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Liquidity Risk and The Impact of Credit Growth on Profitability in Rural Banks: The Moderating Role of Bank Size

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ABSTRACT
This study examines how liquidity risk, credit growth, and third-party funding composition influence the profitability of Rural Banks (BPR), with bank size as a moderating factor. Using panel data from 22 conventional BPRs between 2019 and 2023 and applying a fixed-effect regression model, the results show that liquidity management and bank size are closely linked to higher profitability. Credit growth alone, however, is associated with reduced returns, but its interaction with bank size leads to improved performance. This indicates that larger banks are better equipped to handle the risks of rapid credit expansion, while smaller banks may face challenges. The composition of third-party funds shows little direct effect on profitability. The findings carry important practical implications. For bank managers, the results highlight the importance of balancing credit expansion with strong internal controls and prudent risk management, particularly in smaller institutions. Regulators such as OJK are encouraged to consider bank size when designing supervisory frameworks and early warning systems, to ensure sustainable financial performance in the rural banking sector.

Keywords: Profitability, Credit Growth, Liquidity Risk, Bank Size, Rural Banks.
JEL Code: G21, G32, G28, L25

I. Introduction

Rural Banks (Bank Perkreditan Rakyat, BPR) play a vital role in supporting local economies by providing financial intermediation for micro, small, and medium enterprises (MSMEs) in Indonesia. Despite their importance in promoting financial inclusion, BPRs face structural challenges that distinguish them from commercial banks, particularly in terms of limited funding sources, high operational costs, and constrained digitalization (Anggraeni et al., 2023). As presented in Figure 1, between 2018 and 2023, the profitability of BPRs, measured by Return on Assets (ROA), showed a declining trend, falling from 3.12% in 2018 to 1.00% in 2023 (OJK, 2023). Although credit and third-party funds rebounded after the pandemic, profitability remained under pressure due to rising non-performing loans (NPL), narrowing interest margins, and intensified competition with larger banks offering more attractive digital and deposit services. These conditions raise concerns about the sustainability of BPRs in fulfilling their intermediation role.

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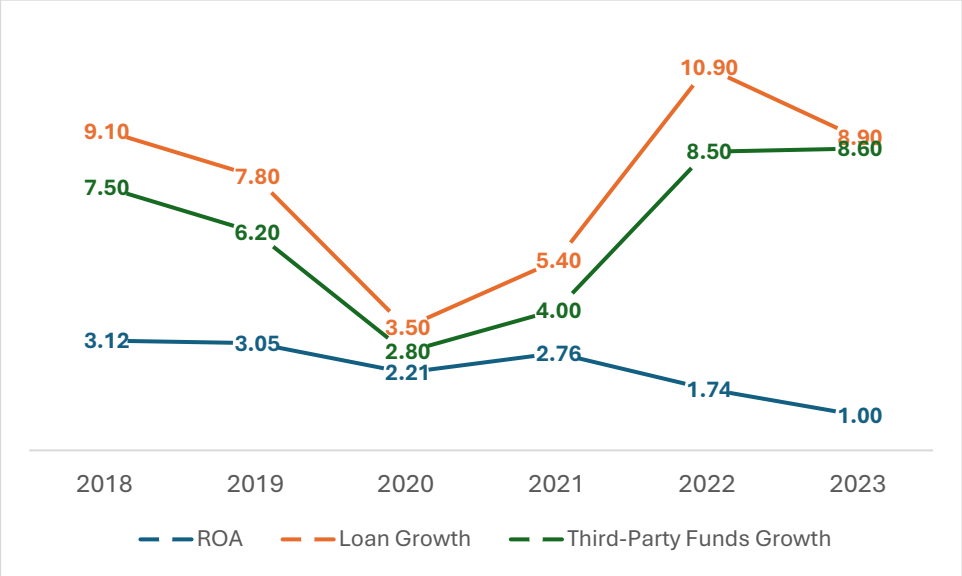

Figure 1. Performance Indicators of BPR in Indonesia (2018–2023)

Prior studies provide mixed evidence on the determinants of bank profitability. Liquidity management may either support stability or suppress returns depending on its level (Doan & Bui, 2021; Nainggolan & Abdullah, 2019). Credit growth can enhance earnings, yet excessive expansion without strong risk control often deteriorates asset quality (Baradwaj et al., 2014; Dang, 2019; Wijayanti & Mardiana, 2020). The composition of third-party funds also influences funding costs, with a reliance on time deposits potentially reducing net interest margins (Jin et al., 2018; Amalia & Nugraha, 2021). Furthermore, bank size may shape these relationships by providing economies of scale and more advanced risk management systems (Thi Thanh Tran & Phan, 2020), although diseconomies of scale are also possible (Chandler, 2009; Mangare et al., 2023). While the literature has examined the effects of liquidity, credit growth, and funding structure on bank profitability, most studies have focused on commercial or Islamic banks, leaving limited attention to Rural Banks. Existing research also tends to analyze these factors separately, with little consideration of the interaction between credit growth and institutional scale. This study addresses the gap by simultaneously testing liquidity risk, credit growth, and third-party fund composition in relation to profitability, while incorporating bank size as a moderating variable. The novelty lies in highlighting how institutional scale strengthens or weakens the effect of credit expansion on profitability, thereby offering new insights into the performance dynamics of BPRs in Indonesia.

II. Literature Review and Hypothesis Development

2.1. Financial Intermediation Theory

Financial intermediation theory explains the fundamental role of banks in channeling funds from depositors to borrowers while reducing transaction costs and information asymmetry (Greenbaum et al., 2019). For Rural Banks (BPRs), which mainly serve micro and small enterprises, credit distribution is the primary channel of intermediation. Higher and well-managed credit growth indicates successful intermediation and contributes to profitability (Garr & Awadzie, 2021). In this framework, both liquidity and deposit composition play essential roles. Excess liquidity may indicate inefficiency, while inadequate liquidity can endanger solvency (Berger & Bouwman, 2009). Similarly, reliance on costly time deposits increases funding costs, which can compress margins (Allen et al., 2021). This study applies financial intermediation theory to examine how liquidity, credit growth, and funding structure shape profitability in BPRs.

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2.2. The Theory of Economies and Diseconomies of Scale

Economies of scale occur when increasing output lowers average costs, leading to higher profitability (Baumers et al., 2016). In banking, larger institutions often enjoy lower unit costs, diversified services, and stronger competitiveness (Beccalli et al., 2015; Duho et al., 2020). Conversely, diseconomies of scale arise when growing complexity, bureaucracy, or managerial inefficiencies increase average costs (Beccalli & Rossi, 2020). Thus, bank size can enhance profitability up to a point but may also reduce efficiency if growth is not matched with effective management. This theory underpins the moderating role of bank size in this study, as larger BPRs may convert credit growth into profitability more effectively than smaller ones.

2.3. Liquidity Risk and Profitability

According to financial intermediation theory, banks act as intermediaries between depositors and borrowers, transforming short-term deposits into longer-term loans while minimizing transaction costs and information asymmetry (Greenbaum et al., 2019). In this process, liquidity management becomes crucial, as it ensures that banks can maintain depositor confidence and sustain lending activities. Effective intermediation requires an optimal balance: sufficient liquidity to meet withdrawal demands and regulatory requirements, but not excessive to the point of reducing income-generating capacity. Liquidity is often measured using the Loan-to-Deposit Ratio (LDR) and Cash Ratio (CR). A balanced LDR reflects efficient allocation of funds to credit, which strengthens intermediation and profitability. However, an excessively high LDR may signal overexposure to credit risk, while a low LDR indicates underutilization of deposits, both of which weaken performance (Doan & Bui, 2021). Similarly, the CR provides a conservative measure of liquidity. While adequate reserves protect banks against sudden withdrawals, idle liquidity tied in cash holdings generates little or no return, creating opportunity costs (Mebounou et al., 2015).

Empirical studies highlight this duality. On one hand, banks with effective liquidity creation functions reinforce depositor trust and generate stable income streams, which enhance profitability (Berger & Bouwman, 2009). On the other hand, excessive liquidity holdings reduce lending opportunities and constrain returns (Doan & Bui, 2021). In Indonesia, Mangare et al. (2023) found that healthy liquidity levels in regional development banks support loan distribution and increase ROA, demonstrating how well-managed liquidity aligns with the financial intermediation role of banks. Grounded in financial intermediation theory, this study argues that liquidity risk directly affects the ability of BPRs to perform their intermediation function effectively. When liquidity is managed at an optimal level, it enables banks to allocate funds efficiently, sustain credit creation, and maintain depositor trust—leading to improved profitability. Conversely, mismanaged liquidity undermines intermediation and weakens financial performance.

Hypothesis 1 (H1): Liquidity risk has a significant effect on the profitability of BPR.

2.4. Credit Growth and Profitability

Within the framework of financial intermediation theory, banks fulfill their primary role by transforming deposits into loans that finance productive activities, thereby generating interest income and supporting economic growth (Diamond, 1984; Greenbaum et al., 2019). For BPRs, which predominantly serve micro and small enterprises, credit distribution is the core of intermediation. Expanding credit portfolios not only reflects the bank's confidence in borrower capacity but also serves as a key driver of profitability, as interest income constitutes the main revenue source (Garr & Awadzie, 2021). However, financial intermediation theory also emphasizes the trade-off between maximizing lending activity and managing default risk. While moderate and well-monitored credit growth enhances returns, uncontrolled expansion may erode asset quality and increase non-performing loans (Baradwaj et al., 2014). Dang (2019) found that excessive credit growth in Vietnam undermined long-term profitability due to rising credit risk, while

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Menicucci & Paolucci (2016) argued that well-managed loan expansion is a significant determinant of bank profitability. In the Indonesian context, Wijayanti & Mardiana (2020) confirmed that credit growth in commercial and rural banks positively affects ROA when combined with sound risk management practices. Yet, Wu et al. (2022) warned that rapid, poorly supervised lending can weaken bank performance, especially in smaller institutions with limited monitoring systems. This study positions credit growth as a central variable because it directly reflects the intermediation effectiveness of BPRs. Guided by financial intermediation theory, the logic is straightforward: higher credit growth, when aligned with prudent risk controls, enhances intermediation efficiency and strengthens profitability. Conversely, credit growth pursued without adequate oversight creates vulnerability, which diminishes profitability.

Hypothesis 2 (H2): Credit growth significantly affects the profitability of BPR.

2.5. Third-Party Funds Composition and Profitability

From the perspective of financial intermediation theory, the ability of banks to mobilize deposits is fundamental to their role as intermediaries between savers and borrowers (Diamond, 1984; Greenbaum et al., 2019). For BPRs, third-party funds (TPF)—consisting of demand deposits, savings, and time deposits—represent the primary source of lending capacity. Efficient intermediation requires not only an increase in total deposits but also an optimal composition of funding that minimizes costs while supporting credit creation. Low-cost funds such as savings and demand deposits enhance profitability by reducing the cost of capital, thereby allowing banks to allocate more resources to productive lending (Sheehan, 2013; Ali & Puah, 2019). Conversely, over-reliance on time deposits raises interest expenses, compresses net interest margins, and weakens profitability, especially if credit growth does not sufficiently compensate for the higher funding costs (Jin et al., 2018; Al-Homaidi et al., 2020). Empirical studies highlight this duality. Amalia & Nugraha (2021) observed that Indonesian banks can sustain profitability even with higher proportions of time deposits, provided that these funds are channeled into high-yield lending portfolios. However, in many BPRs, the dominance of expensive deposits has been linked to weaker profitability due to narrow margins and limited efficiency (Nainggolan & Abdullah, 2019). In line with financial intermediation theory, this study argues that the structure of deposits plays a pivotal role in determining how effectively BPRs perform their intermediation function. A balanced composition—favoring stable, low-cost deposits—enhances profitability by lowering funding costs and expanding lending opportunities. By contrast, an imbalanced composition dominated by high-cost funds diminishes profitability, even if total deposits increase.

Hypothesis 3 (H3): The composition of third-party funds significantly affects the profitability of BPR.

2.6. Bank Size and Profitability

Bank size has long been recognized as a determinant of financial performance. The theory of economies of scale suggests that as banks expand in size, they can lower average operating costs, achieve greater efficiency, and strengthen profitability through resource optimization (Baumers et al., 2016; Menicucci & Paolucci, 2016). Larger banks typically enjoy stronger bargaining power in funding markets, more diversified lending portfolios, and broader access to technology, enabling them to manage risks more effectively and sustain competitive advantage (Duho et al., 2020). Within this framework, bank size becomes a strategic determinant of profitability by amplifying efficiency gains and improving resilience against shocks. However, the theory of diseconomies of scale cautions that beyond a certain threshold, further growth may generate inefficiencies. Increased bureaucratic layers, managerial complexity, and higher overhead costs can reduce operational agility and erode profitability (Beccalli & Rossi, 2020). Chandler (2009) also emphasized that excessively large organizations may experience rigidity that undermines responsiveness and innovation. Thus, while size offers advantages, it may also introduce vulnerabilities when growth outpaces efficiency.

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Empirical evidence supports this dual perspective. Studies such as Thi Thanh Tran & Phan (2020) and Adelopo et al. (2018) found that larger banks benefit from economies of scale and record higher profitability. In contrast, Anggraeni et al. (2023) observed that in some Indonesian cases, larger banks faced declining profitability due to rising operational inefficiencies, supporting the diseconomies argument. This indicates that the size-profitability relationship is not linear but contingent upon managerial capacity and operational context. Building on economies and diseconomies of scale theory, this study posits that bank size plays a crucial role in shaping profitability outcomes in BPRs. Larger banks are expected to leverage scale advantages to strengthen financial performance, while smaller banks may struggle with limited resources. At the same time, unchecked expansion could diminish efficiency, weakening profitability.

Hypothesis 4 (H4): Bank size significantly affects the profitability of BPR.

2.7. Moderating Role of Bank Size in the Credit Growth-Profitability Relationship

According to the theory of economies of scale, larger banks can manage the risks associated with rapid credit growth more effectively by spreading fixed costs over a broader asset base, employing advanced risk management systems, and diversifying their loan portfolios (Berger & Mester, 1997; Menicucci & Paolucci, 2016). These advantages allow bigger institutions to transform accelerated credit expansion into sustainable profitability. In contrast, smaller banks, constrained by limited resources and weaker monitoring capacity, may face rising default rates and deteriorating asset quality when credit growth expands too quickly (Dang, 2019). From the perspective of diseconomies of scale, however, larger banks are not immune to risks. Excessive expansion can lead to bureaucratic inefficiencies, slower decision-making, and reduced agility in responding to credit quality deterioration (Chandler, 2009; Beccalli & Rossi, 2020). In such cases, the benefits of size may be offset by complexity, diminishing the positive effects of credit growth on profitability.

Empirical evidence reflects this duality. Duho et al. (2020) found that bank size amplified the positive relationship between lending activity and profitability in African banks, suggesting economies of scale at work. Meanwhile, Anggraeni et al. (2023) reported that in Indonesian banks, size sometimes weakened performance during aggressive credit expansion, as diseconomies of scale became apparent. This indicates that the moderating role of bank size is context-dependent: it can either enhance or diminish the effect of credit growth on profitability. Based on these arguments, this study adopts the view that bank size functions as a moderator in the credit growth–profitability relationship. Larger banks are expected to better leverage economies of scale to mitigate risks and convert credit expansion into higher profitability, while smaller banks may experience weaker or even adverse effects due to their structural limitations.

Hypothesis 5 (H5): Bank size moderates the effect of credit growth on the profitability of BPR.

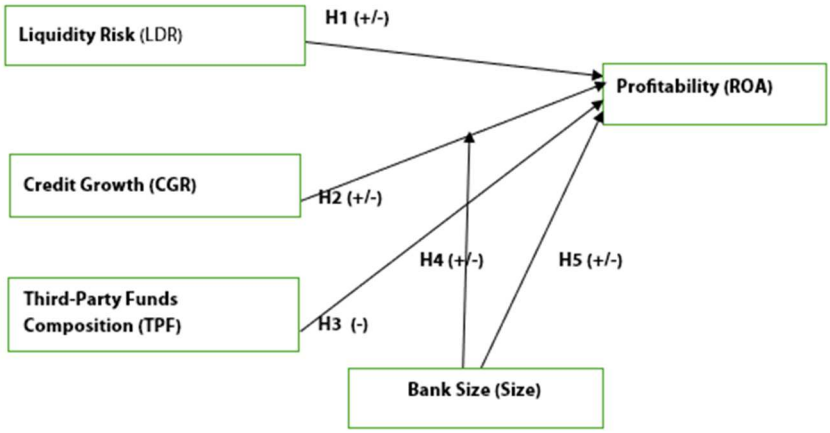

Figure 2. Conceptual Framework

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III. Research Method

This study employs Return on Assets (ROA) as the dependent variable, as it measures a bank's efficiency in generating earnings from its total assets and is widely used in banking performance research. ROA is particularly suitable for BPRs, where profitability largely depends on asset-driven income from loan portfolios. Loan-to-Deposit Ratio (LDR) is selected as the liquidity risk indicator because it reflects the balance between loans disbursed and deposits collected, directly representing a bank's intermediation function. Credit Growth Rate (CGR) captures the rate of loan portfolio expansion over time, serving as a key driver of interest income while also indicating potential credit risk exposure. Bank Size (SIZE), measured as the natural logarithm of total assets, is used as a moderating variable to account for institutional scale, which influences risk absorption capacity and operational efficiency. The choice of these variables aligns with financial intermediation theory, emphasizing the interplay between asset utilization, funding structure, credit allocation, and institutional capacity in determining bank profitability.

3.1. Population dan Sample

The population consisted of all 30 conventional rural banks (BPRs) located in Malang Regency, registered with the Financial Services Authority (OJK) on a semi-annual basis from 2019 to 2023. The sampling method used was purposive sampling, based on the following criteria: (1) BPRs are required to publish complete and continuous semi-annual financial reports throughout the observation period, and (2) BPRs must not have undergone any mergers or acquisitions during the study period. Therefore, a sample of 22 BPRs was selected from the population of 30 BPRs.'

3.2. Data and Data Collection

This study used the entire population of 30 rural banks (BPR) in Malang Regency to ensure statistical reliability and representation. Involving all institutions minimizes sampling error, captures the full variability of financial performance and risk profiles, and enhances external validity for similar rural banking contexts in East Java and Indonesia. Used purposive sampling to select conventional BPRs in Malang Regency that were active during 2019–2023, complied with regulations, and had complete semiannual reports to OJK. While purposive sampling may introduce selection bias due to non-random selection, this risk was mitigated by including all 30 eligible BPRs, ensuring full population coverage. This approach minimizes sampling error and captures the complete variability in performance and characteristics, while panel data over five years enhances robustness. Utilizes secondary data derived from the official financial statements published by each BPR on the OJK website. Although OJK is a credible source, the reliability of data obtained from financial reports has been supervised and audited by independent auditors. The data cover the years 2019 to 2023 and include financial indicators relevant to the study's variables, such as Return on Assets (ROA), Loan to Deposit Ratio (LDR), credit growth (CGR), the composition of time deposits within third-party funds (TPF), and total assets (Size). Clearly defining and calculating financial ratios ensures consistency, comparability, and transparency in the analysis. In this study, profitability is measured using Return on Assets (ROA), calculated by dividing net income by total assets, providing a standardized measure of operational efficiency. Liquidity risk is captured through the Loan-to-Deposit Ratio (LDR), which reflects the proportion of loans to third-party funds and indicates the bank's ability to meet short-term obligations. Credit Growth Rate (CGR) is computed as the percentage change in total loans from one period to the next, offering insight into lending expansion and potential credit risk exposure. Bank size is measured using the natural logarithm of total assets, enabling scale comparison across institutions with different asset bases. By using these standardized formulas, the study facilitates accurate benchmarking across BPRs, enhances replicability for future research, and supports evidence-based recommendations for both practitioners and regulators. Data collection was conducted by systematically collecting the relevant ratios from these published reports. Nonetheless, potential limitations

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exist, including variations in reporting practices across BPRs, time lags in financial disclosures, and the inability of quantitative ratios to fully capture management quality. These limitations are acknowledged to ensure transparency.

3.3. Variables and Operational Definitions

Profitability (ROA) is measured as the ratio of net income to total assets, indicating the bank's efficiency in generating profit (Athanasoglou et al., 2008). Liquidity Risk (LDR) is calculated as the ratio of total loans to third-party funds. A high LDR indicates aggressive lending, which may increase risk (Dang, 2011). Credit Growth (CGR) is the year-over-year percentage change in total loans. Rapid growth can signal strong intermediation or elevated risk (Baradwaj et al., 2014). Third-Party Funds Composition (TPF) is the proportion of time deposits to total third-party funds. A higher share of time deposits typically increases funding costs (Ali & Puah, 2019). Bank Size (SIZE) is the natural logarithm of total assets. Larger banks may benefit from scale but also face complexity (Beccalli & Rossi, 2020).

3.4. Population dan Sample

The analysis uses panel data regression with two models:

a. Model 1 (Main Effect):

$$ROA\_it = \alpha + \beta 1LDR\_it + \beta 2CGR\_it + \beta 3TPF\_it + \beta 4SIZE\_it + \varepsilon\_it$$

b. Model 2 (Moderation Effect):

$$ROA\_it = \alpha + \beta 1LDR\_it + \beta 2CGR\_it + \beta 3TPF\_it + \beta 4SIZE\_it + \beta 5(CGR\_it \times SIZE\_it) + \varepsilon\_it$$

The models are estimated using the Chow test, Hausman test, and Lagrange Multiplier (LM) test to determine the most appropriate estimation technique: Common Effect Model (CEM), Fixed Effect Model (FEM), or Random Effect Model (REM) (Baltagi, 2021). The rationale for selecting a specific panel data model, Common Effect Model (CEM), Fixed Effect Model (FEM), or Random Effect Model (REM) is essential to ensure transparency and methodological rigor. Each model carries distinct assumptions: CEM assumes uniform intercepts and slopes across all entities, FEM accounts for time-invariant heterogeneity by allowing individual-specific intercepts, and REM treats such heterogeneity as random, affecting the error term.'

3.5. Data Collection and Analysis

Data were collected from the financial statements published on the official websites of the Financial Services Authority (OJK). EViews 12 software is employed for statistical testing, including descriptive analysis, classical assumption tests, and regression analysis. This methodological framework allows for a comprehensive evaluation of how BPRs' internal financial dynamics interact with their scale of operations to influence profitability, providing empirical insights relevant to practitioners and regulators. Regression Assumptions includes a section discussing the basic assumptions of regression models, including normality of residuals, homoscedasticity, absence of multicollinearity, and independence of errors. Each assumption is tested (e.g., Jarque–Bera for normality, Breusch–Pagan for heteroscedasticity, and VIF for multicollinearity) to ensure model validity. In interpreting regression coefficients, the sign indicates the direction of the relationship; a positive sign means that an increase in the independent variable increases the dependent variable, while a negative sign indicates the opposite. The magnitude indicates how much the dependent variable is expected to change for a one-unit change in the independent variable, holding other factors

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constant. Statistical significance, assessed through a p-value or t-statistic, determines whether the effect is meaningful or occurs by chance. Beyond numbers, interpretations should align with the research context and theory; for example, a negative coefficient for credit growth in smaller rural banks may reflect the risk of rapid expansion without adequate controls. For moderated models, the interaction term reveals how the primary relationship changes with variations in the moderating variable, so both effects need to be considered simultaneously. The descriptive statistics section now includes a clear presentation of the mean, standard deviation, minimum, and maximum values for each variable in tabular form, followed by an interpretation of their economic and practical implications. Model Fit Evaluation, in addition to R^2, other model fit indicators are now discussed, including the F-test for overall significance and the Akaike Information Criterion (AIC) for model comparison, to provide a more comprehensive assessment of model adequacy. The Model Selection Test above describes the use of the Chow test, the Hausman test, and the Breusch–Pagan Lagrange Multiplier test, explains the purpose of choosing between CEM, FEM, and REM, and explains why the Fixed Effects Model (FEM) is the most appropriate method for this study.'

IV. Results and Discussion

To provide a clearer understanding of the empirical findings, this section begins by presenting the results of the regression analysis, followed by an interpretation of each coefficient in relation to the research hypotheses. The discussion then links these results to relevant financial intermediation theory and prior empirical studies, highlighting areas of convergence and divergence. By structuring the analysis in this way, the reader can trace how statistical evidence supports or challenges theoretical expectations, while also gaining practical insights for BPR operations. Furthermore, the implications of significant and non-significant variables are examined not only from a statistical perspective but also in the context of managerial decision-making and regulatory oversight.

4.1. Analysis Result

This study analyzed 192 observations derived from 22 conventional BPRs in Malang Regency across the period 2019–2023 on a semi-annual basis. Table 1 presents the summary of descriptive statistics for all variables used in this study.

Table 1. Descriptive Statistics

	ROA	LDR	CGR	TPF	SIZE (Million)
Mean	3.36	74.19	8.41	57.75	44.78
Median	3.13	74.70	7.78	61.00	22.83
Maximum	12.46	114.95	56.01	98.74	511.76
Minimum	-4.53	30.96	-40.83	0.01	4.68
Std. Dev.	3.04	15.45	17.56	29.35	81.74
Observations	192	192	192	192	192

These figures reflect significant heterogeneity in profitability, liquidity, and scale among the sample BPRs. Notably, the large standard deviation and skewness of SIZE indicate a wide gap between small and large institutions.

4.2. Panel Regression Model Selection

To determine the most appropriate model for panel data estimation, several tests were conducted:

a. Chow Test : p-value = 0.0000 → Reject H_0 → Use Fixed Effect Model (FEM)
b. Hausman Test : p-value = 0.0055 → Reject H_0 → FEM is preferred over Random Effect Model

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c. LM Test: Not reported; not required as Chow and Hausman point to FEM

Hence, the Fixed Effect Model was selected for further analysis.

Table 2. Model Data Panel

Test Name	Hypothesis	Value	Result
Chow Test (*Common Effect Model vs Fixed Effect Model*)	H0: Accepted if prob. Cross Section F > 0.05 (Choose CEM)	0.0000	FEM
	H1: Accepted if prob. Cross Section F < 0.05 (Choose FEM)		
Hausman Test (*Random Effect Model vs Fixed Effect Model*)	H0: Accepted if prob. > 0.05 (Choose REM)	0.0055	FEM
	H1: Accepted if prob. < 0.05 (Choose FEM)		

4.3. Regression Results

a. Model without Moderation

The first model investigates the direct effects of liquidity risk (LDR), credit growth (CGR), Third-party funds composition (TPF), and bank size (SIZE) on ROA.

Table 3. Panel Regression Results (Without Moderation)

Variable	Coefficient	t-Statistic	t-Table	Prob.	Conclusions
C	-43.4505	-2.4324		0.0161	
LDR	0.0314	2.1881	+/-1.973	0.0301	Significant Positive
CGR	0.0056	0.5800	+/-1.973	0.5627	Not Significant
TPF	0.0111	0.5710	-1.653	0.5687	Not Significant
SIZE	1.8283	2.3973	+/-1.973	0.0176	Significant Positive
R-squared		0.6451			
F-statistic		12.0675			
Prob(F-statistic)		0.0000			

These results indicate that LDR and Bank Size have a significant positive effect on profitability, while CGR and TPF do not significantly affect ROA.

b. Model with Moderation

The second model includes an interaction term between CGR (Credit Growth) and SIZE (Bank Size) to assess the moderating role of bank scale.

Table 4. Panel Regression Results (With Moderation)

Variable	Coefficient	t-Statistic	t-Table	Prob.	Conclusion
C	-41.5466	-2.3553		0.0197	
LDR	0.0305	2.1555	+/-1.973	0.0326	Significant Positive
CGR	-0.6791	-2.3422	+/-1.973	0.0204	Significant Negative
TPF	0.0158	0.8207	-1.653	0.4130	Not Significant
SIZE	1.7353	2.3035	+/-1.973	0.0225	Significant Positive
SIZE*CGR	0.0287	2.3630	+/-1.973	0.0193	Significant Positive
R-squared		0.6567			
F-statistic		12.1385			
Prob(F-statistic)		0			

These findings reveal a significant positive moderating effect of bank size. While credit growth alone negatively affects ROA, the interaction with bank size reverses the effect, turning expansion into a profitability

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driver for larger institutions. This implies that larger BPRs are better positioned to manage the risks of credit expansion, turning potential losses into profitability.

4.4. Discussion

The findings from both regression models before and after introducing the moderating variable offer essential insights into the profitability drivers of Rural Banks (BPR). Liquidity risk, proxied by the Loan to Deposit Ratio (LDR), showed a consistent and significant positive relationship with Return on Assets (ROA). This supports the financial intermediation theory (Diamond, 1984), which emphasizes credit allocation as a primary function of banking profitability. Similar findings by Doan and Bui (2021) confirm that banks with efficient liquidity management tend to perform better financially. For Indonesian BPRs, where market competition is limited and funding relies heavily on time deposits, these findings suggest that scale and liquidity deployment are more critical levers of profitability than aggressive credit expansion.

In contrast, the effect of credit growth (CGR) on ROA shifted notably between the two models. Initially, credit growth was statistically insignificant. However, once bank size was introduced as a moderating factor, the relationship turned significantly negative. This aligns with Baradwaj et al. (2014), who argue that rapid credit expansion without sound risk assessment can erode asset quality. The findings are also in line with Dang (2019), who noted that poorly managed credit growth exposes banks to increased default risk, especially in institutions with weaker internal governance. Similarly, Wu et al. (2022) warned that excessive credit growth in smaller institutions often leads to higher non-performing loans due to weaker oversight, a pattern mirrored in this research's finding of a negative direct effect of credit growth on ROA in small-scale BPRs. In contrast, Dang (2019) observed in the Vietnamese banking sector that credit growth generally has a positive effect on profitability, suggesting that contextual factors such as market structure, regulatory environment, and institutional capacity may explain the divergence. Additionally, the non-significant effects of liquidity risk (LDR) and third-party funding composition (TPF) in this study differ from those of Jin et al. (2018), who reported that funding structure significantly influences net interest margins. This discrepancy may be attributed to differences in funding dependence levels and cost structures between BPRs in Indonesia and commercial banks in other countries.

Third-party fund composition (TPF), which includes savings and time deposits, did not have a significant effect on ROA in either model. This contradicts expectations that a higher share of low-cost savings should enhance profitability (Ali & Puah, 2019). One possible explanation, supported by Jin et al. (2018), is the over-reliance of BPRs on high-cost term deposits, which can compress net interest margins and diminish overall returns. This divergence from Ali & Puah (2019), who found deposit composition to be a profitability driver in Malaysian banks, may reflect structural differences: unlike commercial banks, BPRs operate in segmented rural markets with constrained deposit pricing flexibility. The study found that third-party funds composition (TPF) did not significantly affect profitability, suggesting that simply increasing the proportion of time deposits or savings may not directly improve BPR performance. This may be due to the high cost of time deposits, which dominate BPR funding and reduce net interest margins. Additionally, the homogeneity of deposit structures across BPRs may limit the variation needed to reveal a strong statistical relationship. The result also reflects potential inefficiencies in fund utilization, indicating that even with sufficient deposits, profitability may not improve if funds are not allocated effectively to productive loans. This highlights the need for BPRs to reassess their deposit pricing strategies, enhance asset-liability management, and link deposit growth more closely with targeted lending strategies. Rather than focusing only on deposit structure, BPRs should prioritize efficient fund deployment and explore alternative funding sources. Future studies could refine the analysis by separating deposit types or including net interest margin as a mediating variable.

Bank size (SIZE) demonstrated a consistently positive and significant influence on profitability. This finding reinforces the economies of scale theory, suggesting that larger banks can reduce per-unit costs and access better financial and technological resources (Menicucci & Paolucci, 2016; Al-Homaidi et al., 2021). The findings of this study, which show that bank size positively moderates the relationship between credit growth

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and profitability, are consistent with Abel et al. (2023), who found that larger banks benefit from stronger credit evaluation systems and internal controls, enabling them to manage risks associated with rapid credit expansion. Larger BPRs are better positioned to diversify risk and attract more stable funding, leading to greater financial resilience and efficiency. The inclusion of the interaction term between Bank Size (SIZE) and Credit Growth (CGR) in the regression model allows for the identification of a moderating effect, which reveals how the influence of credit growth on profitability (ROA) changes depending on the scale of the bank. In the non-moderated model, CGR showed no significant effect on ROA, suggesting that, on average, credit growth alone may not contribute meaningfully to profitability across all BPRs. However, upon introducing the interaction term (SIZE × CGR), the direct effect of CGR turned significantly negative, while the interaction term itself became significantly positive. This pattern implies a conditional relationship:

For smaller BPRs, aggressive credit expansion tends to reduce profitability, likely due to limited risk assessment capabilities, inefficient internal control systems, or poor portfolio diversification. On the other hand, larger BPRs, as indicated by the significant and positive coefficient of the interaction term, are more capable of managing the risks associated with credit growth. These institutions tend to have better credit scoring systems, loan monitoring practices, and access to diversified funding, allowing them to convert increased lending activity into sustainable returns. This moderating effect is theoretically consistent with the economies of scale framework, which posits that larger institutions benefit from operational and informational efficiencies (Menicucci & Paolucci, 2016; Abel et al., 2023). Empirically, it aligns with findings from Wu et al. (2022), who observed that small banks are more vulnerable to systemic shocks caused by unchecked credit expansion. The results of the interaction suggest that the impact of credit growth on profitability is not uniform across all banks; it is amplified positively by scale. Therefore, policy implications include strengthening the operational capacity of smaller BPRs before incentivizing aggressive lending targets. Moreover, it highlights the importance of tailored strategies; what works for large institutions may harm smaller ones if not accompanied by adequate risk management. Overall, the study extends financial intermediation theory by incorporating structural and institutional variables relevant to rural banking contexts. The results underscore that while liquidity and scale enhance profitability, the benefit of credit growth depends heavily on institutional capacity. For practitioners and regulators, this highlights the need to strengthen internal credit governance and promote operational scalability in BPRs. Future research may explore additional moderating variables such as digital infrastructure or governance quality, especially in light of post-pandemic shifts in banking behavior (Nguyen et al., 2021). While the panel covers five years and 22 BPRs, the sample may not capture heterogeneity across regions or ownership types. Future research could incorporate longer time spans, risk governance indicators, or digital banking variables to enrich the analysis.

V. Conclusion

This study aimed to examine the effect of liquidity risk (LDR), credit growth (CGR), and third-party funds composition (TPF) on the profitability (ROA) of Rural Banks (BPR) in Malang Regency, with bank size (SIZE) as a moderating variable. Using panel data from 22 BPRs during the 2019–2023 period and applying a fixed effect model, the findings can be summarized as in the model without moderation, credit growth and bank size were found to have a significantly positive effect on profitability, while liquidity risk and third-party fund composition had no significant influence. However, when bank size was introduced as a moderating variable, credit growth showed a significantly negative effect, while the interaction term between credit growth and bank size became significantly positive. This suggests that larger banks are more capable of mitigating the risks associated with rapid credit expansion.

These results highlight the importance of institutional scale and credit quality in improving the financial performance of BPRs. Aggressive lending without adequate risk control may reduce profitability, particularly in small-scale banks. These findings hold important implications for the broader banking landscape in East Java and Indonesia, where BPRs are vital in financing MSMEs. The evidence that bank size moderates the credit growth and profitability relationship underscores that sustainable performance depends

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not only on expanding credit but also on strengthening institutional capacity and risk management. This insight informs policymakers and regulators, such as OJK, in developing targeted incentives, capacity-building programs, and regulatory frameworks that enhance BPR resilience and profitability nationwide.

Theoretically, this study supports financial intermediation theory by confirming the role of credit as a core driver of bank profitability. However, the findings reveal that the relationship is not always linear, especially in small financial institutions. The moderating effect of bank size indicates that institutional capacity plays a crucial role in determining the success of financial intermediation. Therefore, this theory should be adapted when applied to small-scale banking contexts. This study extends financial intermediation theory by demonstrating that the relationship between credit growth and profitability is contingent upon bank size. It suggests that theoretical models of bank performance in small-scale financial institutions should account for operational capacity and risk management systems as key moderating factors. Future research can refine these models by incorporating additional moderators such as operational efficiency (BOPO), asset quality (NPL), or governance structures, particularly in the context of rural banking systems in emerging economies. There are some practical implications of the findings. For BPR managers, the findings emphasize the need to focus on quality-driven credit growth supported by strong internal control systems. Credit expansion without risk mitigation may increase NPL and lower ROA. While bank size contributes positively to performance, it must be accompanied by operational efficiency and sound governance to sustain profitability. For regulators such as the Financial Services Authority (OJK), the study suggests developing incentive schemes for productive lending and implementing integrated early warning systems to monitor liquidity and credit risks across BPRs.

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