

Post-Merger Cost-Effectiveness and Financial Performance in the Indian Banking Sector: An In-Depth Assessment

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Abstract

The Indian banking sector has experienced dramatic structural changes because of consolidation initiatives brought into effect, especially in the case of the State Bank of India consolidation in 2017, the merger of Bank of Baroda in 2019, and the consolidation of ten Public Sector Banks (PSBs) into four anchor banks in 2020. This manuscript reports an in-depth evaluation of empirical research analysing post-merger operating cost efficiency and financial performance of Indian banks that have undergone this transformation. We highlight the previously deployed approaches used in two groups of frameworks: (i) accounting-based ratios analysis using CAMELS technique and (ii) frontier efficiency methods, including Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA). The combination of both approaches indicates a similar trend of “integration lag” or “digestive period” of three to five years in which a significant level of cost efficiency can be demonstrated. Thus, while the integration process helped to optimize the asset quality due to reductions in the amount of net NPAs and improvement of capital adequacy, the profit indicators after the merger (ROA and ROE) remained mixed and were negative due to the impact of hidden costs of integration. Moreover, it was discovered that market-based voluntary mergers are generally more successful in terms of the speed of cost improvement and effectiveness of technical efficiencies than those initiated due to government policies. This review identifies significant future avenues of investigation, focusing on assessing the costs of digital transformation and long-term sustainability of performance.

Keywords: Bank Mergers, Cost-Effectiveness, Indian Banking Sector, Financial Performance, Data Envelopment Analysis (DEA), Public Sector Banks (PSBs), Operational Synergy.

I. Introduction

In today's increasingly uncertain global economy, marked by fierce competition and rapid technological developments, companies are looking for ways to ensure their ongoing competitiveness. Mergers and acquisitions (M&As) are one of the most effective corporate tools to expand their capabilities and create resilience. For the banking sector, the understanding of the consequences and results of mergers is key for the academic community and policy makers. Over the past decade, the Indian government and the Reserve Bank of India have made efforts to move from the operation of a fragmented banking sector to that of global banks. The peak of this reform was marked by the mega-merger of the State Bank of India (SBI) in 2017, as well as the merger of the Bank of Baroda with Dena and Vijaya Bank in 2019, and the 2020 merger, during which ten Public Sector Banks (PSB) became four leading banks with solid capital. After

the mergers, regulators and state stakeholders should aim at minimizing costs, including costs linked to redundancy of infrastructures and improving and enhancing asset quality.

The rationale for massive consolidations is based on the Synergy Hypothesis, which argues that the combined entity will be more financially solid and cost-efficient in comparison to the individual banks that function independently. In terms of banking activity, "cost-effective" refers precisely to the effectiveness of the Input-Output ratio—namely, the inputs that include interest expenses, salaries of employees, administrative costs, and outputs that consist of interest income, non-interest income, and investments made. Ideally, the attainment of such synergies is possible through:

- Economies of Scale: Spreading fixed costs (such as headquarters and IT infrastructure) over a larger asset base.

- Operational Synergies: Closing overlapping branches and lowering the number of branches in urban areas.

Even with these theoretical advantages in mind, the academic literature regarding banking consolidation in India has shown the existence of a contradiction, whereby despite some studies pointing to significant long-term efficiency gains, other studies highlight that hidden costs can lead to inflated cost-income ratio first.

As a result, this review brings together divided empirical insights to assess whether banking mergers provide enduring cost efficiency or only make impractically large institutions weighed down by structural inefficiencies. The integrated viewpoint has been invaluable in providing specifics on the needed “digestion time” for banks to restore the capacity to withstand severe reform shocks.

II. Literature Review

To assess the losses of the Indian banking industry, the existing studies are divided into two main streams: traditional financial ratio analysis (CAMELS model) and the efficiency approach.

1. Traditional Financial Ratio Analysis (CAMELS model). The CAMELS model is one of the communication tools in the existing studies that are helpful in the analysis of the banks’ performance before and after the merger procedure.

A. Financial Synergy with Profitability

Evidence obtained through data reveals that indicators of profitability such as Return on Assets (ROA) and Return on Equity (ROE) have a typical trajectory of recovery in the form of a “U-curve” after the merger. Post-merger the profitability measures subsides owing to a higher cost of transitioning, while stabilization and positive growth appear only a few years later from the merger. For example, Puskar Sudhakar and Mishra (2024) analysed cases of PSB consolidations over a multi-decadal period and found no statistically significant improvements observed in financial performance in the short-run; they found reductions in operating costs but growth in revenues occurred sooner than the execution of changes on the operating costs front. The same can be said about a

case of the Indian Bank and Allahabad Bank merger where Singh Saran (2025) claimed there were no statistically significant differences in their financial performance a few years after the merger.

In a breakthrough development, recent research published in 2026 utilizing the robust Difference-in-Differences (DiD) approach (e.g., Mohapatra & Mahapatra, 2026; Cyril, 2026) has led to the emergence of a sophisticated causal story. It was shown in the research that, by taking account of blended control bank data, the use of a standard paired t-test would normally produce inflated results regarding merger successes, i.e., the overall recoveries on the macro sector level would be included in the merged results. Cyril (2026), for example, demonstrated that, after controlling for macro situations, some leading firms like the Punjab National Bank actually experienced negative short-term integration effects in relevant structural ROA and CIR metrics, thus proving that large-scale structural changes are indeed fraught with the danger of frictional losses.

B. Asset quality and non-performing assets (NPAs)

There is a common agreement among scholars that mergers among banks in the Indian public sector have been quite successful in restructuring the balance sheets of banks and cleaning the books of quite a huge volume of bad loans accumulated by them. Through the merger of troubled banks with stronger banks, the ratio of NPAs has dropped considerably. For example, during the merger between Indian Bank and Allahabad Bank, the NPA ratio dropped significantly to around 0.43% by March, 2024, according to latest statistics. Similarly, in the study by Thippeswami and Bheemanagouda (2024), it was noted that gross NPAs have declined after the completion of set of mergers involving various banks associated with SBI. In addition, empirical investigations in 2026 regarding the merger of the Bank of Baroda with Vijaya Bank and Dena Bank assert that the process of institutional consolidation played a decisive macro-prudential role in combating problems of decreasing asset quality and lowering systemic risk of defaulting.

C. Operational Efficiency and Cost Ratios

Cost-to-Income Ratio (CIR) refers to the key accounting ratio that assesses the efficiency of operations. Based on the analysis of mega-mergers in 2020, it becomes clear that while structural labor costs may not change due to the influence of unions as well as public sector hiring requirements, “other operating expenses” have decreased dramatically due to the effective elimination of redundant ATMs and branches.

2. Efficiency Models Based on Frontier Data (DEA and SFA)

Although accounting ratios enable us to gain insight into the past, it does not make it possible to differentiate “Technical Efficiency,” i.e., the maximum efficiency of banks in transforming inputs into outputs using various techniques.

A. Data Envelopment Analysis (DEA)

DEA is the most widely adopted non-parametric frontier methodology found in the literature. Longitudinal studies led by the Reserve Bank of India (2023) comprehensively evaluated public sector consolidations using DEA models and found that the technical efficiency of acquiring banks climbed progressively from approximately 90.9% pre-merger to 93.8% three years’ post-merger, ultimately reaching 94.2% after a five-year window. These frontier metrics indicate that while integration challenges are formidable, substantial efficiency gains are achievable over an extended horizon. However, research by Vyas (2021) using CCR and BCC models indicates that while “Scale Efficiency” is rapidly achieved via asset expansion, “Managerial Efficiency” often lags considerably due to internal operational bottlenecks. Research stream flowing from this line continues into 2026. For instance, frontier empirical work conducted by (Mishra and Padhan, 2026) employs 15-year-long panel data for various ownership groups to draw conclusions. It comes out that the performance of state-owned anchor banks demonstrates significant economies of scale after merging, although performance varies significantly depending on the size of assets, density of branch network, and liquidity risk profile.

B. Stochastic Frontier Analysis (SFA)

The SFA method employs a parametric model where external shocks and noise of measurement are taken into consideration, while non-parametric models avoid those factors. The application of the SFA models in given studies (e.g., Jayaraman, 2025) reveals that the cost frontier of the banking industry in India improved after the reform fundraising. The SFA findings testify to the fact that the effectiveness of new technologies and the improvement of FinTech systems are much more important than extending the operation geographically, drawing more evidence from the studies demonstrating “X-inefficiency” that occurs in the absence of competition and reduces the performance at failure fitting mergers.

III. Methodology

In order to provide a strong empirical framework for measuring variations in post-merger results, literature takes recourse to a multi-faceted quantitative methodology.

1. Scope and Data Collection

Time Frame: Analytical frameworks focus on a time frame of several years (2015–2025) to obtain balanced pre-merger and post-merger information surrounding the prominent banking reconsolidations in 2017, 2019, and 2020.

Target Entities: The scope of data involves both policy-driven public sector consolidations and market-driven private sector mergers, making it possible to track distinctive operational paths.

Data Sources: Audited secondary data is collected from official reports of the Reserve Bank of India (RBI) on an annual basis, corporate results, and scientific journal publications.

2. Analysis Metrics and Statistically-Pulling Tools:

- **Efficiency Frontiers (DEA/SFA):** Using non-parametric and parametric methods, the analysts determine technical, cost, and scale efficiencies through specific inputs (interest expenses, operating costs, and number of employees) and one output.
- **Financial Ratios:** Accounting indicators like Cost-to-Income Ratio (CIR), Return on Assets

(ROA), Return on Equity (ROE), Net Interest Margin (NIM), Return on Capital Employed (ROCE), and Profit per Employee are helpful to evaluate the overall health of multi-faceted firms financially.

- **Statistical Validation:** The Pairs t-Tests are employed to identify whether the changes in average post-merger ratios are consequential from a statistical point of view or not caused by random fluctuations. The Event Study Method is used to determine capital market responses and find abnormal returns on stock prices around announcements. Multivariate Regression and Correlations are used to explore the correlation between asset sizes prior to mergers and efficiency levels post-measurements.

IV. Results and Discussion

In this section, we present the results and discussion. The comparison of the empirical literature indicates that there is a disconnect between technology-related improvements in efficiency and current accounting profitability. Below we present the main findings:

1. The 'Integration Lag' and the Efficiency Paths

Technological improvements can be linked to time. Both the evaluations of RBI (2023) and the individual frontier studies demonstrate that technological achievements increase in trend over the course of five years' market indicators grow from 90.9% to 94.2%.

2. CIR and Infrastructure Dynamics

Banks that quickly combine their operations have been shown to experience a fall in their Cost-to-Income Ratios (CIR) of 2%–6% after their merger

takes place. This decline in costs is typically stronger among anchor banks with the advanced IT infrastructure prior to the merger in question. The availability of compatible digital architecture made the process of branch rationalization and technology migration smooth and short. On the contrary, banks that lacked technical compatibility usually experience jumps in costs as their integration process is protracted by IT process delays and administrative bottlenecks.

3. Different types of mergers

There are various sources of motivation for different types of mergers.

- **Market Mergers** are voluntary mergers that take place in the private sector. The main feature of these transactions is that they demonstrate higher degrees of adaptability to change, diversity in management, and the ability to streamline costs due to lesser complexities in their organizational structure.
- **Government Mergers** represent mergers in the public sector. Such processes are carried out in a more formal fashion but tend to take longer due to the need for overcoming all bureaucratic hurdles and complexities of existing systems.

4. Human Capital and Cultural Barriers

Integrating human resources is one of the major causes of the difficulties in achieving immediate efficiency in operation of mergers. Difficulties with aligning the labor force, a number of initiatives necessary for retraining employees, and significant differences in culture often adversely impact productivity in the early post-merger period.

V. Overview of Key Empirical Studies

Here follows a table that summarizes the techniques employed, the scope of the research, and the main results obtained in this line of investigation:

Study & Year	Research Scope	Methodology Applied	Core Findings & Discussion Summary
Cyril (2026)	Public Sector Mega-Mergers (Focus on PNB and Canara Bank)	Difference-in-Differences (DiD) vs Paired t-tests	Shows that paired t-tests mask true integration friction. PNB saw short-term declines in ROA and rises in CIR, while Canara achieved structural cost savings.
Mishra & Padhan (2026)	15-Year Panel across Public, Private, and Foreign Banking Groups	Long-term DEA Frontier Analysis & Panel Tobit Regression	Finds government-owned banks as strong structural operators over long horizons. Efficiency frontiers driven by bank size, liquidity risks, and interest rate dynamics.

Chauhan (2026)	Post-2015 Urban Cooperative Bank (UCB) Consolidations	Prudential Ratio Aggregation & Structural Review	Co-operative M&As act as compliance and stability buffers. Efficiency gains are secondary to governance reforms.
Singh, S. (2025)	Indian PSBs (Indian Bank & Allahabad Bank case)	Financial Ratio, Trend Analysis, & Frontier Modelling	Net NPAs dropped significantly (~0.43% by 2024); modest EPS growth. Synergies gradual, reliant on branch rationalization.
Jain, R. (2023)	Major PSB Mergers (Bank of Baroda, PNB, Union Bank)	Window Data Envelopment Analysis (DEA)	Technical efficiency climbed from 90.9% to 94.2% over a 5-year window; CIR dropped by 2–3%. Identifies HR/system integration as primary bottlenecks.
Shenoy et al. (2021)	State Bank of India (2017 Mega-Consolidation)	Pre/Post HR Metrics & Survey Data Analysis	Operating cost efficiency improved; workforce productivity (profit per employee) rose 18%. Emphasizes HR policies and legacy system absorption as critical success variables.
Puskar, S. & Mishra, K. (2024)	10 Indian Public Sector Banks (2000–2020)	Cost-to-Income & ROA/ROE Ratio Analysis	Non-significant short-term improvements in profitability ratios; cost reductions were disproportionate to immediate income growth due to structural delays.
RBI Report (2023/24)	Comprehensive tracking of all Indian PSB Mergers	DEA Modeling & Macro-Statistical Aggregation	Consistent long-term improvements in cost efficiency; CIR decreased by ~3%. Consolidations successfully helped PSBs align with Basel III guidelines.
Maity & Majumder (2024)	Comparative Public vs. Private Sector Mergers	Data Envelopment Analysis (DEA)	Private sector mergers exhibit faster technical efficiency realization compared to policy-mandated PSB consolidations.
Jayaraman, A. R. (2025)	Scheduled Commercial Banks	DEA Frontier & Tobit Regression Models	Systemic reforms positively shifted technical efficiency; identifies heavy IT infrastructure investment as the single largest catalyst for cost-effectiveness.
Soni & Agarwal (2022)	Indian Public Sector Consolidations	Accounting Ratio & Financial Health Frameworks	Operating costs spiked initially due to heavy HR harmonization and IT migration expenses, before stabilizing post-Year 3.

V. Conclusion and Future Research Directions

This exhaustive review affirms that mergers and acquisitions in the Indian banking industry have indeed yielded mild, quantifiable long-term progress towards better operational efficiency and resilience. The integration process yields operational efficiencies, lowers non-performing assets, and results in stable capital adequacy measures. Still, the short-term financial benefits are limited due to the compulsory period of "digesting" the merger. This period lasts from three to five years, is distinguished by the high integration costs, and involves migrating the technology. Above all, sustainable cost efficiency can be achieved due to pre-merger technological compatibility, strategic management approach and thorough internal reorganization only, not through mere increase in size of the assets. In order to improve the scientific literature, future studies should concentrate on the following ideas:

Studies with a Long-Term Perspective: The focus would be on extending the length of the observation period i.e. investigating the sustainability of changes in economies of scale obtained at the state banks in the long run (that is, the time frame of the research will exceed five years).

Digital Transformation Study: The aim here will be to investigate the effects of modern fintech technologies, contribution of AI, as well as the implications of digitization on bank mergers.

Applying Non-Financial Measures: The main objective will be to integrate environment, social, and governance (ESG) criteria and indexes of the banks digitization into the traditional studies of bank efficiency.

Studies of Countries: The comparative evaluations are going to be conducted to understand how differences in regulations affect bank mergers in various countries.

Predictive Measures: The utilization of artificial intelligence and advanced machine learning technologies will allow the modelling of targets for mergers and evaluation of the factors which can help achieve efficiencies and reduce risks of institutional failure before the consolidation takes place.

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