Influence Non Performing Loan, Operating Costs To Operating Income, and Capital Adequacy Ratio Against Return On Asset in Conventional Commercial Banks In Indonesia In 2021-2024

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ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh Non Performing Loan (NPL), Biaya Operasional terhadap Pendapatan Operasional (BOPO), dan Capital Adequacy Ratio (CAR) terhadap Return on Asset (ROA) pada bank umum konvensional di Indonesia periode 2021–2024. Penelitian ini menggunakan pendekatan kuantitatif dengan data sekunder yang diperoleh dari laporan keuangan publikasi perbankan dan statistik perbankan yang diterbitkan oleh Otoritas Jasa Keuangan. Metode pengumpulan data dilakukan melalui dokumentasi, sedangkan teknik penentuan sampel menggunakan purposive sampling. Analisis data dilakukan menggunakan regresi linier berganda dengan bantuan perangkat lunak SPSS serta didahului dengan uji asumsi klasik. Hasil pengujian secara parsial menunjukkan bahwa NPL tidak berpengaruh signifikan terhadap ROA, BOPO berpengaruh signifikan terhadap ROA, sedangkan CAR tidak berpengaruh signifikan terhadap ROA. Secara simultan, NPL, BOPO, dan CAR berpengaruh signifikan terhadap ROA. Temuan ini mengindikasikan bahwa efisiensi operasional menjadi faktor dominan dalam menentukan profitabilitas bank, sementara risiko kredit dan kecukupan modal belum menunjukkan pengaruh langsung terhadap kinerja profitabilitas pada periode pengamatan. Keterbatasan penelitian ini terletak pada jumlah variabel yang digunakan dan rentang waktu penelitian, sehingga penelitian selanjutnya disarankan untuk menambahkan variabel lain serta memperluas periode observasi guna memperoleh hasil yang lebih komprehensif.

Kata Kunci: *Profitabilitas Bank, BOPO, NPL, CAR.*

ABSTRACT

This study aims to analyze the influence Non Performing Loan(NPL), Operating Costs to Operating Income (BOPO), andCapital Adequacy Ratio (CAR) againstReturn on Asset (ROA) in conventional commercial banks in Indonesia for the period 2021–2024. This study uses a quantitative approach with secondary data obtained from published banking financial reports and banking statistics published by the Financial Services Authority. Data collection was conducted through documentation, while the sampling technique used purposive sampling. Data analysis was conducted using multiple linear regression with the help of SPSS software and preceded by a classical assumption test. The partial test results indicate that NPL has no significant effect on ROA, BOPO has a significant effect on ROA, while CAR has no significant effect on ROA. Simultaneously, NPL, BOPO, and CAR have a significant effect on ROA. This finding indicates that operational efficiency is a dominant factor in determining bank profitability, while credit risk and capital adequacy have not shown a direct effect on profitability performance during the observation period. The limitations of this study lie in the number of variables used and the research time span. Therefore, further research is recommended to add other variables and expand the observation period to obtain more comprehensive results.

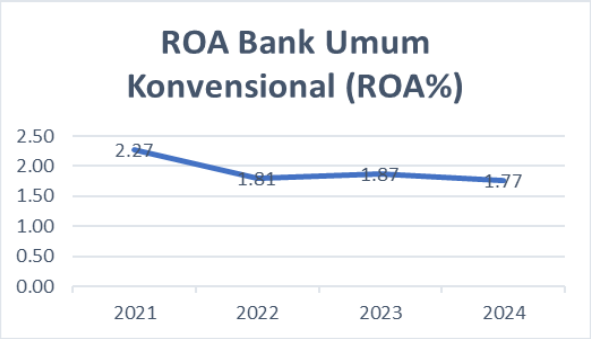
Key words: *Bank Profitability, BOPO, NPL, CAR.*

INTRODUCTION

The banking industry plays a strategic role in maintaining financial system stability and supporting national economic growth. As intermediary institutions, banks collect public funds and redistribute them in the form of productive credit. A healthy banking sector will boost public confidence and strengthen monetary policy transmission. Therefore, profitability is a key indicator in assessing the effectiveness of banking management in optimally managing financial resources.

One of the most widely used indicators to measure bank profitability is Return on Assets (ROA). This ratio reflects management's ability to utilize total assets to generate profit. The higher the ROA, the more effective the bank is in managing its productive assets (Scott, 2020). From a strategic financial management perspective, profitability is viewed not only as the end result of financial performance but also as a consequence of strategic decisions related to risk management, operational efficiency, and capital structure (Tandelilin, 2022).

The 2021–2024 period is the economic recovery phasepost-pandemicCOVID-19 has presented significant challenges to the Indonesian banking sector. According to an official report from the Financial Services Authority (OJK), the stability of the national banking system is relatively well maintained, with strong capital levels and a manageable non-performing loan ratio. However, this increased stability has not always been accompanied by corresponding profitability growth. This phenomenon demonstrates that financial stability does not automatically guarantee profit optimization.



Source:Bank Indonesia data (2024), processed by researchers (2025)

Figure 1. ROA of Conventional Commercial Banks 2021-2024

In the context of financial management, there are three main factors that theoretically influence profitability, namely credit risk, operational efficiency, and capital adequacy. Credit risk is proxied throughNon Performing Loan(NPL) reflects the quality of assets and the effectiveness of management in managing financing. Based on the theoryRisk–Return Trade-Off,Increased risk has the potential to reduce profitability if not balanced with adequate controls (Athanasoglou et al., 2019). Empirical research shows that high NPLs can increase provisioning costs and depress bank profits (Rahman et al., 2021).

In addition to credit risk, operational efficiency, as proxied by the Operating Cost to Operating Income (BOPO) ratio, is an important determinant in creating competitive advantage.Efficiency Theory emphasizes that companies with more efficient cost structures will have the ability to generate higher profits (Berger & Mester, 2019). In the increasingly digitalized banking industry, controlling operational costs is a key strategy for maintaining profitability, especially during periods of economic recovery (Kurniawati & Yudowati, 2022).

The third factor is capital adequacy which is measured through Capital Adequacy Ratio(CAR). Within the frameworkCapital Structure Theory, capital structureinfluencerisk level and company performance. Strong capital increases investor confidence and strengthens systemic stability, but excessive capital without expanding productive assets can reduce resource efficiency (Lee & Hsieh, 2020). Previous research has shown mixed results regarding the effect of CAR on profitability, requiring further testing in the context of economic recovery (Nguyen, 2021).

Although various studies have examined the influence of NPL, BOPO, and CAR on ROA, most of them were conducted in the pre-pandemic period or did not explicitly integrate the three variables in a financial perspective.strategic financial managementFurthermore, previous research has shown inconsistent findings, particularly regarding the significant influence of credit risk and capital adequacy on profitability (Islam & Nishiyama, 2020; Yudaruddin, 2021). This

indicates a relevant research gap requiring further investigation.

This study aims to empirically analyze the influence of credit risk, operational efficiency, and capital adequacy on the profitability of conventional commercial banks in Indonesia for the period 2021–2024. Its contribution lies in the integration of a strategic management perspective to explain the relationship between financial ratios and firm value creation during the economic recovery phase. Thus, this study not only provides empirical evidence but also provides relevant managerial implications for decision-makers in the banking sector.

Based on the theoretical foundation and empirical findings outlined above, this study formulates hypotheses that will be tested quantitatively to obtain empirical evidence in the context of Indonesian banking for the 2021–2024 period. Partially, credit risk, as proxied by Non-Performing Loans (NPLs), is suspected to have a negative and significant effect on Return on Assets (ROA) (Sutrisno et al., 2022), as increased non-performing financing has the potential to increase provisioning costs and depress profits (H1). Furthermore, operational efficiency, as measured by the Operating Expenses to Operating Income (BOPO) ratio, is suspected to have a negative and significant effect on ROA (Anggraeni, 2022), given that a high cost ratio reflects inefficiency that directly reduces a bank's ability to generate profits (H2). Capital adequacy, as proxied by the Capital Adequacy Ratio (CAR), is suspected to have a positive and significant effect on ROA (Rizky & Mandagie, 2021), as adequate capital strengthens the capacity for productive asset expansion and increases market confidence (H3). Simultaneously, NPL, BOPO, and CAR are suspected to have a significant influence on ROA as an indicator of bank profitability (Sutrisno et al., 2022), thus indicating that the combination of risk management, cost efficiency, and capital structure is a strategic determinant in creating corporate value during the economic recovery phase (H4).

METHODS

This research uses a quantitative approach. This approach was chosen because the research aims to examine the causal relationship between independent and dependent variables through hypothesis testing based on numerical data (Sekaran & Bougie, 2019). Philosophically, this research falls within the positivist paradigm, which emphasizes objective measurement, theory testing, and generalization of findings based on statistical analysis (Creswell & Creswell, 2018). The research model is built on the integration ofRisk–Return Trade-Off Theory, Efficiency Theory, And Capital Structure Theory.

The population in this study comprised all conventional commercial banks listed on the Indonesia Stock Exchange (IDX) and operating in Indonesia during the 2021–2024 period. Population data was obtained from official publications of the Financial Services Authority (OJK). The sampling technique used purposive sampling, which selects samples based on specific criteria relevant to the research objectives (Sekaran & Bougie, 2019). Purposive sampling aims to ensure data validity and completeness, allowing accurate interpretation of the analysis results.

This study uses secondary data in the form of annual financial reports of conventional commercial banks for the 2021–2024 period. Data were obtained from official banking publications and industry statistics published by the Financial Services Authority (OJK). Secondary data was selected due to its high level of reliability and regulatory audit and verification. The use of panel data spanning four years allows for a more robust analysis that captures profitability dynamics during the economic recovery period.

The empirical model used in this study is multiple linear regression. This model is used to test the partial and simultaneous influence of the three independent variables on profitability. Data analysis was conducted in several stages, namely the Classical Assumption Test, to ensure the validity of the regression model. Normality tests, multicollinearity tests, heteroscedasticity tests, and autocorrelation tests were carried out. The classical assumption test aims to ensure that the regression estimates meet the criteria.Best Linear Unbiased Estimator(BLUE) as explained in classical econometric theory (Gujarati & Porter, 2019). To test the hypothesis, a partial t-test was used to examine the effect of each independent variable on ROA. A simultaneous F-test was used to examine the joint effect of independent variables on ROA. Finally, the coefficient of determination (R^2) was used to measure the model's ability to explain variations in profitability. All analyses were conducted using

statistical software commonly used in management and financial research.

The use of multiple linear regression in this study aims to examine causal relationships between quantitative variables. This model has been widely used in banking profitability research due to its ability to identify the relative contribution of each determinant (Athanasoglou et al., 2019; Islam & Nishiyama, 2020). Using data from the 2021–2024 recovery period, this study provides a novel empirical contribution to explaining the determinants of bank profitability during the economic stabilization phase.

RESULTS AND DISCUSSION

RESULTS

This study aims to determine to what extent the internal financial ratio, namely*Non Performing Loan*(NPL), Operating Costs to Operating Income (BOPO), and*Capital Adequacy Ratio*(CAR) has an impact on bank profitability, which is measured using*Return on Assets*(ROA). Testing was conducted through multiple linear regression analysis based on data from 33 conventional commercial banks during the 2021–2024 period.

1. **Classical Assumption Test Results**

   The classical assumption test in this study was conducted using a statistical program and multiple linear regression analysis. Prior to conducting the multiple linear regression analysis, the classical assumption test was first performed to ensure the data met the requirements for using a linear regression model. The classical assumption test used is as follows:

   Normality Test: Normality testing is performed to determine whether data is normally distributed or not. Normality testing can be done using graphical and statistical analysis.

   In normality testing, histogram and probability graph analysis are used. Histograms are used to display the frequency distribution of a group of numerical data. Histograms divide the data into several interval groups (bins) and then show the number of data points (frequency) included in each interval. Probability graphs are used to evaluate whether something set follows a normal distribution which aims to compare distributions(usually normal distribution).

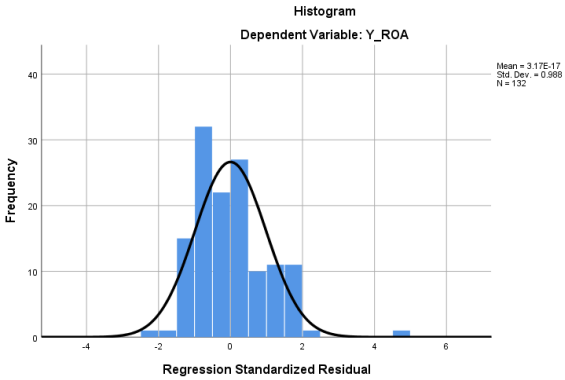


Figure 2. Histogram Analysis

From the results of the normality test with histogram graph analysis, it can be seen that the histogram resultsshowThe distribution of residuals (the difference between actual and predicted values) from the regression model. The shape of the histogram appears to be approximately normal (bell-shaped), which is characteristic of a normal distribution. The black normal curve in the graph shows that most of the residual data distributed around the zero value, and spread symmetrically to the left and right. This is supported by the residual mean value of 3.17E-17, which is very close to zero, as well asstandardThe deviation is 0.988, indicating that the residual distribution is still within reasonable limits. A sample size of 33 is sufficient to provide a representative picture of the distribution.

Based on the histogram, it can be concluded that the residual data from the regression model has a distribution close to normal. Thus, one of the classic assumptions in linear regression analysis, namely residual normality, has been met.

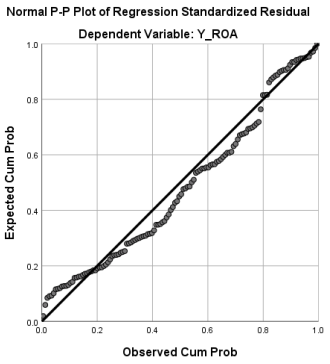


Figure 3. Probability Graph

The results of the probability normality test analysis show that the points on the graph

follow a diagonal line (the ideal normal line) from the bottom left to the top right. This pattern indicates that the observed residual values are close to the expected values in a normal distribution. Points that do not deviate significantly from the diagonal line indicate that the distribution of the regression residuals is close to a normal distribution. This is an important indicator that the assumption of residual normality in the regression model has been met. Therefore, based on the P-P Plot, it can be concluded that the residuals from the regression model that predicts ROA are normally distributed.

The Kolmogorov-Smirnov test is a statistical test used to determine whether data is normally distributed. In quantitative research, particularly those using linear regression analysis, this test is often used to test the classical assumption of data normality. The Kolmogorov-Smirnov test compares the cumulative distribution of sample data with the cumulative distribution of a normal distribution. According to Ghozali (2021), the results of this test are indicated by a significance value (Sig. or p-value). If the significance value is greater than 0.05, the data is considered normally distributed. If the significance value is less than or equal to 0.05, the data is considered non-normally distributed.

Table 1.One-Sample Kolmogorov-Smirnov Test

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			132
Normal Parameters[a,b]	Mean		.0000000
	Std. Deviation		1.76160185
Most Extreme Differences	Absolute		.087
	Positive		.087
	Negative		-.067
Test Statistic			.087
Asymp. Sig. (2-tailed)			.016[c]
Monte Carlo Sig. (2-tailed)	Say.		.255[d]
	99% Confidence Interval	Lower Bound	.243
		Upper Bound	.266

Based on the results of the One-sample Kolmogorov-smirnov(K-S) obtained a Monte Carlo Sig. (2-tailed) value of 0.255, which is greater than the valuesignificance0.05. Thus, it can be concluded that the residual data distributed, because there is not enough evidence to reject the null hypothesis (H_0) which states that the data is normally distributed.

The multicollinearity test aims to determine whether there is a high linear relationship (strong correlation).betweenindependent variables in a regression model.Multicollinearityhigh can cause the estimation results to become unstable and the interpretation of the regression coefficients to become invalid, because the variables to influence each other significantly (Gujarati & Porter, 2019).

Table 2. Multicollinearity Test

Coefficients

Model		Collinearity Statistics	
		Tolerance	VIF
1	X1_NPL	.884	1.131
	X2_BOPO	.979	1.022
	X3_CAR	.883	1.132

Based onThe SPSS output results in the table above show that the tolerance value for each independent variable, namely NPL, is 0.884, BOPO is 0.979, and CAR is 0.883. All tolerance values are above the threshold of 0.10, which means there is there indication/multicollinearity. Meanwhile, the VIF value*(Variance Inflation Factor)*for each variable, namely NPL of 1.131, BOPO of 1.022, and CAR of 1.132. Since all VIF values are below the maximum limit of 10, it can be concluded that this regression model is free from symptoms.multicollinearity.

The heteroscedasticity test is performed to determine whether the residual variances in the regression model vary from one observation to another. If the residual variances are not constant (heteroscedasticity), the regression model is inefficient, although it can still be considered unbiased.

Table 3. TestHeteroscedasticity

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Say.
1	(Constant)	.545	.409		1.332	.185
	LNX1	-.090	.065	-.140	-1.375	.172
	LNX2	.062	.150	.066	.413	.681
	LNX3	.028	.118	.035	.237	.813

Based on the results of the coefficients table with the methodtransformationdata (LN), the sig. value is greater than 0.05 with the value of each NPL variable being 0.172, BOPO being 0.681, and CAR being 0.813. The sig. value obtainedafter done transformationThe data shows that there are no symptomsHeteroscedasticityin the regression model. Thus, it can be concluded that the regression model meets the classical assumptions regarding homoscedasticity, making the model suitable for use in further regression analysis.

The autocorrelation test aims to determine whether there is a correlation between residuals in a period and residuals in the previous period. Autocorrelation often occurs in time series data, but in time series data...*cross section*It also needs to be tested to ensure the validity of the regression model. One method commonly used to test for autocorrelation is the Durbin-Waston (DW) test. The DW statistic value is between 0 and 4, with the following conditions: A DW value close to 2 indicates no autocorrelation, and a DW value <1.5 indicates the possibility of positive autocorrelation.markDW > 2.5 indicates possible negative autocorrelation.

Table 4. Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.338[a]	.114	.093	1.11400	2.010

Based on outputIn the SPSS model summary table, the Durbin-Watson (DW) value is 2.010. Referring to the Durbin-Watson interpretation criteria according to Ghozali 2021: 1) A DW value close to 2 indicates no autocorrelation. 2) A DW value <1.5 indicates the possibility of positive autocorrelation. 3) A DW value >2.5 indicates the possibility of negative autocorrelation. Based on the DW value obtained, namely 2.010, it can be concluded that the regression model in this study is free from autocorrelation, thus fulfilling one of the classical assumptions of multiple linear regression.

2. Multiple Linear Regression Results

The results of data processing produce the following regression model:

Table 5. Multiple Linear Regression

Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta	t	Say.
(Constant)	-.308	.445		-.691	.491
X1_NPL	.017	.021	.070	.839	.403
X2_BOPO	.024	.004	.418	5.285	.000
X3_CAR	.010	.007	.117	1.404	.163

Based on the results of multiple linear regression analysis shown in the table Coefficients, the following regression equation is obtained:

$$Y = -0.308 + 0.017X1 + 0.024X2 + 0.010X3 + e$$

This equation shows that:

1. The increase in NPL contributed to an increase in ROA by 0.017 points.
2. The increase in BOPO has a positive effect on ROA of 0.024 points.
3. The increase in CAR contributed to increasing ROA by 0.010 points.

3. R^2 Determination Coefficient Test Results

The value of the coefficient of determination (Adjusted R^2) shows that the model is able to explain variations in ROA in a moderate proportion, while the remainder is influenced by other factors such as conditions.macroeconomics, funding structure, and management policies that are not included in the model.

Table 6. R^2 Determination Coefficient Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.466[a]	.217	.199	1.78213

The output results of the Model Summary, the coefficient of determination (R Square) value obtained was 0.199, which means that 19.9% of the variation in changes*Return on Assets*(ROA) can be explained by the independent variables in this study, namely Non Performing Loan (NPL), Operating Costs to Operating Income (BOPO), and*Capital Adequacy Ratio*(CAR). Meanwhile, the remaining 80.1% is explained by factors outside this regression model. The Adjusted R Square value of 0.199 indicates that the regression model has been adjusted for the number of variables and samples, and still shows a good level of fit even though the percentagelow (Wooldridge, 2016).

4. Test Hypothesis

Table 7. Partial Test (t-Test)

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sign
1	(Constant)	-.308	.445		-.691	.491
	X1_NPL	.017	.021	.070	.839	.403
	X2_BOPO	.024	.004	.418	5.285	.000
	X3_CAR	.010	.007	.117	1.404	.163

The t-test (partial test) is conducted to etermine the partial effect of each independent variable on the dependent variable (ROA). If the significance value is greater than 0.05, then H_0 is accepted and H_a is rejected. If the significance value is less than 0.05, then H_0 is rejected and H_a is accepted.

The results of the t-test (Partial Test), it can be explained that partial hypothesis testing is carried out to determine how much influence each independent variable has on the dependent variable ROA individually. The following is the explanation H_1: 0.403> significance level of 0.05 then H_0 is accepted and H_1 is rejected, which means that NPL (X_1) partially has no significant effect on ROA (Y), H_2: 0.000 < significance level of 0.05 then H_0 is rejected and H_1 is accepted, which means BOPO (X_2) partially has a significant effect on ROA (Y), H_3: 0.163> significance level of 0.05 then H_0 is accepted and H_1 is rejected, which means that CAR (X_3) partially has no significant effect on ROA (Y).

The results of the t-test (partial test) show that the only independent variable in this study is BOPO which has a significant partial effect on ROA, with a direction of influence that is different from the theory, namely positive.

Table 8. Simultaneous Test (F Test)

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Say.
1	Regression	112.744	3	37.581	11.833	.000[b]
	Residual	406.525	128	3.176		
	Total	519.269	131			

The F test aims to determine whether the independent variables (X), simultaneously or together, have a significant effect on the dependent variable (Y). If the significance value (Sig.) ≤ 0.05, then H_0 is rejected and H_1 is accepted, meaning that the independent variables together have a significant effect. If the significance value (Sig.) > 0.05, then H_0 is accepted and H_1 is rejected.

The results of the F Test (Simultaneous Test) can be explained that the F Test is used to determine whether the independent variables simultaneously (together) have a significant effect on the dependent variable. Basis for decision making If the significance value (Sig.) ≤ 0.05, then H_0 is rejected and H_1 is accepted. From this explanation, it can be seen that the results of the SPSS output in this study are the calculated F value = 11.833, the significance value = 0.000. Because the significance value is 0.000 ≤ 0.05, then H_0 is rejected and H_1 is accepted, which means that the NPL, BOPO, and CAR variables simultaneously have a significant effect on ROA in the banking companies studied.

DISCUSSION

The Impact of Credit Risk on Profitability, the results showed that NPLs had no significant effect on ROA. This finding indicates that during the 2021–2024 period, credit risk remained at a manageable level and did not significantly impact bank profitability. Theoretically, the Risk–Return Trade-Off states that increased credit risk will reduce profits if not managed properly (Athanasoglou et al., 2019). However, in the context of economic recovery, credit restructuring policies and strengthened risk management can mitigate the direct impact of NPLs on short-term profits.

The Effect of Operational Efficiency on Profitability, BOPO has been shown to have a significant effect on ROA. This finding confirms that operational efficiency is a key determinant of bank profitability during the study period. From an Efficiency Theory perspective, companies with more efficient cost structures have the ability to generate higher profits (Berger & Mester, 2019). From a managerial perspective, this finding suggests that cost control strategies, office network optimization, and digital transformation are key factors in increasing profitability. During the economic recovery phase, banks that are able to effectively control operational costs have greater resilience and competitive advantage.

The Effect of Capital Adequacy on Profitability, CAR has no significant effect on ROA. This indicates that a high level of capital adequacy does not directly increase profitability. Within the Capital Structure Theory framework, capital serves as a risk buffer and enhances systemic stability (Lee & Hsieh, 2020). However, if capital is not optimized through the expansion of productive assets, its contribution to profit will be limited.

The Simultaneous Effect of Variables on Profitability, Simultaneously, NPL, BOPO, and CAR significantly influence ROA. This indicates that bank profitability is the result of the interaction between risk management, operational efficiency, and capital structure policy. From a strategic financial management perspective, these three factors are inseparable. Risk stability and capital adequacy create the foundation.strong financial performance, while operational efficiency is the primary driver of profit creation (Tandelilin, 2022). This finding reinforces the argument that during the economic recovery phase, a bank's competitive advantage is determined more by its ability to optimize its cost structure than solely by maintaining financial stability ratios.

CONCLUSION

This study concludes that during the 2021–2024 economic recovery period, the profitability of conventional commercial banks in Indonesia is determined more by operational efficiency than by credit risk and capital adequacy. Partially, Non-Performing Loans and the Capital Adequacy Ratio do not significantly influence Return on Assets, indicating that stable asset quality and strong capitalization serve more as a foundation for sustainability than as a direct driver of profit growth. Conversely, Operating Expenses to Operating Income significantly influences ROA, confirming that management's ability to control costs and optimize operational structures is a key determinant of value creation. However, all three variables simultaneously significantly influence profitability, indicating that bank financial performance is the result of the integration of risk management, efficiency, and capital policies. Therefore, banking management is

advised to prioritize operational efficiency strategies through digital transformation and optimization of productive assets, while maintaining credit quality preventively, and ensuring capital adequacy is utilized productively. For further research, it is recommended to add macroeconomic variables and corporate governance factors to make the analysis model more comprehensive and have higher explanatory power.

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