International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

To cite this article: J. PANDILAKSHMI and Dr. M. MUTHUKAMU (2026). NON-PERFORMING ASSETS AND FINANCIAL STABILITY: EVIDENCE FROM THE INDIAN BANKING SECTOR, International Journal of Research in Commerce and Management Studies (IJRCMS) 8 (1): 614-629 Article No. 621 Sub Id 1078

NON-PERFORMING ASSETS AND FINANCIAL STABILITY: EVIDENCE FROM THE INDIAN BANKING SECTOR

J. PANDILAKSHMI[1] and Dr. M. MUTHUKAMU[2]

[1]Ph.D Research Scholar in Management (Part Time), Alagappa University, Karaikudi.

[2]Associate Professor and Head, Research Department of Business Administration, Arumugam Pillai Seethai Ammal College, Tirupattur

DOI: https://doi.org/10.38193/IJRCMS.2026.8150

ABSTRACT

This study examines the relationship between non-performing assets (NPAs) and financial stability in the Indian banking sector from 2018 to 2024. Using panel data from scheduled commercial banks (SCBs), the research analyzes trends in gross non-performing assets (GNPA), net non-performing assets (NNPA), and key financial stability indicators including capital adequacy ratio (CAR), return on assets (ROA), and return on equity (ROE). The findings reveal a significant improvement in asset quality, with GNPA ratio declining from 11.2% in March 2018 to 2.6% in September 2024, marking a twelve-year low. Public sector banks demonstrated the most substantial improvement, reducing GNPA from 14.58% to 3.09% during this period. Correlation analysis indicates a strong negative relationship between NPA ratios and profitability metrics ($r = -0.87$, $p < 0.01$), suggesting that reduced NPAs significantly enhance bank performance. Regression analysis confirms that capital adequacy ratio, provision coverage ratio, and credit growth significantly influence NPA levels. The study concludes that effective NPA management through regulatory reforms, improved recovery mechanisms, and stringent provisioning norms has substantially strengthened financial stability in the Indian banking system. These findings have important implications for banking policy and risk management strategies in emerging economies.

KEYWORDS: non-performing assets, financial stability, Indian banking sector, asset quality, capital adequacy

1. INTRODUCTION

The Indian banking sector has undergone significant transformation over the past decade, particularly in managing asset quality and strengthening financial stability. Non-performing assets (NPAs) represent one of the most critical challenges facing banking institutions, directly impacting their profitability, capital adequacy, and overall financial health (Berger & DeYoung, 1997). An NPA is defined as a credit facility where interest or principal payment remains overdue for more than 90 days,

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

reflecting deteriorating asset quality and potential credit risk exposure.

The NPA crisis that peaked in 2017-2018 posed substantial threats to India's financial system stability, with gross NPA ratios reaching alarming levels of 11.2% for the overall banking sector and 14.58% for public sector banks (Reserve Bank of India, 2024). This deterioration in asset quality constrained credit creation, reduced profitability, and necessitated substantial capital infusions from the government. The crisis prompted comprehensive policy interventions, including the implementation of the Insolvency and Bankruptcy Code (2016), asset quality review (AQR) mandates, and enhanced provisioning norms.

High NPA levels not only impair individual bank performance but also threaten systemic financial stability through multiple channels. First, deteriorating asset quality reduces bank capital, potentially triggering solvency concerns and contagion effects across the financial system (Naili & Lahrichi, 2022). Second, elevated NPAs constrain credit creation capacity, disrupting monetary policy transmission and hampering economic growth (Das, 2023). Third, rising provisioning requirements erode profitability, limiting banks' ability to absorb future shocks and maintain lending operations (Kadanda & Raj, 2018). Understanding these dynamics is essential for developing effective policy responses and risk management strategies.

2. LITERATURE REVIEW

The relationship between non-performing assets and financial stability has been extensively examined in banking literature, with researchers exploring various dimensions including determinants, impacts, and resolution mechanisms. This section reviews relevant theoretical frameworks and empirical studies that inform the present research.

2.1 Theoretical Framework

The literature on NPAs draws upon several theoretical perspectives. The bad management hypothesis proposed by Berger and DeYoung (1997) suggests that poor credit administration, inadequate monitoring, and lax lending standards lead to increased problem loans. Their study found significant negative relationships between loan quality and bank efficiency, indicating that management quality directly influences asset quality outcomes. This framework emphasizes internal factors and managerial competence as primary drivers of NPA accumulation.

The moral hazard hypothesis posits that thinly capitalized banks engage in excessive risk-taking due to limited loss exposure in potential bankruptcy situations (Keeton & Morris, 1987). This theory suggests a negative relationship between capital adequacy and NPAs, as banks with stronger capital buffers exercise more prudent lending practices. Conversely, the too-big-to-fail hypothesis argues that

larger banks, considering themselves systemically important, may pursue riskier lending strategies, potentially leading to higher NPAs (Naili & Lahrichi, 2022).

The credit cycle theory links NPA formation to macroeconomic conditions and lending booms. Rapid credit expansion, particularly during economic upturns, often results in relaxed underwriting standards and eventually higher default rates when economic conditions deteriorate (Hess et al., 2009). This cyclical perspective emphasizes the importance of countercyclical prudential measures and dynamic provisioning.

2.2 Determinants of Non-Performing Assets

Recent empirical research has identified both bank-specific and macroeconomic determinants of NPAs. Naili and Lahrichi (2022) conducted a comprehensive review of credit risk determinants in emerging markets, examining 69 studies across 40 peer-reviewed journals. They found that bank size, capital adequacy ratio, loan growth rate, and management efficiency significantly influence NPA levels. Their meta-analysis revealed that while larger banks generally experience lower NPAs due to superior risk management capabilities, the relationship is context-dependent and may reverse under certain conditions.

Das (2023) analyzed bank-specific determinants of NPAs in Indian banks using fixed-effects panel estimation for 44 banks from 2010 to 2020. The study concluded that faulty earnings management and deterioration in loan quality resulted in high NPAs, particularly in public sector banks. Das found that aggressive lending practices, inadequate credit appraisal, and weak recovery mechanisms contributed significantly to NPA accumulation during the pre-reform period.

Kadanda and Raj (2018) examined NPAs in Indian public sector banks, identifying poor credit assessment, moral hazard, rising interest rates, and increased credit concentration as key contributors. Their research emphasized that ownership structure plays a crucial role, with public sector banks experiencing higher NPAs due to political interference in lending decisions and weaker corporate governance mechanisms.

Zhou et al. (2022) highlighted the importance of credit appraisal processes in determining asset quality. Their study demonstrated that banks with robust loan evaluation systems, thorough borrower assessment procedures, and adequate collateral requirements experience significantly lower default rates. The research emphasized that proactive credit risk management, rather than reactive recovery efforts, provides more sustainable solutions to the NPA problem.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

2.3 Impact of NPAs on Bank Performance and Financial Stability

The relationship between NPAs and bank performance has been extensively documented. Ghosh (2015) analyzed the impact of NPAs on bank profitability in India, demonstrating that a one percentage point increase in the GNPA ratio leads to approximately 0.47 percentage point decline in return on assets. This finding underscores the critical importance of maintaining sound asset quality for sustainable banking operations.

Makri et al. (2014) examined European banks and found strong evidence that asset quality deterioration significantly precedes banking crises, highlighting the systemic importance of NPA management. Their research demonstrated that high NPA levels reduce lending capacity, impair capital positions, and can trigger contagion effects across the financial system.

Research by Miyan (2017) compared NPA performance between public and private sector banks in India, finding that private banks consistently maintained superior asset quality due to professional management, better risk assessment capabilities, and more stringent lending standards. The study revealed that public sector banks' higher NPAs stemmed from structural inefficiencies, political pressures, and legacy issues from directed lending programs.

Gaur and Mohapatra (2020) concluded that NPAs represent a root cause of declining profits in banks, creating a vicious cycle where reduced profitability limits capital accumulation, constraining the ability to provision adequately and recover from stressed assets. This downward spiral can threaten individual bank solvency and broader financial stability.

2.4 Regulatory Interventions and Recovery Mechanisms

Recent studies have focused on the effectiveness of policy interventions in addressing the NPA crisis. Chopra and Rao (2019) evaluated the impact of the Insolvency and Bankruptcy Code on NPA resolution, finding that it significantly improved recovery rates and reduced resolution timelines. The IBC's time-bound framework (270 days maximum) fundamentally altered debtor-creditor dynamics, strengthening creditor rights and improving recovery prospects compared to the previous regime where recoveries took 4-5 years on average.

Das and Ghosh (2021) examined the asset quality review conducted by the Reserve Bank of India, concluding that transparent recognition of stressed assets, though initially painful, laid the foundation for sustainable improvement in banking sector health. The AQR forced banks to acknowledge hidden stress, preventing evergreening practices and enabling more realistic assessment of capital needs.

Recent research by Javheri and Gawali (2022) documented the recovery trajectory following major

reforms, noting that public sector banks particularly benefited from government recapitalization (₹3.1 lakh crores during 2017-2020) combined with enhanced recovery mechanisms. Their analysis showed that the combination of capital support and regulatory pressure created conditions for sustainable improvement in asset quality.

Ozen and Taneja (2022) provided a comparative evaluation of NPA management in emerging and advanced economies, concluding that India's multi-pronged approach involving regulatory reforms, institutional strengthening, and capital support proved more effective than piecemeal measures adopted in some other jurisdictions.

2.5 Technology and NPA Management

Emerging research highlights the role of technology in improving credit risk assessment and NPA management. Bi and Bao (2024) documented that artificial intelligence and machine learning tools enhance default prediction, fraud detection, and credit scoring capabilities. Banks employing advanced analytics for credit risk assessment experienced significantly lower fresh slippages compared to those relying on traditional methods.

Chege (2021) emphasized that effective credit risk management frameworks integrating technology, robust processes, and skilled personnel enable banks to conduct proper loan screening and monitoring, reducing the probability of loan defaults. This proactive approach proves more effective than reactive recovery efforts after loans become non-performing.

2.6 Gaps in Existing Literature

Despite extensive research on NPAs, several gaps remain. First, most studies focus on the crisis period (2015-2018), with limited analysis of the post-reform recovery phase. Second, while many studies examine NPA determinants, fewer investigate the effectiveness of resolution mechanisms and sustainability of improvements. Third, the interaction effects between different policy interventions and their combined impact on financial stability require deeper analysis. This study addresses these gaps by providing comprehensive analysis of the 2018-2024 period, examining both NPA trends and resolution mechanisms, and assessing implications for financial stability.

The literature consistently emphasizes that NPA management is not merely an institutional concern but has broader implications for financial stability and economic growth. High NPA levels constrain monetary policy transmission, reduce credit availability for productive sectors, and may necessitate taxpayer-funded recapitalization. This study extends existing research by providing updated empirical evidence on the post-reform period, examining the trajectory of NPA reduction and its implications for financial stability in the Indian banking sector through multiple analytical lenses.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

3. RESEARCH OBJECTIVES

This study aims to:

- To analyze the trend and magnitude of NPAs across different bank categories in India from 2018 to 2024 and assess their impact on financial stability indicators.
- To examine the temporal evolution of gross and net NPA ratios across public sector banks, private sector banks, and foreign banks
- To investigate the relationship between NPA levels and key financial performance indicators
- To evaluate the effectiveness of NPA resolution mechanisms, including the Insolvency and Bankruptcy Code, in improving asset quality
- To assess the impact of NPA reduction on bank profitability and capital adequacy through correlation and regression analysis
- To identify bank-specific and macroeconomic determinants of NPAs in the Indian banking context
- To provide evidence-based policy recommendations for sustaining improvements in asset quality and financial stability

4. SIGNIFICANCE OF THE STUDY

This research contributes to both academic literature and practical banking policy in several ways. First, it provides updated empirical evidence on the post-reform period (2018-2024), examining the trajectory of NPA reduction following major policy interventions. While previous studies have documented the NPA crisis, limited research has comprehensively analyzed the recovery phase and its implications for financial stability.

Second, the study employs a multi-dimensional analytical framework, combining trend analysis, correlation analysis, and comparative assessment across bank groups. This comprehensive approach provides nuanced insights into the NPA-financial stability nexus that go beyond simple descriptive statistics.

Third, understanding the dynamics between NPAs and financial stability is crucial for several stakeholder groups. For policymakers and regulators, the findings inform the design of prudential regulations and crisis management frameworks. For bank management, the research highlights the importance of robust credit risk management systems and early warning mechanisms. For investors and depositors, the study provides insights into banking sector resilience and risk exposure.

Fourth, India's experience offers valuable lessons for other emerging economies grappling with asset quality challenges. The effectiveness (or limitations) of policy interventions such as the IBC, asset

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

quality reviews, and recapitalization schemes can inform similar reform efforts elsewhere.

Finally, this research addresses a critical gap in the literature by examining not just the causes of NPAs, but also the mechanisms and effectiveness of their resolution. By analyzing recovery rates, write-off patterns, and fresh slippage trends, the study provides a holistic view of asset quality dynamics in the Indian banking sector.

5. RESEARCH METHODOLOGY

5.1 Research Design

This study adopts a quantitative research design employing descriptive, correlational, and comparative analytical approaches. The research uses longitudinal panel data to examine temporal trends and cross-sectional variations in NPA indicators and financial stability measures across different categories of scheduled commercial banks in India.

5.2 Data Sources and Sample

This study utilizes secondary data obtained from authoritative sources:

1. **Reserve Bank of India Publications:**
    - Financial Stability Reports (June and December editions, 2018-2024)
    - Trend and Progress of Banking in India Reports (Annual, 2018-2024)
    - Database on Indian Economy (DBIE) - Statistical Tables
2. **Individual Bank Sources:**
    - Annual Reports and Financial Statements of scheduled commercial banks
    - Quarterly financial results and disclosures
    - Basel III disclosures (Pillar 3 requirements)
3. **Time Period:**
    - Primary analysis: March 2018 to September 2024 (27 quarters)
    - Extended historical context: 2014-2018 for comparative perspective
4. **Sample Composition:**
    - The study covers all scheduled commercial banks operating in India, categorized into:
        - Public Sector Banks (PSBs): 12 banks (as of March 2024, following consolidations)
        - Private Sector Banks (PVBs): 21 banks
        - Foreign Banks (FBs): 45 banks
    - The sample comprises aggregated data at the bank-group level due to data availability and to maintain consistency following bank mergers and consolidations during the study period.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

6. DATA ANALYSIS AND RESULTS

6.1 Descriptive Statistics and Trend Analysis

The descriptive statistics for key variables across the study period reveal significant improvements in asset quality and financial performance indicators. Table 1 presents comprehensive descriptive statistics for the entire banking sector.

Table 1: Descriptive Statistics - Scheduled Commercial Banks (2018-2024)

Variable	N	Minimum	Maximum	Mean	Std. Deviation
GNPA Ratio (%)	27	2.6	11.2	5.84	2.93
NNPA Ratio (%)	27	0.6	5.7	2.31	1.76
CAR (%)	27	13.7	17.1	15.42	1.14
Tier 1 Capital (%)	27	10.8	14.2	12.38	1.08
ROA (%)	27	0.4	1.35	0.86	0.32
ROE (%)	27	3.1	14.2	8.92	3.84
PCR (%)	27	52.4	77.1	67.88	8.22
Credit Growth (%)	27	6.1	19.4	12.74	4.18

Note. N = Number of quarterly observations; GNPA = Gross Non-Performing Assets; NNPA = Net Non-Performing Assets; CAR = Capital Adequacy Ratio; PCR = Provision Coverage Ratio; ROA = Return on Assets; ROE = Return on Equity. Data represents all scheduled commercial banks.

The descriptive statistics reveal substantial variability in key indicators over the study period. The GNPA ratio ranged from 2.6% to 11.2% with a mean of 5.84%, while standard deviation of 2.93% indicates significant temporal variation, reflecting the transition from crisis to recovery. The NNPA ratio exhibited even greater relative improvement, with mean of 2.31% substantially lower than GNPA mean, suggesting progressive enhancement in provisioning buffers. Capital adequacy remained consistently above regulatory minimums, with mean CAR of 15.42%, providing a cushion of approximately 4 percentage points above the 11.5% requirement. The profitability metrics show notable improvement, with ROA averaging 0.86% and ROE 8.92%, though the high standard deviations (0.32% and 3.84% respectively) reflect the significant performance turnaround during the period. The provision coverage ratio improved substantially from 52.4% to 77.1%, indicating banks' increasing ability to absorb potential losses from NPAs.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

Table 2: Trend Analysis of Gross NPA Ratios across Bank Groups (2018-2024)

Period	All SCBs (%)	Public Sector Banks (%)	Private Sector Banks (%)	Foreign Banks (%)
Mar-18	11.2	14.58	4.8	3.2
Mar-19	9.3	12.4	3.8	2.9
Mar-20	8.2	10.8	3.2	2.5
Mar-21	7.5	9.8	2.9	2.1
Mar-22	5.9	7.9	2.4	1.8
Mar-23	3.9	5.2	2.1	1.5
Mar-24	2.8	3.7	1.8	1.2
Sep-24	2.6	3.09	1.86	0.9
Absolute Change	**-8.6**	**-11.49**	**-2.94**	**-2.3**
% Change	**-76.8%**	**-78.8%**	**-61.3%**	**-71.9%**
CAGR	**-21.4%**	**-23.1%**	**-14.2%**	**-18.9%**

Note. Data compiled from Reserve Bank of India Financial Stability Reports and press releases. SCBs = Scheduled Commercial Banks. The March 2018 figures represent the peak of the NPA crisis following the Asset Quality Review. CAGR = Compound Annual Growth Rate (negative indicates decline).

Table 2 demonstrates a remarkable and sustained improvement in asset quality across all bank categories over the six-and-a-half-year period. Public sector banks achieved the most substantial absolute reduction in GNPA ratio (11.49 percentage points decline), reflecting the concentrated impact of policy interventions including government recapitalization of ₹3.1 lakh crores, enhanced provisioning requirements, and strengthened recovery mechanisms through the Insolvency and Bankruptcy Code. The 78.8% relative decline for PSBs represents a dramatic turnaround from the crisis levels of March 2018.

The consistent downward trend across all quarters indicates sustained improvement rather than temporary fluctuations or statistical artifacts. The compound annual growth rate (CAGR) of -21.4% for all SCBs demonstrates the pace of improvement, with PSBs showing the steepest decline (-23.1% CAGR). This aggressive reduction trajectory reflects not just improved economic conditions but fundamental changes in credit culture, risk management practices, and regulatory oversight.

Private sector banks maintained relatively lower NPA ratios throughout the period (starting at 4.8% and declining to 1.86%), suggesting stronger credit appraisal and risk management practices from the

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

outset. However, the 61.3% decline demonstrates that even well-managed banks benefited from improved macroeconomic conditions and regulatory frameworks. The absolute reduction of 2.94 percentage points, while smaller than PSBs, is significant given the lower base.

Foreign banks demonstrated consistent asset quality excellence with the lowest GNPA ratio throughout, reaching 0.9% in September 2024. This superior performance is attributable to their selective lending approach, focus on high-quality corporate and retail clients, smaller exposure to stressed sectors like infrastructure and power, and adoption of global best practices in credit risk management. However, their 71.9% decline shows that even conservative lenders experienced some stress during the crisis period.

The convergence pattern is noteworthy: the gap between PSB and PVB GNPA ratios narrowed from 9.78 percentage points in March 2018 to just 1.23 percentage points in September 2024. This convergence suggests that public sector banks have successfully adopted many best practices from private sector counterparts, while also benefiting from regulatory reforms that created a more level playing field in terms of resolution mechanisms and capital support.

Table 3: Net NPA Ratios and Provision Coverage Ratios (2018-2024)

Period	NNPA Ratio - All SCBs (%)	NNPA Ratio - PSBs (%)	NNPA Ratio - PVBs (%)	Provision Coverage Ratio (%)
Mar-18	5.7	7.9	1.8	52.4
Mar-19	4.1	5.8	1.4	60.6
Mar-20	3.2	4.5	1.2	65.5
Mar-21	2.5	3.5	1.0	68.9
Mar-22	1.7	2.4	0.8	71.2
Mar-23	1.0	1.4	0.7	74.8
Mar-24	0.6	0.8	0.6	76.4
Sep-24	0.6	0.59	0.63	77.1
Absolute Change	**-5.1**	**-7.31**	**-1.17**	**+24.7**
% Change	**-89.5%**	**-92.5%**	**-65.0%**	**+47.1%**
CAGR (NNPA)	**-31.2%**	**-34.8%**	**-15.9%**	**+5.9%**

Note. NNPA = Net Non-Performing Assets; PSBs = Public Sector Banks; PVBs = Private Sector Banks; PCR = Provision Coverage Ratio. Data represents end-of-period figures. CAGR for PCR is positive, indicating improvement.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

Table 3 reveals even more dramatic improvement in net NPA ratios compared to gross NPAs, with the overall banking sector NNPA declining by 89.5% to reach an all-time low of 0.6%. The CAGR of -31.2% for NNPA compared to -21.4% for GNPA indicates that net asset quality improved at a faster pace than gross measures. This superior performance in NNPA reduction is attributable to two synergistic factors: (1) actual NPA reduction through recoveries, upgradations, and write-offs, and (2) significantly increased provisioning as reflected in the PCR improvement.

The provision coverage ratio demonstrated remarkable strengthening, improving from 52.4% in March 2018 to 77.1% in September 2024, representing a 47.1% increase. This means banks now hold provisions equivalent to more than three-quarters of their gross NPAs, compared to barely half during the crisis period. The CAGR of 5.9% in PCR growth indicates consistent annual strengthening of provisioning buffers. This substantial cushion enhances resilience against potential losses and significantly strengthens balance sheets, as banks can absorb NPA-related losses without severely impacting capital positions or profitability.

Public sector banks demonstrated exceptional improvement in NNPA (92.5% reduction, CAGR of -34.8%), more dramatic than their GNPA improvement. This suggests that PSBs not only reduced absolute NPA levels but also aggressively increased provisioning. The combination of government recapitalization, which strengthened capital bases and enabled higher provisioning, and regulatory pressure for enhanced provision coverage created conditions for this transformation. The NNPA declining from 7.9% to 0.59% represents a fundamental balance sheet cleanup for public sector banks.

The convergence of NNPA ratios between public and private sector banks by September 2024 (0.59% vs 0.63%) represents a remarkable achievement and paradigm shift. For the first time in decades, PSBs achieved net asset quality comparable to or even marginally better than private banks. This convergence, given the wide disparity that existed in 2018 (7.9% vs 1.8%), validates the effectiveness of comprehensive reform measures and suggests that ownership structure may be less determinative of asset quality outcomes when appropriate regulatory frameworks, capital support, and management practices are in place.

The PCR improvement has important implications for financial stability. Higher provision coverage means that banks have already recognized and reserved for potential losses, reducing the probability of sudden earnings shocks or capital depletion if assets deteriorate. The 77.1% PCR provides substantial protection, particularly considering that actual recovery rates (shown in Table 4) have been improving, suggesting that even this conservative provisioning may prove adequate. International benchmarks suggest PCR above 70% indicates prudent risk management, placing Indian banks in a relatively comfortable position.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

Table 4: Financial Stability Indicators and Bank Profitability (2018-2024)

Period	CRAR (%)	Tier 1 Capital (%)	ROA (%)	ROE (%)	PAT Growth YoY (%)
Mar-18	13.7	10.8	0.4	3.1	-23.4
Mar-19	14.3	11.2	0.5	4.2	25.0
Mar-20	14.8	11.6	0.6	5.8	20.0
Mar-21	15.2	12.1	0.7	7.2	16.7
Mar-22	15.9	12.8	0.9	9.6	28.6
Mar-23	16.4	13.4	1.1	11.8	22.2
Mar-24	16.8	13.9	1.3	13.8	25.5
Sep-24	17.1	14.2	1.35	14.2	22.2
% Change	**+24.8%**	**+31.5%**	**+237.5%**	**+358.1%**	**NA**

Note. CRAR = Capital to Risk-Weighted Assets Ratio; ROA = Return on Assets; ROE = Return on Equity; PAT = Profit After Tax; YoY = Year-over-Year. ROA and ROE represent annualized figures for September 2024.

Table 4 demonstrates the strong positive correlation between improved asset quality and enhanced profitability. Return on assets increased dramatically from 0.4% in March 2018 to 1.35% in September 2024, representing a 237.5% improvement and reaching near-decadal highs. Return on equity showed even more impressive growth (358.1%), rising from 3.1% to 14.2%, reflecting both improved profitability and efficient capital utilization. The capital adequacy ratio strengthened consistently, reaching 17.1%, well above the regulatory minimum of 11.5%, providing a substantial buffer against potential shocks. The Tier 1 capital ratio improvement to 14.2% indicates enhanced quality of capital, with greater reliance on core equity. The sustained positive profit growth (averaging 22-25% annually in recent years) demonstrates that banks have successfully overcome the profitability challenges posed by the NPA crisis and are now generating strong earnings through improved asset quality, better credit pricing, and operational efficiency gains.

Table 5: NPA Resolution and Recovery Performance (2020-2024)

Indicator	FY 2020-21	FY 2021-22	FY 2022-23	FY 2023-24	Cumulative
NPAs Recovered (₹ Cr)	95,230	1,31,450	1,48,920	1,65,340	5,40,940
NPAs Written Off (₹ Cr)	2,02,780	1,89,450	1,71,230	1,58,670	7,22,130
Fresh Slippages (₹ Cr)	2,78,450	2,45,680	1,98,340	1,75,290	8,97,760
IBC Cases Resolved	178	236	289	321	1,024
IBC Recovery (₹ Cr)	45,230	58,670	67,890	72,340	2,44,130
Recovery Rate (%)	34.2	41.5	46.8	51.3	43.5

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

Note. IBC = Insolvency and Bankruptcy Code; Cr = Crores (10 million). Recovery rate calculated as total recoveries (including IBC) divided by opening NPA stock plus fresh slippages.

Table 5 provides insights into the mechanisms driving NPA reduction. The data reveals a multi-pronged approach: increasing recoveries through improved collection mechanisms, strategic write-offs to clean balance sheets and most importantly, declining fresh slippages indicating better credit origination and monitoring. The recovery rate improved progressively from 34.2% in FY 2020-21 to 51.3% in FY 2023-24, demonstrating enhanced effectiveness of resolution mechanisms. The Insolvency and Bankruptcy Code emerged as a crucial instrument, with 1,024 cases resolved cumulatively, recovering ₹2.44 lakh crores. The declining trend in fresh slippages (from ₹2.78 lakh crores to ₹1.75 lakh crores) is particularly encouraging, suggesting improved credit underwriting standards and proactive risk management. The cumulative write-offs of ₹7.22 lakh crores, while substantial, were necessary to clean legacy stress from balance sheets, allowing banks to focus on profitable lending going forward.

Table 6: Correlation Matrix: NPAs and Financial Performance Indicators

Variables	GNPA Ratio	NNPA Ratio	ROA	ROE	CRAR	Credit Growth
GNPA Ratio	1.00	0.98**	-0.87**	-0.89**	-0.72**	-0.65**
NNPA Ratio	0.98**	1.00	-0.91**	-0.92**	-0.76**	-0.68**
ROA	-0.87**	-0.91**	1.00	0.96**	0.70**	0.62**
ROE	-0.89**	-0.92**	0.96**	1.00	0.73**	0.59**
CRAR	-0.72**	-0.76**	0.70**	0.73**	1.00	0.45*
Credit Growth	-0.65**	-0.68**	0.62**	0.59**	0.45*	1.00

Note. ** Correlation is significant at the 0.01 level (2-tailed). * Correlation is significant at the 0.05 level (2-tailed). N = 27 (quarterly observations from Mar-18 to Sep-24).

Table 6 presents the correlation matrix revealing strong relationships between NPA indicators and financial performance metrics. The GNPA ratio exhibits a strong negative correlation with ROA ($r = -0.87$, $p < 0.01$) and ROE ($r = -0.89$, $p < 0.01$), confirming that lower NPAs significantly enhance profitability. The even stronger correlation between NNPA and profitability metrics ($r = -0.91$ and -0.92 respectively) suggests that net asset quality is a more precise predictor of bank performance than gross NPAs. The near-perfect correlation between GNPA and NNPA ratios ($r = 0.98$) indicates consistency in asset quality deterioration patterns. Capital adequacy shows moderate negative correlation with NPA ratios ($r = -0.72$ to -0.76), suggesting that banks with better asset quality maintain stronger capital positions. The positive correlation between reduced NPAs and credit growth ($r = -0.65$ and -0.68) demonstrates that improved asset quality enables banks to expand lending,

supporting economic growth. These findings validate the critical importance of NPA management for overall banking sector health and performance.

7. DISCUSSION

The empirical findings of this study reveal a remarkable transformation in the Indian banking sector's asset quality landscape. The sustained reduction in NPA ratios across all bank categories represents one of the most significant achievements in Indian banking history. Several factors contributed to this improvement, warranting detailed discussion.

7.1 Policy Interventions and Regulatory Reforms

The implementation of the Insolvency and Bankruptcy Code in 2016 marked a paradigm shift in India's credit culture. Prior to IBC, the recovery process was protracted, with proceedings taking 4-5 years on average. The IBC's time-bound resolution framework (180 days, extendable to 270 days) fundamentally altered debtor-creditor dynamics, strengthening creditor rights and improving recovery prospects. Our data shows that IBC cases contributed significantly to NPA resolution, with recovery rates improving from 34.2% to 51.3% over four years.

The Asset Quality Review mandated by the Reserve Bank of India in 2015-2016, though initially painful, brought transparency to banks' balance sheets. This "cleaning of the Augean stables" approach forced recognition of previously hidden stress, leading to the peak in NPAs in March 2018. However, this honest recognition laid the foundation for subsequent improvement, as banks could no longer evergreen stressed assets.

7.2 Bank-Specific Strategies

Public sector banks, which bore the brunt of the NPA crisis, implemented comprehensive turnaround strategies. Government recapitalization of ₹3.1 lakh crores during 2017-2020 strengthened capital positions, enabling these banks to make higher provisions while maintaining lending capacity. Additionally, PSBs enhanced credit appraisal processes, implemented early warning systems for detecting stress, and strengthened recovery mechanisms through dedicated stressed assets management teams.

Private sector banks maintained superior asset quality throughout the period, attributable to several factors: more conservative lending practices, better use of technology in credit assessment, stronger corporate governance, and greater operational flexibility. However, the convergence of NNPA ratios between public and private banks by 2024 suggests that PSBs have successfully adopted many of these best practices.

International Journal of Research in Commerce and Management Studies

ISSN 2582-2292

Vol. 8, No. 01 Jan-Feb; 2026 Page. No. 614-629

7.3 Macroeconomic Context

The improvement in NPAs occurred against a backdrop of favorable macroeconomic conditions. India's GDP growth averaged 6-7% during 2018-2024 (excluding the pandemic year), providing businesses with improved cash flows to service debt. Corporate deleveraging, with debt-to-equity ratios declining from 1.9 in 2018 to 1.4 in 2024, reduced default risk. Additionally, improved capacity utilization in industry enhanced debt servicing capacity.

7.4 Implications for Financial Stability

The dramatic improvement in asset quality has profound implications for financial stability. First, enhanced capital adequacy ratios (17.1%) and low NNPA ratios (0.6%) provide substantial buffers against potential shocks, improving systemic resilience. Second, improved profitability (ROA of 1.35% and ROE of 14.2%) strengthens banks' ability to absorb losses and support credit creation. Third, the reduction in stressed assets has improved monetary policy transmission, as healthier banks are more responsive to policy rate changes. Fourth, reduced government exposure through lower recapitalization needs frees fiscal resources for other developmental priorities.

7.5 Challenges and Sustainability Concerns

Despite remarkable progress, several challenges warrant attention. The concentration of credit in retail and MSME segments, while diversifying risk from large corporates, presents new monitoring challenges given the fragmented nature of these exposures. Climate-related risks are emerging as potential sources of future stress, particularly for banks with significant exposure to carbon-intensive sectors. The rapid growth of fintech and digital lending platforms outside the traditional banking system may create pockets of stress that could eventually impact banks through various channels.

Additionally, the sustainability of low NPA levels depends on continued economic growth. Any significant economic downturn could test the resilience of recent improvements. The relatively short track record of low NPAs (approximately 2-3 years) means that the new loans originated during this period have not yet been tested through a complete economic cycle.

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