

Determinants Of Financial Performance in The Indonesian Banking Sector

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ABSTRACT

This study examines the simultaneous and partial effects of the Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Loan to Deposit Ratio (LDR), and Operating Expenses to Operating Income (BOPO) on the financial performance of Indonesian banks, measured by Return on Assets (ROA). It also addresses gaps in previous studies by examining the interaction of these financial indicators using updated evidence from banks listed on the Indonesia Stock Exchange (IDX). A quantitative causal-comparative approach was employed using secondary data from 10 banks consistently listed on the IDX during 2004–2024, resulting in 210 firm-year observations. Multiple linear regression analysis was conducted using SPSS after meeting classical assumption tests. The findings indicate that CAR, NPL, LDR, and BOPO jointly have a significant effect on ROA. Individually, NPL and BOPO have significant negative effects on ROA, whereas CAR and LDR show no significant influence. These results highlight that effective credit risk management and operational efficiency are more critical to improving bank profitability than capital adequacy and liquidity management alone, providing important implications for banking practitioners and policymakers.

Keywords: Financial Performance; ROA; CAR; NPL; LDR; BOPO

INTRODUCTION

The financial performance of banks is a critical determinant of economic stability and growth in Indonesia, given the sector's central role in channeling funds, supporting financial inclusion, and maintaining systemic resilience (Pasaribu & Anastasya, 2023; Wasiaturrahma et al., 2020). In the era of digital transformation, Indonesian banks face dual pressures: strengthening regulatory compliance and adopting financial technology (FinTech) innovations to enhance competitiveness. Adaptive regulation, such as the Branchless Banking Program for Financial Inclusion (Laku Pandai), has expanded financial access to remote areas, demonstrating how regulatory initiatives directly shape performance outcomes (Bede Uzoma et al., 2020; Luthfi et al., 2021; Tay et al., 2022). Meanwhile, FinTech development significantly drives operational efficiency and profitability, positioning technological innovation as a key determinant of bank performance (Darmansyah et al., 2021; Gupta et al., 2022; Rehman, 2023).

From a theoretical perspective, bank performance is frequently analyzed using the CAMEL framework, which emphasizes capital adequacy, asset quality, management efficiency, earnings, and liquidity (Nugroho & Sugiyanto, 2022; Rofi'i, 2023). Within this framework, financial ratios such as Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Loan to Deposit Ratio (LDR), and Operating Expenses to Operating Income (BOPO) are widely adopted as proxies of bank financial health. Return on Assets (ROA) is often chosen as the primary indicator of profitability because it reflects the efficiency of asset utilization in generating income (Mariana & Ramadana, 2020b; Moorcy et al., 2020).

However, empirical evidence remains inconsistent. Some studies find that CAR and LDR positively influence ROA, while others report no significant effect (A. J. Saputra & Angriani, 2023; Suriyani et al., 2019). Likewise, NPL and BOPO are generally found to reduce profitability, but the strength of their impact differs across studies (Mariana & Ramadana, 2020b; Mulatsih et al., 2024). Moreover, most prior research examines these variables individually without considering their interactions, despite the fact that financial determinants in banking are interrelated.

At the theoretical level, existing models also fall short in explaining how these determinants interact in the Indonesian context, particularly when comparing conventional and Islamic banks. Previous studies tend to analyze only one type of bank, overlooking cross-model dynamics that are increasingly relevant in a competitive and integrated financial market (Aryasari & Usman, 2024; Lebdaoui & Wild, 2016).

This study addresses these gaps by simultaneously analyzing the effects of CAR, NPL, LDR, and BOPO on ROA and exploring their interactions. The novelty lies in combining both conventional and Islamic commercial banks listed on the Indonesia Stock Exchange (IDX) over a long observation period (2004–2024), thereby providing updated and comprehensive empirical evidence. The findings are expected to enrich theoretical discourse on banking performance and offer practical recommendations for enhancing efficiency, risk management, and regulatory strategies.

Based on this background, the objective of this study is to examine both partial and simultaneous effects of CAR, NPL, LDR, and BOPO on the ROA of Indonesian banks, as well as to evaluate the interdependent relationships among these variables.

LITERATURE REVIEW

Financial performance is a crucial aspect of evaluating a company's ability to sustain and grow within a competitive economic environment. It represents the overall financial health of a firm and is commonly assessed through key indicators such as profitability, liquidity, solvency, and operational efficiency (Bărbuță-Mișu, 2018; Rifai et al., 2021). In the banking industry, financial performance is particularly significant as it reflects the institution's capability to manage financial resources, control operational costs, and maintain asset quality, all of which contribute to profitability and stability (Firdaus et al., 2025; Haris et al., 2022; Jumono et al., 2019). Sound financial performance is instrumental in building investor confidence, enhancing institutional competitiveness, and ensuring long-term sustainability (Akande et al., 2024; Ramadana et al., 2023).

Return on Assets (ROA) is one of the most commonly used indicators to evaluate financial performance. It measures the efficiency of an organization in generating net income from its total assets (Azura et al., 2023; Kingu et al., 2018; Muzammil, 2019). In the banking sector, where asset-based activities such as lending dominate, ROA serves as a critical metric of profitability and operational success (Dewi & Maulana, 2022; Gholy & Nadya, 2020; Iramani et al., 2018; Mariana et al., 2020; Mariana & Ibrahim, 2022; Nugroho & Sugiyanto, 2022). Research has found that ROA is significantly influenced by several internal financial ratios, including Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Loan to Deposit Ratio (LDR), and Operating Expenses to Operating Income (BOPO) (Mariana & Ramadana, 2020a; Moorcy et al., 2020; A. J. Saputra & Angriani, 2023).

Capital Adequacy Ratio (CAR) reflects the bank's capital strength in absorbing potential losses arising from credit and market risks. A higher CAR generally indicates a stronger risk buffer, promoting financial resilience (Handoyo et al., 2023; Liu & Huang, 2022; Wilevy et al., 2021). However, several studies have reported mixed findings. While some suggest that higher CAR supports profitability, others indicate a negative or insignificant relationship between CAR and ROA due to potential inefficiencies in capital allocation (Indrajaya et al., 2022; Salman, 2022; Sari, 2022).

Non-Performing Loans (NPL) indicate the level of credit risk a bank is exposed to. A high NPL ratio denotes poor asset quality and typically leads to reduced interest income and profitability. Numerous empirical studies have found a negative relationship between NPL and ROA, underscoring the importance of effective credit risk management (Gyau et al., 2024; Shamas et al., 2018). Loan to Deposit Ratio (LDR) serves as a liquidity indicator that measures the proportion of a bank's loans funded by its deposits. A higher LDR is generally associated with improved income generation from loans, thus positively affecting ROA (Hamdillah et al., 2020; Riadi, 2018; Suroso, Siahaan, et al., 2018). Nevertheless, an excessively high LDR may lead to increased liquidity risk and financial vulnerability.

Operating Efficiency (BOPO), represented by the Operating Expenses to Operating Income ratio, measures cost efficiency in banking operations. A lower BOPO ratio signifies better cost control, contributing positively to ROA. Banks that can minimize operational costs relative to their income are better positioned to improve profitability and sustain growth (Mulatsih et al., 2024; Nugroho & Sugiyanto, 2022; A. J. Saputra & Angriani, 2023). In light of the theoretical foundations and previous empirical findings, this study seeks to examine the extent to which CAR, NPL, LDR, and BOPO influence the financial performance of banks as measured by ROA.

Financial performance is a key indicator of a bank's overall financial health and sustainability. It reflects the institution's ability to generate profits, manage risks, and allocate resources efficiently (Bărbuță-Mișu, 2018; Rifai et al., 2021). Return on Assets (ROA) is commonly used to measure financial performance, particularly in the banking sector, as it indicates how effectively a bank can transform its assets into net income (Azura et al., 2023; Mariana, 2022; Mariana & Rahmaniar, 2022; Nugroho & Sugiyanto, 2022).

The Capital Adequacy Ratio (CAR) plays a critical role in maintaining a bank's financial soundness. It reflects the bank's ability to absorb losses and continue its operations during economic downturns (Handoyo et al., 2023; Liu & Huang, 2022). However, the empirical relationship between CAR and ROA is mixed. While sufficient capital buffers are essential, some studies suggest that excessively high CAR may indicate inefficient capital utilization, potentially leading to reduced profitability (Indrajaya et al., 2022; Salman, 2022; Sari, 2022).

H1: Capital Adequacy Ratio (CAR) affects Financial Performance (ROA).

Non-Performing Loans (NPL) serve as an essential measure of credit risk. A high NPL ratio typically signifies declining asset quality and deteriorating profitability (Gyau et al., 2024; Iramani et al., 2018). Numerous studies have consistently reported a negative relationship between NPL and ROA, as non-performing assets reduce interest income and increase provisioning costs (Gholy & Nadya, 2020; Iramani et al., 2018). Effective credit risk management is therefore crucial for sustaining bank profitability.

H2: Non-Performing Loan (NPL) affects Financial Performance (ROA).

The Loan to Deposit Ratio (LDR) measures the extent to which a bank utilizes its customer deposits to support lending activities. A higher LDR generally implies more efficient use of funds, which can positively impact income generation and profitability (Hamdillah et al., 2020; Riadi, 2018). Nonetheless, an overly high LDR can increase liquidity risk and affect financial stability. Thus, maintaining an optimal LDR is necessary for balancing risk and return (Suroso, Siahaan, et al., 2018)

H3: Loan to Deposit Ratio (LDR) affects Financial Performance (ROA).

Operational efficiency, often proxied by the Operating Expenses to Operating Income ratio (BOPO), significantly influences financial outcomes. A lower BOPO indicates higher efficiency and cost control, which in turn supports improved ROA (Mulatsih et al., 2024; Nugroho & Sugiyanto, 2022; A. J. Saputra & Angriani, 2023). Operational efficiency is a strategic factor, particularly in the banking industry where margins are often thin and competition is intense. Thus, banks with effective cost management are better positioned to sustain profitability (Mariana et al., 2020; Moorcy et al., 2020).

H4: Operating Expenses to Operating Income (BOPO) affects Financial Performance (ROA).

RESEARCH METHOD

This think about utilizes a quantitative inquire about approach with a causal-comparative strategy to analyze the impact of money related execution proportions on bank productivity (Mariana et al., 2018). The populace comprises of all managing an account companies recorded on the Indonesia Stock Trade (IDX) from 2004 to 2024. The inspecting strategy utilized is purposive testing (Fajri et al., 2025; Firdaus et al., 2025), with the following criteria banks consistently listed on IDX during the 2004–2024 period, 10 banks were selected.

The observational period covers 21 years (2004–2024), with 10 banks, resulting in 210 firm-year observations (unbalanced panel data will be adjusted based on availability). Secondary data is used in this study, obtained from the annual reports and financial statements published by each bank and downloaded from the official IDX website (www.idx.co.id) or company websites. The next part is the variable operationalization, which can be seen in Table 1

Table 1. Operationalization Table

Variable	Definition	Indicator	Measurement Formula
Return on Assets (ROA)	A benefit proportion that measures how viably a company employments its resources to produce net pay (Chaidir, 2014; Muzammil, 2019; Pambuko & Pramesti, 2020).	Net Income and Total Assets	ROA = Net Income / Total Assets
Capital Adequacy Ratio (CAR)	The ratio used to assess a bank's capital strength and its ability to cover potential risks from its assets (Abral, 2023; Handoyo et al., 2023).	Capital and Risk-Weighted Assets	CAR = Total Capital / Risk-Weighted Assets
Non-Performing Loan (NPL)	A risk indicator that shows the proportion of bad loans that are not generating income for the bank (Atichasari et al., 2023; Darmawan, 2018; Hala, 2020; Shamas et al., 2018).	Non-Performing Loans and Total Loans	NPL = Non-Performing Loans / Total Loans
Loan to Deposit Ratio (LDR)	A liquidity ratio that reflects how much of the bank's funds sourced from deposits are distributed in the form of credit (Handoyo et al., 2023; M. M. Saputra et al., 2020).	Loans and Deposits	LDR = Total Loans / Total Deposits
BOPO (Operational Efficiency Ratio)	An efficiency ratio that shows the proportion of operating costs to operating income. The lower the ratio, the more efficient the bank (Nugroho & Sugiyanto, 2022; A. J. Saputra & Angriani, 2023; Suartini et al., 2018).	Operating Expenses and Operating Income	BOPO = Operating Expenses / Operating Income

Source: Processed data, 2025

The information is analyzed utilizing numerous direct relapse with the assistance of SPSS program, pointing to test the coordinate impact of CAR, NPL, LDR, and BOPO on ROA. Relapse Show:

$$ROA_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 NPL_{it} + \beta_3 LDR_{it} + \beta_4 BOPO_{it} + \epsilon_{it}$$

The information examination procedure utilized in this think about is different direct relapse utilizing SPSS program. Earlier to conducting the relapse investigation, the information were tried through classical presumption tests, which incorporate the taking after, ordinariness test to guarantee that the information conveyance takes after a typical design; multicollinearity test utilizing the Fluctuation Expansion Calculate (VIF) and Resistance values to distinguish any relationship among free factors; heteroscedasticity test; and autocorrelation test utilizing the Durbin-Watson measurement to look at the autonomy of residuals (Dette & Munk, 1998; Morales-Oñate & Morales Oñate, 2023; Rana et al., 2008; Singh & Kumar, 2021).

After meeting the classical assumption requirements, multiple linear regression analysis was performed to examine both partial and simultaneous effects of the independent variables on ROA. The t-test assessed the individual significance of each variable, the F-test evaluated their collective influence, and the R² value indicated how much of the variance in ROA is explained by the model.

RESULTS

Descriptive Statistics

Table 2. Descriptive Statistics (N=210)

Variable	Minimum	Maximum	Mean	Std. Deviation
ROA	0.49	3.76	1.9285	0.73071
CAR	1.16	5.38	2.3913	1.01206
NPL	-0.15	4.11	0.5075	0.55390
LDR	1.40	3.96	2.9375	1.04376
BOPO	1.60	3.94	2.9397	1.00559

Source: Processed data, 2025

Table 2 presents the graphic measurements of the inquire about factors based on 210 perceptions. The Return on Resources (ROA) variable ranges from 0.49 to 3.76, with a cruel esteem of 1.9285 and a standard deviation of 0.73071, demonstrating direct inconstancy in bank benefit. The Capital Ampleness Proportion (CAR) appears a cruel of 2.3913 and a standard deviation of 1.01206, recommending a changed level of capital ampleness among the banks. The Non-Performing Loan (NPL) variable incorporates a least esteem of -0.15 and a greatest of 4.11, with an normal of 0.5075 and standard deviation of 0.55390, reflecting contrasts in credit quality. The Loan to Deposit Ratio (LDR) encompasses a cruel esteem of 2.9375 with a standard deviation of 1.04376, appearing differences within the credit dissemination relative to deposits. Finally, the BOPO variable (Operational Costs to Operational Wage) midpoints 2.9397 with a standard deviation of 1.00559, demonstrating variety in bank operational effectiveness. These comes about highlight the conveyance and inconstancy of the information, which are fundamental for assist investigation in this think about.

Classical Assumption Test Normality Test

Normal P-P Plot of Regression Standardized Residual

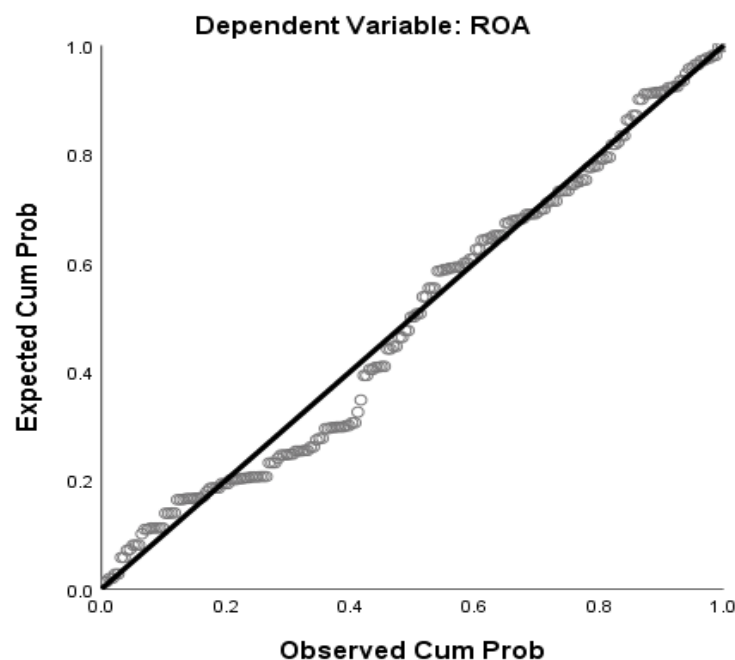


Figure 1. The Normal P-P Plot

Source: Processed data (2025)

To evaluate the ordinariness of residuals, a Typical P-P Plot of relapse standardized residuals was inspected. As portrayed within the plot, the information focuses closely

take after the inclining line, showing that the residuals are around regularly disseminated. This result affirms that the typicality suspicion within the relapse examination is fulfilled, subsequently supporting the legitimacy of the show utilized in this ponder.

Multicollinearity Test

Table 3. Multicollinearity Test (Collinearity Statistics)

Variable	Tolerance	VIF (Variance Inflation Factor)
CAR	0.770	1.299
NPL	0.992	1.008
LDR	0.421	2.378
BOPO	0.372	2.690

Source: processed data, 2025

To identify multicollinearity among free factors, Resistance and Change Swelling Calculate (VIF) values were analyzed. As appeared in Table 3, all Resistance values are over the edge of 0.1 and all VIF values are underneath 10. This shows that there are no multicollinearity issues display among the factors within the relapse show. Thus, each free variable can be considered to contribute interestingly and autonomously to the demonstrate without solid inter-correlations.

Autocorrelation Test

Table 4. Durbin-Watson Test Results for Autocorrelation

Model	Durbin-Watson Value
Regression Model 1	1.019

Source: Processed data, 2025

The comes about of the relapse investigation show that the demonstrate has an R esteem of 0.408, which recommends a direct relationship between the autonomous factors (BOPO, NPL, CAR, and LDR) and the subordinate variable (ROA). The R Square esteem is 0.167, meaning that roughly 16.7% of the variety in ROA can be clarified by the free factors within the show. The Balanced R Square esteem of 0.151 alters for the number of indicators utilized, and still reflects a moderately moo informative control. The comes about of the relapse investigation show that the demonstrate has an R esteem of 0.408, which recommends a direct relationship between the autonomous factors (BOPO, NPL, CAR, and LDR) and the subordinate variable (ROA). The R Square esteem is 0.167, meaning that roughly 16.7% of the variety in ROA can be clarified by the free factors within the show. The Balanced R Square esteem of 0.151 alters for the number of indicators utilized, and still reflects a moderately moo informative control.

Heteroscedasticity Test

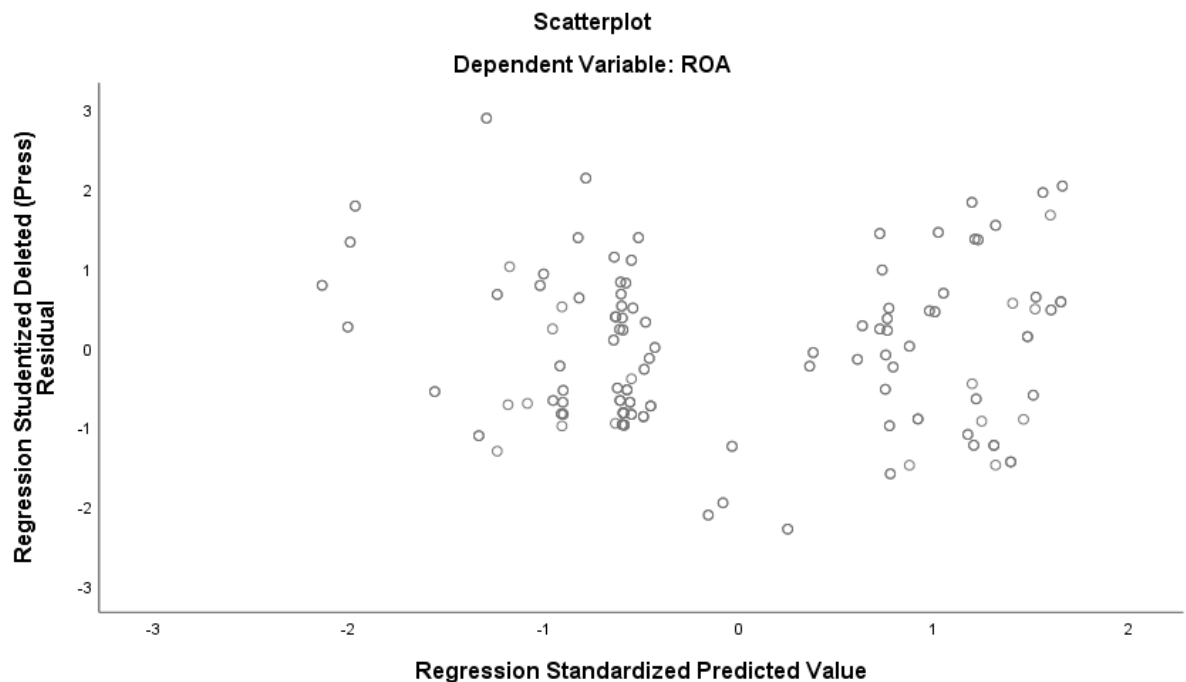


Figure 2. Heteroscedasticity Test Result

Based on the scatterplot showing the relationship between the regression studentized deleted residuals and the regression standardized predicted values, with ROA as the dependent variable, there is no strong indication of heteroscedasticity. This can be seen from the random distribution of the residual points, which do not form a specific pattern such as a funnel shape that widens or narrows. The residuals are evenly spread above and below the zero line and do not display a systematic pattern indicating a change in variance. Therefore, it can be concluded that the relapse show meets the presumption of homoscedasticity, where the fluctuation of the residuals remains consistent over diverse levels of anticipated values. This recommends that the relapse show is fitting and solid for encourage investigation.

F-Test and Determination Coefficient Analysis

Table 5. Results of F-Test and Determination Coefficient

Model	R	R Square	Adjusted R Square	F Statistic	Sig. F (p-value)
1	.408	.167	.151	10.264	.000

Source: Processed data, 2025

The comes about of the relapse examination appear that the demonstrate has an R esteem of 0.408, showing a direct relationship between the free factors (BOPO, NPL, CAR, and LDR) and the subordinate variable (ROA). The R Square esteem is 0.167, which implies that around 16.7% of the variety in ROA can be clarified by the four free factors. The Balanced R Square of 0.151 affirms that, after altering for the number of predictors, the show still encompasses a generally moo informative control. The standard blunder of the appraise is 0.67345, speaking to the normal deviation of watched values from the relapse line. The Durbin-Watson esteem of 1.019 proposes a slight sign of positive autocorrelation among the residuals.

The standard goof of the evaluate is 0.67345, talking to the typical deviation of observed values from the backslide line. The Durbin-Watson regard of 1.019 proposes a slight sign of positive autocorrelation among the residuals. Besides, the F-test comes about appear an F esteem of 10.264 with a centrality level (Sig.) of 0.000. Since this importance

esteem is less than 0.05, it can be concluded that at the same time, the factors CAR, NPL, LDR, and BOPO have a critical impact on ROA. This implies the relapse demonstrate is factually substantial and appropriate for clarifying the variety in ROA based on these four free factors.

Multiple Linear Regression Analysis

Table 6. Results of Hypothesis Test

Variable	Coefficient (B)	t-value	Sig. (p-value)	Decision	Effect on Financial Performance (ROA)
CAR	0.047	0.891	0.374	Not Significant	No Effect
NPL	-0.218	-2.579	0.011	Significant	Negative Effect
LDR	0.088	1.283	0.201	Not Significant	No Effect
BOPO	-0.354	-4.659	0.000	Significant	Negative Effect

Source: Processed data, 2025

Based on the regression output, the multiple linear regression equation to predict Return on Assets (ROA) is as follows:

$$ROA=2.709+0.047CAR-0.218NPL+0.088LDR-0.354BOPO+e$$

The steady esteem of 2.709 is measurably critical ($p = 0.000$), demonstrating the standard ROA when all free factors are zero. Each coefficient within the condition reflects the anticipated alter in ROA coming about from a one-unit alter within the individual variable, expecting all other factors are held consistent. The coefficient for CAR (Capital Adequacy Ratio) is 0.047, but it isn't factually noteworthy ($p = 0.374$). This recommends that CAR does not have a significant affect on monetary execution in this demonstrate.

The coefficient for NPL (Non-Performing Loan) is -0.218, and it is measurably critical ($p = 0.011$). This demonstrates that an increment in NPL is related with a diminish in budgetary execution, highlighting a noteworthy negative affect. The coefficient for LDR (Loan to Deposit Ratio) is 0.088, which is additionally not factually noteworthy ($p = 0.201$), proposing that LDR does not essentially influence financial performance. The coefficient for BOPO (Operating Expenses to Operating Income) is -0.354, and it is profoundly noteworthy ($p = 0.000$), showing a solid negative impact on monetary execution. As BOPO increments, effectiveness decreases, which in turn diminishes productivity.

DISCUSSION

The factors CAR, NPL, LDR, and BOPO simultaneously have a critical impact on Financial Performance (ROA)

The inquire about discoveries show that the factors Capital Ampleness Proportion (CAR), Non-Performing Advances (NPL), Advance to Store Proportion (LDR), and Working Costs to Working Salary (BOPO) at the same time have a noteworthy impact on Return on Resources (ROA), with an F-value of 10.264 and a centrality level of 0.000. The centrality esteem being less than 0.05 affirms that the relapse show built has great factual legitimacy and is reasonable for clarifying varieties in ROA based on these four autonomous factors. A positive relationship between these components and money related execution has been distinguished in past writing.

Past thinks about have appeared that CAR, LDR, and NPL have a critical relationship with benefit as measured by ROA in banks recorded on the Indonesia Stock Trade (Wahyudi & Kartikasari, 2021). These findings support our research results, which indicate a significant simultaneous influence of the four variables. Other findings note that BOPO does not act as a moderator in the relationship between CAR and LDR on stock returns (Siagian et al., 2024). This suggests that although BOPO has an impact,

its interaction with other factors may not always support that influence in a moderating role.

ROA has also been emphasized as a key metric in assessing company performance, reflecting the significant impact of each independent variable (Asif et al., 2023). Another study also shows the evident influence of CAR and LDR on ROA, further strengthening the validity of our findings (Fahlevi et al., 2018). It is important to note that although NPL reflects asset quality, its management and interaction with other factors such as CAR and LDR greatly affect overall financial performance. A multi-factor approach in predicting returns is also relevant to the application of the multiple linear regression model in this context (Suroso, Rusiadi, et al., 2018). Thus, the results of this study not only contribute to the existing literature but also demonstrate that effective management of financial factors is essential for improving ROA, a vital indicator for investors in assessing a company's profit potential.

Capital Adequacy Ratio (CAR) affects Financial Performance (ROA)

The inquire about discoveries show that the Capital Ampleness Proportion (CAR) features a coefficient of 0.047; in any case, it isn't measurably critical with a p-value of 0.374. This recommends that CAR does not have a significant affect on Return on Resources (ROA) in this demonstrate. Other studies support this result, showing that compliance with capital adequacy requirements does not always correlate positively with bank profitability (Warmadewa et al., 2025). One study notes that increases in CAR do not directly and significantly affect ROA, highlighting the importance of effective fund distribution and prudent investment as more influential factors (Widyakto et al., 2023). LDR did not cause a basic differentiate in bank execution, either a few time as of late or after the COVID-19 far reaching, which is solid with our revelations that LDR does not basically impact ROA inside the analyzed demonstrate (Sari, 2022). This aligns with previous findings suggesting that CAR may contribute negatively to ROA (Pasaribu & Anastasya, 2023; Shandhana Rashmi & Marisamynathan, 2023).

Further evidence emphasizes that other factors, such as risk management and operational efficiency, may exert a stronger influence on ROA than CAR. It is noted that while many banks maintain adequate capital, profitability is more closely linked to effective risk management and resource allocation (Hadiwibowo et al., 2023). Dynamic market conditions may also contribute to this finding, as variations in external factors can affect bank profitability alongside liquidity management and other financial ratios (Buniarto, 2023). Therefore, although CAR remains an important indicator for assessing a bank's financial health, its direct association with ROA is likely moderated by various other variables, including risk management practices, operational efficiency, and macroeconomic conditions. This underscores the need for further research to explore this complex relationship and to consider potential intervening variables in financial performance analysis within the banking sector.

Non-Performing Loan (NPL) affects Financial Performance (ROA)

The investigate discoveries affirm that Non-Performing Credits (NPL) have a coefficient of -0.218 with a noteworthiness level of $p = 0.011$, demonstrating that an increment in NPL is related with a diminish in Return on Resources (ROA). This result strengthens the idea that NPLs have a noteworthy negative affect on bank productivity, reliable with numerous past ponders appearing a comparable relationship between NPL and bank money related execution. A study found that less profitable banks tend to take on higher credit risks, thereby increasing their NPLs. This supports the hypothesis that poor management contributes to high NPLs, which in turn reduce ROA. Their research underscores the importance of effective credit management in reducing NPLs to improve financial performance (Kjosevski & Petkovski, 2017).

Similarly, Adegboye et al. highlighted that NPL is a significant indicator used by regulators to assess financial stability and asset quality in banks. Rising NPLs are often seen as early warning signs of banking crises due to their considerable impact on profitability. Our findings align with this, showing that higher NPL levels lead to lower ROA, creating a negative cycle for bank stability (Adegboye et al., 2020). In addition, a study by Sutisnawati and Anggraeni provided further analysis indicating that bank financial performance can be directly affected by NPL conditions. They argued that high NPLs result in operational inefficiencies, thereby reducing ROA. This reflects the need for banks to prioritize credit risk management as a strategic measure to enhance profitability (Sutisnawati & Anggraeni, 2023).

Moreover, Hidayat supported the idea that poor management and risky lending practices are major contributors to rising NPLs and their detrimental effect on ROA. This emphasizes the need for strict credit control to mitigate risks associated with NPLs (Hadiwibowo et al., 2023). In conclusion, our research is consistent with the existing literature, showing that high NPLs not only reflect poor credit risk but also significantly harm bank profitability. Therefore, improving risk management policies and strengthening NPL controls is highly recommended to achieve better financial performance.

Loan to Deposit Ratio (LDR) affects Financial Performance (ROA)

The research findings indicate that the Loan to Deposit Ratio (LDR) has a coefficient of 0.088 with a p-value of 0.201, suggesting that LDR does not have a statistically significant effect on Return on Assets (ROA). This implies that although LDR is an important indicator in bank liquidity management, it does not directly impact bank profitability in this study. Several previous studies related to LDR and ROA provide relevant insights into the insignificant influence of LDR on ROA. For instance, research conducted by Kurniasih found that LDR did not show a significant effect on net profit, which impacts ROA, particularly in the context of banks with good risk management practices (Wilevy et al., 2021). LDR did not cause a critical contrast in bank execution, either some time recently or after the COVID-19 widespread, which is reliable with our discoveries that LDR does not essentially influence ROA within the analyzed demonstrate (Ratri et al., 2022; Rianty & Noviarni, 2022).

Meanwhile, previous research suggested that investors tend to focus more on other aspects of bank financial performance, such as profitability and risk management approaches, rather than solely on LDR (Wuryani et al., 2022). There was insufficient evidence to support the claims made in the reference by Rahima and Muid; thus, it was excluded from the analysis. Overall, while LDR is considered an important indicator in assessing bank performance, the findings indicate that this variable does not have a significant effect on ROA. These results underscore the importance of further research to explore the interaction between LDR and other financial indicators, as well as external factors that may influence bank profitability. More robust and large-scale analytical methods may yield deeper insights into these relationships.

Operating Expense to Operating Income (BOPO) affects Financial Performance (ROA)

The comes about of the think about demonstrate that the Working Expense to Operating Income ratio (BOPO) incorporates a coefficient of -0.354 with a significance level of $p = 0.000$, meaning an awfully noteworthy negative impact on Return on Assets (ROA). This appears that the higher the BOPO, the lower the bank's benefit, steady with the presumption that operational productivity diminishes as working costs rise without corresponding wage increment. This finding is in line with past investigate which found that operational proficiency proportions counting BOPO have a critical negative affect on ROA. Their investigate emphasizes the significance of taken a toll administration

proficiency in making strides bank budgetary execution, comparable to the current study's finding that expanded BOPO contributes to lower ROA (Irawan et al., 2025; Le et al., 2022).

In line with past inquire about, it is emphasized that tall operational costs relative to operational salary enormously influence managing an account budgetary execution (Safitri et al., 2022). BOPO serves as an marker measuring a bank's capacity to oversee working costs to create salary, proposing banks ought to center on operational effectiveness to preserve productivity, backed by the comes about of this think about (Safitri et al., 2022). In differentiate, Dhiba & Esya, 2019 found a positive but immaterial relationship between BOPO and resource development in Islamic banks, suggesting tall working costs may not continuously prevent in general bank execution development. This contrasts with the current finding that expanded BOPO decreases ROA (Dhiba & Esya, 2019).

Furthermore, although LDR and CAR are often considered important, Huang and Azman's (2023) study is not relevant here as it focuses on agriculture rather than banking cost efficiency; therefore, this reference should be excluded (Huang & Azman, 2023). This analysis suggests banks should implement more effective cost management strategies to improve operational efficiency and increase ROA. Controlling and optimizing operating expenses should be prioritized to enhance profitability going forward.

CONCLUSION

This think approximately outlines that the variables Capital Adequacy Ratio (CAR), Non-Performing Loans (NPL), Credit to Store Proportion (LDR), and Working Costs to Operating Income (BOPO) collectively have a critical affect on Return on Assets (ROA) among commercial banks recorded on the Indonesia Stock Exchange. These discoveries demonstrate that the relapse show utilized is factually substantial and competent of clarifying varieties in ROA based on the chosen monetary proportions. Exclusively, CAR does not have a critical impact on ROA, which adjusts with past inquire about proposing that compliance with capital necessities does not continuously connect specifically with bank benefit. Instead, factors such as efficient fund allocation and operational performance may play a more dominant role. NPL contains a negative and critical impact on ROA, showing that an increment in non-performing credits leads to a diminish in benefit. In spite of the fact that LDR is an imperative marker of bank liquidity administration, it does not have a noteworthy impact on ROA in this setting. BOPO appears a negative and critical impact, meaning that higher operational costs relative to wage decrease benefit. Overall, the study underscores the importance of efficient operations and sound credit risk management in driving financial performance, as reflected in ROA.

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DECLARATION OF CONFLICTING INTERESTS

The authors have declared no potential conflicts of interest concerning the study, authorship, and/or publication of this article.

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