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The Effect of Capital Adequacy Ratio, Loan-to-Deposit Ratio, Non-Performing Loans, and Operating Expenses on Operating Income and Bank Stability Among Banking Companies Listed on the Indonesian Stock Exchange Period 2022–2024

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Capital Adequacy Ratio; Loan to Deposit Ratio; Non Performing Loans; operating expenses; operating income

Abstract
This research aims to identify factors influencing the stability of banks listed on the Indonesia Stock Exchange (IDX) during the period 2022-2024. This research employs a quantitative approach using secondary data derived from annual financial reports of 46 banking companies, resulting in 138 observations. The data were analyzed using multiple linear regression analysis, preceded by classical assumption tests, including normality, multicollinearity, autocorrelation, and heteroscedasticity tests. The results show that the Capital Adequacy Ratio (CAR) and the Operating Expenses to Operating Income ratio (BOPO) have a negative and significant effect on bank stability. Meanwhile, the Loan to Deposit Ratio (LDR) and Non-Performing Loans (NPL) do not have a significant effect on bank stability. Simultaneously, CAR, LDR, NPL, and BOPO have a significant influence on bank stability. In conclusion, banking stability is determined by the combined performance of financial ratios, particularly capital management and operational efficiency. Therefore, banks are required to optimize the management of these factors in order to maintain financial stability and enhance resilience against economic uncertainty.

INTRODUCTION

The banking sector is the backbone of the financial system and plays a crucial role in driving the national economy (Challoumis, 2024; Hastuti & Santoso, 2025; onstantinos Challoumis & Eriotis, 2024; Vrotslavskyy & Dropa, 2024). Banking stability reflects the ability of financial institutions to withstand risks and economic shocks without experiencing significant disruptions in their operational functions. Good stability indicates healthy asset quality, sufficient operational efficiency, and strong financial performance. Conversely, instability may increase the risk of bankruptcy and trigger a loss of public confidence, which can negatively affect the overall financial system.

The Capital Adequacy Ratio (CAR) measures a bank's ability to absorb potential losses. A higher CAR indicates stronger capital resilience and greater stability (Ghoniem, 2025;

Olawale, 2024; Oyetade et al., 2022; Ozili, 2025). Another important factor is the Loan-to-Deposit Ratio (LDR), which reflects how effectively banks distribute credit and manage liquidity to maintain financial health.

In addition, the Non-Performing Loan (NPL) ratio represents the level of credit risk (Ozili, 2019; Louzis et al., 2019). A higher NPL ratio indicates poor asset quality, which can reduce income and weaken financial stability (Abid et al., 2021). Meanwhile, the Operating Expenses to Operating Income Ratio (BOPO) reflects operational efficiency (Sufian & Habibullah, 2020). A higher BOPO ratio indicates lower efficiency, which can negatively impact bank stability (Nguyen & Nghiem, 2022).

In recent years, the financial performance of the banking sector in Indonesia has fluctuated (Sari & Suryanto, 2021; Nugroho et al., 2020). This condition suggests that banking stability still faces several challenges, including capital adequacy, high credit risk, and suboptimal operational efficiency (Alamsyah et al., 2019; Prabowo & Jamal, 2022). Therefore, this study aims to examine the effect of CAR, LDR, NPL, and BOPO on bank stability in banking companies listed on the Indonesian Stock Exchange. This research is important for both management and regulators in maintaining the stability of the national banking system (Setiawan & Putri, 2023).

Previous studies have shown mixed results regarding the influence of these financial ratios on bank stability. Hermawati and Purbayati (2022) found that CAR has a significant effect on bank stability, although the relationship may not always be positive due to inefficiencies in capital utilization. Haryanto et al. (2021) reported that LDR and NPL do not significantly affect bank stability, suggesting that banks may have implemented effective risk management practices. Similarly, Ketaren and Haryanto (2020) found that liquidity and credit risk do not always directly impact stability. Meanwhile, Nugroho and Bararah (2018) concluded that BOPO has a significant negative effect on bank stability, indicating that operational inefficiency is a critical factor affecting financial resilience. These inconsistent findings indicate that the relationship between financial performance ratios and bank stability remains inconclusive and requires further investigation.

In recent years, the Indonesian banking sector has experienced fluctuating performance, especially during the post-pandemic recovery period (2022–2024). Banks face challenges related to capital optimization, credit risk management, and operational efficiency in a rapidly changing economic environment. These conditions highlight the importance of reassessing the determinants of bank stability to ensure the sustainability of the financial system.

Based on the research background, the problems formulated in this study focus on examining the effect of several financial ratios on bank stability. Specifically, this study seeks to determine whether the Capital Adequacy Ratio (CAR) has a significant effect on bank stability, whether the Loan-to-Deposit Ratio (LDR) influences bank stability, and whether the Non-Performing Loan (NPL) ratio affects bank stability. In addition, this study investigates the impact of the Operating Expenses to Operating Income Ratio (BOPO) on bank stability. Furthermore, this research also analyzes whether CAR, LDR, NPL, and BOPO simultaneously have a significant effect on bank stability.

The objective of this study is to analyze the influence of financial performance ratios on bank stability. More specifically, this research aims to examine the effect of the Capital Adequacy Ratio (CAR) on bank stability, analyze the influence of the Loan-to-Deposit Ratio

(LDR) on bank stability, and evaluate the effect of the Non-Performing Loan (NPL) ratio on bank stability. In addition, this study seeks to determine the impact of the Operating Expenses to Operating Income Ratio (BOPO) on bank stability. Finally, this research aims to analyze the simultaneous influence of CAR, LDR, NPL, and BOPO on bank stability. This research is expected to provide theoretical contributions to the development of banking and financial management literature, as well as practical implications for bank management and regulators in formulating policies to maintain and enhance banking stability in Indonesia.

RESEARCH METHOD

This research employed a quantitative approach with an explanatory (causal) research design. The quantitative approach was used to analyze the relationships between variables through numerical data and statistical testing, while the explanatory design aimed to examine the causal effects of the independent variables Capital Adequacy Ratio (CAR), Loan-to-Deposit Ratio (LDR), Non-Performing Loans (NPL), and Operating Expenses to Operating Income (BOPO) on the dependent variable, namely bank stability. This research was also categorized as panel data research, as it combined cross-sectional data (several banking companies) and time-series data (period 2022–2024).

The banking sector comprised 47 banks in the population. Purposive sampling was the technique used, based on several criteria, including:

1) Consistent banking listed on the IDX for the 2022–2024 period.
2) Banks that published full-year reports (Q4).
3) Banks that provided data in accordance with the study variables.

The research sample covered 46 banks during the 2022–2024 period, resulting in a total of 138 observations. This research applied a quantitative method with the aim of testing the causal influence between variables using numerical data and statistical procedures.

The data used were secondary data, for example annual reports published on the website www.idx.co.id. The documentation study method was chosen for data collection by obtaining data from the annual financial reports from the Indonesia Stock Exchange (IDX).

RESULTS AND DISCUSSION

Statistics Descriptive

Output descriptive analysis from the variables are:

Table 1. Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
CAR	138	10.50	127.42	35.7847	22.59748
LDR	138	10.58	373.61	92.8888	38.91686
NIM	138	0.01	10.25	2.7533	2.11130
BOPO	138	22.62	223.24	84.1333	22.45161
Stabilitas Bank	138	-8.71	47.50	7.1031	9.85557
Valid N (listwise)	**138**				

Source: SPSS Processing Data (2026)

Based on the output above produce minimum value *Capital Adequacy Ratio* of 10.50. whereas the maximum value is 127.42. Then mean value of 35.7847 with standard deviation

as much as 22.59748. Minimum *loan* value *to Deposit Ratio* of 10.58 and 373.61 as maximum value. Then mean value of 92.8888 with standard deviation as much as 38.91686. Minimum value of *Non Performing* of 0.01 and 10.25 as maximum value. Then mean value of 2.7533 with standard deviation as much as 2.11130. Minimum value Load Operational Income Operational as big as 22.62 and 223.24 as maximum value. Then mean value of 84.1333 with standard deviation as much as 22.45161. Minimum value of stability bank as big as -8.71 and 47.50 as maximum value. Then mean value of 7.1031 with standard deviation as much as 9.85557.

Test Assumptions Classic

Test Normality

The results of data normality include:

Table 2. Results of the Initial Normality Test of Data

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			138
Normal Parameters[ab]	Mean		.0000000
	Std. Deviation		9.41529986
Most Extreme Differences	Absolute		.248
	Positive		.248
	Negative		-.140
Test Statistic			.248
Asymp. Sig. (2-tailed)[c]			.000
Monte Carlo Sig. (2-tailed)[d]	Sig.		.000
	99% Confidence Interval	Lower Bound	.000
		Upper Bound	.000

a. Test distribution is Normal

b. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 2000000

c. Asymptotic significance (2-tailed)

d. Monte Carlo significance (2-tailed)

Source: SPSS Processing Data (2026)

The output above means the data is not normal (sig 0.000). The efforts applied with utilise stages data transformation (LN) and outlier trimming. After improvement, data is normally distributed (table below).

Table 3. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

			Unstandardized Residual
N			114
Normal Parameters[ab]	Mean		0.0000000
	Std. Deviation		0.82923229
Most Extreme Differences	Absolute		0.080
	Positive		0.080
	Negative		-0.041
Test Statistic			0.080
Asymp. Sig. (2-tailed)[c]			0.073
Monte Carlo Sig. (2-tailed)[d]	Sig.		0.075
	99% Confidence Interval	Lower Bound	0.068
		Upper Bound	0.082

a. Test distribution is Normal
b. Calculated from data
c. Lilliefors Significance Correction
d. Lilliefors' method based on 10000 Monte Carlo samples with starting seed 1314643744

Source: SPSS Processing Data (2026)

Based on table, value significance 0.073 > 0.05 indicates the residual of the regression model distributed.

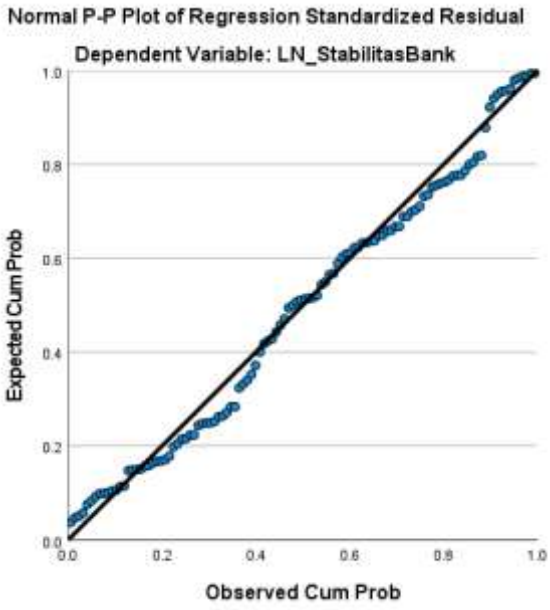

Figure 1. Normal PP Plot

Data source Processing

Figure 1, distribution The points surrounding the diagonal line on the PP Plot indicate

that data is distributed norm l.

Multicollinearity Test

Thistest detect linear relationship between variables independent. Acquisition results seen namely:

Table 4. Multicollinearity Test Results

Coefficients

Model		Unstandardized		Standardized			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	20.507	2.548		8.048	0.000		
	LN_CAR	-0.524	0.180	-0.224	-2.907	0.004	0.961	1.040
	LN_LDR	-0.151	0.259	-0.045	-0.583	0.561	0.966	1.036
	LN_NPL	-0.171	0.144	-0.092	-1.188	0.237	0.946	1.057
	LN_BOPO	-3.731	0.537	-0.538	-6.951	0.000	0.949	1.054

a. Dependent Variable: LN_StabilitasBank

Source: SPSS Processing Data (2026)

All variables free fulfill criteria with *Tolerance* >0.1 and VIF <10 which has conclusion No occurs.

Autocorrelation Test

The results of this test are presented in the following table:

Table 5. Autocorrelation Test Results

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	0.616	0.380	0.357	0.84431	0.723

a. Predictors: (Constant), LN_BOPO, LN_CAR, LN_LDR, LN_NPL

b. Dependent Variable: LN_StabilitasBank

Source: SPSS Processing Data (2026)

The output above produces a DW value of 0.723 which is in the interval -2 to +2, meaning that no has been detected .

Heteroscedasticity Test

test ensures that the regression does not deviate from the classical assumption (homoscedasticity), where different variances (heteroscedasticity) can make the model invalid.

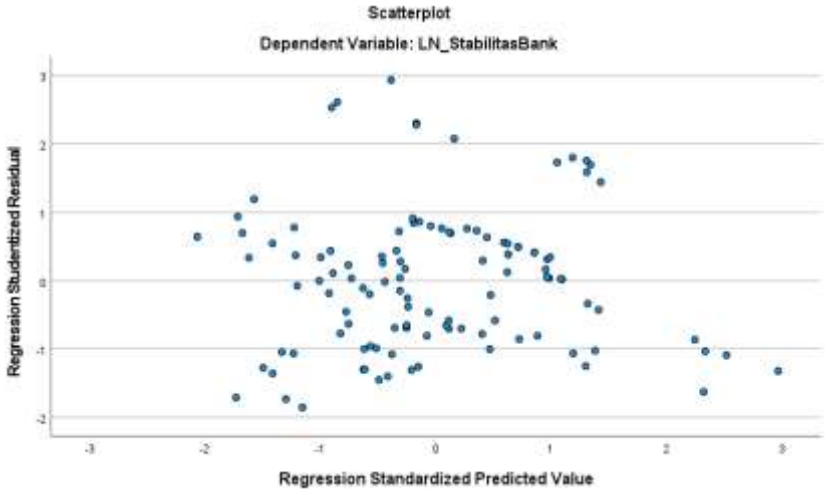

Figure 2. Scatterplot
Source: Data Processing SPSS (2025)

Chart on show scattered data points No regular on Then under number zero, which means has not experienced.

Table 6. Glejser Test
Coefficients

Model		Unstandardized		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.598	1.475	-	.405	.686
	LN_CAR	.065	.104	.059	.621	0.536
	LN_LDR	-.111	.150	-.071	-.744	.459
	LN_NPL	-.161	.084	-.185	-1.921	.057
	LN_BOPO	.107	.311	.033	.343	.732

a. Dependent Variable: RES2

Source: SPSS Processing Data (2026)

The significance value is 0.05 (respectively 0.765; 0.536; 0.459; 0.057; 0.732), so it is concluded that there is no .

Analysis Multiple Linear Regression

Following acquisition this analysis can reflected from the output below This.

Table 7. Multiple Linear Regression Analysis
Coefficients

Model		Unstandardized		Standardized		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	20.507	2.548	-	8.048	0.000
1	LN_CAR	-0.524	0.180	-0.224	-2.907	0.004
1	LN_LDR	-0.151	0.259	-0.045	-0.583	0.561
1	LN_NPL	-0.171	0.144	-0.092	-1.188	0.237
1	LN_BOPO	-3.731	0.537	-0.538	-6.951	0.000

a. Dependent Variable: LN_StabilitasBank

Source: SPSS Processing Data (2026)

0.171 *Non-Performing Loans* –3,731 Load Operational Income Operational

1. When all variables free experience constant so variables stability bank as big as 20,507.
2. Every improvement One-unit *Capital Ratio* will lower bank stability 0.524, assumption other variables constant
3. Every increase in *Loan to Deposit Ratio* decreases bank stability of 0.151, assumption other variables are constant.
4. Every increase in *Non Performing Loan* will lower bank stability of 0.171, assumption other variables are constant.
5. Every improvement Burden Operational Income Operational cause decline bank stability of 3.731, assumption other variables are constant.

4. Coefficient Determination

Testing beneficial in get percentage the influence of the variable free to dependent variable.

Table 8. Coefficient Determination Test

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.616	0.380	0.357	0.84431

a. Predictors: (Constant), LN_BOPO, LN_CAR, LN_LDR, LN_NPL

Source: SPSS Processing Data (2026)

Mark *Adjusted R Square* is 0.357 means *Capital Adequacy Ratio, Loan to Deposit Ratio, Non-Performing Loan* and Expenses Operational Income Operational capable explain bank stability in the banking sector then 64.3% who did not research.

Partial Test

Partial Test obtained namely:

Table 9. Partial Hypothesis Test

Coefficients

Model		Unstandardized		Standardized	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	20.507	2.548	-	8.048	0.000
	LN_CAR	-0.524	0.180	-0.224	-2.907	0.004
	LN_LDR	-0.151	0.259	-0.045	-0.583	0.561
	LN_NPL	-0.171	0.144	-0.092	-1.188	0.237
	LN_BOPO	-3.731	0.537	-0.538	-6.951	0.000

a. Dependent Variable: LN_StabilitasBank

Source: SPSS Processing Data (2026)

1. H $_1$ accepted seen value - tcount (- 2.907) < - t table (- 1.98197) and sig produced 0.004 <0.05 namely *Capital Adequacy* Influential *ratio* negative and significant to stability bank.
2. H $_2$ rejected seen value - tcount (-0.583)>- t table (- 1.98197) and sig produced 0.561>0.05, namely *Loan to Deposit Ratio* No influential to stability bank.

3. H $_3$ rejected seen value - tcount (-1.188)>- t table (-1.98197) and sig produced 0.237>0.05, namely *Non Performing Loan* no influential to stability bank.
4. H $_4$ accepted seen value - tcount (- 6.951) < - t table (- 1.98197) and sig produced 0.000 <0.05 namely Load Operational Income Operational influential negative and significant to stability bank.

Simultaneous Test

Test results in a way simultaneous namely:

Table 10. Simultaneous Hypothesis Testing

ANOVA

Model	Source	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	47.571	4	11.893	16.683	0.000
	Residual	77.702	109	0.713	-	-
	Total	125.273	113	-	-	-

a. Dependent Variable: LN_StabilitasBank

b. Predictors: (Constant), LN_BOPO, LN_CAR, LN_LDR, LN_NPL

From the results above that H $_5$ accepted caused by mark F count (16.683)> F table (2.45) and sig 0.000<0.05 which means *Capital Adequacy Ratio, Loan to Deposit Ratio, Non-*Performing Loan and Expenses Operational Income Operational influential positive and significant to stability bank.

The Influence of Capital Adequacy Ratio on Bank Stability

The Capital Adequacy Ratio (CAR) has a negative and significant effect on bank stability, in line with the findings of Hermawati and Purbayati (2022). An increase in bank capital may, in certain conditions, weaken stability or increase the risk of bank failure. Although theoretically a higher CAR should enhance financial security, excessively high capital may indicate inefficient capital utilization or exposure to high-risk assets that are not managed productively.

The Influence of Loan to Deposit Ratio on Bank Stability

The Loan to Deposit Ratio (LDR) does not have a significant effect on bank stability, as supported by Ketaren and Haryanto (2020). A high or low credit-to-deposit ratio does not necessarily lead to significant changes in liquidity risk or bank failure. This condition may occur due to effective risk management, controlled non-performing loans, and the availability of alternative funding sources. Banks with strong risk management systems can maintain liquidity stability even when credit distribution is high.

The Influence of Non-Performing Loans on Bank Stability

Non-Performing Loans (NPL) do not have a significant effect on bank stability, consistent with the findings of Ketaren and Haryanto et al. (2021). However, a high NPL ratio reflects weaknesses in credit management and has the potential to reduce profitability, which may ultimately pressure financial stability. High credit risk increases operational costs related to handling problematic loans, reduces net interest income, and increases loss provisions.

The Influence of Operating Expenses to Operating Income on Bank Stability

The Operating Expenses to Operating Income ratio (BOPO) has a negative and significant effect on bank stability, consistent with the study by Nugroho and Bararah (2018). A higher BOPO ratio indicates inefficiency, where uncontrolled operational costs reduce income and weaken the bank's resilience to economic risks.

The Simultaneous Influence of CAR, LDR, NPL, and BOPO on Bank Stability

In line with Dewanti et al. (2022), Capital Adequacy Ratio (CAR), Loan to Deposit Ratio (LDR), Non-Performing Loans (NPL), and Operating Expenses to Operating Income (BOPO) simultaneously have a significant effect on bank stability. These financial ratios collectively play a crucial role in determining banking stability. Effective management of these ratios strengthens capitalization, liquidity, operational efficiency, and risk control, thereby enhancing overall financial stability.

CONCLUSION

The study concluded that the Capital Adequacy Ratio (CAR) has a negative and significant effect on bank stability, indicating that higher capital levels do not necessarily improve stability if they are not managed efficiently. In contrast, the Loan-to-Deposit Ratio (LDR) and Non-Performing Loans (NPL) were found to have no significant effect on bank stability, suggesting that liquidity management and credit risk were relatively well controlled by banks during the period of study. Meanwhile, the Operating Expenses to Operating Income ratio (BOPO) showed a negative and significant effect, implying that lower operational efficiency can weaken bank stability. The simultaneous test revealed that CAR, LDR, NPL, and BOPO collectively have a significant effect on bank stability, emphasizing that stability is determined by the interaction of capital adequacy, liquidity, credit quality, and operational efficiency rather than a single factor. Therefore, banks should manage these financial ratios in a balanced and efficient manner to maintain stability amid economic uncertainty. For future research, it is suggested that studies incorporate additional variables such as macroeconomic indicators (e.g., inflation, interest rates, and GDP growth), extend the observation period, or include comparative analysis across different countries or banking systems to provide a more comprehensive understanding of the determinants of bank stability.

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