THE INFLUENCE OF LDR AND NPL ON THE PROFITABILITY OF RURAL BANKS: A SYSTEMATIC LITERATURE REVIEW (2021–2025)

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Abstract

Profitability is a key indicator of the sustainability of Rural Banks (BPR), which play an important role in supporting local economies. This study systematically reviews the relationship between Loan to Deposit Ratio (LDR), Non-Performing Loans (NPL), and BPR profitability using a Systematic Literature Review (SLR) approach. Articles were selected from reputable international databases published between 2015 and 2024 based on topic relevance and empirical methodology. The findings reveal that LDR has a positive impact on profitability when managed proportionally, while NPL has a significant negative effect due to increased credit risk. Rural BPR face greater challenges compared to commercial banks because of limited asset diversification and dependence on micro-agricultural sectors. This study highlights the importance of risk management, adaptive regulation, and digitalization of banking services as strategies to enhance BPR performance, and provides theoretical and practical insights for policy and managerial development.

Keywords: *Loan to Deposit Ratio, Non-Performing Loans, Rural Banks, Bank Profitability, Systematic Literature Review*

Abstrak

Profitabilitas merupakan indikator utama keberlangsungan Bank Perkreditan Rakyat (BPR) yang berperan dalam mendukung perekonomian lokal. Penelitian ini meninjau hubungan Loan to Deposit Ratio (LDR), Non-Performing Loans (NPL), dan profitabilitas BPR melalui

pendekatan Systematic Literature Review (SLR) terhadap artikel terindeks internasional periode 2015–2024 dengan kriteria relevansi topik dan metodologi empiris. Hasil analisis menunjukkan bahwa LDR berpengaruh positif terhadap profitabilitas apabila dikelola secara proporsional, sementara NPL berpengaruh negatif signifikan karena meningkatkan risiko kredit bermasalah. Konteks BPR di wilayah pedesaan menghadapi tantangan lebih besar akibat keterbatasan diversifikasi aset dan ketergantungan pada sektor mikro-agraris. Studi ini menegaskan pentingnya manajemen risiko, regulasi adaptif, dan digitalisasi layanan sebagai strategi peningkatan kinerja BPR, serta memberikan sintesis teoretis dan praktis bagi pengembangan kebijakan dan manajemen perbankan.

Kata Kunci: *Loan to Deposit Ratio, Non-Performing Loans, Bank Perkreditan Rakyat, Profitabilitas Bank, Systematic Literature Review.*

INTRODUCTION

Rural banks, also referred to as Bank Perkreditan Rakyat (BPR) in Indonesia, are essential to the advancement of inclusive financial growth because they provide services to small businesses and communities that are frequently neglected by commercial banks. (Usanti & Setiawati, 2022). Strong financial performance is expected of BPRs, which serve as the cornerstones of local economic empowerment, to guarantee their viability and efficacy in promoting regional development (Akilah, 2024). Profitability is one of the most important metrics among the primary indicators of financial performance since it shows how well these banks turn their resources into cash (Isayas, 2022).

The Loan to Deposit Ratio (LDR) and Non-Performing Loans (NPL) are two particularly strategic financial indicators among the many factors that affect profitability (Hadian & Phety, 2021). As a gauge of operational effectiveness and liquidity management, LDR evaluates how well a bank converts consumer deposits into loans (Adenuga et al., 2021). A bank is maximising its intermediary role without sacrificing liquidity, according to a well-balanced LDR (Bagiana et al., 2025). An overly high LDR, however, might make the bank more susceptible to external shocks and increase its risk of liquidity problems (Gafrej & Boujelbéne, 2022). On the other hand, non-performing loans (NPLs) represent the percentage of loans that are not likely to be repaid (Foglia, 2022). Poor credit quality, elevated financial risk, and diminishing profitability as a result of higher provisioning needs and lower interest income are generally linked to high NPL levels (S. Ahmed et al., 2021; Atichasari et al., 2023; Naili & Lahrichi, 2022).

The effects of LDR and NPL are particularly noticeable in the context of rural banking, where resources and risk management infrastructure may be scarce (Priyadi et al., 2021). These two metrics serve as indicators of overall operational health in addition to having a direct impact on profitability (Mega et al., 2024). Since rural banks are under increasing pressure to remain resilient, competitive, and responsive to regulatory standards, academics, regulators, and financial practitioners must examine their roles (Ali Alqararah et al., 2025).

The connection between LDR, NPL, and profitability has drawn more attention from academics in recent years, especially in light of continuous changes in the economy (Rashaduzzaman, 2024)Changes in regulations (Molosiwa & Kenalemang, 2025), and initiatives to fortify financial institutions at the local level (Chowdhury et al., 2024). Despite this expanding corpus of work, a thorough synthesis that charts the development of these themes in the scholarly literature, identifies the key contributors, and identifies research gaps is conspicuously lacking.

The current study uses the SPAR-4-SLR framework to ensure methodological rigour and clarity in its Systematic Literature Review (SLR) of Scopus-indexed publications from 2021 to 2025. By responding to the following research questions, this study seeks to offer an organised summary of the academic discussion surrounding LDR, NPL, and profitability in rural banking contexts:

Questions for Research:

RQ1: How do rural banks manage the lending-liquidity balance globally, and what is the impact of this balance on their profitability as determined by the Loan to Deposit Ratio, according to recent research (2021–2025)?

RQ2: What conclusions have international studies from the last five years drawn about how non-performing loans affect rural banks' capacity to maintain profitability, and how do these conclusions illustrate the difficulties in controlling credit risk?

RQ3: How have recent studies assessed the financial health of rural banks using instruments such as the CAMEL framework, and what do these studies show about the effects of non-performing loans and loan-to-deposit ratios on the stability and profitability of these banks?

LITERATURE REVIEW

The ratio of loans to deposits (LDR)

A financial metric known as the Loan to Deposit Ratio (LDR) illustrates the proportion of a bank's available deposits that have been utilised for loan issuance (Boďa & Zimková, 2021). When evaluating the bank's capacity to turn its liabilities (deposits) into assets that generate income (loans), this ratio is essential (Sahyouni et al., 2021). A bank's operational success depends on efficient fund utilisation, which is indicated by a well-managed LDR (Muhammed et al., 2024). The bank may be taking on excessive risk by lending aggressively if the LDR is too high (Natufe & Evbayiro-Osagie, 2023). This could result in liquidity shortages if numerous depositors demand their money at once (Majeed & Zainab, 2021). However, if the LDR is too low, it may indicate that the bank is not converting deposits into income effectively or cautiously, which could limit its profit potential (Eltweri et al., 2024). Finding the ideal balance in the LDR is crucial for rural banks, which frequently operate in underserved areas (Adegboyega, 2023; Kumar & Saha, 2025; Nyo et al., 2022). It demonstrates their dedication to lending for community development while making sure they maintain their financial stability and ability to satisfy the demands of their depositors (Ayele & Singh, 2024).

Loans that don't perform (NPL)

Loans that are no longer producing income due to the borrower's prolonged non-payment of scheduled payments are known as non-performing loans (NPLs) (Dimri, 2025; Leesurakarn, 2021; Zaker, 2022). Because these loans tie up capital without producing returns and have the potential to result in financial losses if not recovered, they pose a serious risk to banks (Blattner et al., 2023). Any financial institution should be wary of high NPL levels since they indicate flaws in borrower quality, credit monitoring, or assessment (Naili & Lahrichi, 2022). Managing non-performing loans (NPLs) becomes a challenging but essential task for rural banks, which frequently serve customers with less financial literacy or more erratic incomes (Jayasinghe et al., 2024). These institutions may rapidly experience financial difficulties if they do not have efficient loan monitoring systems and risk mitigation techniques (Benami & Carter,

2021). To preserve liquidity, safeguard capital, and guarantee the bank's long-term viability, NPLs must be kept to a minimum(Oino, 2021).

Profitability of Rural Banks

Rural banks' financial performance and long-term viability are gauged by their profitability (Yitayaw, 2021). Rural banks that are profitable can maintain operations, make investments in improved services, broaden their customer base, and resist external economic pressures (Ansari & Sen Gupta, 2024). Interest income, cost effectiveness, operational effectiveness, and risk management—particularly about loan performance—are important factors that determine profitability (Mehzabin et al., 2023). Profitability is frequently more difficult to attain in rural banking because of issues like smaller loan amounts (Gržeta et al., 2023), expensive monitoring (Kandpal, 2024), and working with customers who might not have official financial histories (Kandpal, 2024; Ofori-Okyere et al., 2023). Rural banks are essential to the economic growth of isolated communities despite these obstacles (Y. Wang et al., 2024). Therefore, the main goal of rural banks is to maintain a sound balance between financial sustainability and financial inclusion (Vo et al., 2021). Their ability to continue making money while carrying out their developmental role is directly related to factors like keeping NPLs low and maintaining an ideal LDR (Anwar et al., 2021).

CAMEL Framework (Capital, Asset Quality, Management, Earnings, Liquidity)

By analysing five important factors—capital adequacy, asset quality, management effectiveness, earnings strength, and liquidity position—the CAMEL framework provides a thorough tool for evaluating banks' financial soundness (Afroj, 2022). Compared to commercial banks, rural banks frequently operate in more unstable and vulnerable environments, so this is particularly pertinent to them (Mogaji et al., 2021). Every component of the CAMEL model sheds light on how rural banks handle their risks and financial resources (H. Wang et al., 2025). Liquidity, as determined in part by the LDR, indicates a bank's capacity to satisfy withdrawal requests and finance continuing credit, whereas asset quality, which is strongly correlated with non-performing loans, indicates the strength of the loan portfolio (Beni et al., 2023). To

withstand shocks from credit losses or economic downturns, strong management and sufficient capital buffers are crucial. The bank's ability to expand, innovate, and support regional development is determined by its earnings (Stewart & Chowdhury, 2021).

Research Method

This systematic literature review (SLR) examines the impact of non-performing loans (NPL) and the loan-to-deposit ratio (LDR) on rural banks' profitability worldwide (2021–2025) using the SPAR-4-SLR framework to ensure transparency and replicability. (Escudero-Guirado et al., 2024; Paul et al., 2021; Sulistyowati et al., 2025). This study applied the SPAR-4-SLR framework to ensure transparency, rigor, and replicability in the review process. In the Assembling phase, the research scope was clearly defined to focus on peer-reviewed journal articles examining the effect of Loan-to-Deposit Ratio (LDR) and Non-Performing Loans (NPL) on rural banks' profitability, guided by three research questions. During the Acquisition phase, Scopus was used as the sole database, with a systematic search strategy developed using Boolean operators and keywords including "Loan to Deposit Ratio," "LDR," "Non-Performing Loan," "NPL," "rural bank," and "profitability." The search was restricted to English-language journal articles published between 2021 and 2025 in the fields of business, management, accounting, economics, econometrics, and finance, producing 440 initial documents. In the Arranging phase, the articles were organized into a spreadsheet and coded by author, country, methodology, sample, theoretical foundation, and key findings, which allowed cross-study and thematic comparisons. Inclusion criteria required empirical studies directly analyzing LDR, NPL, or both in relation to profitability, while non-empirical works or irrelevant studies were excluded. The Purification phase followed PRISMA guidelines, where screening of titles and abstracts was conducted before full-text reviews, resulting in the selection of 43 high-quality and relevant studies. In the Assessing phase, descriptive and thematic analyses identified trends and recurring insights on how LDR and NPL influence profitability, particularly regarding financial stability, risk exposure, and earnings, with findings linked to theories such as profitability modeling, risk-return trade-off, and the CAMEL framework. Finally, the Reporting phase summarized results in tabular form for clarity. Despite limitations,

including reliance on Scopus and English-only publications, the review provides robust global insights into LDR, NPL, and rural bank profitability.

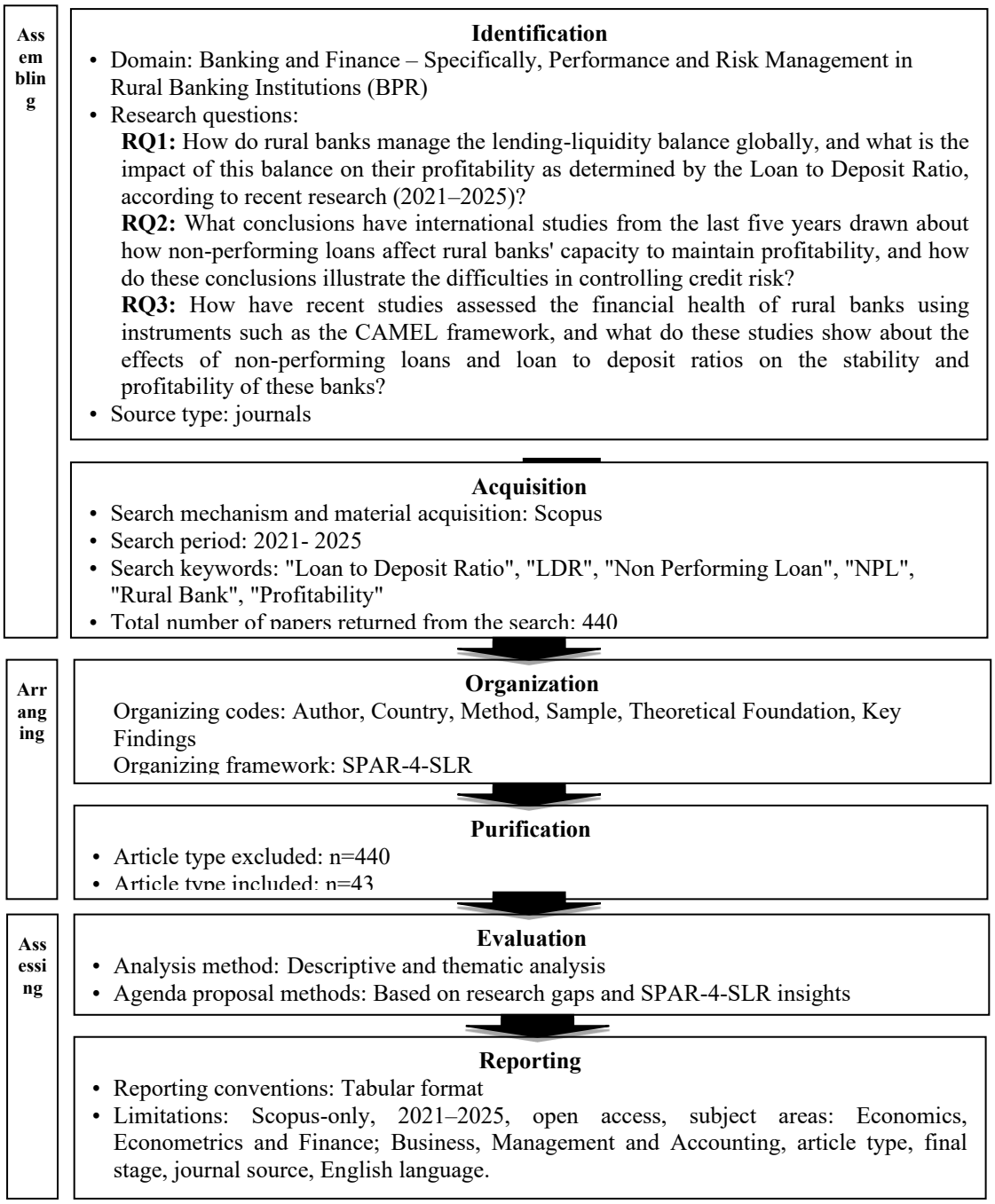

Figure 1. Methodology design of the research

Source: (Escudero-Guirado et al., 2024; Paul et al., 2021)

RESULT

Particularly in uncertain times like the COVID-19 pandemic, recent international studies have been examining the true factors that influence bank profitability, capital strength, and credit risk. The emphasis on non-performing loans (NPLs), which are repeatedly shown to impair a bank's financial stability, unites these studies. Researchers from the Middle East, Nigeria, Indonesia, and other regions have examined the role of market power, revenue diversification, dividend policies, and capital adequacy using a variety of statistical tools. Strong financial strategies and careful risk management can help banks stay stable and profitable, even in times of crisis, but an excessive number of bad loans can bring them to their knees. This is evident even though each study presents its perspective and background. While some studies focus on immediate decisions, others delve deeper by examining indirect relationships or long-term effects. Ultimately, they all serve as a reminder of how critical it is to be adaptable and financially prepared in a world that is changing all the time.

Table 1. Research Findings

Author (Year)	Country	Scope	Method	Findings
(Abusharbeh, 2025)	Arab countries	Determinants of capital adequacy	FMOLS (panel data 2017–2023)	NPLs, interest ↓ CAR; profitability, size ↑ CAR; economic growth not significant
(S. A. Ahmed et al., 2024)	Arab countries	NPLs and COVID-19	Panel data analysis	COVID-19 increased NPLs, reduced bank lending.
(Alnabulsi et al., 2023)	MENA region	NPLs and bank profitability	SGMM & PSTR models (74 banks, 2005–2020)	NPLs' ↓ profitability beyond the 4.42% threshold; size ↑ profitability

(Al-Sharkas & Al-Sharkas, 2022)	Middle East	Bank profitability determinants	GMM dynamic panel model	NPLs and cost-income ratio reduce profits; CAR and inflation effects are mixed.
(Amare, 2021)	Ethiopia	Debt, bank size, and profitability	Panel regression	Short-term debt increases ROA & NIM; larger banks tend to have lower profitability.
(Anh & Huong, 2024)	Vietnam	Bank-specific factors influencing ROAA	Panel data analysis	OBS, NIM, size ↑ ROAA; credit balance ↓ ROAA; NPL, LLR not significant
(Barakat et al., 2024)	Multiple	NPLs and profitability	Meta-analysis	NPLs consistently negatively impact profitability.
(BUCHORY, 2021)	Indonesia	CIMB Niaga Bank (2012–2020)	Quantitative, multiple regression	TPFS had a negative but insignificant effect on ROA; CG positive but insignificant; NPL had a significant negative effect on ROA; together they explain 71.2% of ROA variance.

(Bulut et al., 2024)	Turkiye	Deposit banks (2010–2022)	Seemingly unrelated regression	Real effective exchange rate, inflation, and non-interest income affect profitability for all; capital ratio, size, LDR, and economic activity differ across ownership types.
(Chand et al., 2023)	Fiji	7 banks (2000–2022)	Fixed-effects panel model	COVID-19 had a more severe impact on NPLs than the GFC; economic globalisation reduced losses, social globalisation increased them; non-banks were more vulnerable.
(Chand et al., 2024)	Fiji	Global/institutional effects on bank profitability	Fixed-effects (7 banks, 2000–2021)	NPLs' ↓ profitability, GDP, remittances, and governance ↑ profitability
(Chukwuogor et al., 2021)	USA	NPLs and macroeconomic variables	Panel regression	NPLs, GDP, and mortgage rates significantly affect ROA and ROE.

(Đaković et al., 2023)	Serbia	22 banks (2014–2021)	Regression (fixed & random effects)	Liquidity and bank size negatively affect NIM; debt and unemployment positively affect it.
(Dekar et al., 2024)	Bhutan	Profitability drivers include. COVID-19	Regression analysis	NPLs hurt profitability; COVID-19 had no significant effect.
(Duho, 2023)	Ghana	Determinants of capital adequacy in MFIs	2SLS regression on 439 MFIs (2015–2018)	NPLs' ↓ capital adequacy, income diversification ↑ capital adequacy
(Gazi et al., 2021)	Bangladesh	32 banks (2011–2020)	OLS regression, panel data	Equity to asset, deposit to asset, equity debt, LDR, and GDP growth significantly impact ROA and ROE.
(Handoyo et al., 2023)	Indonesia	Financial ratios and ROA	Panel regression	CAR and LDR increase ROA; NPL and QAP reduce it.
(Horobet et al., 2021)	CEE (Central & Eastern Europe)	CEE banking sector (2009–2018)	Two-step GMM	Unemployment, inflation, budget balance, credit, NPLs, concentration, and capitalisation negatively

				impact profitability.
	Angola	Legal environment and bank performance	Quantitative panel study	The rule of law and property rights strengthen bank profitability.
(Karki et al., 2023)	Nepal	DFIs (2015/16–2021/22)	Random effects regression, panel data	Equity dividends negatively affect ROE; non-interest income has no significant effect; cost-to-income and equity-to-assets ratios negatively affect profitability.
(Katusiime, 2021)	Uganda	Macroeconomics and profitability	ARDL cointegration analysis	GDP and interest rates affect long-run profitability; COVID-19 reduces profitability.
(Masdjojo et al., 2023)	Indonesia	90 observations from commercial banks (2017–2020)	Multiple regression, Sobel test	Profitability mediates NPL and LDR effects on capital buffer; NPL reduces profitability; LTA increases it; profitability negatively

				affects capital buffer.
(Morshed, 2024)	Jordan	19 banks (2012–2022)	Difference-in-Differences, Fixed Effects	IFRS 9 increased loan loss provisions and reduced ROA/ROE; improved transparency and risk assessment.
(Nurkhin et al., 2023)	Indonesia	GCG and Islamic bank performance	Multiple regression (2011–2019)	NPF ↓ ROA & ROE significantly; GCG implementation not significant
(Nurkhin et al., 2024)	Indonesia	Effect of GCG on NPLs in commercial banks	Panel regression on 54 banks (2018–2021)	Independent commissioners ↓ NPLs; board meetings ↑ NPLs; LDR & size ↓ NPLs
(Oino, 2021)	UK	10 banks (2009–2018)	GMM	Credit and liquidity risks are interconnected; NPLs reduce liquidity; efficiency, asset quality, growth, and Tier-1 capital positively affect solvency.
(Priharta & Gani, 2023)	Indonesia	CAR, NPL, ROA, ROE	Regression analysis	CAR → ROA (-), ROE (+);

				NPL negatively impacts both ROA and ROE.
(Purwanto et al., 2023)	Indonesia	LDR, ROA, CAR on financial distress (COVID-19 context)	Linear regression on 27 banks (2016–2021)	Credit risk moderates LDR & ROA; leverage is not moderated
(Putri et al., 2022)	Indonesia	CSR, green banking, ROA	Quantitative, regression analysis	CSR and green banking (except ATM) affect ROA; paperless reduces cost, increases profit.
(Quy & Tuan, 2024)	Vietnam	IRS mediating profitability impact	Panel regression (25 banks, 2008–2020)	IRS mediates profitability; NPL, PL, NIE, and AS are not significant
(Rimintsiwa et al., 2022)	Nigeria	Impact of dividend policy on the profitability of Domestic Systemically Important Banks (D-SIBs)	Panel regression; PMG estimators; 10-year data	Dividend policy significantly affects profitability and efficiency, has a partial effect on valuation, and does not affect liquidity and solvency. Effects are heterogeneous across banks.
(Rohman et al., 2022)	Indonesia	43 banks (2019–2020)	Descriptive & multiple regression	ROA, ROE, and NIM decreased during COVID-19; only CAR and NPL significantly and negatively

				affected profitability; size and liquidity had no significant effect.
(Safitri et al., 2023)	Indonesia	Market power, revenue diversification, profitability, and NPL during the COVID-19 pandemic	Panel data regression (EViews 10); 264 samples	Market power and revenue diversification directly increase profitability and reduce NPLs. Profitability partially mediates their relationship with NPLs. Supports NEIO, Competition Fragility, and Product Portfolio Theory.
(Saleh & Paz, 2023)	Palestine	Credit risk impact on profitability	Regression (2010–2020); SPSS & E-Views	LLPR ↑ profitability; LDR ↓ (insignificant); NPL positive but insignificant
(Shkodra et al., 2024)	Western Balkans (WBCs)	All commercial banks in Albania, Kosovo, Montenegro, North Macedonia, and Serbia (2010–2020)	Panel regression	NPLs negatively affect ROA, CAR, operational cost efficiency, and liquidity, including as

				controls; calls for tighter monitoring and better credit assessment.
(Siauwijaya & Lesmana, 2023)	Indonesia	Green credit policy and profitability	Regression on panel data	Green credit policy increases ROE, NIM, and PBT.
(Sudiyatno et al., 2024)	Indonesia	20 banks	Quantitative, regression analysis	NPL and bank size had no effect; LDR and CSR had a significant positive effect on performance; CSR negatively moderates LDR–LDR-LDR-performance link but not NPL–performance.
(Sultana & Jalloh, 2025)	Bangladesh	Impact of Loan Loss Provisioning on Profitability	Quantitative; 20 private banks; bank-specific + control vars	LLP significantly impacts profitability (ROA & ROE)
(Sutanto & Ariefianto, 2024)	Indonesia	Dynamics of NPLs, profitability, and capital	DCCE on 85 banks (2012–2021)	NPLs ↓ profitability (short & long run); capital not significant
(Thornton & Di Tommaso, 2021)	Europe	NPLs, capital, profitability	Panel regressions	Capital and profits mitigate the negative effect on credit supply.

(Veizi & Çelo, 2024)	Albania	Impact of NPLR on profitability	Linear regression using 8-year data from the Bank of Albania	NPLR negatively affects ROA and ROE
(Yamin et al., 2025)	Bangladesh	20 commercial banks (2014–2023)	Fixed-effects multivariate regression (Hausman test)	Tier-1 capital ratio and CRAR improve ROA and reduce NPLs; larger banks have lower ROA and higher NPLs; higher provisions increase NPLs.
(Zolea, 2024)	Italy	Bank profit vs the productive sector post-2008 crisis	Comparative data analysis	Bank profits were low post-crisis due to ↑ NPLs; improved since 2021

Source: Data processed from the Scopus database on 17 July 2025

RQ1: How do rural banks manage the lending-liquidity balance globally, and what is the impact of this balance on their profitability as determined by the Loan to Deposit Ratio, according to recent research (2021–2025)?

The Loan to Deposit Ratio (LDR), a crucial metric that shows how well a bank turns its deposit liabilities into loans, is the primary way that rural banks around the world manage the lending-liquidity balance, according to recent research conducted between 2021 and 2025. The LDR is a key instrument for striking a balance between making money through lending and making sure there is enough liquidity to cover withdrawal requests and legal requirements. However, different institutional contexts and geographical areas have different levels of success with this balance in terms of increasing profitability. According to studies (Gazi et al., 2021; Handoyo et al., 2023)

Conducted in Bangladesh and Indonesia, a moderately high LDR (usually between 70 and 90%) tends to increase profitability, as measured by return on equity (ROE) and return on assets (ROA), because it shows effective use of deposit funds for interest-generating loans. According to (Handoyo et al., 2023), a higher LDR considerably increases ROA, indicating that rural banks can attain larger margins by streamlining their lending operations without sacrificing liquidity.

This relationship is conditional, though. According to research conducted in Indonesia by Purwanto et al. (2023), credit risk mitigates the impact of LDR on profitability. Non-performing loans (NPLs), which can reduce profits and put a strain on liquidity, may increase for banks with high LDR but inadequate risk management. Similarly, Masdjojo et al. (2023) showed that although LDR has an impact on profitability, this also has an impact on the bank's capital adequacy, indicating a domino effect whereby excessive lending without robust buffers can erode overall financial health. Institutional factors also come into play. According to (Bulut et al., 2024) in Turkey, the impact of LDR on profitability varies depending on the type of ownership (private versus state), underscoring the fact that bank structure and governance influence LDR management. In the meantime, (Sudiyatno et al., 2024) pointed out that because socially conscious policies may limit aggressive lending strategies, corporate social responsibility (CSR) can adversely moderate the positive effect of LDR on performance.

Notably, it is unclear how LDR will affect profitability in some fragile economies. In Palestine, for instance, (Saleh & Paz, 2023) found a negative but negligible correlation, most likely as a result of cautious lending practices or increased financial uncertainty. Additionally, rising NPLs can reduce liquidity, undermining the benefits of high LDR, particularly if credit screening is inadequate, as warned by (Oino, 2021) in the UK. In conclusion, rural banks around the world balance lending and liquidity by adjusting their LDR within a certain range. This allows them to optimise lending returns while maintaining sufficient liquidity to withstand shocks. This balance tends to increase profitability when paired with sound governance and robust credit risk controls. The relationship between LDR and profitability is highly context-dependent, though, as

external shocks (like COVID-19), growing non-performing loans, and institutional weaknesses can upset this equilibrium.

Table 2. Global Evidence on the Relationship Between LDR and Profitability in Rural Banks (2021–2025)

LDR Management Findings	Author (Year)	Country	Method
LDR significantly increases ROA, indicating effective lending supports profitability.	(Handoyo et al., 2023)	Indonesia	Panel regression
LDR significantly influences ROA and ROE; well-balanced deposit-loan management improves bank returns.	(Gazi et al., 2021)	Bangladesh	OLS regression, panel data
Credit risk moderates the effect of LDR on ROA; risky lending can reduce expected gains.	(Purwanto et al., 2023)	Indonesia	Linear regression
LDR's effect on profitability depends on ownership structure; state vs. private banks differ in LDR sensitivity.	(Bulut et al., 2024)	Turkiye	Seemingly unrelated regression
LDR has a strong positive effect on performance, but CSR negatively moderates this effect.	(Sudiyatno et al., 2024)	Indonesia	Regression analysis
LDR shows a negative but **insignificant** effect on profitability, possibly due to instability or risk aversion.	(Saleh & Paz, 2023)	Palestine	Regression analysis
LDR indirectly affects capital adequacy through profitability; over-lending can weaken buffers.	(Masdjojo et al., 2023)	Indonesia	Multiple regression, Sobel test

LDR and size negatively affect NPLs; improved liquidity management reduces credit risk.	(Nurkhin et al., 2024)	Indonesia	Panel regression
Loan loss provisions and LDR significantly affect capital adequacy and profitability.	(Sultana & Jalloh, 2025)	Bangladesh	Bank-level quantitative analysis
LDR reduces liquidity if NPLs rise; careful credit screening is needed to maintain solvency.	(Oino, 2021)	UK	GMM dynamic panel model

Source: Data processed from the Scopus database on 17 July 2025

RQ2: What conclusions have international studies from the last five years drawn about how non-performing loans affect rural banks' capacity to maintain profitability, and how do these conclusions illustrate the difficulties in controlling credit risk?

Non-performing loans (NPLs) continue to be the most persistent and challenging issue in credit risk control for rural banks, adversely affecting their profitability, according to an increasing amount of international research conducted between 2021 and 2025. High NPL levels have been shown to erode important financial performance metrics like return on assets (ROA), return on equity (ROE), capital adequacy, and liquidity in studies conducted in a variety of regions, from Southeast Asia and the Pacific to the Middle East and Europe. NPLs and bank profitability, for instance, are directly and negatively correlated, according to studies conducted in Fiji (Chand et al., 2024), Albania (Veizi & Çelo, 2024), and Indonesia (Sutanto & Ariefianto, 2024). (Shkodra et al., 2024) went one step further in the Western Balkans by showing that non-performing loans (NPLs) can harm a bank's overall resilience and solvency. According to certain research, NPLs have a threshold effect, meaning that once NPL ratios surpass a certain threshold, such as the 4.42% tipping point noted by (Alnabulsi et al., 2023)—profitability sharply declines. According to (S. A. Ahmed et al., 2024) and (Chand et al., 2023), the COVID-19 pandemic made this issue even worse. Smaller and rural banks saw higher increases in non-performing loans and financial instability during the pandemic than they did even during the Global Financial Crisis.

There have been conflicting outcomes from attempts to reduce credit risk through governance changes. According to (Nurkhin et al., 2024), while excessive board meetings may be associated with increased credit risk, governance structures, such as the function of independent commissioners, can lower non-performing loans (NPLs). This suggests that the quality of governance is more important than the frequency of oversight. Stricter credit screening and compliance requirements, like IFRS 9 in Jordan (Morshed, 2024), frequently lead to increased provisioning costs, which can lower short-term earnings. Additionally, NPLs had a statistically negligible impact on profitability in nations like Palestine (Saleh & Paz, 2023) and Vietnam (Anh & Huong, 2024), presumably as a result of conservative lending practices or external policy buffers. Overall, the data from 2021–2025 demonstrates that rural banks continue to face a challenging and unsolved problem with credit risk control, especially with regard to managing non-performing loans. Although corporate governance reforms and regulatory improvements are helpful, many banks continue to face the fundamental trade-off between preserving financial sustainability and increasing credit availability. This implies that to effectively handle non-performing loans (NPLs) in rural banking environments, stronger macroeconomic backing and borrower resilience are also necessary, in addition to improved internal risk management.

Table 3. The Impact of NPLs on Rural Bank Profitability (2021–2025)

Findings on NPLs / Credit Risk Control	Reference	Country	Scope
COVID-19 increased NPLs and reduced profitability in rural banks; greater impact than the Global Financial Crisis.	(Chand et al., 2024)	Fiji	Rural banking during COVID-19
NPLs negatively affect bank profitability (ROA and ROE).	(Veizi & Çelo, 2024)	Albania	Rural banks and profitability
NPLs are a significant determinant of declining bank profitability and	(Sutanto & Ariefianto,	Indonesia	Rural banks' credit risk

capital adequacy.	2024)		
NPLs compromise overall financial solvency and banking resilience.	(Shkodra et al., 2024)	Western Balkans	NPLs and financial stability
NPLs negatively affect performance, especially beyond the 4.42% threshold—tipping point causes a sharp profitability decline.	(Alnabulsi et al., 2023)	Jordan	Threshold analysis of NPLs
Rural banks experienced higher NPLs and more severe financial instability during COVID-19 than in the GFC.	(S. A. Ahmed et al., 2024)	Multiple (Global South)	Comparative COVID-19 vs. GFC impact
Independent commissioners reduce NPLs; too many board meetings correlate with higher credit risk—quality of governance matters more than frequency.	(Nurkhin et al., 2024)	Indonesia	Governance and risk control
Adoption of IFRS 9 increases provisioning, helping control risk but reducing short-term profits.	(Morshed, 2024)	Jordan	IFRS 9 and credit risk
NPLs found statistically insignificant in affecting bank profitability—possibly due to conservative loan practices or regulatory buffers.	(Anh & Huong, 2024)	Vietnam	NPLs and profitability in banks
NPLs did not show a statistically significant impact on profitability—context-specific	(Saleh & Paz, 2023)	Palestine	Rural banking profitability

resilience mechanisms may explain the anomaly.			

Source: Data processed from the Scopus database on 17 July 2025

RQ3: How have recent studies assessed the financial health of rural banks using instruments such as the CAMEL framework, and what do these studies show about the effects of non-performing loans and loan-to-deposit ratios on the stability and profitability of these banks?

The CAMEL framework—Capital Adequacy, Asset Quality, Management, Earnings, and Liquidity—has been used more frequently in recent studies conducted between 2021 and 2025 to evaluate the financial health of commercial and rural banks worldwide. This framework aids in determining how internal financial factors, particularly Loan-to-Deposit Ratios (LDR) and Non-Performing Loans (NPLs), impact the stability and profitability of banks. Research from Albania (Veizi & Çelo, 2024), Indonesia (Handoyo et al., 2023; Sutanto & Ariefianto, 2024), and the larger MENA region (Alnabulsi et al., 2023) Generally demonstrates that high NPLs consistently lower profitability. These studies support the idea that non-performing loans (NPLs) degrade return metrics such as ROA and ROE and frequently lower capital adequacy ratios (CAR), which are crucial for the "Capital" component of CAMEL. (Abusharbeh, 2025), for example, it emphasises a direct erosion of capital buffers and shows that NPLs significantly lower CAR across Arab countries.

The impact of the LDR is more complex. Higher LDR is positively correlated with profitability, according to some research (Handoyo et al., 2023; Sudiyatno et al., 2024), suggesting that when risk is properly managed, credit deployment can increase earnings. Others, however, point out that credit risk is a major moderator and that LDR becomes hazardous in situations of financial distress or the absence of robust governance (Purwanto et al., 2023). Additionally, an excessively high LDR may indicate liquidity stress, particularly if NPLs are increasing at the same time. In conclusion, these studies demonstrate that non-performing loans (NPLs) worsen financial health by lowering capital strength, earnings, and asset quality. On the other hand, prudently managed LDR can improve performance, but excessive or combined

with high NPLs can pose a risk. The CAMEL framework is still a useful instrument for assessing the financial soundness of rural banks, especially in developing nations where these metrics clearly show operational vulnerability and resilience.

Table 4. Applications of the CAMEL Framework in Assessing the Effects of LDR and NPL on Rural Bank Performance (2021–2025)

Findings	Reference	Country	CAMEL Focus	Remarks
High NPLs reduce ROA and ROE, weakening asset quality and profitability.	(Veizi & Çelo, 2024)	Albania	Asset Quality, Earnings	NPLs hurt rural bank profitability.
NPLs negatively affect profitability and CAR; credit risk is a main threat.	(Sutanto & Ariefianto, 2024)	Indonesia	Capital Adequacy, Asset Quality	Poor asset quality weakens capital buffers.
NPLs significantly reduce the capital adequacy ratio (CAR) across MENA countries.	(Abusharbeh, 2025)	Arab Countries	Capital Adequacy	Capital strength deteriorates with higher NPLs.
LDR positively impacts ROA and ROE when credit risk is low.	(Handoyo et al., 2023)	Indonesia	Liquidity, Earnings	Lending efficiency supports earnings if risk is controlled.
LDR improves profitability (ROA, ROE), but	(Purwanto et al., 2023)	Indonesia	Liquidity, Risk Management	Effective LDR needs strong risk governance.

the effect is moderated by credit risk.				
High LDR leads to stronger financial performance if credit risk is controlled.	(Sudiyatno et al., 2024)	Indonesia	Liquidity, Management	Emphasises prudent lending policy.
NPL threshold of 4.42% leads to a sharp decline in profitability; risk increases beyond this point.	(Alnabulsi et al., 2023)	Jordan	Asset Quality, Earnings	Important tipping point identified.
High NPLs compromise solvency and reduce banking sector resilience.	(Shkodra et al., 2024)	Western Balkans	Capital, Asset Quality	CAMEL shows weakening stability.
NPLs and provisioning under IFRS 9 help manage risk but reduce short-term profits.	(Morshed, 2024)	Jordan	Asset Quality, Earnings	Regulatory provisioning affects earnings.
In some contexts, NPLs were not statistically significant to profitability,	(Anh & Huong, 2024; Saleh & Paz, 2023)	Vietnam; Palestine	Asset Quality, Capital	Local practices may explain the anomaly.

possibly due to regulatory buffers or conservative lending practices.				

Source: Data processed from the Scopus database on 17 July 2025

CONCLUSION

This review confirms that Loan-to-Deposit Ratio (LDR) and Non-Performing Loans (NPL) are the key drivers of rural banks' profitability and stability. LDR supports earnings when maintained within the optimal range of 70–90%, but excessive levels, especially under weak governance or external shocks, can threaten solvency. NPLs pose a greater risk, as they directly erode Return on Assets (ROA), Return on Equity (ROE), and Capital Adequacy Ratio (CAR), with profitability declining sharply once thresholds are exceeded. These findings underscore the need for rigorous borrower screening, prudent credit appraisal, and continuous monitoring. While the CAMEL framework remains useful for assessing capital adequacy, asset quality, and liquidity, sustainable performance depends more on effective credit risk management than technical compliance. Strengthened governance, adaptive regulation, and digital risk-monitoring tools are essential for resilience. Ultimately, the balance between LDR and NPL determines not only profitability but also the long-term sustainability of rural banks in supporting local economies.

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