

Strengthening Financial Performance Models through Local Evidence from the Rural Banking Sector

I Ketut Arsana¹, Cecep Taufiqurahman², Ade Imam Muslim³

^{1,2,3}*Sekolah Tinggi Ilmu Ekonomi Ekuitas, Bandung, Indonesia*

*Corresponding author: I Ketut Arsana

Corresponding email: arsana.cds@gmail.com

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ABSTRACT

Rural Banks (BPR) play a crucial role in supporting regional economic stability, yet limited studies have examined the local determinants of their profitability. This study aims to analyze the influence of Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), and Operating Expense Ratio (OER) on the profitability (Return on Assets/ROA) of BPRs in Tangerang City. A quantitative research method was employed using secondary data from BPR financial statements published by the Financial Services Authority (OJK) for the period 2021–2023. The data were processed through descriptive statistics, classical assumption tests, and multiple regression analysis to evaluate both simultaneous and partial effects. The results show that CAR, NPL, and OER collectively have a significant effect on ROA. However, individually, only OER has a significant negative impact, while CAR and NPL do not exhibit direct influences on profitability. This finding highlights that operational efficiency, as reflected in OER, is the dominant factor shaping the financial performance of BPRs. Excessive operating costs reduce profitability, whereas strong capitalization and credit risk do not directly alter returns under the observed conditions. The implications of this research are twofold: first, BPR management must prioritize cost control strategies to enhance financial performance; second, regulators should design microprudential policies that align with the unique characteristics of rural banking institutions, thereby strengthening their contribution to regional economic development.

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1. Introduction

Regional banking institutions, including Rural Banks (BPR), play a pivotal role in strengthening local economic stability. Tangerang City, as a center of economic growth, industry, and residential development, has demonstrated significant financial dynamics in recent years. Data from the Central Bureau of Statistics (BPS, 2024) report that the city's gross regional domestic product (GRDP) per capita reached IDR 5.57 million in 2023, which indicates high levels of economic activity and the need for robust financial intermediation. BPR serve this purpose by providing inclusive access to capital for micro and small-scale communities. To fulfill this role, BPR are required to maintain sound financial performance to remain competitive and to sustain public trust. The financial statements of BPR function both as a reflection of internal performance and as an external

communication tool directed toward investors, regulators, and the broader public. Therefore, the measurement and analysis of financial performance indicators are crucial for assessing the overall health and prospects of BPR.

One relevant approach to understanding the strategic value of financial statements is the perspective of Signalling Theory, which emphasises that information disclosed by firms can function as a signal to reduce information asymmetry between management and external stakeholders (Liu et al., 2024). In the context of Rural Banks (BPR), financial statements not only portray the internal condition of the institution but also convey signals to investors, regulators, and the public regarding the entity's prospects and the quality of its governance (Jadiyahpa et al., 2024). The quality of information presented in financial statements can strengthen market confidence in the stability and financial outlook of BPR (Nguyen et al., 2025). Within a highly competitive banking environment, strong and credible signals become essential for attracting external trust and capital (Tian et al., 2024).

The Capital Adequacy Ratio (CAR), for example, can be utilized to signal the strength of capitalization and the resilience of Rural Banks (BPR) against potential risks (Yamin et al., 2025). A high CAR level indicates that BPR possess the capacity to absorb potential losses, which may enhance public perceptions of financial stability (Sumani et al., 2017). Furthermore, compliance with capital standards reinforces perceptions of professionalism and institutional readiness in managing risks (Yamin et al., 2025). In the long term, strong capitalization serves as a critical foundation for building institutional reputation and sustaining competitive advantage (Tomak et al., 2025).

Meanwhile, Non-Performing Loans (NPL) also play a critical role in conveying signals regarding the quality of credit risk management (Trinugroho et al., 2025). A low NPL level demonstrates the effectiveness of the credit assessment system and the loan management practices of Rural Banks (BPR), which ultimately reflects the overall soundness of the credit portfolio (Lawrence et al., 2024). Conversely, an increase in NPL is frequently associated with weaknesses in internal monitoring systems and operational uncertainties, which may undermine investor perceptions of the bank's long-term performance (Ng et al., 2020). Therefore, transparency in NPL reporting constitutes an essential aspect of generating credible signals concerning asset quality (Mehdi et al., 2025).

In addition, the Operating Expense Ratio (OER) represents managerial and operational efficiency in the utilization of resources (Wasiaturrahma et al., 2020). A low OER indicates the ability of banks to maintain cost efficiency while simultaneously enhancing profitability (Nguyen et al., 2025). This level of efficiency provides a positive signal to investors and stakeholders that the bank is capable of managing its business activities productively and sustainably (Sapiri et al., 2023). Over the long term, consistent operational efficiency strengthens the competitive position of Rural Banks and supports the achievement of optimal financial performance (Monalisa et al., 2022).

Previous research has extensively examined the factors influencing bank profitability; however, most studies have focused on large-scale national or commercial banks rather than on Rural Banks (BPR), which possess distinctive characteristics in terms of risk structure and business models (Wasiaturrahma et al., 2020). Studies that investigate the role of Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), and Operating Expense Ratio (OER) in determining the profitability of BPR, particularly at the local level, such as in Tangerang City, remain relatively limited (Monalisa et al., 2022). These ratios, nevertheless, constitute essential indicators for assessing the financial health and operational efficiency of micro-banking institutions (Sumani et al., 2017). High NPL levels theoretically reduce asset quality and profitability, yet previous findings reveal that the magnitude of the effect varies depending on institutional quality and the effectiveness of risk supervision (Trinugroho et al., 2025). On the other hand, OER is frequently used as a proxy for efficiency, but it has not been extensively tested empirically in relation to its effect on Return on Assets (ROA) within local BPR contexts (Nguyen et al., 2025). Moreover, the impact of compliance with CAR requirements on profitability remains a subject of debate, particularly in the face of increasingly stringent capital regulations (Yamin et al., 2025). This study provides contextual empirical evidence on the relationship between these three ratios and the profitability of BPR in Tangerang City. The findings enrich the literature on the financial performance of BPR in Indonesia

and strengthen the foundation for microprudential policy formulation (Sapiri et al., 2023). Furthermore, the results offer strategic insights for BPR management in designing more targeted policies for efficiency improvement, credit risk control, and capital management (Mehdi et al., 2025).

Hypothesis Development

1.1 The Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Operating Expense Ratio (OER) simultaneously affect the profitability (ROA) of Rural Banks (BPR).

Scholars argue that financial indicators such as Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), and Operating Expense Ratio (OER) make a significant contribution to the formation of bank profitability, particularly within the framework of CAMEL and operational efficiency (Abdelmoneim et al., 2023). Previous studies indicate that a high level of capital adequacy (CAR) strengthens the position of banks in facing risks, thereby supporting long-term stability and profitability (Dao et al., 2020). In addition, operational efficiency, which is reflected in a low OER, is believed to be one of the main drivers of bank profitability because it demonstrates effective cost management (Sumani et al., 2017). A low level of NPL is also considered to enhance bank performance by reducing credit loss risk and optimising net interest income (Lawrence et al., 2024; Trinugroho et al., 2018).

Nevertheless, a considerable body of literature highlights that the relationship between these three indicators and profitability is not always linear or significant, as it largely depends on the institutional context and the managerial capacity of the banks (Nguyen et al., 2025). In several cases, compliance with CAR requirements restricts credit expansion and thereby has the potential to suppress short-term profitability (Yamin et al., 2025). Similarly, a high level of cost efficiency does not necessarily guarantee an increase in ROA if it is not accompanied by growth in operating income (Bhatia et al., 2025). Moreover, a high level of NPL does not invariably reduce profitability, as the outcome depends on provisioning strategies and the structure of the loan portfolio (Annas et al., 2024). Based on these arguments, this study tests the following hypotheses:

H1: The Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Operating Expense Ratio (OER) simultaneously affect the profitability (ROA) of Rural Banks (BPR).

1.2 The Capital Adequacy Ratio (CAR) significantly affects the profitability (ROA) of Rural Banks.

The Capital Adequacy Ratio (CAR) is regarded as an essential indicator in maintaining the stability and solvency of banking institutions, and it is therefore assumed to contribute positively to the enhancement of profitability (Dao et al., 2020). Adequate capital enables banks, including Rural Banks (BPR), to extend credit more freely, to absorb risks effectively, and to expand business activities that ultimately lead to an increase in Return on Assets (ROA) (Abdelmoneim et al., 2023). From a regulatory perspective, the strengthening of minimum capital also reflects the resilience of institutions in responding to economic pressures and market volatility (Yamin et al., 2025). Moreover, sufficient capital enhances public confidence in the performance and financial soundness of banks, which in turn fosters the long-term stability of profitability (Handoyo et al., 2023). However, an opposing view suggests that the imposition of higher minimum capital requirements may create an additional burden for banks, particularly for small-scale Rural Banks that face constraints in accessing external sources of capital (Nguyen et al., 2025). The compliance burden associated with high CAR requirements may restrict the ability of banks to pursue aggressive credit expansion, thereby suppressing the potential for short-term profitability (Yamin et al., 2025). Furthermore, a high level of capital does not necessarily correspond with operational efficiency or adaptive business strategies, and thus may not always be aligned with improvements in ROA (Bhatia et al., 2025). Consequently, the relationship between CAR and the profitability of Rural Banks remains an issue that requires empirical examination in the local context.

H2: The Capital Adequacy Ratio (CAR) significantly affects the profitability (ROA) of Rural Banks.

1.3 The Non-Performing Loan (NPL) significantly affects the profitability of Rural Banks (BPR)

In general, an increase in Non-Performing Loans (NPL) is perceived as a serious threat to bank profitability because a high level of problematic credit reduces interest income and increases provisioning costs for potential losses (Lawrence et al., 2024). Prior studies indicate that poor asset quality, as reflected in high NPL levels, significantly depresses Return on Assets (ROA) by diminishing the efficiency of financial intermediation (Barakat et al., 2024). In the context of small-scale banks such as Rural Banks (BPR), ineffective NPL management can rapidly erode capital and weaken financial resilience (Monalisa et al., 2022). Moreover, high NPL ratios undermine public confidence and may adversely affect liquidity and the availability of subsequent financing (Annas et al., 2024).

Nevertheless, a contradictory perspective suggests that the negative impact of NPL on profitability can be mitigated through adaptive risk management practices and aggressive provisioning strategies (Mehdi et al., 2025). Some banks are even able to sustain stable ROA levels despite facing substantial NPL pressures by leveraging income diversification and maintaining adequate operational efficiency (Nguyen et al., 2025). In addition, macroeconomic conditions, managerial quality, and policy interventions may serve as moderating factors that dampen the direct influence of NPL on profitability (Trinugroho et al., 2025). Therefore, the relationship between NPL and ROA is highly contextual and should not be assumed to follow a uniform or linear pattern across different banking environments.

H3: The Non-Performing Loan (NPL) significantly affects the profitability of Rural Banks (BPR)

1.4 The Operating Expense Ratio (OER) significantly affects the profitability of Rural Banks (BPR)

The Operating Expense Ratio (OER) is recognised as one of the most frequently used indicators of operational efficiency in assessing banking performance, particularly in the context of profitability (Abdelmoneim et al., 2023). In general, a low OER indicates that operating expenses are effectively controlled relative to operating income, thereby exerting a positive influence on the improvement of Return on Assets (ROA) (Dao et al., 2020). Within the CAMEL framework and efficiency analysis, OER is often regarded as a reflection of managerial competence in managing operational activities productively (Abdul Hadi et al., 2018). Empirical studies conducted on banks in developing countries demonstrate that OER exhibits a negative and significant relationship with profitability, in which cost efficiency serves as a principal determinant of earnings sustainability (Nguyen & Vu, 2025).

Nevertheless, several studies reveal inconsistent results, particularly in the context of cost pressures arising from digitalisation or regulatory burdens that increase OER without generating corresponding improvements in profitability (Avianto et al., 2024; Bhatia et al., 2025). In certain circumstances, an increase in operating expenses may be interpreted as a long-term investment that does not immediately generate returns on ROA, such as expenditures for technological development or the expansion of service networks (Barakat et al., 2024). Furthermore, under conditions of economic uncertainty and intense competition, the relationship between OER and ROA may become weak or even statistically insignificant (Tian et al., 2024). Therefore, empirical testing within a contextual framework is required to understand how operational efficiency, as measured by OER, affects the profitability of Rural Banks, specifically within the micro-banking environment of Tangerang City (Handoyo et al., 2023). Based on these arguments, this study tests the following hypothesis.

H4: The Operating Expense Ratio (OER) significantly affects the profitability of Rural Banks (BPR)

2. Methods

2.1 Population and Research Sample

This study will be conducted using a quantitative approach, which is a research method grounded in the positivist paradigm. The researcher will first employ descriptive statistics and classical assumption testing before conducting hypothesis testing. The study utilises secondary data derived from the financial statements of Rural Banks (BPR) in Tangerang City for the period 2021–2023. The researcher collected the data manually from the official website of the Financial Services Authority (OJK). The population of this study consists of all Rural Banks operating in Tangerang City during 2021–2023. The sample was selected through purposive sampling, with the criterion being Rural Banks that disclosed financial information on the official website of the Financial Services Authority (OJK). Accordingly, the selection of the sample from the population is presented in the following.

Table 1. Sample Selection

Description	Number
Rural Banks (BPR) in Tangerang City during the observation period (2021–2023)	17
Total population for the observation period (3 years)	51
Rural Banks (BPR) without financial statement disclosure during the observation period	0
Total sample for 3 years (total observation units)	51

Source: author analysis

The dependent variable employed in this study is the profitability of Rural Banks (BPR). The dependent variable refers to the variable that is influenced or serves as the outcome of the independent variables. Profitability is measured using the Return on Assets (ROA) ratio. The first independent variable used in this study is the Capital Adequacy Ratio (CAR), which is measured based on the CAR ratio reported by BPR in financial statements published by the Financial Services Authority (OJK). The second independent variable is the Non-Performing Loan (NPL), measured through the NPL ratio disclosed in BPR financial statements made publicly available by OJK. The final independent variable is the Operating Expense Ratio (OER), which is assessed using the OER ratio reported by BPR in their financial statements published through OJK.

2.2 Data Analysis Methods

The data analysis method employed in this study consists of descriptive statistics, classical assumption testing, regression analysis, and hypothesis testing. These analyses are conducted to examine the relationships among the independent variables. The regression model applied in this study is as follows.

$$ROA_{it} = \beta_{0it} + \beta_{1it}CAR_{it} + \beta_{2it}NPL_{it} + \beta_{3it}OER_{it} + \varepsilon_{it}$$

Description

- ROA : Profitability measurement (%)
- CAR : Capital Adequacy Requirement (%)
- NPL : Non-Performing Loan (%)
- OER : Operating Expense Ratio (%)

3. Result

3.1 Descriptive Statistical Test

The testing in this study was conducted using SPSS software. The first test was descriptive statistical analysis, which aimed to present the data in a form that was easier to understand through the number of observations, mean, and standard deviation. The results of the descriptive statistical analysis are presented in Table 2 below.

Table 2 Descriptive Statistical Analysis

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Capital Adequacy Ratio (CAR)	51	13.2	135.14	40.8753	28.36827
Non-Performing Loan (NPL)	51	0	32.57	8.7492	7.81531
Operating Expense Ratio (OER)	51	65.07	158.77	91.761	16.95009
Return on Assets (ROA)	51	-25.38	7.43	0.7533	5.49945
Valid N (listwise)	51	–	–	–	–

Source: Processed Data (2025)

Based on the results of the descriptive statistical analysis of 51 sample data from rural banks (BPR) in Tangerang City, a general overview of the characteristics of each research variable was obtained. All variables have the same number of observations (N = 51), indicating that there are no missing values in the dataset. This condition reflects good data quality and ensures the reliability of the dataset for further analysis.

The average CAR is 40.88%, far exceeding the minimum capital requirement (generally 8% under Basel standards). This indicates that rural banks in Tangerang City have strong capital buffers, which can support resilience against potential risks. However, the wide range (13.20% to 135.14%) and high standard deviation (28.37) show significant disparities among banks. Some institutions maintain extremely high capital ratios, which may reflect either prudent risk management or limited credit expansion that reduces risk-weighted assets. The OER has an average of 91.76%, ranging from 65.07% to 158.77%. An OER close to 100% means that banks' operating income is nearly absorbed by operating expenses, leaving limited room for profit generation. The relatively high mean value suggests moderate to low operational efficiency. Banks with OER above 100% are operating at a loss, underscoring the importance of improving cost efficiency and revenue management to enhance overall performance. The results reveal that while rural banks in Tangerang City maintain strong capital adequacy (CAR), they are challenged by high credit risk (NPL), moderate efficiency (OER), and uneven profitability (ROA). Strengthening credit risk management and improving operational efficiency appear crucial for enhancing financial sustainability.

Based on the results of the Variables Entered/Removed test in the linear regression analysis using SPSS, it was found that the regression analysis consisted of only one model, namely Model 1. In this model, all predetermined independent variables—Operating Expense Ratio (OER), Capital Adequacy Ratio (CAR), and Non-Performing Loan (NPL)—were simultaneously included in the regression model without any variable being excluded. The absence of eliminated variables indicates that these three predictors are considered relevant for examining their relationship with the dependent variable, Return on Assets (ROA).

The modelling technique applied was the Enter method, in which all independent variables are introduced into the model simultaneously. This approach allows the researcher to evaluate the contribution of each variable to ROA without relying on automatic selection or elimination based on predictive strength. Consequently, all independent variables are tested equally in relation to their effect on the profitability of rural banks (BPR).

The objective of this analysis is to identify whether OER, CAR, and NPL exert a significant influence on ROA, both individually and collectively. The subsequent stage of the regression interpretation involves examining the Model Summary, ANOVA, and Coefficients tables to assess the strength of the relationships, the statistical significance of each variable, and the extent to which these predictors explain the variation in profitability among the observed rural banks.

3.2 Normality Test

One of the main prerequisites for applying parametric statistical analysis is that the residual data must follow a normal distribution. Therefore, before conducting hypothesis testing, a normality test

of the residuals is performed. A more reliable method for testing normality is the probability plot, which compares the cumulative distribution of the actual data with the cumulative distribution of a normal distribution. If the residuals are normally distributed, the points on the graph will align closely with the diagonal line.

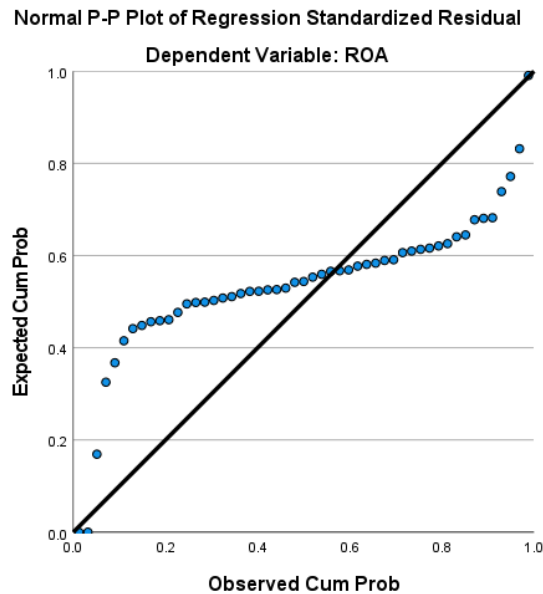


Figure 1 Normal P-Plot Chart
 Source: Data processed, 2025

Figure 1 presents the normality test, where most of the data points are distributed around the diagonal line, despite minor deviations observed at the beginning and end of the graph. This pattern remains acceptable and indicates that the residuals generally follow a normal distribution. Therefore, it can be concluded that the normality assumption is satisfied, making the data appropriate for further analysis using parametric statistical methods.

3.3 Uji Multikolinearitas

Table 3 presents the results of the multicollinearity test, showing that all independent variables—CAR, NPL, and OER—have tolerance values above 0.10 and VIF values below 10. In detail, the tolerance value for CAR is 0.927 with a VIF of 1.079; the tolerance value for NPL is 0.864 with a VIF of 1.158; and the tolerance value for OER is 0.851 with a VIF of 1.175. These findings confirm that there are no indications of multicollinearity among the independent variables in the regression model. Accordingly, the regression model used in this study fulfils the assumption of no high correlation among independent variables, making it suitable for further analysis.

Table 3 Multicollinearity Test

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	CAR	0.927	1.079
	NPL	0.864	1.158
	OER	0.851	1.175

Source: Processed Data (2025)

3.4 The autocorrelation test

The autocorrelation test aims to determine whether, in a linear regression model, there is a relationship or correlation between the error terms (residuals) in the current period (t) and those in

the previous period (t-1). If such a relationship exists, the model is considered to have an autocorrelation problem. One of the most commonly used methods for detecting autocorrelation is the Durbin-Watson (DW) test. The interpretation of DW values is based on the following criteria: if the DW value is less than 1.10, it indicates positive autocorrelation; if the DW value lies between 1.10 and 1.54, the result falls into an inconclusive region (no decision); if the DW value ranges from 1.55 to 2.46, it suggests the absence of autocorrelation; if the DW value falls between 2.46 and 2.90, it also belongs to the inconclusive category; and if the DW value exceeds 2.91, it indicates negative autocorrelation.

Table 4 Autocorrelation Test

Model	Model Summary ^b				
	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.744 ^a	0.554	0.525	3.78943	1.978
a. Predictors: (Constant), OER, CAR, NPL b. Dependent Variable: ROA Source: Processed Data (2025)					

Table 4 presents the Model Summary, providing an overview of the extent to which the constructed model explains the variation in profitability (ROA) of Rural Banks (BPR) based on three independent variables, namely OER, CAR, and NPL. The correlation coefficient (R) of 0.744 indicates a relatively strong relationship between these three independent variables and ROA. This suggests that the combination of OER, CAR, and NPL is significantly associated with the profitability performance of BPR in Tangerang City. Furthermore, the R Square value (coefficient of determination) of 0.554 indicates that approximately 55.4% of the variation in ROA can be explained by the model incorporating OER, CAR, and NPL. This implies that more than half of the changes in BPR profitability can be attributed to these three variables, while the remaining 44.6% is influenced by other factors outside the model, such as management quality, market interest rates, economic conditions, or marketing strategies. The Adjusted R Square value of 0.525 further supports this result, as the adjustment demonstrates that the model remains sufficiently robust despite including multiple independent variables, and does not suffer from overfitting.

Referring to the results of the autocorrelation test presented in Table 4, the Durbin-Watson value is 1.978. This value falls within the range of 1.55 to 2.46, indicating that the regression model does not exhibit autocorrelation. Therefore, it can be concluded that the regression model satisfies the assumption of no autocorrelation, making it valid and reliable as a basis for decision-making.

3.5 The heteroskedasticity test

The heteroskedasticity test is an essential diagnostic procedure in regression analysis, designed to evaluate whether the variance of the residuals remains constant across different levels of the independent variables. In an ideal regression model, the residuals should display homoscedasticity, meaning that their variances are stable and do not depend on the magnitude of the predicted values. If heteroskedasticity is present, it implies that the error variances are unequal, which can lead to inefficiency of the estimated coefficients, biased standard errors, and ultimately misleading statistical inferences. One of the most common techniques used to detect heteroskedasticity is the visual inspection of scatterplot graphs of residuals against predicted values. This method provides a straightforward way to observe whether the residuals are randomly distributed. If the points appear to be scattered randomly above and below the horizontal axis at zero, without forming any discernible pattern, the model can be considered free from heteroskedasticity. Conversely, if the scatterplot reveals systematic shapes, such as funnel-like widening or narrowing patterns, waves, or other structured forms, it indicates the existence of heteroskedasticity. Identifying heteroskedasticity is critical because, although it does not bias the regression coefficients, it undermines the reliability of hypothesis testing, making corrective measures such as robust standard errors or data transformation necessary to ensure valid conclusions.

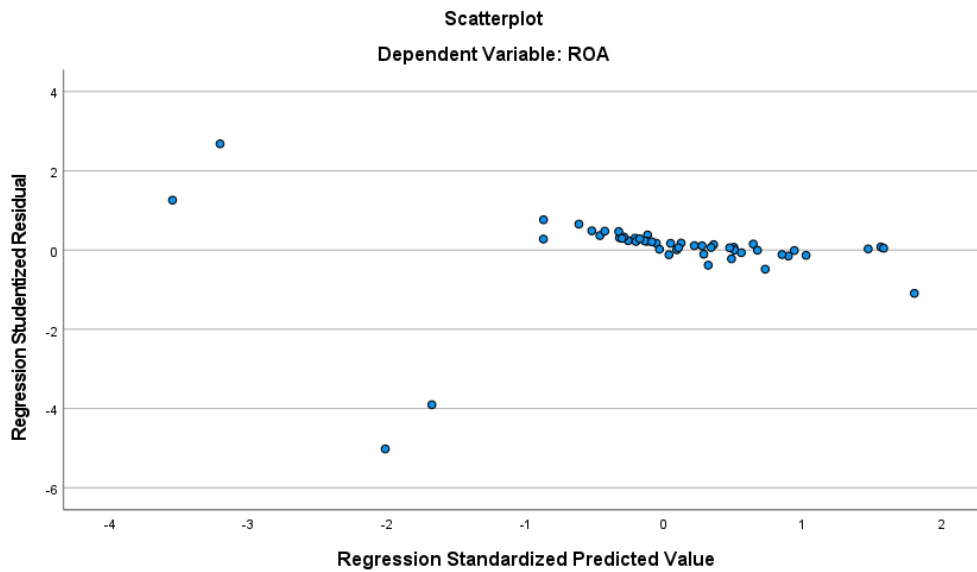


Figure 2. Graphic of Scatterplot
Source: Processed Data (2025)

Figure 2, which presents the scatterplot graph, shows that the data points are randomly distributed above and below both the X-axis and the Y-axis, without forming any specific pattern. This indicates that no symptoms of heteroskedasticity are detected in this study, thereby confirming that the regression model can be appropriately used for further analysis.

3.6 Multiple Linear Regression Analysis

In this study, the analytical technique employed to test the hypotheses is multiple linear regression analysis. This analysis aims to examine the extent to which the independent variables—CAR, NPL, and OER—affect the dependent variable, profitability (ROA), both simultaneously and partially. The study utilises SPSS version 27.0 software to obtain more precise and accurate analytical results. The general form of the regression equation model used in this study is as follows:

$$ROA = \alpha + \beta_1 KPMM + \beta_2 NPL + \beta_3 BOPO + \varepsilon \quad (1)$$

The results of the multiple linear regression analysis, based on data processing using SPSS version 27.0, are presented in Table 5 below.

Table 5. Multiple Regression Test Results

Model		Unstandardized Coefficients	
		B	Std. Error
1	(Constant)	23.155	3.287
	CAR	-0.002	0.02
	NPL	0.103	0.074
	OER	-0.253	0.034

Dependent Variabel: ROA
 Source: Processed Data (2025)

Table 5 presents the results of the analysis, which show that among the three independent variables tested—OER (Operating Expense Ratio) has a significant influence on ROA (Return on Assets). This is evidenced by a coefficient value of -0.253 and a significance level of 0.000, which is well below the 0.05 threshold. This finding implies that for every one-unit increase in OER, ROA decreases by 0.253 units, assuming other variables remain constant. The relationship is both

negative and significant, indicating that the higher the operating expenses relative to operating income (OER), the lower the profitability (ROA) of Rural Banks. Meanwhile, CAR (Capital Adequacy Ratio) has a coefficient of -0.002 with a significance value of 0.905, and NPL (Non-Performing Loan) has a coefficient of 0.103 with a significance value of 0.168. Both variables are statistically insignificant, as their p-values are far above 0.05. This suggests that variations in CAR and NPL do not directly affect ROA.

Model Feasibility Test (F Test)

This test is conducted to determine whether all independent variables included in the model jointly influence the dependent variable. The model's goodness-of-fit is assessed using a significance level of 0.05. If the F significance value is less than 0.05, the independent variables simultaneously exert a significant effect on the dependent variable. Conversely, if the F significance value is greater than 0.05, the independent variables do not have a significant effect on the dependent variable. The results of the model feasibility test using the F-statistic are presented in Table 6.

Table 6. Statistical Test Results F

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	837.287	3	279.096	19.436	0.000 ^b
	Residual	674.911	47	14.36		
	Total	1512.199	50			
a. Dependent Variable: ROA						
b. Predictors: (Constant), OER, CAR, NPL						

Table 6 presents the regression model involving the variables OER, CAR, and NPL, which is statistically significant in explaining the variation of the dependent variable, ROA. This is evidenced by the F-statistic value of 19.436 and a significance level (p-value) of 0.000, which is far below the threshold of 0.05. This finding indicates that, overall, the three independent variables simultaneously have a significant effect on ROA in Rural Banks (BPR) in Tangerang City. The Sum of Squares values further demonstrate that the model accounts for a substantial portion of the variation in ROA, with the regression sum of squares amounting to 837.287, which is greater than the residual sum of squares at 674.911. The total variation in ROA explained by the model is 1,512.199, which combines both the explained and unexplained components.

In terms of degrees of freedom (df), the model utilises 3 df for regression, consistent with the number of independent variables, and 47 df for residuals, corresponding to the total number of observations (51) minus the number of estimated parameters in the model. Furthermore, the Mean Square Regression value of 279.096, which is substantially higher than the Mean Square Residual value of 14.360, reinforces the evidence that the model effectively captures a significant relationship between the independent variables and ROA. Overall, these results confirm that the regression model is appropriate for analysing the influence of OER, CAR, and NPL on the profitability of Rural Banks.

Determinant Coefficient Test (R²)

The coefficient of determination (R²) is used to measure the extent to which the model is capable of explaining the variation in the dependent variable. The value of the coefficient of determination ranges from zero to one. The closer the value is to zero, the weaker the influence of the independent variables on the dependent variable. Conversely, the closer the value is to one, the stronger the influence of the independent variables on the dependent variable. In this analysis, the Adjusted R Square is employed instead of the R Square, as the R Square tends to be biased by the number of independent variables included in the model. Adjusted R Square is considered more accurate because its value may increase or decrease when additional independent variables are introduced into the model. The results of the coefficient of determination (R²) test are presented as follows:

Table 7. Determination Coefficient Test Results (R2)

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.744a	0.554	0.525	3.78943
a. Predictors: (Constant), OER, CAR, NPL				
b. Dependent Variable: ROA				

The Model Summary results of the linear regression analysis showed how well the model explained the variation in profitability (ROA) of Rural Banks (BPR) using three independent variables: OER, CAR, and NPL. The correlation coefficient (R) reached 0.744 and indicated a strong relationship between these variables and ROA. The combination of OER, CAR, and NPL is significantly related to the profitability performance of BPR in Tangerang City. The R Square value measured 0.554 and revealed that 55.4% of the variation in ROA was explained by the model. The remaining 44.6% resulted from other factors outside the model, such as management quality, market interest rates, economic conditions, or marketing strategies. The Adjusted R Square value stood at 0.525 and confirmed that the model remained reliable even with multiple independent variables included, without signs of overfitting.

Hypothesis Testing (Statistical Test)

The t-test measured the significance of the effect of each independent variable on the dependent variable individually. This test aimed to determine whether a hypothesis was accepted or rejected by comparing the significance value (sig t) of each independent variable with the significance level $\alpha = 0.05$. If the significance value was less than 0.05, the hypothesis was accepted, meaning the independent variable had a significant effect on the dependent variable. In contrast, if the significance value was greater than 0.05, the hypothesis was rejected, indicating that the independent variable did not have a significant effect on the dependent variable. The results of the t-test are presented as follows:

Table 8 Analysis of t Test

Model		Unstandardized Coefficients		
		(B)	t	Sig.
1	(Constant)	23.155	7.044	0.000
	CAR	-0.002	-0.12	0.905
	NPL	0.103	1.399	0.168
	OER	-0.253	-7.38	0.000
a. Dependent Variable: ROA				

Based on the results of the t-test, the analysis showed that among the three independent variables tested—OER, CAR, and NPL—only OER (Operating Expense Ratio) had a significant effect on ROA (Return on Assets). The coefficient value of -0.253 and the significance level of 0.000, which was well below the 0.05 threshold, confirmed this result. The finding meant that every one-unit increase in OER reduced ROA by 0.253 units, assuming other variables remained constant. The relationship was negative and significant, indicating that higher operating expenses relative to income lowered the profitability of Rural Banks. CAR (Capital Adequacy Ratio) recorded a coefficient value of -0.002 with a significance level of 0.905, while NPL (Non-Performing Loan) showed a coefficient value of 0.103 with a significance level of 0.168. Neither variables did not significantly affected ROA, as their p-values were far above 0.05. This result implied that changes in CAR and NPL did not directly influence ROA. From the perspective of standardised coefficients (beta), OER recorded a value of -0.780, showing that among the three variables, OER contributed the most in explaining variations in ROA. In contrast, CAR had a beta value of -0.012 and NPL had a beta value of 0.147, which were relatively small, reinforcing the conclusion that their effects on ROA were not dominant.

Overall, operating efficiency reflected in the OER ratio emerged as the most important factor influencing the profitability (ROA) of Rural Banks, while CAR and NPL showed no direct significant

effects. Therefore, from a managerial perspective, BPR management should prioritise controlling operating expenses to enhance profitability.

4. Discussion

4.1 The Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Operating Expense Ratio (OER) simultaneously affect the profitability (ROA) of Rural Banks (BPR)

Hypothesis H1 tested the simultaneous effect of the Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), and Operating Expense Ratio (OER) on the profitability (ROA) of Rural Banks in Tangerang City. The ANOVA table analysis showed that the regression model, which included OER, CAR, and NPL, was statistically significant in explaining the variation in ROA. The F-statistic value of 19.436 with a significance level (p-value) of 0.000, which was far below the 0.05 threshold, confirmed this result. Therefore, the three independent variables jointly had a significant effect on ROA in Rural Banks in Tangerang City, meaning that H1 was accepted. The results of this study aligned with research on Rural Banks in Batam City, research on 38 commercial banks listed on the Indonesia Stock Exchange, research on state-owned commercial banks registered on the Indonesia Stock Exchange, and research on Islamic banks in Indonesia, which showed that CAR, NPL, and OER simultaneously influenced profitability (ROA) (Afandi et al., 2024; Debora et al., 2023; Yahdillah et al., 2024)

4.2 The Capital Adequacy Ratio (CAR) significantly affects the profitability (ROA) of Rural Banks.

Hypothesis H2 tested the effect of the Capital Adequacy Ratio (CAR) on the profitability (ROA) of Rural Banks in Tangerang City. However, the test of the CAR variable showed a coefficient of -0.002 with a significance value of 0.905, which did not significantly affect ROA because the p-value was far above 0.05. Therefore, H2 was rejected.

The results of this study aligned with research on Rural Banks in Riau Province, Pontianak City, and Southeast Sulawesi Province, as well as studies on BRI Bank, Commercial Banks categorised as Book IV, and State-Owned Banks, all of which showed that CAR did not relate to ROA (Afandi et al., 2024; Rifansa et al., 2022; Syahrul et al., 2024; Wulandari et al., 2024). The OJK regulation requires Rural Banks (BPR) to maintain a minimum CAR of 8%, which obliges BPRs to prepare reserve funds to comply with this requirement as well as to anticipate the risk of non-performing loans. The limitation in credit distribution also reduced income generation, even though the CAR remained relatively high (Circular Letter of the Financial Services Authority of the Republic of Indonesia Number 11/SEOJK.03/2022 concerning the Assessment of the Soundness Level of Rural Banks and Islamic Rural Banks, 2022). High capital served as a buffer against risk, but if not accompanied by credit expansion or cost efficiency, its contribution to profitability remained very limited. An adequate CAR was essential for BPRs to maintain public trust in placing their funds in BPRs as a source of low-cost financing for credit distribution (Afandi et al., 2024).

4.3 The Non-Performing Loan (NPL) significantly affects the profitability of Rural Banks (BPR)

Hypothesis H3 tested whether the Non-Performing Loan (NPL) ratio significantly affected the profitability (ROA) of Rural Banks in Tangerang City. However, the test of the NPL variable showed a coefficient of 0.103 with a significance value of 0.168, which did not significantly affect ROA because the p-value was far above 0.05. Therefore, H3 was rejected.

The results of this study supported previous research that demonstrated NPL did not affect the profitability (ROA) of Rural Banks. This finding was consistent with studies on Rural Banks in Riau Province, Pontianak City, Batam City, Tabanan Regency, Semarang City, as well as studies on BRI Bank, Book IV Commercial Banks, and Commercial Banks in Southeast Asia (Afandi et al., 2024; Debora et al., 2023; Rifansa et al., 2022; Sunaryo, 2020; Susilawati et al., 2021; Syahrul et al., 2024). NPL in Tangerang City, on average exceeded the minimum threshold of 5% set by OJK, but it did not affect the profitability of Rural Banks. This result indicated that Rural Banks had become more cautious in extending credit. Although risks existed, they could still be covered by the capital adequacy maintained by Rural Banks. To reduce risks in credit distribution, Rural Banks

financed productive business sectors by strengthening credit analysis and requiring sufficient collateral.

4.4 The Operating Expense Ratio (OER) significantly affects the profitability of Rural Banks (BPR)

Hypothesis H4 tested whether the Operating Expense Ratio (OER) significantly affected the profitability (ROA) of Rural Banks in Tangerang City. The results of the t-test showed that OER had a significant effect on ROA. The coefficient value of -0.253 with a significance level of 0.000, which was far below the 0.05 threshold, confirmed this result. The finding meant that every one-unit increase in OER reduced ROA by 0.253 units, assuming other variables remained constant. The relationship was negative and significant, indicating that higher operating expenses relative to income lowered the profitability of Rural Banks. Therefore, H4 was accepted.

Thus, operational efficiency (OER) had a strong negative effect on ROA. The higher the OER, the lower the ROA, indicating that high operating expenses reduced the profitability of Rural Banks in Tangerang City. In line with Signalling Theory, the findings showed that financial statements reflected the condition of the bank and could be used by investors in decision-making. In the banking context, the information referred to how the products offered by the bank could influence the profitability earned. The results also aligned with previous studies on Rural Banks in Riau Province, Semarang City, and Pontianak City, as well as on Commercial Banks, State-Owned Banks, and Islamic Banks in Indonesia, which demonstrated that OER is negatively related to the ROA of Rural Banks (Afandi et al., 2024; Syahrul et al., 2024; Yahdillah et al., 2024).

5. Conclusion

The study of Rural Banks (BPR) profitability in Tangerang City provides an important addition to the broader literature on financial performance in the micro-banking sector. Previous empirical works have largely concentrated on commercial or state-owned banks, creating a research gap in understanding the determinants of BPR profitability at the local level. This study thus advances the state of the art by contextualising the influence of Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), and Operating Expense Ratio (OER) within the specific environment of microfinance institutions that operate under different risk structures and business models compared to larger banks. By integrating signalling theory into the analysis, the research highlights the role of financial disclosures as credibility-enhancing signals for external stakeholders, thereby reinforcing the relevance of examining efficiency, risk, and capital management simultaneously. The purpose of this research was to investigate the extent to which CAR, NPL, and OER affect the Return on Assets (ROA) of BPRs in Tangerang City during 2021–2023. Employing a quantitative approach with regression analysis, the study sought to generate empirical evidence that could serve as a basis for managerial strategies and regulatory policies aimed at strengthening micro-banking resilience.

The main findings indicate that, when tested simultaneously, CAR, NPL, and OER significantly influence ROA. However, in partial testing, only OER has a statistically significant and negative effect on profitability, while CAR and NPL do not directly influence ROA. This suggests that operational efficiency is the dominant determinant of profitability for BPRs, with excessive operating expenses acting as a major constraint to financial performance. These results underline the managerial importance of efficiency improvements as a pathway to sustaining competitiveness and profitability in micro-banking institutions. The study has limitations that must be acknowledged. The analysis relied solely on secondary data from BPR financial statements within a relatively short observation period of three years, which may not fully capture long-term dynamics or external shocks. Additionally, other factors such as managerial quality, macroeconomic conditions, or customer structure were not included in the model, leaving room for future studies to adopt broader variables or mixed-method approaches. This research contributes to enhancing the empirical understanding of BPR financial performance, offering valuable insights for both practitioners and policymakers. For managers, the findings stress the necessity of controlling operational expenses to achieve sustainable profitability. For regulators, the evidence provides a foundation for refining

microprudential policies tailored to the unique conditions of BPRs, thereby strengthening their role in regional economic stability.

6. References

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