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The Effect of Capital Structure and Liquidity on Company Efficiency and Profitability (Study on Banks that Experienced Acquisitions on the Indonesia Stock Exchange in 2021-2024)

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A B S T R A C T

This study examines the causal relationship between capital structure (CAR) and liquidity (LDR) to efficiency (BOPO) and profitability (ROA) in banks in Indonesia that experienced acquisitions during the 2021–2024 period. The study is motivated by the empirical anomaly that post-acquisition scale expansion does not necessarily result in improved financial performance. To explain this phenomenon, this study places efficiency as a mediating variable that links capital strength and liquidity management with profitability. Using panel data from 14 banks listed on the Indonesia Stock Exchange, the analysis was carried out through a path analysis approach with the Fixed Effect Model and Common Effect Model. The results showed that CAR had a negative and significant effect on BOPO, while LDR had no significant effect on efficiency. In addition, CAR, LDR, and BOPO did not show a significant influence on ROA, so profitability was more influenced by external factors such as asset quality, cost structure, and revenue diversification. This research makes an empirical contribution to the literature on Indonesian banking consolidation and offers strategic implications for regulators, investors, and bank management regarding the importance of operational integration beyond capital strengthening.

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INTRODUCTION

In the last decade (2011–2024), Indonesia's banking industry has undergone a structural transformation characterized by increasing merger and acquisition activities as a consolidation strategy. Regulatory policies encourage capital strengthening and operational efficiency so that banks are able to compete globally. However, empirical phenomena show that post-acquisition business scale increases are not automatically followed by improved financial performance, particularly profitability as measured by Return on Assets (ROA).

Some cases show an insynchronization between expansion and performance. In the early phases of integration, banks often experience operational cost pressures due to system adjustments, organizational restructuring, and harmonization of credit portfolios. This condition is reflected in the increased efficiency ratio (BOPO) and has a direct impact on the decrease in ROA. On the other hand, there is also a phenomenon where operational efficiency is improving, but profitability has not shown a significant increase. This indicates that the relationship between efficiency and profitability does not stand alone, but is influenced by other fundamental factors such as capital structure and liquidity.

In this context, the capital structure proxied through the Capital Adequacy Ratio (CAR) and liquidity through the Loan to Deposit Ratio (LDR) are two important variables that determine the stability and intermediation capabilities of banks. Theoretically, CAR reflects the resilience of capital in absorbing risk, while LDR describes the ability of banks to channel funds productively. However, the results of this study show that these two variables do not consistently have a significant effect on operational efficiency (BOPO). This means that capital adequacy and good liquidity do not necessarily immediately create efficiency if they are not accompanied by effective operational management.

On the contrary, the main findings of this study confirm that operational efficiency (BOPO) has a negative and significant influence on profitability (ROA). This means that the higher the BOPO ratio (the less efficient), the lower the bank's profitability rate. These findings reinforce the view that efficiency is a key factor in determining the success of post-acquisition financial performance. In other words, the ability of banks to control operational costs is a major determinant rather than just capital strength or liquidity.

Furthermore, the results of the study also show that the direct influence of CAR and LDR on ROA tends to be insignificant, thus indicating the existence of an indirect mechanism through efficiency variables. Thus, efficiency (BOPO) acts as a mediating variable that bridges the relationship between capital structure, liquidity, and profitability. These findings are important because they explain that the success of a consolidation strategy depends not only on the structural financial aspect, but also on the effectiveness of operational management in optimizing resources.

Based on empirical phenomena, inconsistencies in previous research results, and actual findings in this study, it can be identified that there is a research gap related to the role of efficiency as a mediating variable in the relationship between CAR, LDR, and ROA.

LITERATURE REVIEW

Hypothesis 1: Capital Structure (CAR) → Efficiency (BOPO)

1. ***Relevant theories***: Trade-Off Theory (Myers, 2001) and Agency Theory (Jensen & Meckling, 1976) explain how capital adequacy can reduce the cost of financial hardship and conflicts of interest, potentially improving operational efficiency.
2. ***Previous research***: Hasmiana et al. (2022) emphasized that capital adequacy (CAR) is a major prerequisite for profitability, with efficiency as a supporting factor. This supports the hypothesis that CAR has an effect on BOPO.

Hypothesis 2: Liquidity (LDR) → Efficiency (BOPO)

1. ***Relevant theories***: Shiftability Theory (Moulton, 1918) and Liability Management Theory (Lucket, 1980) emphasize that good liquidity management allows banks to maintain asset flexibility, thereby reducing operational costs.
2. ***Previous research***: Winarno and Atiningsih (2025) found that LDR affects ROA through BOPO as a mediating variable. This supports the hypothesis that liquidity can affect efficiency.

Hypothesis 3: Capital Structure (CAR) → Profitability (ROA)

1. ***Relevant theory***: Signaling Theory (Ross, 1977) emphasizes that a strong CAR signals positively to the stability of a bank, which in turn increases market confidence and profitability.
2. ***Previous research***: Rionita and Abundanti (2018) found that the capital structure has a positive effect on the profitability of banks on the IDX. On the contrary, Fuadah et al. (2025) show that DER (debt-to-equity ratio) has a negative correlation to profitability, so there is evidence to support both and reject this hypothesis.

Hypothesis 4: Liquidity (LDR) → Profitability (ROA)

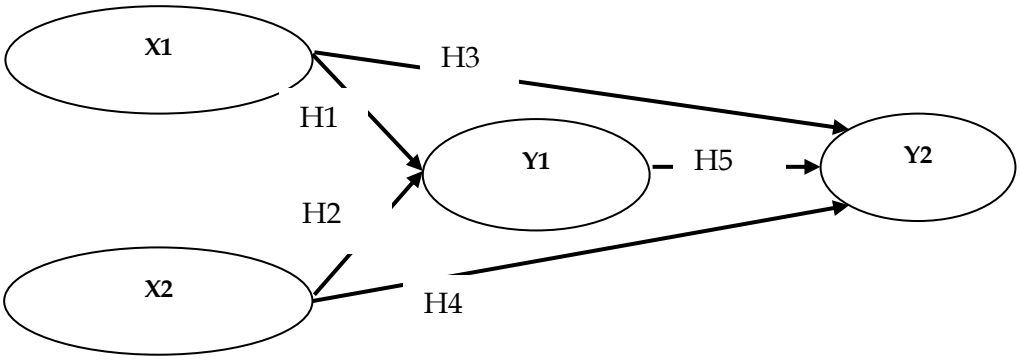
1. ***Relevant theory***: Anticipated Income Theory (Prochnow, 1949) explains that well-managed liquidity allows banks to meet obligations and generate scheduled cash flow, which supports profitability.
2. ***Previous research***: Rionita and Abundanti (2018) found that liquidity has a positive effect on profitability. However, different results have emerged in some studies that emphasize credit risk (NPL) as a constraint, for example Hasmiana et al. (2022).

Hypothesis 5: Efficiency (BOPO) → Profitability (ROA)

1. ***Relevant theories***: X-Efficiency Theory (Leibenstein, 1966) and Economies of Scale (Berger & Mester, 1997) emphasize that optimal managerial efficiency and business scale will increase profitability.
2. ***Previous research***: Mehzabin et al. (2022) show that efficiency and diversification of non-interest income are universal factors influencing banking profitability in Asia. Fuadah et al. (2025) also found a negative

correlation between BOPO and profitability, supporting the hypothesis that efficiency has a significant effect on ROA.

Conceptual Framework



METHODOLOGY

This study is an explanatory quantitative research using panel data analysis. The approach examines the causal relationship between capital structure and liquidity (exogenous variables) on efficiency and profitability (endogenous variables) in banks involved in mergers or acquisitions. Data were collected from audited annual financial reports of banks listed on the Indonesia Stock Exchange (IDX) for the period 2021–2024, accessed via official sources.

Population and Samples

The population consists of all 47 banking companies listed on the IDX during 2021–2024. The sample was determined using purposive sampling, selecting banks that met specific criteria, particularly those engaged in corporate actions such as mergers or acquisitions within or before the observation period.

Data Analysis Tools

Data analysis employed descriptive statistics to provide an overview of financial performance and path analysis to test the causal relationships among variables. The financial ratios used were:

- CAR (Capital Adequacy Ratio) → Capital structure
- LDR (Loan to Deposit Ratio) → Liquidity
- BOPO (Operating Expenses to Operating Income) → Efficiency
- ROA (Return on Assets) → Profitability

RESEARCH RESULT & DISCUSSION

Statistics Descriptive

1. Descriptive analysis was carried out to describe the characteristics of the research variables (CAR, LDR, BOPO, ROA) in 14 sample banks during the period 2021–2024.
2. CAR (Capital Adequacy Ratio): The average is 0.52 with a downward trend from 0.58 (2021) to 0.42 (2024). It shows the existence of post-consolidation capital pressure.
3. LDR (Loan to Deposit Ratio): The average is 1.14, above the OJK's ideal range (78–92%). Illustrates the relatively aggressive expansion of credit, especially in digital banks.
4. BOPO (Efficiency): The average is 0.79, which is within the OJK's ideal threshold. Digital banks tend to record high ratios due to technology investments, while conventional banks are more efficient.
5. ROA (Profitability): The average is 0.0357, indicating the ability to generate profits from relatively moderate assets.

Tabel 1. Descriptive Statistical Analysis Results

Variabel	N	Mean	Median	Minimum	Maximum	Std. Deviation
CAR	56	0.5211	0.3500	0.2000	2.830	0.4773
LDR	56	1.1361	0.9650	0.3000	5.280	0.7586
BOPO	56	0.7904	0.8250	0.3400	0.990	0.1532
ROA	56	0.0357	0.0250	0.0080	0.096	0.0252

Source: Secondary data processed by researchers (2026)

Model Data Selection

Based on a series of panel model selection tests (Chow, Hausman, and Lagrange Multiplier), it was obtained that Equation 1: Effect of Capital Structure (CAR) and Liquidity (LDR) on Efficiency (BOPO) was more appropriately analyzed using the Fixed Effect Model (FEM), while Equation 2: Effect of Capital Structure (CAR), Liquidity (LDR) and Efficiency (BOPO) on Profitability (ROA) was in accordance with the Common Effect Model (CEM).

Final Summary of Panel Model

Structure	Chow Test	Hausman Test	LM Test	Final Model
Sub-structure 1 = CAR, LDR → BOPO	FEM	FEM	-	FEM
Sub-structure 2 = CAR, LDR, BOPO → ROA	CEM	-	CEM	CEM

Path Analysis
Sub-Structure 1 (FEM): The Effect of Capital Structure (CAR/X1) and Liquidity (LDR/X2) on Efficiency (BOPO/Y1)

Sub-Structure Regression Estimation Results 1 (FEM)

Variabel	Path Coefficients (β)	Std. Error	t-Statistik	Significance
Konstanta	0.8451	0.0523	16.16	0.0000
CAR	-0.0912	0.0315	-2.89	0.0046
LDR	0.0107	0.0198	0.54	0.5920

Statistic	Value
R-Squared	0.412
Adjusted R-squared	0.365
F-statistic	8.72
Prob (F-statistic)	0.0000
Durbin-Watson stat	1.95

Source: Secondary data processed by researchers (2026)

The results of the path analysis showed that CAR had a negative and significant effect on BOPO (coefficient -0.0912; p-value 0.0046), so that increasing capital adequacy was proven to reduce the ratio of operating costs to revenue and improve bank efficiency. This finding is relevant because most of the sample banks have CAR well above the minimum limit of 8% set by the OJK, so strong capital contributes to cost control.

In contrast, LDR had a positive but insignificant effect on BOPO (coefficient 0.0107; p-value 0.5920), suggesting that changes in liquidity have not been shown to affect efficiency consistently. The difference in interbank interbank intermediation strategies—for example, large banks with foreign investors who are able to keep LDRs in the ideal range of 78–92%, compared to digital banks that fluctuate due to technology-based credit expansion—explain why the influence of LDRs is not statistically significant even though it is descriptively relevant. Overall, the model explains 36.5% of BOPO variations through CAR and LDR, while the rest is influenced by other factors outside the model, so that banking operational efficiency is still determined by additional variables that need to be further researched.

Sub-Structure 2: The Effect of Capital Structure (CAR/X1), Liquidity (LDR/X2) and Efficiency (BOPO/Y1) on Profitability (ROA/Y2)

Sub-Structure 2 Regression Estimation Results (CEM)

Variabel	Path Coefficient (β)	Std. Error	t-Statistik	Significance
Konstanta	0.0724	0.0187	3.87	0.0002
CAR	0.0215	0.0223	0.95	0.3430
LDR	-0.0032	0.0060	-0.47	0.6370
BOPO	-0.0847	0.0789	-1.07	0.2860

Statistic	Value
R-squared	0.198
Adjusted R-squared	0.172
F-statistic	7.41
Prob (F-statistic)	0.0000
Durbin-Watson stat	1.82

The results of the path analysis showed that CAR, LDR, and BOPO had a insignificant effect on ROA, although the direction of the coefficient of each variable gave an indication of a relationship that was in line with the theory. CAR has a positive coefficient (0.0215; p-value 0.3430), which means that an increase in capital adequacy is likely to be followed by an increase in profitability, but the effect is not statistically consistent. The LDR shows a negative coefficient (-0.0032; p-value 0.6370), indicating that increased liquidity tends to lower ROA, but this relationship is also insignificant. BOPO has a negative coefficient (-0.0847; p-value 0.2860), which theoretically supports the concept of efficiency—a decrease in operating costs to revenue is supposed to increase profitability—but the empirical results are not strong enough to prove the consistency of the relationship.

Overall, an Adjusted R^2 value of 0.172 indicates that only 17.2% of ROA variations can be explained by CAR, LDR, and BOPO, while the remaining 82.8% are influenced by other factors outside the model, such as asset quality, cost efficiency, and revenue diversification.

The findings of this study confirm that the success of post-acquisition banks is not solely determined by the amount of capital or liquidity, but also by management's ability to optimize operational efficiency as a mediating variable. The pathway analysis showed that CAR and LDR had an effect on BOPO, which then had implications for ROA. Thus, capital and liquidity do not automatically increase profitability without first reducing operational costs.

Theoretically, these results reinforce the X-Efficiency Theory (Leibenstein, 1966) which emphasizes the importance of managerial efficiency, while also confirming the Signaling Theory (Ross, 1977) that capital adequacy signals stability, but its impact on profitability depends on internal efficiency. These findings are also consistent with the Anticipated Income Theory (Prochnow, 1949), where well-managed liquidity supports scheduled cash flows, but must still be balanced with efficiency in order to generate profits.

Empirically, this study is in line with the findings of Rionita and Abundanti (2018) which show the positive influence of capital structure and liquidity on profitability, while confirming the results of Hasmiana et al. (2022) that efficiency and capital adequacy are the main prerequisites. Furthermore, this study enriches the literature with evidence that BOPO plays a role as a mediating variable—as shown by Winarno and Atiningsih (2025)—and reinforces the findings of Mehzabin et al. (2022) that efficiency is a universal factor in determining banking profitability.

Academically, the novelty of this research lies in the placement of efficiency as a causality mechanism that bridges the relationship between CAR and LDR to ROA. This contribution expands the conceptual model based on path analysis in the context of banking consolidation in Indonesia, especially the 2021–2024 period. Thus, this study answers the core question: whether the capital structure and liquidity are able to improve the efficiency, and ultimately profitability, of post-acquisition banks on the Indonesia Stock Exchange.

CONCLUSIONS AND RECOMMENDATIONS

1. Capital Structure (CAR)→Efficiency (BOPO). CAR has a significant effect with a negative coefficient on BOPO. This shows that the higher the capital adequacy, the more efficient the bank will be because operational costs are relatively more controlled.
2. Liquidity (LDR)→Efficiency (BOPO). LDR has an effect but is not statistically significant on BOPO. This means that changes in liquidity levels have not been proven to consistently affect the operational efficiency of banks.
3. Capital Structure (CAR)→Profitability (ROA). CAR has an effect but is not significant on ROA. Although capital adequacy tends to increase profitability, the effect is not statistically consistent. Descriptively, CAR continues to play a role as a support for asset expansion and financial stability, although in some digital banks the efficiency of digital banks (BOPO) has increased due to large technology investments.
4. Liquidity (LDR)→Profitability (ROA). LDR has an effect but is not significant on ROA. Liquidity tends to lower ROA, but the effect is not statistically consistent.
5. Efficiency (BOPO)→Profitability (ROA). BOPO has an effect but is not significant on ROA. A decrease in BOPO tends to increase ROA, but this effect has not been proven to be statistically significant, so efficiency has not been assured as a strong mediation pathway.
6. Research novelty

- This study places efficiency (BOPO) as a mediating variable in the relationship between capital structure (CAR), liquidity (LDR), and profitability (ROA). This approach provides a new perspective in the financial management literature, as operational efficiency is rarely tested as an intermediary mechanism in the Indonesian banking context.
- The focus of the research on the banking consolidation period in Indonesia provides additional novelty, because empirical studies with mediation models in the consolidation phase are still limited. This research enriches understanding of how post-acquisition restructuring and capital strengthening affect efficiency and profitability.
- Theoretically, this study confirms that although efficiency shows a positive relationship to profitability, its effect has not been statistically significant. This opens up space for further research to examine other factors that might strengthen the mediation pathway.
- In practical terms, this study provides insight that regulators and banks need to emphasize operational efficiency as the main strategy in consolidation, not just capital adequacy.

Implementation

1. For Bank Management: Acquired banks need to optimize capital allocation not only for credit expansion, but also for accelerating operational integration. Focusing on cost control (BOPO efficiency) is crucial in the early stages of the transition so that additional capital from new investors can be immediately converted into optimal profitability (ROA)
2. For Regulators (OJK): These results can be a reference for regulators in monitoring the health of consolidated banks. Supervision of acquired digital banks needs to pay special attention to efficiency ratios, given that technology investments tend to put pressure on cost burdens in the short term even though the capital structure is in a very strong position.
3. For Investors: Investors are advised not only to look at a high capital ratio as an indicator of the success of the acquisition, but also to monitor the bank's efficiency trends. The bank's ability to reduce operational costs in the midst of the digitalization process is a key indicator of future performance sustainability.
4. For Academics: This study opens up space for further study of the role of mediation variables in the relationship between financial indicators, as well as enriching the local literature with the Indonesian empirical context.

ADVANCED RESEARCH

Research Limitations

First, the scope of the sample is limited to banks listed on the Indonesia Stock Exchange and undergoing acquisitions for the 2021–2024 period, so the results cannot necessarily be generalized to the entire Indonesian banking industry or to the international context.

Second, the research variables only include CAR, LDR, BOPO, and ROA, so other factors such as credit risk (NPL), income diversification, or macroeconomic conditions have not been included. Third, the use of secondary data from a bank's financial statements can be limited in terms of depth of analysis, as it does not capture qualitative aspects such as management strategies or post-acquisition organizational culture.

Suggestions for Further Research

The next study is suggested to expand the scope of the sample by including non-IDX banks or regional banks to make the results more representative. In addition, additional variables such as NPLs, Net Interest Margin (NIM), or external factors such as monetary policy and market conditions can be included to enrich the research model. Mixed methods that combine quantitative analysis with managerial interviews can also provide a more comprehensive perspective on the dynamics of post-acquisition efficiency and profitability.

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