Non-Performing Assets and Financial Performance of Public Sector Banks in India: A Post-IBC 2016 Analysis

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***Abstract*—Purpose: This study examines the relationship between non-performing assets (NPAs) and the financial performance of public sector banks (PSBs) in India during the post-Insolvency and Bankruptcy Code (IBC) 2016 period, spanning financial years 2016–17 to 2023–24. The IBC 2016 is widely considered the most consequential legislative intervention in India's credit recovery architecture and is expected to have materially altered the NPA management landscape of PSBs. This paper empirically assesses whether that legislative expectation has been borne out in the financial performance metrics of PSBs over the ensuing eight-year window.**

Design/Methodology/Approach: The study employs a quantitative, secondary-data-based panel data research design. Data were sourced from the Reserve Bank of India's Report on Trend and Progress of Banking in India, individual bank annual reports, and the CAPITALINE financial database for twelve PSBs that maintained continuous operational identity across the study period. Panel regression models — Fixed Effects (FE) and Random Effects (RE) — were estimated, with the appropriate model selected via the Hausman specification test. The dependent variable is financial performance, measured through Return on Assets (ROA), Return on Equity (ROE), and Net Interest Margin (NIM). The primary independent variable is the Gross NPA ratio (GNPA%), supplemented by Net NPA ratio (NNPA%), Capital Adequacy Ratio (CAR), Credit-Deposit ratio (C-D ratio), and operational efficiency proxied by Cost-to-Income ratio (CIR).

Findings: The panel regression results confirm a significant negative relationship between GNPA ratio and ROA ($\beta = -0.38$, $p < 0.001$) and between GNPA ratio and ROE ($\beta = -0.42$, $p < 0.001$) across the study period, consistent with theoretical predictions. However, a structural break analysis reveals that the magnitude of the NPA-performance nexus moderated meaningfully after FY 2018-19 — the period within which IBC resolutions began reaching financial closure — suggesting a measurable, if gradual, ameliorating effect of the IBC framework. CAR was found to be a significant positive predictor of ROA, while CIR carried a significant negative relationship with all three performance measures.

Practical Implications: The findings carry direct policy relevance for the Reserve Bank of India, the Ministry of Finance, and the boards of PSBs. The evidence supports continued and deepened IBC implementation, accelerated resolution of large stressed accounts, and sustained focus on cost efficiency improvements as the most productive levers for improving PSB financial performance.

Originality/Value: This study contributes original empirical evidence on the post-IBC NPA-performance relationship in Indian PSBs using a comprehensive eight-year panel, structural break analysis, and a multi-indicator financial performance framework — addressing a gap in the predominantly pre-IBC literature on Indian banking sector NPA research.

***Index Terms*—Non-performing assets, public sector banks, IBC 2016, financial performance, ROA, ROE, panel data, India, banking regulation**

I. INTRODUCTION

The non-performing asset (NPA) crisis in India's public sector banking system stands as one of the most extensively documented episodes of systemic credit stress in any emerging market economy during the post-Global Financial Crisis decade. Originating primarily from the aggressive infrastructure and capital-intensive sector lending of the mid-2000s boom years, the NPA problem surfaced with full force between 2012 and 2018, when the Reserve Bank of India's Asset Quality Review (AQR) mandated banks to reclassify previously restructured or evergreened accounts as non-performing under the revised provisioning norms. By March 2018, the Gross NPA ratio of scheduled commercial banks in India had reached 11.2% — one of the highest among major emerging economies — with public sector banks bearing a disproportionate burden, recording a combined GNPA ratio of 14.6% against private sector banks' 4.7% (RBI, 2018). The fiscal cost of this deterioration, reflected in accelerated provisioning requirements, government recapitalisation infusions exceeding INR 3.5 lakh crore between 2015 and 2022, and suppressed credit growth, placed the health of PSBs at the centre of India's macroeconomic policy agenda.

Against this backdrop, the enactment of the Insolvency and Bankruptcy Code (IBC) in May 2016 represented a watershed in India's credit governance framework. For the first time, India had a consolidated, time-bound, creditor-friendly resolution mechanism that replaced a fragmented and notoriously inefficient pre-existing landscape comprising the SARFAESI Act, Debt Recovery Tribunals, and the Corporate Debt Restructuring mechanism. The IBC established a 180-day (extendable to 270-day) resolution timeline, empowered the National Company Law Tribunal (NCLT) as the adjudicating authority, introduced the concept of the Resolution Professional, and critically, shifted the control of the insolvency process from debtors to creditors — a fundamental rebalancing that economists and legal scholars widely regard as the most significant change in India's credit culture in the post-reform era (Datta, 2018; Sengupta and Vardhan, 2017).

The critical empirical question — one that this paper addresses directly — is whether this legislative transformation has translated into measurable improvements in the financial

performance of PSBs over the eight years since the IBC's enactment. The question is non-trivial for several reasons. First, resolution timelines under the IBC have consistently exceeded the statutory limits due to judicial capacity constraints and legal challenges, meaning the IBC's practical benefits may have materialised more slowly and unevenly than its design suggests. Second, several other contemporaneous interventions — the government's recapitalisation programme, the RBI's Prompt Corrective Action (PCA) framework, the merger of ten PSBs into four between 2019 and 2020, and the introduction of the Bad Bank (NARCL) in 2021 — complicate the attribution of observed performance changes to the IBC specifically. Third, the COVID-19 pandemic introduced a substantial exogenous shock in FY 2020-21, with regulatory forbearance measures temporarily suppressing reported NPA ratios and creating a statistical discontinuity in the time series. A rigorous empirical analysis must navigate all of these complications.

This paper contributes to the literature in three substantive ways. First, it covers the most comprehensive post-IBC panel period available at the time of writing — eight financial years from 2016-17 to 2023-24 — capturing both the early implementation turbulence and the subsequent stabilisation of the IBC framework. Second, it employs a structural break test to identify whether a statistically significant inflection in the NPA-performance relationship occurred in the post-IBC period, allowing a more nuanced attribution than simple before-after comparisons. Third, it uses a multi-indicator financial performance framework — ROA, ROE, and NIM — rather than the single-indicator approach prevalent in much of the earlier Indian banking literature, capturing the multidimensional nature of bank performance.

II. REVIEW OF LITERATURE

2.1 Theoretical Framework: NPAs and Bank Performance

The relationship between asset quality deterioration and bank financial performance is grounded in multiple theoretical traditions. Financial intermediation theory (Diamond, 1984) establishes that banks earn returns by efficiently transforming illiquid loans into liquid deposits; when loans turn non-performing, this transformation fails, generating direct income losses through interest income reversal and indirect losses through elevated provisioning requirements. Agency theory (Jensen and Meckling, 1976) explains the genesis of NPAs through moral hazard in lending — particularly relevant in the Indian PSB context where government ownership creates distorted incentive structures that historically rewarded loan disbursement volume over credit quality. The too-big-to-fail hypothesis (Stern and Feldman, 2004) further predicts that implicit government guarantees in state-owned banks reduce market discipline, allowing NPA accumulation to persist longer than it would in a purely market-disciplined banking system.

2.2 Global Evidence on the NPA-Performance Nexus

The international panel data literature consistently confirms a significant negative relationship between NPA levels and bank profitability, though the magnitude varies by country, time period,

and institutional context. Berger and DeYoung (1997), in a foundational study of US commercial banks, established the 'bad management' and 'bad luck' hypotheses — finding evidence that poorly managed banks accumulate NPAs as a consequence of lax credit standards, and that this accumulation then feeds back into further performance deterioration through the cost channel. Louzis et al. (2012), studying Greek banks during the Euro-area sovereign debt crisis, found that bank-specific variables — particularly ROE and management efficiency — were stronger determinants of NPA dynamics than macroeconomic variables, suggesting that internal governance is the primary line of defence against credit quality deterioration. Beck et al. (2015), in a comprehensive 75-country panel study, confirmed that higher bank capitalisation robustly predicts lower NPAs across economic cycles, establishing the empirical importance of the Capital Adequacy Ratio as both a predictor and a moderator of the NPA-performance relationship.

2.3 Indian Banking Sector: NPA Literature

Within the Indian context, the NPA literature has grown substantially since 2015, though a majority of published studies cover periods preceding the IBC's enactment or capture only the immediate post-IBC years. Kaur and Sadhu (2017) studied the determinants of NPAs in Indian PSBs for the period 2006–2016, finding that priority sector lending ratios, credit growth velocity, and GDP growth rate were significant macro determinants, while bank size and capital adequacy were the key bank-specific variables. Siraj and Pillai (2012) examined the impact of NPAs on the profitability of Indian commercial banks and found that every one percentage point increase in the GNPA ratio was associated with a 0.31 percentage point decline in ROA — a magnitude that, given the GNPA ratios observed in 2017-18, implied near-complete profit elimination for several PSBs, a finding that the actual reported losses of banks like Punjab National Bank and IDBI Bank during that period corroborate.

Studies specifically examining the post-IBC period are fewer. Bhatt and Bhatt (2019) provided an early assessment of IBC implementation progress, noting that while resolution rates were improving, timeline overruns were the norm rather than the exception. Srinivasan and Saminathan (2021) found that the GNPA ratios of PSBs declined from 14.6% in March 2018 to 9.11% in March 2021, attributing this improvement to a combination of IBC resolutions, write-offs, and RBI regulatory actions, but did not isolate the specific contribution of each mechanism. Notably, the literature has not yet addressed the full 2016–2024 panel with the structural break methodology employed in this study, leaving a material empirical gap that this paper fills.

2.4 BC 2016: Legal and Economic Significance

The IBC 2016 fundamentally altered the institutional environment within which credit recovery operates in India. Its key architectural features include time-bound resolution (180 days, extendable to 270 days under exceptional circumstances), the creation of a structured hierarchy of claims in which financial creditors enjoy precedence over operational creditors and equity holders, and the establishment of Information Utilities that improve information availability during insolvency proceedings. The empirical literature on IBC's early outcomes (Desai et al., 2020; Dhir

and Mital, 2021) documents average recovery rates of approximately 43% in completed cases through the CIRP — substantially higher than the approximately 26% recovery rate under the pre-IBC SARFAESI and DRT mechanisms, though well below the 70-80% recovery rates achieved in advanced economy insolvency regimes such as Germany and the United Kingdom.

III. OBJECTIVES AND HYPOTHESES

3.1 Objectives

1. To examine the trend and magnitude of NPA levels in twelve PSBs in India over the post-IBC period (FY 2016-17 to FY 2023-24).
   → *Tool: Descriptive trend analysis*
2. To assess the impact of GNPA ratio on ROA, ROE, and NIM using panel data regression models.
   → *Tool: Fixed and Random Effects models*
3. To identify structural breaks in the NPA-performance relationship attributable to the IBC 2016 and associated policy interventions.
   → *Tool: Chow / Bai-Perron structural break test*
4. To examine the moderating role of Capital Adequacy Ratio in the NPA-performance nexus.
   → *Tool: Interaction term in regression*
5. To offer policy recommendations for improving the NPA resolution architecture and PSB financial health.
   → *Tool: Interpretive analysis*

3.2 Hypotheses

H_0	Statement	Expected Direction
H_{01}	GNPA ratio has no significant negative impact on ROA of PSBs in the post-IBC period.	Negative (reject)
H_{02}	GNPA ratio has no significant negative impact on ROE of PSBs.	Negative (reject)
H_{03}	Capital Adequacy Ratio has no significant positive impact on financial performance.	Positive (reject)
H_{04}	Cost-to-Income ratio has no significant negative impact on financial performance.	Negative (reject)
H_{05}	The NPA-performance relationship did not undergo a structural break after IBC implementation.	Break expected (reject)

IV. DATA AND METHODOLOGY

4.1 Data Sources and Sample

This study utilises exclusively secondary data drawn from three authoritative sources: (i) the Reserve Bank of India's annual Report on Trend and Progress of Banking in India, which provides standardised financial ratios and asset quality data across all scheduled commercial banks; (ii) individual bank annual reports filed with the Registrar of Companies and available on bank websites and the BSE/NSE disclosure portals, from which bank-specific income statement and balance sheet data were extracted; and (iii) the CAPITALINE financial database, which was used for cross-verification and for extracting market-based performance data where applicable. The study period spans eight financial years: FY 2016-17 through FY 2023-24, with data points at the end of each financial year (March 31).

The sample comprises twelve public sector banks that maintained continuous and independent operational identity across the full study period. Four PSBs that were merged into acquirer banks between 2019 and 2020 — Vijaya Bank, Dena Bank, Allahabad Bank, and Syndicate Bank — were excluded to maintain panel balance. The final panel thus consists of twelve banks observed over eight years, yielding a balanced panel of 96 bank-year observations. The twelve banks included are: State Bank of India, Punjab National Bank, Bank of Baroda, Canara Bank, Union Bank of India, Bank of India, Indian Bank, Central Bank of India, UCO Bank, Punjab and Sind Bank, Bank of Maharashtra, and Indian Overseas Bank.

4.2 Variable Operationalisation

Variable	Type	Notation	Source & Measurement
Return on Assets	Dependent	ROA	Net Profit / Average Total Assets × 100; RBI / Annual Reports
Return on Equity	Dependent	ROE	Net Profit / Average Shareholders' Equity × 100; Annual Reports
Net Interest Margin	Dependent	NIM	Net Interest Income / Average Earning Assets × 100; RBI
Gross NPA Ratio	Independent	GNPA%	Gross NPAs / Gross Advances × 100; RBI / Annual Reports
Net NPA Ratio	Independent	NNPA%	Net NPAs / Net Advances × 100; RBI Reports
Capital Adequacy Ratio	Control	CAR	Total Capital / Risk-Weighted Assets (Basel III); RBI

Cost-to-Income Ratio	Control	CIR	Operating Expenses / Net Total Income × 100; Annual Reports
Credit-Deposit Ratio	Control	CDR	Total Advances / Total Deposits × 100; RBI
Bank Size	Control	SIZE	Natural log of Total Assets; Annual Reports
Post-IBC Dummy	Structural	D_IBC	1 for FY 2019-20 onwards; 0 otherwise

4.3 Model Specification

The core econometric model is a panel data regression of the following form:

Model 1 (Primary): $ROA_{it} = \alpha + \beta_1 GNPA_{it} + \beta_2 CAR_{it} + \beta_3 CIR_{it} + \beta_4 CDR_{it} + \beta_5 SIZE_{it} + \mu_i + \varepsilon_{it}$

Model 2: $ROE_{it} = \alpha + \beta_1 GNPA_{it} + \beta_2 CAR_{it} + \beta_3 CIR_{it} + \beta_4 CDR_{it} + \beta_5 SIZE_{it} + \mu_i + \varepsilon_{it}$

Model 3 (Structural Break): $ROA_{it} = \alpha + \beta_1 GNPA_{it} + \beta_2 (GNPA_{it} \times D\_IBC_{it}) + \beta_3 CAR_{it} + \beta_4 CIR_{it} + \mu_i + \varepsilon_{it}$

Where i denotes the bank (i = 1 to 12), t denotes the financial year (t = 2017 to 2024), μ_i represents bank-specific fixed effects capturing time-invariant heterogeneity (ownership structure, regional concentration, legacy loan books), and ε_{it} is the idiosyncratic error term. The choice between Fixed Effects and Random Effects estimators is determined by the Hausman (1978) specification test. Heteroskedasticity-robust standard errors (Huber-White sandwich estimators) are used throughout. All estimation was conducted using Stata 17.

V. DATA ANALYSIS AND RESULTS

5.1 Trend Analysis: NPA Ratios (FY 2016-17 to FY 2023-24)

Financial Year	GNPA% (Avg)	NNPA% (Avg)	ROA (Avg %)	ROE (Avg %)	NIM (Avg %)	CAR (Avg %)	CIR (Avg %)
2016-17	11.72	6.61	-0.11	-1.78	2.48	12.42	52.31
2017-18	14.58	7.97	-0.73	-9.42	2.41	11.65	58.94
2018-19	12.14	5.32	-0.51	-6.63	2.62	12.18	56.87
2019-20	9.48	3.71	0.07	0.91	2.73	12.87	54.23
2020-21	9.34	2.87	0.24	2.84	2.81	14.22	51.66
2021-22	7.28	2.24	0.41	5.37	3.01	14.87	49.41

2022-23	5.02	1.24	0.68	8.62	3.24	15.43	47.18
2023-24	3.83	0.91	0.82	10.14	3.38	16.02	45.62

Source: Compiled from RBI Report on Trend and Progress of Banking (various years) and individual bank annual reports. Averages are unweighted cross-sectional means across the twelve sample banks.

The trend data presented above reveal a consistent and economically meaningful story. The GNPA ratio of sample PSBs peaked at 14.58% in FY 2017-18 — a period that corresponds to the full force of the RBI's AQR-driven reclassification — and has since declined monotonically to 3.83% by FY 2023-24, representing a reduction of over 73% from peak levels. Correspondingly, the aggregate ROA of sample banks swung from deeply negative territory (-0.73% in FY 2017-18) to positive and improving performance (0.82% in FY 2023-24), while ROE recovered from a trough of -9.42% to 10.14% — a level approaching the long-term average cost of equity capital for Indian PSBs and broadly comparable with the performance of second-tier private sector banks. The NIM has shown a steady upward trajectory from 2.41% to 3.38%, reflecting both improved credit pricing discipline and the declining drag of non-accrual interest on gross income.

Critically, the trajectory of improvement is not linear in its pace. The steepest improvement in GNPA ratios occurs in the period from FY 2018-19 to FY 2020-21, which corresponds to the initial wave of large-account CIRP resolutions under the IBC, including the Essar Steel case (resolved in December 2019, recovering approximately INR 42,000 crore), the Bhushan Steel case (resolved in May 2018), and the Monnet Ispat case. The subsequent years show continued improvement but at a more gradual pace, consistent with the resolution pipeline progressively moving toward smaller and more complex accounts.

5.2 Panel Regression Results

Variable	Model 1: ROA	Model 2: ROE	Model 3: NIM	Significance
GNPA Ratio (%)	−0.381***	−0.421***	−0.189***	$p < 0.001$
NNPA Ratio (%)	−0.142*	−0.198**	−0.071	$p < 0.05$
Capital Adequacy Ratio	0.214***	0.287***	0.143***	$p < 0.001$
Cost-to-Income Ratio	−0.176***	−0.243***	−0.098**	$p < 0.001$
Credit-Deposit Ratio	0.083*	0.091	0.112**	$p < 0.05$
Bank Size (log assets)	0.047	0.062	0.031	n.s.
R^2 (within)	0.712	0.684	0.641	—

F-statistic	34.87***	29.43***	24.18***	$p < 0.001$
Hausman Test	FE preferred	FE preferred	FE preferred	$p < 0.01$
Observations	96	96	96	12 banks × 8 years

*Notes: Coefficients are standardised. *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$; n.s. = not significant. Robust standard errors (Huber-White) used. All models estimated with bank-level Fixed Effects. FY 2020-21 includes a COVID-19 forbearance dummy (coefficient not tabulated).*

The Fixed Effects panel regression results provide robust support for the rejection of hypotheses H_{01} through H_{04}. The GNPA ratio exerts a significant negative effect on all three performance measures: ROA ($\beta = -0.381$, $p < 0.001$), ROE ($\beta = -0.421$, $p < 0.001$), and NIM ($\beta = -0.189$, $p < 0.001$). These magnitudes imply that a one percentage point increase in the GNPA ratio is associated with a 0.38 percentage point decrease in ROA — consistent with and slightly higher than the 0.31 estimated by Siraj and Pillai (2012) for the pre-AQR period, suggesting that the post-AQR provisioning regime has intensified the income impact of NPAs relative to earlier periods. Capital Adequacy Ratio is a significant positive predictor across all three performance dimensions, confirming that better capitalised banks not only satisfy regulatory requirements but generate superior earnings outcomes — a finding consistent with Beck et al. (2015) in the global cross-country context.

5.3 Structural Break Analysis

To test H_{05} — that no structural break occurred in the NPA-performance relationship after IBC implementation — Model 3 introduces an interaction term between the GNPA ratio and the Post-IBC dummy variable (D_IBC = 1 for FY 2019-20 onwards). The interaction coefficient (GNPA × D_IBC) captures whether the marginal impact of NPA ratio on ROA changed significantly in the post-IBC resolution phase.

Variable	Coefficient	t-statistic	Interpretation
GNPA Ratio (Main effect)	−0.447***	−8.23	Strong negative pre-IBC effect
GNPA × D_IBC (Interaction)	0.192***	4.18	Significant attenuation post-IBC
Net GNPA effect post-IBC	−0.255***	—	Reduced but still significant
D_IBC (standalone)	0.134**	3.02	Level shift upward in ROA post-IBC
CAR	0.201***	5.67	Robust across specification

The interaction term is positive and highly significant ($\beta = 0.192$, $p < 0.001$), confirming that the marginal negative impact of GNPA ratio on ROA moderated substantially in the post-IBC resolution phase. In practical terms, the net effect of GNPA on ROA post-IBC (-0.255) is 43% smaller in absolute magnitude than the pre-IBC effect (-0.447), indicating that the IBC framework has meaningfully reduced — though not eliminated — the performance penalty associated with a given level of NPAs. The positive standalone coefficient on D_IBC (0.134, $p < 0.01$) additionally confirms a positive level shift in ROA attributable to the post-IBC period, independent of NPA ratio changes, consistent with the broader improvements in governance, provisioning clarity, and credit culture that the IBC era has introduced.

VI. DISCUSSION

The results of this study, taken together, tell a coherent and policy-instructive story about the trajectory of India's public sector banking sector over the eight years since the IBC's enactment. The empirical evidence confirms three substantive conclusions. First, the NPA-performance relationship in Indian PSBs is robust, negative, and statistically strong across multiple performance dimensions — ROA, ROE, and NIM — and across both pre- and post-IBC sub-periods. This finding aligns with the global banking literature (Berger and DeYoung, 1997; Louzis et al., 2012) and provides an Indian panel data confirmation of what the international evidence has established in other contexts.

Second, and crucially, the IBC 2016 has materially altered the NPA-performance nexus — not by eliminating it, but by reducing its intensity. The 43% attenuation in the marginal performance impact of NPA ratios in the post-IBC period reflects multiple transmission mechanisms: faster resolution and recovery of value from stressed assets reduces the duration of performance drag; the creditor-in-control framework creates stronger incentives for borrower compliance and thereby prevents the worst-case write-off scenarios; and the signalling effect of a functioning resolution mechanism appears to have improved credit discipline in new loan origination, contributing to the lower fresh NPA formation rates observed from FY 2020-21 onwards. The improvement is real, but it is also partial — the net post-IBC NPA effect of -0.255 remains strongly negative and economically large, indicating that NPAs continue to significantly impair PSB profitability even in the improved institutional environment.

Third, Capital Adequacy Ratio emerges as a consistent positive predictor of financial performance across all model specifications — a finding that validates the RBI and Basel III committee's emphasis on capital buffers as both a safety and performance variable. The positive CAR-performance relationship is particularly relevant in the current period, as all twelve sample banks now meet Basel III minimum CAR requirements, and the average CAR of 16.02% in FY 2023-24 provides a comfortable buffer above the 11.5% regulatory minimum. This capitalisation improvement — substantially financed by government recapitalisation infusions — appears to be yielding performance dividends through improved credit growth capacity, reduced cost of funds, and stronger provisioning coverage ratios.

VII. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

7.1 Conclusions

This study examined the relationship between non-performing assets and the financial performance of twelve public sector banks in India over the post-IBC period from FY 2016-17 to FY 2023-24 using panel data regression and structural break analysis. All five null hypotheses were rejected at the 5% significance level, confirming significant negative NPA-performance relationships, significant positive effects of capital adequacy, and a statistically meaningful structural break in the NPA-performance nexus attributable to the post-IBC resolution phase.

The overarching finding is one of substantial but incomplete progress. Indian PSBs have made remarkable strides in NPA reduction — the aggregate GNPA ratio having declined from a peak of 14.58% in FY 2017-18 to 3.83% in FY 2023-24 — and their financial performance has correspondingly recovered from generalised losses to aggregate profitability. The IBC framework is a significant contributor to this improvement, as confirmed by the structural break evidence. However, resolution timelines remain a persistent weakness, and the benefits of IBC have been concentrated in large corporate accounts, with smaller stressed assets continuing to face lengthy and uncertain resolution processes.

7.2 Policy Recommendations

- Accelerate judicial capacity in the NCLT system by increasing the number of benches and specialist members, with a specific focus on reducing the average resolution timeline from the current 653 days (IBBI, 2024) toward the 270-day statutory limit.
- Strengthen the National Asset Reconstruction Company (NARCL, or 'Bad Bank') with additional capital and expanded mandate to address mid-sized stressed accounts that fall below the resolution threshold currently prioritised by Resolution Professionals.
- Mandate enhanced provisioning norms for Special Mention Accounts (SMA-1 and SMA-2) to ensure early recognition and pre-emptive provisioning before accounts transition to NPA status.
- Design executive compensation frameworks in PSBs that explicitly reward NPA containment and credit quality outcomes, addressing the principal-agent misalignment that the agency theory identifies as a root cause of NPA accumulation.

7.3 Limitations

This study is subject to several limitations. The balanced panel requirement excluded four merged banks, potentially biasing the sample toward banks with stronger institutional continuity. The COVID-19 forbearance period (FY 2020-21) introduces measurement distortion in NPA ratios that could not be fully corrected through the dummy variable approach. Future research should incorporate market-based performance measures — Tobin's Q, stock price-to-book ratios — alongside accounting metrics to capture the investor-perception dimension of NPA resolution, and should extend the analysis to private sector banks to provide a comparative institutional context.

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