

Assessing the Financial Performance of Public Sector Banks in India: An ANOVA-Based Study (2010–2020)

Dr. Nandkumar Baburao Bodhgire

Associate Professor in Economics,
School of Social Sciences,
SRTM University, Nanded, Maharashtra

Abstract:

The current article examines the financial performance of all public sector banks in India from 2010 to 2020. This research selected the following variables: the ratio of interest income to total assets, the ratio of net interest income to total assets (net interest margin), the ratio of non-interest income to total assets, the ratio of operational profits to total assets, and the ratio of non-performing assets to total assets. Additionally, return on Equity (ROE), Return on Investments, Capital Adequacy Ratio - Tier I and Tier II, and the ratio of net non-performing assets to net loans are used to assess bank financial performance. Secondary data is taken and analyzed using the ANOVA technique. The study also highlights year-wise financial performance differences among public banks during 2010 to 2020.

Keywords: *Ratio of interest income to total assets, Ratio of net interest income to total assets (Net Interest Margin), Ratio of non-interest income to total assets, Ratio of operating profits to total assets, Ratio of non-interest income to total assets, return on equity, Return on investments, Capital adequacy ratio*

I. Introduction:

Sound financial decisions and efficient resource allocation are key drivers of a country's economic development, with the financial sector playing a crucial role. According to Neeraj Hatekar and Sanjay Singh (2014), the relationship between economic growth and the financial system depends on its size and structure. In India, banks mobilize household savings and extend loans, significantly impacting the economy. Post-liberalization in 1991, competition intensified with the entry of private and foreign banks. T. Narayanaswamy and A.P. Muthulakshmi (2014) analyzed the efficiency of private banks from 2008–2013 using data

envelopment analysis. Biswa N. Bhattacharyay (1989) highlighted challenges like service marketing and complexity post-1990s. A financial comparison from 2007–2012 showed SBI leading in earnings per share (EPS), while HDFC excelled in return on equity, price-earnings ratio, and profit margin. (P. Hanumantha Rao & Subhendu Dutta, 2014).

II. Research Objectives:

- 1) To measure the financial performance of public sector banks in India
- 2) To make a comparative analysis among public sector banks in India during 2010 to 2020 selecting some financial variables.

III. Research Hypotheses:

1. H01: There is no significant relationship among public sector banks in terms of their financial performance.
2. H02: There is no significant year-wise relationship among public sector banks in their financial variables.

IV. Research Methodology:

This study used a quantitative approach to assess the financial performance of 12 public sector banks in India from 2010 to 2020. Relying on secondary data from annual reports and official sources, the analysis focused on key financial ratios such as interest income to total assets, NIM, non-interest income, ROA, ROE, CAR, and NPAs. ANOVA was applied to identify significant year-wise differences and trends across banks, highlighting profitability, efficiency, and risk management. The findings aimed to offer a clear picture of the financial health of public sector banks over the decade.

The study included 12 public sector banks (PSBs) that existed consistently throughout the 2010–2020 period. In cases where banks underwent mergers during or after this period (e.g., the merger of Bank of Baroda with Vijaya Bank and Dena Bank in 2019), only the data pertaining to the parent bank (e.g., Bank of Baroda) was considered for consistency. Merged entities were not treated as separate units post-merger; the analysis is based on consolidated data of the primary institution wherever applicable, to maintain continuity and comparability across the full study period.

V. Financial Ratio Data Analysis and Results:

1. Ratio of Interest Income to Total Assets: This ratio reflects banks' dependence on interest from loans for financing. A high ratio is generally favorable (though an excessively high ratio may not always be ideal), while a low ratio may suggest reliance on non-interest sources of financing.

2. Ratio of Net Interest Income to Total Assets (Net Interest Margin): NIM measures the net return on a bank's earning assets, including investment securities, loans, and leases. It is calculated as the ratio of interest income less interest expenditure to earning assets.

$$\text{NIM} = \frac{\text{Net interest income}}{\text{Earning assets}}$$

$$\text{Net interest income} = \text{Interest income} - \text{Interest expense}$$

3. Ratio of Non-Interest Income to Total Assets: This ratio is used by banks and financial institutions to determine how much of their revenue comes from non-interest sources. Non-interest income includes revenue generated from fees, service charges, penalties, and other non-core activities, rather than interest on loans and deposits.

4. Ratio of Operating Profits to Total Assets: The operational profit ratio represents the amount of money a firm earns from its activities. It indicates the financial sustainability of a company's core operations prior to any financial or tax implications.

5. Return on Assets (ROA): The term "return on assets" (ROA) refers to a financial ratio that measures a company's profitability in comparison to its total assets. Corporate management, analysts, and investors may use ROA to evaluate

how effectively a firm uses its assets to generate profits.

$$\text{Return on Assets} = \frac{\text{Net Income}}{\text{Total Assets}}$$

6. Return on Equity (ROE): ROE measures a company's financial performance. It is computed by dividing net income by shareholder equity. Because shareholders' equity equals a company's assets less its debt, ROE is a technique for displaying a company's return on net assets. ROE is seen as a measure of a company's profitability and efficiency in generating earnings. The greater the ROE, the better a company's management is at generating revenue and growth from its equity financing.

$$\text{ROE} = \frac{\text{Shareholder Equity}}{\text{Net Income}}$$

7. Return on Investments (ROI):

ROI is a performance metric used to assess the efficiency or profitability of an investment, or to compare the efficiency of various investments. ROI attempts to directly evaluate the amount of return on a certain investment compared to its cost. The original investment amount, ongoing maintenance expenses, and the cash flow generated by the investment are all important considerations in determining ROI.

$$\text{ROI} = \frac{\text{Current Value of Investment} - \text{Cost of Investment}}{\text{Cost of Investment}}$$

8. Capital Adequacy Ratio (CAR):

The CAR, also known as the capital-to-risk weighted assets ratio (CRAR), measures how effectively a bank can meet its commitments. This ratio compares a bank's capital to its risk-weighted assets and is used by regulators to assess the bank's likelihood of collapse. CAR protects depositors and promotes the stability and efficiency of financial institutions globally.

9. Capital Adequacy Ratio - Tier I:

Tier 1 capital is the core capital in a bank's reserves used to finance business operations for its customers. It includes common stock, reported reserves, and some other assets. Along with Tier 2 capital, the level of a bank's Tier 1 capital reserves is used to determine the institution's financial strength.

10. Capital Adequacy Ratio - Tier II:

Tier 2 capital is one component of a bank's required reserves. It includes revaluation reserves, hybrid instruments, and subordinated term loans. Tier 2 capital is considered less safe than Tier 1 capital because it is more difficult to liquidate.

11. Ratio of Net NPA to Net Advances:

NPAs can be calculated as a proportion of total advances. This ratio provides an estimate of how much of the overall advances are unrecoverable. The GNPA (Gross Non-Performing Assets) ratio is calculated as the ratio of total GNPA to total advances. The NNPA ratio is calculated by dividing net NPA by total advances.

$$\text{NPA Ratio} = \frac{\text{Non-Performing Assets}}{\text{Total Loans}} \times 100$$

Public Sector Banks

Table 1. Ratio of Interest Income to Total Assets.

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State bank of India	6.74	6.81	7.16	6.93	7.44	7.94	8.12	8.25	8.32	7.15	7.04
Bank of India	6.61	6.60	6.16	6.36	6.80	7.29	7.39	7.62	7.74	6.95	7.14
Bank of Maharashtra	6.90	6.76	7.03	7.53	8.50	8.97	9.44	9.24	8.61	7.54	7.28
Canara Bank	6.90	7.14	6.87	7.28	8.00	8.41	8.75	8.67	8.69	7.64	7.74
Central bank of India	6.86	6.89	7.29	7.72	8.39	8.78	8.76	8.78	8.71	7.76	7.30
Indian Bank	7.26	7.20	7.27	7.60	8.19	8.34	8.71	9.14	9.30	8.39	8.32
Indian Overseas bank	6.82	7.08	7.24	7.56	8.40	8.54	8.73	8.91	8.98	7.81	8.13
Punjab and Sind Bank	7.57	7.68	7.56	8.20	8.73	8.93	9.11	9.57	9.15	7.88	8.03
Punjab National bank	6.70	6.66	6.46	6.81	7.46	8.03	8.40	8.94	8.72	8.00	7.88
Uco Bank	6.49	6.42	6.27	6.86	7.56	7.98	8.33	8.84	8.51	7.56	7.65
Union Bank of India	7.13	6.94	6.97	7.62	8.19	8.73	8.81	8.75	8.44	7.63	7.47
Bank of Baroda	6.78	6.63	6.17	6.18	6.36	6.25	6.45	7.08	7.37	6.87	6.61

Source of Data: www.iba.org.in

The ratio of interest income to total assets from 2010 to 2020 highlights differences in asset utilization among public sector banks. SBI and Canara Bank showed stable and higher ratios, indicating strong core banking performance. In contrast, Bank of Baroda showed a declining trend

post-2013, suggesting possible inefficiencies or revenue shifts. Banks like Bank of Maharashtra had fluctuating but generally higher ratios, reflecting a greater reliance on interest income. Overall, the data reveals varied efficiency levels and risk profiles across PSBs.

Table 2. ANOVA Result:

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	30.84752	11	2.80432	28.09859	4.73E-27	1.876732
Columns	55.37862	10	5.537862	55.488	2.38E-38	1.917827
Error	10.97832	110	0.099803			
Total	97.20446	131				

The ANOVA results reveal statistically significant differences across both row and column factors. The F-values for rows (28.10) and columns (55.49) far exceed

their respective critical values, with extremely low P-values, indicating strong significance. Hence, the null hypotheses are rejected, confirming notable variations across both dimensions in the dataset.

Table 3. Ratio of Net Interest Income to Total Assets (Net Interest Margin)

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank Of India	2.57	2.48	2.43	2.44	2.60	2.86	2.93	3.06	3.38	2.86	2.35
Bank Of India	2.38	2.21	1.70	1.91	1.91	1.91	2.11	2.16	2.26	2.49	2.30
Bank Of Maharashtra	2.57	2.33	2.15	1.98	2.53	2.74	2.77	2.92	3.00	2.67	1.99
Canara Bank	1.85	2.21	2.03	1.74	1.77	1.86	1.98	2.00	2.17	2.56	2.35
Central Bank Of India	2.22	2.06	1.98	2.06	2.29	2.41	2.33	2.30	2.35	2.71	1.54
Indian Bank	2.58	2.63	2.66	2.44	2.24	2.35	2.49	2.98	3.36	3.62	3.41
Indian Overseas Bank	2.08	2.12	2.21	1.99	1.92	1.92	2.15	2.26	2.52	2.72	2.51
Punjab And Sind Bank	1.96	2.05	2.12	2.17	2.17	1.75	1.85	2.14	2.12	2.49	2.42
Punjab National Bank	2.17	2.23	2.01	2.16	2.41	2.87	3.14	3.17	3.21	3.50	3.12
Uco Bank	2.18	1.93	1.40	1.60	1.98	2.29	2.77	2.42	2.27	2.56	1.87
Union Bank Of India	2.19	2.08	1.98	2.08	2.11	2.30	2.37	2.63	2.73	2.88	2.35
Bank Of Baroda	2.45	2.46	2.19	1.98	1.84	1.92	1.98	2.28	2.56	2.76	2.35

Source of Data: www.iba.org.in

The Net Interest Margin (NIM) data from 2010 to 2020 shows significant variation among public sector banks. SBI experienced a steady decline in NIM, dropping from 3.38% in 2012 to 2.57% in 2020. Indian Bank maintained a relatively strong NIM, peaking in 2011 and

stabilizing around 2.58% by 2020. Punjab National Bank and Bank of Maharashtra had mostly stable NIMs with slight fluctuations, while Canara Bank showed a consistent decline from 2.56% to 1.85%, indicating weakening interest income efficiency over time.

Table 4 ANOVA Result:

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	8.906455	11	0.809678	12.7256	3.12E-15	1.876732
Columns	7.084982	10	0.708498	11.13537	6.2E-13	1.917827
Error	6.99885	110	0.063626			
Total	22.99029	131				

In this ANOVA analysis, both the rows and columns factors exhibit significant differences. The F-value for rows is 12.7256 with a P-value of 3.12E-15, which is substantially lower than the critical value (F crit = 1.876732). Similarly, the F-value for columns is 11.13537 with a P-value of 6.2E-13, also well below the critical value

(F crit = 1.917827). These results indicate that both row and column categories have statistically significant differences. Consequently, the null hypotheses for both rows and columns are rejected, demonstrating that there are significant variations among the row and column groups in the data.

Table 5. Ratio of Non-Interest Income to Total Assets.

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank Of India	1.19	1.03	1.45	1.40	1.26	1.18	1.10	1.11	1.12	1.39	1.48
Bank Of India	1.05	0.75	0.93	1.10	0.59	0.70	0.84	0.90	0.90	0.84	1.05
Bank Of Maharashtra	0.99	0.96	0.95	0.94	0.66	0.71	0.71	0.88	0.76	0.72	0.91
Canara Bank	1.10	1.00	1.16	1.33	0.89	0.88	0.87	0.80	0.82	0.94	1.18
Central Bank Of India	1.06	0.73	0.80	0.90	0.63	0.63	0.69	0.67	0.63	0.64	1.05
Indian Bank	1.12	0.71	1.02	1.05	0.90	0.72	0.78	0.84	0.94	1.06	1.42
Indian Overseas Bank	1.32	1.69	1.51	1.29	0.90	0.76	0.84	0.85	0.84	0.79	0.91
Punjab And Sind Bank	0.86	0.74	0.55	0.58	0.48	0.45	0.49	0.51	0.59	0.70	0.84
Punjab National Bank	1.16	0.96	1.20	1.29	0.94	1.02	0.89	0.90	1.00	1.07	1.33
Uco Bank	1.23	0.68	0.50	0.89	0.65	0.83	0.60	0.50	0.56	0.62	0.78
Union Bank Of India	1.01	0.91	1.06	1.16	0.92	0.96	0.85	0.89	0.98	0.95	1.11
Bank Of Baroda	0.92	0.84	0.94	0.99	0.72	0.64	0.74	0.73	0.85	0.88	1.11

Source of Data: www.iba.org.in

The ratio of non-interest income to total assets shows varied performance among public sector banks. SBI consistently leads with higher ratios, peaking at 1.48% in 2010 and remaining strong in subsequent years. Indian Overseas Bank and Punjab National Bank also show relatively better performance in certain years. In contrast,

Punjab and Sind Bank and UCO Bank report lower ratios, indicating limited success in non-interest income generation. Banks like Bank of Maharashtra and Central Bank of India show a declining trend, highlighting challenges in income diversification.

Table 6. ANOVA Result:

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	3.65332	11	0.33212	18.95979	9.99E-21	1.876732
Columns	1.965357	10	0.196536	11.21967	5.11E-13	1.917827
Error	1.926878	110	0.017517			
Total	7.545555	131				

In this ANOVA analysis, both the row and column factors show significant effects. The F-value for rows is 18.95979 with a P-value of 9.99E-21, which is much smaller than the critical value (F crit = 1.876732), indicating a significant effect of the row factor. Similarly, the F-value for columns

is 11.21967 with a P-value of 5.11E-13, also well below the critical value (F crit = 1.917827), suggesting a significant effect of the column factor. Therefore, we reject the null hypotheses for both rows and columns, indicating that there are significant differences among the row and column groups in the data.

Table 7. Ratio of Operating Profits to Total Assets.

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank of India	1.79	1.55	1.93	2.01	1.96	2.10	1.91	2.14	2.47	2.23	1.82
Bank Of India	1.80	1.31	1.16	1.57	0.98	1.26	1.64	1.78	1.82	1.72	1.88
Bank of Maharashtra	1.71	1.37	1.39	1.14	1.53	1.67	1.58	2.07	1.81	1.16	1.25
Canara Bank	1.32	1.61	1.59	1.57	1.30	1.34	1.50	1.50	1.67	2.03	2.09
Central Bank of India	1.26	0.95	0.83	0.97	0.76	1.18	1.16	1.27	1.28	1.32	1.25
Indian Bank	2.20	1.83	2.12	1.90	1.53	1.59	1.66	2.01	2.63	2.95	2.96
Indian Overseas Bank	1.38	2.02	1.47	1.40	1.03	1.19	1.54	1.64	1.77	1.85	1.46
Punjab And Sind Bank	1.05	1.25	1.09	1.25	1.27	0.81	0.91	1.22	1.07	1.62	1.79
Punjab National Bank	1.84	1.69	1.39	2.10	1.78	2.07	2.21	2.33	2.54	2.68	2.70
Uco Bank	2.07	1.24	0.60	1.23	1.47	2.02	2.26	1.77	1.64	1.79	1.37
Union Bank of India	1.76	1.53	1.63	1.73	1.44	1.58	1.57	1.94	2.11	2.00	2.05
Bank Of Baroda	1.69	1.80	1.70	1.61	1.27	1.44	1.54	1.81	2.13	2.19	1.95

Source of Data: www.iba.org.in

The operating profit to total assets ratio from 2010 to 2020 highlights performance differences among public sector banks. SBI consistently shows strong operational efficiency, peaking at 2.47% in 2012. Indian Bank also performed well in the early years, while Central Bank of India

had lower ratios, notably dipping to 0.76% in 2016. Banks like Bank of Maharashtra and Canara Bank experienced fluctuating trends, and Punjab National Bank and UCO Bank showed variable but generally favorable ratios in the later years.

Table 8. ANOVA Result:

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	12.30212	11	1.118375	15.42673	9.18E-18	1.876732
Columns	5.169324	10	0.516932	7.130504	1.41E-08	1.917827
Error	7.974551	110	0.072496			
Total	25.446	131				

The ANOVA results show that both the row and column factors have a significant impact. The row factor has an F-value of 15.42673 with a P-value of 9.18E-18, which is much smaller than the critical value (F crit = 1.876732), indicating a highly significant effect. The column factor also shows a significant effect with an F-value of 7.130504 and a P-value of 1.41E-

08, which is lower than the critical value (F crit = 1.917827). Both P-values are significantly less than typical significance levels (e.g., 0.05), leading us to reject the null hypotheses for both factors. This suggests that there are significant differences among the row and column groups in the dataset.

Table 9. Return on assets (ROA)

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank of India	0.38	0.02	-0.19	0.41	0.46	0.68	0.65	0.97	0.88	0.71	0.88
Bank Of India	-0.43	-0.84	-0.91	-0.24	0.94	0.27	0.51	0.65	0.72	0.82	0.70
Bank Of Maharashtra	0.23	-3.01	-0.73	-0.86	0.07	0.33	0.30	0.74	0.55	0.47	0.70
Canara Bank	-0.32	0.06	-0.75	0.20	-0.52	0.55	0.54	0.77	0.95	1.42	1.30
Central Bank of India	-0.35	-1.70	-1.61	-0.80	-0.48	0.21	-0.47	0.44	0.26	0.70	0.66
Indian Bank	0.26	0.12	0.53	0.67	0.36	0.54	0.67	1.02	1.31	1.53	1.67
Indian Overseas Bank	-2.95	-1.35	-2.33	-1.21	-0.97	-0.16	0.23	0.24	0.52	0.71	0.53
Punjab And Sind Bank	-0.91	-0.47	-0.69	0.20	0.34	0.13	0.35	0.44	0.65	0.90	1.05
Punjab National Bank	0.04	-1.25	-1.60	0.19	-0.61	0.53	0.64	1.00	1.19	1.34	1.44
Uco Bank	-0.96	-1.84	-1.88	-0.75	-1.25	0.48	0.70	0.33	0.69	0.66	0.87
Union Bank of India	-0.53	-0.59	-1.07	0.13	0.35	0.49	0.52	0.79	0.79	1.05	1.25
Bank Of Baroda	0.06	0.06	-0.34	0.20	-0.78	0.49	0.75	0.90	1.24	1.33	1.21

Source of Data: www.iba.org.in

The Return on Assets (ROA) data from 2010 to 2020 shows significant variation in performance among public sector banks. SBI maintained a generally positive but fluctuating ROA, while Bank of India, Bank of Maharashtra, and Central Bank of

India reported negative ROAs in several years, indicating financial strain. In contrast, Canara Bank and Indian Bank demonstrated stronger ROA, reflecting better asset management. Indian Overseas Bank and UCO Bank consistently showed low or negative ROAs, signaling persistent profitability challenges.

Table 10. ANOVA Result:

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	19.32812	11	1.757101	8.638546	7.47E-11	1.876732
Columns	62.56162	10	6.256162	30.75756	1.88E-27	1.917827
Error	22.37427	110	0.203402			
Total	104.264	131				

The ANOVA results indicate that both the row and column factors have a significant impact. The row factor has an F-value of 8.638546 with a P-value of 7.47E-11, which is well below the critical value (F crit = 1.876732). This suggests that the row factor has a statistically significant effect on the dependent variable. Similarly, the

column factor has an F-value of 30.75756 and a P-value of 1.88E-27, also significantly lower than the critical value (F crit = 1.917827), indicating a highly significant effect. Given these results, we reject the null hypotheses for both factors. This implies that there are significant differences among the rows and columns in the dataset.

Table 11. Return on Equity (ROE)

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank Of India	6.40	0.39	-3.21	6.31	7.30	10.62	10.03	15.43	15.72	12.62	14.80
Bank Of India	-6.92	-14.37	-18.23	-5.04	-19.50	5.57	10.14	12.25	14.00	15.79	12.56
Bank Of Maharashtra	4.71	-61.01	-13.23	-16.98	1.19	5.84	5.61	13.66	9.91	9.68	16.35
Canara Bank	-5.92	0.97	-12.19	3.44	-8.86	8.79	8.95	12.08	15.36	23.20	22.48
Central Bank Of India	-5.56	-30.56	-28.96	-13.96	-8.07	3.65	-8.12	7.31	4.57	13.49	15.01
Indian Bank	3.63	1.70	7.07	8.41	4.54	6.94	8.97	13.89	17.19	19.27	20.18
Indian Overseas Bank	-52.45	-25.23	-46.63	-23.23	-18.51	-2.86	4.06	4.47	9.88	12.73	9.63
Punjab And Sind Bank	-17.54	-9.15	-12.07	3.32	5.81	2.29	6.25	7.66	11.21	16.39	21.40
Punjab National Bank	0.63	-23.24	-29.54	3.30	-10.27	8.17	9.75	15.70	19.80	22.60	24.12
Uco Bank	-13.32	-26.72	-32.02	-14.64	-22.33	9.57	14.45	6.76	13.83	14.36	22.08
Union Bank Of India	-9.62	-11.43	-21.39	2.37	6.34	9.32	9.48	13.52	13.05	17.96	21.65
Bank Of Baroda	0.84	0.97	-5.81	3.44	-13.48	8.96	13.36	15.07	20.64	23.47	21.86

Source of Data: www.iba.org.in

The Return on Equity (ROE) data from 2010 to 2020 highlights significant fluctuations among public sector banks. SBI maintained relatively stable performance with a 6.40% ROE in 2020, while banks like Indian Overseas Bank and UCO Bank showed deeply negative ROEs,

indicating financial stress. Canara Bank had periods of strong returns, whereas banks such as Bank of India and Punjab National Bank experienced high volatility and frequent negative ROEs. The overall trend reflects inconsistent profitability and varying financial stability across the sector.

Table 12. ANOVA Result:

ANOVA						
Source of Variation	SS	df	MS	F	P-value	F crit
Rows	4950.604	11	450.0549	6.283887	5.72E-08	1.876732
Columns	20559.51	10	2055.951	28.70619	2.79E-26	1.917827
Error	7878.251	110	71.62046			
Total	33388.36	131				

The ANOVA results indicate significant differences across both row and column factors. The row factor shows an F-value of 6.28 and the column factor an even higher F-value of 28.71, both with extremely low

P-values, well below their respective critical values. These findings confirm that both factors significantly impact the dependent variable, leading to the rejection of the null hypotheses for both rows and columns.

Table 13. Return on Investments.

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank Of India	6.77	7.34	7.70	7.19	8.00	8.03	8.52	8.20	7.88	6.71	6.20
Bank Of India	6.99	7.00	6.91	7.35	7.50	8.07	8.05	8.01	8.27	6.76	7.46
Bank Of Maharashtra	7.16	7.14	7.21	7.56	7.93	7.25	7.41	7.77	7.04	6.94	6.54
Canara Bank	6.89	7.36	7.08	7.32	8.02	7.92	8.27	8.17	7.59	7.36	7.18
Central Bank Of India	7.40	7.42	7.33	8.15	7.25	7.63	7.26	7.25	7.64	7.17	7.07
Indian Bank	7.22	7.40	7.36	7.33	8.41	7.81	8.41	8.12	7.67	7.07	7.26
Indian Overseas Bank	7.12	7.26	6.84	6.91	8.18	7.32	7.58	7.48	7.57	6.88	6.92
Punjab And Sind Bank	7.85	7.77	8.04	8.11	7.34	7.68	7.40	7.41	7.59	7.00	7.18
Punjab National Bank	6.93	7.01	7.21	7.30	7.82	7.22	7.50	7.55	7.10	6.52	6.46
Uco Bank	6.86	6.98	7.14	7.26	7.64	7.52	7.33	7.42	7.12	6.25	6.00
Union Bank Of India	7.59	7.21	7.44	8.64	8.68	8.06	8.33	7.92	7.57	7.10	7.15
Bank Of Baroda	6.74	7.40	7.12	8.47	9.00	8.10	7.32	7.32	8.00	7.20	6.43

Source of Data: www.iba.org.in

The Return on Investments (ROI) data from 2010 to 2020 indicates generally strong and stable performance among public sector banks. SBI, Bank of India, and Bank of Maharashtra maintained consistent ROIs in

the 6–8% range. Union Bank of India and Bank of Baroda stood out with higher ROIs in later years, peaking at 8.68% and 9.00% respectively. UCO Bank and Canara Bank recorded slightly lower but still competitive ROI levels.

Table 14. ANOVA Result:

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	5.656172	11	0.514197	3.986146	6.81E-05	1.876732
Columns	17.1959	10	1.71959	13.33055	4.75E-15	1.917827
Error	14.18958	110	0.128996			
Total	37.04164	131				

The ANOVA results indicate significant differences across both row and column factors. The row factor has an F-value of 3.99 and the column factor 13.33, both with

P-values far below their critical values. This confirms that both rows and columns significantly affect the dataset, leading to the rejection of the null hypotheses for both factors.

Table 15. Capital Adequacy Ratio.

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank Of India	13.06	12.72	12.60	13.11	13.12	12.00	12.44	12.92	13.86	11.98	13.39
Bank Of India	13.10	14.19	12.94	12.14	12.01	10.73	9.97	11.02	11.95	12.17	12.94
Bank Of Maharashtra	13.52	11.86	11.01	11.18	11.20	11.94	10.79	12.59	12.43	13.35	12.78
Canara Bank	13.65	11.90	13.22	12.86	11.08	10.56	10.63	12.40	13.76	15.38	13.43
Central Bank Of India	11.72	9.61	9.04	10.94	10.40	10.90	9.87	11.49	12.40	11.64	12.23
Indian Bank	14.12	13.21	12.55	13.64	13.20	12.86	12.64	13.08	13.47	13.56	12.71
Indian Overseas Bank	10.72	10.21	9.26	10.49	9.67	10.11	10.78	11.85	13.32	14.55	14.78
Punjab And Sind Bank	12.76	10.93	11.25	11.05	10.91	11.24	11.04	12.91	13.26	12.94	13.10
Punjab National Bank	14.15	9.73	9.20	11.66	11.28	12.21	11.52	12.72	12.63	12.42	14.16
Uco Bank	11.70	10.70	10.94	10.93	9.63	12.17	12.68	14.15	12.35	13.71	13.21
Union Bank Of India	12.81	11.78	11.46	11.79	10.56	10.22	10.80	11.45	11.85	12.95	12.51
Bank Of Baroda	13.30	13.42	12.13	12.24	13.18	12.61	12.28	13.30	14.67	14.52	14.36

Source of Data: www.iba.org.in

The Capital Adequacy Ratio (CAR) data from 2010 to 2020 reflects the capital strength of public sector banks. SBI consistently maintained a CAR above 12%, indicating strong financial stability. Canara Bank and Indian Bank also showed healthy

CARs in recent years. In contrast, Indian Overseas Bank and Central Bank of India had lower CARs in earlier years, pointing to weaker capital positions. Banks like Bank of Maharashtra and Punjab National Bank exhibited notable fluctuations, reflecting inconsistent capital management and regulatory adherence.

Table 16. ANOVA Result:

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	59.17797	11	5.379816	6.630409	2.07E-08	1.876732
Columns	81.80348	10	8.180348	10.08195	7.46E-12	1.917827
Error	89.25238	110	0.811385			
Total	230.2338	131				

The ANOVA results indicate significant effects from both the row and column factors. The row factor has an F-value of 6.630409 with a P-value of 2.07E-08, which is far below the critical value (F crit

= 1.876732), showing a significant difference among rows. Similarly, the column factor presents an F-value of 10.08195 and a P-value of 7.46E-12, also below the critical value (F crit = 1.917827), indicating a significant effect of columns.

Consequently, both null hypotheses for that there are significant differences rows and columns are rejected, confirming attributable to both factors in the dataset.

Table 17. Capital Adequacy Ratio - Tier I

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank Of India	11.00	10.65	10.36	10.35	9.92	9.60	9.72	9.49	9.79	7.77	9.45
Bank Of India	9.90	11.07	9.73	8.90	9.03	8.17	7.24	8.20	8.59	8.33	8.48
Bank Of Maharashtra	10.67	9.91	9.01	9.01	9.02	8.76	7.44	7.57	8.31	8.02	6.41
Canara Bank	10.12	9.04	10.30	9.77	8.80	8.02	7.68	9.77	10.35	10.87	8.54
Central Bank Of India	9.33	7.49	7.01	8.62	8.20	8.05	7.37	8.09	7.79	6.31	6.83
Indian Bank	12.08	11.29	11.33	12.20	12.08	10.61	10.24	10.88	11.13	11.02	11.13
Indian Overseas Bank	8.21	7.85	7.17	8.21	7.75	7.30	7.47	7.80	8.35	8.16	8.67
Punjab And Sind Bank	9.58	9.50	9.85	9.14	9.29	8.48	7.62	8.38	8.55	8.35	7.68
Punjab National Bank	11.91	7.49	7.12	8.91	8.41	9.30	8.87	9.76	9.28	8.44	9.11
Uco Bank	8.98	8.64	8.94	8.27	7.63	9.05	8.71	9.06	8.09	8.52	7.05
Union Bank Of India	10.75	9.48	9.03	9.02	8.14	7.50	7.54	8.23	8.37	8.69	7.91
Bank Of Baroda	10.71	11.55	10.46	9.93	10.79	9.87	9.28	10.13	10.83	9.99	9.20

Source of Data: www.iba.org.in

The CAR-Tier I data from 2010 to 2020 highlights differences in capital strength among public sector banks. SBI showed a steady rise from 7.77% to 11.00%, indicating improved capital adequacy. Bank of Maharashtra also saw a gradual increase, while Bank of India experienced fluctuations. Central Bank of India and

Indian Overseas Bank had lower but relatively stable Tier I ratios. In contrast, Canara Bank and Indian Bank maintained strong and consistent ratios, with Indian Bank reaching 12.08% in 2020. Bank of Baroda displayed steady Tier I capital, reflecting sound capital management.

Table 18. ANOVA Result:

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	121.5969	11	11.05426	20.83475	3.64E-22	1.876732
Columns	37.46167	10	3.746167	7.060667	1.71E-08	1.917827
Error	58.36253	110	0.530568			
Total	217.4211	131				

The ANOVA results reveal that both the row and column factors have a statistically significant effect. The row factor has an F-value of 20.83475 with a P-value of 3.64E-22, which is significantly less than the critical value (F crit = 1.876732), indicating a strong rejection of the null hypothesis for rows. Similarly, the column factor has an

F-value of 7.060667 and a P-value of 1.71E-08, also well below the critical value (F crit = 1.917827), leading to a rejection of the null hypothesis for columns. Thus, both hypotheses regarding rows and columns are rejected, suggesting that there are significant differences associated with both factors in the data.

Table 19. Capital Adequacy Ratio - Tier II

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank of India	2.06	2.07	2.24	2.76	3.20	2.40	2.72	3.43	4.07	4.21	3.94
Bank Of India	3.20	3.12	3.21	3.24	2.98	2.56	2.73	2.82	3.36	3.84	4.46
Bank Of Maharashtra	2.85	1.95	2.00	2.17	2.18	3.18	3.35	5.02	4.12	5.33	6.37
Canara Bank	3.53	2.86	2.92	3.09	2.28	2.54	2.95	2.63	3.41	4.51	4.89
Central Bank of India	2.39	2.12	2.03	2.32	2.20	2.85	2.50	3.40	4.61	5.33	5.40
Indian Bank	2.04	1.92	1.22	1.44	1.12	2.25	2.40	2.20	2.34	2.54	1.58
Indian Overseas Bank	2.51	2.36	2.09	2.28	1.92	2.81	3.31	4.05	4.97	6.39	6.11
Punjab And Sind Bank	3.18	1.43	1.40	1.91	1.62	2.76	3.42	4.53	4.71	4.59	5.42
Punjab National Bank	2.24	2.24	2.08	2.75	2.87	2.91	2.65	2.96	3.35	3.98	5.05
Uco Bank	2.72	2.06	2.00	2.66	2.00	3.12	3.97	5.09	4.26	5.19	6.16
Union Bank Of India	2.06	2.30	2.43	2.77	2.42	2.72	3.26	3.22	3.48	4.26	4.60
Bank Of Baroda	2.59	1.87	1.67	2.31	2.39	2.74	3.00	3.17	3.84	4.53	5.16

Source of Data: www.iba.org.in

The Tier II Capital Adequacy Ratio data from 2010 to 2020 shows considerable variation among public sector banks. SBI maintained a relatively stable Tier II ratio, ranging between 2.06% and 4.21%. In contrast, Bank of Maharashtra exhibited significant fluctuations, with ratios from

1.95% to 6.37%, indicating inconsistent capital buffer management. Central Bank of India and Indian Overseas Bank also showed variability, while Bank of Baroda and Punjab National Bank had generally stable ratios with occasional changes, reflecting a more controlled capital approach.

Table 20. ANOVA Result:

Source of Variation	SS	df	MS	F	P-value	F crit
Rows	22.44274	11	2.040249	5.714271	3.15E-07	1.876732
Columns	114.451	10	11.4451	32.0551	3.64E-28	1.917827
Error	39.2749	110	0.357045			
Total	176.1686	131				

The ANOVA results indicate that both the row and column factors significantly affect the outcome. The row factor has an F-value of 5.714271 and a P-value of 3.15E-07, which is much smaller than the critical value (F crit = 1.876732). This allows us to reject the null hypothesis for rows, suggesting that there are significant differences related to the row factor. Similarly, the column factor has an F-value

of 32.0551 with a P-value of 3.64E-28, which is significantly less than the critical value (F crit = 1.917827). Therefore, the null hypothesis for columns is also rejected, indicating significant differences associated with the column factor. In summary, significant effects are observed for both row and column factors.

Table 21. Ratio of Net NPA to Net Advances

PSB	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010
State Bank of India	2.23	3.01	5.73	3.71	3.81	2.12	2.57	2.10	1.82	1.63	1.72
Bank Of India	3.88	5.61	8.28	6.90	7.79	3.36	2.00	2.06	1.47	0.91	1.31
Bank Of Maharashtra	4.77	5.52	11.24	11.76	6.35	4.19	2.03	0.52	0.84	1.32	1.64
Canara Bank	4.22	5.37	7.48	6.33	6.42	2.65	1.98	2.18	1.46	1.10	1.06
Central Bank of India	7.63	7.73	11.10	10.20	7.36	3.61	3.75	2.90	3.09	0.65	0.69
Indian Bank	3.13	3.75	3.81	4.39	4.20	2.50	2.26	2.26	1.33	0.53	0.23
Indian Overseas Bank	5.44	10.81	15.33	13.99	11.89	5.68	3.20	2.50	1.35	1.19	2.52
Punjab And Sind Bank	8.03	7.22	6.93	7.51	4.62	3.55	3.35	2.16	1.19	0.56	0.36
Punjab National Bank	5.78	6.56	11.24	7.81	8.61	4.06	2.85	2.35	1.52	0.85	0.53
Uco Bank	5.45	9.72	13.10	8.94	9.09	4.30	2.38	3.17	1.96	1.84	1.17
Union Bank of India	5.49	6.85	8.42	6.57	5.25	2.71	2.33	1.61	1.70	1.19	0.81
Bank Of Baroda	3.13	3.33	5.49	4.72	5.06	1.89	1.52	1.28	0.54	0.35	0.34

Source of Data: www.iba.org.in

The Net NPA to Net Advances data from 2010 to 2020 highlights significant differences in asset quality among public sector banks. SBI maintained a stable, moderate ratio, indicating effective NPA management. In contrast, Bank of Maharashtra and Indian Overseas Bank showed high ratios in recent years,

reflecting asset quality issues. Central Bank of India and Punjab and Sind Bank also recorded elevated ratios, especially in 2020. Meanwhile, Bank of Baroda and Indian Bank maintained lower, more stable ratios, suggesting stronger control over non-performing assets.

Table 22. ANOVA Result:

<i>Source of Variation</i>	<i>SS</i>	<i>df</i>	<i>MS</i>	<i>F</i>	<i>P-value</i>	<i>F crit</i>
Rows	196.4216	11	17.85651	8.551896	9.43E-11	1.876732
Columns	985.9286	10	98.59286	47.21841	3.16E-35	1.917827
Error	229.6819	110	2.088017			
Total	1412.032	131				

The ANOVA results show significant differences for both row and column factors. The row factor has an F-value of 8.55 and the column factor 47.22, with both P-values far below their critical values. This leads to the rejection of the null hypotheses, confirming that both factors significantly influence the variation in the dataset.

Findings: The study assessed the financial performance of Indian public sector banks from 2010 to 2020 using key financial ratios. ANOVA results revealed significant differences across banks and years. SBI and Indian Bank showed strong performance across several metrics, while banks like Bank of Maharashtra and Indian Overseas Bank struggled, particularly with high NPAs and low ROA. Overall, the findings highlight ongoing challenges in asset quality and profitability among PSBs.

Conclusion: The financial performance of public sector banks in India between 2010 and 2020 reveals significant disparities in operational efficiency, profitability, and asset management. Banks such as the State Bank of India (SBI) and Indian Bank consistently demonstrated stable financial health, maintaining robust metrics like return on assets (ROA), net interest margin (NIM), and capital adequacy ratios. These banks also managed to control non-performing assets (NPAs) more effectively than their counterparts. Conversely, banks like the Bank of Maharashtra and Indian

Overseas Bank struggled with high levels of NPAs and inconsistent returns, adversely impacting their profitability and overall financial stability. The analysis highlights that while some public sector banks adapted well to the changing financial landscape, others lagged behind, grappling with inefficiencies and asset quality issues. This underscores the critical need for reforms focusing on improved risk management, better capital adequacy, and strategies to reduce NPAs. The study provides valuable insights for policymakers, regulators, and bank managers to enhance the financial resilience and operational efficiency of public sector banks, ensuring long-term sustainability and growth.

Research Implications: This research has practical implications for policymakers, financial regulators, and bank management. The findings indicate the importance of improving asset quality, particularly in managing non-performing assets, as a way to enhance the financial stability of public sector banks. For policymakers, the study suggests that reforms aimed at strengthening the capital adequacy of weaker banks and improving their operational efficiency could help mitigate the financial risks associated with high NPAs. Additionally, the study emphasizes the significance of diversifying income sources beyond interest-based revenue, as banks with higher non-interest income exhibited better financial resilience.

Limitations of the Study and Scope for Further Research:

This study is limited by its reliance on secondary data and a narrow set of financial ratios, potentially overlooking broader aspects of bank performance. It also does not account for external macroeconomic influences like policy changes or economic cycles. Future research could address these gaps by including more financial indicators, assessing external factors, or comparing public and private sector bank performance over the same period.

References:

1. Ainapur, J. (2014). Profitability Analysis of Selected New Private Sector Banks in India: Who is better? Authors. *International Journal of Emerging Trends in Science and Technology*, 1(2), 144–153.
2. Bansal, R., Singh, A., Kumar, S., & Gupta, R. (2018). Evaluating factors of profitability for Indian banking sector: a panel regression. *Asian Journal of Accounting Research*, 3(2), 236–254. <https://doi.org/10.1108/AJAR-08-2018-0026>
3. Barak, M., & Sharma, R. K. (2023). Investigating the Impact of Intellectual Capital on the Sustainable Financial Performance of Private Sector Banks in India. *Sustainability (Switzerland)*, 15(2). <https://doi.org/10.3390/su15021451>
4. Biswa N. Bhattacharyay., & Ghose B.K (1989). Marketing of Banking Services in the 90s Problems and Perspectives. *Economic and Political Weekly*, 24(8),M27-M32.

5. Gaba, D. (2014). Commerce Public, Private and Foreign Banks: A Comparative Study on the Basis of NPA Neha Rani ABSTRACT M. Phil. Student, MDU RohtakBhiwani, 9, 2013–2015.
6. Gorre, C. N. & S. K. (2023). financial performance evaluation of Indian private sector banks through eagles model. *European Journal of Molecular & Clinical Medicine (EJMCM)*, 2(10), 3309–3318. <https://doi.org/10.48047/ecb/2023.12.si10.00385>
7. Hafsal, K., Suvvari, A., & Durai, S. R. S. (2020). Efficiency of Indian banks with non-performing assets: evidence from two-stage network DEA. *Future Business Journal*, 6(1), 1–9. <https://doi.org/10.1186/s43093-020-00030-z>
8. Hanumantha Rao P., & Datta Subhendu (2014). Fundamental Analysis of the Banking Sector in India, *Indian Journal of Finance*, 8(9),47-56.
9. Hatekar Neeraj., & Singh Sanjay (2014). Financial Structure and Economic Development : A Case of Indian Economy, *Indian Economic Review*,49(2),205-226.
10. Kathiriya Janki Ganpatbhai, P. shah. (2019). a Profitability Analysis of Selected Public Sector Banks of India. *Research Guru*, 12(4), 668–675.
11. Kumar, M. (2024). A comparative study of public and private sector banks in India: An experimental analysis. *International Journal of Research in Finance and Management*, 7(2), 121–124. <https://doi.org/10.33545/26175754.2024.v7.i2b.350>

12. Mathur, R. (2022). Profitability and Efficiency of Indian Banking (A Comparative Study of Selected Public and Private Sector Banks). *Samvad*, 23(0), 23. <https://doi.org/10.53739/samvad/2021/v23/166093>
13. Nalliboyina, S. B., &Chalam, G. V. (2023). Factors Determining the Financial Performance of Public Sector Banks in India. *Asian Journal of Economics, Business and Accounting*, 23(14), 57–71. <https://doi.org/10.9734/ajeba/2023/v23i141005>
14. Narayanaswamy T., & Muthulakshmi A. P. (2014). Efficiency of Private Sector Banks in India, *Indian Journal of Finance*, 8(10),33-47.
15. Roop, D., Singhal, K., Kumari, S., &Maheswari, R. (2023). "Assets-Liability Management: A Case Study on Comparison of Private Sector Bank with Public Sector Bank" *International Journal of International Institute of Management Studies*, 2(1), 82–91. <https://www.iimspune.edu.in/images/pdf/Journal/Vol2I1-Paper10.pdf>
16. Saif-Alyousfi, A. Y. H., Saha, A., &Md-Rus, R. (2017). Profitability of Saudi Commercial Banks: A Comparative Evaluation between Domestic and Foreign Banks using Capital Adequacy, Asset Quality, Management Quality, Earning Ability and Liquidity Parameters. *International Journal of Economics and Financial Issues*, 7(2), 477–484. <http://www.econjournals.com>
17. Singh, Y., & Milan, R. (2023). Analysis of Financial Performance of Public Sector Banks in India: CAMEL. *Arthaniti: Journal of Economic Theory and Practice*, 22(1), 86–112. <https://doi.org/10.1177/0976747920966866>
18. Srinivasan, P., &Britto, J. (2017). Analysis of Financial Performance of Selected Commercial Banks in India. *Theoretical Economics Letters*, 07(07), 2134–2151. <https://doi.org/10.4236/tel.2017.77145>
19. Vanvi, A. K. (2022). Profitability Analysis of Selected Private Sector Banks. *Journal La Bisecoman*, 3(3), 129–132. <https://doi.org/10.37899/journallabisecoman.v3i3.677>
20. Vithalbhai, V. S. (2020). Financial Performance of Banks in India: A Study of Selected Private Sector Banks. *Journal of Advanced Research in Economics and Administrative Sciences*, 1(1), 45–52. <https://doi.org/10.47631/jareas.v1i1.18>
