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ARTÍCULO

The Influence of Interest Rate Level and Non-Performing Loans on the Performance of Rural Banks in Indonesia

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Abstract: Recently, interest rates and non-performing loans have been the most critical factors in gauging bank performance, and academics must pay attention to this. Consequently, this study investigates the long- and short-term effects of loan interest rates and non-performing loans (NPLs) on performance as measured by return on assets (ROA) and return on equity (ROE). This study utilizes secondary data from the financial accounts of ten Indonesian rural banks from 2014 to 2020. The data is analyzed using Moments-Quantile-Regression Methods (MMQR). The survey results indicated three things. The first is that credit interest rates affect performance positively and considerably. The second fact demonstrates that loan interest rates have a favorable and substantial effect on performance. The third demonstrates that NPLs significantly and negatively impact banking performance. The study instructs banks on managing and establishing loan interest rates. In addition, the study suggests that Indonesian rural banks will continue to enhance their financial performance, profitability, and liquidity. This study also facilitates improved future decision-making and planning.

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1. Introduction

The bank offers a variety of credit and financial services to help consumers improve their quality of life. The company hopes to maintain its existence in a profit-or-loss position. Crediting customers is one method for creating a profit. In terms of benefits, loans are vitally important. Profits will increase as annual growth rates rise. The primary function of banks, including rural banks, is a loan or capital distribution. Rural banks, commonly abbreviated as BPR, are known for their proximity to micro, small, and medium-sized businesses, and their placement near those in need. The bank has the right to the borrower's responsibilities in the case of loans (Lopez et al., 2020). In addition to repaying their loans, borrowers may obtain contracts. A rise in the SBI (Bank Indonesia Certificate) interest rate and a fall in the Rupiah currency rate can increase outstanding loans. Inadequate internal bank circumstances, such as bad management, lending to the bank's business groups, and inadequate capital, contributed to the bank's failing performance (Bikker et al., 2018).

According to Law No. 10/1998, a loan is the distribution of money or bills based on an agreement or contract between a bank and another individual who must take out a loan with interest payments for a specified period. According to the Indonesian banking statistics report, BPR lending in Indonesia is rising (Claessens et al., 2018).

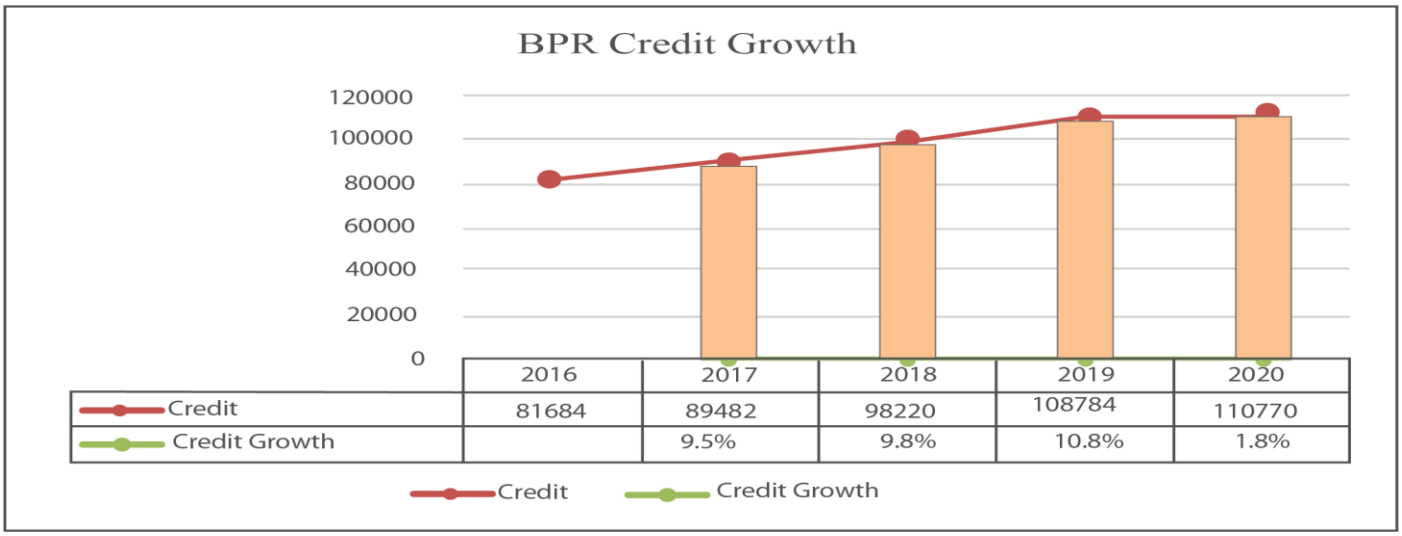

Figure 1. Development of Rural Banks Loans in Indonesia

The graph above illustrates that Indonesia's distribution of BPR loans rose from 2017 to 2020. With a gain of 10.8 percent, 2019 had the highest growth rate. Despite a minor slowdown in 2020, there was still a 1.8% increase over the previous year. This had consequences for BPRs with significant credit risk. Bank loans are one of the services a BPR provides, as one of its roles is to act as an intermediary. The origin of the word credit can be traced back to the Latin word credo, which signifies faith. Credit is the lender's (the creditor's) promise to the debtor that they will be able to meet future obligations (Partovi et al., 2019). Following POJK No. 4/POJK.03/2015, BPR must adhere to the prudential concept while allocating funds, referring to BPR's maximum credit limit requirements. A Rural Bank and a third party agreed to a contract or loan agreement, which this credit represents—the provision of money or other similar claims. After a defined period, the debt must be repaid with interest, compensation, or profit participation.

The principal source of revenue for banks is the repayment of loans. However, both lenders and borrowers face substantial risk in this approach. The possibility that business partners would breach their contractual obligations poses a substantial threat to the bank's operations (Irawati et al., 2019). However, banks with a high credit risk are susceptible to failure, putting depositors in danger. A large proportion of non-performing loans on the bank's balance sheet harms the bank's profitability and bottom line. Therefore, examining how BPR performance, as measured by ROA and ROE, is affected by loan interest rates and non-performing loans as a measure of credit risk is essential.

Numerous studies have demonstrated that NPLs and credit interest rates affect the functioning of healthy banks. Kingu et al. (2018) discover through their analysis that NPL negatively influences ROA performance. NPLs have been utilized as a proxy for bank risk and can explain the lacklustre performance of South Asian banks. Additionally, Rachman et al. (2018) suggest that low-interest rates can be detrimental to the banking business over the long term. According to Koju et al. (2018), high-interest rates can be an alternative to potentially hazardous debt. Credit interest rates also affect the amount individuals are willing to borrow. The demand for loans decreases as future interest rates increase. Interest income from loans is a significant portion of the bank's overall income. With optimum loans, BPR may increase its profits and expand its business. Because interest rates are part of the external environment, they influence a bank's inflow and outflow of capital.

In addition, the non-performing loan ratio indicates the likelihood that a debtor will not repay the loan. High non-performing finance (NPF) indicates a decline in the quality of bank borrowing. As funding deteriorates, financing quality declines (Ichsan et al., 2021). People will be hesitant to invest in a bank with a high NPF because they perceive it to be unhealthy. If NPLs increase, banks will not perform as well or earn as much money. Hence NPLs harm banks' performance. In addition, loan interest significantly impacts the earnings of national private commercial banks. Suppose a bank has more bad debts than productive assets. In that case, it may be hampered in its ability to generate income from loans, resulting in reduced earnings and a diminished ability to generate income. Following Bank Indonesia's regulations, for a bank to receive a performance rating of blue, its non-performing loans (NPL) must remain below 5%. This study investigates whether long-term or short-term loan interest rates and non-performing loans affect BPR performance as evaluated by ROA and ROE.

2. Literature Review

The study employed the agency theory to forecast the performance of banks. Jensen and Meckling created agency theory in 1976, which clarifies the relationship between a principal and an agent in labour performance. The principal delegates business management to the agent. To keep the agent focused on achieving the principal's objectives, the principal supervises him. There are two primary reasons academics have applied agency theory to banking research (Wang et al., 2018; Ali, Swiety, & Mansour, 2022; Alnaa & Matey, 2022; Doan, & Chang, 2022; Isyandi & Trihatmoko, 2022). First, by offering customer protection, bank management reduces the bank's likelihood of risk financing and, as a result, the shareholders' motivation to manage and control risk. Second, the distinction between principals and agents can help managers pursue their goals at the expense of shareholder interests. Traditionally, interest rates are payments banks make to individuals who purchase or sell their products (Suyanto, 2021; Krasniqi-Pervetica & Ahmeti, 2022; Mubeen, Hye, Shahid, & Rehan, 2022;). Interest rates are essential to the operation of a bank. The primary functions of rural banks are accepting deposits and extending loans. When interest rates rise, bank liabilities become more expensive. However, the interest rate on bank loans would also increase. Large banks typically change their labour usage, capital inputs, output prices of deposits and loans, and interest rates on loans and cash deposits to protect their profits against deregulation. Therefore, enhancing the business environment is less crucial for smaller banks to continue making money, while it is more crucial for larger banks to increase their profits.

According to Irawati et al. (2019), non-performing loans fall into three categories: current, questionable, and harmful. According to Ichsan et al. (2021), NPL is a situation where the debtor cannot fulfil his obligations to the bank, specifically the need to pay the initial payments pledged. NPLs calculate the percentage of non-performing loans in a bank, given that non-performing loans make repayments. NPLs, also known as the NPL ratio, are used by banks to evaluate the risk of loan default by borrowers. The bigger the credit score, the greater the risk of a loan default (Ichsan et al., 2021; Nguyen, & Nguyen, 2021; Peng & Dong, 2021; Zhu & Chen, 2018; Zuhroh, Rofik, & Suliswanto, 2022; Wijaya, Nurjanana, & Erwin, 2022). A bank's total performance depends on factors that directly or indirectly affect the quality of customer services and operating expenses. Thus, direct costs are not the only factor that affects a bank's performance. To evaluate and explain a bank's performance, especially its financial performance, it is vital to consider a variety of elements. Since non-performing loans still make payments, it is evident that the definition of NPL is a method for determining the number of non-performing loans in a bank (Partovi et al., 2019).

3. Research Hypothesis

Changes in interest rates, which impact both consumers and the bank itself, are one factor that can impact the performance of rural banks. The percentage that a bank adds to the amount of credit it extends to a customer benefits the bank (Dinçer et al., 2019). Bank Indonesia's policy influences the interest rate it establishes. Loan interest rates determine how much someone can borrow. When interest rates increase, the majority of borrowers avoid banks. In this situation, the bank cannot earn as much money because it is not receiving as much interest. When interest rates rise, individuals who borrow money from banks may be unable to repay it. People cannot repay the interest and principal on their loans since the interest rates are excessive. It results in substandard loans, which reduces BPR yields. Godswill et al. (2018) discovered that the interest risk profile factors for net margin and return on assets were distinct before and after implementing Bank Indonesia Regulation. Sofyan (2019) demonstrates that bad bank performance in Europe is related to reduced net interest margins, lower policy interest rates, insufficient non-performing loan resolution, and an increase in the proportion of deposits. According to Yusuf et al. (2021), the B.I. rate shock was the one to which most bank performance indicators responded the most. Consequently, the investigation developed the following hypothesis:

H1. Credit interest rates have a significant effect on bank performance.

H2. Loan interest rates significantly affect the bank's performance

The NPL ratio measures a bank's capacity to appraise the risk of debtor default. Banks utilize a ratio to assess the likelihood of loan repayment default by borrowers. The greater the ratio's value, the greater the likelihood of loan default (Ahmed et al., 2021). As NPL represents a credit risk, a low NPL at a BPR indicates that the BPR carries a low credit risk. BPR must examine the debtor's ability to repay its obligations before extending credit. Following the credit disbursement to the debtor, the bank shall continue to monitor the debtor's use of credit and the debtor's ability and compliance with its responsibilities.

Consequently, Non-Performing Loans represent the total amount of non-performing loans. Those who fail to repay their obligations may face harsher penalties. As a result, the bank loses the possibility to generate income from the authorized funding, significantly damaging its profitability and bottom line (Singh et al., 2021).

According to the research conducted by Swandewi and Purnawati in 2021, non-performing loans are a proxy for bank risk. The regression results can explain why banks in South Asian nations have performed poorly. According to Saleh et al. (2021)'s analysis, it was a sign of credit risk. The regression results indicate a negative relationship between credit risk and ROA and ROE. Furthermore, Žunić et al. (2021) find that NPLs substantially impact the financial performance of Regional Development Banks before and after implementing the Bank Indonesia Regulation. Based on this explanation, the following are the research hypotheses:

H3. Non-performing loans have a short-term negative impact on BPR performance.

4. Research Method

This study investigates the long- and short-term effects of loan interest rates and NPLs on performance as measured by ROA and ROE. This study utilizes secondary data from the financial accounts of ten Indonesian rural banks from 2014 to 2020.

$$ROA_{it} = \alpha_0 + \beta_1 CIR_{it} + \beta_2 LIR_{it} + \beta_3 NPL_{it} + e_{it} \quad (1)$$

$$ROE_{it} = \alpha_0 + \beta_1 CIR_{it} + \beta_2 LIR_{it} + \beta_3 NPL_{it} + e_{it} \quad (2)$$

Where;

ROE	=	Return on Equity
ROA	=	Return on Assets
t	=	Time Period
i	=	Banks
CIR	=	Credit Interest Rate
LIR	=	Loan Interest Rate
NPL	=	Non-performing Loans

The study's dependent variable was bank performance, as evaluated by ROA and ROE. In addition, the study employed two additional predictors, including interest rate as assessed by credit interest rate and loan interest rate, and non-performing loans as defined by the percentage of late-repaid loans to total loans. These dimensions are listed in Table 1.

Table 1. Variables with Measurements

S#	Variables	Measurement	Sources
01	Bank Performance	Return on assets Return on equity	Annual Reports
02	Interest Rate	Credit interest rate Loan interest rate	Annual Reports
03	Non-performing loans	The ratio of late repaid loans to total loans	Annual Reports

The study uses descriptive statistics to examine the specifics of the variables. In addition, descriptive statistics are employed to examine the association between constructs. In addition, the variance inflation factor (VIF) is utilized to examine multicollinearity. The following equations are given:

$R^2_Y \longrightarrow \quad Y_{it} = \alpha_0 + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it}$ **(3)**

$$j = R^2_Y, R^2_{X1}, R^2_{X2,} R^2_{X3,} R^2_{X4,} R^2_{X5} \quad \textbf{(4)}$$

$$Tolrance = 1 - R^2_j VIF = \frac{1}{Tolerance} \quad \textbf{(5)}$$

Finally, the study applied the MMQR to examine the association among variables. This approach is developed by Machado et al. (2019). It is a suitable approach that includes nonlinear and asymmetric associations (Adebayo et al., 2022). In addition, the MMQR also has the feature to permit the "conditional heterogeneous covariance effects" (Ike et al., 2020). Hence, $Q\tau(\tau/X)$ is the conditional quantile for the "locational-scale alternate model" is established as under:

$$Y_{it} = \alpha_i + X_{it}\beta + (\delta_i + Z_{it}\lambda)U_{it} \quad \textbf{(6)}$$

In equation (6), $P\{\delta_i + Z_{it}\lambda > 0\} = 1$ shows the probability, while $\alpha, \beta, \lambda \; and \; \delta$ shows the parameters, $\alpha_i, \delta_i \; \mathrm{i} = 1, \ldots\ldots, \mathrm{n}$ shows a precise fixed effect, while z shows the k-vector of component X.

The components are transformed with component l mentioned below:

$$Zl = Zl\,(X), l = 1, \ldots\ldots, k \quad \textbf{(7)}$$

In equation (7), U_{it} shows the orthogonal to X_{it} and consistent with attaining the moment conditions that do not contain stringent heterogeneity.

Thus, in equation (6) mentioned above, the conditional quantile of Y is formulated as below:

$$Q\tau(\tau/X_{it}) = (\alpha_i + \delta_i q(\tau)) + X_{it}\beta + Z_{it}\,\lambda\, q(\tau) \quad \textbf{(8)}$$

In equation (8), X_{it} shows the independent variables, such as CIR, LIR, and NPL and Y_{it} represents the predictive dependent variables such as ROA and ROE that is conditional as X_{it}. Hence, $Q(\tau)$ is developed as under:

$$Min_q = \sum_t \sum_i p\tau\,(R_{it} - (\delta_i + Z_{it}\,\lambda\,)q) \quad \textbf{(9)}$$

5. Research Findings

According to the overall descriptive analysis results, the number of data (N) is 70, and the standard deviation of credit interest, NPL, ROA, and ROE is less than the average value. It shows that all variables of credit interest rates, credit risk, and banking performance have extremely little data fluctuations, indicating that their data are typically distributed. The average of the descriptive analysis of credit interest rates was 28.157%. It indicates that the BPR loan interest rate will be 28,15% annually from January 2014 to December 2019. In the meantime, the average Non-Performing Loan rate is 6.347%, showing that rural banks in Indonesia face a very high risk of loan default by borrowers.

As determined by ROA and ROE, descriptive data on BPR's performance indicate that BPR's ability to generate a net income from asset management and its capital and liquidity levels are generally satisfactory. As determined by ROA, the average BPR performance is 2.702 percent. It indicates that rural banks in Indonesia can manage bank assets to generate a total net profit of 2.7%. The average ROE is 24.324 percent, demonstrating that BPRs can create a return on equity that is fairly strong at 24.324 percent. The average LIR, measured by loan interest rate, is 21.961%. Table 2 contains these values.

Table 2. Descriptive statistics

	CIR	NPL	ROA	ROE	LIR
Mean	28.157	6.347	2.702	24.324	21.961
Median	28.110	6.560	2.630	23.590	21.845
Maximum	36.720	7.360	3.420	31.430	28.710
Minimum	24.650	4.750	2.260	19.980	19.630
Std. Dev.	2.278	0.751	0.295	2.950	2.806
Observations	70	70	70	70	70

In addition, descriptive statistics are employed to examine the association between constructs. The results demonstrated that the CIR, LIR, and NPL have a favorable relationship with ROA and ROE. Table 3 contains these values.

Table 3. Matrix of Correlations

Variables	ROA	ROE	CIR	LIR	NPL
ROA	1.000				
ROE	0.309	1.000			
CIR	0.739	0.352	1.000		
LIR	0.635	0.473	0.311	1.000	
NPL	0.434	0.772	0.355	0.672	1.000

In addition, the variance inflation factor (VIF) is utilized to examine multicollinearity. According to the results, the VIF value is less than five. These data revealed no evidence of multicollinearity. Table 4 contains these values.

Table 4. Variance Inflation Factor

	VIF	1/VIF
CIR	3.548	0.282
LIR	3.446	0.290
NPL	2.193	0.456
Mean VIF	3.062	.

The findings of the MMQR estimation presented in Table 5 indicate that the interest variable for the previous year has a considerable positive effect on ROA-measured bank performance. It indicates that the preceding period's high loan interest rates will increase the performance of BPRs. It will make it simpler for banks to generate a net income from managing assets and equity and increase banks' liquidity. The findings of the MMQR estimation presented in Table 5 indicate that the NPLs for the prior year had a considerable negative impact on ROA-measured bank performance. It indicates that the performance of banks will be hindered by the previous period's high non-performing loans. These outcomes are listed in Table 5.

Table 5. Panel Quartile Estimation (MMQR)

Variables	Method of Moments Quantile Regression (MMQR)										
	Location	Scale	Grid of Quartiles								
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
CIR	0.434***	0.874*	0.532**	0.564**	0.674*	0.763**	0.763*	0.093	0.673*	0.221	0.533*
LIR	0.763**	0.827*	0.563**	0.743*	0.829*	0.673***	0.122	0.546*	0.662*	0.102	0.143*
NPL	0.320***	0.454**	-0.372*	-0.612*	-0.673*	-0.164	-0.821*	-0.517*	-0.643*	-0.321*	-0.321

***, **, and * represent significant level at 1%, 5%, and 10%, respectively

The findings of the MMQR estimation presented in Table 6 indicate that the interest variable for the preceding year considerably benefits bank performance as evaluated by ROE. It indicates that the preceding period's high loan interest rates will increase the performance of BPRs. It will make it simpler for banks to generate a net income from managing assets and equity and increase banks' liquidity. The findings of the MMQR estimation presented in Table 6 indicate that the NPLs for the prior year had a considerable negative impact on the ROE-based bank performance. It indicates that the performance of banks will be hindered by the previous period's high non-performing loans. These outcomes are listed in Table 6.

Table 6. Panel Quartile Estimation (MMQR)

Variables	Method of Moments Quantile Regression (MMQR)										
	Location	Scale	Grid of Quartiles								
			0.10	0.20	0.30	0.40	0.50	0.60	0.70	0.80	0.90
CIR	0.434***	0.542*	0.353**	0.382**	0.774*	0.782**	0.673*	0.511*	0.192	0.661*	0.133*
LIR	0.283**	0.438*	0.283**	0.382*	0.632*	0.912***	0.292*	0.092	0.988*	0.763	0.123*
NPL	0.829***	0.099**	0.473**	-0.291*	-0.121	-0.920*	-0.291*	-0.281*	-0.392*	-0.773*	-0.221

***, **, and * represent significant level at 1%, 5%, and 10%, respectively

6. Discussions

Based on these statistics, we may conclude that credit interest rates considerably impact bank performance as assessed by ROA and ROE. Since the direction of the effect of the loan interest rate variable on the performance of the bank is positive, the results of this study support either the first or second hypothesis, "H1. Credit interest rates have a positive impact on performance" or "H2. Loan interest rates have a positive impact on bank performance."

The results indicate that credit interest rates have a favorable impact on the performance of banks. A high-interest rate will motivate banks to perform better. It could be because the bank's interest rate cap is still within a safe range. Therefore, the debtor has not been overly burdened. A bank that specializes in extending credit will earn more money from interest by increasing its loans' interest rate, which will impact its net profit. Therefore, as measured by ROA and ROE, banks can earn more money. This study's findings contradict other research, including those by Rahayu et al. (2021). They discovered a correlation between weak bank performance in Europe and lower net interest margins and policy interest rates, poor settlement of non-performing loans, and a more significant proportion of deposits. In another study, Kazem et al. (2021) found that most bank performance indicators responded most strongly to the B.I. rate shock. This analysis supports the findings of Drechsler et al. (2021), who discovered that the net margin and ROA varied before and after implementing the Bank Indonesia Regulation. According to research by Lopez et al. (2020), credit interest rates have a positive and statistically significant effect on bank profitability. According to Puspitasari et al. (2021)'s argument, higher loan rates increase the national debt's interest expense and make it more difficult for the government to grant loans. Puspitasari et al. (2021) concur that this could generate additional bank revenue. According to research conducted in Al-Quds, 2021, the loan interest variable had a regression coefficient of 0.71. It means that a 1% increase in the loan's interest rate will result in a 7% increase in revenue.

The second test results indicate that NPLs significantly impact the performance of BPRs as assessed by ROA and ROE. The direction of negative influence contradicts the third hypothesis of the study, which states, "H3. Non-Performing Loans harm BPR performance. Bank's operations are limited to savings and loan

operations. The Banking Law states that payment flow does not comprise service activity (Al-Qudah, 2021). The bank will optimize its activities by extending the highest amount of credit to debtors to obtain the total interest income. It is risky, as evidenced by the average non-performing loan rate above the 5% minimal criteria for a healthy bank. The bank will not make more money and will not be more profitable as the number of non-performing loans rises. Therefore, the bank's ROA and ROE performance will not improve.

The findings of this study contradict what Rohimah (2021) discovered in their study, namely that NPLs are a proxy for bank risk. The regression results can explain why banks in South Asian nations perform poorly. According to the findings of Sadi'yah et al. (2021), non-performing loans are an indicator of credit risk. The regression results indicate a negative relationship between credit risk and ROA and ROE. However, the study's findings corroborate those of Maulana et al. (2021), who discovered that NPL had a tremendously unfavorable impact on the financial performance of Regional Development Banks both before and after the implementation of the Bank Indonesia Regulation. The study's findings concur with Fauziah's research from 2021, which demonstrated that NPLs have a considerable negative impact on bank profits.

Its performance still influences the results of the Variance Decomposition study of the BPR's performance in the prior period. The Variance Decomposition analysis findings indicate that most of the variance in BPR performance over the following 12 periods is still attributable to the performance variable itself. However, loan interest rates and non-performing loans comprise just the second element. Therefore, the most crucial aspect has not yet been identified. The best contribution over the next 12 months will come from the new variable interest rate, while the most significant contribution will come from the NPL after nine months.

The results indicate that credit interest rates have a positive and statistically significant impact on banks' profitability, as evaluated by ROA and ROE. In addition, loan interest rates have a favorable and substantial impact on the performance of banks as assessed by ROA and ROE. Other results indicate that basks' performance, as measured by ROA and ROE, demonstrates a robust response to credit interest rate shocks and NPL over the next three months. In contrast, banks' performance demonstrates a negative response to NPL shocks over the next two months and a negative response to credit interest rate shocks over the next ten months. According to the MMQR research, the primary factor influencing banks' performance remains the banks themselves. However, throughout the subsequent 12 months, interest rates and non-performing loans (NPLs) also impacted the performance of banks while not being the primary contributor.

7. Research Implications

Banks should be able to manage and establish loan interest rates as effectively as possible because research can improve the bank's efficiency. The interest rate must consider the level of risk so that the bank's non-performing loans do not exceed the 5% limit. Even though NPL is appropriate for bank performance, this variable shock will likely result in a negative response during the following twelve months. Indonesia's banks will improve their financial performance in various ways, including by becoming more profitable and liquid, becoming better intermediaries in the distribution of funds, making banks more efficient, and enhancing macroeconomic performance, such as the situation with Bank Indonesia's interest rates. When making judgments and developing plans for the future, prepare for risks that could result from rapid changes in Indonesia and global macroeconomic situations.

8. Limitations and Future Directions

This study has several limitations that will influence the path of future researchers. The study uses only three indicators to forecast bank performance and suggests that future research should incorporate additional predictors. This research model can be enhanced by building other research models, for as by incorporating more variables, countries, and banks. It should result in improved conclusions. Other banking sectors were omitted from the examination of rural banks, and it was advised that future research include other banking industries.

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