Does Credit Risk Mediate the Loan Growth–Profitability Relationship?

A Panel Study of Rural Banks in East Java

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Abstract
This study investigates the impact of capital adequacy, liquidity, and loan growth on the profitability of rural banks (BPRs), with credit risk examined as a mediating variable. Motivated by the declining national trend in BPR profitability, panel data from 21 BPRs in Malang Regency between 2019 and 2023 were analyzed using a random effects model and the Sobel test. Profitability was measured by Return on Assets (ROA), while the explanatory variables included Capital Adequacy was measured by Capital Adequacy Ratio (CAR), Liquidity was measured by Loan to Deposit Ratio (LDR), Loan Growth (LG), and Credit Risk was measured by Non-Performing Loans (NPL). The findings indicate that capital asequacy significantly enhances profitability, while credit risk negatively affect it. In contrast, liquidity and loan growth show no significant direct effect on profitability. Credit risk does not significantly mediate the relationship between loan growth and profitability. These results underscore the critical role of capital strength and credit quality in improving BPR performance, suggesting that liquidity and credit expansion alone are insufficient without effective risk management. This study contributes to the literature by contextualizing profitability dynamics within the post-pandemic recovery period and the Indonesian rural banking sector, offering actionable insights for bank managers and regulators focused on financial sustainability
Keywords: capital adequacy, credit risk, loan growth, profitability, rural banks

1.   INTRODUCTION

The financial services sector plays a pivotal role in driving economic growth by facilitating financial intermediation, risk management, and capital allocation. Within this sector, *Bank Perekonomian Rakyat* (BPR) formerly *Bank Perkreditan Rakyat* occupies a unique position in Indonesia by focusing on micro, small, and medium enterprises (MSMEs), particularly in rural and underserved areas. Governed by the Financial Services Authority Regulation (POJK No. 7 of 2024), BPRs are strategically positioned to strengthen local economic resilience and promote inclusive finance.

Despite their vital role, recent statistics reveal a decline in BPR profitability. Data from the 2023 Indonesian Banking Statistics (OJK, 2023) show that the average Return on Assets (ROA) for conventional BPRs fell by 0.74 percentage points, the lowest level recorded between 2019 and 2023, while commercial banks experienced an increase during the same period. This divergence raises important concerns regarding BPRs' financial sustainability and adaptability to evolving market conditions.

Prior studies highlight several factors influencing bank profitability, including capital adequacy, liquidity, loan growth, and credit risk. Capital adequacy, measured by the Capital Adequacy Ratio (CAR), reflects a bank's ability to absorb shocks and maintain solvency, yet empirical findings remain inconclusive. Recent studies present mixed findings on how capital adequacy influences rural bank profitability. Adequate capitalization enables banks to support lending and absorb potential losses, ensuring solvency and stability (Ikatan Bankir Indonesia, 2016). While Goh et al. (2022) and Amalia and Nugraha (2021) found a positive and significant effect, Serwadda (2018) reported otherwise, suggesting that excessive capital may constrain income generation. These inconsistencies highlight a research gap that merits further examination, particularly within Indonesia's rural banking context, to determine the optimal capitalization level that balances risk resilience and profitability in BPRs.

Liquidity, commonly represented by the Loan to Deposit Ratio (LDR), can enhance profitability through increased lending, but excessive or insufficient liquidity may create financial vulnerabilities. Loan growth often signals income potential but may also heighten credit risk if not managed prudently. Credit risk, measured by the Non-Performing Loan (NPL) ratio, consistently shows a negative relationship with profitability, though its magnitude varies across contexts. Credit risk may also act as a mediator between loan growth and profitability. Rapid credit expansion can increase default risk and erode returns, while cautious growth supported by sound risk management can sustain profitability. This dynamic underscores the need to understand not only the direct effects of capital adequacy, liquidity, and loan growth on profitability, but also the indirect role of credit risk.

This study addresses these issues by examining rural banks in Malang Regency, East Java—an area where 67% of BPRs recorded improved ROA in 2023, defying the national trend. By focusing on the 2019–2023 post-pandemic recovery period, the research provides timely insights into BPRs' financial resilience. The study's novelty lies in its mediation framework, which integrates capital adequacy, liquidity, loan growth, and credit risk, offering both theoretical contributions and practical implications for policymakers, practitioners, and stakeholders in the rural banking sector.

2.   LITERATURE REVIEW

2.1 Theoretical Framework

Financial Intermediation Theory highlights the role of banks in channeling funds between surplus and deficit units, thereby improving capital allocation and reducing information asymmetry (Greenbaum et al., 2019). For BPRs, profitability depends on effective management of capital adequacy, liquidity, and loan growth, particularly in the presence of credit risk. Adequate capital strengthens trust and supports lending, while liquidity must be balanced to maintain operations without sacrificing income potential. Loan growth signals intermediation success but requires robust risk controls to prevent rising NPLs.

The Risk–Return Trade-Off Theory asserts that higher returns are associated with higher risks (Brigham & Houston, 2019). For BPRs serving high-risk market segments, lending decisions must balance potential income against default risk. Effective management of this trade-off requires integrated risk assessment, capital allocation, and

diversification strategies (Saunders & Cornett, 2020), alongside leadership and institutional culture that promote calculated risk-taking (Gani & Mashamba, 2022).

Empirical evidence offers mixed findings. Wu et al. (2022) found that loan growth in Vietnamese banks reduced NPLs and increased ROA when well-managed. Amalia and Nugraha (2021) reported that higher LDR improved profitability in Indonesian banks, while NPLs reduced it. Abdelaziz et al. (2020) demonstrated that in the MENA region, both high LDR and NPL negatively affected profitability, indicating that credit risk often transmits the effects of loan growth to financial performance. Based on these insights, this study hypothesizes that capital adequacy positively affects profitability, liquidity has a significant effect on profitability, loan growth positively affects profitability, credit risk negatively affects profitability, and credit risk mediates the relationship between loan growth and profitability.

2.2 Hypotheses

2.2.1 The Relationship between Capital Adequacy and Profitability

Capital adequacy reflects a bank's resilience and lending capacity. According to Financial Intermediation Theory, well-capitalized banks strengthen intermediary functions, enhance depositor trust, and facilitate low-cost funding (Greenbaum et al., 2019; Aiyar et al., 2015). Higher capital levels also improve credit capacity and public confidence (Dursun-de Neef & Schandlbauer, 2022). For rural banks, strong capitalization is vital for compliance, loss absorption, and growth. Empirical studies show a positive link between capital adequacy and profitability (Goh et al., 2022; Amalia & Nugraha, 2021). In Indonesia's BPRs, capital measured by CAR drives growth, though underutilization may weaken its profitability impact.. Building on established theory and empirical insights, this study proposes the following hypothesis:

H1: Capital adequacy has a positive and significant effect on the profitability of rural banks.

2.2.2 The Relationship between Liquidity and Profitability

Effective liquidity management is crucial for rural banks (BPRs) that rely heavily on deposit-based funding. Under Financial Intermediation Theory, liquidity supports the intermediary role by ensuring funds are available for lending and withdrawals (Greenbaum et al., 2019). Liquidity is often measured by the Loan to Deposit Ratio (LDR), where a balanced level reflects efficient fund use—earning interest while maintaining obligations. Studies confirm its positive link to profitability (Amalia & Nugraha, 2021; Al-Husainy & Jadah, 2021). However, both low and high LDRs can harm performance: excess liquidity limits returns, while overextension risks funding instability (Berger & Bouwman, 2009; Herring & Carmassi, 2012). For Indonesian BPRs, with limited funding sources and concentrated credit risk, maintaining optimal liquidity is essential to avoid income loss or mismatches, making it a key determinant of profitability

H2: Liquidity has a significant effect on the profitability of rural banks

2.2.3 The Relationship Between Loan Growth and Profitability

Loan growth reflects a bank's core function in financial intermediation, demonstrating its capacity to channel deposits into productive loans that stimulate

economic activity and generate interest income (Greenbaum et al., 2019; Philippon, 2015). For rural banks (BPRs) serving micro and small enterprises with limited financing access, expanding credit portfolios is vital for performance and sustainability. An expanding loan base often boosts interest income, enhancing profitability, particularly when lending targets productive sectors and is priced according to credit risk. Thus, loan growth signals effective intermediation and business expansion (Galbis, 2016). Empirical studies confirm that strong loan growth can improve return on assets (ROA) when supported by sound credit appraisal and monitoring systems (Wu et al., 2022; Amalia & Nugraha, 2021; Martino, 2021). Thus, both theoretical foundations and empirical findings lead us to hypothesize the following:

H3: Loan growth has a positive and significant impact on the profitability of rural banks.

2.2.4 The Relationship Between Credit Risk and Profitability

Credit risk is a critical determinant of a bank's financial performance, shaping loan portfolio quality and the stability of interest income. Under Financial Intermediation Theory, banks transform short-term liabilities into long-term loans, a process that inherently carries default risk (Greenbaum et al., 2019). Higher credit risk, typically measured by the Non-Performing Loan (NPL) ratio, signals deteriorating asset quality and requires increased loan loss provisions, thereby reducing profitability. For rural banks (BPRs), which primarily serve micro and small enterprises with limited collateral and volatile earnings, the impact is particularly severe. Elevated NPLs cut interest income, raise provisioning expenses, weaken capital adequacy, and may harm reputation, restricting future lending. Empirical evidence consistently shows a significant negative effect of credit risk on profitability, especially on Return on Assets (ROA) (Anggraeni & Giranti, 2023; Zedan, 2022; Al-Husainy & Jadah, 2021). Grounded in this theoretical and empirical context, we propose the following hypothesis:

H4: Credit risk has a negative and significant impact on the profitability of rural banks.

2.2.5 Mediation of Credit Risk in the Relationship Between Loan Growth and Profitability

Credit growth is a major contributor to bank revenue, as expanding loan portfolios boosts interest income and overall performance. However, if pursued too aggressively without strong credit assessment and monitoring, it can heighten risk exposure. Financial Intermediation Theory recognizes lending as a core banking function but warns of adverse selection and moral hazard risks (Greenbaum et al., 2019; Philippon, 2015). Excessive loan growth can outpace a bank's risk management capacity, leading to relaxed lending standards, higher-risk borrowers, and sectoral concentration, which in turn raise the Non-Performing Loan (NPL) ratio (Shahzad et al., 2019; Wu et al., 2022). Higher NPLs reduce interest income, increase provisioning costs, and deteriorate asset quality (Zedan, 2022; Anggraeni & Giranti, 2023). For rural banks (BPRs), operating in high-risk environments without hedging mechanisms, these effects are more severe. Thus, disciplined credit risk management is essential, as NPLs may mediate the link between loan growth and profitability.

H5: Credit risk mediates the effect of credit growth on profitability

3. RESEARCH METHODS

This study uses a quantitative, associative-causal approach to examine the effects of capital adequacy, liquidity, and loan growth on rural bank profitability, with credit risk as a mediating variable. Conducted in Malang Regency, East Java, from 2019–2023, it analyzes 21 conventional BPRs selected purposively from 30 based on audited financial reports and complete five-year data, totaling 105 firm-year observations. Variables include ROA, CAR, LDR, LG, and NPL, all measured on a ratio scale per OJK standards using data from the official OJK portal.

Table 1. Data sources per variable

Variabel	Formula	Source
ROA	$\dfrac{Net\ Income\ before\ Tax}{Average\ Total\ Asset}\ x\ 100\%$	Otoritas Jasa Keuangan (2022)
CAR	$\dfrac{Capital}{Risk\ Weighted - Asset}\ x\ 100\%$	Otoritas Jasa Keuangan (2016)
LDR	$\dfrac{Total\ Loans}{Total\ Deposits}\ x\ 100\%$	Bank Indonesia (1997)
LG	$\dfrac{Current\ Year's\ Loans - Previous\ Year's\ Loans}{Previous\ Year's\ Loans}\ x\ 100\%$	Wu et al. (2022)
NPL	$\dfrac{Non - Performing\ Loans - Loan\ Loss\ Reserves}{Total\ Loans}\ x\ 100\%$	Otoritas Jasa Keuangan (2019)

Note: Researcher Processed Data, 2024

Panel data regression was used to combine cross-sectional and time-series data, controlling for unobserved heterogeneity and multicollinearity (Gujarati, 2021). Model selection employed Chow, Hausman, and Lagrange Multiplier tests, followed by descriptive, t-, F-, and R^2 analyses. The Sobel test assessed credit risk's mediating role, with all tests at a 5% significance level ($\alpha = 0.05$). The following regression formula was constructed:

$$ROA_{it} = \alpha_1 + \beta1CAR_{it} + \beta2LDR_{it} + \beta3LG_{it} + \beta4NPL_{it} + e_{it}$$

4.   RESULT AND DISCUSSION

4.1 Descriptive Statistic

The descriptive analysis provides a summary of the central tendency and dispersion of each research variable. The descriptive output results are in Table. 2

Table 2. Descriptive Result

Variabel	Min	Max	Mean	Std. Dev
CAR	15.0400	182.9400	75.5048	46.9238
LDR	24.9400	121.0000	72.9746	16.8271
LG	-30.6400	159.2000	10.7697	24.9613
NPL	0.1200	44.44000	10.4413	10.4959
ROA	-8.4400	13.39000	3.7569	3.3636

Source: Data processed by Eviews 13, 2024

The average Capital Adequacy Ratio (CAR) of 75.50 percent far exceeds the 12 percent regulatory minimum, yet high variability indicates uneven capital use, with some banks holding excessive idle buffers. The Loan to Deposit Ratio (LDR) averaged 72.97 percent, showing moderate liquidity use but inconsistent efficiency. Loan Growth (LG)

varied sharply, from -30.64 to 159.20 percent, reflecting contrasting strategies that may elevate credit risk. This is evident in the high Non-Performing Loan (NPL) average of 10.44 percent, over twice the industry benchmark. Despite this, average ROA reached 3.76 percent, though wide disparities reveal the need for stronger capital, risk, and operational management.

4.2 Best Model Selection

Prior to testing the hypothesis, three diagnostic assessments were performed to determine the most appropriate econometric model: the Chow test, the Hausman test, and the Lagrange Multiplier (LM) test. This model was selected due to its ability to effectively capture the variability among BPRs while ensuring estimation efficiency. According to Table 3, the statistical results indicated the presence of individual-specific effects, which are more appropriately treated as random effects instead of fixed effects, enabling the model to yield consistent and unbiased parameter estimates. Consequently, the analysis advances utilizing the Random Effect Model to evaluate the connection between financial ratios and profitability.

Table 3. Result of Model Selection

Test Type	Statistic	Probability	Result
Cow Test: Cross-SectionF	52.877781	0.0001	Fixed Model
Hausman Test: Cross-Section Random	8.268959	0.0822	Random Model
LM: Breusch-Pagan	0.0178	0.0022	Random Model

Source: Data processed by Eviews 13,2024

4.3 Panel Regression Analysis

Based on the model testing using the panel data regression model with Eviews 13 as described above, and with the Random Effect Model being selected, the panel data regression results and t-test are presented in Table 4

Tabel 4. Data panel regression result and t-test

Variabel	Coefficient	Std. Error	t-statistik	t-table	Result
Constan	1.1059	1.4606	0.7571		
CAR	0.0335	0.0071	4.7269	1,9830	H1 Accepted
LDR	0.0143	0.0169	0.8447	1,9830	H2 Rejected
LG	0.0160	0.0099	1.6042	1,6596	H3 Rejected
NPL	-0.1015	0.0257	-3.9492	1,6596	H4 Accepted
F Statistic	10.3996				
Prob R	0.00000				
R^2	0.29378				

Source: Data processed by Eviews 13, 2024

The analysis reveals that capital adequacy (CAR) has a positive and statistically significant effect on profitability (t = 4.7269, $p < 0.05$), implying that better-capitalized banks tend to generate higher returns. Liquidity risk (LDR), although positive, did not show a statistically significant effect on ROA (t = 0.8447, $p > 0.05$). Loan growth (LG) similarly showed a positive but non-significant effect (t = 1.6042, $p > 0.05$), suggesting that credit expansion alone may not guarantee improved profitability unless accompanied by efficient credit risk management. In contrast, NPL had a significant negative effect on

profitability (t = -3.9492, p < 0.05), underscoring the detrimental impact of credit risk on earnings. A 1% increase in NPL is associated with a 0.10% decline in ROA, emphasizing the importance of loan quality in sustaining bank performance.

4.4 Hypothesis Testing

The t-test results, conducted at a 5% significance level ($\alpha = 0.05$), show that the Capital Adequacy Ratio (CAR) has a positive and statistically significant effect on ROA, with a t-statistic of 4.7269 exceeding the critical value of 1.9830, thus supporting Hypothesis 1 (H1) that greater capital adequacy enhances profitability. The Loan to Deposit Ratio (LDR) recorded a t-statistic of 0.8447, below the threshold, indicating a positive but insignificant relationship and leading to the rejection of Hypothesis 2 (H2). Loan Growth (LG) had a t-statistic of 1.6042, slightly below its critical value of 1.6596, showing no significant direct effect on ROA and resulting in the rejection of Hypothesis 3 (H3). Conversely, Non-Performing Loans (NPL) exhibited a significant negative effect on profitability, with a t-statistic of -3.9492, supporting Hypothesis 4 (H4) that higher credit risk reduces profitability. These results highlight the critical role of capital strength and credit quality, while liquidity and loan expansion alone do not directly drive profitability. The model's coefficient of determination (R^2) is 0.2938, indicating that 29.38% of ROA variation is explained by CAR, LDR, LG, and NPL, consistent with financial research where profitability is also shaped by external factors outside the model

4.5 Mediation Non Performing Loan

Table 5 presents the results of testing the mediating role of credit risk on the influence of credit growth on profitability using the Sobel Test. The test results indicate that credit risk, as measured by the Non-Performing Loan (NPL) ratio, does not significantly mediate the effect of credit growth (LG) on profitability (ROA). The Sobel test, conducted using an online calculator, yielded a value of 1.5332, which is less than the critical value of 1.96, and a p-value of 0.1252, which is greater than 0.05. Therefore, Hypothesis 5 is rejected.

Tabel 5. Result of Mediation (Sobel Test)

Test	Test statistic	Std. Error	p-value
Sobel test	1.5332	0.0039	0.1252

4.6 Discussion

The results indicate a statistically significant and positive relationship between the Capital Adequacy Ratio (CAR) and Return on Assets (ROA), underscoring that BPRs with stronger capital positions are better equipped to sustain profitability. This finding supports the argument that adequate capitalization enhances a bank's capacity to manage risk exposures, absorb potential losses, and maintain operational stability (Haris, Tan, Malik, & Ain, 2020). Similar evidence from Goh, Lee, and Lee (2022) in the ASEAN context affirms that higher CARs are associated with superior financial performance, as capital functions both as a protective buffer and a catalyst for credit growth. In Indonesia, regulators view CAR as a critical measure of institutional soundness, with the OJK (2022) designating it a primary component in assessing BPR health. Berger and Bouwman (2009) further emphasize that well-capitalized banks are better positioned to generate liquidity and endure financial distress. Lutfi, Kristijadi, and Silvy (2020) add that Indonesian banks often adjust capital structures alongside risk profiles, indicating a dynamic link between capitalization and risk-taking. Thus, for BPRs, strengthening CAR

is not merely a compliance requirement but a strategic imperative for long-term sustainability.

Liquidity, measured by the Loan to Deposit Ratio (LDR), shows a positive but statistically insignificant effect on ROA. While higher LDRs may indicate greater fund utilization, they do not guarantee improved profitability if lending is not supported by robust credit risk assessment. This is consistent with Al-Husainy and Jadah (2021), who found that inefficient liquidity management in Iraqi private banks failed to enhance profitability despite aggressive lending. Goh, Erika, Henry, and Syawaluddin (2022) also observed that LDR's positive effect on ROA weakens when non-performing loans are high. The average LDR of 72.97 percent in the sample suggests conservative liquidity usage relative to the OJK's optimal range, potentially indicating untapped intermediation opportunities. However, such conservatism may be deliberate, reflecting strategies to mitigate risk under uncertain market conditions. As Berger and Bouwman (2009) note, liquidity creation is most effective when aligned with risk profiles and market dynamics, especially for rural banks facing volatile borrower creditworthiness.

Loan Growth (LG) has a positive but statistically insignificant impact on ROA, implying that credit expansion does not necessarily translate into immediate profitability gains. This underscores the importance of balancing loan quantity with quality. Dang (2019) cautions that rapid loan growth without sound credit risk management can erode asset quality, negating potential income benefits. Wu, Nguyen, and Vo (2022) similarly find that accelerated credit expansion in developing markets increases default exposure, thereby reducing profitability. For BPRs, factors such as institutional capacity, borrower segmentation, and local economic conditions influence loan growth outcomes. Lack of portfolio diversification can heighten default risk, as noted by Wijayanti and Mardiana (2020), where increased lending without stringent borrower evaluation elevated NPLs and offset interest income gains through higher provisioning costs.

Credit risk, proxied by Non-Performing Loans (NPL), exhibits a significant negative effect on ROA, reaffirming that rising credit risk undermines profitability. This is consistent with Ekinci and Poyraz (2019) for Turkish banks and Zedan (2022) for Egyptian banks, both of whom documented that higher NPL levels constrain earnings due to asset quality deterioration. In Indonesia, Rachmawati and Endri (2020) observed similar patterns, with profitability declining as NPLs exceeded manageable levels. For BPRs, limited diversification and a focus on higher-risk borrowers such as microenterprises amplify the impact of credit quality deterioration. Maintaining low NPL levels is thus a strategic necessity for sustaining profitability and institutional credibility. The Sobel test results indicate that NPL does not significantly mediate the relationship between loan growth and profitability. This suggests that in the case of BPRs in Malang, credit expansion is managed conservatively enough to avoid substantial deterioration in asset quality. Dang (2019) and Wu et al. (2022) note that in certain contexts, loan growth can be achieved without increasing credit risk, provided strong underwriting and monitoring are in place. However, contrasting evidence from Wijayanti and Mardiana (2020) and Shahzad, Ali, and Tiwari (2019) shows that in some settings, rapid loan growth without adequate risk controls leads to financial instability via rising bad loans. The present findings likely reflect effective early risk controls and conservative growth strategies, highlighting the importance of disciplined credit quality management as a foundation for long-term profitability

5. CONCLUSION

5.1 Conclusion

This study examined the direct and indirect effects of capital adequacy, liquidity, and loan growth on the profitability of rural banks (BPRs) in East Java, with credit risk considered as a potential mediating variable. The empirical results demonstrate that capital adequacy (CAR) significantly enhances profitability, reaffirming the vital role of strong capitalization in sustaining bank performance and resilience. Credit risk, as proxied by non-performing loans (NPL), exerts a significant negative influence on profitability, confirming its critical role in shaping financial outcomes. On the other hand, liquidity (LDR) and loan growth (LG) showed no significant direct effect on profitability, indicating that their contribution may depend on other contextual or strategic factors. Furthermore, the mediation analysis found that credit risk does not significantly mediate the relationship between loan growth and profitability, suggesting that credit expansion, when managed prudently, does not necessarily compromise asset quality.

Theoretically, these findings extend the Financial Intermediation Theory and Risk-Return Trade-Off framework by emphasizing the differentiated roles of internal bank characteristics in influencing profitability, especially in high-risk and underserved market segments. Practically, the results underscore the importance of maintaining adequate capital buffers and implementing sound credit risk management to enhance financial performance in rural banking institutions.

5.2. Research Limitations

This research is not without limitations. First, it relies solely on secondary financial data, which may not capture qualitative nuances related to managerial decisions or borrower behaviors. Second, the analysis is geographically limited to rural banks in East Java, which may constrain the generalizability of the findings to other regions in Indonesia or similar emerging markets. Third, the study period coincides with the COVID-19 pandemic, introducing potential distortions in financial indicators that may not fully reflect typical banking conditions. Lastly, the scope of mediating analysis is restricted to credit risk alone, while other possible mediators such as operational efficiency or digital adoption were not included.

5.3. Recommendations

Future research is encouraged to adopt a more comprehensive geographic scope by including BPRs across various provinces to enhance external validity. Incorporating qualitative approaches—such as interviews or case studies—can also help uncover the behavioral and institutional factors underlying credit practices and profitability management. Researchers may further explore additional mediating or moderating variables, such as managerial capability, regulatory compliance, or digital transformation, to capture more complex interrelationships. Additionally, assessing the impact of recent regulatory changes, particularly POJK No. 1/2024 concerning rural banking, may provide timely insights into how evolving governance frameworks influence financial outcomes. These enhancements will contribute to a deeper and more policy-relevant understanding of profitability dynamics within Indonesia's rural banking landscape.

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