



A STUDY OF TOP 3 PUBLIC SECTOR COMMERCIAL BANKS USING CAMEL MODEL

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ABSTRACT

Article DOI URL: <https://doi.org/10.36713/epra6422>

The consistent and efficient functioning of the PSU bank is very significant to pace up the economic development of a developing nation. In the present study, an attempt has been made to assess the performance of the three largest PSU banks of India - SBI, PNB & BOB. The necessary data of 5 years (from 2015-16 to 2019-20) are collected from the secondary sources and the CAMEL model is used to evaluate the performance further, the statistical tool ANOVA is applied to test the hypothesis. The analysis disclosed that the SBI topped the chart while the BOB and the PNB secured the second and the third position respectively.

KEYWORDS: CAMEL Model, Ratio Analysis, Public Sector Bank, Financial Performance, Commercial Banks

INTRODUCTION

In the growth of an economy, especially in the context of developing countries like India, the banking sector plays an important role. It is often said that for sound economic development, a country must have strong public sector banks.

In India, with the adoption of LPG-Liberalisation, Privatisation, and Globalisation in the 1990s, the banking industry has witnessed a sea-change in competitiveness level with the arrival of different foreign and private banks. The globalization of the economy has made a highly competitive environment in the banking industry and therefore, the government of India made various reforms in the public sector banks to make them more efficient, competitive, and profitable. The major reform made recently was the merger of 10 public sector banks into 4 and with this merger, the number

of public sector banks further decreased to 12 from 27 (in 2017).

The sound financial health of public sector commercial banks is not only significant for shareholders and customers but the country as a whole. The economic development largely depends upon the efficient banking industry. Hence, time to time analysis of the overall financial performance of banks is necessary to understand their soundness. In this study, an effort has been made to analyse the overall financial performance of the top 3 leading public sector commercial banks- State Bank of India, Punjab National Bank, and Bank of Baroda using the CAMEL model.

LITERATURE REVIEW

Gupta (2014) analysed the performance of 26 Indian public sector commercial banks using the CAMEL model.

The study period was limited to five years i.e. from 2009 to 2013. In the study, Andhra bank secured the first position followed by Bank of Baroda and State Bank of Hyderabad while United bank of India stood the last.

Kumar and Sharma (2014) in their study selected 8 Indian commercial banks based upon market capital and analysed their performance using the CAMEL model. The study period was limited to six years i.e. from 2007-08 to 2012-13. In the study, it was found that the State Bank of India ranked first followed by PNB and HDFC while Kotak Mahindra bank secured the last position.

Talreja and Shivappa (2016) in their study selected the top 3 public and 3 private sector Indian commercial banks based on the highest asset value. The data for a period of 4 years i.e. from 2011-12 to 2014-15 was collected and analyzed using the CAMEL model. It was found that in terms of capital adequacy, earning capability, and asset quality, the private sector banks performed well while the public sector banks performed better in terms of liquidity and management capability.

Priya and Manjula (2016) analyzed the performance of IDBI bank for five years i.e. from 2010-11 to 2014-15 using the CAMEL model. The author recommended improving the capital adequacy, asset quality, and management efficiency of the bank.

Kumar and Malhotra (2017) analyzed the financial performance of five private-sector Indian commercial banks using the CAMEL model. The study period was limited to 10 years i.e. from 2006-07 to 2016-17. In the study, they found that Axis Bank ranked first followed by ICICI Bank and Kotak Mahindra Bank while Indus Ind bank positioned the last.

Chakraborty (2017) in his study selected 4 leading Indian commercial banks. The overall performance of the banks was analyzed for five years i.e. from 2011-12 to 2015-16 using the CAMEL model and the statistical tool ANOVA was used. The study revealed the overall performance of the banks and it was found that HDFC ranked first followed by Axis Bank, SBI, and ICICI bank.

OBJECTIVES

The objectives of the study are:

1. To evaluate the overall performance of the selected public sector banks.
2. To compare the performance of the selected public sector banks.

HYPOTHESIS

The following hypotheses are formulated and tested in the present study

Hypothesis-1

H_0 = There is no significant difference in the composite capital adequacy ratios of the selected public sector banks.

H_1 = There is a significant difference in the composite capital adequacy ratios of the selected public sector banks.

Hypothesis-2

H_0 = There is no significant difference in the composite asset quality ratios of the selected public sector banks.

H_1 = There is a significant difference in the asset quality ratios of the selected public sector banks.

Hypothesis-3

H_0 = There is no significant difference in the composite management efficiency ratios of the selected public sector banks.

H_1 = There is a significant difference in the composite management efficiency ratios of the selected public sector banks.

Hypothesis-4

H_0 = There is no significant difference in the composite earning quality ratios of the selected public sector banks.

H_1 = There is a significant difference in the composite earning quality ratios of the selected public sector banks.

Hypothesis-5

H_0 = There is no significant difference in the composite liquidity ratios of the selected public sector banks.

H_1 = There is a significant difference in the composite liquidity ratios of the selected public sector banks.

Hypothesis-6

H_0 = There is no significant difference in the overall performance of the selected public sector banks.

H_1 = There is a significant difference in the overall performance of the selected public sector banks.

RESEARCH METHODOLOGY

Research design- This is a descriptive research study based on an analytical research design.

Sample design- The top 3 Indian public sector commercial bank is selected based on total assets. The selected banks are – State Bank of India, Punjab National Bank, and Bank of Baroda.

Period of the study- The study is based on 5 financial years data i.e. from 2015-16 to 2019-20.

Source of the data- The study is based on secondary data which are collected from the annual reports of the respective banks.

Tools used for analysis- To evaluate the performance of the banks, CAMEL ratios are calculated and the statistical tool one-way ANOVA is applied to test the hypothesis.

The Federal Financial Institution Examination Council adopted the CAMEL rating for the first time on November 13, 1979, and then adopted by the National Credit Union Administration in October 1987. The acronym CAMEL stands for – C= Capital Adequacy, A= Asset quality, M= Management efficiency, E= Earning quality, and L= Liquidity.

The following ratios have been calculated under the CAMEL model:

C	Capital adequacy	<ul style="list-style-type: none"> Capital to risk assets ratio (%) Debt – equity ratio (times) 	<ul style="list-style-type: none"> Advance to total assets (%) Investment in government securities to total investment (%)
A	Assets quality	<ul style="list-style-type: none"> Gross NPA to gross advance (%) Net NPA to net advance (%) 	<ul style="list-style-type: none"> Total investment to total assets (%) Net NPA to total assets (%)
M	Management efficiency	<ul style="list-style-type: none"> Total advance to total deposit (%) Business per employee (₹ in Crore) 	<ul style="list-style-type: none"> Net profit per employee (₹ in Crore)
E	Earning quality	<ul style="list-style-type: none"> Return on assets (%) Interest income to total income (%) 	<ul style="list-style-type: none"> Non-interest income to total income (%) Interest spread to total assets (%)
L	Liquidity	<ul style="list-style-type: none"> Liquid assets to total assets (%) Liquid assets to total deposits (%) 	<ul style="list-style-type: none"> Liquid assets to demand deposits (%) Government securities to total assets (%)

Limitations of the study

1. The study is based on secondary data. Hence the limitations of secondary data apply.
2. The study covers only 5 years.
3. The study is limited to only 3 banks i.e. SBI, PNB, and BOB.
4. The effects of the merger in SBI, PNB and BOB have been ignored.
5. Any abnormal event during the study period has been ignored.

ANALYSIS AND DISCUSSION

I. Capital Adequacy

Capital adequacy denotes whether the bank has enough capital to meet the unexpected losses. It also shows the

ability of the management to meet the further requirement of capital. It helps the bank to gain the depositors' confidence in the bank and it also defends against getting bankrupt. The following ratios are computed to measure capital adequacy:

1. **Capital to Risk-weighted Assets:** It measures the ability of the bank to cope up with unexpected losses. The minimum capital adequacy ratio as per BASEL norm III is 8% however as per the RBI guidelines the Indian scheduled commercial banks need to maintain 9% CAR while the public sector banks are highlighted to maintain a CAR of 12%. The higher the capital adequacy ratio the better it is. The capital to risk-weighted assets ratio is computed as follows:

Table 1: Capital to Risk-Weighted Assets Ratio (%)

Years	SBI	BOB	PNB
2015-16	13.21	13.17	11.28
2016-17	13.11	12.24	11.66
2017-18	12.6	12.13	9.2
2018-19	12.72	13.42	9.73
2019-20	13.06	13.5	14.14
MEAN	12.94	12.90	11.20
RANK	1	2	3
SD	0.24	0.59	1.73

$$\frac{\text{Tier I Capital} + \text{Tier II Capital}}{\text{Risk Weighted Assets}}$$

From the above table, we observe that SBI ranks first with the highest mean capital to risk-weighted assets ratio of 12.94% followed by BOB and PNB.

2. **Debt-equity ratio:** The debt-equity ratio shows the financial leverage of the bank. It

measures how much the bank is financed with debt and how much with equity. It is the proportion of total outside liability to net worth, a high debt-equity ratio denotes high leverage.

Table 2: Debt-equity Ratio (Times)

Years	SBI	BOB	PNB
2015-16	13.44	14.53	15.33
2016-17	13.13	14.98	15.31
2017-18	13.16	14.35	16.49
2018-19	13.95	14.6	15.71
2019-20	13.93	13.98	12.03
MEAN	13.52	14.49	14.97
RANK	1	2	3
SD	0.36	0.33	1.53

$$\frac{\text{Outside liability}}{\text{Net Worth}}$$

From the above table, we observe that SBI ranked first with a debt-equity ratio of 13.52 times whereas BOB and PNB ranked second and third respectively.

yields better profitability. A higher ratio is favoured.

3. **Total Advance to Total Assets:** The total advance to total assets ratio implies a bank's aggressiveness in lending which ultimately

Table 3: Advance to Total Assets (%)

$\frac{\text{Total Advances}}{\text{Total Assets}}$

Years	SBI	BOB	PNB
2015-16	62.95	56.64	62.58
2016-17	55.06	54.54	57.85
2017-18	54.2	58.56	56.33
2018-19	57.27	59.07	58.52
2019-20	56.56	58.88	56
MEAN	57.21	57.54	58.26
RANK	3	2	1
SD	3.07	1.73	2.36

From the above table, we observe that Bank of Baroda ranked first with the mean advance to total assets ratio of 57.54% whereas Punjab National Bank and State Bank of India ranked 2nd and 3rd respectively.

associated with the total investment of the bank. Investment in government securities is risk-free hence, the more the bank invests in government securities the lesser is the risk. The higher ratio is favoured.

4. **Investment in Government Securities to Total Investment:** This ratio points out the risk

Table 4: Investment in Government Securities to Total Investment (%)

$\frac{\text{Investment in Government Securities}}{\text{Total Investment}}$

Years	SBI	BOB	PNB
2015-16	77.22	85	79.74
2016-17	76.82	86.18	79.15
2017-18	77.01	86.84	76.98
2018-19	74.35	87.6	80.33
2019-20	72.75	89.2	85.65
MEAN	75.63	86.95	80.37
RANK	3	1	2
SD	1.78	1.41	2.87

From the above table, we observe that the Bank of Baroda ranked 1st with investment in government securities to total securities of 86.95% while the Punjab

National Bank and the State Bank of India ranked 2nd and 3rd respectively.

5. Composite Capital Adequacy

Table 5: Composite Capital Adequacy

BANKS	CAPITAL ADEQUACY		DEBT EQUITY RATIO		ADVANCE/TOTAL ASSETS		GOVERNMENT SECURITIES / TOTAL INVESTMENT		GROUP RANK	
	%	RANK	TIMES	RANK	%	RANK	%	RANK	AVERAGE	RANK
SBI	12.94	1	13.52	1	57.21	3	75.63	3	2	2
BOB	12.9	2	14.49	2	57.54	2	86.95	1	1.75	1
PNB	11.2	3	14.97	3	58.26	1	80.37	2	2.25	3

From the above table, we observe that the Bank of Baroda ranked 1st in overall capital adequacy ratio while

the State bank of India ranked 2nd, and the Punjab National Bank ranked 3rd.

Table 6: Composite Capital Adequacy- Hypothesis Test ANOVA: SINGLE FACTOR

Groups	Count	Sum	Average	Variance
Capital adequacy	3	37.04	12.35	0.99
Debt equity ratio	3	42.98	14.33	0.55
Advance/total assets	3	173.01	57.67	0.29
Investment in Government Securities to Total Assets	3	242.95	80.98	32.32

ANOVA: Variation

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	10225.79	3	3408.6	399.39	4.75E-09	4.07
Within Groups	68.28	8	8.53			
Total	10294.06	11				

From the above analysis, we observe that the F value (399.39) is more than the F critical value (4.07), hence the null hypothesis is rejected and the alternative hypothesis is accepted. Hence there is a significant difference among the composite capital adequacy ratios of the banks.

II. Asset Quality

It is important to measure the asset quality as this affects significantly the financial health of a bank. The primary aim is to measure the bad loans or non-performing assets as a percentage of the total assets of the bank. This helps us to identify the quality and kind of loans and advances made by the bank. The quality of advances has a direct impact on the earning ability of a bank. Any bad loan

leads to a reduction in the capital as it is ultimately written-off against the capital. The following ratios are calculated to measure the asset quality of the banks:

- 1. Gross NPA to Gross Advance:** This ratio measures the quality of assets of the bank when the losses in non-performing assets are yet to be considered by the management. It also targets the quality of advances made by the bank. The gross non-performing assets include all the advances that are regarded as non-performing assets as per the guidelines of the Reserve Bank of India. A lower ratio indicates better asset quality.

Table 7: Gross NPA to Gross Advance (%)

$$\frac{\text{Gross NPAs}}{\text{Gross Advance}}$$

Years	SBI	BOB	PNB
2015-16	6.5	9.99	12.9
2016-17	9.11	10.46	12.53
2017-18	10.91	12.26	18.38
2018-19	7.53	9.61	15.5
2019-20	6.15	9.4	14.21
MEAN	8.04	10.34	14.70
RANK	1	2	3
SD	1.76	1.02	2.12

From the above table, we observe that the State Bank of India ranked 1st with a mean gross NPA to the gross advance ratio of 8.04% while the Bank of Baroda and Punjab National Bank ranked 2nd and 3rd respectively.

- 2. Net NPA to Net Advance:** It is the most standard measure to assess the quality of assets of

a bank. The net non-performing asset is obtained after deducting provisions from the gross NPA and adjusting interest. A lower ratio implies better asset quality.

Table 8: Net NPA to Net Advance (%)

$$\frac{\text{Net NPAs}}{\text{Net Advance}}$$

Years	SBI	BOB	PNB
2015-16	3.81	5.06	8.61
2016-17	3.71	4.72	7.81
2017-18	5.73	5.49	11.24
2018-19	3.01	3.33	6.56
2019-20	2.23	3.13	5.78
MEAN	3.7	4.35	8
RANK	1	2	3
SD	1.1	0.95	1.9

From the above table, we observe that the State bank of India ranked 1st with the mean net NPA to net advance ratio of 3.7%. The Bank of Baroda ranked 2nd with 4.35% whereas the mean net NPA to net advance ratio of the Punjab National Bank is significantly higher compared to SBI and BOB.

- 3. Total Investment to Total Assets:** This ratio points out the portion of the total assets that are invested by the bank instead of making advances. A Bank makes investments to protect itself from non-performing assets but it also decreases the profitability of a bank. A higher ratio displays the conservative policy of a bank.

Table 9: Total Investments to Total Assets (%)

$\frac{\text{Total Investments}}{\text{Total Assets}}$	Years	SBI	BOB	PNB
	2015-16	23.74	18.65	23.17
2016-17	29.82	19.56	26.12	
2017-18	32.73	23.42	26.43	
2018-19	28.78	23.88	26.65	
2019-20	29.26	24.15	29.81	
MEAN	28.87	21.93	26.44	
RANK	3	1	2	
SD	2.91	2.34	2.11	

From the above table, we observe that the Bank of Baroda ranked 1st with the mean total investment to total assets of 21.93% followed by the Punjab National Bank and the State Bank of India.

4. **Net NPA to Total Assets:** This ratio helps to assess the efficiency of a bank in gauging the credit risk and recovering the debts. A lower ratio expresses the better performance of the bank.

Table 10: Net NPA to Total Assets (%)

$\frac{\text{Net NPAs}}{\text{Total Assets}}$	Years	SBI	BOB	PNB
	2015-16	2.47	2.81	6.43
2016-17	2	2.52	6.56	
2017-18	3.21	3.14	4.83	
2018-19	1.79	1.9	2.79	
2019-20	1.31	1.8	2.33	
MEAN	2.15	2.43	4.6	
RANK	1	2	3	
SD	0.65	0.52	1.77	

From the above table, we observe that the State Bank of India ranked 1st with the mean net NPA to total assets

ratio of 2.15% whereas the Bank of Baroda and the Punjab National Bank ranked 2nd and 3rd respectively.

5. Composite Asset Quality

Table 11: Composite Asset Quality

BANK S	GROSS NPA/Gross ADVANCE		NET NPA/NET ADVANCE		TOTAL INVESTMENT / TOTAL ASSETS		NET NPA/ TOTAL ASSETS		GROUP RANK	
	%	RANK	%	RANK	%	RANK	%	RANK	AVERAGE	RANK
SBI	8.04	1	3.7	1	28.87	3	2.15	1	1.5	1
BOB	10.34	2	4.35	2	21.93	1	2.43	2	1.75	2
PNB	14.7	3	8	3	26.44	2	4.6	3	2.75	3

From the above table, we observe that in terms of overall asset quality, the State Bank of India ranked 1st in the

group followed by the Bank of Baroda and the Punjab National Bank.

Table 12: Composite Asset Quality- Hypothesis Test

ANOVA: SINGLE FACTOR

Groups	Count	Sum	Average	Variance
Gross NPA to net advance	3	33.08	11.02667	11.44253
Net NPA to Net Advance	3	16.05	5.35	5.3725
Total investment to total assets	3	77.24	25.75	12.40
Net NPA to Total assets	3	9.18	3.06	1.8

ANOVA: VARIATION

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	936.24	3	312.08	40.25	3.58E-05	4.07
Within Groups	62.03	8	7.75			
Total	998.27	11				

From the above analysis, we observe that the F value (40.25) is more than the F critical value (4.07), therefore the null hypothesis is rejected and the alternative hypothesis is accepted. Hence there is a significant difference among the asset quality ratios of the banks.

III. Management Efficiency

Management is a technique of getting various work done by others in an efficient way and besides this, it includes coordinating human and non-human resources in an integrated way. So, an efficient management system is key to the success and prosperity of any organisation. So, in order to

identify the Management efficiency of the SBI, PNB and BOB, the following ratios are taken into consideration: -

- Total Advance to Total Deposits:** The ratio of total advance to total deposits shows the efficiency of the bank's management in converting the deposits into advances for earning interest income. It reflects the ability of the bank in mobilising and utilising the deposits. Even though the Reserve Bank of India has not set any specific standard, a higher ratio is desirable.

Table 13: Total Advances to Total Deposits (%)

Years	SBI	BOB	PNB
2015-16	82.98	66.73	78.21
2016-17	72.96	65.2	67.37
2017-18	72	72.09	67.67
2018-19	75.73	72.75	67.82
2019-20	72.52	72.6	67.14
MEAN	75.24	69.88	69.64
RANK	1	2	3
SD	4.08	3.24	4.29

$$\frac{\text{Total Advances}}{\text{Total Deposits}}$$

From the above table, we observe that the State Bank of India ranked 1st with the mean total advances to total deposits ratio of 75.24% followed by the Bank of Baroda and the Punjab National Bank.

- Business per Employee:** This ratio points out the productivity of the bank's employees. It

reflects the competence of the bank's employees in generating business for the bank. The higher ratio indicates the higher productivity of the employees.

Table 14: Business per Employee (₹ in Crore)

Years	SBI	BOB	PNB
2015-16	14.11	16.8	13.59
2016-17	16.24	17.49	14.17
2017-18	16.7	17.66	14.74
2018-19	18.77	18.77	16.8
2019-20	21.05	18.88	18.14
MEAN	17.37	17.92	15.49
RANK	2	1	3
SD	2.31	0.79	1.72

$$\frac{\text{Deposites} + \text{Advances}}{\text{Number of Employees}}$$

From the above table, we observe that the Bank of Baroda ranked 1st with the mean business per employee ratio of ₹ 17.92 crores followed by the State Bank of India and the Punjab National Bank.

- Net Profit per Employee:** This ratio of net profit per employee shows the average profit earned per employee of a bank. It reflects the efficiency of an employee at the branch level. The higher ratio indicates the higher efficiency of the employees.

Table 15: Net Profit per Employee (₹ in Crore)

Years	SBI	BOB	PNB
2015-16	0.47	-0.1	-0.06
2016-17	0.51	0.026	0.02
2017-18	-0.24	-0.04	-0.17
2018-19	0.03	0.008	-0.15
2019-20	0.58	0.007	0.53
MEAN	0.27	-0.02	0.03
RANK	1	3	2
SD	0.32	0.04	0.26

$$\frac{\text{PAT}}{\text{Number of Employees}}$$

From the above table, we observe that the State Bank of India ranked 1st with mean net profit per employee of ₹ 0.27 crore followed by the Punjab National Bank and the Bank of Baroda.

3. Composite Management Efficiency

Table 16: Composite Management Efficiency

BANKS	TOTAL ADVANCE/ TOTAL DEPOSITS		BUSINESS PER EMPLOYEE		NET PROFIT PER EMPLOYEE		GROUP RANK	
	%	RANK	₹	RANK	₹	RANK	AVERAGE	RANK
SBI	75.24	1	17.37	2	0.27	1	1.33	1
BOB	69.88	2	17.92	1	-0.02	3	2	2
PNB	69.64	3	15.49	3	0.03	2	2.67	3

From the above table, we observe that the State Bank of India ranked 1st in the group rank. The Bank of Baroda and the Punjab National Bank ranked 2nd and 3rd respectively.

**Table 17: Composite Management Efficiency- Hypothesis Test
ANOVA: SINGLE FACTOR**

Groups	Count	Sum	Average	Variance
TOTAL ADVANCE/ TOTAL DEPOSITS	3	214.76	71.59	10.02
BUSINESS PER EMPLOYEE	3	50.78	16.93	1.62
NET PROFIT PER EMPLOYEE	3	0.28	0.09	0.02

ANOVA: VARIATION

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	8382.37	2	4191.19	1077.22	2.14E-08	5.14
Within Groups	23.34	6	3.89			
Total	8405.72	8				

From the above analysis, we observe that the F value (1077.22) is more than the F critical value (5.14), therefore the null hypothesis is rejected and the alternative hypothesis is accepted. Hence there is a significant difference among the management efficiency ratios of the banks.

IV. Earning Quality

It is another important measure under the CAMEL model. It not only helps to measure the quality of earning but also highlights the issue of sustainability and growth of the bank's future earnings. It is used to figure out the profitability of a

bank. It also helps a bank to boost the confidence of different stakeholders in the bank. The following ratios are calculated to measure the earning ability of the banks:

- 1. Return on Assets:** It measures the efficiency of the bank in the utilization of assets to generate profit. Banks that utilise their assets efficiently yield higher net profit. The higher ratio indicates better utilisation of the assets and hence the higher ratio is favoured.

$$\frac{\text{Net Profit}}{\text{Total Assets}}$$

Table 18: Return on Assets (%)

Years	SBI	BOB	PNB
2015-16	0.46	-0.8	-0.61
2016-17	0.41	0.2	0.19
2017-18	-0.19	-0.34	-1.6
2018-19	0.02	0.06	1.25
2019-20	0.38	0.05	0.04
MEAN	0.216	-0.166	-0.15
RANK	1	3	2
SD	0.29	0.41	1.05

From the above table, we observe that the State Bank of India ranked 1st with the mean return on assets of 0.216% while the Punjab National Bank and the Bank of Baroda ranked 2nd and 3rd respectively.

2. Interest Income to Total Income: The primary source of income of a bank is the interest income earned on the advances made by it. A higher interest income to total income is

always regarded better as it ensures a consistent flow of income to the bank in its normal course of operation.

Table 19: Interest Income to Total Income (%)

$\frac{\text{Interest Income}}{\text{Total Income}}$	Years	SBI	BOB	PNB
	2015-16	81.3	88.43	87.92
	2016-17	77.17	84.86	83.98
	2017-18	74.7	85.21	84.57
	2018-19	76.6	87.03	87.62
	2019-20	73.33	86.62	85.4
	MEAN	76.62	86.43	85.9
	RANK	3	1	2
	SD	2.71	1.29	1.6

From the above table, we observe that the Bank of Baroda ranked 1st with the mean interest income to total income ratio of 86.43% followed by the Punjab National Bank and the State Bank of India.

3. Non-interest Income to Total Income: It shows the proportion of total income generated from non-interest income. It displays the potential of a bank to generate non-interest income.

Table 20: Non-interest Income to Total Income (%)

$\frac{\text{Non interest Income}}{\text{Total Income}}$	Years	SBI	BOB	PNB
	2015-16	18.7	11.6	12.07
	2016-17	22.83	15.14	16.01
	2017-18	25.3	14.79	15.41
	2018-19	23.4	12.97	12.37
	2019-20	26.67	13.38	14.59
	MEAN	23.38	13.58	14.09
	RANK	1	3	2
	SD	2.71	1.29	1.6

From the above table, we observe that the State Bank of India ranked 1st with the mean non-interest income to total income of 23.38% followed by the Punjab National Bank and the Bank of Baroda.

income earned and the interest expended. A higher interest spread to total assets ratio shows better profitability.

4. Interest Spread to Total Assets: Interest spread is the difference between the interest

Table 21: Interest Spread to Total Assets (%)

$\frac{\text{Interest Spread}}{\text{Total Assets}}$	Years	SBI	BOB	PNB
	2015-16	2.65	1.98	2.31
	2016-17	2.36	2.07	2.09
	2017-18	2.28	2.26	1.95
	2018-19	2.51	2.49	2.22
	2019-20	2.59	2.4	2.1
	MEAN	2.49	2.24	2.13
	RANK	1	2	3
	SD	0.14	0.19	0.12

From the above table, we observe that the State Bank of India ranked 1st with mean interest spread to total assets

ratio of 2.49% whereas the Bank of Baroda and the Punjab National Bank ranked 2nd and 3rd respectively.

5. Composite Earning Quality

Table 22: Composite Earning Quality

BANKS	RETURN ON ASSETS		INTEREST INCOME TO TOTAL INCOME		NON-INTEREST INCOME TO TOTAL INCOME		INTEREST SPREAD TO TOTAL ASSETS		GROUP RANK	
	%	RANK	%	RANK	%	RANK	%	RANK	AVERAGE	RANK
SBI	0.22	1	76.62	3	23.38	1	2.49	1	1.5	1
BOB	-0.16	3	86.43	1	13.58	3	2.24	2	2.25	2.5
PNB	-0.15	2	85.9	2	14.09	2	2.13	3	2.25	2.5

From the above table, we observe that the State Bank of India ranked 1st in the group rank whereas the Bank of Baroda and the Punjab National Bank performed identically and hence secured the same group rank 2.5.

Table 23: Composite Earning Quality- Hypothesis Test

ANOVA: SINGLE FACTOR

Groups	Count	Sum	Average	Variance
RETURN ON ASSETS	3	-0.1	-0.03	0.05
INTEREST INCOME TO TOTAL INCOME	3	248.95	82.98	30.44
NON-INTEREST INCOME TO TOTAL INCOME	3	51.05	17.01	30.43
INTEREST SPREAD TO TOTAL INCOME	3	6.86	2.29	0.03

ANOVA: VARIATION

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	13701.28	3	4567.094	299.71	1.48E-08	4.07
Within Groups	121.908	8	15.24			
Total	13823.19	11				

From the above analysis, we observe that the F value (299.71) is more than the F critical value (4.07), therefore the null hypothesis is rejected and the alternative hypothesis is accepted. Hence there is a significant difference among the earning quality ratios of the banks.

V. Liquidity

Liquidity shows the capacity of any concern to encounter its financial obligation whenever it is required; at the same time, it also ensures that the concern can easily convert its assets into cash with minimal loss. But banks should take every step very

carefully to hedge their risk of liquidity as too much liquidity harms the profit of any concern, on the other hand, less liquidity can increase insolvency. The following ratios are calculated to measure the liquidity of the banks:

- Liquid Assets to Total assets:** This ratio measures the complete presentation of a bank in liquidity as this ratio build image of the bank among its stakeholder. A higher ratio display that a bank has the potential to achieve its financial responsibility.

Table 23: Liquid assets to Total Assets (%)

$$\frac{\text{Liquid assets}}{\text{Total Assets}}$$

Years	SBI	BOB	PNB
2015-16	6.87	19.82	10.8
2016-17	7.93	21.42	12.46
2017-18	5.4	13.03	12.51
2018-19	5.8	11.94	9.79
2019-20	6.06	10.92	9.13
MEAN	6.41	15.43	10.94
RANK	3	1	2
SD	0.89	4.32	1.37

From the above table, we observe that the Bank of Baroda ranked 1st with the mean liquid assets to total assets of 15.43% followed by the Punjab National Bank and the State Bank of India.

- Liquid Assets to Total Deposits:** This ratio helps to access the liquidity available among its depositor. A higher ratio expresses superior surety on depositor's deposit.

Table 24: Liquid assets to Total deposits. (%)

Liquid Assets
Total Deposit

Years	SBI	BOB	PNB
2015-16	9.06	23.35	13.51
2016-17	10.51	24.96	14.51
2017-18	7.17	16.03	15.03
2018-19	7.67	14.71	11.34
2019-20	7.77	13.46	10.95
MEAN	8.44	18.50	13.07
RANK	3	1	2
SD	1.21	4.71	1.65

From the above table, we observe that the Bank of Baroda ranked 1st with the mean liquid assets to total deposits of 18.50% followed by the Punjab National Bank and the State Bank of India.

meet the demand of depositor's in a precise year. To provide higher liquidity, the bank has to finance its deposits in extremely liquid form.

- 3. Liquid Assets to Demand Deposit:** This ratio measures the efficiency of a bank to

Table 25: Liquid assets to Demand deposits. (%)

Liquid Assets
Demand Deposit

Years	SBI	BOB	PNB
2015-16	119.62	385.43	202.75
2016-17	144.64	352.38	194.78
2017-18	102.23	206.17	235.37
2018-19	108.23	202.95	170.16
2019-20	110.85	198.31	167.01
MEAN	117.114	269.05	194.01
RANK	3	1	2
SD	14.85	82.24	24.84

From the above table, we observe that the Bank of Baroda ranked 1st with the mean liquid assets to demand deposits of 268.05% followed by the Punjab National Bank and the State Bank of India.

- 4. Government Security to Total assets:** This ratio expresses a parallel relation among total funds invested in Government security. The higher ratio indicates lower risk in depositing funds.

Table 26: Government Security to Total assets. (%)

Government Security
Total Assets

Years	SBI	BOB	PNB
2015-16	18.33	15.85	18.47
2016-17	22.91	16.86	20.67
2017-18	25.21	20.34	20.35
2018-19	21.4	20.92	21.4
2019-20	21.29	21.53	25.53
MEAN	21.83	19.1	21.28
RANK	1	3	2
SD	2.25	2.25	2.33

From the above table, we observe that the State Bank of India ranked 1st with the mean return on assets of

21.83% while the Punjab National Bank and the Bank of Baroda ranked 2nd and 3rd respectively.

5. Composite liquidity

Table 27: COMPOSITE LIQUIDITY

BANKS	LIQUID ASSETS TO TOTAL ASSETS		LIQUID ASSETS TO TOTAL DEPOSITS		LIQUID ASSETS TO DEMAND DEPOSITS		GOVERNMENT SECURITIES TO TOTAL ASSETS		GROUP RANK	
	%	RANK	%	RANK	%	RANK	%	RANK	AVERAGE	RANK
SBI	6.41	3	8.44	3	117.14	3	21.83	1	2.5	3
BOB	15.43	1	18.5	1	269.05	1	19.1	3	1.5	1
PNB	10.94	2	13.07	2	194.01	2	21.28	2	2	2

From the above table, we observe that in terms of overall liquidity, the State Bank of India ranked 1st followed by the Punjab National Bank and Bank of Baroda.

Table 28: Composite liquidity- Hypothesis Test

ANOVA: SINGLE FACTOR

Groups	Count	Sum	Average	Variance
LIQUID ASSETS TO TOTAL ASSETS	3	32.78	10.93	20.34
LIQUID ASSETS TO TOTAL DEPOSITS	3	40.01	13.34	25.35
LIQUID ASSETS TO DEMAND DEPOSITS	3	580.2	193.4	5769.44
GOVERNMENT SECURITIES TO TOTAL ASSETS	3	62.21	20.74	2.085

ANOVA: VARIATION

Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	71766.56	3	23922.19	16.45	0.000878	4.07
Within Groups	11634.44	8	1454.305			
Total	83401	11				

From the above analysis, we observe that the F value (16.45) is more than the F critical value (4.07), hence the null hypothesis is rejected and the alternative hypothesis is accepted. Hence there is a significant difference among the composite liquidity ratios of the banks.

Composite ranking: In order to analyses the overall performance of SBI, BOB and PNB, composite ranking is presented:

Table 29: COMPOSITE RANKING

BANKS	C	A	M	E	L	AVERAGE	RANK
SBI	2	1.5	1.33	1.5	2.5	1.76	1
BOB	1.75	1.75	2	2.25	1.5	1.91	2
PNB	2.25	2.75	2.67	2.25	2	2.38	3

The above table outlines the overall performance of respected banks under CAMEL analysis of the past 5 years. State bank of India ranked 1st under CAMEL analysis followed by the Bank of Baroda. The Punjab National Bank occupied the last position among all the three banks.

ANOVA RESULTS

One-way Anova test is applied to ascertain whether there is any significant difference in the means of CAMEL ratio.

ANOVA: SINGLE FACTOR

Groups	Count	Sum	Average	Variance
C	3	6	2	0.0625
A	3	6	2	0.4375
M	3	6	2	0.4489
E	3	6	2	0.1875
L	3	6	2	0.25

ANOVA: VARIATION

ANOVA	SS	df	MS	F	P-value	F crit
Source of Variation						
Between Groups	4.44E-16	4	1.11E-16	4E-16	1	3.47805
Within Groups	2.7728	10	0.27728			
Total	2.7728	14				

From the above analysis, we observe that the F value (4) is more than the F critical value (3.47805), therefore the null hypothesis is rejected and the alternative hypothesis is accepted. Hence there is a significant difference among the CAMEL ratios of the banks.

FINDINGS & CONCLUSION

The following are our findings after applying the CAMEL model analysis to the three public sector commercial banks, namely- State Bank of India (SBI), Punjab National Bank (PNB) and Bank of Baroda (BOB).

1. The Bank of Baroda has the highest capital adequacy followed by the SBI and the BOB.
2. In terms of asset quality, the State Bank of India tops among the three banks. The Bank of Baroda and the Punjab National Bank secured 2nd and 3rd position respectively.
3. The State Bank of India is the top performer in terms of management efficiency while the Punjab National bank stood the last. The Bank of Baroda ranked 2nd among the three banks.
4. The earning quality is the best in the State Bank of India among the three banks whereas the Punjab National Bank and the Bank of Baroda have identical earning quality in terms of composite group ranking but as per the hypothesis test, there is a significant difference among the earning quality ratios.
5. Under the fifth parameter of CAMEL i.e. liquidity, the Bank of Baroda performed better than the other two banks. The State Bank of India ranked 2nd whereas the Punjab National bank stood the last.
6. To understand the overall performance of the banks under the CAMEL model analysis, the composite ranking was calculated. The State Bank of India showed the all-round performance and stood 1st among the three banks whereas the Bank of Baroda and the Punjab National Bank ranked 2nd and 3rd respectively.

From the present study, it is quite clear that the State Bank of India outperformed the other two banks – BOB & PNB. Going deep into the results, the SBI found to be lacking in the capital adequacy as well as in the liquidity aspect of the CAMEL model, hence it is advisable to improve the capital adequacy and liquidity of the bank. The BOB stood 2nd among the three banks. It is falling short in the 3rd & 4th parameter of the CAMEL model i.e. the earning quality and the management efficiency. The bank should stress on improving its earning and management efficiency. The Punjab National Bank, the second-largest public sector bank of India is struggling to compete with the other two banks. The bank has failed to perform in almost all the parameters. The management should try to improve the performance of the bank considering all the aspects of the CAMEL model ratios.

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