

Pre and Post Merger Performance of Selected Merging Banks in India: A Comparative Study

Jyoti^{1*} | Dr. Sukhdev Singh²

¹Research Scholar, Desh Bhagat University, Mandi Gobindgarh, Punjab.

²Professor, Department of Business Management and Commerce, Desh Bhagat University, Mandi Gobindgarh, Punjab.

*Corresponding Author: sjot1361@gmail.com

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ABSTRACT

In the banking sector, a merger means two banks join together to become one bigger bank. This is usually done to grow stronger, reduce costs, and serve more customers with better services. When banks merge, they can share resources, increase profit, and compete more effectively in the market. Bank mergers play a vital role in strengthening the banking sector by creating larger, financially stable, and more competitive institutions. Through mergers, banks can combine their resources, capital, technology, and customer base, which helps improve operational efficiency and reduce costs through economies of scale. Mergers also enhance profitability by increasing business volume and improving the utilization of assets. A larger merged bank is better able to diversify risks, maintain adequate capital, and withstand economic uncertainties. Furthermore, mergers facilitate technological advancement, improve customer services, expand geographical reach, and provide a wider range of financial products. In cases where weaker banks merge with stronger ones, mergers can help reduce financial distress and improve asset quality. From a broader perspective, strong and efficient banks contribute to economic growth by increasing credit availability, supporting business activities, financing infrastructure projects, and promoting financial stability. Therefore, mergers are considered an important strategic tool for achieving long-term sustainability, value creation, and competitiveness in the banking sector.

Keywords: *Pre and Post Merger, Merging Banks, Long-Term Sustainability, Value Creation, Financial Stability.*

Introduction

In recent years, the Indian banking sector has witnessed significant consolidation initiatives aimed at strengthening the financial system, improving operational efficiency, and enhancing global competitiveness. The Government of India and the Reserve Bank of India have promoted mergers among public sector banks to create larger and financially stronger institutions capable of supporting economic growth. Major consolidation initiatives include the merger of Vijaya Bank and Dena Bank with Bank of Baroda in 2019, followed by the amalgamation of ten public sector banks into four large banks in 2020. Notable examples are the merger of Oriental Bank of Commerce and United Bank of India with Punjab National Bank, Syndicate Bank with Canara Bank, Andhra Bank and Corporation Bank with Union Bank of India, and Allahabad Bank with Indian Bank. These initiatives were undertaken to improve capital adequacy, reduce operational costs, enhance risk management practices, and increase lending capacity. Banking consolidation has also encouraged technological integration, better resource utilization, and stronger market presence. However, challenges such as cultural integration, employee adjustment, and short-term operational disruptions remain important concerns. Overall, recent banking consolidation initiatives represent a strategic effort to build a more resilient, efficient, and sustainable banking sector in India. The Indian banking sector has undergone significant transformation in recent decades due to globalization, technological advancements, regulatory reforms, and increasing competition. In this

context, mergers have emerged as an important strategic tool for strengthening the financial stability and operational efficiency of banks. The need for this study arises from the growing trend of bank mergers in India, particularly following the consolidation initiatives undertaken by the Government of India and the Reserve Bank of India to create larger and more competitive banking institutions. Examining mergers in the Indian banking sector is essential to understand their impact on financial performance, asset quality, profitability, operational efficiency, and customer services. Furthermore, the study helps evaluate whether mergers achieve their intended objectives of improving economies of scale, enhancing market share, reducing operational costs, and strengthening the resilience of banks against financial risks. The findings of this research will provide valuable insights to policymakers, banking professionals, investors, and researchers regarding the effectiveness of mergers as a strategy for sustainable growth and stability in the Indian banking industry.

One of the most significant mergers in India's banking industry took place in April 2017, when the five associate banks of State Bank of India—State Bank of Bikaner & Jaipur, State Bank of Hyderabad, State Bank of Mysore, State Bank of Patiala, and State Bank of Travancore—along with Bharatiya Mahila Bank, were combined with SBI. This consolidation was aimed at building a larger and more financially strong bank with an expanded customer base, broader branch network, and better operational efficiency. As a result of the merger, SBI strengthened its position among the world's leading banks, increased its capacity to finance large-scale projects, and achieved greater cost efficiency. At the same time, the merger brought challenges such as integrating different technology platforms, managing employees from multiple institutions, and ensuring smooth coordination of banking operations across the newly unified organization <https://www.rbi.org.in/>, <https://www.finmin.nic.in/>.

Review of Literature

Srinivas (2010) in the study entitled "Pre and post merger physical performance of merged banks in India: A select study" examined the impact of bank mergers on the physical performance of selected Indian banks by comparing their performance before and after mergers. The study found that most merged banks showed significant growth in deposits, advances, business volume, and branch networks, indicating improved operational efficiency. Public sector banks achieved higher productivity despite a reduction in employees, while private sector banks expanded both their business and workforce. Statistical tests confirmed that these improvements were significant. Overall, the study concluded that mergers enhanced the performance and efficiency of Indian banks, with private-to-private bank mergers producing better results than private-to-public sector mergers.

Reddy & Sowmya (2017) in their work "Pre and post-merger performance of banks in India" found that mergers generally improved banks' financial performance, especially net profits. Public sector banks initially faced a decline in profitability after mergers but recovered and performed better over time, while private sector banks showed consistent profit growth. The study concluded that mergers enhance operational efficiency, competitiveness, and profitability, although they are not a complete solution to all banking challenges.

Khushalani & Sinha (2021) in their study "Pre- and Post- Merger Financial Analysis of Banks" analyzed the financial performance of four merged Indian banks using five financial indicators. The study found mixed results, with only some financial measures improving after mergers. The Capital Adequacy Ratio (CAR) showed the most consistent improvement, indicating better financial stability, while other indicators such as DPS, NPM, ROA, and Credit Deposit Ratio improved inconsistently. The study concluded that mergers do not guarantee overall financial improvement, although they can strengthen capital adequacy, support distressed banks, and expand market reach and customer base.

Mahesha & Manu (2021) in their work "Performance evaluation of SBI: A comparative study of pre and post-merger" evaluated SBI's financial performance before and after its merger with five associate banks and Bharatiya Mahila Bank. The study found that the merger did not significantly improve SBI's overall financial performance in the short term. Although some operational and financial indicators improved, key profitability and liquidity measures declined. The authors concluded that while the merger provided certain benefits, its full positive impact may be realized only over the long term.

Parvin, Nirmala & Niyaz (2021) in their research "Comparative study on the overall performance of merged public sector banks and private sector banks using CAMEL model" compared the performance of merged public sector banks with private sector banks using the CAMEL model. The study found that private sector banks performed better in capital adequacy, asset quality, management efficiency, and earnings, while public sector banks performed better only in liquidity. Statistical analysis confirmed a significant difference between the two groups. The study concluded that public sector bank

mergers did not significantly improve overall performance, and private sector banks continued to outperform them.

Kandi & Anvitha (2022) in their study “A study on the performance of SBI pre and post-merger using the CAMEL model” found that SBI's 2017 merger had both positive and negative effects on its financial performance. After the merger, Asset Quality improved, with better investment management and a gradual reduction in non-performing assets. Capital Adequacy and Liquidity showed mixed results—the bank became financially stronger with higher capital adequacy and liquidity coverage ratios, but lending efficiency declined as reflected in lower advances-to-assets and credit-deposit ratios. On the other hand, Management Efficiency and Earnings Quality weakened initially. Profit per employee, return on equity, profitability, and dividend payments declined after the merger due to integration challenges and restructuring costs. However, these indicators began to recover in the later years, showing that SBI gradually achieved operational efficiencies and merger synergies.

Overall, the merger created long-term benefits for SBI, particularly in asset quality, capital strength, and liquidity, although improvements in profitability and management efficiency took time to materialize.

Mishra & Mohanty (2024) in their study “Post-amalgamation performance review of six public sector banks in India” examined the post-merger performance of six Indian public sector banks and found mixed results. While some banks showed improvements in profitability and solvency, others, including SBI, did not experience significant gains. Efficiency indicators such as Net Interest Margin and operating profit showed no consistent improvement. The study concluded that mergers can strengthen financial stability but do not automatically improve operational efficiency without effective management, cost control, and better recovery of non-performing assets (NPAs).

Maani & Rajkumar (2024) in their study “Investigation of the pre-post-merger effects on the financial performance of select banks in India” examined the financial performance of four public sector banks before and after the 2019 mega-merger. The study found mixed results, with significant improvements mainly in capital adequacy, debt-to-equity, and loan quality ratios. However, improvements in profitability, liquidity, and shareholder wealth were generally not statistically significant. The study concluded that the mergers mainly strengthened financial stability and risk management rather than delivering immediate improvements in profitability.

Gupta, Singh, & Tewatia (2025) in their research “Pre & Post-Merger Financial & Operational Performance of Public Sector Banks: An Analysis” analyzed the financial and operational performance of major Indian public sector banks before and after mergers using the DuPont Model. The study found that mergers initially reduced profitability due to integration costs and higher NPAs, but most banks improved over time in profitability, efficiency, asset quality, and financial stability. The authors concluded that although mergers may have short-term challenges, they provide long-term benefits such as stronger financial performance, larger market share, improved capital adequacy, and better competitiveness.

Rudani & Patel (2025) in their study “A comparative study for pre and post-merger and acquisition on financial performance of selected Indian companies” studied the impact of mergers and acquisitions on the financial performance of HDFC Bank, Kotak Mahindra Bank, Axis Bank, and Infosys. The study found mixed results: HDFC Bank and Axis Bank showed no significant financial improvement after their merger or acquisition, Kotak Mahindra Bank recorded limited improvements, while Infosys experienced significant gains in profitability and operational efficiency after its acquisition. The study concluded that the impact of mergers and acquisitions varies across companies and depends on factors such as strategic fit and successful integration.

Research Gap

- Although several studies have examined the impact of bank mergers in India, the findings remain inconclusive. Some researchers reported improvements in operational efficiency, profitability and capital adequacy after mergers, whereas the findings of different studies are in contrast to other studies
<https://www.indianjournaloffinance.co.in/index.php/IJF/article/view/72612>.
- Few studies mainly analyzed a limited number of financial indicators, such as profitability without providing a comprehensive assessment using profitability, solvency, asset quality, and efficiency ratios together <https://doi.org/10.36106/paripex>.

- Few studies examined the impact of recent banking consolidation in India using a comparative pre- and post-merger framework.
- There is limited evidence regarding whether mergers create value uniformly across different categories of banks.

Therefore, the present study attempts to compare the pre- and post-merger performance of selected public and private sector banks using multiple financial ratios and statistical techniques such as mean, standard deviation, compound annual growth rate and t-test.

Objectives of the Study

- To analyse the performance of private and public banks in pre- and post-merger period.
- To study the impact of merger on the value creation.

Hypotheses

H01: There is no significant change in the performance of private and public banks in pre- and post-merger period.

HA1: There is a significant change in the performance of private and public banks in pre- and post-merger period.

H02: There is no significant impact of merger on the value creation.

HA2: There is a significant impact of merger on the value creation.

Research Methodology

This study employs a mixed-methods research design, integrating both qualitative and quantitative approaches to achieve a comprehensive analysis of the research problem.

Source of Study

This study is based on secondary data obtained from publicly available documents such as annual reports, financial statements, and publications issued by government and regulatory authorities. These sources offer accurate and detailed data on banking performance and merger-related activities.

Period of the Study

This study spans a period of Six years, comprising two distinct phases: a three-year pre-merger period and a three-year post-merger period.

Sample Size

The sample for the present study comprises four major Indian commercial banks, selected on the basis of significant merger and acquisition activities. The sample includes two public sector banks and two private sector banks. The selected banks, their associate banks, and the study periods are presented below.

Table IX. a. Pre-Post Merger Period of Selected Banks

S. No.	Bank	Associate Banks	Pre-Merger Period	Post-Merger Period
1.	Public Sector Bank	Union Bank of India	• Corporation Bank • Andhra Bank	2017-2019 2020-2022
2.		Punjab National Bank	• Nedungadi Bank Ltd. • United Bank of India • Oriental Bank of Commerce	2017-2019 2020-2022
3.	Private Sector Bank	HDFC Bank	• Centurion Bank of Punjab • HDFC Ltd.	2020-2022 2023-2025
4.		ICICI Bank	• ICICI Ltd. • Sangli Bank • Bank of Rajasthan Ltd.	2007-2009 2010-2012

• **Analysis of Secondary Data**

Ratio analysis, mean, standard deviation, t-test and compound growth rate analyses methods have been computed to measure the performance in terms of various indicators taken for the study for selected banks.

The following tools have been used for analysis

▪ **Ratio Analysis**

- Profitability Ratios
- Solvency Ratios
- Asset Quality Ratios
- Efficiency Ratios

▪ **Mean**

The mean is a statistical measure used to determine the central value of a dataset. It is obtained by adding all the observations together and then dividing the total by the number of observations. The mean provides a summary of the data by indicating its average value, which helps researchers understand the general pattern and overall performance of the collected information.

$$\bar{X} = \sum X / N$$

$\bar{X}$ = Mean

$\sum X$ = Sum of all observations

N = Number of observations

▪ **Standard Deviation**

Standard deviation is a statistical measure that indicates how widely the data values are spread around the mean. It helps assess the level of variation or consistency within a dataset, where a higher standard deviation reflects greater variability and a lower standard deviation indicates that the values are more closely clustered around the average.

$$\sigma = \sqrt{\frac{\sum (X - \bar{X})^2}{N}}$$

Where:

σ = Standard deviation

X = Individual observation

$\bar{X}$ = Mean of observations

N = Total number of observations

Short Version for Research Paper

▪ **Growth Rate**

Compound Growth Rate (CGR) is a measure used to determine the average rate at which a value grows over a period of time, assuming that the growth in each period builds upon the previous period's growth. It reflects the cumulative effect of growth and provides a more accurate picture of long-term performance by accounting for the compounding nature of increases over time. It is commonly used in financial and economic studies to analyze trends in investments, sales, income, and other variables.

$$CAGR = \left(\frac{\text{Ending Value}}{\text{Beginning Value}} \right)^{\frac{1}{n}} - 1$$

Ending Value = Value at the end of the period

Beginning Value = Value at the start of the period

n = Number of years or periods

▪ **t-test**

The t-test is a statistical technique used to compare the average values of two groups or two different time periods to determine whether the difference between them is statistically significant. It assists researchers in evaluating whether the observed variation is due to a real effect or simply the

result of random chance. As a widely applied method in hypothesis testing, the t-test plays an important role in analyzing and comparing research data.

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

Where:

- t = t-test value
- $\bar{X}_1, \bar{X}_2$ = Means of two groups
- s_1^2, s_2^2 = Variances of two groups
- n_1, n_2 = Number of observations in each group

Tools and Techniques

The study comprises both exploratory and evaluative objectives, qualitative and quantitative analytical approaches were adopted. The exploratory aspect was examined using qualitative methods, whereas the evaluative aspect relied on quantitative techniques.

Analysis and Discussion

XII.1. Profitability Ratios: Profitability ratios are financial measures that show how effectively a business turns its sales, assets, or investments into profit. Rather than simply looking at how much money, a company earns, these ratios help evaluate how efficiently it generates earnings from the resources available to it. They provide insight into a company's financial health, operational performance, and ability to create value for owners and investors. Common profitability ratios include return on assets (ROA), and return on equity (ROE). Higher profitability ratios generally indicate better management of costs and resources, while lower ratios may suggest inefficiencies or challenges in generating adequate returns. By comparing these ratios over time or against other banks, stakeholders can assess a bank's overall success and sustainability. [integrated-annual-report-2023-24.pdf](#) (HDFC).

XII.1a. Return on Assets: Return on Assets (ROA) is a profitability ratio that measures how efficiently a company or bank uses its total assets to generate net profit. It indicates the amount of profit earned for every unit of assets employed. A higher ROA reflects better management efficiency in utilizing assets to produce earnings.

Return on Assets (ROA)=Net Profit After Tax / Average Total Assets×100

Table. XII.1a. Pre -Post merger changes in Return on Assets Ratio

Bank/Period	Mean		Standard Deviation		Compound Annual Growth Rate		t – Value
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	
Union Bank of India	-0.74	0.48	0.30	0.21	-29.95	59.86	-5.75
Punjab National Bank	-1.15	0.22	0.50	0.13	-38.21	57.06	-4.60
HDFC Bank	1.990	1.945	0.078	0.049	3.08	-3.54	0.857
ICICI Bank	1.067	0.900	0.058	0.00	0.00	0.00	5.000

Source: Compiled from annual reports.

The table compares the mean, standard deviation, t-value, and compound annual growth rate (CAGR) of selected banks during the pre-merger and post-merger periods. For Union Bank of India, the mean improved from -0.74 in the pre-merger period to 0.48 post-merger, while the standard deviation decreased from 0.30 to 0.21, indicating improved performance and lower variability. The negative and significant t-value (-5.75) suggests a substantial difference between the two periods, and the post-merger CAGR was 59.86%.

Similarly, Punjab National Bank showed improvement, with the mean increasing from -1.15 to 0.22 and standard deviation declining from 0.50 to 0.13, indicating greater stability after the merger. The t-value (-4.60) also indicates a significant change, while the post-merger CAGR reached 57.06%.

In contrast, HDFC Bank exhibited only a slight decline in mean performance from 1.990 to 1.945, accompanied by a reduction in standard deviation from 0.078 to 0.049. The t-value (0.857)

suggests that the difference between the two periods was not statistically significant. Its CAGR changed from 3.08% pre-merger to -3.54% post-merger.

For ICICI Bank, the mean decreased from 1.067 to 0.900, while the standard deviation fell from 0.058 to 0.00, indicating highly consistent post-merger performance. The t-value (5.000) suggests a significant difference between the periods, although the CAGR remained 0.00% in both phases.

Overall, the public sector banks (Union Bank of India and Punjab National Bank) showed notable improvements in performance and stability after the merger, whereas the private sector banks (HDFC Bank and ICICI Bank) experienced either marginal declines or stable performance with reduced variability.

XII.1b. Return on Equity: ROE is a profitability ratio that measures the ability of a company or bank to generate profit from the shareholders' equity invested in the business. It indicates how efficiently management utilizes the owners' funds to earn profits. A higher ROE reflects better financial performance and more effective use of shareholders' capital.

Return on Equity (ROE) = Net Profit After Tax / Average Shareholders' Equity × 100

Table. XII.1b. Pre -Post Merger Changes in Return on Equity Ratio

Bank/Period	Mean		Standard Deviation		Compound Annual Growth Rate		t – Value
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	
Union Bank of India	-18.69	10.14	8.19	3.10	-0.33	37.05	-5.75
Punjab National Bank	-15.50	5.47	17.10	2.75	-0.50	49.22	-2.10
HDFC Bank	16.800	15.350	0.469	1.061	2.20	-9.32	1.845
ICICI Bank	15.300	15.750	1.082	0.495	1.91	-4.35	-0.629

Source: Compiled from annual reports.

The table presents a comparison of the selected banks' performance during the pre-merger and post-merger periods based on mean, standard deviation, t-value, and CAGR. Union Bank of India and Punjab National Bank showed substantial improvement after the merger, with their mean values increasing from -18.69 to 10.14 and -15.50 to 5.47, respectively. Both banks also experienced a decline in standard deviation, indicating greater stability in performance. Their negative t-values (-5.75 and -2.10) suggest significant differences between the pre- and post-merger periods, while post-merger CAGR rose to 37.05% and 49.22%, respectively.

In contrast, the private sector banks HDFC Bank and ICICI Bank maintained relatively stable performance. HDFC Bank's mean slightly declined from 16.80 to 15.35, while ICICI Bank's mean increased marginally from 15.30 to 15.75. Both banks showed lower variability in the post-merger period, as reflected by reduced standard deviations. The t-values (1.845 for HDFC and -0.629 for ICICI) indicate that the changes were not substantial. However, both banks recorded negative post-merger CAGR values (-9.32% and -4.35%), suggesting a decline in growth. Overall, the merger appears to have benefited the public sector banks more significantly than the private sector banks.

XII.2. Solvency Ratios: Solvency ratios are financial measures that show a company's ability to meet its long-term debts and financial commitments. They help investors, lenders, and other stakeholders assess whether a business has a stable financial structure and can continue operating without facing financial distress. These ratios compare a company's debt levels with its assets, equity, or earnings to determine how effectively it can cover its obligations over time. A higher solvency ratio generally indicates stronger financial health and lower risk, while a lower ratio may suggest that the company relies heavily on borrowed funds and could face difficulties in repaying its debts. By analyzing solvency ratios, stakeholders can gain insight into the long-term sustainability and financial strength of a business ([integrated-annual-report-2023-24.pdf](#) (HDFC)).

XII.2a. Capital Adequacy Ratio: CAR, also known as the Capital to Risk-Weighted Assets Ratio (CRAR), is a financial ratio that measures a bank's ability to absorb potential losses and protect depositors by maintaining sufficient capital against its risk-weighted assets. It reflects the financial strength and stability of a bank and ensures that the bank has adequate capital to withstand financial distress.

CAR = Tier 1 Capital + Tier 2 Capital / Risk-Weighted Assets × 100

Table XII.2a: Pre-Post Merger Changes in Capital Adequacy Ratio

Bank/Period	Mean		Standard Deviation		Compound Annual Growth Rate		t – Value
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	
Union Bank of India	12.03	14.37	0.69	1.75	5.54	13.01	-2.16
Punjab National Bank	10.20	14.38	1.29	0.10	-8.65	0.63	-5.58
HDFC Bank	18.875	19.200	0.330	0.566	1.42	4.26	-0.751
ICICI Bank	13.1333	12.540	1.150	0.792	9.16	9.35	0.683

Source: Compiled from annual reports.

The table compares the performance of selected banks during the pre-merger and post-merger periods using mean, standard deviation, t-value, and CAGR. Union Bank of India and Punjab National Bank showed notable improvements in their mean values, increasing from 12.03 to 14.37 and 10.20 to 14.38, respectively, indicating better post-merger performance. While Union Bank's standard deviation increased, suggesting greater variability, Punjab National Bank's standard deviation decreased significantly, indicating more stable performance. Their negative t-values (-2.16 and -5.58) suggest significant differences between the two periods. Post-merger CAGR improved to 13.01% for Union Bank and 0.63% for Punjab National Bank.

Among the private sector banks, HDFC Bank recorded a slight increase in mean from 18.88 to 19.20, while ICICI Bank experienced a marginal decline from 13.13 to 12.54. Both banks showed moderate changes in standard deviation, indicating relatively stable performance. The t-values (-0.751 for HDFC and 0.683 for ICICI) suggest that the differences between the pre- and post-merger periods were not statistically significant. Both banks achieved positive CAGR in both periods, with ICICI Bank recording the highest post-merger CAGR (9.35%). Overall, the results indicate that public sector banks benefited more noticeably from the merger, while private sector banks maintained stable performance with moderate growth.

XII.3. Asset Quality Ratios: Asset quality ratios measure how healthy and reliable a company's assets are in generating value and avoiding losses. These ratios help assess whether the assets recorded on the balance sheet are likely to produce future economic benefits or whether they carry significant risk, such as unpaid loans, obsolete inventory, or uncollectible receivables. A strong asset quality ratio indicates that a larger portion of a company's assets is productive, liquid, and capable of generating income, while a weaker ratio may suggest that the company holds assets that are difficult to convert into cash or are exposed to a higher risk of impairment. Investors, lenders, and analysts use asset quality ratios to evaluate the effectiveness of asset management, the stability of earnings, and the overall financial strength of an organization. In industries such as banking, these ratios are particularly important because they reveal the proportion of non-performing assets relative to total assets, providing insight into the institution's credit risk and financial health [https:// www.icici.bank.in/about-us/annual/2013](https://www.icici.bank.in/about-us/annual/2013).

XII.3a. Gross NPA: GNPA Ratio is an asset quality ratio that measures the proportion of a bank's gross non-performing assets to its total gross advances. It indicates the percentage of loans that have become non-performing due to non-payment of principal or interest for more than 90 days. The GNPA Ratio is widely used to assess the credit risk and asset quality of a bank.

A lower GNPA Ratio indicates better asset quality and effective credit management, whereas a higher ratio reflects a larger proportion of bad loans and greater credit risk.

GNPA Ratio= Gross Non-Performing Assets / Gross Advances × 100

Table XII.3a: Pre -Post Merger Changes in Gross NPA Ratio

Bank/Period	Mean		Standard Deviation		Compound Annual Growth Rate		t – Value
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	
Union Bank of India	15.13	10.79	0.85	3.12	-5.16	-25.97	2.32
Punjab National Bank	8.54	10.23	2.42	0.40	-8.35	-3.40	-1.19
HDFC Bank	1.218	1.285	0.090	0.064	-3.85	7.26	-1.063
ICICI Bank	3.650	2.130	0.593	0.438	10.09	-25.41	3.292

Source: Compiled from annual reports.

The table compares the pre-merger and post-merger performance of selected banks based on mean, standard deviation, t-value, and CAGR. Union Bank of India and Punjab National Bank showed improvements in their mean values, with Union Bank increasing from 15.13 to 10.79 and Punjab National Bank from 8.54 to 10.23. Punjab National Bank's standard deviation decreased significantly from 2.42 to 0.40, indicating more stable performance after the merger, while Union Bank's standard deviation increased, reflecting greater variability. The t-values (2.32 and -1.19) indicate differing levels of change between the two periods. However, both banks recorded negative post-merger CAGR values (-25.97% and -3.40%), suggesting a decline in growth.

Among the private sector banks, HDFC Bank showed a slight increase in mean from 1.218 to 1.285 and lower variability in the post-merger period. ICICI Bank experienced a decline in mean from 3.650 to 2.130, although its standard deviation also decreased, indicating more consistent performance. The t-values (-1.063 for HDFC and 3.292 for ICICI) suggest varying degrees of difference between the periods. HDFC Bank achieved a positive post-merger CAGR of 7.26%, whereas ICICI Bank recorded a significant negative CAGR of -25.41%. Overall, the results indicate mixed post-merger outcomes, with improved stability in some banks but weaker growth performance in most cases.

XII.3b. Net NPA: NNPA Ratio is an asset quality ratio that measures the percentage of a bank's net advances that remain non-performing after deducting provisions for bad and doubtful debts. It is calculated by dividing Net Non-Performing Assets by Net Advances and multiplying the result by 100. A lower NNPA Ratio indicates better asset quality, adequate provisioning, and effective credit risk management, while a higher ratio suggests greater financial risk and weaker loan portfolio quality.

Net NPA Ratio = Net Non-Performing Assets / Net Advances × 100

Table.XII.3b. Pre -Post Merger Changes in Net NPA Ratio

Bank/Period	Mean		Standard Deviation		Compound Annual Growth Rate		t – Value
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	
Union Bank of India	6.35	2.99	2.10	1.12	-29.65	-31.28	2.45
Punjab National Bank	6.55	3.44	0.01	0.62	0.00	-15.40	8.65
HDFC Bank	0.338	0.380	0.056	0.071	-9.14	30.30	-0.743
ICICI Bank	1.747	2.020	0.067	0.283	3.53	21.98	-1.342

Source: Compiled from annual reports.

The table compares the pre-merger and post-merger performance of the selected banks based on mean, standard deviation, t-value, and CAGR. Union Bank of India and Punjab National Bank experienced declines in their mean values from 6.35 to 2.99 and 6.55 to 3.44, respectively, indicating weaker post-merger performance. However, both banks showed reduced variability, as reflected in lower standard deviations. The t-values (2.45 for Union Bank and 8.65 for Punjab National Bank) suggest notable differences between the two periods. Both banks also recorded negative post-merger CAGR values (-31.28% and -15.40%), indicating a decline in growth.

In contrast, the private sector banks showed better post-merger outcomes. HDFC Bank improved its mean from 0.338 to 0.380, while ICICI Bank increased from 1.747 to 2.020. Although the standard deviations rose slightly, indicating somewhat greater variability, both banks achieved strong positive post-merger CAGR values of 30.30% and 21.98%, respectively. The t-values (-0.743 for HDFC and -1.342 for ICICI) indicate that the changes were not highly significant. Overall, the results suggest that private sector banks performed better in terms of growth after the merger, whereas the public sector banks experienced a decline in performance and growth.

XII.4. Efficiency Ratios: Efficiency ratios measure how effectively a business uses its resources to generate revenue and profits. Instead of focusing on how much a company earns, these ratios evaluate how well management utilizes assets, inventory, receivables, and other resources. They help determine whether the company is operating smoothly and making the best use of its available resources. Higher efficiency ratios generally indicate better operational performance, as the business is able to generate more sales or income from a given level of investment in assets. Examples include inventory turnover, asset turnover, and receivables turnover ratios, which provide insights into different aspects of operational efficiency. By analyzing these ratios, stakeholders can assess the company's

productivity, identify areas for improvement, and compare performance with competitors or industry standards [PNB Annual Reports | PNB Reports | PNB Bank Annual Reports](#).

XII.4a. Operating Expense to Total Assets Ratio: Operating Expense to Total Assets Ratio is an efficiency ratio that measures the proportion of a bank's operating expenses relative to its total assets. It indicates how efficiently a bank utilizes its asset base while controlling operating costs. The ratio is widely used to evaluate managerial efficiency and cost management in banking institutions.

A lower Operating Expense to Total Assets Ratio indicates greater operational efficiency, whereas a higher ratio suggests that a larger portion of the bank's assets is being consumed by operating expenses.

Operating Expense to Total Assets Ratio

$$= \text{Operating Expenses} / \text{Average Total Assets} \times 100$$

Table XII.4a: Pre -Post Merger Operating Expense to Total Assets Ratio

Bank/Period	Mean		Standard Deviation		Compound Annual Growth Rate		t – Value
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger	
Union Bank of India	1.41	1.92	0.05	0.04	-2.84	-1.54	-14.21
Punjab National Bank	3.64	1.59	0.58	0.01	9.22	-0.3	6.14
HDFC Bank	--	17.475	--	0.064	--	-0.51	
ICICI Bank	1.747	0.137	1.555	0.035	-7.50	3.27	2.318

Source: Compiled from annual reports.

The table presents a comparison of the pre-merger and post-merger performance of selected banks based on mean, standard deviation, t-value, and CAGR. Union Bank of India showed an increase in mean from 1.41 to 1.92, while its standard deviation decreased slightly from 0.05 to 0.04, indicating improved and more stable performance. However, its CAGR remained negative, declining from -2.84% to -1.54%. Punjab National Bank experienced a decline in mean from 3.64 to 1.59, but its standard deviation fell sharply from 0.58 to 0.01, suggesting greater consistency after the merger. Despite a positive t-value (6.14), its post-merger CAGR was slightly negative (-0.30%).

For the private sector banks, HDFC Bank had data available only for the post-merger period, recording a mean of 17.48, a low standard deviation of 0.064, and a post-merger CAGR of -0.51%. ICICI Bank showed a significant decline in mean from 1.747 to 0.137, accompanied by a substantial reduction in standard deviation from 1.555 to 0.035, indicating more stable but lower performance. Its t-value (2.318) suggests a noticeable difference between the periods, while its CAGR improved from -7.50% to 3.27%. Overall, the results indicate mixed post-merger outcomes, with improvements in stability across most banks but varying effects on growth and profitability.

XII.4b. Operating Expense to Total Income Ratio: Operating Expense to Total Income Ratio is an efficiency ratio that measures the proportion of a bank's operating expenses relative to its total income. It indicates how effectively a bank controls its operating costs while generating income from its business activities. The ratio is widely used to assess operational efficiency, cost management, and overall financial performance. A lower Operating Expense to Total Income Ratio indicates better operational efficiency because the bank incurs lower operating expenses to generate its income. Conversely, a higher ratio suggests relatively higher operating costs and lower operating efficiency.

$$\text{Operating Expense to Total Income Ratio} = \text{Operating Expenses} / \text{Total Income} \times 100$$

XII.4b. Pre -Post Merger Changes in Operating Expense to Total Income Ratio

Bank/Period	Mean		Standard Deviation		t – Value	Compound Annual Growth Rate	
	Pre-Merger	Post-Merger	Pre-Merger	Post-Merger		Pre-Merger	Post-Merger
Union Bank of India	18.39	21.92	0.62	1.78	-3.24	-3.20	7.59
Punjab National Bank	47.65	21.98	8.81	0.71	5.03	9.57	2.81
HDFC Bank	23.890	37.410	1.371	0.127	16.969	5.91	0.48
ICICI Bank	17.257	15.995	1.562	0.064	1.397	8.69	-0.56

Source: Compiled from annual reports.

The table compares the pre-merger and post-merger performance of selected banks using mean, standard deviation, t-value, and CAGR. Union Bank of India showed an improvement in mean value from 18.39 to 21.92, indicating better post-merger performance, although its standard deviation increased from 0.62 to 1.78, reflecting higher variability. Its CAGR also improved from -3.20% to 7.59%. Punjab National Bank, however, experienced a significant decline in mean from 47.65 to 21.98, while its standard deviation decreased sharply from 8.81 to 0.71, indicating greater stability. Its post-merger CAGR remained positive at 2.81%.

Among the private sector banks, HDFC Bank recorded a substantial increase in mean from 23.89 to 37.41, along with a significant reduction in standard deviation from 1.371 to 0.127, suggesting improved and more consistent performance. However, its CAGR declined from 5.91% to 0.48%. ICICI Bank showed a slight decrease in mean from 17.26 to 15.99 and a notable reduction in standard deviation from 1.562 to 0.064, indicating increased stability. Its CAGR decreased marginally from 8.69% to -0.56%. Overall, the results indicate that while most banks achieved greater stability after the merger, the impact on growth and performance varied across institutions.

Findings

The study found that bank mergers had a generally positive impact on the financial performance of the selected banks, with public sector banks benefiting more than private sector banks. Union Bank of India and Punjab National Bank showed significant improvements in profitability (ROA and ROE) and capital adequacy after the merger. Although asset quality and efficiency ratios produced mixed results, public sector banks demonstrated improved financial stability, while private sector banks such as HDFC Bank and ICICI Bank maintained relatively stable performance with only marginal changes. Overall, the findings indicate that mergers strengthened the financial position of banks, but their impact on profitability and operational efficiency was not uniform across all selected banks.

Conclusion

The study concludes that bank mergers have generally contributed to improving the financial performance and stability of the selected banks, although the extent of improvement differs between public and private sector banks. Public sector banks benefited more significantly from mergers in terms of profitability, capital adequacy, and financial strength. In contrast, private sector banks maintained relatively stable performance because they were already operating efficiently before the mergers. The results further indicate that mergers alone cannot guarantee improvements in all aspects of financial performance. Successful post-merger integration, efficient management, technological integration, and effective utilization of resources play a crucial role in realizing merger benefits. Overall, mergers have emerged as an important strategic tool for strengthening the Indian banking sector and enhancing long-term competitiveness.

Suggestions

The study suggests that banks should focus on effective post-merger integration to achieve operational synergies and improve overall performance. Management should emphasize cost control, profitability, employee training, and technological integration to overcome post-merger challenges. Public sector banks need to continue reducing non-performing assets (NPAs) and strengthening asset quality, while private sector banks should utilize mergers to expand their market share and enhance shareholder value. Policymakers should regularly monitor post-merger performance to ensure that consolidation achieves its intended objectives. Future research should consider a larger sample of banks, a longer post-merger period, and additional financial and non-financial indicators, such as customer satisfaction, digital banking performance, and market value creation, to provide more comprehensive insights.

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