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RESEARCH ARTICLE

The Effect of Non-Performing Loans, Loan to Deposit Ratio, and Capital Adequacy Ratio on Profitability in State-Owned Banks for the 2018-2024 Period

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Abstract
This study aims to examine the influence of Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Capital Adequacy Ratio (CAR) on profitability measured using Return on Assets (ROA) in state-owned banks listed on the Indonesia Stock Exchange for the 2018–2024 period. The research approach used is quantitative with multiple linear regression analysis methods. The research data is sourced from the annual reports of four state-owned banks, namely PT Bank Rakyat Indonesia Tbk, PT Bank Negara Indonesia Tbk, PT Bank Mandiri Tbk, and PT Bank Tabungan Negara Tbk. The analysis process is carried out through a partial test (t-test), simultaneous test (F-test), and calculation of the determination coefficient (R^2). The results of the study revealed that partially, NPL had a significant negative influence on ROA with a regression coefficient value of -0.772 and a significance level of 0.000 < 0.05. The LDR variable did not show a significant effect on ROA with a significance of 0.092 > 0.05, nor did CAR which also had no significant effect with a significance of 0.648 > 0.05. However, simultaneously these three variables were shown to have a significant effect on ROA with F calculated at 19.744 greater than F in table 2.99 and Adjusted R^2 value of 0.676. This means that 67.6% of ROA variations can be explained by NPLs, LDRs, and CARS, while the remaining 32.4% are influenced by other factors outside of this research model.

Keywords
NPL; LDR; CAR; ROA.

1 | INTRODUCTION

Indonesia's economy is supported by various sectors, one of the most critical being the Micro, Small, and Medium Enterprises (MSMEs) sector, which serves as a driving force for the national economy. MSMEs make a significant contribution to job creation, income generation, and economic stability, particularly in times of economic uncertainty. As the backbone of Indonesia's economy, MSMEs not only provide livelihoods for millions of Indonesians but also play a pivotal role in the country's growth, accounting for a large proportion of employment and economic activity. They have a wide-reaching influence, affecting sectors such as manufacturing, services, agriculture, and retail. According to Aprilia et al. (2025), MSMEs are an essential contributor to the Indonesian economy, with their ability to withstand economic fluctuations and adapt to local market conditions further enhancing their importance.

Despite their significance, MSMEs face significant challenges, particularly in terms of access to capital. Many MSMEs struggle with limited financial resources, hindering their growth potential and ability to scale operations. This limited access to financing prevents them from expanding, investing in new technologies, or even maintaining their operations during periods of economic stress. To overcome these challenges, MSMEs often seek financing support from financial institutions. Among these, banks play a crucial role as intermediaries between those who have excess funds and those who need financial assistance. They help channel financial resources from depositors to borrowers, enabling businesses to grow and thrive. The banking sector, particularly in Indonesia, plays a substantial role in economic development, contributing significantly to the national Gross Domestic Product (GDP).

State-owned banks are central to the financial system in Indonesia, with a strategic role in ensuring that funds are available for critical sectors such as MSMEs. These banks not only provide funding to large corporations but also cater to small businesses, which are essential to the economy. According to Muhammad & Lubis (2025), state-owned banks control approximately 40% of the total banking assets in Indonesia, and they play an essential role as government agents in distributing credit, particularly to MSMEs. These banks are integral to the financial infrastructure, and their role in promoting inclusive economic growth cannot be overstated. Four major state-owned banks listed on the Indonesia Stock Exchange (IDX) are recognized as pillars of the country's banking sector. These include PT Bank Rakyat Indonesia (Persero) Tbk (BRI), PT Bank Negara Indonesia (Persero) Tbk (BNI), PT Bank Mandiri (Persero) Tbk (Mandiri), and PT Bank Tabungan Negara (Persero) Tbk (BTN).

Each of these state-owned banks has a specific focus and plays a unique role in the economy. BRI, for instance, is widely known as an MSME-oriented bank, providing financing and tailored products to small and medium-sized enterprises across the country. PT Bank Mandiri, on the other hand, serves a broader customer base, including various corporate and retail segments, with a focus on providing a range of banking services. BNI has distinguished itself by offering innovative products to corporate customers, while BTN specializes in housing financing, contributing to the government's efforts to address Indonesia's housing needs.

While these state-owned banks have consistently demonstrated stable financial performance, as evidenced by a healthy Return on Assets (ROA), they are not without their challenges. The onset of the COVID-19 pandemic exacerbated issues such as rising Non-Performing Loans (NPLs), as businesses, particularly MSMEs, struggled to repay loans due to the economic impact of the pandemic. Furthermore, the banking sector is facing increasing competition from private banks and emerging financial technologies (fintech). Fintechs, with their ability to offer innovative and digitalized financial services, have become formidable competitors, particularly in terms of providing quick and convenient access to credit for MSMEs. As the financial landscape evolves, state-owned banks must adapt to these challenges while continuing to support Indonesia's MSMEs and real sector financing. Their ability to balance traditional banking services with digital innovation will be key to their continued success and relevance in the market.

The role of state-owned banks in Indonesia is critical to ensuring that MSMEs have access to the financing they need to succeed and thrive. While these banks have shown resilience in the face of challenges, they must continue to innovate and adjust their strategies to meet the evolving needs of the market and maintain their leadership in the Indonesian financial sector.

2 | BACKGROUND THEORY

2.1 NonPerforming Loan (NPL)

Non Performing Loan (NPL) adalah rasio yang membandingkan antara total kredit bermasalah terhadap total kredit yang distributed in the form of percentages. Non-performing loans are loans that are included in the category of less current, doubtful, and stuck.(Khairi, 2021) According (Muniru et al., 2025)to said that: "Non-performing loans are a situation in which the customer is no longer able to pay part or all of his obligations to the bank as he has promised." According to (Alnabulsi & Kozarevi, 2023)bad loans (NPL) are classified into three subs, namely non-current loans, doubtful loans and bad loans.

$$\text{NPL} = \frac{kredit\ bermasalah}{total\ kredit} \times 100\%$$

2.2 Loan To Deposit Ratio (LDR)

Loan to Deposit Ratio (LDR) is a ratio that measures how much loan a bank provides compared to the number of deposits it receives from customers. This is an important indicator in assessing the financial health of banks and their propensity in granting credit.(Putu et al., 2025) According to (Kusnandar et al., 2019) LDR is a ratio to measure the composition of the amount of credit provided compared to the amount of public funds and own capital used. Meanwhile, according to (Carlos et al., 2023) the definition of Loan to Deposit Ratio is: "LDR is one of the indicators of bank health. Liquidity assessment is an assessment of a bank's ability to maintain an adequate level of liquidity and adequacy of liquidity ratio management. LDR is most often used by financial analysts in assessing a bank's performance, especially from the total amount of credit provided by the bank with the funds received by the bank".

$$\text{NPL} = \frac{kredit\ bermasalah}{total\ kredit} \times 100\%$$

2.3 Capital Adequacy Ratio (CAR)

Capital Adequacy Ratio (CAR) is a capital adequacy ratio that shows the bank's ability to bear the risk of losses that may occur due to credit activities or other risky assets. In the context of banking, CAR reflects how much of the bank's own capital is able to cover the risk losses incurred by risky assets (credits, securities, participation, etc.). (Rizaldy et al., 2025) CAR is a comparison between bank capital and risk-weighted assets (ATMR), where the government requires a minimum CAR value of 8% as a standard of bank health. According to ,(Capital, 2020) ATMR or Risk-Weighted Assets is a measure in which Loans have the highest risk weight. Credit also acts as the main source of income for the Bank. As the number of Credits increases, the total ATMR will also increase, which in turn can result in a decrease in the CAR. CAR is the main indicator of a bank's health in terms of capital and resilience to the risk of business losses. The higher the value of the CAR, the better the bank's resilience to deal with credit risk and maintain the trust of third parties (customers and regulators).

$$\text{CAR:} \frac{Total\ Modal}{Total\ ATMR} \times 100\%$$

2.4 Return On Assets (ROA)

Return On Assets (ROA) is a key financial metric that measures a bank's ability to generate profits from its assets. It is calculated by dividing the bank's pre-tax profit by its average total assets over a specific period. ROA provides valuable insight into how efficiently a bank is utilizing its resources to produce earnings. A higher ROA indicates that the bank is effectively leveraging its assets to generate more profit, which is a sign of operational efficiency and financial health. Conversely, a lower ROA may suggest underperformance in asset utilization. As such, ROA is often used by investors and analysts to assess a bank's profitability relative to its asset base, and it serves as an important indicator of financial performance (Bank & Di, 2015).

$$\text{ROA} = \frac{Laba\ Bersih\ Setelah\ Pajak}{Total\ Asset} \times 100\%$$

3 | METHOD

This study utilizes a quantitative approach, specifically employing multiple linear regression analysis to examine the relationship between various factors and the financial performance of state-owned banks. The data used in this analysis are secondary data, sourced from the annual financial reports of state-owned banks listed on the Indonesia Stock Exchange (IDX) for the period 2018–2024. The sample consists of four major state-owned banks: PT Bank Rakyat Indonesia (Persero) Tbk, PT Bank Negara Indonesia (Persero) Tbk, PT Bank Mandiri (Persero) Tbk, and PT Bank Tabungan Negara (Persero) Tbk. These banks were selected based on their significance in the Indonesian financial system, and the total number of observations is 28, covering multiple years for each institution. The research model employed in the study is.

$$ROA = \alpha + \beta 1\ (NPL) + \beta 2\ (LDR) + \beta 3\ (CAR) + \varepsilon$$

Where:
ROA = Return on Assets
NPL = Non-Performing Loan
LDR = Loan to Deposit Ratio
CAR = Capital Adequacy Ratio
α = Constant
β = Regression Coefficient
ε = Error term

The data analysis technique involves several steps, beginning with descriptive statistics to summarize the key features of the data. Classical assumption tests are conducted to ensure the validity of the regression model, including tests for normality, multicollinearity, heteroscedasticity, and autocorrelation. Finally, hypothesis testing is performed using t-tests, F-tests, and the Coefficient of Determination (R^2), which measures the proportion of variance in the dependent variable that is predictable from the independent variables. This comprehensive analysis allows for a detailed understanding of the factors affecting the return on assets in the selected state-owned banks.

4 | RESULTS AND DISCUSSION

4.1 Results

The One-Sample Kolmogorov-Smirnov Test was performed to check the normality of the data distribution. This test compares the observed sample distribution to a normal distribution, helping to determine if there is a significant difference. The outcomes of the test, shown in Table 1, include the test statistic and significance values. A significant result indicates that the data does not follow a normal distribution, while a non-significant result suggests that the data is normally distributed. This step is essential for validating the assumptions required for conducting further analyses, such as multiple linear regression.

Table 1. One-Sample Kolmogorov-Smirnov Test

N	28
Normal Parameters	
Mean	0.0000000
Standard Deviation	0.00494775
Most Extreme Differences	
Absolute	0.103
Positive	0.075
Negative	-0.103
Test Statistic	0.103
Asymp. Sig. (2-tailed)	0.200

a. Test distribution is Normal.
b. Calculated from data.
c. Lilliefors Significance Correction.
d. This is a lower bound of the true significance.

The test results listed in the table show the value of Asymp. Sig. (2-tailed) is 0.200. This value is significantly greater than the critical limit of 0.05, indicating that the distribution of the sample data does not show significant differences with the normal distribution. Thus, it can be concluded that the data used in this study meet the assumption of normality, thus making it possible to proceed with the relevant parametric statistical analysis.

Table 2. Multicollinearity Test

No.	Variable	Mean	Standard Deviation
1	X1_NPL	0.786	1.272
	X2_LDR	0.842	1.188
	X3_CAR	0.842	1.187

Since all Tolerance values exceed the threshold of 0.10 and all Variance Inflation Factor (VIF) values are below the critical value of 10.00, it can be confidently concluded that multicollinearity does not pose any issues in this regression model. This indicates that the independent variables do not exhibit high correlations with each other, ensuring the reliability of the regression results. The absence of multicollinearity suggests that each predictor variable contributes

uniquely to explaining the dependent variable.

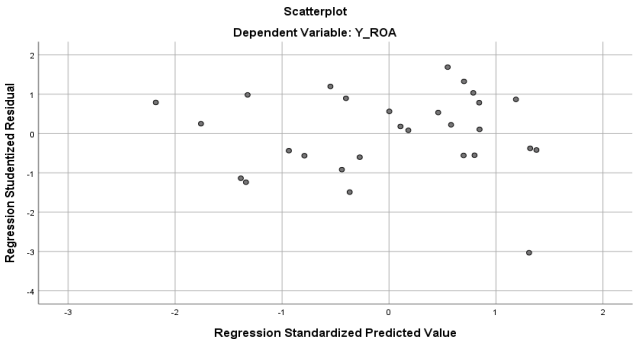

Figure 1. Scatter Plot Dependent ROA

Based on the Scatterplot graph above, it can be seen that the data points are scattered randomly and do not form a specific pattern. The points are scattered around the number 0, both above and below the Y axis. Thus, it can be concluded that there is no heteroscedasticity problem in this regression model, and that the model meets the homoscedasticity assumption. This shows that residual variance is constant and the results of regression analysis are reliable.

Table 3. Autocorrelation Test

Unstandardized Residual	
Test Value	0.00069
Cases < Test Value	14
Cases >= Test Value	14
Total Cases	28
Number of Runs	9
Z	-2.118
Asymp. Sig. (2-tailed)	0.034

The results indicate that the residual variance remains constant, which is a positive sign, suggesting that the assumptions of the regression model are met, and the analysis results are reliable. Additionally, the Runs Test results, as shown in the table, indicate that the Asymp. Sig. (2-tailed) value is 0.034, which is less than the threshold of 0.05. This further confirms that there are no indications of autocorrelation in the model. Therefore, the linear regression analysis can proceed without concerns regarding this assumption.

Table 4. Multiple Linear Regression Analysis Test

Model	Unstandardized Coefficients	Standardized Coefficients	t	Sig.
	B	Std. Error	Beta	
1	(Constant)	0.055	0.018	
	X1_NPL	-0.772	0.106	-0.901
	X2_LDR	-0.019	0.011	-0.210
	X3_CAR	-0.022	0.048	-0.055

Based on the results of the Multiple Linear Regression Analysis, the equation is interpreted as follows. Y_ROA = 0.055 - 0.772 (X1_NPL) - 0.019 (X2_LDR) - 0.022 (X3_CAR) The multiple regression analysis above can be interpreted as follows: the constant value in this regression equation is 0.055. This value indicates that if the variables NPL (X1), LDR (X2), and CAR (X3) are at zero, the value of ROA (Y) will be 0.055. Statistically, this constant is significant (Sig. 0.05 < 0.05). The regression coefficient for NPL (X1) is -0.772, suggesting that NPLs have a negative impact on ROA. This means that for every increase of one unit in NPL, ROA tends to decrease by 0.772, assuming the other variables remain constant. This effect is statistically significant (Sig. 0.000 < 0.05). The regression coefficient for LDR (X2) is -0.019, indicating that LDR has a negative effect on ROA. This means that an increase of one unit in LDR will likely decrease ROA by 0.019, assuming the other variables remain unchanged. However, this effect is not statistically significant (Sig. 0.092 > 0.05). Finally, the regression coefficient for CAR (X3) is -0.022, suggesting that CAR also has a negative influence on ROA. This implies that for every increase of one unit in CAR, ROA tends to decrease by 0.022, assuming the other variables are constant. This effect is not statistically significant (Sig. 0.648 > 0.05).

Table 5. Determination Coefficient Test

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.844	0.712	0.676	0.00525	1.114

a. Predictors: (Constant), X3_CAR, X2_LDR, X1_NPL
b. Dependent Variable: Y_ROA

Based on the Model Summary table, the results of the analysis show, R value (Correlation Coefficient): R value of 0.844 or 84.4% indicates that there is a strong relationship between independent variables (NPL, LDR, and CAR) and dependent variables (ROA), Adjusted R Square value (Coefficient of Determination): The Adjusted R Square value is 0.676 or 67.6%. This means that 67.6% of the total variation in the Return on Assets (ROA) variable can be explained by the variation that occurs in the NPL, LDR, and CAR variables simultaneously. Remaining Variation: The remainder, which is 32.4% (100% - 67.6%), is a contribution of other variables that were not included or not studied in this regression model.

Table 6. Partial Test Results (t-test)

Model	Unstandardized Coefficients B	Standardized Coefficients Std. Error	t Beta	Sig.
1	(Constant)	0.055	0.018	
	X1_NPL	-0.772	0.106	-0.901
	X2_LDR	-0.019	0.011	-0.210
	X3_CAR	-0.022	0.048	-0.055

a. Dependent Variable: Y_ROA

Partial t-test is used to test the significance of the influence of each independent variable on the dependent variable individually. The test criteria were based on a comparison of Sig. values with a significance level of 0.05. If the Sig. value < 0.05, then the variable has a significant influence. The effect of X1_NPL on the Y_ROA Significance value (Sig.) for the X1_NPL variable is 0.000. Since the Sig. value is 0.000 < 0.05, it can be concluded that X1_NPL has a significant influence on Y_ROA. The effect of X2_LDR on Y_ROA Significance value (Sig.) for the X2_LDR variable is 0.092. Since the Sig. value is 0.092 > 0.05, it can be concluded that X2_LDR has no significant effect on Y ROA. The effect of X3_CAR on Y_ROA Significance value (Sig.) for the X3_CAR variable was 0.648. Since the Sig. value is 0.648 > 0.05, it can be concluded that X3_CAR has no significant influence on Y_ROA.

Table 7. Simultaneous Test Results (f-Test)

Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.002	3	0.001	19.744
	Residual	0.001	24	0.000	
	Total	0.002	27		

a. Dependent Variable: Y_ROA
b. Predictors: (Constant), X3_CAR, X2_LDR, X1_NPL

Based on the ANOVA table, a simultaneous F test is performed to test the influence of all independent variables together on the dependent variables. Using a significance level of 0.05, the number of samples (n) 28, and the number of independent variables (k) 3, the value of the F table can be searched on the distribution table F. Where f table is obtained at 2.99, then compared to F calculation which is 19.744 > F Table 2.99, it can be concluded that there is a significant influence between all independent variables and the ROA variable.

4.2 Discussion

The Effect of Non-Performing Loans on Profitability

In the research that has been carried out, it can be found that the t-test value between Non-Performing Loans Against Profitability Significant Value 0.000 < 0.05 partial test results from t calculate < t table Where -7,288 < 2.06390. From the partial test findings, it was found that Non-Performing Loans have a significant and negative influence on Profitability (ROA). The results of this study show that the higher the non-performing loan (NPL) ratio in state-owned banks, the greater the risk that must be borne by banks. This risk makes the interest income that should be received not run optimally, due to delays and inability of the debtor to pay off his obligations. This has caused several direct impacts, including declining interest receipts because non-performing loans are unable to make optimal contributions. The burden of reserves increased as banks were required to provide Proposed Impairment Losses (CKPN) on non-performing loans so that net profit was depressed. Operational costs increased due to problematic handling, restructuring, and debt collection activities. The level of investor and customer confidence decreases, which then has an impact on increasing funding costs and a reduction in banks' ability to expand productive credit. The findings of this study are in line with previous research

conducted by (Tahu et al., 2023) with the title The Effect of Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL) and Loan to Deposit Ratio (LDR) on Profitability in Banking Companies on the Indonesia Stock Exchange which shows that based on the results of the study, Non-Performing Loans (NPL) have a negative and significant effect on profitability.

The Effect of Loan to Deposit Ratio on Profitability.

In the research that has been carried out, it can be found that the t-test value between the Loan to Deposit Ratio to Profitability is Significant Value 0.092 > 0.05 the partial test result of t calculating < t table Where -1.757 < 2.06390. From the partial test findings, it was found that the Loan to Deposit Ratio did not have a significant influence on Profitability (ROA). These results show that the level of credit disbursement measured through LDR does not necessarily have a direct impact on increasing bank profitability. This can happen for several reasons. Namely, the high LDR ratio does not always reflect the efficiency of credit disbursement. If the loans disbursed are not managed properly or increase the risk of non-performing loans (NPLs), the expected profits will not be achieved and can even reduce profitability. The relationship between LDR and ROA is not always linear. An LDR that is too low indicates that public funds are not being used optimally, while an LDR that is too high can cause liquidity problems and increase the risk of default. This condition causes high LDR to not have a positive impact on ROA.The findings of this study are in line with the findings carried out by (Manajemen & Ageng, 2025)with the title The Influence of CAR, NPL, LDR, GDP and Inflation on ROA in National Foreign Exchange Private Commercial Banks Listed on the Indonesia Stock Exchange for the 2017-2021 Period, which shows that the Loan to Deposit Ratio (LDR) does not have a significant effect on Return On Asset (ROA).

The Effect of Capital Adequacy Ratio on Profitability.

In the research that has been carried out, it can be found that the t-test value between the Capital Adequacy Ratio to Profitability is 0.648 > 0.05 the partial test result of t calculates < t table Where -462 < 2.06390. From the partial test results, it was found that the Capital Adequacy Ratio also did not have a significant influence on Profitability (ROA). These results show that the level of capital adequacy owned by banks, as reflected in CAR, is not necessarily directly related to the level of profitability (ROA). There are several reasons that support these findings. Namely, large capital does provide a guarantee of security and resilience for banks in facing risks, but it is not necessarily optimized in the form of credit distribution or investment that can increase profits. In other words, high capital functions more as a buffer (risk buffer) than as an instrument to increase profitability directly. The high CAR can actually reflect that most of the funds are deposited as capital, not used for productive activities that generate interest income. This can make profitability not increase even though banks have high capital adequacy. The findings of this study are in line with previous research according to (Damayanti & Indrabudiman, 2024)with the research title The Effect of Capital Adequacy Ratio, Operating Expenses and Operating Income, Loan To Deposit Ratio, and Non-Performing Loan on Banking Profitability which shows that Capital Adequacy Ratio (CAR) has no effect on Profitability

The Effect of Non-Performing Loan, Loan to Deposit Ratio and Capital Adequacy Ratio on Profitability.

Based on the results of the hypothesis test, the results of the anova test were obtained that the value of Fcal > Ftable where 19,744 > 2.99 and the significance level was 0.000 < 0.05. From the results of the test, it was obtained that simultaneously NonPerforming Loan, Loan to Deposit Ratio, and Capital Adequacy Ratio have a significant influence on Profitability (ROA). This research indicates that although NPLs, LDRs, and CAR do not always have a significant effect on ROA, together they have an important role in determining the profitability of banks. NPLs affect ROA through increasing the risk of non-performing loans, LDR reflects the extent to which the funds raised can be channeled productively, while CAR shows the bank's capital ability to deal with risks. Therefore, the combination of asset quality, liquidity management, and capital adequacy can encourage increased profitability, so the bank's performance needs to be assessed comprehensively, not just from one indicator The findings of this study are in line with the findings conducted by) (Tahun et al., 2021) with the research title The Influence of CAR, NPL, LDR ON Bank Profitability (Roa) in 2017-2019, which shows that simultaneously CAR, NPLs and LDRs have a significant effect on Profitability.

5 | CONCLUSIONS AND FUTURE WORK

From the results of the analysis and discussion that have been explained previously, conclusions can be drawn from the study on the Effect of Non-Performing Loans, Loan to Deposit Ratio and Capital Adequacy Ratio on the Profitability of Banks Listed on the Indonesia Stock Exchange for the 2018-2024 Period as follows: The results of the study partially show that Non-Performing Loans has a significant and negative influence on the Profitability (ROA) of Banks listed on the Indonesia Stock Exchange for the 2018-2024 period. The results of the study partially show that the Loan to Deposit Ratio does not have a significant influence on the Profitability (ROA) of Banks listed on the Indonesia Stock Exchange Tbk for the 2018-2024 period. The results of the study partially show that the Capital Adequacy Ratio also does not have a significant influence on the Profitability (ROA) of state-owned banks

listed on the Indonesia Stock Exchange Tbk for the 2018-2024 period. Simultaneously, it shows that the variables of Non-Performing Loan, Loan to Deposit Ratio, and Capital Adequacy Ratio have a significant influence on the Profitability (ROA) of SOEs listed on the Indonesia Stock Exchange for the 2018-2024 period.

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