Research Article

Comparative Performance Evaluation Of Selected Public And Private Sector Banks: CAMELS Model Approach In Indian Context - A Longitudinal Study

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ARTICLE INFO	ABSTRACT
	The CAMELS model is highly effective, efficient, and accurate as a tool for evaluating performance and anticipating future risks in the banking industry. It focuses on key financial performance indicators, including Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity. The main objective of this study is to compare the performance of private and public sector banks based on CAMELS parameters. The research examines the financial performance of Indian banks from 2011-12 to 2020-21, focusing on two private sector banks (Kotak Mahindra Bank and ICICI Bank) and two public sector banks (State Bank of India and Canara Bank). The study's CAMELS rating results show that Kotak Mahindra Bank, a private sector bank, ranked first overall, followed by ICICI Bank and SBI in second and third place, respectively, with Canara Bank ranking last. Hypothesis testing indicates that there is no significant difference between the performance of public and private sector banks in the Indian banking sector. The study's outcomes are expected to provide valuable insights for regulatory authorities in designing appropriate policies for the banking industry. **Keywords:** CAMELS Model, Performance analysis, Public sector bank, Private sector bank, Capital adequacy, Asset quality, Management efficiency, Earning quality, Liquidity, Sensitivity.

Introduction

The CAMELS model, a widely used framework for evaluating the soundness and performance of banks, has had a significant evolution in India. Introduced in the late 1990s by the Reserve Bank of India (RBI), the model has become a cornerstone of banking supervision in the country. Initially, the RBI set up a working group in 1995, chaired by Shri S. Padmanabhan, to review the banking supervision system. Based on the group's recommendations, the RBI introduced a rating system for domestic and foreign banks in 1998, aligning with the international CAMELS model. The CAMELS model assesses banks based on six key parameters: Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity to market risk. *(Aspal & Dhawan, 2016)*[1]The introduction of the CAMELS model in India marked a significant shift towards risk-based supervision, emphasizing the importance of not just financial metrics but also management practices and risk management frameworks. *(Meena, 2016)*[9] Over the years, the model has undergone refinements to suit the Indian banking landscape, reflecting changes in regulatory priorities and market dynamics.

Today, the CAMELS model is an integral part of the RBI's supervisory framework, providing a comprehensive and systematic approach to evaluating banks' overall health and performance. Its evolution in India underscores the RBI's commitment to enhancing the resilience and stability of the banking sector, aligning with global best practices in banking supervision.

Regulatory bodies evaluate the general health and soundness of banks using a supervisory rating system called the CAMELS model. It assesses banks using six main criteria: sensitivity to market risk, earnings, asset quality, management quality, liquidity, and capital sufficiency. From 1 (strong) to 5 (weak), each component

is given a rating. *(Dzeawuni & Tanko, 2011)*[4] These individual ratings are then used to create the composite rating.

✿ Capital Adequacy (C): The bank's capital is evaluated in relation to the risk it faces in this component. It assesses the capital of the bank in terms of its assets, including its capacity to withstand losses, as well as its quantity and quality. The capital adequacy ratio (CAR) and the quality of capital are two factors taken into account. [6] [13]

✿ Asset quality (A) looks at the amount of non-performing assets (NPAs) and the makeup of the bank's loan portfolio. It assesses loan diversification, the sufficiency of loan loss reserves, and the bank's underwriting guidelines. Adequacy of loan loss reserves, net charge-offs to average loans, and the ratio of non-performing assets to total loans are among the factors taken into account. [6]

✿ Management Quality (M): The efficacy and procedures of the bank's management are assessed in this component. It evaluates the effectiveness of the bank's strategic planning procedure, internal controls, risk management techniques, and board of directors and senior management. The credentials and background of important management staff members are among the factors taken into account.*(Panboli & Birda, 2019)* [11]

✿ Earnings (E): Earnings evaluate the bank's capacity to produce long-term gains. It assesses the non-interest income, operating costs, efficiency ratio, and net interest margin of the bank. The bank's return on equity (ROE), return on assets (ROA), and earnings stability and consistency are among the factors taken into account. [13]

✿ Liquidity (L): This metric assesses the bank's capacity to fulfill its immediate obligations. It evaluates the bank's methods for managing liquidity risk, the make-up of its funding sources, and the sufficiency of its liquid assets. The bank's net stable funding ratio (NSFR), liquidity coverage ratio (LCR), and the availability of funding sources during difficult times are among the factors taken into account.

✿ Sensitivity to Market Risk (S): The bank's exposure to market risk, such as interest rate, foreign exchange, and commodity price risk, is evaluated in this component. It assesses the efficacy of the bank's hedging strategies as well as its risk management procedures. The bank's susceptibility to fluctuations in interest rates, foreign exchange rates, and commodity prices is one of the factors taken into account, along with the suitability of its risk management policies and processes.

An extensive framework for assessing the general soundness and health of banks' finances is offered by the CAMELS model. It facilitates the identification of possible risks and weaknesses in the banking system by regulatory bodies, allowing them to implement corrective measures in order to preserve stability.

Steps in Applying CAMELS rating system

To implement the CAMELS rating system effectively, following steps to be followed:

a. Calculation of Financial Ratios: Compute various financial ratios for each bank, including earning capacity, liquidity position, asset quality, capital adequacy, and management efficiency, as required by the CAMELS rating system.*(Khatri, 2018)* [6]

b. Bank Ranking: Utilize the calculated ratios to rank the banks based on each parameter of the CAMELS rating system. Assign scores to each bank for every parameter, with higher scores indicating better performance.*(Khatri, 2018)* [6]

c. Overall Ranking and Interpretation: Aggregate the scores for each parameter to determine the overall ranking of each bank. Analyze the rankings to identify the top-performing banks and areas where improvement may be needed.(Khatri, 2018) [6]

By following these steps, we can effectively assess and rank banks using the CAMELS rating system, enabling better evaluation of their financial performance and other critical metrics.

Review of Literature

Suman & Swati (2023), This study evaluates 12 commercial banks, comprising 7 from the public sector and 5 from the private sector, by analyzing fifteen financial ratios. Each bank's performance is assessed by calculating a six-year average using arithmetic mean and subsequently ranking them. The study relies on secondary data extracted from Statistical Tables pertaining to banks in India. Descriptive statistics are employed for analysis, and one-way ANOVA is utilized to ascertain whether there is a significant discrepancy in the means of CAMEL ratios between public and private sector banks. The findings suggest that private sector banks outshine their public sector counterparts, with Kotak Bank securing the third rank and Bank of India occupying the bottom position among the banks examined.*(Suman & Swati, 2023)* [15]

Meraj Banu & Sudha Vepa (2021), The study focuses on the analysis of the two largest Public Sector Banks and two largest Private Sector Banks in India over a span of 10 years. Utilizing descriptive statistics, T-Test, and correlation analysis, the research aims to evaluate their financial performance. The sample selection follows a judgment sampling technique due to the data's availability. The findings suggest that the capital adequacy ratio plays a crucial role in maintaining the long-term solvency of banks, ensuring the safety of deposit holders' interests. Public sector banks exhibit superior performance in maintaining average asset quality and consistency in earning capacity, comparable to private sector banks. However, private sector banks outperform public sector banks in terms of consistency in overall performance. The study's statistical analysis shows that the mean values of the selected banks indicate significantly better performance, as

evidenced by the t-test value exceeding the critical value at a 0.05 level of significance. *(Banu & Vepa, 2021)* [2]

Shelly Gupta & Pramod Singhal (2020), This study aims to assess the financial position and performance of 21 Indian public sector banks over a decade, ranking them based on their performance. The analysis revealed that 13 banks in the sample achieved a Capital Adequacy Ratio (CAR) exceeding the RBI's mandated level of 12% for public sector banks, with the remaining banks averaging around 11%. Bank of Baroda stood out with an average CAR of 13.33%, securing the top rank in capital adequacy. This suggests a concerted effort by most public sector banks to maintain adequate capital, emphasizing the need for all banks to surpass the regulatory threshold in the future. However, public sector banks continue to grapple with Non-Performing Assets (NPAs), which account for nearly three-fourths of the total NPA burden. The NPA growth rate reached 22 percentages per annum, underscoring the challenge NPAs pose to the growth of public sector banks. *(Singhal, 2020)* [14]

Sarit Biswas & Mousumi Bhattacharya (2020), The study relies on secondary data and selects a limited number of ratios to represent the CAMEL model. It aims to assist regulators and the government in making regulatory and policy decisions. Banks are ranked by averaging the ratios over five years using Simple Average Analysis. Descriptive Analysis is used to summarize the behavior of variables, and One-Way ANOVA is applied to examine mean differences of various ratios across banks. The sample consists of Ten new generation Private Sector Banks (PVBs), selected using purposive sampling. The research design is descriptive, and the study is empirical in nature.*(Biswas & Bhattacharya, 2020)* [3]

Dr. Dhanesh Kumar Khatri (2018), The study is empirical and focuses on the applicability of the CAMELS rating system for evaluating bank performance in India. The results of hypothesis testing suggest that there is no significant difference in performance between public sector banks and private sector banks. The hypothesis is tested using the overall CAMELS ranking assigned to the banks, with a t-test conducted at a 5% significance level and two degrees of freedom. Evaluation of the banks' financial performance across different CAMELS parameters, including capital adequacy, asset quality, management efficiency, earning capability, liquidity position, and systems and controls, indicates strong performance across all categories.*(Khatri, 2018)* [6]

Dr. Anas Khan (2018), The study involves calculating eighteen ratios to assess bank performance under the CAMEL Model, spanning five years. Seven public and private sector banks are included, with the study using the CAMEL model to evaluate their financial performance. An independent sample t-test is utilized to analyze differences in the calculated ratios. The public sector banks considered are Allahabad Bank, Canara Bank, Bank of Baroda, and Bank of India, while Axis Bank, HDFC Bank, and ICICI Bank represent the private sector. The analysis indicates that private sector banks outperform public sector banks across all aspects, with the hypothesis being rejected in all four cases.*(Khan, 2018)* [5]

Vinod Kumar & Bhawna Malhotra (2017), The study focuses on the top five private sector banks in India grounded on request capitalization HDFC Bank, ICICI Bank, Kotak Mahindra Bank, Axis Bank, and IndusInd Bank. It relies on secondary data and selects pointers grounded on their logical significance, data vacuity, and applicability. Axis Bank stands out for its strong performance in asset quality, operation effectiveness, and earnings capability, but shows a pause in capital acceptability. Again, IndusInd Bank ranks smallest due to its poor performance in capital acceptability. The study calculates rates under each CAMEL model and uses compound rankings, pars, and covariance for relative and significant analysis across different CAMEL parameters.*(Malhotra, 2017)* [7]

Balaji & Praveen Kumar (2017), The study analyzes the financial performance of Indian banks using the CAMEL variables and compares the performance of new private sector and public sector banks over a six-year period. The sample includes three leading private sector banks HDFC Bank, ICICI Bank, Kotak Mahindra Bank and three public sector banks State Bank of India, Bank of Baroda, Punjab National Bank, selected based on judgment and market capitalization. The study adopts the CAMEL Model to evaluate the performance of Indian commercial banks.*(Prasad K N.et al., 2017)* [12]

Malihe Rostami (2015), The study selects five indicators in each category of the CAMELS model and calculates them. The CAMELS rating method is employed to identify important and effective indicators in each category, and the calculated ratios are then compared with the industry average. This approach allows managers to control and analyze financial data, as well as assess their organization's position within the industry. Financial ratios play a crucial role in measuring a bank's overall financial soundness and the quality of its management.*(Rostami, 2015)* [13]

Statement of the Problem

In India, banks face several challenges that impact their performance and stability. The banking industry's high percentage of non-performing assets (NPAs), which reduces capital adequacy ratios and hinders profitability, is one major problem. As of March 2023, the gross non-performing assets (NPA) ratio for Indian banks was approximately 78.8%. Notably, public sector banks (PSBs) reported a higher ratio of 94.4%, while private sector banks reported a lower ratio of 41.1%. About 190 million adults in India still do not have access to formal banking services, which presents another challenge due to the low level of financial inclusion. This restricts the pool of potential clients that banks can serve and impedes the industry's overall

expansion. In recent years, the financial system, particularly banks, has undergone significant changes through reforms, regulations, and norms. While many studies have analyzed the performance of public and private sector banks focusing on profitability determinants and financial indicators, this study takes a unique approach. It utilizes financial ratios to analyze bank performance based on the CAMELS model, specifically focusing on two public sector banks and two private sector banks.*(Mathiraj & Ramya, 2014)* [8]

Objectives of the Study

The main objective of the study is to examine the financial performance through the CAMELS Model of selected Public and Private Sector Banks and compare them. To achieve this, the specific objectives of the study are:
a. To evaluate the financial performance of State Bank of India, Canara Bank, Kotak Mahindra Bank, and ICICI Bank.
b. To assess the CAMELS Model parameters of the banks, including examining their Capital adequacy, Asset quality, Management efficiency, earning capacity, Liquidity position, and Sensitivity in detail to identify strengths and weaknesses.
c. To rank the banks based on the CAMEL approach by assigning scores to each bank for the CAMELS parameters.

Research Methodology:

The study is Empirical in Nature. The Period of the study covers Ten years from 2011-12 to 2020-21. The rationale of this study period is that during this period RBI has Merged State Bank of India with its Associates Banks in the year 2017, During the same period Syndicate Bank got merged with Canara Bank (2019). In the Year 2015 ING Vysya Bank Voluntary got merged with Kotak Mahindra Bank and another Private Sector Bank which also got merged during the same term was Bank of Rajasthan which merged with ICICI Bank in 2010. The study will rely entirely on secondary data collected from the annual reports of the banks. Additionally, reports will be sourced from the Reserve Bank of India, Securities and Exchange Board of India, Centre for Monitoring Indian Economy Pvt. Ltd., and various journals.

Mode of Analysis:

- **Simple Average Analysis:** To rank the banks, the ratios for each bank are averaged over a Ten-year period. This approach ensures that the ranking is based on objective criteria and avoids the use of subjective weights. Simple averages are calculated for each bank based on the selected components of the CAMEL model. This method provides a clear and transparent way to assess the performance of each bank and determine their relative rankings.*(Biswas & Bhattacharya, 2020)* [3]
- **Descriptive Analysis:** To summarize the behavior of variables such as mean and standard deviation, we use descriptive statistics. Descriptive statistics provide a clear picture of the central tendency (mean) and the dispersion (standard deviation) of the data. These measures help us understand the distribution and variability of the variables, providing valuable insights into the characteristics of the data set.*(Biswas & Bhattacharya, 2020)* [3]
- **One Sample T-Test:** A one-sample t-test is a statistical test used to determine if there is a significant difference between the mean of a sample and a known or hypothesized population mean. It is typically used when you have a single group and want to compare its mean to a specific value, often to test a hypothesis. The one-sample t-test calculates a t-value, which is then compared to a critical t-value based on the chosen significance level (usually 0.05). If the calculated t-value exceeds the critical t-value, you reject the null hypothesis, concluding that there is a significant difference between the sample mean and the population mean. If the calculated t-value does not exceed the critical t-value, you fail to reject the null hypothesis, indicating no significant difference.
- **Correlation:** Correlation is a statistical measure that describes the strength and direction of a relationship between two variables. It indicates how much and in what way the variables change together.

Data Analysis and Interpretation

1. **Capital Adequacy:** The bank's capital is evaluated in relation to the risk it faces in this component. It assesses the capital of the bank in terms of its assets, including its capacity to withstand losses, as well as its quantity and quality. The capital adequacy ratio (CAR) and the quality of capital are two factors taken into account. As per the Reserve Bank of India (RBI), the minimum capital adequacy ratio required for Indian banks is 9%, with a minimum Tier 1 capital ratio of 7%.*(Malhotra, 2017)*[7]These ratios are in line with the Basel III framework, which sets international standards for bank capital adequacy. Banks are required to maintain these ratios to ensure they have enough capital to cover potential losses and continue operating safely.

Table -01: Ranking of Banks under Capital Adequacy parameter.

Ratio	Parameter	SBI	Canara Bank	Kotak Mahindra Bank	ICICI Bank
CAMEL Ratings (2011-12 to 2020-21): Capital Adequacy of Selected Banks					
Capital Adequacy Ratio (CAR)	Mean	12.96%	12.32%	17.85%	17.66%
	Standard Deviation	0.0060	0.0122	0.0176	0.0101
	Rank	3	4	1	2
Debt Equity Ratio	Mean	1.5409	0.9140	1.446	1.959
	Standard Deviation	0.1495	0.1558	0.5465	0.5093
	Rank	3	1	2	4
Total Advances to Assets Ratio	Mean	61.11%	59.81%	57.02%	58.26%
	Standard Deviation	0.0457	0.0206	0.0576	0.0260
	Rank	1	2	4	3
Share-Holder's Fund to Total advances	Mean	10.24%	9.52%	25.42%	20.85%
	Standard Deviation	0.0080	0.0051	0.0322	0.0178
	Rank	3	4	1	2
Share-Holder's Fund to Total assets	Mean	6.24%	5.69%	14.47%	12.11%
	Standard Deviation	0.0038	0.0034	0.0199	0.0071
	Rank	3	4	1	2
Return on Net worth ratio	Mean	7.40%	3.35%	12.01%	10.05%
	Standard Deviation	0.0547	0.0988	0.0160	0.0342
	Rank	3	4	1	2
Composite	Average	2.67	3.17	1.67	2.50
	Rank	3	4	1	2

Source: Author's own calculation
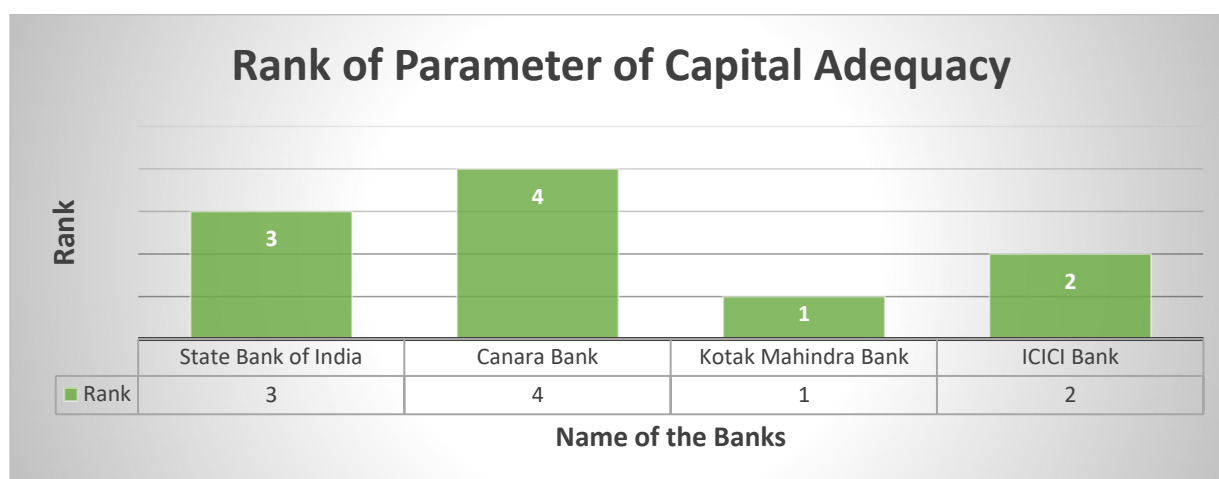
Fig. 1: Ranking of Banks under Capital Adequacy Parameter
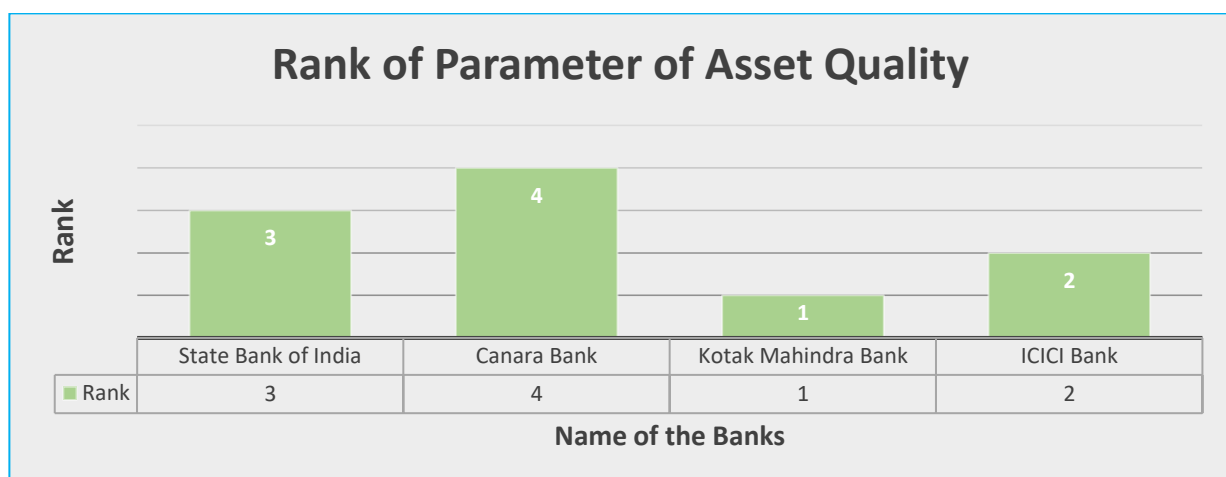
Analysis and Discussion:

The Capital Adequacy Ratio (CAR) of Kotak Mahindra Bank is ranked number one, followed by ICICI Bank with an average percentage of 17.66%. State Bank of India follows with 12.96%, and Canara Bank ranks lowest with an average percentage of 12.32%, primarily due to its poor performance in Tier I Capital. This is also evident in the Shareholders Fund to total Advances ratio. In contrast, Canara Bank and State Bank of India rank first in the Debt Equity Ratio and Total Advances to Assets Ratio, respectively, compared to the other two private banks, which rank fourth. CAR is a critical parameter for measuring a bank's strength in terms of meeting unforeseen losses. Private banks maintain an average CAR of 17.85% and 17.66%, respectively, securing the top ranks compared to public sector banks. Overall, after considering the averages of the Capital Adequacy Ratio, Debt Equity Ratio, Total Advances to Assets ratio, Shareholders funds to Total assets, and Return on Net worth ratio, private banks only occupy the top position compared to public sector banks. Under BASEL III guidelines, banks are required to maintain a minimum Capital Adequacy Ratio (CAR) of 9%. However, in India, Public Sector Banks (PSBs) are required by the Reserve Bank of India (RBI) to maintain a higher minimum CAR of 12% or above. This requirement is crucial for PSBs as it safeguards the interests of shareholders and helps prevent banks from facing bankruptcy.

2. Asset Quality: This aspect of the rating system evaluates the quality of a bank's loan portfolio and the adequacy of its provisions for loan losses. It considers factors such as the percentage of non-performing loans, the level of delinquent loans, and the overall risk management practices related to asset quality. The specific ratios used to assess asset quality can vary, but common ones include the ratio of non-performing loans to total loans, the ratio of loan loss reserves to total loans, and the ratio of net charge-offs to average loans. These ratios help regulators and analysts measure how well a bank is managing its credit risk and the potential impact of loan losses on its financial stability.*(Aspal & Dhawan, 2016)*[1] As for the ratios prescribed by the Reserve Bank of India (RBI) for assessing asset quality, they may include specific guidelines and thresholds for various indicators related to non-performing assets (NPAs), restructured assets, and provisioning requirements. These ratios help the RBI monitor the health of banks and take appropriate regulatory actions when necessary.

Table -02: Ranking of Banks under Asset Quality parameter.

Ratio	Parameter	SBI	Canara Bank	Kotak Mahindra Bank	ICICI Bank
CAMEL Ratings (2011-12 to 2020-21): Asset Quality of Selected Banks					
Gross NPA to Total Assets	Mean	3.85%	4.18%	1.03%	3.50%
	Standard Deviation	0.0112	0.0232	0.0031	0.0155
	Rank	3	4	1	2
Net NPA to Total Assets	Mean	1.73%	2.50%	0.43%	1.36%
	Standard Deviation	0.0070	0.0129	0.0013	0.0107
	Rank	3	4	1	2
Gross NPA to Total Advances	Mean	6.38%	7.01%	1.80%	5.94%
	Standard Deviation	0.022	0.039	0.005	0.025
	Rank	3	4	1	2
Net NPA to Total Advances	Mean	3.00	4.00	0.75	2.30
	Standard Deviation	1.333	2.000	0.211	1.788
	Rank	3	4	1	2
Total Investment to Total Assets Ratio (%)	Mean	25.756	25.283	31.405	25.767
	Standard Deviation	3.0603	2.2376	3.0256	4.7719
	Rank	2	1	4	3
Credit Deposit Ratio	Mean	79.501	70.49	91.047	96.716
	Standard Deviation	5.7658	1.3385	4.8188	6.1550
	Rank	2	1	3	4
Composite	Average	2.67	3.00	1.83	2.50
	Rank	3	4	1	2

Source: Author's own calculation

Fig. 2: Ranking of Banks under Asset Quality Parameter

Analysis and Discussion:

Measuring the Asset Quality of banks primarily aims to assess the extent of Non-Performing Assets (NPAs) within their portfolios. The Gross NPA to Total Advances percentage reflects the proportion of bad assets without adjusting for provisions from gross NPAs against total advances. A higher percentage indicates a larger portion of total assets as non-performing, while a lower average percentage indicates higher asset quality. Kotak Mahindra Bank secured the first rank with an average percentage of 1.80%, followed by ICICI

Bank and State Bank of India. Canara Bank occupies the lowest rank with an average score of 7.01%. The Net NPA reflects the actual burden on the banks. Here, a lower average percentage indicates higher asset quality. When it comes to the Total Investments to Total Assets ratio and Credit Deposit ratio, public sector banks hold better rankings compared to private sector banks. This implies that the total investments and credit deposit ratios are favourable for State Bank of India and Canara Bank compared to Kotak Mahindra Bank and ICICI Bank. When we consider the average of all asset quality ratios, Kotak Mahindra Bank ranks first, followed closely by ICICI Bank and State Bank of India, with Canara Bank at the lowest position.

3. Management Efficiency: This component assesses how effectively and efficiently a bank's management team operates the institution and makes strategic decisions. It includes evaluating the quality of management, the bank's organizational structure, risk management practices, and overall corporate governance. The Reserve Bank of India (RBI) also uses a similar framework for supervising banks, which includes assessing management quality and efficiency. However, the specific ratios or metrics used by RBI may vary and are not always publicly disclosed. These ratios are likely part of the internal supervisory framework used by RBI to evaluate banks' management practices.*(Aspal & Dhawan, 2016)*[1]

Table -03: Ranking of Banks under Management Efficiency parameter.

CAMEL Ratings (2011-12 to 2020-21): Management Efficiency of Selected Banks					
Ratio	**Parameter**	**SBI**	**Canara Bank**	**Kotak Mahindra Bank**	**ICICI Bank**
Business per Employee	Mean	16.119	15.659	8.051	12.074
	Standard Deviation	5.2974	1.8154	1.3869	2.5900
	Rank	1	2	4	3
Diversification ratio (%)	Mean	13.86%	11.96%	15.42%	20.35%
	Standard Deviation	1.9263	3.3482	1.7534	3.0041
	Rank	3	4	2	1
Total Assets turnover ratio (%)	Mean	8.05%	8.36%	9.99%	8.79%
	Standard Deviation	0.6773	0.6376	1.1010	0.6162
	Rank	4	3	1	2
Profit per Employee	Mean	4.38%	1.38%	9.85%	11.69%
	Standard Deviation	0.03239	0.05191	0.02085	0.04028
	Rank	3	4	2	1
Total Expenditure to Total Income ratio	Mean	94.66%	98.38%	83.81%	86.44%
	Standard Deviation	4.0311	6.0629	2.7392	4.6592
	Rank	3	4	1	2
Total Advances to Total deposits ratio	Mean	78.55%	69.36%	88.92%	94.93%
	Standard Deviation	7.1934	2.7059	6.0230	9.0471
	Rank	3	4	2	1
Composite	Average	2.83	3.50	2.00	1.67
	Rank	3	4	2	1

Source: Author's own calculation
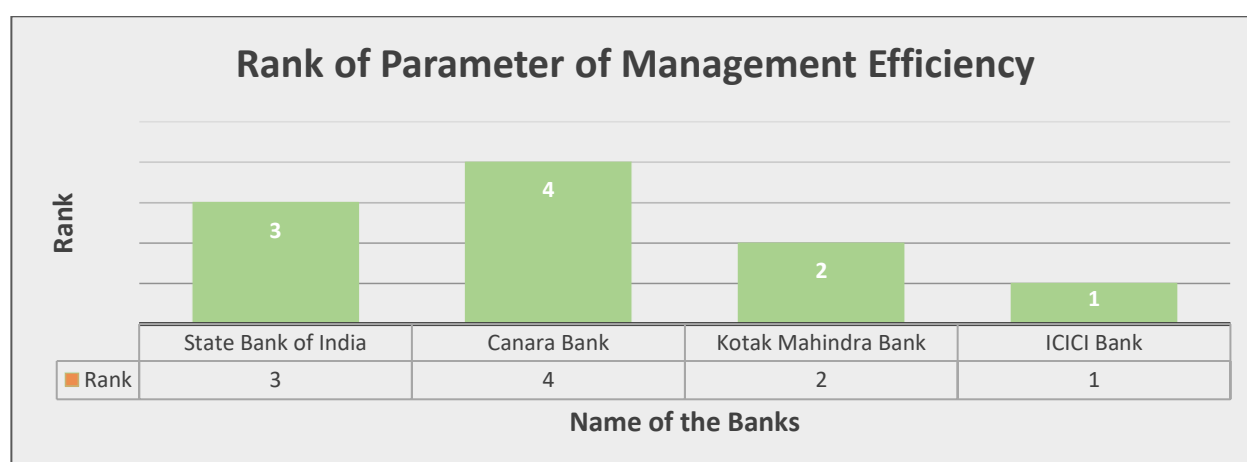
Fig. 3: Ranking of Banks under Management Efficiency Parameter

Analysis and Discussion:
The data provided represents the average contribution per employee to profit/loss and revenue generation. In terms of Business per Employee, State Bank of India secured the top position with an average business per

employee of 16.119%, followed by Canara Bank with an average percentage of 15.659%. In contrast, Kotak Mahindra Bank holds the last position in this metric.

However, the scenario is reversed when considering Profit per Employee, Diversification Ratio, and Total Advances to Total Deposits Ratio. ICICI Bank holds the first rank in Profit per Employee, Diversification Ratio, and Total Advances to Total Deposits Ratio, followed by Kotak Mahindra Bank and State Bank of India. Canara Bank is at the lowest position in these metrics. When we consider the overall average ranking of the Management Efficiency parameter, private sector banks' average stands in the first two positions compared to the public sector banks, which share the third and fourth places, respectively.

4. Earnings Quality: It evaluates a bank's earnings performance, profitability, and the quality of its earnings. This includes analyzing the bank's net interest margin, return on assets, and overall profitability. As for the specific ratios used by the Reserve Bank of India (RBI) to assess the earnings of banks, they may vary.*(Murty, 2017)*[10]

Table -04: Ranking of Banks under Earnings Quality parameter.

CAMEL Ratings (2011-12 to 2020-21): Earnings Quality of Selected Banks					
Ratio	**Parameter**	**SBI**	**Canara Bank**	**Kotak Mahindra Bank**	**ICICI Bank**
Return on Assets ratio.	Mean	8.05%	8.36%	9.99%	8.79%
	Standard Deviation	0.007	0.006	0.011	0.006
	Rank	4	3	1	2
Dividend pay-out ratio	Mean	10.04%	0.75%	0.54%	6.13%
	Standard Deviation	0.098	0.010	0.004	0.063
	Rank	1	3	4	2
Net Profit Margin	Mean	6.208	2.02	19.182	17.022
	Standard Deviation	4.518	6.717	3.512	5.720
	Rank	3	4	1	2
Net profit to Total Assets ratio	Mean	0.44%	0.15%	1.60%	1.21%
	Standard Deviation	0.003	0.005	0.002	0.004
	Rank	3	4	1	2
Interest Income to Total Income ratio	Mean	60.75%	63.92%	64.17%	57.65%
	Standard Deviation	0.050	0.031	0.029	0.029
	Rank	3	2	1	4
Composite	Average	2.8	3.2	1.6	2.4
	Rank	3	4	1	2

Source: Author's own calculation
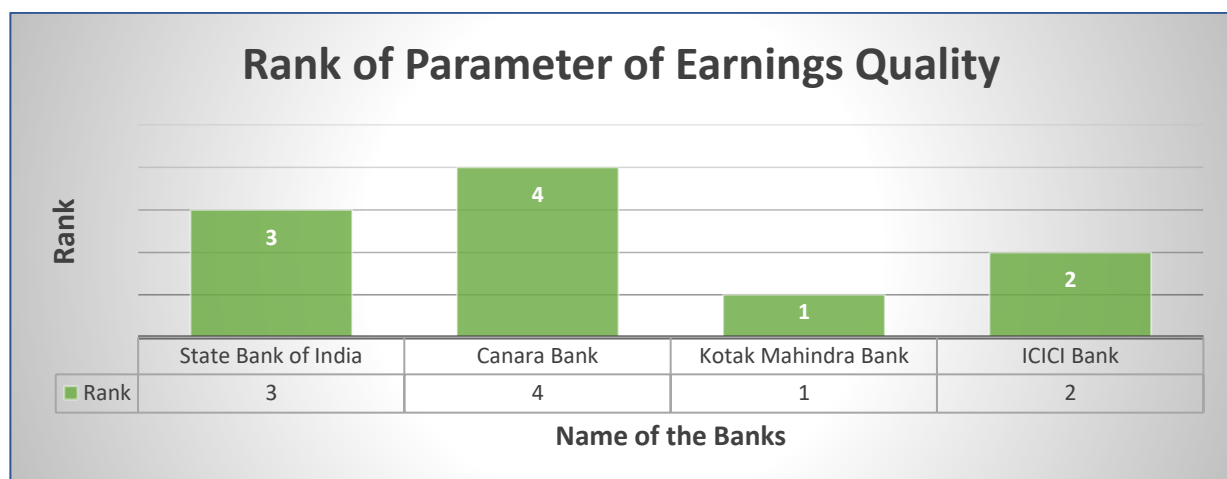
Fig. 4: Ranking of Banks under Earnings Quality Parameter

Analysis and Discussion:
The earning ability of banks is evaluated using various profitability ratios, including the interest income ratio, net profit ratio, and return on asset ratio. Banks need to generate sufficient earnings to cover all operating expenses, and a higher earnings ratio is generally considered favourable, indicating greater profitability. Based on the Return on Assets (ROA), Kotak Mahindra Bank leads with an average percentage of 9.99%, followed by ICICI Bank with 8.79%. Canara Bank ranks third, while State Bank of India (SBI) ranks last with 8.05%. When considering other ratios like Net Profit Margin Ratio, Net Profit to Total Assets Ratio, and Interest Income Ratio, private banks outperform Canara Bank and SBI. However, in terms of Dividend Payout Ratio, SBI ranks highest with 10.04%, nearly twice as high as any other bank, while Kotak Mahindra

Bank ranks last. In terms of the overall average ranking of the Earnings Quality parameter, private sector banks rank in the top two positions compared to public sector banks, which rank third and fourth, respectively. This indicates that private sector banks generally exhibit better earnings quality than public sector banks.

5. **Liquidity Position:** "Liquidity," which assesses a bank's ability to meet its short-term obligations. Liquidity is crucial for a bank to maintain the confidence of depositors and creditors. The Reserve Bank of India (RBI) uses various liquidity ratios to assess a bank's liquidity position, including the Cash Reserve Ratio (CRR) and the Statutory Liquidity Ratio (SLR). These ratios determine the proportion of a bank's deposits that must be kept in cash or invested in specified low-risk securities, ensuring that banks have enough liquid assets to cover withdrawals and other short-term obligations.

Table -05: Ranking of Banks under Liquidity Position parameter.

CAMEL Ratings (2011-12 to 2020-21): Liquidity Position of Selected Banks					
Ratio	**Parameter**	**SBI**	**Canara Bank**	**Kotak Mahindra Bank**	**ICICI Bank**
Liquid Assets to Total Assets ratio	Mean	14.268	25.573	18.443	16.082
	Standard Deviation	3.4268	2.1800	2.3160	3.3927
	Rank	4	1	2	3
Liquid Assets to Total Deposit ratio	Mean	34.91%	37.39%	44.78%	49.07%
	Standard Deviation	0.0384	0.0243	0.0752	0.1077
	Rank	4	3	2	1
Current Ratio	Mean	0.067	0.045	0.045	0.105
	Standard Deviation	0.0216	0.0143	0.0143	0.0255
	Rank	2	3.5	3.5	1
Credit Deposit Ratio	Mean	79.501	70.49	91.047	96.716
	Standard Deviation	5.7658	1.3385	4.8188	6.1550
	Rank	3	4	2	1
Total Investment to Total Deposit ratio	Mean	33.104	29.079	29.239	44.227
	Standard Deviation	3.3568	2.6664	2.3960	4.1019
	Rank	2	4	3	1
Composite	Average	3	3.25	2.25	1.5
	Rank	3	4	2	1

Source: Author's own calculation
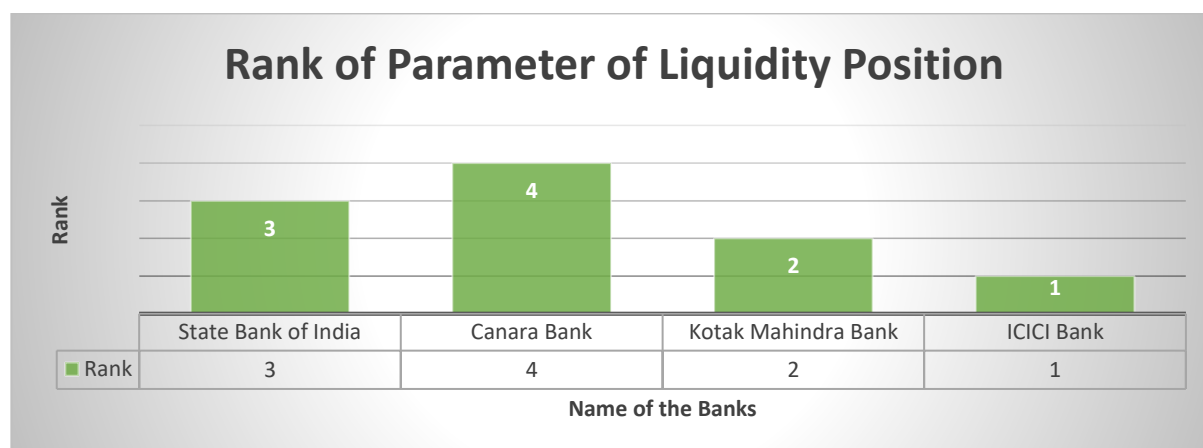
Fig. 5: Ranking of Banks under Liquidity Position Parameter
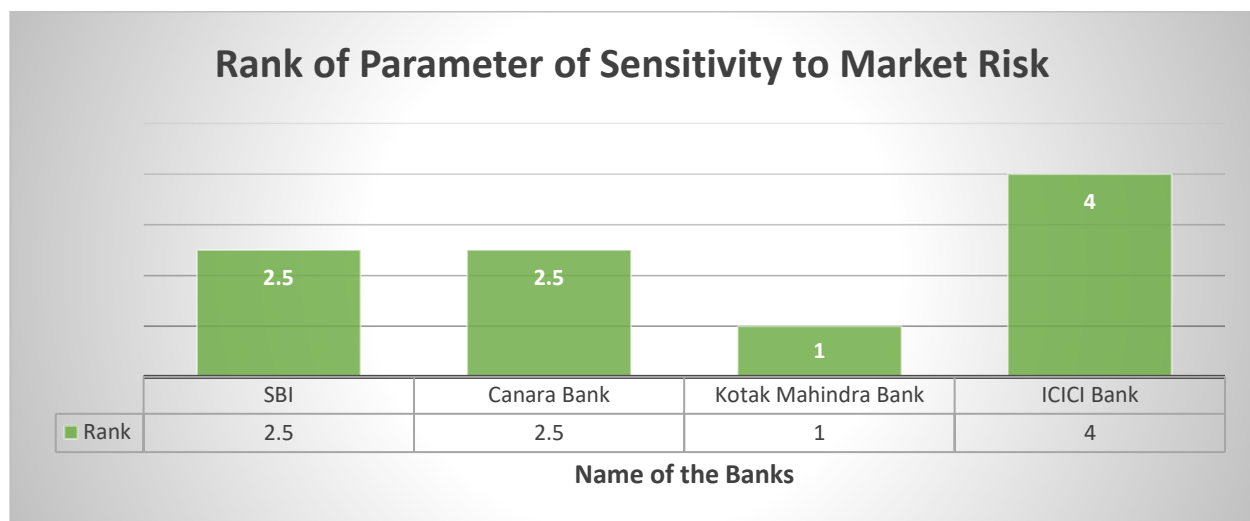
Analysis and Discussion:

Table 5 displays the liquidity position ratios of selected banks over the last ten years, where a higher percentage indicates better performance. Canara Bank secured the top rank with an average percentage of 25.57% in the Liquid Assets to Total Assets ratio, followed by Kotak Mahindra Bank and ICICI Bank with average percentages of 18.44% and 16.082%, respectively. In terms of the Liquid Assets to Total Deposits ratio, private banks occupy the top two positions compared to public sector banks. This trend is also observed in the Interest Expended to Interest Earned ratio. On the other hand, ICICI Bank ranks first in the Current Ratio and Total Investment to Total Deposits ratio, followed by SBI. Notably, Canara Bank and Kotak Mahindra Bank share the third position in these ratios. In terms of the overall average ranking of the Liquidity Position parameter, private sector banks rank in the top two positions compared to public sector banks, which rank third and fourth, respectively. This indicates that private sector banks generally exhibit better liquidity positions than public sector banks.

6. **Sensitivity to market Risk:** It is used to assess a bank's vulnerability to changes in market conditions, including interest rates, exchange rates, and commodity prices. The "S" component evaluates a bank's ability to manage and mitigate risks related to market fluctuations.

Table -06: Ranking of Banks under Sensitivity to Market Risk parameter.

CAMEL Ratings (2011-12 to 2020-21): Sensitivity to Market Risk of Selected Banks					
Ratio	Parameter	SBI	Canara Bank	Kotak Mahindra Bank	ICICI Bank
Interest Income to Total Funds	Mean	111.44%	129.33%	64.06%	57.86%
	Standard Deviation	0.100	0.086	0.128	0.038
	Rank	2	1	3	4
Interest Expended to Interest Earned ratio (%)	Mean	63.856	73.819	55.665	60.655
	Standard Deviation	1.9796	4.0535	2.9899	3.7354
	Rank	3	4	1	2
Composite	Average	2.5	2.5	2	3
	Rank	2.5	2.5	1	4

Source: Author's own calculation

Fig. 6: Ranking of Banks under Sensitivity to Market Risk Parameter

Analysis and Discussion:
The effectiveness of a bank's system and control mechanism in managing market risk is measured by several ratios, including the sensitivity of interest income to total funds and the interest expended to interest earned ratio. A lower ratio is preferred, as it indicates less vulnerability to market interest rate fluctuations, which can lead to earnings volatility. Public sector banks occupy the first two positions in terms of the interest income to total funds ratio when compared to private sector banks. However, the scenario is reversed for the interest expended to interest earned ratio, where private sector banks outperform public sector banks. In the overall average ranking for the Sensitivity to Market Risk parameter, Kotak Mahindra Bank ranks highly, followed by State Bank of India. Canara Bank shares the second position among public sector banks, while ICICI Bank ranks lowest.

Overall Performance of Banks under CAMELS Model
To evaluate the overall performance of the selected banks in India, a composite ranking has been calculated based on the group ranking of the selected Public and Private Sector banks for the period 2011 to 2021. The bank with the lowest average ranking is positioned at the top of the list.

Table -07 Composite Ranking

Name of the Bank	C	A	M	E	L	S	Average	Rank
State Bank of India	2.67	2.67	2.83	2.80	3.00	2.50	2.74	**3**
Canara Bank	3.17	3.00	3.50	3.20	3.25	2.50	3.10	**4**
Kotak Mahindra Bank	1.67	1.83	2.00	1.60	2.25	2.00	1.89	**1**
ICICI Bank	2.50	2.50	1.67	2.40	1.50	3.00	2.26	**2**

Source: Author's own calculation
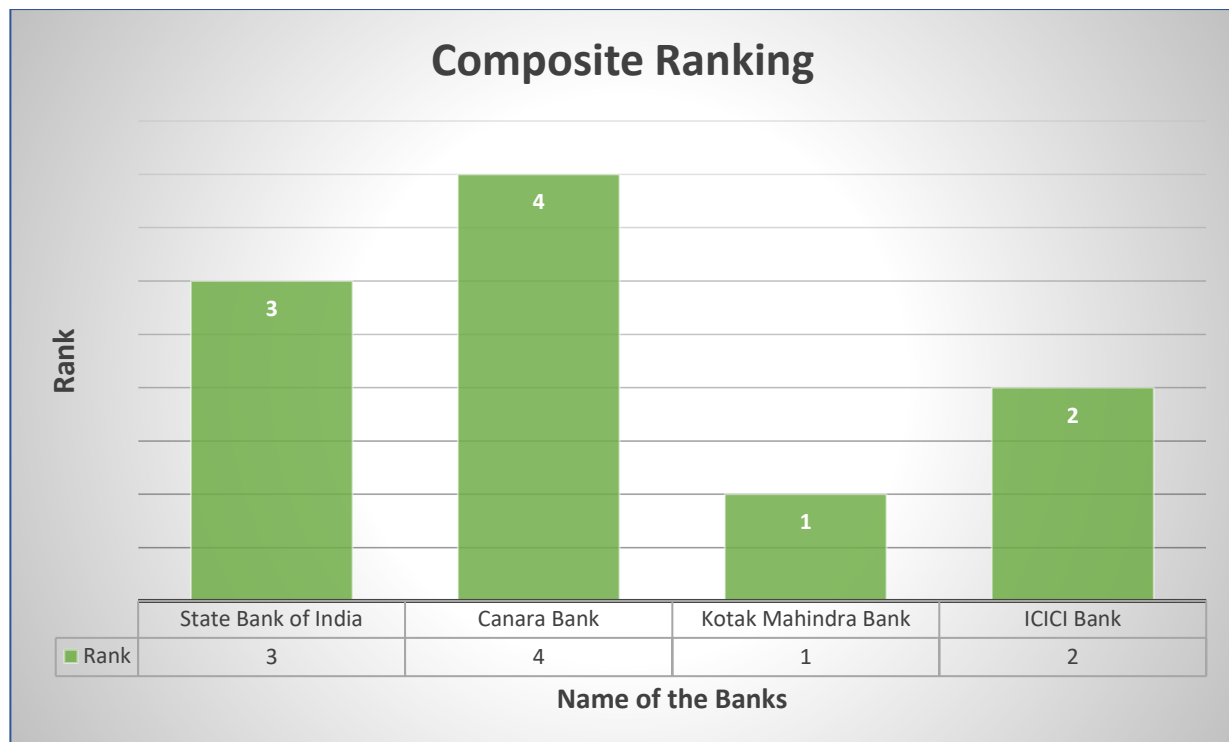
Fig. 7: Composite Ranking of Banks

Analysis and Discussion:

Based on the rankings assigned to the banks on different parameters of the CAMELS rating system, a final standing score was calculated for the banks under study (see Table 06). The rankings for each bank on all parameters were summed up to calculate the mean overall rank. Kotak Mahindra Bank, a private sector bank with a score of 1.87, was ranked first. ICICI Bank followed closely with a mean overall rank score of 2.11, earning it the alternate position. State Bank of India secured third place with an average score of 2.79, while Canara Bank, with a mean overall rank score of 3.22, was assigned the fourth rank. Thus, the final effective ranking places Kotak Mahindra Bank first, followed by ICICI Bank and State Bank of India in second and third place, respectively, with Canara Bank ranked last. This overall CAMELS ranking highlights that the top two positions are occupied by private sector banks when compared to public sector banks.

Table -08 Test of Significance of Performance of Selected Public and Private Sector Bank

One-Sample Test						
	Test Value = 0					
	t	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
State Bank of India	2.859	30	0.008	12.677	3.62	21.73
Canara Bank	2.894	30	0.007	12.774	3.76	21.79
Kotak Mahindra Bank	2.819	30	0.008	13.097	3.61	22.59
ICICI Bank	2.834	30	0.008	14.194	3.96	24.42

Source: Author's own calculation

Hypothesis:

H0: There is no significant difference in financial performance of Select banks by using the CAMELS analysis.
H1: There is significant difference in financial performance of Select banks by using the CAMELS analysis.

Analysis and Discussion:

The t-test conducted on the mean performance of selected banks indicates minor differences among them, with similar t-test values observed. However, there is a noticeable distinction in the mean difference between private sector banks compared to public sector banks. Notably, the p-values for State Bank of India, Canara Bank, Kotak Mahindra Bank, and ICICI Bank are 0.008, 0.007, 0.008, and 0.008, respectively, all of which are less than the conventional onset of 0.05. As a result, the null hypothesis is rejected, suggesting a significant difference in financial performance among all the selected banks.

Table -09 Relationship between Selected Public Sector and Private Sector Bank

Correlations					
		State Bank of India	Canara Bank	Kotak Mahindra Bank	ICICI Bank
State Bank of India	Pearson Correlation	1	.984[**]	.984[**]	.988[**]
	Sig. (2-tailed)		.000	.000	.000
	N	31	31	31	31
Canara Bank	Pearson Correlation	.984[**]	1	.949[**]	.952[**]
	Sig. (2-tailed)	.000		.000	.000
	N	31	31	31	31
Kotak Mahindra Bank	Pearson Correlation	.984[**]	.949[**]	1	.994[**]
	Sig. (2-tailed)	.000	.000		.000
	N	31	31	31	31
ICICI Bank	Pearson Correlation	.988[**]	.952[**]	.994[**]	1
	Sig. (2-tailed)	.000	.000	.000	
	N	31	31	31	31
**. Correlation is significant at the 0.01 level (2-tailed).					

Source: Author's own calculation

Hypothesis:
H0: There is no significant relationship in financial performance of Public Sector and Private Sector Bank.
H1: There is significant relationship in financial performance of Public Sector and Private Sector Bank.

Analysis and Discussion:

The correlation coefficients among the four selected banks, namely State Bank of India, Canara Bank, Kotak Mahindra Bank, and ICICI Bank, suggest a positive correlation. The significance level tested at 5% (0.05) indicates that the p-value is less than 0.05. Consequently, the null hypothesis is rejected, indicating a significant correlation among the banks. This implies that the performance of these banks is linked, and movements in one bank's performance are likely to be reflected in the others. This finding underscores the interconnectedness of these banks within the financial system, highlighting the importance of considering their performance collectively when assessing the banking sector's health.

Conclusion

This study is a longitudinal analysis of selected public and private sector banks' performance using the CAMELS model. The research found that private sector banks outperformed public sector banks significantly in capital adequacy, asset quality, managerial efficiency, and earnings. However, public sector banks surpassed private sector banks in terms of liquidity and sensitivity analysis. The study ranked Kotak Mahindra Bank as the most efficient among the selected banks, followed by ICICI Bank and State Bank of India, while Canara Bank ranked last. The evaluation of financial performance on different CAMELS parameters indicated that all selected banks performed well across all categories. The hypothesis testing revealed no significant difference between the performance of public sector banks and private sector banks in the study. The research relied solely on secondary data and selected a limited number of banks and ratios to represent the CAMELS model. It covered a period of ten years. The study highlights the significant contribution of the banking sector to economic growth in India. It notes the dynamic structural changes in the Indian banking sector due to recent mergers.

Future scope of the study
The Capital Adequacy Ratio (CAR) is a critical metric used by banking regulators to assess a bank's health, specifically by comparing its capital to its risk exposure. Regulators worldwide define and monitor CAR to safeguard depositors and maintain trust in the banking system. This research paper is likely to be highly beneficial to banking institutions, policymakers, and academic researchers focusing on banking performance evaluation, particularly regarding capital adequacy.

By shedding light on the significance of CAR and its implications for bank stability, the study offers valuable insights for shaping banking policies and practices. Policymakers can use this study to enhance regulatory frameworks, while banking institutions can leverage them to optimize their capital management strategies. Additionally, academic researchers can utilize this research to further explore and understand the complexities of evaluating banking performance, contributing to the advancement of knowledge in this field.

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