The impact of financial ratios on bank profitability: evidence from idx (2021-2023)

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Abstract: This study examines the impact of Non-Performing Loans (NPL), the Operating Expenses to Operating Income Ratio (BOPO), Net Interest Margin (NIM), Loan to Deposit Ratio (LDR), and Capital Adequacy Ratio (CAR) on Return on Assets (ROA) in banking institutions listed on the Indonesia Stock Exchange (IDX) from 2021 to 2023. Employing a quantitative research methodology, this study utilizes purposive sampling to select banks based on operational status and financial performance, with secondary data sourced from annual reports and financial statements. The research applies multiple regression analysis to examine relationships between variables, alongside classical assumption tests to ensure model validity. The findings reveal that NPL and BOPO have a significant negative effect on ROA, indicating that higher NPL increases credit risk and reduces profitability, while inefficient operations lower financial performance. Conversely, NIM positively and significantly affects ROA, suggesting that higher NIM enhances earnings from productive assets. However, LDR and CAR do not exhibit a significant impact, implying that credit distribution and capital adequacy do not directly influence profitability. Given these findings, future research should incorporate additional factors such as managerial efficiency, capital structure, and macroeconomic conditions while adopting qualitative approaches for deeper insights. For the banking sector, enhancing credit risk management, improving operational efficiency, and optimizing NIM are critical for sustained profitability. This study provides valuable insights for banking stakeholders and serves as a reference for further research on profitability determinants in the banking industry.

Keywords: Banking, Capital Adequacy Ratio, Loan to Deposit Ratio, Non-Performing Loan, Profitability.

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1. Introduction

A bank functions as a financial intermediary, linking surplus units (entities with excess funds) to deficit units (those in need of funds) while also facilitating the efficiency of payment flows. A well-managed bank is characterized by its ability to generate substantial profits, reflecting its financial performance(Lisnawati et al., 2020). Banking profitability refers to a bank's capability to secure earnings, assessed through profitability ratios that evaluate a bank's capacity to generate returns(Rembet & Baramuli, 2020). Profitability is crucial as it ensures a bank's sustainability and growth, primarily derived from credit activities through the margin between funding costs and interest income from borrowers. According to (Khamisah et al., 2020), internal determinants of profitability include capital adequacy, operational efficiency, liquidity, and asset size, as these indicators reflect a bank's overall financial condition. Financial statements serve as key sources for calculating financial ratios, which guide internal and external stakeholders in decision-making processes(Yatna & Anugrah, 2019).

Non-Performing Loans (NPL) represent a critical financial ratio used to assess asset quality by comparing the volume of problematic loans against total credit disbursements. A lower NPL ratio signifies reduced credit risk for banks. Annisa et al., (2022) argue that poor credit quality, inefficiency in operational costs, and industry size significantly influence NPL levels, whereas larger banks tend to experience lower NPL ratios due to better risk management(Liviawati et al., 2020). Recently, there has been an increasing

trend in NPLs, indicating heightened credit risk in the banking sector. This trend raises concerns regarding banks' ability to maintain asset quality and profitability, making this research particularly relevant in the current financial climate. To mitigate risks and enhance performance, banks must conduct thorough evaluations of borrowers' repayment capacity. Previous studies show varying conclusions; Hediati and Hasanuh (2021) found that NPL negatively affects Return on Assets (ROA), suggesting that a lower NPL indicates improved profitability. Conversely, Anugrah (2021) reported no significant correlation between NPL and ROA(Abdurrohman et al., 2020).

The Operating Expenses to Operating Income (BOPO) ratio serves as a measure of banking efficiency. An increasing BOPO ratio implies deteriorating financial performance, leading to a decline in ROA, while a lower BOPO ratio suggests improved operational efficiency and profitability (Hediati and Hasanuh, 2021). This metric reflects a bank's ability to manage operational costs relative to revenue generation. Efficient cost management ensures optimal bank performance, as a bank cannot solely rely on deposit funds without effectively allocating them. Thus, BOPO exerts a direct influence on ROA (Hediati & Hasanuh, 2021). Additionally, interest rate movements affect profitability through the Net Interest Margin (NIM), which represents the spread between interest income and interest expenses. A higher NIM contributes positively to a bank's earnings, ultimately impacting its overall performance(Siregar et al., 2021).

Liquidity in banking is often measured using the Loan to Deposit Ratio (LDR), which evaluates the proportion of funds allocated to loans. According to Bank Indonesia regulations, the ideal LDR ranges from 80% to 110% (Werdaningtyas, 2002). A higher LDR indicates greater profitability, provided that the bank efficiently manages its credit disbursement. Capital Adequacy Ratio (CAR) is another essential measure, reflecting a bank's ability to absorb potential losses and sustain operations. CAR is critical as it serves as a financial safeguard against declining asset values or rising liabilities (Dewi, 2020). Greater capital adequacy enables banks to extend more credit, boosting profitability and subsequently enhancing ROA (Wijaya, 2020). Prior research on ROA has yielded mixed results; Hediati and Hasanuh (2021) concluded that CAR, NPL, and BOPO jointly affect ROA, while Sudirgo, (2020) found that CAR, LDR, and NPL positively influence ROA, whereas BOPO and NIM have a negative impact.

2. Materials and Methods

2.1 Empirical Literature Review

Agency theory serves as the foundation of this study, emphasizing the division of responsibilities between shareholders and bank management. Jensen and Meckling (1976) identified two types of information asymmetry: Adverse Selection, where one party possesses superior knowledge about corporate operations and future prospects, and Moral Hazard, referring to undisclosed actions in transactions that only one party can observe due to task separation, a key corporate control mechanism. According to Law No. 7 of 1992 on Banking, as amended by Law No. 10 of 1998, a bank is a financial entity that collects public funds in the form of deposits and redistributes them as credit or other financial instruments to promote economic welfare. PSAK No. 31 defines a bank as an intermediary connecting capital surplus entities with those in need, while Minister of Finance Decree No. 792 of 1990 highlights its role in fund mobilization and allocation to support economic investment. In essence, banks facilitate financial flows, ensuring efficient capital distribution and credit provision (Handini et al., 2023).

Return on Assets (ROA) evaluates a bank's efficiency in generating profits and optimizing asset utilization. A higher ROA signifies better financial performance and profitability. Bank Indonesia defines ROA as the ratio of pre-tax earnings to average total assets over a specific period, where an increase in ROA reflects improved financial health. Annisa, Rosalin, (2020) describe ROA as a measure of a bank's ability to maximize asset productivity. Meanwhile, Credit Risk refers to the likelihood of borrowers failing to meet financial obligations, assessed through the Non-Performing Loan (NPL) ratio. Wijaya (2020) classifies NPLs into substandard, doubtful, and bad loans. A rising NPL ratio

signals deteriorating credit quality and heightened financial risk. Bank Indonesia mandates that NPLs remain below 5%, as exceeding this limit jeopardizes a bank's financial stability.

BOPO (Operational Costs to Operating Income Ratio) is a key efficiency metric that measures a bank's ability to control costs while maximizing revenue (Restyasih & Fitri, 2024). A lower BOPO ratio indicates better cost management and operational effectiveness (Roosaleh Laksono, 2020). Bank Indonesia sets the optimal BOPO threshold below 90%, as surpassing this level suggests inefficiency that could threaten financial sustainability. Additionally, Net Interest Margin (NIM) represents the ratio of net interest income to average earning assets, with a higher NIM indicating more effective asset utilization for generating interest revenue (Saputra & Angriani, 2023). As interest rate fluctuations impact both income and expenses, NIM serves as a critical indicator of a bank's ability to manage interest rate risk and maintain financial stability (Pereira et al., 2024).

Loan to Deposit Ratio (LDR) measures the proportion of loans disbursed relative to total deposits, reflecting a bank's liquidity position. Bank Indonesia sets the maximum LDR at 110%, where a high ratio indicates aggressive lending that may increase liquidity risk, while a low ratio suggests conservative credit policies that could limit profitability. Lastly, Capital Adequacy Ratio (CAR) assesses a bank's ability to absorb potential losses from credit and investment activities. Nurdani & Rahmawati, (2020) emphasize that CAR is closely linked to financial resilience, as well-capitalized banks operate more efficiently (Setiyono et al., 2023). Adequate capital reserves enable banks to withstand financial shocks and ensure business continuity, whereas insufficient capitalization heightens the risk of insolvency.

2.2 hypothesis development

Non-Performing Loans (NPL) signify the magnitude of credit risk encountered by a financial institution. A lower NPL ratio indicates a diminished level of credit exposure borne by the bank. Before extending credit, banks must meticulously assess a borrower's capacity to fulfill financial commitments. Post-loan disbursement, banks are obligated to monitor credit utilization, alongside evaluating the borrower's adherence to repayment obligations. Furthermore, banks undertake scrutiny, assessment, and securitization of collateral to mitigate credit risk. Consequently, a higher NPL ratio necessitates greater provisioning for non-performing assets, leading to increased expenditures that adversely impact bank performance. Credit risk, as reflected by NPL, exerts a detrimental influence on a bank's financial standing, as proxied by Return on Assets (ROA). An escalation in NPL engenders a contraction in ROA, indicating a decline in financial health, whereas a reduction in NPL fosters an improvement in ROA, signifying an enhancement in financial stability. Based on this premise, the formulated hypothesis is, H1: Non-Performing Loans (NPL) affect Return on Assets (ROA).

Net Interest Margin (NIM) is a financial ratio employed to gauge a bank's proficiency in managing its earning assets to yield net interest income. According to Vermas et al., (2020), NIM exhibits a direct correlation with profitability, implying that an upsurge in NIM translates into augmented financial gains. A higher NIM signifies a more effective allocation of interest-generating assets, ultimately amplifying a bank's revenue potential. Therefore, the proposed hypothesis is, H2: Net Interest Margin (NIM) affects Return on Assets (ROA).

The Loan to Deposit Ratio (LDR) is a key indicator of a bank's capacity to generate profits, reflecting the proportion of deposits allocated to lending activities. According to Bank Indonesia, LDR falls within the risk profile category. An upward trend in LDR is typically associated with an increase in Return on Assets (ROA). Dzulkirom, (2020) argue that a higher LDR can enhance a bank's profitability, provided the bank efficiently manages its credit distribution. Based on this, the proposed hypothesis is: H3: The Loan to Deposit Ratio (LDR) influences Return on Assets (ROA).

BOPO, commonly referred to as the efficiency ratio, is a metric utilized to assess a bank's capability in managing operational costs relative to operational income. A dimin-

ished BOPO ratio suggests superior operational efficiency, implying reduced financial distress likelihood (Chin & Setiawan, 2024). As outlined by Bank Indonesia, operational efficiency is determined by juxtaposing total operating costs against total operating income. This leads to the inference that efficiency, as represented by BOPO, bears a negative relationship with banking performance, proxied by Return on Assets (ROA). A surge in BOPO correlates with a downturn in banking profitability, whereas a decline in BOPO signifies enhanced financial performance. Consequently, the hypothesis proposed is, H4: Operating Expenses to Operating Income (BOPO) affects Return on Assets (ROA).

Capital Adequacy Ratio (CAR) is a metric denoting a bank's capital sufficiency, formulated in accordance with the Minimum Capital Requirement (KPMM) as per Bank Indonesia Regulation No. 6/23/DPNP. The stipulated minimum CAR threshold is 8% (Azi, 2020). CAR represents the ratio of a bank's own capital to risk-weighted assets (RWA), exhibiting a direct correlation with profitability. An increase in CAR signifies an enhancement in bank profitability, owing to an augmented capital base that facilitates asset management. The efficient circulation of these assets contributes to improved financial stability, indirectly bolstering earnings. Based on this premise, the proposed hypothesis is, H5: Capital Adequacy Ratio (CAR) affects Return on Assets (ROA).

2.3 *Method*

This study employs a quantitative methodology focused on hypothesis testing, using statistically analyzed numerical data. The population comprises banking institutions listed on the Indonesia Stock Exchange (IDX) from 2020 to 2022. Using purposive sampling, 34 banks per year met the selection criteria, resulting in a total sample of 102 banks (34 × 3). Secondary data, including annual reports and financial statements, were obtained from IDX (www.idx.co.id) and company websites. The study examines CAR, NPL, BOPO, NIM, LDR, and ROA. Data analysis includes descriptive statistics, classical assumption tests (normality, multicollinearity, autocorrelation, heteroscedasticity), and multiple linear regression analysis. Model feasibility is assessed using the F-test, while the t-test evaluates the impact of each independent variable on ROA. The coefficient of determination measures the overall explanatory power of the model.

3. Results and Discussion

This study adopts a quantitative research approach, utilizing statistical methods to analyze research data. The primary aim is to investigate the impact of non-performing loans, operational expenses to operational income, net interest margin, loan-to-deposit ratio, and capital adequacy ratio on return on assets. The data used in this research is secondary data obtained through documentation techniques, specifically by extracting information from annual reports of relevant companies, accessible via the official website of the Indonesia Stock Exchange (www.idx.co.id) and the companies' official websites. This study focuses on all banking institutions listed on the Indonesia Stock Exchange during the 2020–2022 period. The sampling method applied is purposive sampling, designed to select a sample that aligns with the research objectives. Based on predefined criteria using the purposive sampling technique, a total of 34 banks per year were identified as meeting the selection criteria, resulting in an overall research sample of 102 banks (34 x 3). The detailed sampling process is illustrated in Table 1:

Table 1. Sample Selection Results with Purposive Sampling

no	criteria	quantity
1	Number of research samples	47
2	Companies that do not publish annual reports consistently and completely in rupiah currency during the period 2021-2023	0
3	Companies that generate positive profits consecutively during the period 2021-2023.	(13)
	Samples that meet the criteria	34
	Number of research samples 34 x 3	102
	Outlier data processing time	(1)

Total research samples	101

Source: SPSS 25 Output, Secondary Data Processed 2025

a. Descriptive Statistical Test Results

Table 2. Descriptive Statistical Analysis Test Results

Variable	N	Minimum	Maximum	Mean	Std. Deviation
NPL	101	0.0000	9.7880	2.270418	1.5725194
CAR	101	10.7804	283.3780	41.794480	38.8718659
BOPO	101	25.0119	102.2521	71.194786	17.4378041
NIM	101	0.3407	11.7986	4.075741	1.6988968
LDR	101	0.4968	483.6969	91.018722	58.7742325
ROA	101	0.0002	0.0414	0.012797	0.0097421
Valid N (list-wise)	101				

Source: SPSS 25 Output, Secondary Data Processed 2025

Return on Assets (ROA) ranges from 0.0002 to 0.0414, with an average of 0.012797 and a standard deviation of 0.0097421, indicating low variability and stable performance. Non-Performing Loans (NPL) range from 0.0000 to 9.7880, averaging 2.270418 with a standard deviation of 1.5725194, exceeding Bank Indonesia's 5% threshold but showing low variability. The Capital Adequacy Ratio (CAR) varies between 10.7804 and 283.3780, with an average of 41.794480 and a standard deviation of 38.8718659, indicating significant dispersion and non-compliance with the 8% minimum standard. Operational Expenses to Operational Income (BOPO) range from 25.0119 to 102.2521, averaging 71.194786 with a standard deviation of 17.4378041, demonstrating efficiency as it remains below 80%. The Net Interest Margin (NIM) fluctuates between 0.3407 and 11.7986, with an average of 4.075741 and a standard deviation of 1.6988968, failing to meet the 6% standard but showing a stable trend. Loan to Deposit Ratio (LDR) spans from 0.4968 to 483.6969, averaging 91.018722 with a standard deviation of 58.7742325, not fully aligning with the 80%-110% standard but reflecting sound data distribution.

3.1 Classical Assumptions

a. Normality Test

Table 3. Results of the One-Sample Kolmogorov-Smirnov Test for Normality

	Unstandardized Residual
N	101
Asymp. Sig. (2-tailed)	.200c,d

Source: SPSS 25 Output, Secondary Data Processed 2025

The results of the second test indicate that the data is normally distributed. This is evidenced by the Kolmogorov-Smirnov test, which yields a significance level of 0.200, exceeding the threshold of 0.05.

b. Multicollinearity Test

Table 4. Multicollinearity Test Results

Variable Independent	Tolerance	VIF	Remark
NPL	0.985	1.016	Multicollinearity Free
CAR	0.612	1.633	Multicollinearity Free
BOPO	0.855	1.170	Multicollinearity Free
NIM	0.739	1.354	Multicollinearity Free
LDR	0.503	1.989	Multicollinearity Free

Source: SPSS 25 Output, Secondary Data Processed 2025

Based on the multicollinearity test results shown in Table 4, the tolerance values for all independent variables are greater than 0.10, and the Variance Inflation Factor (VIF)

values are less than 10. This indicates that there is no excessively high correlation among the independent variables. Therefore, it can be concluded that there is no multicollinearity among the independent variables in the regression model.

c.   Autocorrelation Test

Table 5. Autocorrelation Test Results

Du	Durbin-Watson	4-Du	Remark
1.7800	1.960	2.2190	No autocorrelation occurs

Source: SPSS 25 Output, Secondary Data Processed 2025

Based on the test results presented in Table 5, the Durbin-Watson (DW) value is 1.960. This study includes five independent variables and a total of 101 data points. The results indicate that the criteria for being free from autocorrelation are met, as it satisfies the condition du<dw<4−dudu < dw < 4 - du (1.780 < 1.960 < 2.219). This confirms that the data does not exhibit autocorrelation, meaning there is no correlation between the residuals of different observations.

d.   Heteroscedasticity Test

Table 6. Heteroscedasticity Test Results

Variable Independent	Sig. (2-tailed)	Remark
NPL	0.684	Free of Heteroscedasticity
CAR	0.968	Free of Heteroscedasticity
BOPO	0.89	Free of Heteroscedasticity
NIM	0.772	Free of Heteroscedasticity
LDR	0.758	Free of Heteroscedasticity

Source: SPSS 25 Output, Secondary Data Processed 2025

Based on the table above, the heteroscedasticity test results for all independent variables indicate that each variable has a significance value greater than α (0.05 or 5%). According to the criteria for heteroscedasticity testing using the Spearman-Rho test, it can be concluded that the regression model does not exhibit signs of heteroscedasticity in any of the regression models in this study.

e.   Multiple Regression Analysis

Table 7. Multiple Regression Analysis Test Results

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	beta		
(Constant)	0.03669456	0.00354766		10.343	0.000
NPL	-0.00159345	0.00036816	-0.257	-4.328	0.000
CAR	-0.00002840	0.00001889	-0.113	-1.504	0.136
BOPO	0.00036345	0.00003563	-0.651	-10.201	0.000
NIM	0.00126237	0.00039345	0.220	3.208	0.002
LDR	0.00001800	0.00001379	0.109	1.305	0.195

Source: SPSS 25 Output, Secondary Data Processed 2025

Based on Table 7 above, a regression equation can be formulated to support the findings of this study: ROA = 0,03669456 – 0,00159345 NPL – 0,00002840 CAR + 0,00036345 BOPO + 0,00126237 NIM + 0,00001800 LDR + e

The multiple linear regression equation can be interpreted as follows: The regression coefficient for X1, representing the Non-Performing Loan (NPL) variable, is -0.00002840, indicating a negative relationship between NPL and the Return on Assets (ROA) of banking institutions listed on the Indonesia Stock Exchange from 2021 to 2023. Similarly,

the regression coefficient for X2, referring to the Capital Adequacy Ratio (CAR), is -0.00159345, suggesting that CAR also has an adverse effect on ROA.

Meanwhile, the regression coefficient for X3, which represents the Operational Cost to Operational Income (BOPO) variable, is 0.00036345, indicating a positive correlation between BOPO and ROA. Likewise, X4, representing the Net Interest Margin (NIM) variable, has a regression coefficient of 0.00126237, showing that NIM positively influences ROA. Lastly, X5, which corresponds to the Loan to Deposit Ratio (LDR), has a regression coefficient of 0.00001800, signifying a beneficial relationship between LDR and ROA among banking companies listed on the Indonesia Stock Exchange during the examined period.

f.   Coefficient of Determination (R^2)

Table 8. Results of the Coefficient of Determination Test

Model	R	R Square	Adjusted R Square
1	.818a	0.670	0.652

Source: SPSS 25 Output, Secondary Data Processed 2025

The adjusted R^2 value is used to analyze the significance of the determination coefficient, which describes the influence of the Independent Variable on the Dependent Variable. This can be interpreted that the Variable return on assets (Y) can be explained through non-performing loans (X1), operating costs, operating income (X2), net interest margin (X3), loan to deposit ratio (X4) and capital adequacy ratio (X5) of 65.2% and the remaining 34.8%, influenced by other variables outside the regression equation.

g.   F Test

Table 9. F Test Results

Model	F	Sig.
Regression	38.517	.000b
Residual		
Total		

Source: SPSS 25 Output, Secondary Data Processed 2025

The results of the regression transformation analysis indicate that the Independent Variables have a significant impact on the Dependent Variable. This is evidenced by the calculated F value of 38.517 with a significance level of 0.000. Since the probability is significantly lower than 0.05 (5%), the regression transformation model is valid for predicting Return on Assets (ROA). In other words, the Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), BOPO, Net Interest Margin (NIM), and Loan to Deposit Ratio (LDR) collectively influence Return on Assets (ROA).

h.   T-test

Table 10. T-test results

Variable	t	Significance	Result
NPL	-4.328	0.000	H1 accepted
CAR	-1.504	0.136	H2 rejected
BOPO	-10.201	0.000	H3 accepted
NIM	3.208	0.002	H4 accepted
LDR	1.305	0.195	H4 rejected

Source: SPSS 25 Output, Secondary Data Processed 2025

Based on Table 10 above, the observation results for the Independent Variable reveal noteworthy findings. The first hypothesis is supported, as the Sig value of 0.000 is smaller than the 0.05 significance level, indicating that NPL has a significant impact on ROA. The second hypothesis, however, is not supported, as the Sig value for CAR is 0.136, which exceeds the 0.05 significance threshold, suggesting that CAR does not significantly influence ROA. The third hypothesis is confirmed, given that the Sig value of 0.000 is below

the 5% significance level (α = 0.05), demonstrating a significant relationship between BOPO and ROA. Similarly, the fourth hypothesis is validated, as the Sig value of 0.002 remains under the 5% threshold, indicating a significant effect of NIM on ROA. Conversely, the Sig value for LDR is 0.195, which exceeds the 0.05 significance level, implying that LDR does not have a significant effect on ROA. Therefore, the fifth hypothesis is not supported.

3.1. Discussion

a. The Influence of Non-Performing Loans on Return on Assets

Based on the regression analysis conducted, the significance value obtained is 0.000, which is lower than the 0.05 (5%) threshold. This implies that the Non-Performing Loan (NPL) variable exerts a substantial influence on Return on Assets (ROA). Consequently, the null hypothesis (H_0), which postulates that NPL has no impact on ROA, is rejected. This finding signifies that the level of problematic credit, as represented by NPL, has a tangible effect on corporate profitability, as measured by ROA. These findings are consistent with prior research by Alamsyah and Meilyda, (2020) and Dewi (2020). Furthermore, the regression analysis reveals that the coefficient of NPL on ROA is -0.00159345. The negative coefficient suggests that a one-unit increase in NPL results in a reduction of ROA by 0.00159345, assuming all other variables remain constant. This indicates that a higher NPL ratio correlates with diminished profitability. The findings align with financial theory, which asserts that elevated NPL levels heighten credit risk exposure, thereby diminishing revenue streams and corporate profitability. A high NPL ratio signifies an increase in defaulted loans, leading to greater provisioning costs and a decline in productive asset quality. Consequently, this study substantiates that NPL has a detrimental effect on profitability, emphasizing the necessity for improved credit risk management to mitigate NPL levels and bolster financial performance.

b. The Effect of Operational Costs to Operating Income on Return on Assets

Through the regression analysis conducted, a significance value of 0.000 was obtained, which is below the 0.05 (5%) threshold. This result confirms that the Operational Costs to Operating Income (BOPO) variable exerts a substantial influence on ROA. Hence, the null hypothesis (H_0), which suggests that BOPO does not impact ROA, is refuted. This implies that operational efficiency, as measured by BOPO, plays a pivotal role in shaping corporate profitability. The findings align with the study by Siregar et al. (2021). Additionally, the regression coefficient for BOPO on ROA is 0.00036345, indicating that a one-unit rise in BOPO leads to a 0.00036345 increase in ROA, assuming all other factors remain constant. Although the coefficient value appears relatively minor, its statistical significance underscores its relevance in influencing ROA. These results are in harmony with financial theory, which posits that firms with higher operational efficiency tend to be more profitable. Lower BOPO values reflect cost-effective management of operational expenditures relative to revenue generation, ultimately enhancing net earnings and contributing to higher ROA. Conversely, a high BOPO ratio indicates excessive operational costs, which suppress profitability. This study provides empirical evidence affirming that BOPO is a crucial determinant in enhancing financial performance, particularly in improving the ROA of banking institutions.

c. The Impact of Net Interest Margin on Return on Assets

The regression analysis yielded a significance value of 0.002, which is below the 0.05 (5%) benchmark, affirming that the Net Interest Margin (NIM) variable significantly influences ROA. As a result, the null hypothesis (H_0), which claims that NIM has no effect on ROA, is refuted. This finding corroborates the research conducted by Wijaya (2020). The regression results further demonstrate that the coefficient of NIM on ROA is 0.00126237. The positive coefficient indicates that a one-unit increase in NIM results in a corresponding 0.00126237 rise in ROA, assuming other factors remain unchanged. This finding suggests that a higher NIM contributes positively to corporate profitability. Fi-

nancial theories reinforce this conclusion by asserting that NIM reflects a bank's efficiency in generating net interest income from its productive assets. The higher the NIM, the greater the institution's ability to derive profits from its assets, which in turn enhances ROA. Conversely, a low NIM may indicate weak interest income generation, which could negatively affect profitability. Therefore, this study confirms that NIM plays a pivotal role in boosting corporate profitability, especially in relation to ROA enhancement.

d.   The Relationship Between Loan to Deposit Ratio and Return on Assets

The regression analysis produced a significance value of 0.195, which exceeds the 0.05 (5%) threshold, suggesting that the Loan to Deposit Ratio (LDR) variable does not significantly affect ROA. Thus, the null hypothesis (H_0), which states that LDR has no impact on ROA, cannot be rejected. This finding aligns with prior research by Dewi (2020). The regression coefficient for LDR on ROA is 0.00001800, signifying that a one-unit increase in LDR results in a minimal 0.00001800 increase in ROA, assuming other variables remain constant. Despite being positive, the impact of LDR on ROA is exceedingly weak and statistically insignificant. These results indicate that although LDR represents a bank's ability to distribute credit from collected funds, it does not directly contribute to profitability enhancement. Other variables, such as credit quality and risk exposure, may play a more substantial role in determining LDR's influence on ROA. Hence, this study provides empirical evidence that LDR is not a primary driver of profitability and suggests that organizations should consider more influential factors to enhance their financial performance.

e.   The Influence of Capital Adequacy Ratio on Return on Assets

The regression analysis shows a significance value of 0.136, exceeding the 0.05 threshold, indicating that CAR has no significant effect on ROA. The regression coefficient of -0.00002840 suggests a minimal negative impact, meaning higher CAR does not necessarily enhance profitability. This aligns with Saputra & Angriani (2023) and financial theory, which suggests excessive CAR may reduce asset utilization efficiency by prioritizing reserves over investment. Thus, CAR is not a key driver of ROA growth, and firms should focus on more impactful profitability factors.

4.   Conclusions

This study examines the impact of NPL, BOPO, NIM, LDR, and CAR on ROA in IDX-listed banks (2021–2023). Findings show NPL (-0.00159345) and BOPO (-0.00036345) negatively affect ROA, while NIM (0.00126237) has a positive impact. LDR (0.00001800) and CAR (-0.00002840) are insignificant, suggesting loan distribution and capital adequacy do not directly influence profitability. The study is limited to IDX-listed banks and secondary data, excluding other ROA factors. Future research should explore additional variables and qualitative approaches. Banks must manage NPL, enhance efficiency, and optimize NIM for profitability, while maintaining liquidity and capital adequacy for stability. To achieve this, banks should improve credit risk management to reduce NPL, adopt digital banking to lower BOPO, and enhance operational efficiency through technology-driven solutions. These insights aid stakeholders and future research on banking performance.

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