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Financial Performance with Asset Quality as Intervening Variable: Liquidity, Solvency and Operational Efficiency

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Abstract

Some banks in Indonesia that experience high solvency reflect an expansion strategy and aggressive lending. However, it also shows that there is a great risk in this large lending. Furthermore, the decline in asset quality has led to a disruption in financial stability due to an increase in operating expenses and a surge in impairment of financial assets. The purpose of this paper is to determine the effect of Liquidity, Solvency and Operational Efficiency on financial performance with Asset Quality as an intervening variable in Conventional Commercial Banks in Indonesia. The analysis was conducted based on a panel data approach of 32 commercial banks listed on the Indonesian stock exchange during 2019-2023. The author uses multiple linear regression analysis methods to see the direction of the direct relationship of the liquidity, solvency and operational efficiency variables to asset quality and to bank performance. then conduct a path test to see the direction of the path of the liquidity, solvency and operational efficiency variables to bank performance by placing asset quality as an intervening variable. The results showed that liquidity and operational efficiency affect asset quality while solvency does not. Then the variables of liquidity, solvency, operational efficiency and asset quality partially influence bank performance. Then other findings show that asset quality can mediate the relationship between liquidity and solvency on bank performance. This shows that both directly and with the presence of asset quality as an intervening variable liquidity and solvency and operational efficiency have a positive influence on banking performance.

Keywords: Bank Performance, Liquidity, Solvency, Operational Efficiency, Asset Quality

Introduction

Banking is one of the most important sectors in supporting the economy in Indonesia because banks have a role in maintaining monetary stability, regulating and maintaining a smooth payment system. Not only that, the role of banking as a provider of financing is very crucial in helping economic growth. This financing distribution is not limited to individuals but rather to the MSME sector, industrial trade and services. Banks that have this important role also need to pay attention to several things, because banks are not only institutions that maintain economic stability but also as business institutions that have the aim of getting profit. Therefore, to maintain business stability, banking institutions need to pay attention to their financial performance, by optimizing all their resources such as human resources and financial resources (1)

One important component that can maintain the sustainability of banking is liquidity. Liquidity can determine whether a bank can fulfill its short-term obligations in a timely manner. This liquidity can also affect the reputation of a bank and can be one of the triggers for bankruptcy caused by the inefficiency of the company in managing its assets (2). Another thing that can affect financial performance is solvency because the company can also be seen from how much the company is financed by debt (3).

Along with the journey of the operation of the bank, the bank must maintain the level of efficiency of its operating costs in order to maximize revenue. A decrease in the value of operational efficiency will increase the value of financial performance. to see this operational value, the bank can use the BOPO approach. The more decreased or low the BOPO value, the bank shows the efficiency of the operations carried out (4).

Another component that is no less important is the quality of assets in a bank. Asset quality shows that the state of assets owned by the bank in order to anticipate the risk of payment failure through existing credit. The assets in question are productive assets. In the banking world productive assets have a high risk so that there is a policy that requires banks to set aside part of their profits so that they can form reserves from the risks that will be incurred (3).

From the explanation above, it can be concluded that it is important to revisit what factors can affect the financial performance of banks in Indonesia because in the last few years there have been several banks that have experienced bankruptcy. This can be seen from the Loan to Deposit Ratio (LDR) ratio which fluctuates and some exceed the safe limit recommended by Bank Indonesia. The LDR of Conventional Commercial banks over the past 10 years is 2014 (83.89%); 2015 (80.50%); 2016 (85.88%); 2017 (89.70%); 2018 (92.11%); 2019 (94.43%); 2020 (82.99%); 2021 (82.93%); 2022 (83.83%); 2023 (86.51%) while as of August 2024 the LDR of Conventional Commercial banks is at 86.8%. When banks experience liquidity pressures, it will have an impact on the bank's financial performance which reflects banking performance and has an impact on the bank's financial stability (5).

Likewise, the increase in DER that occurred in commercial banks in Indonesia in 2014 (8.5%); 2015 (8.7%); 2016 (8.9%); 2017 (9.1%); 2018 (9.3%0; 2020 (9.7%); 2021 (9.9%); 2022 (10.1%); 2023 (10.3%); 2024 (10.5%). This shows that there is an increasing trend in DER over the last ten years. The increase in DER reflects that there is an increase in debt in the capital structure. This condition indicates that there is an increase in financial risk. This financial risk will be exacerbated if it is not balanced with an increase in liquidity and financial performance (5).

From the above phenomenon, the focus of the problem is more on liquidity pressures faced by banking institutions and see its effect on financial performance. This is because there are several banks that experience high LDR such as Bank Rakyat Indonesia, Bank Negara Indonesia, Bank Central Asia and CIMB Niaga. High DER reflects an expansion strategy and aggressive lending. However, it also shows that there is a great risk of this large lending. Furthermore, there is a decline in asset quality that results in disruption of the bank's financial stability, such as what happened to Bank Permata. Bank Permata experienced a decrease in net profit of 1.61% in 2023 due to an increase in operating expenses and a soaring impairment of financial assets. Not only

Permata bank but a number of other banks such as Seabank and Bank Neo Commerce also showed a decrease in asset value in 2013, namely 60.64% and 151.44%. as well as the level of solvency and operational efficiency of banks that are not optimal.

Based on the above background, researchers are interested in raising a research title, namely the Effect of Liquidity, Solvency and Operational Efficiency on Financial Performance with Asset Quality as an intervening variable in Conventional Commercial Banks in Indonesia.

The following is the research framework:

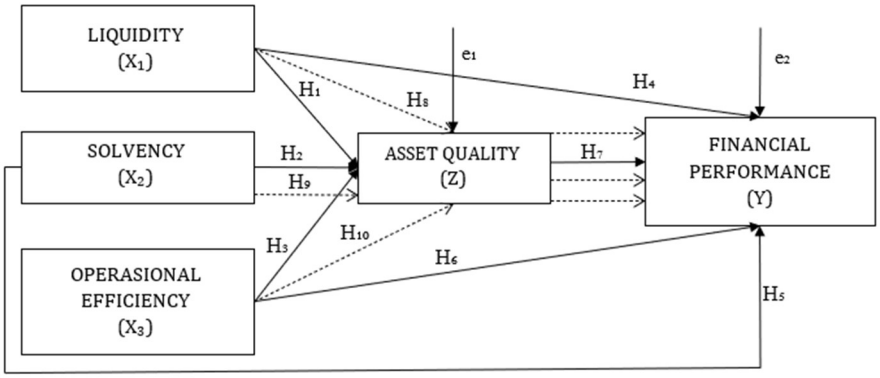


Figure 1. Conceptual Framework

Literature Review

1. Financial Performance

Financial performance in the context of the business world contains a very broad understanding. The definition of financial performance according to(6) is a formal effort that has been carried out by a company that can measure the company's success in generating profits, so that it can see the prospects, growth, and potential for good development of the company by relying on existing resources. Financial performance is a description of the company's success in the form of results that have been achieved thanks to various activities that have been carried out (7) . Financial performance is usually measured based on net income which consists of income and expenses. According to (8) , financial performance is an analysis conducted to see the extent to which a company has carried out using the rules of financial implementation properly and correctly. (9) explains that financial performance is the success, achievement or work ability of the company in the context of creating value for the company or owners of capital in an effective and efficient way. Financial performance can be used as a measuring tool by using financial ratios and other analytical tools (10) . The purpose of assessing company performance according to(11) , which can be shown as follows:

a. To determine the level of profitability and profitability
   By knowing this, it can show the company's ability to generate profits during a certain period.
b. To determine the level of liquidity
   By knowing this, it can show the company's ability to obtain its financial obligations that must be met immediately or the company's ability to fulfill its finances when billed.
c. To determine the level of solvency
   By knowing this, it can show the company's ability to meet short-term and long-term financial obligations.
d. To determine the level of business stability
   By knowing this, it can show the company's ability to conduct its business stably, which is measured by considering the company's ability to pay interest expenses on its debts including paying back the principal on time and the ability to pay dividends regularly to shareholders without experiencing obstacles or financial crises. Financial performance can be measured using the ROA ratio in formula 1.

$$\textbf{ROA} = \frac{Net\ profit}{Total\ Assets} \quad \textbf{1}$$

2. Banking Asset Quality
   The quality of banking assets can usually be seen from the amount or size of the Non-Performing Loan (NPL). NPL is a situation that reflects the occurrence of customer defaults or the existence of credit arrears that exceed 90 days. In banking a customer's credit is included in the NPL when the credit is included in the substandard, doubtful and bad categories. basically non-performing loans reflect a standard of banking performance. This is done in order to inform the amount of credit risk given to the quality of the credit provided (12) . based on bank Indonesia circular number 6/23 / DPNP regarding ratio calculation guidelines, NPLs can be measured using Formula 2

$$\textbf{NPL} = \frac{Non-performing\ loans}{Total\ Credit} \quad \textbf{2}$$

3. Liquidity
   Liquidity is a condition or ability of a banking institution in order to fulfill its short-term obligations. Good liquidity can reflect and can maintain the level of financial stability of a bank (13) . Banking liquidity can be measured with Formula 3 or *loan to deposit ratio (LDR).* LDR is a ratio that compares the amount of credit provided with the amount of funds provided by customers and the capital of the bank itself.

$$\textbf{LDR} = \frac{Amount\ of\ Credit\ Given}{Total\ deposit+equity} \quad \textbf{3}$$

4. Solvency
   Bank solvency is a measuring tool or ratio measuring the ability of a bank to generate profits in a certain period of time in order to fulfill its obligations, both short-term and long-term obligations. Assessment of the bank's ability to fulfill its obligations can be measured by the debt to equity ratio (DER) as shown in Formula 4. DER is used to determine the amount of funds that can be provided by the bank. DER can determine the amount of owner's equity used to GUARANTEE BANk DEBT. The smaller the DER, the better for banking (14) . The DER formulation is as follows:

$$\textbf{DER} = \frac{Debt}{Equity} x\ 100\% \quad \textbf{4}$$

5. Operational Efficiency
   Operational efficiency can be used as a tool to measure how efficient a bank is. BOPO is usually seen from the ratio of operating expenses to operating income. The BOPO ratio is used to see the ability of a banking institution in order to minimize operating costs and increase operating income so as to increase revenue which can have a positive impact on banking performance. An increase in operating costs can result in a decrease in profit before tax so that it can reduce net profit (ROA). Based on bank indonesia regulations, the BOPO ratio must be below 90%, if the BOPO ratio reaches 90% or even 100%, the bank can be categorized as an inefficient bank in running its operations (15) . The formulation for the BOPO ratio can be seen in Formula 5.

$$\textbf{BOPO} = \frac{Operational\ Cost}{Operational\ Revenue} \quad \textbf{5}$$

Research Methods

This research uses a quantitative descriptive approach. This research was conducted in the banking subsector listed on the Indonesia Stock Exchange in 2019-2023. The population in this study was all banks listed on the IDX, namely 42 banks, while the sample in this company was 32 banks. This study uses purposive sampling method. This method is carried out with the aim of getting the sample desired by the researcher so that it is easy to conduct research. The data used is secondary data. Data analysis was carried out using the path analysis test or better known as path analysis. The data used is panel data, so the model test is carried out first, then test the classical assumptions in accordance with the selected model, then multiple linear regression tests will be carried out using Eviews 12 software. The next step is to do the sobel test to see the indirect effects that occur between the research variables.

Result

Descriptive Statistics

The descriptive statistical description of the variables can be seen in Table 1.

Table 1. Descriptive Statistics

Statistik	NPL	LDR	DER	BOPO	ROA
Mean	-4.495550	0.852316	0.534761	0.522568	-8.945665
Median	-4.136431	0.833550	1.085347	1.153477	-8.767003
Maximum	-2.885745	1.630000	2.706599	2.689859	-6.703868
Minimum	-9.329124	0.123500	-4.750365	-4.982046	-15.12484
Std. Dev.	1.170346	0.254301	1.664412	1.784024	1.347004
Skewness	-1.359411	0.479458	-1.579530	-1.525984	-1.136074
Kurtosis	5.493024	4.201229	6.460351	4.342627	5.198344
Jarque-Bera	90.71441	15.74981	84.90948	74.11436	66.65381
Probability	0.000000	0.000380	0.000000	0.000000	0.000000
Sum	-719.2880	136.3706	85.56183	83.62528	-1431.306
Sum Sq. Dev.	217.7839	10.28236	440.4762	506.0558	288.8509
Observations	160	160	160	160	160

Source: Output Eviews, 2025

Selection of the Best Model

In panel data there are three components or stages that must be carried out to determine the best model of research data including the chow test, Hausman test and Lagrange Multiplier test. The chow test is conducted to compare the common effect model with the fixed effect model if the Cross-section Chi-square> 0.05 then the selected model is the common effect model, if the Cross-section Chi-square <0.05 then the fixed effect model is selected.

Meanwhile, the Hausman test is conducted to select the random effect model with the fixed effect model. If the cross-section random probability value is greater than 0.05 then the Random effect model is selected. Furthermore, the Lagrange Multiplier test is to select the Random effect model with the common effect model, if the Breusch pagan value is less than 0.05, the Random Effect model is selected. The following are the model test results from this study

a. Chow Test

Table 2. Chow Test Equation 1

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.526008	(31,125)	0.0000

Cross-section Chi-square	138.092773	31	0.0000

Source: Output Eviews, 2025

Table 3. Chow Test Equation 2

Effects Test	Statistic	d.f.	Prob.
Cross-section F	7.383382	(31,124)	0.0000
Cross-section Chi-square	167.337636	31	0.0000

Source: Output Eviews, 2025

From the two equations above, it can be seen that the cross-section probability value is 0.00, which means it is smaller than 0.05, so the selected model is the Fixed Effect Model.

b. Hausman Test

Table 4. Hausman Test Equation 1

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.940078	3	0.8157

Source: Output Eviews, 2025

Table 5. Hausman Test Equation 2

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	15.086476	4	0.0045

Source: Output Eviews, 2025

From the two equations above, it can be concluded that the hausman test for the first equation shows a statistical chi sq number with a probability of 0.81 which means greater than 0.05. meaning that the selected model is the Random Effect Model. As for the second equation, the probability value is 0.00, which means it is smaller than 0.05, meaning that the selected model is the fixed effect model.

c. Lagrange Multiplier Test

Table 6. Lagrange Multiplier Test Equation

Test Type	Cross-section (Prob.)	Time (Prob.)	Both (Prob.)
Breusch-Pagan	69.51340 (0.0000)	0.378092 (0.5386)	69.89149 (0.0000)
Honda	8.337469 (0.0000)	0.614892 (0.2693)	6.330275 (0.0000)
King-Wu	8.337469 (0.0000)	0.614892 (0.2693)	3.397268 (0.0003)
Standardized Honda	8.978431 (0.0000)	1.025405 (0.1526)	2.769038 (0.0028)
Standardized King-Wu	8.978431 (0.0000)	1.025405 (0.1526)	0.878866 (0.1900)
Gourieroux, et al.	--	--	69.89149 (0.0000)

Source: Output Eviews, 2025

From the Table 6, it can be seen that the Breusch Pagan value of the first equation is 0.00, which means it is smaller than 0.05. this indicates that the selected model is the Random Effect model. The second equation is no longer done Lagrange Multiplier test because successively selected fixed effect model. So that in its provisions it is no longer necessary to do the Lagrange Multiplier test.

From the three steps of model selection above, it can be concluded that for the first equation the best model used in this study is the random effect model. While for the second equation is the fixed effect model. Because the first model chosen is the Random effect model, there is no need to test classical assumptions.

Table 7. Hypothesis test Equation 1

Variabel	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.285804	0.453739	-11.64945	0.0000
LDR	0.930419	0.493158	1.886658	0.0611
DER	-0.817019	0.179709	-4.546352	0.0000
BOPO	0.830663	0.168034	4.943423	0.0000

Source: Output Eviews, 2025

Table 8. Hypothesis Test Equation 2

Variabel	Coefficient	Std. Error	t-Statistic	Prob.
C	-4.687405	0.620549	-7.553646	0.0000
NPL	0.652115	0.076554	8.518337	0.0000
LDR	-1.567386	0.535326	-2.928307	0.0041
DER	0.672055	0.200458	3.352603	0.0011
BOPO	-0.669923	0.168220	-3.982422	0.0001

Source: Output Eviews, 2025

From the table above, the regression equation can be arranged as follows:

NPL = -5.285804 +0930419LDR -0.817019DER +0.830663BOPO 6

ROA = -4.687405 +0.652115 NPL-1.567368LDR +0.672055DER - 0.669923BOPO 7

Simultaneous Test and R square test

Table 9. F-test and R-square test Equation 1

Statistics	Value
Root MSE	0.789087
Mean dependent var	-1.828515
S.D. dependent var	0.853395
Sum squared resid	99.62529
Durbin-Watson stat	1.659603
R-squared	0.139656
Adjusted R-squared	0.123111
S.E. of regression	0.799139
F-statistic	8.440971
Prob(F-statistic)	0.000031

Source: Output Eviews, 2025

Table 10. F-test and R-square test Equation 1

Statistics	Value
Root MSE	0.606156
Mean dependent var	-8.945665
S.D. dependent var	1.347840
Akaike info criterion	2.286640
Schwarz criterion	2.978554
Hannan-Quinn criter.	2.567602
Durbin-Watson stat	2.197209
R-squared	0.796477
Adjusted R-squared	0.739030
S.E. of regression	0.688546
Sum squared resid	58.78793
Log likelihood	-146.9312
F-statistic	13.86475
Prob(F-statistic)	0.000000

Source: Output Eviews, 2025

Based on the simultaneous test picture of equation 1 and equation 2, it can be concluded that the probability value of 0.00 is less than 0.05, meaning that simultaneously the independent variable

affects the dependent variable. As for the determination test, the first equation shows the Adjusted R-Square value of 0.13 or equivalent to 12%, which means that the effect given simultaneously is only 12 percent and the rest is influenced by other variables. Likewise, the Adjusted R-Square value is 0.73 in the second equation. This shows that the effect given by the independent variable on the dependent variable is 73% and the rest is influenced by other variables.

Path Analysis

Path analysis is carried out to see the direct and indirect relationship or influence seen from the regression results that have been carried out. The equation is as follows:

NPL = -5.285804 +0930419LDR -0.817019DER +0.830663BOPO 8

ROA = -4.687405 +0.652115 NPL-1.567368LDR +0.672055DER - 0.669923BOPO 9

Mediation test with Sobel Test

The Sobel test is a test to determine whether the relationship through a mediating variable is significantly able to mediate the relationship. For example, the effect of A on B through M. In this case the variable M is a mediator of the relationship from A to B. To test how much the role of variable M mediates the effect of A on B, the Sobel test is used. Where the Sobel test uses the z test with the following formula:

$$z = \frac{ab}{\sqrt{(b^2SE_a^2)+(a^2SE_b^2)}} \quad \text{..... 10}$$

Where:

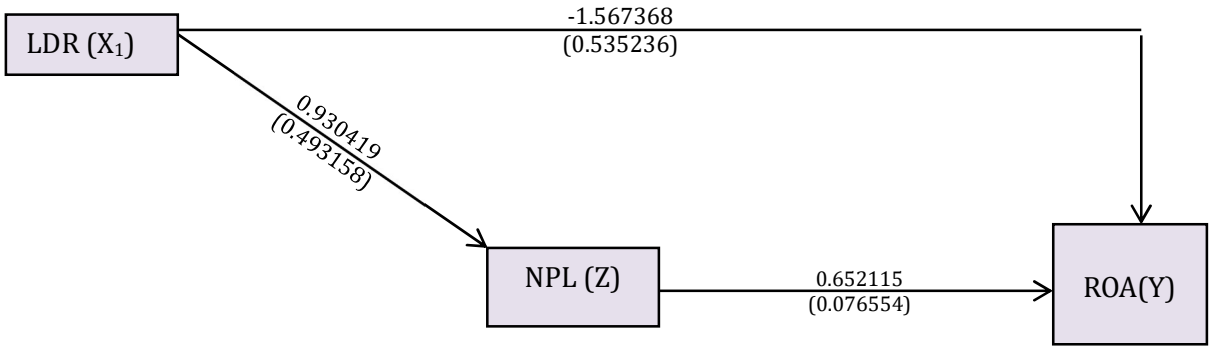
a Regression coefficient of the independent variable on the mediating variable

b Regression coefficient of the mediating variable on the dependent variable

SEa Standard error of estimation of the effect of the independent variable on the mediating variable

SEb Standard error of estimation of the effect of the mediating variable on the independent variable

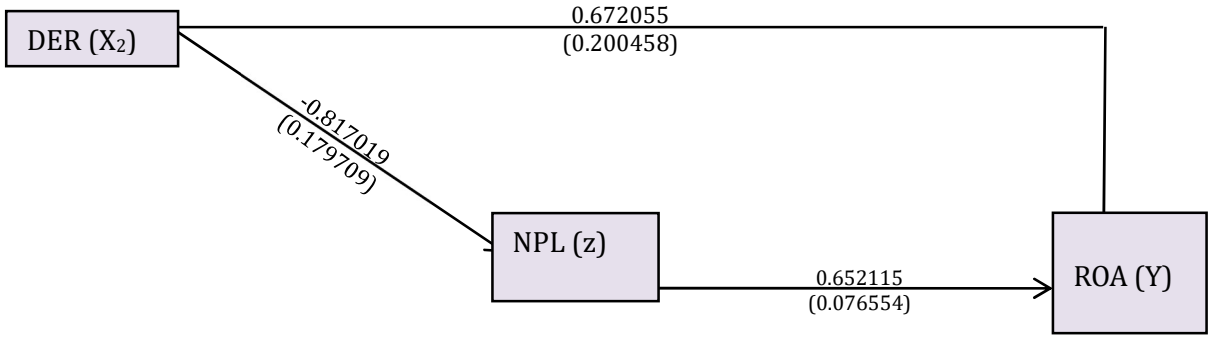
The effect of LDR on ROA through NPL



$$z = \frac{0.930419\ x\ 0.652115}{\sqrt{(0.652115^2 x 0.493158^2)+0.930419^2 0.076554^2)}} = 2,37 \quad \text{..... 11}$$

From the results of the sobel test calculation above, it gets a y value of 2.37 because the y value obtained is 2.37 large 1.96 with a significance level of 5%, proving that asset quality is able to mediate the effect of liquidity on bank performance.

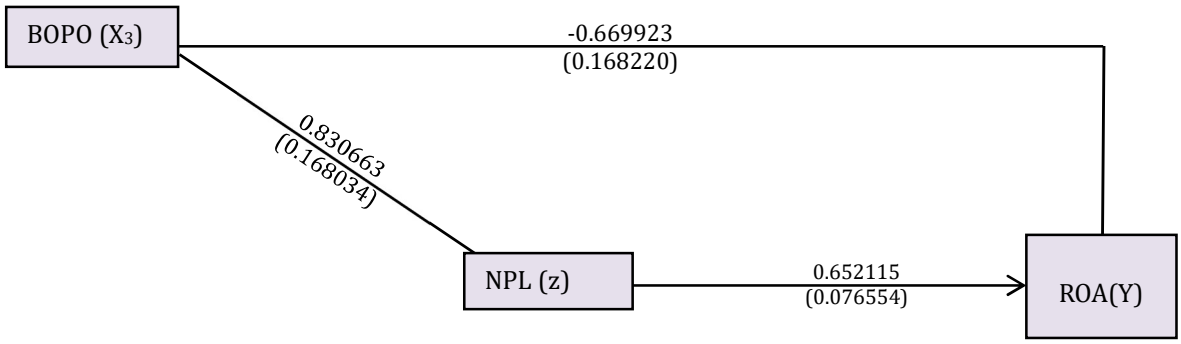
The effect of Solvency on ROA through NPL



$$z = \frac{-0.817019 \; x \; 0.652115}{\sqrt{(0.652115^2 x 0.179709^2)+0.930419^2 0.076554^2)}} = 4,09 \quad \text{..... 12}$$

From the results of the sobel test calculation above, the y value is 4.09, because the y value obtained is 4.09 greater than 1.96 with a significance level of 5%, it proves that asset quality is able to mediate the effect of solvency on bank performance.

Effect of BOPO on ROA through NPL



$$z = \frac{0.830663 \; x \; 0.652115}{\sqrt{(0.652115^2 x 0.168034^2)+0.930419^2 0.076554^2)}} = 4,23 \quad \text{..... 13}$$

From the results of the sobel test calculation above, the value of y is 4.23, because the value of y obtained is 4.23 greater than 1.96 with a significance level of 5%, it proves that asset quality can mediate the relationship between operational efficiency and bank performance.

Discussion

Effect of LDR on NPL

From the figure, the analysis results show that LDR has a Prob value of 0.00 <0.05, with a t-statistic value of -11.64945. This means that it can be concluded that the LDR variable partially has a significant effect on NPLs in banking institutions listed on the Indonesian stock exchange for the 2019-2023 period. Liquidity conditions shape banks' risk-taking and thus asset quality: tighter liquidity (or high loans-to-deposits) amplifies credit risk and raises NPLs, while stable liquidity buffers curb defaults and improve asset quality (16); (17). Evidence from Indonesia likewise shows liquidity metrics (e.g., LDR) significantly affect NPLs, linking liquidity management directly to banking asset quality (18); (19).

The effect of DER on NPL

From the figure above, it is known that the analysis results show that DER has a prob value of 0.06, 0.05. with a t-statistic value of -1.886658. This means that the DER variable partially has no significant effect on NPLs in banking institutions listed on the Indonesian stock exchange for the 2019-2023 period. Debt-to-equity ratio (DER) reflects funding structure, not loan book quality, so it often shows no direct or robust effect on NPLs; cross-country and national evidence finds NPLs are primarily driven by bank-specific credit-risk/efficiency metrics (provisions, profitability, capital buffers) and macro factors (growth, unemployment, interest/exchange rates), rather than capital structure per se (20); (21); (22).

The effect of BOPO on NPL

From the figure above, it is known that the analysis results show that BOPO has a Probability value of 0.00 <0.05. With a t statistic value of 4.943423. This means that the BOPO variable partially has a significant effect on NPLs in banking institutions listed on the Indonesian stock exchange for the 2019-2023 period. BOPO (operating expense to operating income) reflects cost efficiency; higher BOPO signals operational inefficiency that squeezes monitoring capacity and pricing margins, weakening screening/collection and elevating credit risk, hence higher NPLs and poorer asset quality. Empirical studies on Indonesian banks show BOPO significantly increases NPLs, and international evidence links inefficiency to problem loans (23); (24); (25); (26).

Effect of LDR on ROA

From the figure above, it is known that the analysis results show that LDR has a Probability value of 0.00 <0.05. With a t-statistic value of -2.928370. This means that the DER variable partially has a significant effect on ROA in manufacturing companies listed on the Indonesia Stock Exchange in 2016-2021. Liquidity affects ROA because holding sufficient liquid assets lowers funding costs, prevents distress sales, and enables timely lending and operations, improving asset productivity, whereas excessive liquidity tied up in low-yield assets can depress returns. Empirical studies document positive (but sometimes nonlinear) links between liquidity (e.g., LDR/NSFR, current ratio) and ROA in banks and firms across contexts, including Pakistan during COVID-19, UK banks post-Basel III, and Indonesian conventional banks. Thus, disciplined liquidity management enhances profitability up to an optimal threshold (27); (28); (29); (30).

Effect of DER on ROA

From the figure above, it is known that the analysis results show that DER has a Probability value of 0.00 <0.05. With a t-statistic value of 3.352603. This means that the DER variable partially has no significant effect on ROA in banking institutions listed on the Indonesian stock exchange for the 2019-2023 period. Higher DER raises financial leverage, increasing interest expense and default risk, which suppresses net income relative to total assets, thereby lowering ROA. While moderate debt can create tax shields, many empirical studies find leverage (including D/E) is negatively associated with ROA because the marginal cost of debt often exceeds asset returns, especially in volatile markets and banks. Recent evidence documents a significant negative effect of debt ratios on ROA across listed firms and banking samples in Africa (31); (32); (33).

Effect of BOPO on ROA

From the figure above, it is known that the results of the analysis show that Institutional Share Ownership has a Probability value of 0.00< 0.05. With a t-statistic value of -3.982422. This means that the Institutional Share Ownership variable partially has no significant effect on ROA in banking institutions listed on the Indonesian stock exchange for the 2019-2023 period. Higher BOPO (operating expense to operating income) signals inefficient cost management: operating costs consume more revenue, squeeze net interest and fee margins, and reduce profits generated per asset, so ROA falls. Empirical evidence shows a significant negative BOPO–ROA relationship in Indonesian banks (34); (35) and in broader samples (36). Hence, lowering BOPO via efficiency gains tends to lift ROA.

The effect of NPL on ROA

From the figure above, it can be seen that the results of the NPL analysis show a Prob value of 0.00 <0.05. With a t-statistic value of 8.518337. This means that the NPL variable partially has a significant effect on ROA in banking institutions listed on the Indonesian stock exchange for the 2019-2023 period. Higher NPLs depress ROA because non-earning assets cut interest income, require larger loan-loss provisions, raise collection/legal costs, and tie up capital, reducing asset productivity and overall profitability. Empirical evidence consistently finds a significant negative NPL–ROA relationship across markets, including Euro-Mediterranean listed banks and Indonesian banks (37); (38); (39).

The effect of LDR on ROA through NPL

From the results of the sobel test calculation above, it gets a y value of 2.37 because the y value obtained is 2.37 large 1.96 with a significance level of 5%, proving that asset quality is able to mediate the effect of liquidity on bank performance. Liquidity can affect profitability partly through asset quality: stronger liquidity positions enhance screening/monitoring and temper risk-taking, which reduces NPLs; because NPLs erode interest income and raise provisions, they depress ROA, thus NPLs transmit (mediate) liquidity's impact to ROA (17); (27); (40); (41).

The effect of Solvency on ROA through NPL

From the results of the sobel test calculation above, the y value is 4.09, because the y value obtained is 4.09 greater than 1.96 with a significance level of 5%, it proves that asset quality is able to mediate the effect of solvency on bank performance. Higher leverage (DER) intensifies banks' risk exposure and can deteriorate asset quality; this shows up as more non-performing loans (NPLs). NPLs then compress earnings via lost interest income and higher loss provisions, directly dragging down profitability (ROA). Hence, NPLs operate as the transmission channel, linking capital structure (DER) to performance (ROA): leverage influences NPL formation, and NPLs depress ROA (42); (43); (44).

Effect of BOPO on ROA through NPL

From the results of the sobel test calculation above, the value of y is 4.23, because the value of y obtained is 4.23 greater than 1.96 with a significance level of 5%, it proves that asset quality can mediate the relationship between operational efficiency and bank performance. Higher BOPO reflects inefficiency that erodes screening/monitoring quality, raising problem loans; these Non-Performing Loans then depress earnings via lost interest and provisioning, transmitting BOPO's effect to profitability (ROA). Empirical studies show NPF/NPL significantly mediates the BOPO→ROA relationship,BOPO increases NPF/NPL, which in turn lowers ROA, confirming an indirect pathway from operational inefficiency to profitability (45); (46).

Conclusion

This study shows that liquidity and operational efficiency have a significant effect on asset quality, while solvency does not have a significant effect. Partially, the variables of liquidity, solvency, operational efficiency, and asset quality are proven to affect bank performance. Other findings reveal that asset quality is able to mediate the relationship between liquidity and solvency on bank performance. Thus, both directly and through asset quality as an intervening variable, liquidity, solvency, and operational efficiency have a positive influence on banking performance.

Bank management is advised to maintain liquidity stability and improve operational efficiency in order to strengthen asset quality and encourage overall improvement in bank performance. Although solvency does not directly affect asset quality, its role remains important in maintaining long-term financial health, especially when combined with asset quality enhancement. Further research is recommended to examine external factors such as macroeconomic conditions or financial regulations as additional variables that may influence the relationship between variables in the context of banking performance.

References

1. Ayoush MD, Toumeh AA, Shabaneh KI. Liquidity, leverage, and solvency: What affects profitability of industrial enterprises the most? Investment Management and Financial Innovations. 2021 Sep 8;18(3):249–59.
2. Kepramareni P, Apriada K, Putra INFA. The Effect of Credit Risk, Capital Adequacy Ratio, Liquidity, Operational Efficiency, and Solvency on The Financial Performance of BPR In The City of Denpasar. Jurnal Ekonomi & Bisnis JAGADITHA. 2022 Mar 16;9(1):7–14.
3. Yadav AS, Yadav IS. Debt maturity, governance and investment efficiency: new evidence from emerging market. Asian Review of Accounting. 2025 Jan 8;33(1):132–62.
4. Fahriani A. Pengaruh Risiko Pembiayaan dan Efisiensi Operasional Terhadap Profitabilitas. Bongaya Journal for Research in Management (BJRM). 2022 Apr 30;5(1):26–35.
5. OJK. Otoritas Jasa Keuangan. 2024. Penguatan Sektor Jasa Keuangan Dalam Menjaga Pertumbuhan Ekonomi: Laporan Kinerja OJK Tahun 2023.
6. Hidayati C, Selmury N. Analisis Rasio Keuangan Dan Analisis Eva Sebagai Alat Untuk Menilai Kinerja Keuangan Pt Charoenpokphand Indonesia Tbk Yang Terdaftar Dibursa Efek Indonesia. Jurnal Ekbis. 2021;21(1):16.
7. Lestari DA, Purnamasari ED, Setiawan B. Pengaruh Payment Gateway terhadap Kinerja Keuangan UMKM. Jurnal Bisnis, Manajemen, dan Ekonomi. 2020;1(1):1–10.
8. Francis H. Analisis Kinerja Keuangan Perusahaan (Gita Puspi). Desanta Publisher; 2021.
9. Rahayu. Kinerja Keuangan Perusahaan. Nas Media Pustaka; 2021.
10. Sri H. Manajemen Keuangan. SCOPINDO MEDIA PUSTAKA; 2020. 252 p.
11. Francis H. Analisis Kinerja Keuangan Perusahaan (Gita Puspi). Desanta Publisher; 2021.
12. Singh SK, Basuki B, Setiawan R. The Effect of Non-Performing Loan on Profitability: Empirical Evidence from Nepalese Commercial Banks. Journal of Asian Finance, Economics and Business. 2021;8(4):709–16.
13. Davydov D, Vähämaa S, Yasar S. Bank liquidity creation and systemic risk. Journal of Banking and Finance. 2021;123.
14. Soewignyo TI. Analysis of the Effect of Profitability , Solvability , and Dividend Policy on Banking Firm Value. 2020;21(1):28–37.
15. Pradnyawati SO, Luh N, Widhiastuti P. the Effects of Nim, Ldr and Bopo on Balinese People'S Credit Bank (Bpr) Profitability of Tabanan. American Journal of Humanities and Social Sciences Research. 2020;4(11):196–203.
16. Boussaada R, Hakimi A, Karmani M. Is there a threshold effect in the liquidity risk–non-performing loans relationship? A <scp>PSTR</scp> approach for <scp>MENA</scp> banks. International Journal of Finance & Economics. 2022 Apr 21;27(2):1886–98.
17. Vuong GTH, Phan PTT, Nguyen CX, Nguyen DM, Duong KD. Liquidity creation and bank risk-taking: Evidence from a transition market. Heliyon. 2023 Sep;9(9):e19141.
18. Safitri R. Determinants of non-performing loans (NPL) in banking companies listed on the Indonesian Stock Exchange. Indonesian Journal of Economics, Business and Accounting Research (IJEBAR). 2023;7(2).
19. Yudaruddin R, Nugroho BA, Mardiany, Fitrian Z, Hapsari P, Fitrianto Y, et al. Liquidity and Credit Risk in Indonesia: The Role of FinTech Development. Sage Open. 2024 Apr 9;14(2).

20. Salas Mb, Lamothe P, Delgado E, Fernández-Miguélez AL, Valcarce L. Determinants of Nonperforming Loans: A Global Data Analysis. Comput Econ. 2024 Nov 18;64(5):2695–716.

21. Chand SA, Kumar RR, Stauvermann PJ. Determinants of Non-Performing Loans in a Small Island Economy of Fiji: Accounting for COVID-19, Bank-Type, and Globalisation. Journal of Risk and Financial Management. 2023 Oct 7;16(10):436.

22. Nasir MS, Oktaviani Y, Andriyani N. Determinants of Non-Performing Loans and Non-Performing Financing level: Evidence in Indonesia 2008-2021. Banks and Bank Systems. 2022 Nov 28;17(4):116–28.

23. Nugroho IS, Endri E. Determinants of Non-Performing Bank Loans Listed on The Indonesia Stock Exchange For The 2016-2020 Period. Journal of Social Science. 2022 Nov 7;3(6):1214–32.

24. Abidi R, Sastradipraja U. EFFECT OF LDR, CAR, BOPO AND INFLATION ON NP. Jurnal Ekonomi. 2023;12(01):848–63.

25. Marchela FN, Widodo P. Determinants of non-performing loans in Regional Development Banks (BPD) in Indonesia. International Journal of Research in Business and Social Science (2147- 4478). 2023 May 6;12(3):263–71.

26. Berger AN, DeYoung R. Problem loans and cost efficiency in commercial banks. J Bank Financ. 1997 Jun;21(6):849–70.

27. Haris M, Yao H, Fatima H. The impact of liquidity risk and credit risk on bank profitability during COVID-19. PLoS One. 2024 Sep 9;19(9):e0308356.

28. Eltweri A, Sawan N, Al-Hajaya K, Badri Z. The Influence of Liquidity Risk on Financial Performance: A Study of the UK's Largest Commercial Banks. Journal of Risk and Financial Management. 2024 Dec 23;17(12):580.

29. Ferli O, Larasati PA, Ardila A, Irawan RS. Mengungkap Hubungan Likuiditas dan Profitabilitas pada Perbankan Konvensional di Indonesia. Jurnal Ekonomi, Manajemen dan Perbankan (Journal of Economics, Management and Banking). 2022 Jan 28;7(3):113.

30. Le M, Hoang VN, Wilson C, Managi S. Net stable funding ratio and profit efficiency of commercial banks in the US. Econ Anal Policy. 2020 Sep;67:55–66.

31. Ahmed F, Rahman MU, Rehman HM, Imran M, Dunay A, Hossain MB. Corporate capital structure effects on corporate performance pursuing a strategy of innovation in manufacturing companies. Heliyon. 2024 Feb;10(3):e24677.

32. Kabichi R, Bwana KM. Impact of capital structure on profitability of commercial banks in Tanzania. Journal of European Economy. 2024;23(4):599–620.

33. Khoza F. The Impact of Liquidity and Leverage on the Financial Performance of the Johannesburg Stock Exchange-Listed Consumer Goods Firms. Journal of Risk and Financial Management. 2025 Sep 15;18(9):510.

34. Yuliana IR, Listari S. Pengaruh CAR, FDR, Dan BOPO Terhadap ROA Pada Bank Syariah Di Indonesia. Jurnal Ilmiah Akuntansi Kesatuan. 2021 Aug 22;9(2):309–34.

35. Kirana PA, Waluyo DE. Pengaruh NPL, LDR, BOPO terhadap ROA pada bank yang terdaftar di Bursa Efek Indonesia periode 2012–2021. Jurnal CAPITAL. 2022;4(2):46–63.

36. Rajindra, Guasmin, Burhanuddin, Anggraeni RN. Costs and Operational Revenue, Loan to Deposit Ratio Against Return on Assets: A Case Study in Indonesia. The Journal of Asian Finance, Economics and Business. 2021;8(5):109–15.

37. Psaila A, Spiteri J, Grima S. The Impact of Non-Performing Loans on the Profitability of Listed Euro-Mediterranean Commercial Banks*. International Journal of Economics and Business Administration. 2019 Nov 1;VII(Issue 4):166–96.

38. Dewi NLGS, Tahu GP, Gunadi IGstNB. PENGARUH CAPITAL ADEQUACY RATIO(CAR), NON PERFORMING LOAN(NPL), DAN LOAN TO DEPOSIT RATIO(LDR) TERHADAP PROFITABILITAS PADA PERUSAHAAN PERBANKAN DI BURSA EFEK INDONESIA. Jurnal EMAS. 2023;4(7):1819–32.

39. Hutahaean LFR. Pengaruh DPK dan NPL Terhadap ROA pada Sektor Perbankan yang Tercatat di BEI. Indonesian Journal of Economics and Management. 2021 Nov 30;2(1):134–42.

40. Al-Sharkas AA, Al-Sharkas TA. The impact on bank profitability: Testing for capital adequacy ratio, cost-income ratio and non-performing loans in emerging markets. Journal of Governance and Regulation. 2022 Feb 17;11(1, special issue):231–43.

41. Mandala V, Oktariyana MD, Tanan EHP. Pengaruh NPL dan BOPO Terhadap Return On Assets pada bank yang terdaftar di Bursa Efek Indonesia Tahun 2018-2022. Jurnal Inovasi Akuntansi (JIA). 2023 Dec 1;1(2):162–72.

42. Trung NKQ. Does leverage fit non-performing loans in the COVID-19 pandemic – evidence from the Vietnamese banking system. Cogent Business & Management. 2022 Dec 31;9(1).

43. Khan MdF, Ali MdS, Hossain MdN, Bairagi M. Determinants of non-performing loans in conventional and Islamic banks: Emerging market evidence. Modern Finance. 2023 Oct 7;1(1):56–69.

44. Wahyuni W, Badollahi I, Nurhidayah N, Mardiastuti W. Analyzing the Impact of Non-Performing Loans and Loan-to-Deposit Ratios on Return on Assets: A Study of Conventional Commercial Banks in Indonesia. Advances in Management & Financial Reporting. 2023 Sep 30;1(3):107–18.

45. Tho'in M. Effect of Financing to Deposit Ratio and Operational Efficiency on Profitability (ROA) with NPF as Intervening in Islamic Banks. Jurnal Ilmiah Ekonomi Islam. 2022;8(2):2020–6.

46. Murtini, Purnama ED, Lumbantobing R. The effect of non-performance loan (NPL) mediation and interest rate moderation on the effect of CAR and BOPO on ROA in consumer finance companies. Enrichment: Journal of Management. 2023;12(6):5333–5346.