged, with PNB at 14.886% and SBI at 13.918%, suggesting relatively weaker capital buffers. In terms of asset quality, HDFC Bank again led with the lowest Net NPA of 0.336%, reflecting excellent management of non-performing assets, while PNB showed significant concern with the highest average Net NPA of 4.09%.

Table 6: Five-Year Average of CAMEL Indicators

Bank	Average CAR (%)	Net NPA	Net Profit Margin (%)	Return on Assets (%)	CASA
SBI	13.918	1.198	2.508	0.65	43.334
PNB	14.886	4.09	2.318	0.23	43.276
HDFC	18.86	0.336	3.476	1.746	43.812
ICICI	17.812	0.842	3.486	1.554	45.616

Source: Author's compilation using bank reports.

When evaluating profitability, both HDFC and ICICI Banks demonstrated strong performance, with average Net Profit Margins of 3.476% and 3.486% respectively, compared to the lower margins of SBI (2.508%) and PNB (2.318%). A similar trend was observed in Return on Assets (ROA), where HDFC (1.746%) and ICICI (1.554%) far outperformed SBI (0.65%) and PNB (0.23%). Lastly, ICICI Bank had the highest average CASA ratio at 45.616%, indicating a strong low-cost deposit base, followed closely by HDFC (43.812%), while SBI and PNB trailed slightly with averages of 43.334% and 43.276%, respectively. Overall, the average values highlight the superior financial strength, profitability, and asset quality of private sector banks compared to their public sector counterparts.

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7) Five Year Composite CAMEL Scores and Rankings of Selected Banks

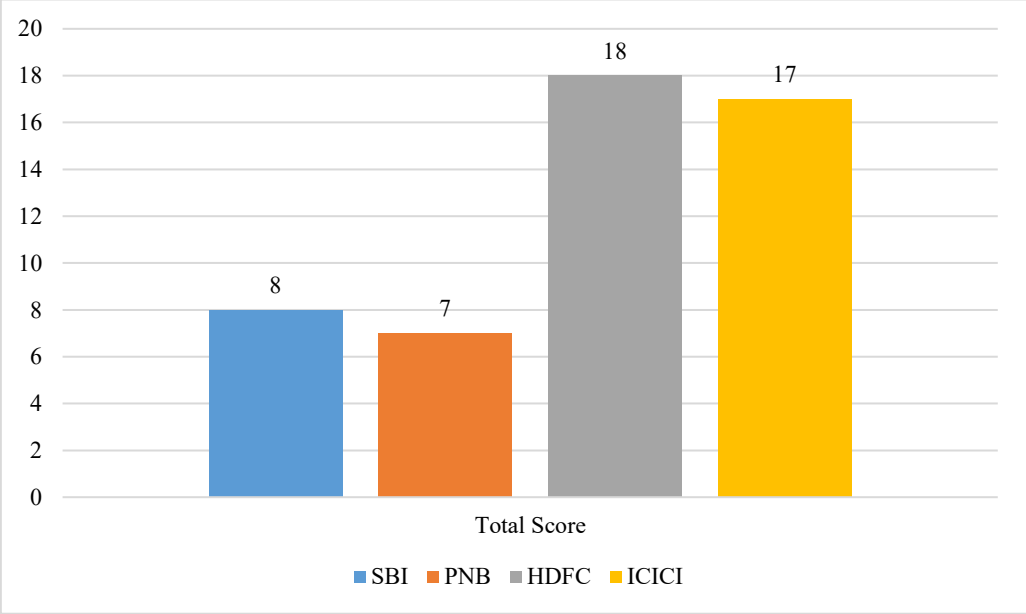
To calculate the composite score for each bank, we have provided a rank from 1 to 4, where a score of 1 indicates a lower rank and a score of 4 indicates a higher rank. Table 7 illustrates the average composite CAMEL score and ranking for each bank.

Table 7: Five-Year Composite CAMEL Score and Ranking

Bank	CAR (%)	Net NPA	Net Profit Margin Rank	Return on Assets	CASA	Total Score
SBI	1	1	2	2	2	8
PNB	2	2	1	1	1	7
HDFC	4	4	3	4	3	18
ICICI	3	3	4	3	4	17

Based on the CAMEL model analysis, HDFC Bank achieved the highest total score of 18, indicating the strongest overall performance among the four selected banks. It consistently ranked highest in capital adequacy, asset quality, return on assets, and maintained a competitive position in net profit margin and CASA ratio.

Figure 6: Five-Year Composite CAMEL score and Ranking



ICICI Bank followed closely with a total score of 17, demonstrating strong profitability, efficient asset utilisation, and robust liquidity. Despite slightly lower rankings in asset quality and capital adequacy compared to HDFC, ICICI remained a solid performer. On the other hand, public sector banks lag. State Bank of India (SBI) secured a total score of 8, reflecting moderate performance. While it showed reasonable asset quality and liquidity, its capital adequacy and returns were relatively weaker. Punjab National Bank (PNB) ranked last with a total score of 7, mainly due to poor asset quality and low profitability, although its capital adequacy was slightly better than SBI. Overall, the results indicate that private sector banks outperformed public sector banks in terms of financial health and efficiency, as measured by the CAMEL model parameters.

4.2 Descriptive Statistics

Table 8 shows the descriptive statistics of CAMEL indicators of selected private and public banks for the period under study. The result shows that the private sector banks have a higher average CAR (18.34%) compared to public sector banks (14.40%), indicating a strong capital adequacy in private sector banks. Similarly, the mean Net NPA is substantially lower for private banks (0.59%) than for public banks (2.64%), reflecting better asset quality and credit risk management approach in private banks. In terms of profitability, private sector banks demonstrate superior performance with a higher mean Net Profit Margin, i.e., 3.48% and a positive ROA, i.e., 1.65% in comparison to public sector banks, i.e,, NPM of 2.41% and ROA of (-0.40%). The CASA ratio is slightly higher in private banks (44.71%) compared to public banks (43.30%), reflecting a marginal advantage in mobilizing low-cost deposits. The standard deviations indicate that public sector banks exhibit relatively lower variability in CAR, Net Profit Margin, and ROA, whereas private sector banks show higher dispersion, especially

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in CASA ratio. This suggests that although private banks outperform in terms of averages, performance across banks in the private sector is somewhat less consistent.

Table 8: Descriptive Statistics

Descriptive Statistics						
Sector		CAR (%)	Net NPA	Net Profit Margin (%)	ROA (%)	CASA
Private	N	10	10	10	10	10
	Mean	18.3360	.5890	3.4810	1.6500	44.7140
	Std. Deviation	1.15693	.39111	.34691	.38733	3.14349
Public	N	10	10	10	10	10
	Mean	14.4020	2.6440	2.4130	.4400	43.3050
	Std. Deviation	.84379	2.21262	.17004	.31170	2.14637
Total	Mean	16.3690	1.6165	2.9470	1.0450	44.0095
	N	20	20	20	20	20
	Std. Deviation	2.24588	1.87157	.60899	.70878	2.71761

Source: SPSS

4.3 Normality Test

To assess the distribution of data, the Kolmogorov–Smirnov and Shapiro–Wilk tests were applied. The results (Table 9) indicate that most variables did not follow a normal distribution.

Table 9: Test of Normality

Tests of Normality							
	Sector	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Capital Adequacy Ratio (%)	Private	.288	10	.019	.747	10	.003
	Public	.171	10	.200*	.957	10	.753
*. This is a lower bound of the true significance.							
a. Lilliefors Significance Correction							

Source: SPSS

The Shapiro–Wilk test for Capital Adequacy Ratio in private banks was significant ($p = 0.003 < 0.05$), suggesting a departure from normality. Similar deviations were observed for other variables. Since the assumption of normality was not satisfied, non-parametric methods were deemed appropriate for hypothesis testing. Accordingly, the Mann–Whitney U Test was employed as a robust alternative to the independent samples t-test.

4.4 Hypothesis Testing (Mann-Whitney U Test)

Given the violation of normality, the Mann–Whitney U Test was applied to compare the mean ranks of public and private banks under each CAMEL indicator. Table 10 summarises the test results.

Table 10: Mann-Whitney U Test

Test Statistics[a]					
	Capital Adequacy Ratio (%)	Net NPA	Net Profit Margin (%)	Return on Assets (%)	CASA
Mann-Whitney U	.000	11.000	.000	2.000	33.000
Wilcoxon W	55.000	66.000	55.000	57.000	88.000
Z	-3.781	-2.949	-3.780	-3.634	-1.285
Asymp. Sig. (2-tailed)	.000	.003	.000	.000	.199
Exact Sig. [2*(1-tailed Sig.)]	.000[b]	.002[b]	.000[b]	.000[b]	.218[b]
a. Grouping Variable: Sector_Code					
b. Not corrected for ties.					

Source: Authors Calculation using SPSS

The table 11 shows the hypothesis testing results according to the Mann-Whitney U test.

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Table 11 Hypothesis Testing

Hypothesis	Variable	Mann–Whitney U	Z	Sig. (2-tailed)	Decision
H01	Capital Adequacy Ratio	0.000	-3.781	0.000	Rejected
H02	Net NPA	11.000	-2.949	0.003	Rejected
H03	Net Profit Margin	0.000	-3.780	0.000	Rejected
H04	Return on Assets	2.000	-3.634	0.000	Rejected
H05	CASA Ratio	33.000	-1.285	0.199	Accepted

The results of the Mann-Whitney U Test reveal several significant differences between the public and private sector banks across different financial indicators. Specifically, for the Capital Adequacy Ratio (%), there is a statistically significant difference between the two groups, with a p-value of 0.000 (Asymp. Sig. < 0.05). This indicates that private and public sector banks differ significantly in terms of their capital adequacy, with private sector banks generally having higher capital adequacy compared to their public counterparts. The corresponding Z-value of -3.781 further supports this observation, showing a large magnitude of the difference between the two groups. Similarly, the Net NPA (Non-Performing Assets) ratio also shows a significant difference between public and private banks, with a p-value of 0.003. This suggests that private sector banks tend to perform better in terms of managing non-performing assets compared to public sector banks. The Z-value for this comparison is -2.949, indicating a moderate but meaningful difference.

The Net Profit Margin (%) also exhibits a significant difference, with a p-value of 0.000, which suggests that the profitability between the two types of banks is markedly different. Private sector banks are likely to have a higher net profit margin than public sector banks, as indicated by the negative Z-value of -3.780, which reflects a considerable gap between the two groups. Similarly, the Return on Assets (ROA) (%) shows a significant difference between public and private sector banks (p = 0.000). This difference indicates that private banks have a significantly higher return on assets compared to public banks, suggesting better asset utilisation. The Z-value for this comparison is -3.634, highlighting the strength of this difference. However, when it comes to the CASA (Current Account Savings Account) ratio, the result is not statistically significant (p = 0.199). This suggests that there is no meaningful difference between public and private sector banks in terms of the CASA ratio, implying that both types of banks maintain similar performance when it comes to managing their current and savings account deposits.

5. CONCLUSION

The study examined the financial performance of selected public and private sector banks in India through the CAMEL framework, employing descriptive statistics and the Mann–Whitney U Test to compare performance across the two groups. The results reveal that private sector banks consistently outperform their public counterparts in terms of capital adequacy, asset quality, and profitability. Specifically, private banks demonstrate significantly higher capital adequacy ratios, lower levels of non-performing assets, and superior profitability measured by both net profit margin and return on assets. In contrast, public sector banks continue to struggle with higher NPAs and weaker profitability, highlighting persistent structural inefficiencies in their operations. However, when liquidity is measured through CASA, no significant difference is observed between the two groups, suggesting that both sectors maintain comparable ability to mobilize low-cost deposits. These findings reinforce the growing evidence that private sector banks in India have benefited from market-oriented governance, technological innovation, and stricter risk management practices, while public sector banks remain constrained by legacy issues and higher exposure to stressed assets. The comparative weakness of public sector banks in capital adequacy and asset quality poses a challenge to financial stability, particularly in an environment of rising credit demand and regulatory tightening.

The implications of the study are particularly relevant for policymakers, regulators, and banking practitioners. Strengthening risk management systems, improving credit appraisal processes, and enhancing operational autonomy in public sector banks are critical to reducing the performance gap. Further, reforms aimed at governance restructuring, technology adoption, and accountability enhancement may enable public banks to compete more effectively with private banks in terms of efficiency and profitability. Despite its contributions, the study is not without limitations. The analysis is based on a small sample of four banks observed over a five-year period, which restricts the generalizability of the results. Moreover, the study focuses exclusively on CAMEL parameters and does not account for bank-specific or macroeconomic factors that may influence performance outcomes. Therefore, the results should be interpreted as indicative rather than conclusive. Future research can extend this study in multiple directions. Expanding the sample size to include a larger set of banks across different ownership categories and incorporating a longer time horizon would provide more robust evidence. Employing advanced econometric models such as panel regression or structural equation modelling may help identify the

causal drivers of performance differences. Furthermore, integrating qualitative factors, including governance practices, management efficiency, and technological adoption, could yield a more holistic understanding of the comparative strengths and weaknesses of public and private sector banks in India.

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