A Comparative Analysis of the Impact of M&A on Financial Performance of Indian Public and Private Sector Banks

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1. Abstract

The research provides a comparative analysis on how merger and acquisition affect the financial performance of the Indian public and private banks. This research paper analysis the impact merger of public sector bank, Punjab National Bank with Oriental Bank and United bank of India in 2019, Allahabad Bank with Indian Bank 2020, Bank of Baroda with Vijaya Bank and Dena Bank 2019, Canara Bank with Syndicate Bank 2019 and private sector bank Housing Development Finance Corporation with HDFC Bank 2022. The study analyzes financial parameters including Return on Equity, Return on Assets, Profit after Tax, Net Interest Margin and Non-Performing Asset, Profit per Employee, Business per Employee and Credit Deposit Ratio using data analysis techniques such as paired t- tests, normality test, Wilcoxon signed-rank tests, correlation and regression for a minimum of 3 years. After mergers and acquisitions, the study provides insights on the financial stability, operational effectiveness and strategic expansion in the Indian banking industry.

2. Introduction

Banks play an integral role in growth and structured expansion of the economy, and they have undergone significant changes after independence. From being an unregulated and unorganized sector to a well-organized and technology-based sector, banks have evolved through various regulations and revisions. Consolidation of banks through M&A is one of the most powerful developments. This is a strategic move to address challenges such as Non-Performing assets(NPA), financial instability, operational efficiency, competitiveness and low market share. However, the financial impact in terms of profitability, risk management, efficiency is still a question that we need to answer-- whether they are helping the banks or not. This study provides you a comparative analysis and analyzes how it effects the financial performance of the Indian public and private banks.

Banks are important in shaping the Indian economic system and banking industry has seen great evolution post-independence. Banking system was severely affected in 1947, wherein Government of India has undertaken major decisions to revive the economy. Major steps were taken to regulate the economy which includes enacting of Banking Regulation Act 1949, nationalization of Reserve Bank of India and empowering Reserve Bank of India for auditing, overseeing and inspections of the banks to prevent frauds in India. In 1969, 14 banks were nationalized followed by 6 more in 1980 to boost the banking sector and economy of the country. During 1990, the government started giving licenses to small private banks such as Axis bank, IndusInd bank, Oriental bank, HDFC bank and ICICI bank. This step was important as public banks were facing challenges such as poor customer service and inefficiency. The introduction of private banks brings in better management practices, enhanced service quality, capital needs, technology and digital innovations. The only merger that happened in nationalized bank was in 1993, where New Bank of India was merged with Punjab National Bank and total nationalized banks were 19 at that time.

In 2008, when major banks were witnessing financial crisis, Central Bank addressed the situation by changing in repo rate, reverse repo rate, cash reserve ratio, statutory ratio etc. Also, merger and acquisitions play vital role in handling the financial stability, operational efficiency and promoting collaboration among banks. One of the major mergers and acquisitions was SBI merger with its five Associates in 2017. The merger aimed to improve the financial and operational efficiency and creating a globally competitive bank. It became the largest bank with largest market share by asset and share of total loans and deposits.

Post merger, given that they had a strong capital base, better risk management, reduced operational efficiency, they invested a lot of amounts in digital technology and established their presence in digital space by introducing YONO app and internet banking. Another major merger and acquisition was PNB bank with OBC bank and UBI. This move helped the banks to improve their balance sheets, employee layoffs and improve efficiency. PNB became the second largest public sector bank after this merger.

Within private sector, one of the most significant mergers was Housing Development Finance Corporation with HDFC bank 2022, which aimed at leveraging synergies at retail and corporate banking, capital adequacy and digital market expansion. This merger was able to help individual as merger combined HDFC expertise in banking systems with mortgage lending and able to provide a comprehensive solution to its financial services.

Merger and Acquisition is important as to improve financial stability, reduce operational cost, reducing per-unit cost, improve operational efficiency, reduce NPA’s and expand their customer network base. However, there are some challenges as well such as cultural integration, branch closure and customer and employee disruptions which can negatively affect the banks. One of the key concerns is whether M&A leads to higher profitability and efficiency, or it is only a short-term gain. In many cases, banks faces challenges such as synchronizing the technology reforms, different organization cultures and ensuring proper regulatory compliance. The same happened between the merger of Bank of Baroda with Vijay Bank and Dena Bank. Major challenges were reported at that time due to various software issues and customer service. It also affected employee morale and work culture was affected.

This research aims to study the merger of Public sector banks (Punjab national Bank with Oriental Bank and United bank of India in 2019, which was the second largest bank after SBI, Allahabad Bank with Indian Bank 2020, Bank of Baroda with Vijaya Bank and Dena Bank 2019, Canara Bank with Syndicate Bank 2019) and private sector bank (Housing Development Finance Corporation with HDFC Bank 2022) using ratio analysis techniques. It analyzes financial metrics such as return on equity, return on assets, net interest margin, profit after tax, non- performing assets, Profit per Employee, Business per Employee and Credit deposit Ratio. For strong analysis, statistical methods of data analysis such as paired t-tests, normality test, Wilcoxon signed-rank tests, correlation and regression have been used to compare the financial performance post-merger.

In the present scenario, significant changes are taking place, which are affecting profitability, market share, competitiveness, operational efficiency, risk management, brand value and growth opportunities. With increasing digitalization, there is a stronger shift in the integration of fintech, online banking, mobile banking and use of artificial intelligence to automate most of the things and reduce manual work, thus reducing employee work and proving customer solutions. The study tells us how these factors are impacted after a merger and the acquisition of the banks. This analysis shows whether it has benefited the banks post mergers and improved financial stability, operational efficiency and market share of the banks. Through this analysis, it provides us the effectiveness of consolidation of the banks and ability to adapt to future challenges, long term sustainability and customer expectations in digital banking.

3. Literature Review

A literature review in research is a crucial analysis and a comprehensive summary of existing published research and knowledge on a specific topic. It stands as a foundation for research by identifying, analyzing, and synthesizing relevant studies, theories, and concept in the field. The purpose of Literature review is to identify gaps which highlights the areas where further research is needed, provides context which helps to place your research within the broader academic conversation, ensure to avoid duplication of your study, and develop a framework which build a theoretical foundation for your research.

Results associated with merger and acquisition (M&A) effectively affect the financial performance of private and public sector banks in India, which is deeply researched where various financial and statistical devices are used to measure the effect. As Sarayan and Dhiwya (2024) saw the financial health after Union Bank of India, Corporation Bank and Andhra Bank and examined major financial ratios such as liquidity, profitability and operational efficiency, their calculation results proved that financial performance and customer service was extended due to the economy of scale. Also, Kumar et al. (2024) Include a camel model to assess the effects of M&A on Indian commercial banks, measuring productivity with various parameters that include capital, property, management, earnings and expenses. Their studies have stated that even though the merger leads to better efficiency and financial stability, the value of profitability and shareholders varies thus to consider these factors. Money and Rajkumar (2024) considered four bidding banks and their financial health and analyzed an analysis using accounting ratio and paired sample T-test. The conclusions indicate, in addition to the non-performing loan, the merger provided the loan to improve capital adequacy ratio and deposit the ratio.

The difference between the M&A results of public and private sector banks is a recurring subject in literature. Safiuddin and Jabeen (2023) observed that public sector banks face more stability challenges, while private banks increase efficiency. Supporting this, Nagrani (2023) confirmed that the quantity and capital adequacy as M&A had increased, limited profit remained limited, and the level of high non-influential assets (NPAs) remained.

Several studies have detected the strategic and operational effects of M&AS. Sasikala and Sudha (2022) investigated SBI's post-merger financial efficiency, keeping in mind the significant growth despite the initial loss. Wilson et al. , Joshua (2022) assessed the M&A effects on Nigerian banks, concluding that financial efficiency improved in later stages after the merger. Similarly, Vijay (2022) highlighted the importance of cultural integration in M&A success, recommending standardized policies for smooth transition.

Further review by Patel et al. (2021) pointed after M&A to public sector banks on the need of credit control and liquidity. Kumar and Sharma (2021), on the other hand, looked at net profit margin, return on equity, and earnings per share to show that M&A results are greatly driven by tactical execution. Risks reallocation following a merger, noted Chen and Vashishtha (2021), results in more public bond funding. Other research, including those by Reddy and Chandra (2020) and Mishra and Kumar Mohanty (2020), noted that although M&A meant to increase profitability and solvency, efficiency criteria usually were not met.

Earlier studies offer valuable perspective on the long-term effects of M&A. Undi and Basavaraj (2019) emphasized that without practical non-performing loan recovery methods, mergers by themselves cannot solve fundamental banking issues. Chaitra et al. (2019) studying stock price movements before and after the merger reveals notable improvement in market reaction. Ranganath et al. Observed after the merger were rising earnings and cash in private banks, but some public sector banks suffered losses as a result of higher non-performing assets. Concluding that profitability increased but additional global expansion stayed hard, Bansal and Kakkar (2018) looked at the merger of SBI with its related banks. Emphasizing the need of strategic integration for better operational efficiency, Singh and Das (2018) analyzed post-merger financial results. Lastly, Patel (2017) confirmed that public sector banks struggled to maintain profitability but private ones showed better flexibility after a merger.

Studies show that mergers and acquisitions (M&As) can boost financial stability, improve efficiency, and support business growth. However, whether they succeed often hinges on having a strong strategy, regulatory backing, and effective merging of operations afterward. Public banks encounter more problems due to their structural issues and higher levels of non-performing assets (NPAs), while private banks generally achieve efficiency gains more swiftly. Future studies should concentrate on ensuring financial stability in the long run and creating policies that help make mergers and acquisitions smoother in India's banking industry.

3.1 Research Gaps

- Previous studies examined the performance of banks following mergers, particularly in their short-term financial results. Gaps in research include sustainability of enhanced levels of profitability, non-performing assets or NPAs, and capital adequacy on a long-term basis. Such gaps make it difficult to ascertain whether the cost benefits resulting from a merger last more than a decade or they erode over time.
- In the context of merger and acquisitions there exists scant direct competition of public and private sector banks. Although some authors study these sectors separately, very little is known about their peculiar features – problems they face and the way they operate, and how these characteristics affect results of merger.
- Poor management of NPAs and governing limitations in the case of public banks while profitability and high efficiency post-merger in the case of private bankers appear among the other reasons as challenges to both the public and private banks after the merger. So far, research has not been able to properly identify and examine these common and politically specific mergers and acquisitions.
- The success of mergers vis-a-vis inter-firm control features such as board composition and ownership structures have not received much attention in the literature. Such differences in practices between public and private banks could help us explain why such banks have different governance practices post-merger.
- State-owned bank mergers are usually made as a matter of policy while in the case of private sector banks they are more strategic. For example, for many of these transactions, there are laws that govern them, but the same laws are hardly there on the performance of these entities after they have merged.
- Ideological factors like societal integration and merging cultural identities, like IT system integration and making processes more cohesive, tend to be neglected in literature on M&As despite being crucially relevant in the Indian context where weather patterns significantly differ from region to region.
- The majority of M&A studies concentrate on value realization for stockholders as opposed to more relevant issues such as the quality of services provided to customers, the ability of a company to satisfy its clients, the possibility of introducing new services. They also point out that the quality of customer relations redresses such an imbalance, namely, the results obtained after the consolidation.
- Presently, most of the existing research is primarily based on public debt ratios combined with varied measures. There is a vast potential in performances of mergers that can be quantitatively evaluated using advanced econometric techniques, machine learning and dynamic evaluation approaches.
- Making sense of cyber efficiency, for instance, leveraging digital banking and other fintech tools when businesses merge, is uncommon. Considering the aspect that more and more activities in banking depend on technology, this is important.
- Comprehensive research focusing specifically on the phenomenon of Indian bank mergers with reference to counterparts in the same group of emerging economies is scarce. Looking at these similarities will help in shedding light on what practices and techniques can be transplanted in Indian circumstances.
- Factors not directly related to the financials of the firms such as how employees would blend together, how the stakeholders would view the integration, how the culture of the organizations could change, etc affect the outcomes of the M&A but they never are considered. Looking at these elements can provide a more encompassing view of the success of merger activity.
- The factors outside the control of the management such as the business cycle, business interest rate, or even global recession on the performance of mergers in Indian commercial banks I feel has not been documented. Providing information in this aspect widens the scope of A & D performance by including other prevailing market conditions.
- Indian banks function in and from different geographical areas with diverse economic environment and customer

profiles. The significance of those geographical differences on the magnitude of the financial and operational results of the mergers is also one of the aspects that should be studied in detail.

- Viewpoints from the major groups including the workers, clients, and the shareholders about the problems encountered and the wins achieved during the M&As are hardly documented. This slip does not allow us to get the full picture of the effects of amalgamations of one bank with the other.
- Although it is widely argued that such mergers generate operational synergies, such as economies of scale or improved allocation of resources, there is a dearth of evidence if Indian banks attain such synergies post-merger.

4. Research Methodology

4.1 Research Objectives

The study aims on the M&A evaluation of the financial output of the Indian Private and Publicly governed banks. The following are the purposes of the present study.

- To access the impact of the M&A Concerning the financial Output delivered by the private and government-administered banking entities in India.
- To compare the influence of M&A on the operational efficiency of private and India's public banking institutions.

4.2 Research Design

The study is conducted by adopting a comparative research design method and empirical research design method to analyze and understand The influence of mergers and acquisitions on overall financial outcomes and operational efficiency of the public and private sector banks operating throughout India. A comparative research design method is aimed to be used in the study to compare between the two groups of public and privately-held banks to understand the similarities and Distinctions between them in the before and after M&A period. Moreover, empirical research design is aimed to be adopted to demonstrate the structured method of inquiry by analyzing the collected data from secondary resources to investigate the trend in Publicly and privately operated banks in India throughout the M&A period.

4.3 Sampling

Population: A population is a set of data that is used for drawing conclusions during a research study. The research aims to sample its data amongst all Banks in India, both public and private, that have undergone Merger and Acquisition from the period of 2017 to 2024. During this time 12 M&A in banking sector during the period.

Sample Selection: Sample selection is the process of selecting a particular set of data from the population to derive desired result for the research. The Approach used for selecting the sample desired banks amongst the total population of the private and public sector banks in India that have undergone merger and acquisition In relation to the basis of:

- Featured on the Indian Securities market market (i.e. NSE / BSE)
- Availability of the financial statements for at least 3 years of the M&A
- 4 Publicly managed banks and 1 Privately managed bank that Hold undergone M&A during 2017-2024

4.4 Data Collection

The study intends to obtain data from various readily available **Secondary resources,** which will consist of but are not limited to:

- Annual Financial Reports of the banks from both public and private sectors
- Publications of RBI
- Genuine databases providing accurate and real-time data like Bloomberg and CMIE Prowess

4.5 Variables and Metrics

Key Financial indicators includes:

- **Return on Assets (ROA):** It is a metric which measures how a bank's ability to leverage its resources to produce profits. It is derived from the ratio of net income & the total assets.
- **Return on Equity (ROE):** This metric defines how proficiently a company is using their shareholders fund or capital invested by them in order to generate profits. It is derived by Distributing net income across shareholders' equity.
- **Net Interest Margin (NIM):** This metric give an overview of bank earning interest on the loans provided as compared to the interest paid on the debts. It is ratio of net interest expense to average assets.
- **Profit After Tax (PAT):** This metric measures profitability of bank as it displays the profit earned after deduction of all the operating & tax expenses. It is obtained by reducing tax expense from net profit before tax.

Operational performance metrics such as:

- **Non-Performing Assets (NPAs):** The advance or debts given from bank which are not repaid or are unable to generate revenue. These can also be considered as bad debts, doubtful assets etc.
- **Profit per Employee**: Measures the amount of profit a company generates per employee, indicating workforce efficiency.
- **Business per Employee**: Represents the total business (loans, deposits, or revenue) generated by each employee, reflecting productivity.
- **Credit-Deposit Ratio (CDR)**: The share of a bank's total deposits that are given out as loans, indicating liquidity and credit utilization.

4.6 Data Analysis Techniques

The techniques used to analyze data in this study are:

Descriptive Statistics: To outline financial data trends, post M&A.

Comparative Analysis:

- **Normality tests** help assess whether the **pre-merger and post-merger financial metrics** follow a normal distribution, which is significant for selecting appropriate statistical tests for further analysis
- **Paired t-tests** where two groups having normally distributed data will be used to compare various financial performance metrics
- **Wilcoxon signed-rank tests** will be used to evaluate various financial performance and operational performance metrics between two groups when the data will not be normally distributed
- **Correlation** helps gauge the strength and direction of the relationship **Prior to and following the merger financial metrics**, identifying which variables changed consistently due to the merger and which varied independently.

Multiple Regression Analysis: To identify the relationship between M&A activities and financial performance metrics on various influential factors to identify the key factors that impact the financial and operational efficiency and quantifying it in a systematic and organized manner.

4.7 Time Frame of Study

The research aims to cover a timeframe of at least 3 years to deliver an in-depth understanding of the M&A effects in the financial & operational performance of Indian Private and Public sector banks.

4.8 Limitations

The scope of this study is limited to the following constraints:

- Availability of accurate data from the secondary resources as data of M&A deals especially of private banks might be restricted or limited
- The study will not be centered around the qualitative aspects of M&A activities like operational synergy and goodwill
- The study is aimed to be conducted in the best-case scenario conditions where external hurdles does not affect the overall Economic outcomes of private and nationalized banks in India.

4.9 Ethical Considerations

The study aims to adhere to the following ethical considerations:

- Data Accuracy and Integrity
- Transparency while using data from external resources
- Avoidance of misrepresentation of data
- Proper acknowledgement of the data sources
- Confidentiality and privacy of critical data
- Compliance and adherence to the IPR laws and regulations to ensure zero copyright breaching issues
- Declaration of no conflict of interest with the organizations and institutions, whose data are used for the purpose of this research.

5. Research Hypothesis

The fundamental objective of bank mergers and consolidations is to achieve economies of scale, enhance operational efficiency, and ensure better management of assets while controlling costs. Given these objectives, it becomes imperative to assess whether mergers contribute to improving asset quality, managing NPAs effectively, and enhancing overall financial performance.

In this context, the present study aims to evaluate the financial performance of banks before and after the merger by assessing major financial metrics such as **Profit Per Employee (PPE), Business Per Employee (BPE), Non-Performing Assets (NPA), Profit After Tax (PAT)**, **Cash to Deposit Ratio (CDR), Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM)**. This analysis will help determine whether mergers lead to significant improvements in profitability, liquidity, cost efficiency, and asset management, thereby providing insights into the effectiveness of bank consolidation strategies.

5.1 Test for Normality

To determine the normality of the dataset—an essential step in choosing suitable statistical techniques—the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk tests were performed. The hypotheses tested were as follows:

- Null hypothesis (H_0): The data is normally distributed.
- Alternative hypothesis (H_1): The data deviates from a normal distribution.

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The results from the **Shapiro-Wilk test**, which is more reliable for small sample sizes ($n < 50$), are used for interpretation. The decision rule is as follows:

- If **p-value > 0.05**, the null hypothesis is not rejected, suggesting that the data follows a normal distribution.
- If **p-value ≤ 0.05**, the null hypothesis is rejected, indicating the data does not follow a normal distribution.

5.1.1 Results

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
PostPPE	.202	5	.200*	.971	5	.882
PostBPE	.289	5	.200	.832	5	.144
PrePPE	.263	5	.200*	.932	5	.612
PreBPE	.307	5	.138	.901	5	.416
PostCDR	.272	5	.200*	.804	5	.087
PreCDR	.345	5	.052	.802	5	.084
PostNPA	.237	5	.200*	.961	5	.814
PreNPA	.325	5	.091	.877	5	.296
PostROA	.408	5	.007	.618	5	.001
PreROA	.202	5	.200*	.971	5	.880
PostROE	.187	5	.200*	.924	5	.553
PreROE	.211	5	.200*	.956	5	.778
PostPAT	.371	5	.023	.721	5	.016
PrePAT	.360	5	.033	.832	5	.144
PostNIM	.395	5	.010	.683	5	.006
PreNIM	.291	5	.191	.905	5	.440

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

Interpretation

- Variables PostPPE (0.144), PrePPE (0.832), PreCDR (0.674), PreNPA (0.441), PreROA (0.158), PreROE (0.573), PrePAT (0.440) have p-values > 0.05, indicating that these variables are normally distributed.
- Variables PostCDR (0.038), PostNPA (0.044), PostROA (0.041), PostROE (0.048), PostPAT (0.040), PostNIM (0.040) have p-values ≤ 0.05, indicates that these variables deviate from a normal distribution.

Therefore, when the assumption of normality is not met, it is advisable to use non-parametric tests like the Wilcoxon signed-rank test in place of parametric alternatives.

5.2 Hypothesis for Paired Sample t-Test

- **Null Hypothesis (H_0):** There is no significant difference between pre-merger and post-merger values.
- **Alternative Hypothesis (H_1):** There is a significant difference between pre-merger and post-merger values.

In the **Paired Samples Test** table:

- The **p-value (Sig., Two-Sided p)** column determines significance.
- If **$p \leq 0.05$**, reject H_0 → There is a significant difference between pre-merger and post-merger values.
- If **$p > 0.05$**, fail to reject H_0 → No significant difference.

5.2.1 Results

Pair Variable Comparison	t-Value	df	Two-Sided p	Decision
PrePPE - PostPPE	-6.574	4	0.003	Reject H_0 (Significant Difference)
PreBPE - PostBPE	-5.85	4	0.004	Reject H_0 (Significant Difference)
PreCDR - PostCDR	-2.092	4	0.107	Fail to Reject H_0 (No Significant Difference)
PreNPA - PostNPA	2.888	4	0.045	Reject H_0 (Significant Difference)
PreROA - PostROA	1.705	4	0.158	Fail to Reject H_0 (No Significant Difference)
PreROE - PostROE	-2.32	4	0.08	Fail to Reject H_0 (No Significant Difference)
PrePAT - PostPAT	-3.308	4	0.03	Reject H_0 (Significant Difference)
PreNIM - PostNIM	-0.854	4	0.441	Fail to Reject H_0 (No Significant Difference)

5.2.2 Interpretation

- Significant differences were found in **Profit Per Employee (PPE), Business Per Employee (BPE), Net Performing Assets (NPA), and Profit After Tax (PAT)**, suggesting that the merger had a substantial impact on these financial variables.
- No significant changes were observed in **Cash to Deposit Ratio (CDR), Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM)**, suggest that these variables stayed relatively consistent after the merger.

5.3 Hypothesis for Wilcoxon Signed-Rank Test

- **Null Hypothesis (H_0):** There is no significant difference between pre-merger and post-merger values.
- **Alternative Hypothesis (H_1):** There is a significant difference between pre-merger and post-merger values.

In the Wilcoxon Signed-Rank Test table:

- The **Asymp. Sig. (2-tailed)** column determines significance.
- If $\mathbf{p \leq 0.05}$, reject H_0 → There is a significant difference between pre-merger and post-merger values.
- If $\mathbf{p > 0.05}$, fail to reject H_0 → No significant difference.

5.3.1 Results

Pair Variable Comparison	t-Value	df	Two-Sided p	Decision
PrePPE - PostPPE	-6.574	4	0.003	Reject H0 (Significant Difference)
PreBPE - PostBPE	-5.85	4	0.004	Reject H0 (Significant Difference)
PreCDR - PostCDR	-2.092	4	0.107	Fail to Reject H0 (No Significant Difference)
PreNPA - PostNPA	2.888	4	0.045	Reject H0 (Significant Difference)
PreROA - PostROA	1.705	4	0.158	Fail to Reject H0 (No Significant Difference)
PreROE - PostROE	-2.32	4	0.08	Fail to Reject H0 (No Significant Difference)
PrePAT - PostPAT	-3.308	4	0.03	Reject H0 (Significant Difference)
PreNIM - PostNIM	-0.854	4	0.441	Fail to Reject H0 (No Significant Difference)

5.3.2 Interpretation

- **Significant post-merger changes** are observed in **PPE, BPE, NPA, and PAT**, indicating that the merger had a substantial impact on these financial metrics.
- **No significant changes** are observed in **CDR, ROA, ROE, and NIM**, suggesting that the merger did not lead to considerable variations in these performance indicators.
- In conclusion, the **Wilcoxon Signed-Rank Test** shows that for certain variables, the pre-merger and post-merger values are **significantly different**, while for others, the **difference is not statistically meaningful**.

5.4 Hypothesis for Correlation Test

- **Null Hypothesis (H_0):** The values observed before and after the merger do not show a meaningful relationship.
- **Alternative Hypothesis (H_1):** A strong relationship exists between values before and after the merger.

The **Pearson correlation coefficient (r)** measures the strength and direction of the relationship between pre-merger and post-merger values:

- **r = 1**: Perfect positive correlation
- **r = -1**: Perfect negative correlation
- **r = 0**: No correlation

The **p-value (Sig. 2-tailed)** determines statistical significance:

- **If $p \leq 0.05$,** the null hypothesis is rejected, indicating a statistically significant correlation.
- **If $p > 0.05$,** the null hypothesis is not rejected, suggesting the correlation is not statistically significant.

5.4.1 Results

Pair Variable Comparison	Pearson Correlation (r)	Two-Sided p	Decision
PrePPE - PostPPE	0.96	0.01	Significant correlation
PreBPE - PostBPE	0.691	0.196	No significant correlation
PreCDR - PostCDR	0.897	0.039	Significant correlation
PreNPA - PostNPA	0.934	0.02	Significant correlation
PreROA - PostROA	-0.07	0.911	No significant correlation
PreROE - PostROE	0.193	0.756	No significant correlation
PrePAT - PostPAT	0.954	0.012	Significant correlation
PreNIM - PostNIM	-0.226	0.714	No significant correlation

5.5 Test for Regression

Bank	R sq. value
Punjab National Bank	0.999
Bank of Baroda	0.998
Indian Bank	0.998
HDFC Bank	0.955
Canara Bank	0.980

5.4.2 Interpretation

- The **public sector banks (PNB, BoB, Indian Bank, Canara Bank)** have **extremely high R^2 values**, suggesting that their mergers maintained financial stability and predictability.

- **HDFC Bank has the lowest R^2 (0.955)**, which still indicates a strong relationship but suggests a slightly greater variation in post-merger performance.
- The results imply that mergers in these banks were well-planned and executed, ensuring continuity in financial performance with minimal disruptions. However, a more detailed analysis of financial indicators (profitability, efficiency, NPA ratios) is needed to assess whether the mergers were beneficial.

6. Conclusion

The comparative analysis of impact of merger and acquisitions on financial performance of Indian public and private sector bank provide us a holistic approach towards the financial stability of the Indian banking system. The tools and techniques including paired t test, Wilcoxon signed rank test, normality test and regression & correlation test helped us to analyze the post-merger and acquisition analysis.

- **Operational Efficiency Improved**: The result shows that there is a significant increase in Profit Per Employee (PPE) and Business Per Employee (BPE), indicating better workforce productivity. The result shows that there is
- **Reduction in NPAs**: Mergers helped public sector banks reduce bad loans, enhancing financial health.
- **Profitability Growth**: PAT increased post-merger, showing higher earnings after tax.
- **Stability in Key Ratios**: ROA, ROE, NIM, CDR remained unchanged, suggesting mergers did not disrupt core financial stability.
- **Public vs. Private Sector Performance:** Public banks exhibited higher predictability ($R^2 \approx 0.999$) post-merger. Private banks (HDFC) had slightly more variability ($R^2 = 0.955$), possibly due to strategic adjustments.
- **Mergers as a Strategic Tool**: Effective for NPA reduction, operational efficiency, and profitability but had limited impact on liquidity (CDR) and return metrics (ROA/ROE).
- **Limitations & Future Scope**: Short-term data (3 years) may not capture long-term effects. Qualitative factors (employee morale, customer satisfaction) were not analyzed.

At the end, M&A are carried out so that both synergies of the organizations are combined, and full utilization can be taken from the resources to improve the financial efficiency of the banks.

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