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The Influence of Liquidity, Solvency, and Activity Ratios on Profitability (ROA) in Banking Companies Listed on the Indonesia Stock Exchange During 2021–2024

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Abstract: This study aims to analyze the influence of liquidity, solvency, and activity ratios on profitability (Return on Assets/ROA) in banking companies listed on the Indonesia Stock Exchange during 2021–2024. Using a quantitative approach and Partial Least Squares Structural Equation Modeling (PLS-SEM), the results reveal that the activity ratio (Total Asset Turnover/TATO) significantly and positively affects profitability. In contrast, the liquidity ratio (Loan to Deposit Ratio/LDR) and solvency ratio (Debt to Equity Ratio/DER) do not significantly influence profitability. These findings highlight that efficient asset management plays a crucial role in enhancing bank performance. Empirically, this implies that banking firms should prioritize asset utilization strategies to improve financial outcomes. From a managerial perspective, the results suggest the need for focused efforts on optimizing operational efficiency over merely maintaining liquidity or adjusting capital structure.

Keywords: Liquidity, Solvency, Activity, Profitability, ROA, PLS-SEM, Banking.

INTRODUCTION

The main goal of most businesses is to make money and stay in business. To reach this goal, businesses need to stay competitive, which means they need to keep doing well in the global market (Jullia et al., 2024). The growth in the field of banking is very important in order to keeping the financial sector stable and helping it thrive. Banks are expected to not only keep their operations stable but also make the most money possible as financial intermediaries (Riyanti et al., 2025). Recent events show that the national banking sector is under a lot of pressure to make money. As 2025 began, some of Indonesia's largest banks reported significant drops in profit. For example, Bank Rakyat Indonesia (BRI) saw their net profit plummet by 58.33% from IDR 4.82 trillion in January 2024 to IDR 2 trillion in January 2025. The main reasons for this drop were a huge rise of 188.49% in impairment loss reserves and a 7.62% drop in net interest income. Bank Tabungan Negara (BTN) also said that its profits fell by

63.10%, to only IDR 101.6 billion. Bank Mandiri (BMRI) made 4.46% more money this year than last year, but its monthly profits went down by 11% (Investor.id, 2025).

These pressures are also evident in the Indonesian banking context, where monetary policy, particularly changes in interest rates and inflation, has been shown to significantly affect banking profitability, as measured by ROA. An increase in interest rates tends to raise net interest income, while inflation exerts downward pressure by increasing operational costs and credit risk (Rahmatullah, 2025). In Indonesia, the recent drop in bank earnings shows how important it is to manage money well inside the bank and use important financial indicators to stay profitable even when things are tough outside the bank. There are a number of internal elements that might affect a bank's profitability, including its liquidity, solvency, and operational efficiency ratios.

According to agency theory, managers are motivated to increase company profitability as a signal of performance to principals, especially when linked to performance-based incentives such as bonuses (Puspitaningrum & Taswan, 2020). High ROA not only reflects efficient use of assets but also supports transparency in financial reporting and risk management (Haryanti & Hardiyanti, 2022). Previous studies have demonstrated that liquidity, solvency, and activity ratios, measured respectively by Loan to Deposit Ratio (LDR), Debt to Equity Ratio (DER), and Total Asset Turnover (TATO), are crucial in determining profitability. Some studies report that these ratios exert significant collective influence on ROA (Ali et al., 2022), though when evaluated individually, their impact may vary depending on the bank's risk profile and capital structure (Amiyatun et al., 2025; Ramadona et al., 2025). These varying findings highlight the need for further research within the Indonesian banking context.

The liquidity ratio, like the Loan to Deposit Ratio (LDR), shows how effectively a bank settles its immediate liabilities. Solvency ratios, including the Debt to Equity Ratio (DER), show how well a bank can handle long-term financial risks. Activity ratios, like the Total Asset Turnover (TATO), on the other hand, show how well a bank uses its assets to make money (Khasanah et al., 2022). These results are in line with the findings of Rahmatullah (2025), who emphasized that in the Indonesian banking context, interest rates have a significant and positive effect on profitability as measured by ROA, as they enhance net interest income. Conversely, inflation exerts a negative impact by raising operational costs and increasing credit risk, thereby reducing profitability.

In Indonesia, falling profits show how important it is to improve internal financial management, especially by looking at financial measures that affect bank profitability, such as liquidity, solvency, and activity ratios. Several previous research underscore the significance of these three ratios. Khasanah et al. (2022) discovered that liquidity and activity ratios exhibit a favourable impact in relation to Islamic banks' earnings. Vuong et al. (2023) contended that the generation of excessive liquidity, devoid of sufficient risk management, escalates credit risk.

Setiawan and Suwaidi (2022) conducted a study demonstrating that activity and solvency ratios exert a beneficial influence on profitability, particularly when controlled by firm size. On the other hand, Husniar (2022) discovered that solvency did not have a substantial effect on profitability in the banking industry. The disparate findings necessitate additional examination of the correlation between financial parameters and profitability within Indonesia's banking sector. Vuong et al. (2023) also said that increased liquidity could be good for profits and lower credit risk, but only if it is backed up by good risk management. Jurniaan and Irawan (2021) also showed that LDR, DER, and TATO have a big effect on how well Indonesian banks fare financially.

As a result, this research aims to analyse the effects of liquidity, solvency, and operational efficiency ratios on profitability (ROA) in banking firms included in the Indonesia Stock Exchange (IDX) from 2021 to 2024. In light of the preceding context, this study examines the

research problem of whether liquidity (Loan to Deposit Ratio), solvency (Debt to Equity Ratio), and activity (Total Asset Turnover) ratios exert a partial or simultaneous influence on the profitability (Return on Assets) of banking companies listed on the Indonesia Stock Exchange during the 2021–2024 period. The aim of this study is to assess the impact of liquidity (LDR), solvency (DER), and activity (TATO) ratios with respect to earnings (ROA), both separately and in combination, among banks publicly traded on the Indonesia Stock Exchange since 2021 to 2024.

METHOD

This research is conducted to examine the impact of internal financial ratios, specifically, the liquidity ratio (Loan to Deposit Ratio/LDR), solvency ratio (Debt to Equity Ratio/DER), and activity ratio (Total Asset Turnover/TATO), on the profitability, as measured by Return on Assets (ROA), of banking institutions listed on the Indonesia Stock Exchange (IDX) during the 2021–2024 period. The study utilizes secondary data derived from the annual financial statements of the selected banks, which were collected from the official IDX website (www.idx.co.id) and the respective banks' official websites. For data analysis, the study employs Structural Equation Modeling (SEM) with the Partial Least Squares (PLS) method, processed using SmartPLS version 4 software. This analytical technique is chosen for its ability to assess complex interactions between latent variables, its flexibility in handling data that do not meet the assumptions of normality, and its effectiveness with small to moderate sample sizes, making it particularly suitable for financial research involving multiple indicators and interdependent constructs.

Population and Sample

The population of this study includes all banking sector firms listed on the Indonesia Stock Exchange (IDX), totalling 47 companies during the 2021–2024 period. Purposive sampling is applied as the sampling technique, with the following selection criteria:

1. From 2021 to 2024, banks were always on the IDX.
2. Banks that are on the IDX and disclose their finances in Indonesian Rupiah between 2021 and 2024.
3. Banks that give full financial information on ROA, LDR, DER, and TATO for the years 2021 to 2024.

A total of 34 banking businesses that were listed on the IDX between 2021 and 2024 were chosen as the sample for this study based on these criteria.

Research Variables

Return on Assets (ROA) serves as the indicator for measuring profitability, acting as the dependent variable in this research. ROA shows how well a corporation can make money from all of its assets. A higher ROA value means that a company is doing a better job of making money. The following formula is used to figure out ROA (Jurniaan & Irawan, 2021).

$$ROA = \frac{Net\ Income}{Total\ Assets}$$

This research considers the following as independent variables company's internal aspects that are thought to affect how profitable it is. The independent variables include financial measurements that show how liquid, solvent, and active the company is. These are the Loan to Deposit Ratio (LDR), the Debt to Equity Ratio (DER), and the Total Asset Turnover (TATO).

1. Loan to Deposit Ratio (LDR) serves as an indicator of liquidity (Jurniaan & Irawan, 2021):

$$\text{LDR} = \frac{\text{Total Loan}}{\text{Total Deposits from Customers}}$$

2. Debt to Equity Ratio (DER) is an indicator of solvency (Ihsan, 2023):

$$\text{DER} = \frac{\text{Total Long} - \text{Term Liabilities}}{\text{Total Equity}}$$

3. Total Asset Turnover (TATO) is an indicator of activity (Setiawan & Suwaidi, 2022):

$$\text{TATO} = \frac{\text{Sales}}{\text{Total Assets}}$$

Data Analysis Technique

This research employs the Partial Least Squares Structural Equation Modeling (PLS-SEM) technique using SmartPLS software as the primary data analysis tool. PLS-SEM was selected due to its ability to handle complex relationships among latent variables, its flexibility in dealing with non-normally distributed data, and its suitability for relatively small to medium sample sizes. In this study, PLS-SEM enables simultaneous analysis of measurement validity and structural relationships among variables, thus providing a comprehensive evaluation of the proposed model.

The data analysis was conducted in two major stages:

1. Measurement Model (Outer Model) Evaluation

   This stage is intended to evaluate the constructs' validity and reliability through the following steps:

   a. Convergent Validity

      Assessed through outer loading values (acceptable threshold: ≥ 0.70). Indicators below this threshold may be removed unless theoretically justified. Average Variance Extracted (AVE) is used to evaluate the extent to which a latent variable explains its indicators. A value of AVE ≥ 0.50 is considered acceptable (Hair Jr et al., 2024), indicating that more than half of the variance in the indicators is captured by the construct.

   b. Discriminant Validity

      Evaluated using the Fornell-Larcker Criterion, which requires the square root of AVE for each construct to be greater than its correlation with other constructs. Cross loading analysis ensures that each indicator loads more highly on its associated construct than on others. Additionally, Heterotrait-Monotrait Ratio (HTMT) is employed, with values ≤ 0.85 indicating good discriminant validity.

   c. Reliability Test

      Composite Reliability (CR) assesses the internal consistency of constructs, with a recommended threshold of ≥ 0.70. Cronbach's Alpha is also calculated, with values ≥ 0.60 considered acceptable, although CR is regarded as a more accurate measure of construct reliability in PLS-SEM.

2. Evaluation of the Structural Model (Inner Model)

   Once the measurement model is validated, the next step is to evaluate the relationships among latent variables, which includes:

   a. Path Coefficients (β values)

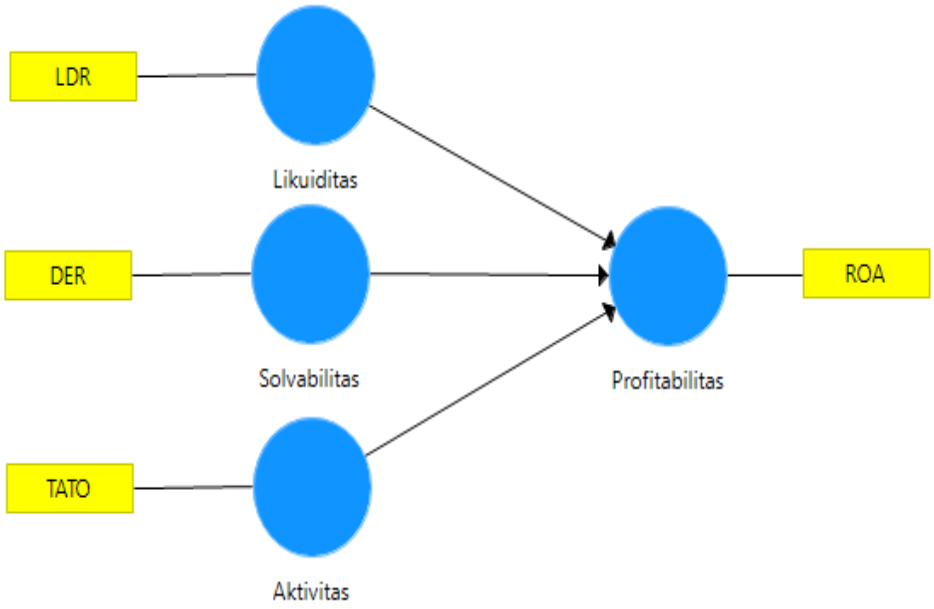
      Indicate the strength and direction of the relationships between independent and dependent variables. Conducted with 5000 resamples to generate t-statistics and p-values. A relationship is considered statistically significant if the t-statistic > 1.65 (for one-tailed tests) or $p < 0.05$.

   b. Coefficient of Determination (R^2)

Indicates how much the independent variables can account for variations in the dependent variable. $R^2 \geq 0.75$ is considered substantial, $R^2 \geq 0.50$ moderate, and $R^2 \geq 0.25$ weak (Hair Jr et al., 2024).

c. Effect Size (f^2):
Assesses the impact of each predictor on the dependent variable. Values of 0.02, 0.15, and 0.35 indicate small, medium, and large effects, respectively.

d. Model Fit Assessment
Although traditional fit indices are not emphasized in PLS-SEM, Standardized Root Mean Square Residual (SRMR) may be reported, with values < 0.08 indicating good fit.



Source: SmartPLS, 2025

Figure 2. Path Diagram of the Influence of Liquidity, Solvency, and Activity Ratios on Profitability (ROA)

The blue circles in the picture show the observed variables that were measured with questionnaires. In the same way, different structures are shown based on the forms of their indicators. A path diagram can show causal links in the PLS application.

H1: The Liquidity Ratio has a bearing on profitability.
H2: The Solvency Ratio has a bearing on profitability.
H3: The Activity Ratio has a bearing on profitability.
H4: Liquidity, Solvencyand Activity Ratios collectively have a bearing on profitability.

RESULTS AND DISCUSSION

Descriptive Statistics

A summary of the research data is presented in the table below.

Table 4.1 Descriptive Statistics of Research Data

	No.	*Missing*	*Mean*	Median	Min	*Max*	*Standard Deviation*	*Excess Kurtosis*	*Skewness*
LDR	1	0	0.748	0.74	0.602	0.935	0.07	-0.46	0.17
DER	2	0	2.363	2.329	1.387	4.023	0.528	-0.096	0.479
TATO	3	0	0.232	0.226	0.155	0.327	0.042	-0.908	0.278
ROA	4	0	0.046	0.048	-0.086	0.1	0.033	2.144	-0.773

Source: SmartPLS, 2025

Table 4.1 presents evidence that the average the amount indicated for the Loan to Deposit Ratio (LDR) variable is 0.748, having a standard deviation of 0.07. This means that, on general, banking companies have a lot of liquidity and not much variety. The skewness score of 0.17 means that the LDR data is slightly right-skewed (positive), while the excess kurtosis a recorded value of -0.46 signifies that the data is a little flatter compared to a normal distribution. The average Debt to Equity Ratio (DER) is 2.363, as well as the standard deviation is 0.528. This indicates that, on general, the companies' solvency levels are rather high. This means that they tend to borrow money more than they use their own stock. A skewness of 0.479 means that the DER data is somewhat right-skewed, and an excess kurtosis of -0.096 means that the data is close to normal (platykurtic). The average value of the Total Asset Turnover (TATO) variable is 0.232, while the standard deviation is 0.042. This suggests that the average efficiency of employing assets to make money is still not very high. The TATO distribution is significantly right-skewed since its skewness is 0.278. The data exhibits a broader spread than that of a normal distribution because its excess kurtosis is -0.908. The average Return on Assets (ROA) is 0.046 and the standard deviation is 0.033, which means that the banks aren't making much money. The skewness value of -0.773 reveals that the ROA distribution is left-skewed (negative), while an excess kurtosis value of 2.144 shows that the distribution has a higher peak compared to a normal distribution (leptokurtic). In general, all of the variables have values, therefore the data is ready for more analysis.

Path Coefficients (Mean, STDEV, T-Values)

Table 4.2 Path Coefficients (Mean, STDE, T-Values)

	Original Sample (O)	*Sample Mean (M)*	*Standard Deviation (STDEV)*	*T Statistics (|O/STDEV|)*	*P Values*
Aktivitas -> Profitabilitas	0.164	0.162	0.079	2.058	**0.040**
Likuiditas -> Profitabilitas	-0.052	-0.057	0.096	0.541	**0.589**
Solvabilitas -> Profitabilitas	0.036	0.036	0.091	0.397	**0.692**

Source: SmartPLS, 2025

According to Table 4.2, the T-Statistic value is used to see how much one latent variable affects another by comparing it to the crucial T-table value of 1.96 at a 5% significance level. When the T-statistic exceeds 1.96 and the p-value is below 0.05, the alternative hypothesis (Ha) is accepted; otherwise, the null hypothesis (Ho) is maintained. The path coefficient analysis indicates that the activity ratio significantly affects profitability, evidenced by a T-statistic of 2.058 and a p-value of 0.040. On the other hand, liquidity and solvency ratios do not have a big effect on profitability, with T-statistics of 0.541 and 0.397 and p-values of 0.589 and 0.692, which are lower than the critical T-table and more than 0.05. To examine the determination effect in SEM, the R-square value is employed to assess the contribution of exogenous variables to the endogenous variable. The coefficient of determination (R^2) tells you how well the model describes the changes in the outcome variable

Table 4.3. Test of Coefficient of Determination (R-Square)

	R Square	R Square Adjusted
Profitabilitas	0.029	0.007

Source: SmartPLS, 2025

The R^2 value of 0.029 indicates that LDR, DER, and TATO together explain only 2.9% of the variance in profitability (ROA), suggesting that other influential factors are not captured

in this model.

This low R^2 may be due to:

1. Limited variables, ROA is also influenced by macroeconomic factors (interest rates, inflation), operational risks, or bank-specific factors like size and efficiency.
2. Post-pandemic market volatility, The 2021–2024 period includes economic disruptions that could weaken the explanatory power of standard ratios.
3. Model limitations, LDR, DER, and TATO alone may not fully reflect the dynamics affecting profitability.

Despite the low explanatory power, these ratios are still relevant indicators for internal bank performance monitoring. However, the findings suggest a need for future studies to include additional variables, such as NPL, CAR, or external economic indicators, for a more robust model.

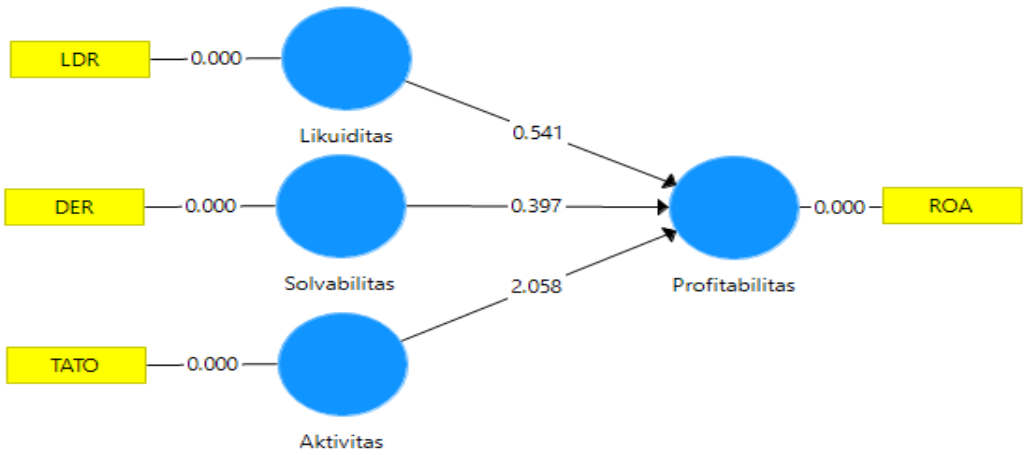
Table 4.4. f-Square Test

	Activity	Liquidity	Profitability	Solvency
Activity			0.028	
Liquidity			**0.003**	
Profitability				
Solvency			**0.001**	

The f^2 values we got from the table above are as follows:

1. The f^2 value for the activity variable in relation to profitability is 0.028. This implies that activity affects profitability to a moderate degree.
2. The f^2 value for the liquidity variable in relation to profitability is 0.003. This means that liquidity exerts a minor influence on profitability.
3. The f^2 value for the solvency variable compared to profitability is 0.001. This means that solvency has very little effect on profitability.

Hypothesis testing in this research is conducted using a significance threshold (α) of 0.05, or 5%, to determine whether the observed relationships between variables are statistically meaningful. Values below this threshold indicate a significant relationship, while values above suggest that the effect may be due to chance.



The results of the hypothesis testing can be seen as follows.

Table 4.5. Hypothesis Testing Results

	Original Sample (O)	*Sample Mean* (M)	*Standard Deviation* (STDEV)	*T Statistics* (|O/STDEV|)	*P Values*
Activity → Profitability	0.164	0.162	0.079	2.058	**0.040**
Liquidity → Profitability	-0.052	-0.057	0.096	0.541	**0.589**
Solvency → Profitability	0.036	0.036	0.091	0.397	**0.692**

Source: SmartPLS, 2025

The hypothesis testing produces the following outcomes, as shown in the table above:

1. The T-statistic is 2.058, exceeding the critical value of 1.96, and the p-value is 0.040, below the 0.05 threshold. This confirms that activity has a significant positive effect on profitability, with an effect size of 0.164. This finding indicates that the more efficiently a bank utilizes its assets, the higher its profitability.
2. The T-statistic is 0.541, which is below 1.96, and the p-value is 0.589, higher than 0.05. This suggests that liquidity has no significant effect on profitability, with an effect size of -0.052. This may indicate that banks' excess liquidity is not optimally used for income-generating activities. In some cases, overly conservative lending or a mismatch between deposit growth and credit distribution may result in idle funds. High or low LDR may both reflect inefficient liquidity management, which explains the weak link to profitability.
3. The T-statistic value is 0.397, less than 1.96, and the p-value is 0.692, exceeding 0.05. This implies that solvency does not significantly affect profitability, with an effect size of 0.036. This may be attributed to Indonesia's banking structure, where many banks rely more on equity or internal capital than external debt. As a result, leverage does not strongly influence managerial behavior or profitability outcomes, weakening its impact as a disciplinary mechanism in agency relationships.

This study's findings demonstrate that activity, as quantified by Total Asset Turnover (TATO), has a strong and positive impact on profitability (ROA). In other words, the more efficiently a bank uses its assets, the more money it makes. These results align with earlier work by Khasanah et al. (2022) and Setiawan & Suwaidi (2022), which stress the importance of asset efficiency for better financial performance. This backs up agency theory, which says that managers, as agents, do a good job of managing assets to make money, which is in the best interests of the principals.

This kind of efficiency lowers conflicts of interest and makes owners more confident in management. A high TATO means that managers are doing a good job of using the company's assets to hold them accountable to shareholders (Argoputro et al., 2023). The Loan to Deposit Ratio (LDR) is another way to measure liquidity, and it doesn't have a big effect on ROA. Even if high liquidity means that a company can pay its short-term debts, it doesn't always mean that it will make more money. This is because high liquidity can also mean that the company has money that isn't being used.

This outcome aligns with the results of Rizki (2019) and Vuong et al. (2023). Agency theory posits that excessive liquidity may incur agency costs, as it implies that managers are not effectively utilizing idle capital. If LDR doesn't have a big effect on profitability, it means that management hasn't been able to use liquid assets effectively for operations that make money. This shows that proprietors aren't keeping a close eye on agents when it comes to managing the company's liquid assets (Komara & Riana, 2024). The Debt to Equity Ratio

(DER) likewise shows that solvency doesn't have a big effect on ROA. The banks' funding structure is one of the key reasons.

This finding is consistent with Husniar (2022) but contradicts Davis et al. (2022), which indicated that solvency requirements in Europe adversely impacted the profitability of small banks. In the context of agency theory, debt serves as a mechanism to compel management to prioritize the interests of shareholders. Nonetheless, the negligible impact of DER on ROA indicates that debt financing has been inadequate in compelling or incentivizing managers to enhance performance. This suggests that leverage has not yet effectively served as a control mechanism inside the agency relationship (Amiyatun et al., 2025).

CONCLUSION

According to the findings of this study, it is advisable that activity, as shown by the Total Asset Turnover (TATO) ratio, exerts a favorable and meaningful influence on the profitability (ROA) of banking sector businesses included in the Indonesia Stock Exchange from 2021 to 2024. The more efficiently a bank manages its assets, the more it helps the company make money. The Loan to Deposit Ratio (LDR) measures liquidity, and the Debt to Equity Ratio (DER) measures solvency. Neither of these has a big effect on profitability. This means that the bank's ability to pay off short-term debts and its financing structure don't have a direct effect on profits. Also, the balance between debt and equity financing hasn't been a major influence in how much money banks made during the study period.

Recommendations

Based on the findings, banks are advised to improve asset efficiency by optimizing their credit portfolio, such as increasing the loan-to-asset ratio, reallocating idle assets into productive lending, and adopting digital tools to accelerate and monitor asset utilization. Although liquidity (LDR) did not significantly affect profitability, banks should still manage excess funds effectively by channeling them into income-generating activities rather than holding idle reserves. Similarly, while solvency (DER) showed no significant impact, maintaining a balanced capital structure remains important to ensure long-term financial stability. For future research, it is recommended to include additional variables such as operating cost efficiency, credit risk ratios (e.g., NPL), bank size, and macroeconomic indicators to better capture the full range of factors influencing bank profitability.

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