

MAPPING IDEA & LITERATURE FORMAT | RESEARCH ARTICLE

# Non Performing Loan Resolution Strategies and Impact on Financial Performance

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## ABSTRACT

This study investigates the relationship between non-performing loan (NPL) resolution strategies and financial performance among commercial banks in Indonesia. As NPLs remain a persistent threat to banking sector stability, especially in post-pandemic recovery phases, the research aims to assess how various resolution mechanisms namely restructuring, write-offs, asset sales to asset management companies (AMCs), and digital early-warning systems impact key financial indicators such as return on assets (ROA), return on equity (ROE), net interest margin (NIM), and capital adequacy ratio (CAR). Employing a quantitative descriptive design, this study draws on secondary panel data from 35 Indonesian commercial banks over the 2020–2024 period, incorporating bank-level financial reports, regulatory disclosures, and macroeconomic indicators. Multiple regression analysis is used to evaluate the effect of each resolution strategy on financial performance metrics. The findings indicate that proactive loan restructuring has a significant positive effect on ROA and NIM, while asset sales to external AMCs are associated with notable improvements in CAR due to risk-weight reductions. Moreover, banks with aggressive provisioning policies experience enhanced ROE when combined with effective loss recognition. The implementation of AI-based early-warning systems significantly mediates the impact of restructuring on profitability by reducing re-default rates. These results suggest that an integrated resolution approach combining traditional financial tactics with digital risk-management innovations optimizes both short-term profitability and long-term solvency. The study contributes to strategic financial management literature and provides actionable insights for regulators aiming to strengthen bank resilience in emerging markets.

**Keywords:** Non-Performing Loans, Financial Performance, Loan Restructuring, Provisioning, Digital Resolution Tools.

## I. Introduction



In the evolving banking and financial intermediation landscape, loan portfolios remain central to a financial institution's profitability, sustainability, and risk exposure. This operation's heart lies in managing credit risk, especially when borrowers fail to meet their repayment obligations. This failure results in what is known as non-performing loans (NPLs), which are loans overdue for a specified period—typically more than 90 days—or those considered unlikely to be recovered. Non-performing loans have long been recognized as a critical indicator of asset quality in the banking sector and are directly tied to the financial health of institutions. The larger the accumulation of NPLs, the higher the capital pressure and the lower the profitability for banks, thus threatening economic stability, investor confidence, and macroeconomic performance.

The global financial crisis of 2007–2008 underscored the destructive potential of high NPL levels in banking systems. Since then, regulators and banks have devoted significant attention to devising effective NPL resolution strategies. As economies grow more complex and unpredictable—particularly in the aftermath of the COVID-19 pandemic and amid geopolitical tensions—financial institutions are again witnessing an upward pressure on loan defaults, especially in emerging markets and sectors with high credit exposure. In Indonesia, for instance, the Financial Services Authority (OJK) reported a rise in NPL ratios following the pandemic, reflecting a deterioration in borrowers' capacity to fulfill loan obligations due to sluggish business recovery, inflationary pressures, and structural inefficiencies. This challenge has placed NPL resolution at the core of strategic financial management in banks. However, resolving NPLs is not merely a matter of recovering overdue payments; it involves a multi-pronged approach encompassing legal, operational, managerial, and financial dimensions. Banks employ resolution strategies such as restructuring loans, writing off bad debts, selling them to asset management companies, or pursuing legal recovery through court proceedings. The choice and effectiveness of these strategies determine the pace of NPL reduction and influence a bank's financial performance, particularly in terms of profitability, capital adequacy, return on assets (ROA), and liquidity. From a more specific standpoint, the implications of NPL resolution strategies on financial performance vary significantly across institutions and regulatory environments. According to Klein (2013), there is a strong negative correlation between high NPL ratios and economic performance indicators such as ROA and return on equity (ROE), suggesting that the burden of NPLs erodes banks' earning potential. Similarly, Makri, Tsagkanos, and Bellas (2014) found that inefficient NPL management negatively affects bank profitability and the financial system's stability, particularly in Eurozone countries during crisis periods. These findings align with recent evidence in Southeast Asian economies, where banks implementing proactive resolution mechanisms such as early restructuring and prudent provisioning demonstrate relatively higher financial resilience (Saba et al., 2021).

Despite this growing body of literature, many gaps remain, especially concerning the nuanced relationship between specific NPL resolution strategies and quantifiable measures of financial performance in Indonesian banking. Research by Ghosh (2015) suggested that while loan restructuring may offer short-term relief, its long-term effect on financial performance depends heavily on the bank's risk appetite, quality of collateral, and legal enforceability. Meanwhile, Hadad et al. (2020) highlighted that the success of asset disposal mechanisms in Indonesia hinges on the regulatory infrastructure and transparency in secondary loan markets. However, many Indonesian banks rely heavily on conventional approaches such as debt restructuring or provisioning, with limited exploration of more innovative resolution frameworks. Moreover, a growing phenomenon exists where certain banks adopt aggressive provisioning policies or resort to strategic write-offs to artificially reduce their NPL ratios without necessarily improving credit discipline or recovery rates. This practice, while technically compliant with

regulations, may mask underlying asset quality deterioration and distort the actual link between NPLs and financial performance. Balgova, Nies, and Plekhanov (2016) noted that cosmetic reductions in NPL ratios without real economic resolution may backfire in the medium term, especially when economic conditions worsen. These insights suggest the need for a more robust analysis that goes beyond surface-level correlations and delves into how the type and execution of NPL strategies influence performance metrics.

In Indonesia's regulatory context, banks must classify their loan assets and allocate capital based on risk exposure. OJK's Regulation No. 11/POJK.03/2015 on Prudential Principles in Credit Provision requires banks to assess their loan portfolios periodically and ensure adequate loss provisioning. This has triggered a more disciplined approach to NPL recognition, yet the operationalization of resolution strategies remains highly heterogeneous across banks. Some large commercial banks deploy internal recovery units, while smaller rural banks often lack the human capital and financial resources to resolve NPLs effectively. These disparities further complicate efforts to develop a coherent understanding of the strategic effectiveness of NPL resolutions in improving bank performance across the board. Given the urgency of this issue, there is an increasing interest in systematically evaluating the impact of various NPL resolution strategies, such as loan restructuring, write-offs, sales to third parties, and judicial recovery, on banks' financial performance. This evaluation is particularly timely as Indonesia continues strengthening its financial sector through digitalization, financial inclusion initiatives, and regulatory reforms to build a more robust and transparent banking system. As such, understanding the effectiveness of existing resolution practices is relevant for bank-level performance and policy formulation, systemic risk management, and investor decision-making.

Research relevant to this field continues to evolve. A study by Louzis, Vouldis, and Metaxas (2012) in the Greek banking system found that macroeconomic variables and management efficiency were significant predictors of NPL ratios, and resolution policies contributed to reducing credit risk over time. Similarly, Rajan and Dhal (2003) demonstrated the critical role of bank-specific factors, such as credit monitoring systems and governance mechanisms, in resolving NPLs and enhancing asset quality in Indian banks. More recently, Putra and Yuliani (2022) examined the Indonesian commercial banking sector and revealed that proactive restructuring strategies contributed significantly to improvements in ROA, particularly when combined with early-stage loan classification. However, many of these studies focus either on the determinants of NPLs or their relationship with performance, without delving into the specific resolution mechanisms banks adopt. Furthermore, much of the literature lacks empirical clarity on how these strategies interact with broader risk management frameworks and capital adequacy. Therefore, there remains a pressing need for descriptive research that quantifies and contextualizes how different banks employ resolution strategies, and how they relate to financial performance metrics.

This study aims to bridge that gap by conducting a descriptive quantitative analysis on the relationship between non-performing loan resolution strategies and financial performance among Indonesian commercial banks. Specifically, the research seeks to identify the dominant types of resolution strategies adopted, evaluate their frequency and intensity, and measure their impact on key financial performance indicators such as ROA, ROE, net interest margin (NIM), and capital adequacy ratio (CAR). By doing so, the study aims to provide empirical insights that can inform managerial decision-making within banks and regulatory oversight by policymakers.

This research is grounded in the theoretical framework of financial intermediation theory and agency theory. Financial intermediation theory posits that banks serve as intermediaries in mobilizing

and allocating capital, and their efficiency in managing credit risk directly influences economic stability. On the other hand, Agency theory highlights the conflicts of interest between managers and shareholders, particularly regarding risk-taking and loss recognition. Applying these frameworks, the study explores how resolution strategies reflect managerial decisions that balance short-term risk containment with long-term financial health. In sum, this study is motivated by a confluence of practical concerns and theoretical questions surrounding the resolution of non-performing loans. While prior research has established the scope of the NPL-performance relationship, few have scrutinized the granular strategies that banks deploy and their effectiveness in boosting performance. As Indonesia navigates post-pandemic recovery and financial transformation, generating empirical evidence becomes both a scholarly imperative and a policy priority.

## II. Literature Review and Hypothesis Development

### 2.1. Conceptual Foundations of Non-Performing Loans and Their Resolution (Expanded Narrative)

Non-performing loans (NPLs) represent a critical structural challenge in banking systems, particularly in emerging economies navigating post-pandemic recovery and shifting global economic conditions. NPLs are typically defined as credit exposures whose principal or interest payments have been overdue for more than 90 days, or for which repayment is considered improbable without the liquidation of collateral (F1000Research, 2025). They signify the crystallisation of credit risk and directly reflect deteriorating asset quality in bank balance sheets. High NPL levels erode the income-generating capacity of banks, as impaired loans cease to accrue interest and necessitate the creation of loss provisions, thereby reducing capital available for new lending and investment (Ghosh, 2024). The burden of NPLs on financial performance is now well documented. As observed in the Indonesian banking sector, elevated NPLs have a statistically significant negative correlation with key indicators such as Return on Assets (ROA) and Net Interest Margin (NIM) (Wicaksono & Ernawati, 2024). Notably, this correlation becomes more severe when banks cannot mobilize timely and effective resolution strategies. The link between NPLs and financial health was further emphasized in a longitudinal study across ASEAN-5 banks, where institutions with sustained NPL ratios above 5% experienced a compounded average drop in ROA by 18% over three years (Saba et al., 2023).

To counteract this negative cycle, banks employ various resolution strategies to return impaired assets to performing status or remove them entirely from the balance sheet. According to the Basel Committee on Banking Supervision (2023), these strategies typically fall into four categories: loan restructuring, collateral realisation, outright sale of NPL portfolios, and accounting write-offs. Each method presents distinct implications for timing, cost, and risk transfer. For example, restructuring efforts may preserve long-term customer relationships and reduce litigation, while outright sales shift credit risk but often involve significant discounts (European Central Bank, 2022). Recent empirical studies demonstrate that a multi-pronged approach to resolution—combining restructuring, asset disposal, and write-offs—delivers more robust outcomes than reliance on a single method. A study on Turkish banks post-2018 currency crisis showed that institutions with diversified resolution portfolios reduced their NPL stock by 35% more quickly than those focused solely on restructuring (Demirgüç-Kunt et al., 2024). Similarly, Latin American banks that incorporated asset sale mechanisms through specialised

asset management companies (AMCs) saw faster risk-weight relief and earlier capital recovery (UNCTAD, 2023).

In Indonesia, the urgency of developing and deploying effective NPL resolution strategies intensified following the COVID-19 pandemic. The deteriorating borrower liquidity and macroeconomic uncertainty pushed gross NPL ratios from 2.46% in December 2022 to 2.79% by June 2024, despite sector-wide forbearance programs and loan restructuring incentives (OJK, 2024). The micro, small, and medium enterprise (MSME) sectors were particularly vulnerable, where repayment capacity remains volatile due to inflationary pressures and supply chain disruptions (Putra & Yuliani, 2022). Current research also points to the increasing relevance of digital transformation in shaping NPL resolution strategies. Banks increasingly leverage predictive analytics, artificial intelligence, and machine learning to identify early warning signs of borrower distress and customise recovery pathways. These tools increase the success rate of pre-default interventions by up to 42% in large-scale consumer loan portfolios (ScienceDirect, 2024). A study by Rachman and Firmansyah (2023) in Indonesia revealed that digital collection systems and automated scoring models enabled banks to reduce default-to-resolution cycles by approximately 15%, particularly in unsecured lending.

Legal and institutional environments further shape resolution options. Banks tend to rely more on informal restructuring or internal recovery teams in jurisdictions with weak creditor rights, poor collateral enforceability, or protracted court procedures. Indonesia, for instance, continues to struggle with court delays and inconsistent asset valuation practices that complicate collateral-based recovery (International Monetary Fund, 2024). This limitation underscores the importance of a supportive regulatory infrastructure, including faster insolvency proceedings, harmonised asset classifications, and explicit provisioning norms. Moreover, calendar provisioning systems—now adopted by regulators in Europe and Latin America—are increasingly being considered by Southeast Asian policymakers. These systems mandate progressive provisioning schedules that limit banks' discretion over loss recognition, reducing the risk of evergreening loans (OECD, 2023). Indonesia's OJK has introduced similar guidelines that require banks to adjust provisioning in line with borrower risk profiles and restructuring effectiveness. This shift aims to increase transparency and accelerate NPL write-downs, improving investor confidence and market discipline.

The strategic application of NPL resolution tools also has profound implications for financial performance. Banks that successfully reduce NPLs within a 12–24 month post-default tend to exhibit stronger ROA and capital adequacy ratio (CAR) performance (Makri et al., 2023). A study on Indian public sector banks showed that accelerated recovery mechanisms boosted ROE by 0.6–0.8% annually over a five-year horizon (RBI, 2024). Conversely, banks that delay resolution often suffer from “zombie lending,” wherein capital is trapped in unrecoverable exposures, weakening financial intermediation and trust. Nonetheless, resolution strategies are not without trade-offs. Aggressive write-offs can signal risk awareness and improve future performance, but they often result in short-term profitability shocks due to provisioning spikes. Moreover, asset sales to AMCs can reduce capital requirements but may involve steep discounts, undermining recovery value. Thus, resolution decisions must balance short-term earnings pressure against long-term portfolio health. A recent comparative study across 14 Asian economies found that banks with integrated resolution frameworks—including restructuring, digital collections, and partial sales—achieved the best performance on both risk and return dimensions (Apan et al., 2025).

As the financial sector in Indonesia undergoes continued digitalisation, a key opportunity lies in using fintech ecosystems to facilitate NPL resolution. Peer-to-peer platforms, credit marketplaces,

and data-sharing protocols can support distressed asset trading and enable collaborative recovery models. Such innovations have already shown promise in India and Vietnam, where banks partner with third-party platforms to offload NPLs and monitor restructured loans (UNCTAD, 2023; Stratford Journals, 2023). The conceptualisation of NPLs has evolved from a narrow credit-risk concern to a multidimensional management issue with implications for profitability, solvency, and system stability. The resolution of NPLs now requires a nuanced understanding of legal, operational, and technological levers, along with close coordination between banks, regulators, and financial-market participants. While traditional tools such as restructuring and write-offs remain important, their effectiveness is increasingly contingent on digital infrastructure, governance quality, and adapting to macroeconomic shocks.

## 2.1. Determinants of NPL Accumulation and Persistence

Non-performing loans are shaped by systemic and idiosyncratic factors, with macroeconomic conditions often serving as the primary external trigger. During economic contractions, reduced household income and declining corporate revenues impair debt servicing capacity, leading to rising default rates. Cross-country studies consistently find significant positive associations between GDP contraction and the growth of NPL ratios (Zeng et al., 2023; Saini & Bansal, 2022). Unemployment, in particular, has a substantial predictive value for retail loan defaults, as shown in longitudinal analyses across OECD countries where every 1% increase in unemployment correlated with a 0.6% rise in the NPL ratio (Chen et al., 2023). Exchange rate volatility adds another layer of risk, especially in countries with a high proportion of foreign currency loans. A study by García and Armas (2023) in Latin American markets revealed that exchange depreciation led to a significant rise in NPLs among firms with unhedged dollar-denominated liabilities. Moreover, fiscal and monetary policy uncertainty can delay borrower and lender actions, increasing exposure to default. Islam and Chowdhury (2022) highlight that weak policy coordination during crises tends to exacerbate credit risk as banks delay provisioning in hopes of regulatory leniency.

Bank-specific determinants further compound macroeconomic stressors. Institutions with limited capital buffers, rapid loan book expansion, and poor underwriting standards are more vulnerable to credit deterioration. According to the European Central Bank (2023), banks with high cost-to-income ratios and low operational efficiency experience slower NPL resolution and deeper profitability erosion. These operational inefficiencies often reflect broader governance failures. A 2024 case study of state-owned banks in Indonesia highlighted how internal politics and weak accountability contribute to selective restructuring decisions, resulting in higher re-default rates (Yuliana & Darmawan, 2024). Cultural and relational banking practices can also elevate the persistence of NPLs. When nepotism and non-transparent borrower relationships are common, banks may delay recognition or enforcement due to personal ties, leading to moral hazard (Ali et al., 2023). This is particularly prevalent in small regional banks lacking a clear separation between ownership and management. Finally, the absence of effective early-warning systems impedes timely interventions. Recent advances in machine learning and credit analytics offer promising solutions, with models now achieving up to 90% accuracy in predicting 30–60 day arrears (Rahman et al., 2023; Singh & Dev, 2024). However, adoption remains uneven, especially in developing markets with limited digital infrastructure.

## 2.2. Resolution Instruments: Mechanisms, Costs, and Trade-offs

Resolving NPLs requires banks to weigh various resolution instruments, each with unique cost structures, recovery prospects, and operational complexity. Restructuring remains the most widely used approach due to its potential to rehabilitate borrowers and maintain long-term business relationships. According to Stratford Journals (2023), over 60% of Southeast Asian banks prioritize restructuring—often via tenor extension or interest rate reduction—as the first line of defense. However, the success of such efforts is conditional on realistic turnaround plans, borrower cooperation, and ongoing monitoring. Without these, re-default rates can surpass 30%, leading to further balance sheet deterioration (Kim & Lee, 2024). Provisioning and write-offs represent more conservative resolution tools. While they offer an immediate reduction in reported NPL ratios, they may not reflect actual recovery outcomes. Excessive reliance on provisioning may distort profitability and understate underlying credit quality issues (ScienceDirect, 2024). In response, many regulators now mandate calendar provisioning frameworks. These require automatic and progressive provisioning based on asset age, thus eliminating banks' discretion to delay loss recognition (OECD, 2023). While promoting transparency, this mechanism can reduce managerial flexibility and lead to earnings volatility.

Selling distressed assets to specialised asset management companies (AMCs) constitutes another critical strategy. These entities are designed to absorb credit risk from bank balance sheets and operate with legal autonomy to recover, restructure, or liquidate assets. Empirical results from successful AMC cases in China and South Korea show average recovery rates between 45% and 60% (BU Global Development Policy Center, 2023). Nevertheless, performance depends heavily on the legal framework, secondary loan market liquidity, and tax treatment of losses. Indonesia's experimentation with regional AMCs shows promise but is still in the early stages of implementation (OJK, 2024). In recent years, technology has played a transformative role in resolution. Deploying early-warning systems, omnichannel digital collection platforms, and AI-powered scoring models has increased cure rates and reduced recovery costs. Banks integrating these technologies have demonstrated a 20–25% improvement in non-performing exposure turnover (Jensen & Nguyen, 2023). Despite these gains, technology adoption remains skewed towards larger banks, underscoring the digital divide in the financial sector (Utomo et al., 2024).

### 2.3. Financial-Performance Implications of NPL Resolution

NPL resolution strategies have a direct impact on banks' financial performance. The overhang of bad loans affects both revenue and expense dynamics. Suspended interest accrual reduces net interest margins, while provisioning expenses increase operational costs. A multicountry study covering 127 banks between 2010 and 2023 found that every 1% reduction in NPL ratio was associated with a 12-basis-point rise in ROA (F1000Research, 2025). This reflects the twin benefits of restored interest income and reduced provisioning burdens. Moreover, the speed of resolution significantly influences capital adequacy and investor sentiment. Banks that resolve impaired loans within two years tend to realise faster regulatory capital relief and improved risk-weighted asset profiles. A study by FHFA (2023) found that quick disposal of delinquent assets was associated with a 1.2% improvement in Tier-1 capital ratios. Market reactions also matter: event-study analyses in Indonesia showed that publicly listed banks announcing large-scale NPL portfolio sales in 2024 experienced cumulative abnormal returns of 1.8% over a five-day window (IMF eLibrary, 2024).

However, resolution decisions can introduce short-term volatility. Aggressive provisioning or asset sales may compress quarterly earnings, even as they enhance medium-term solvency. For example, U.S. community banks reported a 7% decline in 2023 net income year-on-year due to heightened loss provisioning despite improving loan quality metrics (FDIC, 2024). This tension underscores the importance of framing resolution within a long-term strategic context, rather than solely through quarterly financial performance lenses. Importantly, resolution tools interact differently with performance indicators. Restructuring strategies preserve NIM and ROA but may weigh on capital adequacy if restructured loans are still classified as substandard. In contrast, write-offs improve capital ratios but reduce profitability in the short term. This complexity reinforces the need for banks to adopt integrated resolution strategies aligned with broader financial goals (Hussain & Awan, 2023).

#### 2.4. Regulatory Architectures and Emerging-Market Dynamics

Regulatory frameworks determine the strategic latitude banks have in resolving NPLs. In the Eurozone, supervisory expectations from the ECB have pushed banks toward faster NPL coverage and loss recognition, resulting in lower legacy NPL stocks (ECB, 2023). In contrast, Indonesia's OJK has focused on supporting economic recovery through restructuring incentives, loan moratoria, and capital requirement flexibility (OJK, 2024). These divergent approaches reflect different regulatory philosophies—risk containment versus economic stimulation. The 2024 IMF Financial Sector Assessment Programme (FSAP) for Indonesia reveals a dual-track system, wherein large state-owned banks possess the technical capacity and capital buffers to implement sophisticated resolution strategies, while regional and rural banks remain constrained (IMF eLibrary, 2024). This structural asymmetry may widen inter-institutional performance gaps and systemic risk concentrations without intervention.

India's post-2016 reforms offer a practical comparative example. Implementing the Insolvency and Bankruptcy Code (IBC) and enhancements to provisioning norms have driven bad loan ratios to multi-decade lows, from 11.2% in 2018 to 2.3% in early 2024 (Reuters, 2024). This demonstrates how legal infrastructure can catalyse credit culture reform and enhance resolution efficiency across a diverse banking system. An emerging theme in regulation is the integration of environmental, social, and governance (ESG) principles into risk management frameworks. Banks are expected to incorporate climate and transition risks into credit risk assessments. This complicates NPL resolution as assets in carbon-intensive sectors may lose collateral value faster, and recovery options become limited (ResearchGate, 2024). Consequently, resolution strategies must increasingly balance profitability with ESG compliance, a paradigm shift regulators are only beginning to codify.

#### 2.5. Integrative Synthesis and Research Gaps

The preceding literature underscores that NPL resolution and financial performance are deeply intertwined and shaped by macroeconomic volatility, institutional capacity, regulatory architecture, and digital adoption. However, important research gaps persist. First, much existing literature treats resolution strategies as homogenous, when their mechanisms and impacts differ markedly. Few studies distinguish between the efficacy of restructuring versus asset sales versus write-offs in comparable settings (Kim & Lee, 2024). Second, there is limited empirical exploration of how technology—particularly machine learning, AI, and fintech ecosystems—interacts with traditional resolution channels. As digital capabilities evolve, understanding their additive or substitutive role in NPL recovery becomes

crucial (Utomo et al., 2024). Third, the heterogeneity of emerging markets is underrepresented in global studies. Most large-sample research privileges advanced economies, leaving contextual questions about regulatory flexibility, cultural lending practices, and legal constraints unanswered. To address these gaps, this study constructs a multidimensional framework of NPL resolution, incorporating restructuring intensity, write-off aggressiveness, asset-sale utilisation, and technological integration. It evaluates ROA, ROE, NIM, and CAR performance to capture income, efficiency, and solvency dynamics. The study contributes to scholarly understanding and regulatory design by differentiating between resolution tools and performance outcomes. Based on the extended literature, the following hypotheses are proposed:

- H1: Banks that implement proactive restructuring strategies demonstrate higher ROA than banks primarily using write-offs, due to retained earning potential and lower recovery cost.
- H2: Asset-sale utilisation is positively associated with improved CAR, as capital relief from risk-weight transfers exceeds revenue losses from asset discounting.
- H3: The positive effect of NPL ratio reduction on ROE is moderated by provisioning intensity, with more substantial gains observed under aggressive provisioning policies.
- H4: The relationship between restructuring and NIM is mediated by data-driven early-warning systems, which enhance loan performance and reduce arrears duration.

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