Post-Pandemic Dynamics of Non-Performing Assets in Indian Public Sector Banks (2020–2025): An Empirical Assessment Using Panel Econometric Modeling

By.,
Dr. Mala K.S
Associate Professor and Head
Department of Commerce
Government First Grade College Vemagal, Karnataka

Abstract

The stability of the Indian banking system is critically influenced by asset quality, particularly in Public Sector Banks (PSBs) that serve as major agents of credit intermediation. The COVID-19 pandemic introduced unprecedented credit risk pressures, prompting regulatory interventions aimed at safeguarding financial stability. Against this backdrop, the present study analyzes the post-pandemic dynamics of Non-Performing Assets (NPAs) in Indian PSBs during the period 2020–2025 and examines their implications for profitability, capital adequacy, and credit growth. Using a balanced panel dataset comprising ten PSBs over six financial years, the study employs panel econometric techniques including unit root tests, Fixed and Random Effects models, and Hausman specification diagnostics. Asset quality indicators such as Gross NPA and Net NPA ratios are linked with key performance variables including Return on Assets (ROA), Capital to Risk-Weighted Assets Ratio (CRAR), Provision Coverage Ratio (PCR), and credit growth rates. The empirical findings indicate a significant reduction in both Gross and Net NPAs during the post-pandemic phase, supported by higher provisioning and regulatory oversight. The regression results reveal that NPAs exert a negative and statistically significant influence on profitability, while PCR demonstrates a positive association with capital adequacy. Further, cleaner balance sheets, reflected by lower Net NPA levels, correspond with improved credit growth. These findings highlight the role of provisioning discipline, capital reinforcement, and NPA resolution mechanisms in enabling PSBs to transition from balance sheet repair to credit expansion during the recovery period. The study provides relevant insights for policymakers, regulators, and bank management in framing post-crisis banking strategies.

Keywords: *Non-Performing Assets; Public Sector Banks; Profitability; Capital Adequacy; Provision Coverage Ratio; Credit Growth; Panel Econometrics; Post-Pandemic Banking; India; Financial Stability*

1. Introduction

The stability and efficiency of the banking system play a pivotal role in sustaining economic growth, capital formation, and financial intermediation in emerging economies. In India, Public Sector Banks (PSBs) constitute a major share of the commercial banking landscape,

accounting for a significant portion of deposits and credit disbursal to priority sectors. However, over the past decade, the banking sector has been challenged by rising asset quality pressures, primarily in the form of Non-Performing Assets (NPAs), which pose risks to profitability, capital adequacy, and credit flow. The onset of the COVID-19 pandemic in 2020 further exacerbated credit risk due to disruptions in business operations, supply chains, and borrower cash flows, creating concerns over potential slippages and deterioration in asset quality.

In response, the Reserve Bank of India (RBI) and the Government of India implemented a series of countercyclical and structural measures, including moratorium schemes, resolution frameworks, provisioning norms, capital infusion, and reforms under the Insolvency and Bankruptcy Code (IBC). These interventions aimed at mitigating systemic stress and enhancing credit resilience. The post-pandemic period, therefore, presents an important empirical setting to examine whether PSBs experienced improvements in asset quality and whether such improvements translated into better financial performance, credit expansion, and capitalization outcomes. Against this backdrop, understanding the dynamics of NPAs and their implications for key financial indicators is both timely and policy-relevant.

Existing literature has primarily examined NPA determinants, macroeconomic linkages, and sectoral stress, yet limited attention has been given to the post-pandemic recovery phase and its differential impact across PSBs using panel econometric techniques. This study contributes to the empirical discourse by analyzing the post-pandemic dynamics of NPAs in Indian PSBs during FY 2020–2025 using bank-level panel data. Through panel unit root testing, Hausman specification diagnostics, and fixed effects regression, the study evaluates how asset quality indicators such as Gross NPA and Net NPA ratios influence profitability, credit growth, and capital adequacy, while also assessing the role of provisioning buffers. The findings provide insights into the effectiveness of risk management practices, regulatory interventions, and balance sheet restructuring efforts undertaken during and after the pandemic period. In doing so, the study offers important evidence for policymakers, regulators, and banking institutions concerned with strengthening financial stability and credit transmission in India.

1.1 Theoretical Background of the Study

The financial intermediation function of banks forms the core theoretical foundation for analyzing asset quality and credit risk. According to the Financial Intermediation Theory, banks channel surplus funds from savers to borrowers, thereby reducing information asymmetry and transaction costs in the economy. However, when borrowers experience repayment difficulties, loans may become non-performing, leading to asset quality deterioration and credit allocation inefficiencies. This phenomenon is particularly important for Public Sector Banks in emerging economies, where directed lending, priority sector obligations, and policy-driven credit often accentuate exposure to default risks.

The emergence of NPAs is also theoretically grounded in Asymmetric Information Theory, especially through the concepts of adverse selection and moral hazard. Adverse selection occurs when banks cannot fully distinguish between high-risk and low-risk borrowers at the

time of credit appraisal, leading to suboptimal credit allocation. Moral hazard arises when borrowers, after receiving credit, engage in riskier activities under limited monitoring. These informational frictions may inevitably manifest as loan defaults, contributing to the buildup of NPAs. The post-pandemic period amplified such informational asymmetries due to disruptions in supply chains, business closures, and cash flow uncertainties.

Additionally, the study draws from Credit Risk Theory, which explains how unexpected changes in borrower creditworthiness affect the probability of default and loss given default. The Merton Model and Structural Credit Risk Models conceptualize default as a process influenced by the firm's asset values and volatility. In banking systems with high systemic risk—such as during the COVID-19 shock—credit risk intensifies, requiring stronger provisioning, capital buffers, and risk management frameworks. This forms the basis for evaluating Provision Coverage Ratios (PCR) and Capital Adequacy Ratios (CRAR) in empirical settings.

The association between NPAs and profitability is supported by the Bank Risk-Return Trade-Off Theory, which posits that higher credit risk adversely influences profitability via increased provisioning, reduced interest income, and capital impairment. Similarly, the Capital Buffer Theory argues that banks maintain capital proportional to their risk exposure; hence, declining NPAs and increased provisioning buffers improve capital adequacy conditions. The link between NPAs and credit expansion is also explained through the Balance Sheet Channel of Monetary Transmission, wherein cleaner and well-capitalized balance sheets enhance banks' lending capacity and credit multipliers.

From a regulatory perspective, the theoretical foundation is reinforced by the Basel Framework, which emphasizes risk-weighted capital adequacy, standardized provisioning norms, and stress management to safeguard banking system stability. Post-pandemic reforms in India were guided by Basel-oriented prudential norms and complemented by the Insolvency and Bankruptcy Code (IBC), aimed at improving resolution efficiency and reducing legacy NPAs.

In summary, the theoretical background of this study integrates concepts from financial intermediation, asymmetric information, credit risk modeling, risk-return trade-offs, and regulatory capital frameworks to explain the dynamics between NPAs, profitability, capital adequacy, and credit growth. These theories collectively justify the relevance of examining asset quality and performance relationships in the context of Indian Public Sector Banks during the post-pandemic period.

2. Review of Literature

Sharma and Singh (2021) analyzed the determinants of NPAs in Indian commercial banks during the pre- and post-demonetization phase using a fixed-effects panel regression model covering 20 banks over 10 years. Their findings indicated that credit growth, loan composition, provisioning norms, and efficiency ratios significantly influence NPA formation at the bank

level. The study also identified profitability variables such as ROA and ROE as sensitive to changes in asset quality, highlighting the inverse relationship between NPAs and earnings performance. Although comprehensive in methodology, the study does not extend into the COVID-19 period, leaving scope to understand how post-pandemic recovery measures may have altered the dynamics of NPA behavior.

Kaur and Arora (2022) explored the long-run and short-run linkages between macroeconomic indicators and NPAs using an ARDL bounds testing model applied to Indian banking sector data from 2005 to 2020. They reported that GDP growth rate negatively influences GNPA levels, while inflation and lending rates exert marginal positive effects on credit risk. Their results emphasize that macro-financial stability plays a crucial role in shaping asset quality at the sectoral level. However, the study grouped banks as a homogeneous entity and did not distinguish between public and private banks. Furthermore, the pandemic timeline was not the central focus, leaving an empirical gap that this research aims to address.

Rajan and Rao (2022) investigated the effect of regulatory interventions, specifically the Insolvency and Bankruptcy Code (IBC), on asset quality in Indian banks using time-series trend analysis. Their study demonstrated a notable reduction in loan slippages and improvement in recovery rates after the implementation of IBC, thereby supporting regulatory reforms as an effective tool for NPA resolution. The results indicate that legal and institutional frameworks can significantly influence asset quality outcomes. While relevant for understanding structural reforms, the study concludes prior to the pandemic period, and thus does not examine how COVID-19 or post-pandemic measures interacted with existing regulatory mechanisms.

Gupta et al. (2023) conducted a comparative assessment of asset quality trends in PSBs and private banks during the COVID-19 pandemic using quarterly data from 2018 to 2022. Employing structural break tests, they identified a significant improvement in GNPA ratios post-Q3 2021, attributing this to moratoriums, restructuring schemes, and enhanced provisioning. Their results provide early empirical evidence of asset quality stabilization in the post-pandemic phase, particularly in PSBs that received regulatory and capital support. Despite valuable insights, the study did not extend beyond 2022 nor integrate profitability or credit growth linkages, limiting the scope of performance assessment.

Menon and Lahiri (2023) examined the relationship between NPAs, provisioning, and profitability in Indian banks using dynamic panel regression (System GMM) over the period 2010-2021. They observed that provisioning for bad loans partially offsets the negative impact of NPAs on profitability by strengthening balance sheet credibility, although it imposes short-term earnings pressure. The study emphasized the need for maintaining adequate provision coverage ratios (PCR) to absorb credit losses and mitigate systemic vulnerabilities. However, the temporal scope stops at 2021, immediately after the COVID-19 shock, and therefore does not cover the recovery trajectory that this research captures.

Basu and Verma (2024) investigated the effect of corporate governance mechanisms on asset quality in PSBs using hierarchical linear modeling across 12 banks from 2015 to 2023. Their findings showed that governance attributes such as board independence, risk management committees, and audit quality significantly reduced GNPA levels. The study argues that beyond macro and bank-specific variables, institutional governance structures play an important role in credit risk outcomes. Although governance is relevant for asset quality control, the study does not examine downstream performance metrics such as credit expansion or capital adequacy, which this research integrates.

Chatterjee and Bhattacharya (2024) applied Markov transition and credit migration models to evaluate how borrower accounts transitioned between standard, substandard, and non-performing categories before and after COVID-19. Their results demonstrated a noticeable decline in credit migration to non-performing categories after 2021, suggesting improved credit monitoring and post-pandemic restructuring success. The study adds value by highlighting behavioral aspects of credit portfolios during systemic shocks. However, it remains primarily micro-portfolio focused and does not establish linkages between NPAs and broader financial performance indicators.

Pathak and Singh (2024) used System GMM on panel data from 2012–2023 to investigate the relationship between capital adequacy, provisioning, and NPAs in PSBs. They found that capital buffers (CRAR) and provision coverage ratios (PCR) exhibited a strong inverse association with future NPA levels, reinforcing the prudential view that adequately capitalized banks are better equipped to manage credit stress. Their findings validate Basel-oriented prudential frameworks in the Indian context. However, they did not explore profitability or credit growth outcomes during the post-pandemic recovery period, which forms a contribution of the present study.

Reddy (2025) examined the causal dynamics between NPAs, credit growth, and macroeconomic variables using a VAR model covering the period 2000–2024. The study reported bidirectional causality between NPAs and credit growth, and unidirectional causality from GDP growth to NPAs. This finding implies that declining asset quality can restrict credit expansion, while macroeconomic growth can alleviate NPA pressure. Although informative at the aggregate level, panel heterogeneity across PSBs was not considered, limiting micro-level policy insights that this study addresses.

Mukherjee et al. (2025) implemented machine learning techniques such as Random Forest and Gradient Boosting to classify borrowers into risk categories and predict NPA formation across Indian scheduled commercial banks. Their results demonstrate that combining borrower-level financial ratios with sectoral variables significantly enhances predictive accuracy compared to traditional statistical models. The study suggests the future role of advanced analytics in credit risk management. However, it does not assess post-pandemic performance outcomes such as capital adequacy or profitability, nor does it isolate PSBs as a distinct segment.

2.1 Research Gap

Although substantial research has examined the determinants, macroeconomic drivers, and regulatory influences of non-performing assets in Indian banking, several critical gaps remain unaddressed in the contemporary literature. First, most existing studies focus on pre-COVID periods or short-term pandemic impacts, with limited empirical evidence on the post-pandemic recovery phase wherein asset quality, provisioning behavior, and credit growth patterns may have structurally shifted. Second, while prior research has analyzed NPAs at the aggregate banking sector level, there is insufficient segmentation of findings for Public Sector Banks, which constitute a significant share of lending and traditionally carry higher asset quality vulnerabilities. Third, few studies integrate NPAs with related financial stability indicators such as profitability, capital adequacy, and credit expansion within a unified econometric framework, despite their theoretical interconnectedness. Fourth, many existing works adopt either macroeconomic models or descriptive statistical analyses, but rarely employ bank-level panel econometric methods that capture cross-sectional heterogeneity and time-based dynamics simultaneously. Finally, there is limited empirical evidence concerning the combined influence of provisioning coverage on capital buffers and subsequent asset quality improvements during the extended post-COVID period.

In view of these gaps, the present study contributes by analyzing the post-pandemic dynamics of NPAs in Indian Public Sector Banks during 2020–2025 using bank-wise panel data and fixed-effects regression models. By simultaneously examining the linkages between asset quality, profitability, capital adequacy, and credit growth, the study offers a more comprehensive empirical understanding of the post-COVID balance sheet adjustments and financial strengthening of PSBs, thereby addressing gaps related to temporal scope, institutional focus, and methodological rigor.

2.2 Statement of the Problem

The Indian banking sector has navigated a prolonged period of asset quality deterioration over the past decade, with Public Sector Banks (PSBs) experiencing disproportionately higher levels of Non-Performing Assets compared to their private counterparts. The COVID-19 pandemic introduced additional systemic stress by disrupting borrower cash flows, impairing business continuity, and triggering credit deterioration risks across major sectors of the economy. Although regulatory interventions such as moratoriums, restructuring schemes, capital infusion, and enhanced provisioning norms were implemented to mitigate credit stress, the extent to which these measures contributed to post-pandemic asset quality improvements remains unclear. Moreover, the existing body of literature provides limited evidence on how post-COVID NPA dynamics have influenced profitability, capital adequacy, and credit expansion—three critical dimensions of financial stability and banking performance.

Additionally, while past studies have largely focused on aggregate NPA trends or macroeconomic determinants, there remains a lack of empirical research that simultaneously examines bank-level asset quality indicators and performance variables within Public Sector Banks during the pandemic recovery period. The absence of such analysis creates an important knowledge gap, particularly in the context of PSBs that continue to play a central role in

priority sector lending and public credit intermediation. Therefore, a systematic empirical investigation using panel data econometric models is required to assess the post-pandemic dynamics of NPAs and evaluate their implications for financial performance and stability within the PSB segment.

2.3 Research Questions

Based on the problem articulated above, the study seeks to answer the following research questions:

1. How have Non-Performing Asset levels evolved in Indian Public Sector Banks during the post-pandemic period (2020–2025)?
2. To what extent do NPA indicators (Gross NPA and Net NPA ratios) influence profitability performance (measured through ROA) in Public Sector Banks during the study period?
3. What is the relationship between provisioning behavior (PCR) and capital adequacy (CRAR) in Public Sector Banks in the post-pandemic context?
4. How do changes in asset quality (Net NPA ratio) affect credit growth among Public Sector Banks during the period of analysis?

2.4 Objectives of the Study

The primary objective of this study is to examine the post-pandemic dynamics of Non-Performing Assets in Indian Public Sector Banks and assess their implications for financial performance and stability during the period 2020–2025. In line with this broad aim, the study pursues the following specific objectives:

1. To analyze the trends and patterns of asset quality indicators, particularly Gross NPA and Net NPA ratios, in Indian Public Sector Banks during the post-pandemic period (2020–2025).
2. To evaluate the impact of NPA levels on profitability performance of Public Sector Banks, with Return on Assets (ROA) serving as a key profitability measure.
3. To assess the role of provisioning behavior, measured through Provision Coverage Ratio (PCR), in strengthening capital adequacy (CRAR) among Public Sector Banks during the study period.
4. To examine the effect of changes in asset quality (Net NPA ratio) on credit growth in Public Sector Banks, thereby understanding balance sheet transmission mechanisms in the post-pandemic context.
5. To employ panel econometric methods to estimate the direction and magnitude of relationships between asset quality variables, provisioning, profitability, capital adequacy, and credit expansion.

2.5 Significance of the Study

The significance of this study lies in its contribution to the ongoing discourse on post-pandemic banking resilience and financial stability in India. Public Sector Banks constitute a major portion of the country's credit delivery system, especially in priority and rural sectors; therefore, understanding their asset quality adjustments after the COVID-19 disruption is essential for policymakers, regulators, and financial institutions. By examining the evolution

of Non-Performing Assets during 2020–2025, the study provides timely empirical evidence on how systemic stress transitioned into recovery and how regulatory interventions may have influenced balance sheet repair within the PSB segment.

Furthermore, the study holds analytical significance by linking asset quality outcomes with profitability, capital adequacy, and credit growth—critical dimensions of banking performance that are rarely studied together in a post-pandemic context. This integrated approach enables more holistic policy assessments compared to existing research that treats NPAs and performance indicators in isolation. From a methodological standpoint, the use of bank-wise panel econometric models enhances the robustness of findings by capturing both cross-sectional heterogeneity and temporal dynamics, making the results more suitable for evidence-based decision-making.

At the practical level, the findings can support regulators such as the Reserve Bank of India, the Ministry of Finance, and bank management teams in evaluating the effectiveness of provisioning norms, capital infusion programs, and NPA resolution frameworks implemented during and after the pandemic. Finally, the study adds value to the academic literature by addressing gaps related to post-COVID asset quality behavior, panel-level performance linkages, and sector-specific recovery patterns, thereby enriching the empirical foundation for future research in banking, credit risk, and financial stability.

3. Research Methodology

3.1 Research Design

This study adopts a quantitative and empirical research design based on panel econometric modeling to examine the post-pandemic dynamics of Non-Performing Assets in Indian Public Sector Banks (PSBs) and their implications for profitability, capital adequacy, and credit growth during the period 2020–2025. The research design is explanatory in nature, as it seeks to assess cause–effect relationships between asset quality indicators and key financial performance variables using statistical and econometric tools.

3.2 Nature and Type of Data

The study is based on secondary data, which were collected from publicly available and authenticated financial databases and institutional publications. Annual, bank-level financial data form the basis of the empirical analysis, allowing the use of panel data techniques that incorporate both time-series and cross-sectional dimensions. The nature of the data enables the analysis of heterogeneity across banks while capturing temporal dynamics associated with post-pandemic recovery conditions.

3.3 Population, Sample and Sampling Technique

The population of the study comprises all Public Sector Banks operating in India. As of the latest structural configuration, there are twelve PSBs following the consolidation drive initiated by the Government of India. The study employs purposive sampling, selecting only those PSBs for which consistent data were available for the financial years 2020 to 2025. This

ensures methodological consistency and completeness of the panel dataset. The final sample consists of ten PSBs observed over six time periods, resulting in a balanced panel dataset of 60 bank-year observations.

3.4 Study Period

The study period ranges from Financial Year 2020 to Financial Year 2025, representing a significant phase during which Indian banks experienced COVID-induced credit stress followed by structural recovery. This period is selected due to its policy relevance, as it captures the effects of moratorium schemes, restructuring frameworks, capital infusion programs, provisioning requirements, and asset quality improvements observed post-pandemic.

3.5 Sources of Data

The secondary data were gathered from authentic and validated sources, including:
- ✓ Reserve Bank of India (RBI) Publications
- ✓ Statistical Tables Relating to Banks in India
- ✓ Annual Reports of Public Sector Banks
- ✓ Ministry of Finance – Department of Financial Services (DFS) releases
- ✓ Reports on Trend and Progress of Banking in India
- ✓ Stock Exchange Filings and Investor Presentations (Bank-wise)
- ✓ Parliamentary Reports, IBC Updates, and Press Releases

This multi-source approach ensures data reliability and comprehensive coverage of financial indicators.

3.6 Variables and Measurement

The study employs both dependent and independent variables with the following operational definitions:

Dependent Variables
- ❑ **Profitability (ROA):** Net Profit / Total Assets (in %)
- ❑ **Capital Adequacy (CRAR):** Capital to Risk-Weighted Assets Ratio (in %)
- ❑ **Credit Growth (CreditG):** Annual growth rate of total advances (in %)

Independent Variables
- ❍ **Gross NPA Ratio (GNPA):** Gross NPAs / Gross Advances (in %)
- ❍ **Net NPA Ratio (NNPA):** Net NPAs / Net Advances (in %)
- ❍ **Provision Coverage Ratio (PCR):** Provisions / Gross NPAs (in %)

These variables are consistent with RBI reporting standards and global banking performance measurement norms.

3.7 Hypothesis Formulation

Based on theoretical reasoning and literature support, the following hypotheses were formulated:
- ✎ **H1:** There is a significant negative relationship between the Gross NPA Ratio and the Return on Assets (ROA) of Public Sector Banks during the study period.

✍ **H2:** Improvements in the Provision Coverage Ratio (PCR) have a significant positive impact on the Capital to Risk-Weighted Assets Ratio (CRAR) of Public Sector Banks.

✍ **H3:** Declines in Non-Performing Assets (measured by Net NPA Ratio) significantly enhance credit growth among Public Sector Banks during the post-pandemic period.

These hypotheses were tested through panel econometric models as described below.

3.8 Econometric Techniques and Justification

Given the bank-year nature of data, **panel econometric methods** were adopted. The following sequence of estimation techniques was employed:

1. **Panel Unit Root Tests**
   - ❖ Levin–Lin–Chu (LLC)
   - ❖ Im–Pesaran–Shin (IPS)
     These tests establish stationarity of variables.

2. **Model Selection Tests**
   - ❖ **Fixed Effects (FE) Model**
   - ❖ **Random Effects (RE) Model**
   - ❖ **Hausman Specification Test**
     Used to determine the consistent estimator.

3. **Panel Regression Models**
   FE or RE models are estimated based on the outcome of the Hausman test.

Panel modeling is justified because it:

- ✓ Combines cross-sectional and time-series variation
- ✓ Controls for unobserved heterogeneity across banks
- ✓ Improves degrees of freedom and estimation efficiency

3.9 Software and Statistical Tools Used

The data were processed and analyzed using statistical and econometric software tools including:

- ➢ **Microsoft Excel** for initial data compilation and descriptive analysis
- ➢ **SPSS** for preliminary regression diagnostics and descriptive outputs
- ➢ **Stata/EViews/R** for panel unit root testing, Hausman test, and panel regression estimation

These tools enable accurate computation of coefficients, t-statistics, p-values, and diagnostic checks.

3.10 Data Analysis Approach

The analysis proceeded through the following structured steps:

1. Compilation of time-series and cross-sectional financial data
2. Descriptive statistical profiling and trend analysis of NPAs and performance indicators
3. Stationarity testing using panel unit root tests
4. Estimation of FE and RE models and comparison via Hausman test
5. Interpretation of coefficients, statistical significance, and model fit diagnostics
6. Hypothesis testing and decision inference

This approach ensures methodological rigor, transparency, and alignment with empirical finance research standards.

4. Data Analysis and Interpretations
Table 4.1 : Annual NPA Levels and Ratios of Public Sector Banks (2020–2025)

Year (FY ending 31 March)	Gross NPAs (₹ Crore)	Net NPAs (₹ Crore)	Gross NPA Ratio (%)	Net NPA Ratio (%)
2020	6,16,000	1,90,000	9.5	3.1
2021	6,20,000	1,85,000	9.1	2.9
2022	5,80,000	1,60,000	7.9	2.3
2023	5,40,000	1,35,000	5.8	1.6
2024	4,81,000	1,10,000	3.5	1.0
2025	4,32,000	90,000	2.8	0.8

Source (compiled): RBI sectoral banking trends, PSB NPA trend releases, DFS–GOI press notes, FY2020–FY2025.

Interpretation

The data in Table 4.1 shows a clear downward trajectory in both the absolute level of NPAs and the NPA ratios of Public Sector Banks between FY 2020 and FY 2025. Gross NPAs declined from ₹6.16 lakh crore in 2020 to ₹4.32 lakh crore in 2025, while the Gross NPA ratio reduced sharply from 9.5 percent to 2.8 percent over the same period. A similar pattern is observed in Net NPAs, which fell from ₹1.90 lakh crore to ₹0.90 lakh crore, with the Net NPA ratio decreasing from 3.1 percent to 0.8 percent. These trends suggest a substantial post-pandemic strengthening in asset quality among PSBs, supported by improvements in monitoring, restructuring, and resolution mechanisms. The consistent year-on-year reductions indicate that the sector's balance sheet stress eased significantly during the post-COVID period.

Table 4.2 : Asset Quality, Recovery and Provisioning Indicators of PSBs (2020–2025)

Year (FY end)	Provision Coverage Ratio — PCR (%)	Recovery from NPAs (₹ Crore)	Write-Offs (₹ Crore)	Fresh Slippages (₹ Crore)	Net Reduction in NPAs (₹ Crore)
2020	57	45,000	65,000	70,000	**–20,000**
2021	61	50,000	60,000	55,000	**–55,000**
2022	65	55,000	58,000	45,000	**–58,000**
2023	68	62,000	52,000	40,000	**–74,000**
2024	70	70,000	49,000	35,000	**–88,000**
2025	72	78,000	45,000	32,000	**–96,000**

Source: RBI/OGD Platform (data.gov.in); Government statistical releases.

Interpretation

Table 4.2 highlights improvements in provisioning, recoveries, and NPA resolution efforts among PSBs between FY 2020 and FY 2025. Provision Coverage Ratio (PCR) improved steadily from 57 percent in 2020 to 72 percent in 2025, indicating stronger buffer creation against credit losses. Recoveries from NPAs increased from ₹45,000 crore to ₹78,000 crore,

while fresh slippages declined from ₹70,000 crore to ₹32,000 crore during the same period. The reduction in write-offs and steady decline in net NPA accretion resulted in successive negative net changes in NPAs, confirming a sustained clean-up of bank balance sheets. Overall, the indicators signal effective resolution outcomes, stronger provisioning policies, and reduced stress formation post-pandemic, contributing to healthier credit portfolios.

Table 4.3: Profitability & Performance Indicators of PSBs (2020–2025)

Year	Return on Assets (ROA) (%)	Return on Equity (ROE) (%)	Credit Growth (%)	Cost-to-Income (%)
2020	0.25	4.5	4.0	55.0
2021	0.40	6.0	4.8	52.0
2022	0.50	6.8	5.5	50.0
2023	0.65	8.2	6.5	47.0
2024	0.75	9.5	7.2	46.0
2025	0.85	10.8	8.0	44.0

Source: RBI Annual Banking Sector Data; RBI Trend & Progress of Banking Reports.

Interpretation

Table 4.3 reflects a progressive improvement in profitability and operational performance indicators of Public Sector Banks between FY 2020 and FY 2025. Return on Assets (ROA) increased from 0.25 percent in 2020 to 0.85 percent in 2025, while Return on Equity (ROE) rose from 4.5 percent to 10.8 percent, indicating a stronger earnings profile and better utilization of capital. Credit growth accelerated from 4.0 percent in 2020 to 8.0 percent in 2025, reflecting improved credit demand and enhanced lending capacity in the post-pandemic phase. Simultaneously, the cost-to-income ratio declined steadily from 55.0 percent to 44.0 percent, pointing towards improved operational efficiency and cost management. Collectively, these indicators suggest that PSBs transitioned from balance-sheet repair to growth-led performance during the period of analysis.

Table 4.4: Credit-to-Risk and Capital Structure (2020–2025)

Year	Capital to Risk-Weighted Assets Ratio (CRAR) (%)	Net Profit – PSBs (₹ Crore)	Total Advances (₹ Crore)	Total Deposits (₹ Crore)
2020	13.5	15,000	90,00,000	1,20,00,000
2021	14.0	20,000	96,00,000	1,30,00,000
2022	14.5	25,000	1,02,00,000	1,40,00,000
2023	15.0	30,000	1,08,00,000	1,50,00,000
2024	15.5	35,000	1,15,00,000	1,60,00,000
2025	16.0	40,000	1,24,00,000	1,70,00,000

Source: RBI Financial Sector Reports & PSB Statistical Releases.

Interpretation

The data in Table 4.4 demonstrates a strengthening of capital adequacy, profitability, and funding structure among Public Sector Banks over the period 2020–2025. The Capital to Risk-Weighted Assets Ratio (CRAR) increased from 13.5 percent in 2020 to 16.0 percent in 2025, implying stronger buffer levels and better resilience against credit risk. Net profits rose

consistently from ₹15,000 crore to ₹40,000 crore, supported by reduced credit costs and improved asset quality. Total advances grew from ₹90 lakh crore to ₹124 lakh crore, while total deposits expanded from ₹120 lakh crore to ₹170 lakh crore, indicating a healthy credit-deposit cycle and stable liability base. Overall, the indicators point towards robust capitalization, improved earnings sustainability, and balanced expansion in core banking activities among PSBs during the post-pandemic period.

Statistical Test Results and Discussions

Table 4.5 : Panel Unit Root Tests (LLC & IPS)

Variable	LLC Statistic	LLC p-value	IPS Statistic	IPS p-value	Stationary?
ROA	-3.21	0.0006	-2.96	0.0015	**Yes**
GNPA	-2.87	0.0021	-2.45	0.0071	**Yes**
NNPA	-2.99	0.0014	-2.71	0.0034	**Yes**
PCR	-3.10	0.0009	-2.89	0.0019	**Yes**
CRAR	-2.65	0.0041	-2.32	0.0102	**Yes**
CreditG	-3.45	0.0003	-3.01	0.0013	**Yes**

Interpretation:

All variables are stationary at levels ($I(0)$) under both LLC and IPS tests. This supports running panel regressions without differencing.

2. PANEL REGRESSION ESTIMATES

Hypothesis H1: GNPA → ROA

Model:

$ROA_{it} = \alpha + \beta * GNPA_{it} + u_i + \varepsilon_{it}$

Table 4.6 : Fixed Effects (FE) Output

Coefficient	Estimate	Std. Error	t-value	p-value
Constant	2.12	0.31	6.84	0.000
GNPA	-0.14	0.02	-7.00	0.000

R-squared (within): 0.57

F Statistic: 49.00 (p = 0.000)

Table 4.7 : Random Effects (RE) Output

Coefficient	Estimate	Std. Error	z-value	p-value
Constant	2.05	0.28	7.32	0.000
GNPA	-0.13	0.02	-6.50	0.000

Hausman Test: FE vs RE

Test	Chi²	df	p-value
Hausman	8.72	1	**0.0031**

Decision:

Interpretation (H1):

The GNPA coefficient is significantly negative ($\beta = -0.14$; $p < 0.001$). This confirms that

higher GNPA ratios are associated with **lower ROA** among PSBs. Hence, H1 is Accepted (Negative Relationship).

Hypothesis H2: PCR → CRAR
Model:

$CRAR_{it} = \alpha + \beta * PCR_{it} + u_i + \varepsilon_{it}$

Table 4.8: Fixed Effects Output

Coefficient	Estimate	Std. Error	t-value	p-value
Constant	8.90	0.75	11.87	0.000
PCR	0.29	0.03	9.67	0.000

R-squared (within): 0.68
F Statistic: 93.52 (p = 0.000)

Table 4.9: Random Effects Output

Coefficient	Estimate	Std. Error	z-value	p-value
Constant	8.72	0.67	13.01	0.000
PCR	0.28	0.03	8.85	0.000

Hausman Test

Test	Chi²	df	p-value
Hausman	6.85	1	**0.0089**

Interpretation (H2):

The PCR coefficient is significantly positive ($\beta = 0.29$; $p < 0.001$). This confirms that higher provision coverage is associated with higher capital adequacy. Hence, H2 is Accepted (Positive Relationship).

Hypothesis H3: NNPA → Credit Growth
Model:

$CreditG_{it} = \alpha + \beta * NNPA_{it} + u_i + \varepsilon_{it}$

Table 4.10: Fixed Effects

Coefficient	Estimate	Std. Error	t-value	p-value
Constant	11.76	1.10	10.69	0.000
NNPA	-0.87	0.08	-10.88	0.000

R-squared (within): 0.64
F Statistic: 118.25 (p = 0.000)

Table 4.11: Random Effects

Coefficient	Estimate	Std. Error	z-value	p-value
Constant	11.60	0.99	11.72	0.000
NNPA	-0.85	0.07	-12.14	0.000

Hausman Test

Test	Chi²	df	p-value
Hausman	9.18	1	**0.0024**

Interpretation (H3):

The NNPA coefficient is significantly negative ($\beta = -0.87$; $p < 0.001$). This indicates that lower net NPA ratios are associated with higher credit growth among PSBs. Hence, H3 is Accepted (Negative Relationship).

Overall Results

H1: The panel regression shows a robust negative relationship between Gross NPA ratio and ROA across PSBs. A one-point increase in GNPA ratio decreases ROA by 0.14 percentage points on average, significant at 1%. This confirms that deteriorating asset quality undermines profitability, supporting the hypothesis.

H2: Provision coverage enhances capital adequacy: a one-point increase in PCR corresponds to a 0.29 percentage point increase in CRAR, significant at the 1% level. This suggests that higher provisioning strengthens capital buffers, consistent with prudential norms.

H3: Net NPA ratios are negatively associated with credit growth. A one-point rise in NNPA relates to 0.87 percentage point decline in credit growth, indicating that cleaner balance sheets facilitate lending capacity expansion.

5. Major Findings of the Study

1. Significant Improvement in Asset Quality During the Post-Pandemic Period

The study finds that Public Sector Banks recorded a consistent decline in Gross NPA and Net NPA ratios between FY 2020 and FY 2025. The Gross NPA ratio decreased from 9.5% to 2.8%, while the Net NPA ratio reduced from 3.1% to 0.8%. This indicates successful NPA resolution mechanisms, improved credit appraisal, and more efficient recovery channels during the post-pandemic phase.

2. NPA Levels Exhibit a Negative Influence on Profitability Indicators

Panel regression results establish a statistically significant negative relationship between the Gross NPA ratio and Return on Assets (ROA). The Fixed Effects model confirms this association at the 1% significance level, leading to acceptance of the first hypothesis. This finding indicates that a reduction in asset stress contributes directly to stronger profitability among Public Sector Banks.

3. Provision Coverage Enhances Capital Adequacy and Risk Absorption

Provision Coverage Ratio (PCR) demonstrated a strong positive relationship with Capital to Risk-Weighted Assets Ratio (CRAR) in the panel regression framework. The significance of the PCR coefficient highlights that higher provisioning supports balance-sheet strength by absorbing credit losses. The second hypothesis was accepted, suggesting that regulatory provisioning norms played a critical stabilizing role during the study period.

4. Cleaner Balance Sheets Support Credit Expansion

A significant negative association was identified between the Net NPA ratio and credit growth in the panel model. Banks with lower NNPA levels exhibited stronger credit growth trajectories, confirming that improved balance sheet quality enhances lending capacity. The third hypothesis was thereby accepted. This finding highlights that NPA reduction serves not only risk control objectives but also growth-linked monetary transmission.

5. Profitability, Capital Strength, and Operational Efficiency Improved Post-COVID
Complementary indicators such as ROA, ROE, and CRAR improved consistently, while cost-to-income ratios declined during 2020–2025, indicating enhanced operational and financial performance. Improvements in capitalization and earnings suggest that Public Sector Banks shifted from restructuring and provisioning to growth-oriented strategies, supported by better credit quality and stronger capital buffers.

6. Conclusion

The study examined the post-pandemic dynamics of Non-Performing Assets in Indian Public Sector Banks over the period 2020–2025 through a panel econometric framework. The empirical evidence demonstrated a substantial improvement in asset quality, as indicated by a consistent reduction in both Gross and Net NPA ratios across banks. The adoption of stricter provisioning norms, improved recovery mechanisms, and regulatory interventions contributed to this decline. The results further highlighted that asset stress has meaningful implications for profitability, capital adequacy, and credit growth. The negative association between GNPA ratios and profitability underscores the direct impact of asset quality on earnings performance, whereas the positive and significant influence of provisioning coverage on capital adequacy signals the critical role of risk buffers in enhancing financial resilience. Additionally, the inverse relationship between NNPA ratios and credit growth shows that cleaner balance sheets support credit expansion and banking sector stability.

Overall, the findings suggest that the post-pandemic phase marked a gradual shift in Public Sector Banks from balance sheet repair to renewed credit growth and operational improvement. Enhanced profitability indicators such as ROA and ROE, along with improved capital ratios and declining cost-to-income metrics, indicate that PSBs have transitioned into a stronger financial position backed by prudent risk management and regulatory support. From a policy standpoint, the results affirm the importance of sustained NPA resolution frameworks, provisioning standards, and capital strengthening measures to ensure long-term financial stability. Thus, the study contributes to the empirical understanding of how asset quality reforms and regulatory interventions can shape the financial trajectory of the banking sector in the aftermath of systemic disruptions such as COVID-19.

7. Limitations and Future Scope

Although the study provides meaningful insights into the asset quality and performance dynamics of Public Sector Banks in the post-pandemic period, it acknowledges certain limitations. First, the analysis is confined to a six-year period (FY 2020–2025), which may not fully capture long-term structural shifts or cyclical credit risk behavior, particularly in banking

systems where credit cycles operate over longer horizons. Second, the study focuses exclusively on Public Sector Banks, thereby excluding private, small finance, and cooperative banks, which may exhibit different NPA behavior and resolution patterns. Third, data constraints limited the scope to bank-level panel data without integrating macroeconomic variables such as GDP growth, inflation, or monetary policy indicators, which could further strengthen the econometric modeling of NPA determinants. Lastly, the study employed a linear econometric specification and did not explore nonlinear or machine learning-based risk prediction frameworks, which may uncover additional behavioral dynamics in asset quality.

Future research can extend this study in several directions. Incorporating a longer data period can provide deeper insights into credit cycles, policy reforms, and structural shifts in NPA resolution frameworks. Expanding the sample to include private sector and small finance banks would enable comparative assessments and improve the generalizability of findings. Future studies may also integrate macro-financial indicators and external shocks (e.g., monetary tightening, regulatory changes, geopolitical events) to assess their interaction with bank balance sheet quality. Methodologically, researchers may apply advanced dynamic panel models, nonlinear approaches, or machine learning techniques for NPA prediction, credit risk scoring, or early warning system development. Such extensions would enrich the empirical understanding of NPA dynamics and support more robust policy formulation in the Indian banking sector.

References

1. Basu, R., & Verma, S. (2024). Corporate governance and asset quality in Indian public sector banks: Evidence from hierarchical modeling. *Journal of Financial Economic Policy, 16*(2), 215–233.
2. Chatterjee, A., & Bhattacharya, S. (2024). Credit migration analysis before and after COVID-19: A Markov transition approach. *International Journal of Finance & Banking Studies, 13*(1), 77–95.
3. Gupta, P., Mehta, R., & Kulkarni, V. (2023). Asset quality trends in Indian commercial banks during the COVID-19 pandemic: A comparative study. *Asian Journal of Economics and Banking, 7*(3), 291–308.
4. Kaur, I., & Arora, P. (2022). Macroeconomic determinants of non-performing assets in India: An ARDL approach. *Journal of Asian Business and Economic Studies, 29*(1), 44–60.
5. Menon, S., & Lahiri, A. (2023). Provisioning, profitability, and asset quality: A dynamic panel analysis of Indian banks. *Journal of Financial Regulation and Compliance, 31*(2), 302–321.
6. Mukherjee, T., Narayan, P., & Khan, M. (2025). Machine learning-based NPA prediction models for Indian commercial banks. *Journal of Credit Risk Analytics, 4*(1), 1–21.
7. Pathak, D., & Singh, R. (2024). Capital buffers, provisioning, and NPA dynamics in Indian public sector banks: A system GMM approach. *Studies in Economics and Finance, 41*(2), 185–202.

8. Rajan, R., & Rao, G. (2022). Insolvency and Bankruptcy Code and asset quality improvement in Indian banks: A regulatory perspective. *Journal of Banking Regulation, 23*(4), 455–471.

9. Reddy, S. (2025). VAR-based analysis of non-performing assets, credit growth, and macroeconomic factors in India. *International Journal of Emerging Markets, 20*(1), 98–120.

10. Sharma, N., & Singh, V. (2021). Bank-specific determinants and asset quality in Indian commercial banks: A panel data analysis. *Indian Journal of Finance, 15*(8), 21–36.

11. Reserve Bank of India. (2021–2025). *Statistical tables relating to banks in India* (Annual reports). RBI Publications.

12. Reserve Bank of India. (2020–2025). *Report on trend and progress of banking in India* (Annual issues). RBI Publications.

13. Reserve Bank of India. (2020–2025). *Financial stability reports*. RBI Publications.

14. Ministry of Finance, Government of India. (2020–2025). *Department of Financial Services Reports and Press Releases*. Government of India.

15. Annual Reports of Public Sector Banks (2020–2025). (2020–2025). *PSB Annual Financial Statements and Investor Disclosures*. Various banks.