The Influence of Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Operational Costs to Operating Income (BOPO) on Return on Asset (ROA) in Banks Listed on the Indonesia Stock Exchange

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Abstract.

The objective of this research is to determine the effect of the Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Operational Costs to Operating Income (BOPO) on Return on Assets (ROA) in banks listed on the Indonesia Stock Exchange. The sample was selected using purposive sampling, with a total of 32 banks. The research data were tested using multiple regression analysis. The results of the study show that the Capital Adequacy Ratio (CAR) has no effect on Return on Assets (ROA), while Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Operational Costs to Operating Income (BOPO) have a negative and significant effect on Return on Assets (ROA).

Keywords: CAR, NPL, LDR, BOPO, RO

1. INTRODUCTION

Economic development is closely related to the banking sector because banks play a crucial role in economic activities [1]. The banking sector is a key driver of a nation's economy, acting as an intermediary between individuals with surplus funds and those in need of funds [2]. Banks play a vital role in the financial system for industrial and economic development, both in developed and developing countries [3]. This role includes intermediation by effectively and efficiently mobilizing and channeling public funds. The banking sector is one of the most significant actors in the

domestic economy and financial system. Therefore, an efficient and financially strong banking system is crucial for economic growth and financial stability [4].

The banking industry in Indonesia is currently showing quite good growth [5]. The assessment of a bank's performance is based on an evaluation of the bank's financial statements over a certain period in accordance with the standards set by Bank Indonesia. According to [6], signal theory explains how companies convey signals to various stakeholders through financial statements. This signal is crucial information from company management that can indicate that the company has better prospects compared to other companies through its financial statements. The bank's financial statements provide an overall picture of the bank's financial condition, including identifying its weaknesses and strengths. To assess the financial performance of a bank, an analysis is conducted based on the requirements that the bank must meet according to the financial ratio standards of general banks. A bank's financial performance is reflected in its profitability [7]. Profitability is important information for investors, the public, and the bank itself [8]. Profitability plays a dominant role in improving a bank's corporate image because it creates a win-win situation between the bank and its stakeholders, especially investors [9]. A bank's profitability includes the bank's ability to generate profits from the total assets it owns, known as Return on Assets (ROA).
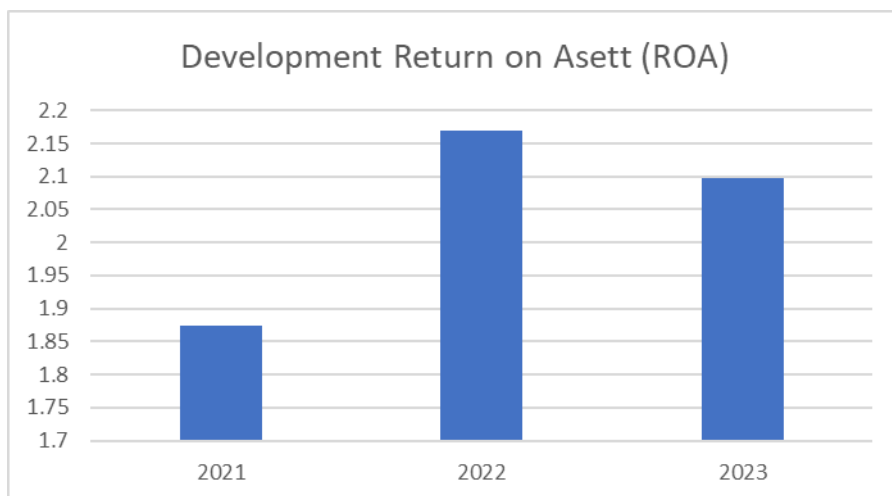
Data Source : Processed Data, 2024

Based on Chart 1, the development of Return on Assets (ROA) indicates that during the research period from 2021 to 2023, the ROA position was above the standard set by Bank Indonesia, which is $\geq 1.5\%$. This means that the higher the ROA of a bank, the more effectively the bank's assets are being utilized. However, during the three-year research period, the ROA level showed fluctuations, with an average ROA of 1.87% in 2021, increasing to 2.17% in 2022, and then decreasing to 2.09% in 2023. Although ROA is not the only method for measuring banking profitability

performance, it remains an indicator closely monitored by investors and other stakeholders. Several previous studies by [10] [11], [12], [13] and [14], mention that ROA is influenced by various factors such as the Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR), Non-Performing Loans (NPL), and Operational Costs and Operational Income (BOPO).

The selection of variables is based on Bank Indonesia Regulation No. 3/1/PBI/2011 concerning the Assessment of the Health Level of Commercial Banks, and is supported by [15], who state that it is widely known that banks function as financial intermediaries between borrowers and depositors. Therefore, it is necessary to further explain specific bank factors such as capital, liquidity, credit, bank size, and other important factors.

One of the factors affecting banking financial performance is the Capital Adequacy Ratio (CAR). The CAR is used to measure the adequacy of a bank's capital in relation to its assets and the associated risks [16]. A higher capital ratio indicates that the bank is safer in managing its capital [17]. The higher the capital, the higher the bank's profitability. This means that the capital ratio has a positive effect on the bank's profitability [18]. Banks with a high capital ratio are expected to provide higher credit growth and profitability. Previous studies by [19], [1] showed that CAR has a positive and significant effect on profitability with the proxy return on assets (ROA).

In addition to CAR, Non-Performing Loans (NPL) are also an important factor in measuring banking financial performance. NPL is a ratio used to assess a bank's ability to manage problematic loans. A higher NPL value indicates a worsening quality of the bank's credit portfolio. This results in an increasing number of problematic loans, which negatively impacts the bank's condition [8] A lower NPL ratio signifies fewer problematic loans, meaning reduced credit risk and improved bank conditions. [20] found that NPL does not have a positive and significant effect on Return on Assets (ROA), while [21] found that NPL has a negative and significant effect on ROA.

The next factor affecting banking financial performance is the Loan to Deposit Ratio (LDR). The LDR reflects the bank's ability to cover deposit withdrawals by relying on the loans it provides as a source of liquidity. A higher LDR indicates lower liquidity capacity of the bank. [4], [22], and [19] found that LDR does not affect profitability. In contrast, [20] reported that LDR has a negative and significant effect on Return on Assets (ROA).

The final factor affecting banking performance is Operational Costs and Operational Income (BOPO). BOPO is a ratio that describes the efficiency of operational costs compared to the bank's operational income. The BOPO ratio shows how well the bank can reduce its operational costs on one hand, and how much it can increase its operational income on the other. This is related to the bank's efficiency and ability to carry out its operations; with cost efficiency, the bank's profits will be higher. A lower BOPO ratio indicates better management performance, as it reflects greater efficiency in using the company's resources. [23] state that the BOPO ratio significantly affects Return on Assets (ROA), while [24] that BOPO has a negative and

significant effect on ROA. A negative BOPO value indicates that the bank is able to minimize its operational costs.

Based on the existing phenomenon and previous studies, as well as the importance of measuring banking performance in supporting a country's financial stability, particularly in the banking sector, the problem formulation in this research is whether there is an influence of Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Operational Costs and Operational Income (BOPO) on Return on Assets (ROA). The results of this research can also serve as a consideration for important policies for banks in facing global challenges and contribute to the diversity of literature.

II. METHODS

This study employs a quantitative method, specifically focusing on the variables of Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Operational Costs and Operational Income (BOPO) in relation to Return on Assets (ROA). The population refers to the entire group of research subjects sharing similar characteristics. In this case, the population consists of banks listed on the Indonesia Stock Exchange during the period from 2021 to 2023. The sample includes banks listed on the Indonesia Stock Exchange during this same period, selected using purposive sampling based on specific criteria. The data collection method used in this study is document analysis, which involves reviewing existing company data, particularly annual financial reports, over the three-year period from 2021 to 2023.

Table 1. Sample Selection Results

No.	Description	Sample
1.	Banking companies that are continuously registered during 2021-2023.	47
2.	Banking companies that did not report annual financial statements during 2021-2023.	(7)
3.	Banking companies that experienced losses during the period 2021 – 2023.	(8)
	Total Sample	**32**

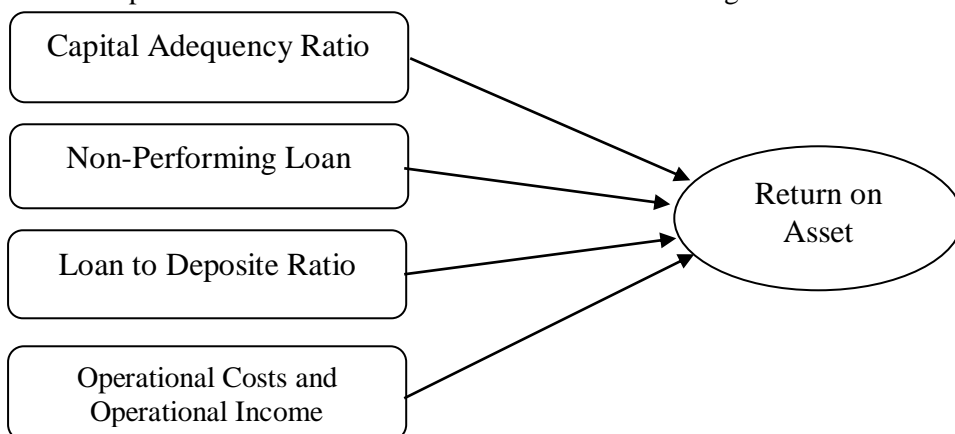The conceptual framework of this research is illustrated in Figure 1

Figure 1. Conceptual Framework

The first stage of the data analysis technique is the classical assumption test, which consists of: a) the normality test, aimed at determining whether the regression model's dependent and independent variables are normally distributed or not. A good regression model should have data that is normally or approximately normally distributed; b) the multicollinearity test, which examines whether there is or is not linear correlation among two or more independent variables; and c) the heteroscedasticity test, conducted to determine whether there is inequality in the variance of the residuals from one observation to another [25]. Furthermore, multiple linear regression analysis is used as the model to test the relationship between the independent and dependent variables, which includes three types of tests: the coefficient of determination test, the F test, and the t test.

III. RESULT AND DISCUSSION

Descriptive Statistical Test. The purpose of this test is to obtain a general overview of the research information, including the minimum value, maximum value, average value, and standard deviation of the data. Based on Table 2, it is observed that the sample size in this study is 96. Additionally, the overall values of the variables, as indicated by the mean, highest value, lowest value, and standard deviation, are positive. The CAR variable shows a lowest value of 2.70 and a highest value of 283.88, with an average value of 40.1065 and a standard deviation of 40.17951. The NPL variable shows a lowest value of 0.01 and a highest value of 4.48, with an average value of 1.1568 and a standard deviation of 1.02836. The LDR variable shows a lowest value of 39.08 and a highest value of 527.91, with an average value of 95.0718 and a standard deviation of 60.57145. The BOPO variable shows a lowest value of 23.69 and a highest value of 103.36, with an average value of 76.0320 and a standard deviation of 16.84068. The ROA variable shows a lowest value of 0.04 and a highest value of 11.43, with an average value of 1.9904 and a standard deviation of 1.86392.

Table 2. Descriptive Statistics Test Results

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
CAR	96	2.70	283.88	40.1065	40.17951
NPL	96	.01	4.48	1.1568	1.02836
LDR	96	39.08	527.91	95.0718	60.57145
BOPO	96	23.69	103.36	76.0320	16.84068
ROA	96	.04	11.43	1.9904	1.86392

Classical Assumption Test
Normality Test

Table 3. Normality Test Results

Information	*Unstandardized Residual*	*Alpha*
N	96	0,05
Asymp. Signifikansi (2-tailed)	0,250	

Based on Table 3, the significance value (2-tailed) is 0.250. This indicates that the residual value is greater than 0.05, meaning the residual data is considered to be normally distributed.

Multicollinearity Test

Based on Table 4, it can be seen that the tolerance value of the independent variable is greater than 0.1 and the VIF value is less than 10. This indicates that multicollinearity does not occur.

Table 4. Multicollinearity Results

Variable	Tolerance	VIF
Capital Adequency Ratio (CAR)	0,507	1,973
Non-Performing loan (NPL)	0,813	1,230
Loan to Deposite Ratio (LDR)	0,411	2,435
Operational Costs and Operational Income (BOPO)	0,689	1,452

Heteroscedasticity Test

Based on the calculation results in Table 5 below, the significance value is greater than the alpha value of 0.05. Therefore, heteroscedasticity does not occur in the regression model.

Table 5. Heteroscedasticity Test Results

Variable	Significance	*Alpha*	Information
Capital Adequency Ratio (CAR)	0,439	0,05	There is no heteroscedasticity
Non-Performing loan (NPL)	0,062	0,05	There is no heteroscedasticity
Loan to Deposite Ratio (LDR)	0,440	0,05	There is no heteroscedasticity
Operational Costs and Operational Income (BOPO)	0,096	0,05	There is no heteroscedasticity

Regression Result

Table 6. Regression Model Testing Results

Model	Unstandardized koefisien		T	*Sig.*	Decision
	B	*Standar Error*			
a (konstanta)	8,455	0,366	23,084	0,011	
Capital Adequency Ratio (CAR)	-0,002	0,002	-1,166	0,247	Rejected
Non-Performing Loan (NPL)	0,204	0,063	-3,240	0,002	Accepted
Loan to Deposite Ratio (LDR)	0,004	0,002	-2,485	0,015	Accepted
Operational Costs and Operational Income (BOPO)	0,076	0,004	-18,154	0,000	Accepted
Dependent Variable:	Return on Asset (ROA)				
N	95				
Nilia R Squared	0.837				
Koefisien Determinasi (R^2)	0.830				
Nilai F statistic	116.606				
Probabilitas (F-Statistic)	0.000[b]				

Next, Table 6 shows the coefficient of determination value of 0.830. This means that 83% of the variance in the dependent variable can be explained by the independent variables. The remaining 17% is explained by other variables not included in the research model. The probability (statistic) value is also $0.000 < 0.05$, indicating that the variables of capital adequency ratio, non-performing loan, loan to deposite ratio, and Operational Costs and Operational Income simultaneously have an effect return on assets. Additionally, the capital adequency ratio variable has a not significant value at the level of $0.247 > 0.05$, proving its non effect on the return on assets. Furthermore, non-performing loan, loan to deposite ratio and Operational Costs and Operational Income variables have significance values of 0.002, 0.015, and

0.000, respectively, which show lower significance compared to the alpha value of 0.05. Supported by the calculated t value (-1.166, -2.485, -18.154) which is greater than the t table (1.661). This means that the Non-Performing Loan, Loan to Deposit Ratio, and Operational Costs and Operational Income variables have a negative and significant effect on Return on Assets.

Capital Adequency Ratio (CAR) to Return on Assets (ROA). The The Capital Adequacy Ratio (CAR) provides an overview of a company's ability to cope with potential losses. Based on the test results, CAR is proven to have no significant effect on Return on Assets (ROA), with a significance value of 0.247, which is greater than 0.05, and a calculated t-value (-1.166), which is higher than the t-table value (1.661). This indicates that an increase in CAR does not affect ROA. The bank's capital primarily serves to cover unexpected losses and as a reserve in times of banking crises [26]. This capital can come from shareholders, the government, Bank Indonesia, foreign entities, or domestic society. When the bank's capital increases, the funds available for lending to customers also increase, potentially boosting ROA. However, in this study, the average CAR of 40.10% is far above the banking standard of 8%. This supports the finding that although CAR increases, ROA decreases.

Additionally, companies with high profitability typically have lower debt levels because their capital comes from internal funding. CAR is measured by the amount of capital a bank possesses, which is used to cover the risks of productive assets, including operational risks in loan disbursement. If operational risks are well-managed, profitability will increase, but if not, profitability will decrease. Capital also plays a crucial role in maintaining public trust in the bank's ability to function as an intermediary institution [27]. Strong capital reflects the bank's stability and security, thereby boosting public confidence in depositing funds and conducting transactions. This study supports the research of [28] and [29], which stated that CAR has no effect on ROA. However, different findings from [19] and [1] show that the Capital Adequacy Ratio (CAR) has a positive and significant effect on Return on Assets (ROA).

Non-Performing Loan (NPL) to Return on Assets (ROA). Based The research results show that non-performing loans (NPL) have a negative and significant effect on return on assets (ROA). This is evidenced by the significance value of 0.002, which is less than 0.05, and the calculated t-value (-3.240), which is greater than the t-table value (1.661). This indicates that the bank is able to distribute and manage loans effectively, as reflected by the low NPL value, which in turn contributes to increased profitability. Based on the average NPL value of 1.15%, it remains below the threshold set by Bank Indonesia, which stipulates that the NPL value should be no more than 5% of the total loans disbursed. A low NPL value increases profitability for banking institutions. In this study, the bank has effectively managed loan distribution, resulting in a low credit risk. This reduces the amount of funds that need to be allocated for loan loss provisions. As a result, the bank has sufficient liquidity to distribute loans and allocate funds to other activities, which ultimately enhances profitability. Additionally, the low NPL indicates that the amount of funds tied up in customers is low, allowing the bank to use those funds for its operations. Given that the primary source of income for banks in Indonesia still comes from interest income, it is crucial for banks to

minimize bad loans. Thus, the flow of capital disbursed through loans will have a positive impact on profitability. The lower the credit risk or bad loans, the higher the profitability of the bank, and vice versa, the higher the credit risk, the lower the profitability. The signaling theory explains that signals or cues in the form of useful information help investors in making investment decisions. Financial ratios reported by banking companies related to liquidity, such as the NPL value, provide useful signals or information for investors. The results of this study support the findings of [21], [10], and [16], which show that NPL has a negative and significant effect on return on assets. Different results were found by [18] and [20], which indicate that NPL does not affect return on assets, while [30] state that NPL has a positive and significant effect on return on assets.

Loan to Deposite Ratio (LDR) to Return on Assets (ROA). The analysis results show that the loan to deposit ratio (LDR) has a negative and significant effect on return on assets (ROA). This is evidenced by a significance value of $0.015 < 0.05$, with a calculated t-value (-2.485) greater than the t-table value (1.661). This means that the negative impact of LDR on ROA indicates that the higher the LDR, the lower the ROA. In other words, when a bank provides more loans compared to the funds it obtains, the profits (ROA) will decrease. This is due to the increased credit risk, where some borrowers may be unable to repay their loans, causing losses for the bank.

Based on the standard deviation range of 60.57, which is below the mean value of 95.07%, this indicates that the LDR is within the range set by Bank Indonesia, which is 78% - 100%. Therefore, the higher the LDR, the greater the credit risk faced, and the lower the ROA obtained. However, it is important to note that the impact of LDR on ROA may vary depending on market conditions and the bank's business strategy. Signal theory also explains that positive information will enhance the profitability of banking companies. Thus, careful management of the LDR is essential to ensure that the bank's financial performance is not significantly affected. This study's findings differ from those of [12], who stated that LDR has a positive and significant effect, while [1] found that it has a positive but not significant effect.

Operational Costs and Operational Income (BOPO) to Return on Assets (ROA). Data Based on the test results, it shows that the operational cost and operational income ratio (BOPO) has a negative and significant effect on return on assets (ROA). This is evident from the significant value of $0.000 < 0.05$, with a calculated t-value (-18.154) greater than the t-table value (1.661). This means that the more efficient the bank is in its operational activities, the better its performance will be, as reflected by its ROA. Conversely, a higher BOPO ratio indicates inefficiency and poor performance, which negatively impacts the bank's profitability. From the descriptive statistics, the average BOPO during the research period was 76.03%, which, while below the regulatory threshold of 85%, is still considered to be in the "good" category, with a standard deviation of 16.84%, below the mean. This indicates that the bank has been able to effectively manage its resources in operational activities and control operational costs, leading to improved profitability, particularly in terms of ROA.

This is consistent with the theory that the ratio of operational costs to operational income has a negative relationship with profitability. It shows that the lower the BOPO

ratio, the more efficiently the bank utilizes its resources in operational activities. This is also supported by the signaling theory, which posits that the information provided by banks reflects the quality of their performance. Since the primary role of a bank is to act as an intermediary, collecting and distributing funds (such as public funds), most of a bank's operational costs and income consist of interest expenses and interest income. This ultimately affects the bank's profitability. The findings of this study are consistent with the research by [31] and [32], which both indicate that BOPO has a negative and significant impact on profitability.

IV. CONCLUSION

Based on the research results regarding the influence of the Capital Adequacy Ratio (CAR), Non-Performing Loan (NPL), Loan to Deposit Ratio (LDR), and Operational Costs to Operating Income (BOPO) on Return on Assets (ROA), the findings are as follows:

The effect of the Capital Adequacy Ratio (CAR) is not significant on Return on Assets (ROA). This indicates that an increase in CAR does not affect ROA. The bank's capital primarily functions to cover unexpected losses and serve as a reserve in banking crisis situations (IBI, 2016:191).

The effect of Non-Performing Loan (NPL) is negative and significant on Return on Assets (ROA). This shows that the bank is capable of distributing and managing loans effectively, as reflected in the low NPL value, which in turn contributes to increased profitability.

The effect of the Loan to Deposit Ratio (LDR) is negative and significant on Return on Assets (ROA). This means that the negative LDR value on ROA indicates that the higher the LDR, the lower the ROA. It implies that when the bank distributes more loans than the funds it receives, the resulting profit (ROA) will decrease.

The effect of Operational Costs to Operating Income (BOPO) is negative and significant on Return on Assets (ROA). This means that the more efficient a bank is in its operations, the better its performance, as reflected in its Return on Assets (ROA). Conversely, a higher BOPO ratio indicates inefficiency and poor performance, leading to a decrease in the bank's profitability.

V. ACKNOWLEDGMENTS

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