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EVALUATION OF THE FINANCIAL PERFORMANCE OF PUBLIC AND PRIVATE SECTOR BANKS IN INDIA: AN ANALYSIS USING THE CAMELS FRAMEWORK IN A CROSS-SECTIONAL AND TEMPORAL CONTEXT

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ABSTRACT

This study aims to evaluate and compare the financial performance of selected public sector banks (PSBs) and private sector banks (PVBs) in India, examining a cross-sectional and temporal context spanning 2015 to 2024. The research examines five leading banks from each sector using the CAMELS framework, also known as the "Uniform Financial Institution Rating System" (UFIRS), which assesses six key components: Capital Adequacy, Asset Quality, Management Efficiency, Earning Ability, Liquidity, and Sensitivity. Secondary data were gathered from authentic sources, including the annual reports of the banks under study and their websites. In addition to the CAMELS model, statistical tools, including the arithmetic mean and one-way ANOVA, were used to identify significant differences between groups. The findings reveal notable performance disparities between public and private banks, with private sector banks generally demonstrating superior financial health across most parameters. KMBL, HDFC, and IndusInd Bank consistently outperformed in composite rankings, while PNB, Axis, and Union Bank of India reflected weaker performance, securing 8th, 9th and 10th position. The overall CAMELS ranking shows that private-sector banks dominate the top three spots compared to their public-sector counterparts. The results provide valuable insights for stakeholders, policymakers, and investors seeking a deeper understanding of the Indian banking sector's financial stability and operational efficiency.

***Keywords**: CAMELS Framework, Component Rating, Composite Rating, UFIRS, NCUA*

THE CAMELS "UNIFORM FINANCIAL INSTITUTIONS RATING SYSTEM" AN INTRODUCTION

Since 1979, state member banks have been rated using the interagency "**Uniform Financial Institution Rating System**" (UFIRS), which was recommended by the Federal Reserve and other banking agencies. This rating system, known throughout the industry as CAMEL, evaluates five key components: capital adequacy, asset quality, management and administration, earnings, and liquidity. The CAMELS model has evolved into a vital tool in the global banking sector. This model, which relies on ratio analysis of financial statements and on-site examinations by a designated supervisory regulator, is not just a set of guidelines, but a cornerstone of our regulatory framework. It is applied to every bank and credit union in the U.S. and implemented internationally by various banking supervisory regulators.

The "Uniform Financial Institution Rating System" (UFIRS), commonly known as the CAMELS rating, was adopted by the Federal Financial Institution Examination Council (FFIEC) on November 13, 1979, and by the National Credit Union Administration (NCUA) in October 1987. Ratings are based on a bank's financial statement ratio analysis. As the country's central bank, the Reserve Bank of India (RBI) is empowered by the BR Act, 1949, to inspect and supervise commercial banks, carrying out these powers through on-site and off-site surveillance. In 1995, the RBI formed a working group, chaired by Shri S. Padmanabhan, to review the overall supervisory setup of the banking sector. Based on the recommendations of the Padmanabhan committee, a rating system known as the CAMEL model (later modified to CAMELS) was introduced for banks, starting with the July 1998 audit and inspection cycle.

The NCUA Board (the Board) is updating the NCUA's supervisory rating system from CAMEL to CAMELS by adding the "S" (Sensitivity to Market Risk) component to the existing CAMEL rating system and redefining the "L" (Liquidity Risk) component. The benefits of adding the "S" component are to enhance transparency and allow the NCUA and federally insured natural person and corporate credit unions to better distinguish between liquidity risk "L" and sensitivity to market risk "S". The addition of "S" also enhances consistency between the supervision of credit unions and financial institutions supervised by the other banking agencies. The effective date of the rule will be April 1, 2022. The Board plans to implement the addition of the "S" rating component and a redefined "L" rating for examinations and contacts started on or after April 1, 2022. The committee suggested rating the banks on a 5-point scale (1-5) using the international CAMELS rating system guidelines.

This rating system assesses the operational and financial performance of banks across six key components.

- **C**apital adequacy
- **A**sset quality
- **M**anagement Efficiency
- **E**arnings Ability
- **L**iquidity Management
- **S**ensitivity to market risk

REVIEW OF LITERATURE

(Bhayani, 2006) Investigated the performance of new private-sector banks using the CAMEL model. The study highlighted the transformative goal of banking sector reforms in India, which aimed to significantly improve the efficiency and profitability of banks. The research focused on four leading private-sector banks: HDFC, ICICI, IDBI, and UTI (now known as Axis Bank). After analysing the CAMEL parameters, the author ranked the banks based on their performance across the various CAMEL parameters, with significant implications for the banking industry. The research found that IDBI had the strongest overall performance among all banks, with UTI second, indicating promising potential for sector improvement and inspiring optimism in the industry.

(Suresh, 2008) Investigated the key indicators of non-performing assets, profitability, and financial performance of nationalised banks, including the "State Bank of India" and its associates. This analysis covered the period from 1997-98 to 2006-07, utilising the widely recognised CAMEL Model—a tool that has proven its applicability across different banking sectors—and relying on secondary data. The study employed relevant accounting ratios, statistical tools, and techniques, including the arithmetic mean, one-way ANOVA, multiple correlations, multiple regression, coefficient of variation, and trend analysis.

(Karthikeyan & Shangari, 2014) Analysed the performance of India's top six private sector banks -HDFC, ICICI, Axis Bank, Kotak Mahindra, IndusInd, and YES Bank. The research design, characterised by its thoroughness and rigour, employed non-probability judgmental sampling. To ensure the reliability of the findings, secondary data from 2008-09 to 2012-13 were extracted from the financial statements of the selected private-sector banks. To evaluate bank performance, the CAMEL framework was utilised alongside financial ratios and statistical techniques, including ratio analysis, variance analysis, and composite ranking. The study concluded with a significant finding: HDFC Bank outperformed the other banks, a testament to the thoroughness and reliability of the research design.

(Nathwani, 2015) An evaluation was conducted of six scheduled commercial banks, comprising three public-sector banks—specifically, SBI, BoB, and PNB—and three private-sector banks —namely, Axis Bank, HDFC Bank, and ICICI Bank. This analysis spanned 10 years, from the fiscal year 2004-2005 to 2013-2014, with a focus on the CAMEL model. Private banks in India are more profitable than public banks. The banking industry's profitability has been significantly affected by economic liberalisation and globalisation, leading to a decline in earnings for public-sector banks. To remain competitive, public banks must adopt new financial products and innovations. This is not just a recommendation; it is an essential requirement for their survival in an increasingly complex and evolving environment. Indian banks are making strides toward modernisation by

adopting information technology and offering tech-driven banking products and services. The effective management of credit risk and the expansion into fee-based services are vital for the long-term success and prosperity of banking institutions.

(Banu & Sudha, 2021) The financial performance of four key public and private sector banks in India was evaluated using the CAMEL model's parameters to rank them. The study focused on two public sector banks—State Bank of India (SBI) and Syndicate Bank (now Canara Bank)—and two private sector banks—HDFC Bank and ICICI Bank. It utilised a decade's worth of secondary data from 2009-10 to 2018-19, sourced from the financial statements of the selected banks, as well as newspapers, websites, and magazines. The research employed an empirical approach and used a non-probability judgmental sampling technique to select the samples.

(Kantharaju, 2024) The financial performance of Indian banks was examined from the fiscal year 2011-12 to 2020-21, focusing on two private-sector banks—KMBL and ICICI Bank—and two public-sector banks—SBI and Canara Bank. The study's CAMELS rating results indicate that KMBL, a private-sector institution, achieved the highest overall ranking, followed by ICICI Bank in second place and SBI in third. Canara Bank received the lowest ranking among the four.

OBJECTIVES OF THE STUDY

The research aims to analyse the financial performance of selected public and private sector banks using the CAMELS Model and compare their outcomes.

- To assess the financial performance of the State Bank of India (SBI), Bank of Baroda (BoB), Punjab National Bank (PNB), Canara Bank, Union Bank of India (UBI), HDFC Bank, ICICI Bank, Axis Bank, Kotak Mahindra Bank Limited (KMBL), and IndusInd Bank.
- To assess the parameters of the CAMELS Framework by allocating component rankings and a composite ranking.
- To rank banks based on the overall evaluation of CAMELS components and to compare the performance of selected Public Sector Banks (PSBs) and Private Sector Banks (PVBs) in India.

RESEARCH HYPOTHESIS

The hypothesis serves as a starting point for further investigation. It outlines what the researcher expects to find or demonstrate through their work. The goal is to test this hypothesis through research activities and gather evidence to support or refute it.

- H0: There is no significant difference in performance between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.
- H1: There is a significant difference in performance between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.
- **Decision: Reject H_0 if $F > F(crit)$ or $p < \alpha$ or accept H_0 if $F < F(crit)$ or $p > \alpha$.**

RESEARCH METHODOLOGY

RESEARCH DESIGN

The research design is "descriptive, and the study is empirical in nature".

SAMPLE SIZE AND SAMPLING TECHNIQUE

Currently, India's commercial banking sector comprises 12 "Public Sector Banks (PSBs), 21 Private Sector Banks (PVBs)", 28 Regional Rural Banks (RRBs), 44 Foreign Banks (FBs), 11 Small Finance Banks (SFBs), 5 Payments Banks (PBs), 2 Local Area Banks (LABs), and 4 Financial Institutions. Among these 128 commercial banks, 124 are categorised as scheduled banks, while four are classified as non-scheduled banks. Our sample size includes 5 PSBs and 5 PVBs, utilising a purposive sampling technique.

DATA COLLECTION

The data was collected from secondary sources, including the Reserve Bank of India (RBI), annual reports from the selected banks, and various reputable academic journals.

PERIOD OF STUDY

The study encompasses ten years from 2014-15 to 2023-24, examining key developments and trends within that timeframe. The justification for selecting this study period is based on the fact that in 2015, ING Vysya Bank Voluntary merged with Kotak Mahindra Bank Limited (KMBL), and the State Bank of India underwent a merger with its associate banks, which became effective on April 1, 2017. Syndicate Bank underwent a merger with Canara Bank, while "Andhra Bank and Corporation Bank merged with Union Bank of India" on 1st April, 2020. Furthermore, United Bank of India and Oriental Bank of Commerce were merged with Punjab National Bank, and Allahabad Bank was merged with Indian Bank, effective April 1, 2020. The merger between HDFC Bank and HDFC Limited was announced on April 4, 2022, on the exchanges, leading to a 9-10 per cent rise in the share prices of both entities.

MODE OF ANALYSIS

Simple Average Analysis: To rank the banks, the ratios for each institution are averaged over a ten-year period. This methodology ensures that the ranking is based on objective criteria. To avoid subjective judgment, weights are avoided, and simple averages are calculated. Simple averages are computed for each bank using the selected components of the CAMELS model. This approach provides a clear, transparent means of assessing each bank's performance and establishing its relative ranking.

One-Way ANOVA - To analyse the average difference of different ratios among banks, one-way ANOVA is utilised when comparing the means of more than two groups. The confidence interval is assumed to be 95%. That is, the level of significance is 5%. The "one-way ANOVA" is used in our analysis to test the null hypothesis. The null hypothesis states that there is no significant difference in the "performance of Public Sector Banks (PSBs)" and Private Banks (PVBs) in India.

THE FIRST COMPONENT: CAPITAL ADEQUACY

Financial institutions are required to maintain capital that is appropriately aligned with the nature and extent of their risks, as well as with management's ability to identify, measure, monitor, and control these risks. Although the specific ratios used to evaluate capital adequacy may vary, some standard metrics include the CRAR, Debt-to-Equity Ratio, Total Advances to Total Assets Ratio, Government Securities to Total Investment Ratio, Total Investment to Total Assets Ratio, and the Provisioning Coverage Ratio. In India, scheduled commercial banks are mandated by the RBI to maintain a capital-to-risk-weighted assets ratio (CRAR) of 9%. In comparison, Indian public sector banks are required to maintain a CRAR of 12%. Compliance with these regulations is essential for ensuring the stability and resilience of financial institutions.

Table 1: Composite Ranking of Banks Under Capital Adequacy Component (2015-24)

Ratio		Public Sector Banks					Private Sector Banks				
		SBI	**PNB**	**Canara**	**UBI**	**BOB**	**HDFC**	**ICICI**	**Axis**	**IndusInd**	**KMBL**
Capital to Risk (Weighted) Assets Ratio (CRAR)	Mean %	13.57	12.85	13.43	12.88	14.01	17.41	17.54	16.72	16.13	19.11
	Rank	7	10	8	9	6	3	2	4	5	1
Debt-Equity Ratio	Mean (in Times)	1.66	0.91	0.91	1.23	1.07	0.92	1.27	1.79	1.34	0.60
	Rank	9	2	3	6	5	4	7	10	8	1
Total Advances to Total Assets Ratio	Mean %	58.26	58.12	59.76	60.57	60.49	64.61	60.65	62.28	63.61	62.79
	Rank	9	10	8	6	7	1	5	4	2	3
Government Securities to Total Investment Ratio	Mean %	79.81	83.99	91.23	77.14	87.79	80.83	75.12	74.11	86.38	78.68
	Rank	6	4	1	8	2	5	9	10	3	7
Composite	Mean	7.75	6.5	5	7.25	5	3.25	5.75	7	4.5	3
	Rank	**10**	**7**	**4**	**9**	**4**	**2**	**6**	**8**	**3**	**1**

(Source: Author's own calculation)

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ANALYSIS AND DISCUSSION

Table 1 provides evidence that all banks have complied with the guidelines established by the RBI, as each institution maintains a Capital to Risk (Weighted) Assets Ratio (CRAR) surpassing the stipulated minimum requirement of 9%. KMBL achieved the highest average CRAR at 19.11%, followed by ICICI with 17.54% and HDFC with 17.41%. Conversely, Punjab National Bank (PNB) recorded the lowest average CRAR of 12.85%, ranking it tenth among the banks examined. Regarding the average Debt-to-Equity (D/E) ratio, KMBL secured the leading position with a ratio of 0.60 times. PNB and Canara Bank followed, both achieving a ratio of 0.91 times, ranking second and third, respectively. In contrast, Axis Bank, with a D/E ratio of 1.79 times, ranked tenth, indicating a greater proportion of total debt relative to equity compared to its peers. HDFC Bank achieved a total advance-to-total assets (TA/TA) ratio of 64.61%, ranking it first. IndusInd Bank ranked second with a TA/TA ratio of 63.61%, while KMBL secured third place with a ratio of 62.79%. PNB, with a ratio of 58.12%, ranked tenth, yet remains above the minimum required limit of 50% as prescribed by the RBI, which is deemed suitable for the institution. Furthermore, Canara Bank recorded the highest GS/TI ratio of 91.23%, securing first place in this category. BoB followed closely in second place with a ratio of 87.79%, while IndusInd Bank achieved third place with a ratio of 86.38%. Conversely, Axis Bank ranked tenth with an average of 74.11 in this analysis. In assessing the composite average of all CAR components, KMBL ranks first with an average score of 3, followed closely by HDFC with an average of 3.25. IndusInd Bank ranks third with an average of 4.5, while the SBI ranks tenth with a notably higher average of 7.75.

Table 1.1: One-Way ANOVA for Capital Adequacy Component

Source of Variation	SS (Sum of Squares	df	MS (Mean Square): SS/df	F: ratio of MS (between) to MS (within)	P-value: probability of observing F ≥ 1.39 under H_0 is	F crit cut-off for α = 0.05 and (9, 30) df is
Between Groups	97	9	10.77777778	1.38769671	0.23735454	2.210697
Within Groups	233	30	7.766666667			
Total	330	39				

(Source: Author's own calculation)

SS (Sum of Squares): The between-groups value of 97 indicates the variation caused by differences between group means and the overall mean. The within-group value is 233, indicating the variation within each group around their respective mean, which represents the noise or residual error. The total value of 330 represents the overall variation within the entire dataset. **D.f. (Degrees of Freedom):** Between groups = k − 1 = 10 − 1 = 9. Within groups = N − k = 40 − 10 = 30 observations.

The ANOVA analysis presented in Table 1.1 reveals that there is no significant difference in the means of the 10 banks for the Capital Adequacy component. In this context, the p-value for capital adequacy is 0.24, which exceeds the 0.05 threshold; consequently, we do not reject the null hypothesis (H_0). The F-statistic for capital adequacy is less than the corresponding critical value of F. Specifically, the calculated F-value of 1.39 is lower than the critical F-value of 2.21. "Therefore, there is no notable difference in the capital adequacy between public sector banks (PSBs) and private sector banks (PVBs)."Regarding Capital Adequacy, all banks are making efforts to meet the minimum capital requirements established by Basel III, resulting in no significant differences in their performance, as demonstrated by the table above.

- Decision: Reject H_0 if $F > F(crit)$ or $p < \alpha$ or accept H_0 if $F < F(crit)$ or $p > \alpha$.
- Here, $F = 1.39 < F(crit) = 2.21$ and $p = 0.24 > 0.05 \Rightarrow$ do not reject H_0. or accept H_0.
- *Result: There is no significant difference in Capital Adequacy between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.*

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THE SECOND COMPONENT: ASSET QUALITY

This aspect of the rating system evaluates the quality of a bank's lending portfolio and the adequacy of its reserves for potential loan losses. It considers various factors, such as the percentage of "non-performing loans and overall risk management practices" related to asset quality. While the specific ratios used to evaluate asset quality may differ, some standard metrics include the Net Non-Performing Assets to Net Advances ratio, the Gross NPA to Gross Advances ratio, the Total-Investment to Total Assets ratio, and the Provisioning Coverage ratio. These metrics provide regulators and analysts with a framework for evaluating how effectively a bank manages its credit risk and the potential impact of loan losses on financial stability.

Table 2: Composite Ranking of Banks Under Assets Quality Component (2015-24)

Ratio		Public Sector Banks					Private Sector Banks				
		SBI	**PNB**	**Canara**	**UBI**	**BOB**	**HDFC**	**ICICI**	**Axis**	**IndusInd**	**KMBL**
Net Non-Performing Assets to Net Advances Ratio	Mean %	2.59	5.80	4.19	4.63	3.00	0.33	2.02	1.28	0.62	0.83
	Rank	6	10	8	9	7	1	5	4	2	3
Gross NPA to Gross Advances Ratio	Mean %	5.84	12.34	7.78	10.68	7.76	1.16	5.59	3.49	1.72	2.23
	Rank	6	10	8	9	7	1	5	4	2	3
Total Investment to Total Assets Ratio	Mean %	27.54	26.91	24.24	26.11	21.90	23.90	23.18	22.62	17.86	24.42
	Rank	1	2	5	3	9	6	7	8	10	4
Provisioning Coverage Ratio	Mean %	78.16	72.26	70.53	70.66	77.54	71.80	70.00	80.52	63.02	70.89
	Rank	2	4	8	7	3	5	9	1	10	6
Composite	Mean	3.75	6.5	7.25	7	6.5	3.25	6.5	4.25	6	4
	Rank	**2**	**6**	**10**	**9**	**6**	**1**	**6**	**4**	**5**	**3**

(Source: Author's own calculation)

ANALYSIS AND DISCUSSION

Table 2 demonstrates that in terms of the average NNPA/NA ratio throughout the research period, HDFC secured the top rank with 0.33%, followed by IndusInd at 0.62% and KMBL at 0.83%. Conversely, PNB had the lowest rank with a NNPA/NA ratio of 5.80%. During the same period, HDFC also achieved the highest rank for the average GNPA/GA ratio, with a ratio of 1.16%. IndusInd Bank followed in second place with a ratio of 1.72%, while KMBL ranked third with a ratio of 2.23%. PNB reported the highest GNPA/GA ratio of 12.34%, placing it tenth among the banks analysed. For the average TI/TA ratio during the research period, SBI took first place with 27.54%, followed by PNB at 26.91% in second place, and UBI at 26.11% in third place. IndusInd Bank ranked tenth with a TI/TA ratio of 17.86%. In terms of the Provision Coverage Ratio (PCR), Axis Bank achieved the highest rank at 80.52%, followed by SBI at 78.16% and BoB at 77.54%. IndusInd Bank ranked tenth, having a PCR of 63.02%, which was lower than that of the other selected banks. Finally, when analysing the composite average of all Asset Quality Capital components, HDFC ranked first with an average score of 3.25, followed closely by SBI in second place with an average of 3.75, and KMBL in third with an average of 4. In contrast, PNB ranked tenth with a significantly higher average of 7.25.

Table 2.1 One-way ANOVA for Asset Quality Component

Source of Variation	SS (Sum of Squares)	df	MS (Mean Square): SS/df	F: ratio of MS (between) to MS (within)	P-value: probability of observing $F \geq 1.10$ under H_0 is	F crit cut-off for $\alpha = 0.05$ and (9, 30) df is
Between Groups	82	9	9.111111111	1.102150538	0.39084907	2.210697
Within Groups	248	30	8.266666667			
Total	330	39				

(Source: Author's own calculation)

SS (Sum of Squares): The between-groups value of 82 indicates the variation caused by differences between group means and the overall mean. The within-group value is 248, indicating the variation within each group

around their respective mean, which represents the noise or residual error. The total value of 330 represents the overall variation within the entire dataset. **D.f. (Degrees of Freedom):** Between groups = k − 1 = 10 − 1 = 9. Within groups = N − k = 40 − 10 = 30 observations.

The ANOVA analysis presented in Table 2.1 reveals that the average Asset Quality scores remain statistically consistent, indicating no significant changes. In this context, the p-value for the Asset Quality Component is 0.39, which exceeds the 0.05 threshold; consequently, we do not reject the null hypothesis (H_0). The F-statistic for Asset Quality Component is less than the corresponding critical value of F. Specifically, the calculated F-value of 1.10 is lower than the critical F-value of 2.21. Consequently, the null hypothesis is accepted, and the alternative hypothesis is rejected. Therefore, there is no significant difference in asset quality between the chosen public and private sector banks.

- Decision: Reject H_0 if $F > F(crit)$ or $p < \alpha$ or accept H_0 if $F < F(crit)$ or $p > \alpha$.
- Here, $F = 1.10 < F(crit) = 2.21$ and $p = 0.39 > 0.05 \Rightarrow$ Accept H_0.
- *Result: There is no significant difference in Asset Quality between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.*

THE THIRD COMPONENT: MANAGEMENT EFFICIENCY

These components evaluate the board and management's ability to identify, measure, monitor, and control the risks associated with a bank's activities. It also assesses their effectiveness in ensuring the bank operates safely, soundly, and efficiently while complying with relevant laws and regulations. Some standard metrics include the ratio of Total Advances to Total Deposits, Business per Employee, Profit per Employee, and Return on Net Worth. These ratios are a crucial component of the RBI's internal supervisory framework for effectively assessing banks' management practices.

Table 3: Composite Ranking of Banks Under Management Efficiency Component (2015-24)

Ratio		Public Sector Banks					Private Sector Banks				
		SBI	**PNB**	**Canara**	**UBI**	**BOB**	**HDFC**	**ICICI**	**Axis**	**IndusInd**	**KMBL**
Total Advances to Total Deposits Ratio	Mean %	74.38	67.78	68.90	71.38	72.43	87.31	89.96	90.21	91.06	86.19
	Rank	6	10	9	8	7	4	3	2	1	5
Business Per Employee	Mean %	21.26	17.44	17.92	19.13	20.72	16.41	12.89	16.64	12.68	8.80
	Rank	1	5	4	3	2	7	8	6	9	10
Profit Per Employee	Mean %	8.82	0.33	3.20	2.05	6.13	22.10	15.90	11.25	13.68	12.70
	Rank	6	10	8	9	7	1	2	5	3	4
Return on Net Worth	Mean %	9.42	-3.69	4.22	0.90	4.15	17.46	11.58	11.19	14.23	13.58
	Rank	6	10	7	9	8	1	4	5	2	3
Composite	Mean	4.75	8.75	7	7.25	6	3.25	4.25	4.5	3.75	5.5
	Rank	5	10	8	9	7	1	3	4	2	6

(Source: Author's own calculation)

ANALYSIS AND DISCUSSION

Table 3 illustrates that the IndusInd Bank achieved the highest TA/TD ratio at 91.06%, securing the top position, closely followed by Axis Bank with a ratio of 90.21%, and ICICI Bank, which ranked third with a ratio of 89.96%. In contrast, Punjab National Bank (PNB) reported the lowest ratio at 67.78%, placing it tenth among the selected banks. SBI recorded the highest average BPE of ₹21.26 Crore, earning the top spot, followed by Bank of Baroda (BoB) with an average BPE of ₹20.72 Crores, and Union Bank of India (UBI) in third with a BPE of ₹19.13 Crores. Conversely, Kotak Mahindra Bank Limited (KMBL) had a BPE of ₹8.80 Crores, ranking it last in this category. In terms of average PPE, HDFC Bank led the ranking with ₹22.10 Lakhs, followed by Axis Bank with ₹15.90 Lakhs, and IndusInd Bank in third with ₹13.68 Lakhs. Notably, PNB reported a PPE of just ₹0.33 Lakhs, placing it last. Regarding Return on Equity (ROE), HDFC Bank topped the list with a ratio of 17.46%, followed by IndusInd Bank at 14.23% in second place and KMBL at 13.58% in third. PNB had a negative ROE ratio at -3.69%, placing it tenth due to its significantly lower ratio compared to other banks. When analysing the composite average of all Management Efficiency components, HDFC ranked first with an average score of 3.25, closely followed by IndusInd Bank at an average of 3.75. ICICI secured third place with an average of 4.25. Notably, PNB ranked tenth in a different comparison with a significantly higher average score of 8.75.

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Table 3.1 One-way ANOVA for Management Component						
Source of Variation	SS (Sum of Squares)	df	MS (Mean Square): SS/df	F: ratio of MS (between) to MS (within)	P-value: probability of observing F ≥ 1.39 under H₀ is	F crit cut-off for α = 0.05 and (9, 30) df is
Between Groups	109.5	9	10.77778	1.38770	0.23735	2.21
Within Groups	220.5	30	7.76667			
Total	330	39				

(Source: Author's own calculation)

SS (Sum of Squares): The between-groups value of 109.50 indicates the variation caused by differences between group means and the overall mean. The within-group value is 220.50, indicating the variation within each group around their respective mean, which represents the noise or residual error. The total value of 330 represents the overall variation within the entire dataset. **D.f. (Degrees of Freedom):** Between groups = k − 1 = 10 − 1 = 9. Within groups = N − k = 40 − 10 = 30 observations.

The ANOVA analysis presented in Table 3.1 reveals that there is no significant difference in the means of the 10 banks for the Management Component. In this context, the p-value for the as Management Component is 0.24, which exceeds the threshold of 0.05; consequently, we do not reject the null hypothesis (H_0). The F-statistic for the Management Component is less than the corresponding critical value of F. Specifically, the calculated F-value of 1.38 is lower than the critical F-value of 2.21. Consequently, the null hypothesis is accepted, and the alternative hypothesis is rejected. Thus, there is no significant difference in the Management Efficiency of public and private sector banks.

- Decision: Reject H_0 if $F > F(crit)$ or $p < \alpha$ or accept H_0 if $F < F(crit)$ or $p > \alpha$.
- Here, $F = 1.38 < F(crit) = 2.21$ and $p = 0.24 > 0.05 \Rightarrow$ do not reject H_0. or accept H_0.
- *Result: There is no significant difference in Management Efficiency between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.*

THE FOURTH COMPONENT: EARNINGS

Evaluating a bank's capacity to generate earnings, its overall profitability, and the quality of those earnings requires a thorough analysis of financial ratios. Key indicators include the Interest Income to Average Working Funds, Non-Interest Income to Average Working Funds, Return on Average Assets Ratio, Operating Profit to Average Working Funds, and NIM. Additionally, the Cost-to-Deposit Ratio is used to assess overall profitability. The specific ratios used by the RBI for evaluating bank profitability may differ.

Table 4: Composite Ranking of Banks Under Earnings Component (2015-24)											
Ratio		Public Sector Banks					Private Sector Banks				
		SBI	PNB	Canara	UBI	BOB	HDFC	ICICI	Axis	IndusInd	KMBL
Interest Income to Average Working Funds	Mean %	6.67	6.57	7.23	7.18	6.34	8.52	7.52	7.56	9.42	8.40
	Rank	8	9	6	7	10	2	5	4	1	3
Non-interest Income to Average Working Funds	Mean %	1.07	1.02	1.21	1.36	0.86	1.64	1.85	1.75	2.36	1.69
	Rank	8	9	7	6	10	5	2	3	1	4
Return on Average Assets Ratio	Mean %	0.49	-0.16	0.18	0.12	0.26	1.97	1.46	1.06	1.65	1.92
	Rank	6	10	8	9	7	1	4	5	3	2
Operating Profit to Average Working Funds	Mean %	1.70	1.72	1.69	1.75	1.70	3.45	3.24	2.81	3.51	3.08
	Rank	9	7	10	6	8	2	3	5	1	4
Net Interest Margin	Mean %	3.04	2.67	2.56	2.46	2.67	4.17	3.69	3.70	4.22	4.68
	Rank	6	7	9	10	8	3	5	4	2	1
Cost to Deposit Ratio	Mean %	5.06	5.00	5.58	5.58	4.55	4.87	4.81	4.99	6.25	4.80
	Rank	7	6	8	9	1	4	3	5	10	2
Composite	Mean	7.3	8.0	8.0	7.8	7.3	2.8	3.7	4.3	3.0	2.7
	Rank	6	9	9	8	6	2	4	5	3	1

(Source: Author's own calculation)

ANALYSIS AND DISCUSSION

Table 4 highlights the performance of banks based on various financial ratios. IndusInd Bank achieved the highest average Interest Income to Average Working Fund (II/AWF) ratio at 9.42%. HDFC followed in second place with a ratio of 8.52%, while KMBL secured third place with a ratio of 8.40%. In contrast, BoB ranked tenth, with an interest income ratio of 6.34%. Regarding the Net Interest Income to Average Working Fund (NII/AWF) ratio, IndusInd Bank again led with the highest average of 2.36%. ICICI Bank followed in second with a ratio of 1.85%, and Axis Bank secured third place with a ratio of 1.75%. Conversely, BoB ranked tenth with an NII/AWF ratio of 0.86%. In terms of Return on Average Assets (ROAA), HDFC secured the first rank with a ratio of 1.97%, followed by KMBL at 1.92% in second place, and IndusInd Bank at 1.65% in third place. On the other hand, PNB recorded a negative ROAA of -0.16%, ranking tenth among banks. Additionally, during the research period, the average Operating Profit to Average Working Fund (OP/AWF) ratio was 3.51% for IndusInd Bank, followed by HDFC at 3.45% and ICICI at 3.24%. Canara Bank secured the tenth rank with an interest rate of 1.69%. KMBL achieved the highest average Net Interest Margin (NIM) ratio of 4.68%, followed by IndusInd Bank at 4.22% and HDFC Bank at 4.17%. In contrast, Union Bank of India (UBI) reported the lowest NIM ratio at 2.46%, ranking tenth among the banks, which is unfavourable for the bank's profitability. BoB ranked highest among all selected banks with an average lowest Cost to Deposit (CTD) ratio of 4.55%. KMBL followed at 4.80%, and ICICI at 4.81%. However, IndusInd Bank had the highest CTD ratio of 6.25% among the selected banks, ranking tenth overall. When analysing the composite average of all earnings components, KMBL ranked first with an average score of 2.70, followed by HDFC at 2.80. IndusInd Bank secured third place with an average of 3. Notably, PNB and Canara Bank ranked equally in ninth place with significantly higher average scores of 8.

Table 4.1 One-way ANOVA for Earnings Component

Source of Variation	SS (Sum of Squares)	df	MS (Mean Square): SS/df	F: ratio of MS (between) to MS (within)	P-value: probability of observing F ≥ 8.89 under H₀ is	F crit cut-off for α = 0.05 and (9, 50) df is
Between Groups	304.666	9	33.851851	8.892780	(7.57×10^{-8}) 0.0000000757	2.073351
Within Groups	190.333	50	3.8066666			
Total	495	59				

(Source: Author's own calculation)

SS (Sum of Squares): The between-groups value of 304.67 indicates the variation caused by differences between group means and the overall mean. The within-group value is 190.33, indicating the variation within each group around their respective mean, which represents the noise or residual error. The total value of 495 represents the overall variation within the entire dataset. **D.f. (Degrees of Freedom):** Between groups = k − 1 = 10 − 1 = 9. Within groups = N − k = 60 − 10 = 50 observations.

The ANOVA analysis presented in Table 4.1 reveals that there are significant differences in earnings components across the selected banks. The p-value for the Earnings Component is 7.57×10^{-8} or 0.0000000757, which is significantly low and much lower than the 0.05 threshold of 2.073, providing strong evidence to reject the null hypothesis.; therefore, we reject the null hypothesis (H_0). The F-statistic (8.89) significantly exceeds the F-critical value (2.073), indicating that the variation between group means is statistically significant. Consequently, the null hypothesis is rejected, and the alternative hypothesis is accepted. Consequently, there is a significant difference in the Earnings Capacity between banks in the public sector and those in the private sector.

- Decision: Reject H_0 if $F > F(crit)$ or $p < \alpha$ or accept H_0 if $F < F(crit)$ or $p > \alpha$.
- Here, $F = 8.89 > F(crit) = 2.07$ and $p = 7.57 \times 10^{-8}$ or $0.0000000757 < 0.05 \Rightarrow$ Reject H_0.
- *Result: There is a significant difference in Earnings ability between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.*

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THE FIFTH COMPONENT: LIQUIDITY MANAGEMENT

"Liquidity" refers to a bank's ability to meet its immediate financial commitments. Maintaining liquidity is essential for a bank to uphold the trust of its depositors and creditors. The Reserve Bank of India (RBI) employs various liquidity ratios to assess a bank's liquidity status, including the Cash Reserve Ratio (CRR) and the Statutory Liquidity Ratio (SLR). Important performance ratios consist of the Liquid Asset to Total Assets Ratio, the Liquid Asset to Demand Deposit Ratio, the Liquid Asset to Total Deposit Ratio, and the Government Securities to Total Assets Ratio. These ratios dictate the percentage of a bank's deposits that must be maintained in cash or allocated to specific, low-risk securities, ensuring that banks hold sufficient liquid assets to handle withdrawals and other immediate obligations.

Table 5: Composite Ranking of Banks Under Liquidity Management Component (2015-24)

Ratio		Public Sector Banks					Private Sector Banks				
		SBI	PNB	Canara	UBI	BOB	HDFC	ICICI	Axis	IndusInd	KMBL
Liquid Asset to Total Assets Ratio	Mean %	6.60	10.20	10.72	8.45	12.98	6.89	9.12	7.91	9.59	8.80
	Rank	10	3	2	7	1	9	5	8	4	6
Liquid Asset to Demand Deposit Ratio	Mean %	19.36	28.86	41.09	28.87	47.55	21.21	28.43	24.87	34.44	24.21
	Rank	10	5	2	4	1	9	6	7	3	8
Liquid Asset to Total Deposit Ratio	Mean %	8.40	11.90	12.33	9.95	15.42	9.30	13.42	11.31	13.60	12.06
	Rank	10	6	4	8	1	9	3	7	2	5
Government Securities to Total Asset Ratio	Mean %	21.97	22.65	21.98	20.08	19.28	19.22	17.33	16.67	17.72	19.20
	Rank	3	1	2	4	5	6	9	10	8	7
Composite	Mean	8.25	3.75	2.5	5.75	2	8.25	5.75	8	4.25	6.5
	Rank	**9**	**3**	**2**	**5**	**1**	**9**	**5**	**8**	**4**	**7**

(Source: Author's own calculation)

ANALYSIS AND DISCUSSION

Table 5 presents the average LA/TA ratio during the research period. BoB ranked first with 12.98%, followed by Canara Bank with 10.72% in second place and PNB with 10.20% in third place. In contrast, SBI 6.60% has the lowest LA/TA ratio and ranks tenth, as its LA/TA ratio is lower than those of other selected banks, which is not suitable for the bank's profitability. The average result of the LA/DD ratio during the research period was as follows: BoB ranked first with 47.55%, followed by Canara Bank with 41.09% in second place and IndusInd with 34.44% in third place. In contrast, SBI has the lowest LA/DD ratio at 19.36% and secured the tenth rank. The average result of the LA/TD ratio during the research period was BoB ranked first with 15.42%, followed by IndusInd Bank in second place with 13.60%, and ICICI Bank ranked third with 13.42%. In contrast, SBI has the lowest LA/TD ratio at 8.40% and secured the tenth rank. The average GS/TA ratio results in better bank performance. According to the average result of the GS/TA ratio during the research period, PNB ranked first with 22.65%, followed by Canara Bank with 21.98% in second place, and SBI Bank ranked third with 21.97%. When analysing the composite average of all Liquidity components, BoB ranked first with an average score of 2.0, closely followed by Canara with an average of 2.50. PNB secured third place with an average of 3.75. Notably, SBI and HDFC Bank ranked equally in ninth place with significantly higher average scores of 9.

Table 5.1 One-way ANOVA for Liquidity Component

Source of Variation	SS (Sum of Squares)	df	MS (Mean Square): SS/df	F: ratio of MS (between) to MS (within)	P-value: probability of observing $F \geq 4.72$ under H_0 is	F crit cut-off for $\alpha = 0.05$ and (9, 30) df is
Between Groups	193.5	9	21.5	4.725274725	0.00058512	2.210697
Within Groups	136.5	30	4.55			
Total	330	39				

(Source: Author's own calculation)

SS (Sum of Squares): The between-groups value of 193.50 indicates the variation caused by differences between group means and the overall mean. The within-group value is 136.50, indicating the variation within

each group around their respective mean, which represents the noise or residual error. The total value of 330 represents the overall variation within the entire dataset. **D.f. (Degrees of Freedom):** Between groups = k − 1 = 10 − 1 = 9. Within groups = N − k = 40 − 10 = 30 observations.

The ANOVA analysis presented in Table 5.1 reveals significant differences in the means of the 10 banks for the Liquidity Component. In this context, the p-value for the Earnings Component is 0.00058512, which is much lower than the threshold of 0.05, providing substantial evidence to reject the null hypothesis (H_0); consequently, we reject the null hypothesis (H_0). The F-statistic (4.7253) is greater than the F critical (2.2107), indicating statistically significant differences in liquidity across the groups. Thus, the liquidity component varies between public and private sector banks.

- Decision: Reject H_0 if $F > F(crit)$ or $p < \alpha$ or accept H_0 if $F < F(crit)$ or $p > \alpha$.
- Here, $F = 4.72 > F(crit) = 2.21$ and $p = 0.00058512 < 0.05 \Rightarrow$ Reject H_0.
- *Result: There is a significant difference in liquidity management between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.*

OVERALL PERFORMANCE OF BANKS UNDER THE CAMELS MODEL

To evaluate the overall performance of selected banks in India, a composite ranking has been calculated based on the individual rankings of chosen public and private sector banks from 2015 to 2024. These individual rankings were used to determine a final score for each bank under review. By summing the rankings across all parameters, we obtained an overall mean rank. The bank with the lowest average rank is placed at the top, while the bank with the highest average rank appears at the bottom of the list.

Table 6: Overall Ranking of Banks Under CAMELS Framework (2015-24)

Components		Public Sector Banks					Private Sector Banks				
		SBI	**PNB**	**Canara**	**UBI**	**BOB**	**HDFC**	**ICICI**	**Axis**	**IndusInd**	**KMBL**
Capital Adequacy	Mean	7.75	6.5	5	7.25	5	3.25	5.75	7	4.5	3
	Rank	10	7	4	9	4	2	6	8	3	1
Assets Quality	Mean	3.75	6.5	7.25	7	6.5	3.25	6.5	4.25	6	4
	Rank	**2**	**6**	**10**	**9**	**6**	**1**	**6**	**4**	**5**	**3**
Management Efficiency	Mean	4.75	8.75	7	7.25	6	3.25	4.25	4.5	3.75	5.5
	Rank	5	10	8	9	7	1	3	4	2	6
Liquidity Management	Mean	7.3	8.0	8.0	7.8	7.3	2.8	3.7	4.3	3.0	2.7
	Rank	6	9	9	8	6	2	4	5	3	1
Earnings	Mean	8.25	3.75	2.5	5.75	2	8.25	5.75	8	4.25	6.5
	Rank	9	3	2	5	1	9	5	8	4	7
Overall	Mean	6.20	7.75	7.00	8.50	6.75	5.00	6.25	8.25	5.50	4.75
	Rank	**4**	**8**	**7**	**10**	**6**	**2**	**5**	**9**	**3**	**1**

(Source: Author's own calculation)

ANALYSIS AND DISCUSSION

Table 6 presents the rankings assigned to various banks based on the components of the CAMELS rating system. KMBL achieved an impressive best score of 4.75, the lowest among its competitors, securing the first position. HDFC Bank closely followed with a mean overall rank score of 5, earning second place. IndusInd came in third with an average score of 5.50. SBI, with a mean overall rank score of 6.20, was assigned the fourth rank. ICICI followed closely behind with a score of 6.25, placing it in fifth place. BoB, also with a mean overall rank score of 6.75, was positioned sixth. Canara Bank received a mean overall rank score of 7.00, landing in the seventh position, while PNB ranked eighth with a score of 7.75. Axis Bank, with a mean overall rank score of 8.25, ranked ninth, and UBI rounded out the list in tenth place with a mean overall rank score of 8.50.

The final effective ranking is as follows: KMBL occupies the top position, followed by HDFC Bank in second place, IndusInd Bank in third, SBI in fourth, ICICI in fifth, Bank of Baroda (BoB) in sixth, Canara Bank in seventh, Punjab National Bank (PNB) in eighth, Axis Bank in ninth, and Union Bank of India (UBI) in tenth

place. This overall CAMELS ranking shows that private-sector banks dominate the top three spots compared to their public-sector counterparts.

Table 6.1 Overall Ranking of Banks Under CAMELS Framework (2015-24)

Source of Variation	SS (Sum of Squares)	df	MS (Mean Square): SS/df	F: ratio of MS (between) to MS (within)	P-value: probability of observing F ≥ 10.08 under H_0 is	F crit cut-off for α = 0.05 and (9, 40) df is
Between Groups	296.72	9	32.96	10.0822	6.8989E-08 (0.000000069)	2.124029
Within Groups	130.8	40	3.27			
Total	427.52	49				

(Source: Author's own calculation)

SS (Sum of Squares): The between-groups value of 296.72 indicates the variation caused by differences between group means and the overall mean. The within-group value is 130.80, indicating the variation within each group around their respective mean, which represents the noise or residual error. The total value of 452.52 represents the overall variation within the entire dataset. **D.f. (Degrees of Freedom):** Between groups = k − 1 = 10 − 1 = 9. Within groups = N − k = 50 − 10 = 40 observations

The ANOVA analysis presented in Table 6.1 reveals that there is significant variation in the means of the ten banks concerning the CAMELS Component. In this context, the p-value for the CAMELS Component is 0.000000069, which is extremely lower than the threshold of 0.05. The F-statistic (10.0822) is greater than the F critical (2.124), indicating statistically significant differences in liquidity across the groups. Consequently, the null hypothesis is rejected, and the alternative hypothesis is accepted. The study concluded that the selected banks differ significantly in their overall performance under the CAMELS framework over the 10 years.

- Decision: Reject H_0 if F > F(crit) or p < α or accept H_0 if F < F(crit) or p > α.
- Here, F = 10.082 > F(crit) = 2.124 and p = 0.000000069 < 0.05 ⇒ Reject H_0.
- *Result: There is a significant difference in financial performance between Public Sector Banks (PSBs) and Private Banks (PVBs) in India.*

LIMITATIONS OF THE STUDY

The research focuses exclusively on a select group of ten banks, carefully chosen from both the public and private sectors in India, providing a unique perspective on their operations and practices.

- The financial statements of the banks serve as the exclusive basis for the analysis; however, it is essential to consider the possibility that these documents may have been subject to manipulation.
- The research endeavour is set to unfold over a dynamic span of ten years, where discoveries will blossom, and insights will flourish.
- Due to the non-availability of data on the sensitivity component, it is not considered during either the component or the overall ranking of the banks.

FINDINGS AND ANALYSIS

The present research aimed to investigate the financial performance of public and private sector banks in India. The findings reveal notable performance disparities between public and private banks, with private sector banks generally demonstrating superior financial health across most parameters. KMBL, HDFC, and IndusInd Bank consistently outperformed in composite rankings, while PNB, Axis, and Union Bank of India reflected weaker performance. The overall CAMELS ranking shows that private-sector banks dominate the top three spots compared to their public-sector counterparts. The Indian banking sector has undergone several dynamic structural changes with the introduction of private banks.

The dominance of public sector banks in the industry has significantly diminished, as private banks have successfully established a firm foothold by leveraging technology and skilled management. Many socio-economic activities are intricately linked to the banking system; thus, the banking sector needs to operate on a solid foundation. In addition to fulfilling their social responsibilities, banks must also prioritise liquidity and profitability. A bank with a robust financial base can not only foster public confidence but also effectively meet its social obligations. This study can serve as a valuable resource for investors making informed decisions among these new-generation banks.

Management efficiency and liquidity are essential factors to consider when making investment decisions. This study can help regulators and government officials make informed decisions regarding regulatory and policy matters. It will enable the government to assess the need for capital infusion and identify specific banks that require assistance. The research focused exclusively on five public and five private sector banks. While the findings may not be broadly applicable to the entire banking industry in India, they can be generalised for all public and private sector banks within the country.

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