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Research Article

The Effect of Liquidity, Capital Adequacy, Operational Risk, and Credit Risk on Profitability
(A Study on Banks Listed on the Indonesia Stock Exchange)

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Abstract: Profitability represents a bank's capability to evaluate how effectively its management generates profits. This study seeks to explore and determine the influence of liquidity, capital adequacy, operational risk, and credit risk on bank profitability. The research focuses on banking institutions listed on the Indonesia Stock Exchange over the 2021–2023 period. The study utilizes quantitative data obtained from secondary sources; specifically financial statements published by the respective banks. A total of 32 banks were selected as research samples through purposive sampling. The study adopts a non-participant observation approach, and the data were processed using multiple linear regression analysis. The results indicate that liquidity has a positive yet statistically insignificant effect on profitability, capital adequacy has a significant negative effect, operational risk shows a negative but non-significant influence, and credit risk has a significant negative impact on bank profitability.

Keywords: Liquidity, Capital Adequacy, Operational Risk, Credit Risk, Profitability.

1. Introduction

The advancement of Indonesia's economy is strongly influenced by the role of financial institutions, particularly the banking industry. As financial intermediaries, banks are responsible for collecting funds from the public often in the form of deposits and redistributing them in the form of credit to individuals or entities requiring financial assistance. Korompis et al. (2020) emphasize that the banking sector is fundamental in stimulating economic development and enhancing societal welfare. In addition, Supartoyo et al. (2018) highlight the sector's contribution to supporting government initiatives aimed at fostering regional economic growth through monetary policy channels.

To effectively serve their intermediary function, financial institutions must maintain public trust, especially amid the increasingly dynamic and complex economic landscape. The rapid evolution and intricate nature of banking operations can significantly influence bank performance, as noted by Widyastuti & Aini (2021), who argue that complexity often leads to heightened risk. As such, evaluating a bank's financial condition becomes essential in determining its stability and resilience in supporting national economic activities (Sumarni et al., 2023).

A healthy bank is characterized by its ability to manage entrusted public funds efficiently, facilitate seamless payment processes, and contribute to the implementation of governmental monetary strategies (Andriasari & Munawaroh, 2020). One of the primary tools to evaluate financial soundness is through a detailed analysis of financial statements (Muttaqim et al., 2022), often using ratio analysis (Iswandi, 2020) to determine the strength or weakness of a bank's financial performance (Sinaga & Lumbanraja, 2020).

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Among these tools, profitability ratios are vital indicators of performance. Ningsih & Manda (2021) describe profitability as a measure of how effectively a bank manages its resources to generate earnings. Higher profitability reflects strong management and benefits stakeholders, whereas low profitability could compromise sustainability (Aulia & Anwar, 2021).

Financial performance assessments typically rely on ratios derived from annual reports, offering essential insights to external stakeholders such as regulators, investors, and the general public (Sari & Septiano, 2020). Furthermore, achieving a satisfactory level of profitability is contingent upon compliance with capital requirements. In accordance with OJK Regulation No. 12/POJK.03/2020, all commercial banks in Indonesia are mandated to hold a minimum core capital of IDR 3 trillion by the end of 2022. This regulation supports consolidation efforts aimed at improving operational effectiveness and resource optimization (OJK, 2020).

Effective fund mobilization and allocation are key to improving profitability, which aligns with the bank's overarching objective of maximizing returns (Anggraini et al., 2022). A common measure for profitability is Return on Assets (ROA), defined as net income after tax divided by total assets. A higher ROA indicates that assets are being utilized efficiently to generate income (Izuddin, 2020), serving as a critical metric for assessing operational performance (Aulia & Anwar, 2021).

Several factors both internal and external affect bank profitability. These include liquidity, capital adequacy, operational risk, and credit risk. According to OJK Regulation No. 18/POJK.03/2016, liquidity refers to a bank's capacity to meet its short-term obligations using cash or other liquid assets without undermining financial stability. Anwar (2019) also notes that liquidity reflects the ability to manage short-term liabilities effectively. While sufficient liquidity helps a bank fulfill obligations, excessive liquidity may signal inefficiencies in fund management and reduce overall profitability.

A strong liquidity position enhances confidence among creditors, indicating a bank's ability to meet commitments. Conversely, inadequate liquidity could result in defaults and jeopardize business continuity (Trisnayanti & Wiagustini, 2022). The Loan to Deposit Ratio (LDR), which compares total loans to third-party funds, is commonly used to assess liquidity (Anggari & Dana, 2020). A balanced LDR suggests efficient credit allocation and contributes to profitability (Ulfa, 2020).

However, the literature reveals conflicting findings regarding the impact of liquidity on profitability. Several studies (e.g., Ulfa, 2020; Dali & Bokiu, 2023; Dewi & Badjra, 2020; Sudarsana & Suarjaya, 2019; Aztari & Idayati, 2023; Sumarni et al., 2023) confirm a positive and significant link between LDR and ROA. On the other hand, research by Widyastuti & Aini (2021), Obim & Mgbado (2020), Nuryanto et al. (2020), Susilowati et al. (2019), and Darma et al. (2021) indicates a negative or statistically insignificant relationship.

Capital adequacy is another essential determinant of profitability. It reflects a bank's ability to absorb losses and manage risk-weighted assets (Budiadnyani & Arlita, 2023). OJK Regulation No. 11/POJK.03/2016 mandates a minimum Capital Adequacy Ratio (CAR) of 8%. A robust CAR not only enhances investor and customer confidence but also strengthens financial resilience (Dwintama et al., 2021; Suroso, 2022). Nonetheless, empirical studies offer mixed evidence: while some (e.g., Budiadnyani & Arlita, 2023; Hediati et al., 2021; Mukaromah & Supriono, 2020; Yuniar & Manda, 2021) report a positive and significant influence, others (e.g., Suraya & Rismanty, 2023; Anisa & Anwar, 2021; Kessek et al., 2024) find negative or insignificant effects, suggesting that excessive capital may constrain lending and reduce profitability.

Operational risk, stemming from failures in internal systems or external disruptions (Sugiartha et al., 2021; OJK, 2016), also plays a critical role. Elevated operational risk is often

linked to inefficiencies that can erode profits (Pratama et al., 2021). The Operating Expenses to Operating Income Ratio (BOPO) is commonly used to measure this risk, where a lower ratio indicates better cost efficiency (Firmanila, 2023). Most studies (e.g., Anggraini et al., 2022; Firmanila, 2023; Lee et al., 2023; Khasanah et al., 2022; Wicaksana & Ramantha, 2019; Sugiartha et al., 2021; Yuniar & Manda, 2021) suggest a negative relationship, though others (e.g., Karolina et al., 2020; Safei, 2020) have reported positive findings.

Credit risk often the result of borrower default is another key factor (OJK, 2016; Hariemufti et al., 2016), commonly measured by the Non-Performing Loan (NPL) ratio. A high NPL ratio signals deteriorating credit quality and potential profitability losses (Silitonga & Manda, 2022; Saleh & Winarso, 2021). The majority of studies (e.g., Putri et al., 2021; Adhim, 2018; Riani et al., 2022; Aztari & Idayati, 2023; Sugiartha et al., 2021; Josefin et al., 2024; Dewi & Badjra, 2020) confirm the negative and significant effect of credit risk on profitability. However, Claudia (2022) offers a contrary perspective, attributing improved profitability to effective credit risk management.

This study focuses on conventional commercial banks, as defined in OJK Regulation No. 13 of 2024, which refers to banks operating under conventional financial principles, including foreign bank branches. Between 2021 and 2023, 47 banks were listed on the Indonesia Stock Exchange (IDX, 2024). The selection of conventional banks is due to their prominent role in financial intermediation and distinct characteristics compared to Islamic banks, particularly in their use of interest-based systems making them more suitable for analyzing liquidity and credit risk variables.

Conventional banks are widely recognized for their extensive services and strong reputations, which enhance their appeal to the public (OCBC, 2024). Many previous studies have concentrated on this sector, thus motivating the present research to re-examine profitability determinants within conventional banks. Trends in profitability, particularly Return on Assets (ROA) from 2021 to 2023, underline the sector's importance to Indonesia's economic growth. Rising ROA reflects improved profitability and efficiency, while declining ROA points to operational challenges.

Given the theoretical background, recent trends, and inconsistencies in empirical evidence, this study re-investigates the influence of liquidity, capital adequacy, operational risk, and credit risk on the profitability of conventional commercial banks listed on the Indonesia Stock Exchange during the 2021–2023 period.

2. Literature Review

Profitability in Banking

Profitability is a crucial measure of a bank's performance, reflecting its ability to manage resources efficiently and generate earnings. Ningsih and Manda (2021) define profitability as a measure of managerial effectiveness, while Aulia and Anwar (2021) emphasize that strong profitability ensures sustainability and stakeholder confidence. Return on Assets (ROA) is the most widely used indicator, as it demonstrates how effectively assets are utilized to generate income (Izuddin, 2020). A higher ROA signals efficient asset management and contributes to long-term stability, making it a critical metric for evaluating banking performance.

Liquidity and Profitability

Liquidity refers to a bank's capacity to meet short-term obligations without undermining financial stability (OJK Regulation No. 18/POJK.03/2016; Anwar, 2019). The Loan to Deposit Ratio (LDR) is commonly employed to measure liquidity, as it compares total loans to third-party funds (Anggari & Dana, 2020). Empirical findings on the relationship between liquidity and profitability are mixed. Several studies confirm a positive and significant effect

of LDR on ROA (Ulfa, 2020; Dali & Bokiu, 2023; Dewi & Badjra, 2020; Sudarsana & Suarjaya, 2019; Aztari & Idayati, 2023; Sumarni et al., 2023). Conversely, other research reports negative or insignificant effects (Widyastuti & Aini, 2021; Obim & Mgbado, 2020; Nuryanto et al., 2020; Susilowati et al., 2019; Darma et al., 2021). These inconsistencies suggest that liquidity's impact on profitability depends on the efficiency of fund allocation and prevailing market conditions.

Capital Adequacy and Profitability

Capital adequacy reflects a bank's ability to absorb potential losses and manage risk-weighted assets (Budiadnyani & Arlita, 2023). The Capital Adequacy Ratio (CAR), mandated at a minimum of 8% by OJK Regulation No. 11/POJK.03/2016, is a key measure of financial resilience. Empirical studies provide conflicting evidence. Research by Budiadnyani and Arlita (2023), Hediati et al. (2021), Mukaromah and Supriono (2020), and Yuniar and Manda (2021) demonstrates a positive and significant relationship between CAR and profitability. In contrast, Suraya and Rismanty (2023), Anisa and Anwar (2021), and Kessek et al. (2024) find negative or insignificant effects, suggesting that excessive capital may constrain lending activities and reduce profitability. These findings highlight the delicate balance between maintaining adequate capital for resilience and optimizing lending for profitability.

Operational Risk and Profitability

Operational risk arises from failures in internal systems, processes, or external disruptions (OJK, 2016; Sugiartha et al., 2021). It is commonly measured using the Operating Expenses to Operating Income ratio (BOPO), where a lower ratio indicates greater efficiency (Firmanila, 2023). Most studies report a negative relationship between BOPO and profitability, indicating that higher operational risk reduces earnings (Anggraini et al., 2022; Firmanila, 2023; Lee et al., 2023; Khasanah et al., 2022; Wicaksana & Ramantha, 2019; Sugiartha et al., 2021; Yuniar & Manda, 2021). However, Karolina et al. (2020) and Safei (2020) present contrary findings, suggesting that under certain conditions, operational costs may contribute positively to profitability. Overall, the literature supports the view that operational efficiency is critical to sustaining profitability in the banking sector.

Credit Risk and Profitability

Credit risk, often resulting from borrower default, is measured by the Non-Performing Loan (NPL) ratio (OJK, 2016; Hariemufti et al., 2016). A high NPL ratio signals deteriorating credit quality and potential losses in profitability. Empirical evidence largely supports a negative relationship, as shown in studies by Putri et al. (2021), Adhim (2018), Riani et al. (2022), Aztari and Idayati (2023), Sugiartha et al. (2021), Josefin et al. (2024), and Dewi and Badjra (2020). These findings confirm that rising credit risk undermines profitability. However, Claudia (2022) provides a different perspective, arguing that effective credit risk management can enhance profitability by improving loan recovery and strengthening customer trust. This divergence underscores the importance of managerial quality in mitigating the adverse effects of credit risk.

Theoretical Framework

This study is grounded in the principles of financial intermediation theory and the risk–return trade-off. Liquidity management plays a dual role: while sufficient liquidity enhances confidence and supports lending, excessive liquidity may reduce returns (Anwar, 2019; Ulfa, 2020). Capital adequacy ensures resilience against shocks, but excessive capital can limit lending capacity and reduce profitability (Budiadnyani & Arlita, 2023; Suraya & Rismanty, 2023). Operational risk, measured through BOPO, reflects efficiency in managing expenses

relative to income; higher operational risk generally reduces profitability (Anggraini et al., 2022; Firmanila, 2023). Credit risk, proxied by NPL, typically exerts a negative influence on profitability, though effective risk management can mitigate this impact (Putri et al., 2021; Claudia, 2022).

Hypotheses

Based on the literature review and theoretical framework, the following hypotheses are proposed:

H1: Liquidity (LDR) has a significant positive effect on profitability (ROA).

H2: Capital adequacy (CAR) has a significant positive effect on profitability (ROA).

H3: Operational risk (BOPO) has a significant negative effect on profitability (ROA).

H4: Credit risk (NPL) has a significant negative effect on profitability (ROA).

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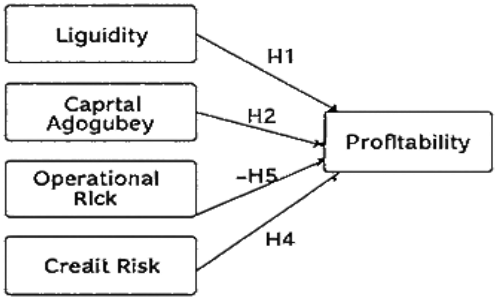

3. Research Methods

This research adopts a quantitative method with a causal-associative design to investigate the influence of liquidity, capital adequacy, operational risk, and credit risk on the profitability of banking institutions listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. The study utilizes secondary data obtained from the financial reports publicly available on the official IDX website. Out of a population of 47 banks, 32 were selected as the final sample based on specific purposive sampling criteria, resulting in a total of 96 observations across three years (Sugiyono, 2019).

The research includes one dependent variable—profitability, represented by Return on Assets (ROA)—and four independent variables: liquidity, measured by the Loan to Deposit Ratio (LDR); capital adequacy, indicated by the Capital Adequacy Ratio (CAR); operational risk, assessed using the ratio of Operating Expenses to Operating Income (BOPO); and credit risk, proxied by the Non-Performing Loan (NPL) ratio. Data collection was conducted through non-participant observation by analyzing publicly disclosed financial statements on the IDX, supported by related literature and official documents (OJK Circular Letter No. 9/SEOJK.03/2020; Sugiyono, 2019).

To analyze the data, the study applies multiple linear regression to determine the joint and individual effects of the independent variables on the dependent variable. Prior to interpretation, classical assumption tests—including assessments of normality, multicollinearity, autocorrelation, and heteroscedasticity—were performed to ensure the validity of the regression model. Further statistical tests such as the F-test were used to evaluate the overall model significance, the t-test to assess the significance of each independent variable, and the coefficient of determination (R^2) to measure the explanatory power of the model. All statistical analyses were conducted using SPSS software (Ghozali, 2016; Utama, 2016; Sahir, 2021).

4. Results and Discussion

Results

Classical Assumption Test Results

Normality Test

Table 1. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		Unstandardized Residual
N		96
Normal Parametersa, b	Mean	.0000000
	Std. Deviation	.59393315
Most Extreme Differences	Absolute	.125
	Positive	.125
	Negative	-.118
Test Statistics		.125
Asymp. Sig. (2-tailed)		.001c

Source: Processed data, 2025

Based on the results presented in Table 1, the Asymptotic Significance (2-tailed) value is 0.001, indicating that the residual data are not normally distributed, as the significance value is less than 0.05. To address this issue and ensure that the residuals follow a normal distribution, the Kolmogorov–Smirnov (K–S) test was re-evaluated using the Monte Carlo exact test.

The Monte Carlo test is a computational algorithm that involves repeated random sampling to obtain numerical results. According to Ghozali (2018), the Monte Carlo test is used to determine whether the residual data are normally distributed, particularly when the sample data exhibit extreme values. The decision-making process for the Monte Carlo exact test of normality is as follows:

a. If the probability value (significance) is greater than 0.05, the data are considered to be normally distributed.
b. If the probability value (significance) is less than 0.05, the data are considered to be not normally distributed.

The following section presents the results of the normality test using the Monte Carlo method.

Table 2. Results of Normality Test After Using Monte Carlo Exact Test

Monte Carlo Exact Test			Unstandardized Residual
N			96
Normal Parametersa, b	Mean		.0000000
	Std. Deviation		.59393315
Most Extreme Differences	Absolute		.125
	Positive		.125
	Negative		-.118
Test Statistics			.125
Asymp. Sig. (2-tailed)			.001c
Monte Carlo Sig. (2-tailed)	Sig.		.089d
	99% Confidence Interval	Lower Bound	.081
		Upper Bound	.096

Source: Processed data, 2025

After the Monte Carlo test was conducted in Table 2, it was found that the residual values in this study were normally distributed. This can be proven that the significance value which was originally 0.001 after the Monte Carlo test was conducted increased to 0.089. Where the significance value of 0.089 is greater than 0.05 so that the residual values are normally distributed.

Multicollinearity Test

Table 3. Multicollinearity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	LDR	.410	2.438
	CAR	.516	1,938
	BOPO	.610	1,638
	NPL	.798	1.253

Source: Processed data, 2025 (Appendix 10)

Based on the test results in Table 3, it shows that the tolerance value for each independent variable is greater than the previously determined tolerance value of 0.10 and the VIF value for each independent variable is smaller than the previously determined VIF value of 10. These results indicate that the regression model in this study does not contain symptoms of multicollinearity between independent variables.

Autocorrelation Test

Table 4. Autocorrelation Test Results

Model Summaryb

R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
.885a	.783	.774	.60685	1,938

Source: Processed data, 2025 (Appendix 11)

Based on the test results in Table 4 shows the DW value of 1.938. In this study dU = 1.7553 and the value of 4-dU = 2.2447, then 1.7553 < 1.938 < 2.2447. Thus, it can be concluded that this regression model does not have autocorrelation symptoms.

Heteroscedasticity Test

Table 5. Heteroscedasticity Test Results

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1,353	.262		5.158	.000
	X1	-.001	.001	-.169	-1.313	.193
	X2	.004	.001	.358	3.125	.002
	X3	-.012	.003	-.423	-4.015	.000
	X4	-.093	.044	-.195	-2.114	.037

Source: Processed data, 2025 (Appendix 12)

Based on the results of the heteroscedasticity test shown in Table 5, the significance value for the liquidity variable is 0.193 (>0.05), the capital adequacy variable is 0.002 (<0.05), the operational risk variable is 0.000 (<0.05), and the credit risk variable is 0.037 (<0.05). The significance value for the capital adequacy, operational risk and credit risk variables which are smaller than 0.05 indicates that there are symptoms of heteroscedasticity in the data used in this study. To overcome the symptoms of heteroscedasticity, the data affected by the symptoms can be transformed to become more normal.One of the transformation methods

that can be done is by using natural logarithm (LN). The results of the data test after transformation using natural logarithm (LN) are presented in Table 6

Table 6. Results of Heteroscedasticity Test after Transformation

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.051	2.015		-.025	.980
	LNX1	.199	.195	.128	1,023	.309
	LNX2	.008	.143	.007	.055	.956
	LNX3	-.075	.326	-.029	-.229	.820
	LNX4	.119	.077	.167	1,556	.123

Source: Processed data, 2025

Based on the test results shown in Table 6, the significance value for each independent variable against the absolute residual variable is above 0.05. Thus, it can be concluded that the data used, namely liquidity (X1), capital adequacy (X2), operational risk (X3), and credit risk (X4) in this study do not show symptoms of heteroscedasticity.

Multiple Linear Analysis Results

Table 7 Results of Multiple Linear Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	7,803	.440		17,744	.000
	LDR	.002	.002	.084	1.106	.272
	CAR	-.012	.002	-.347	-5.115	.000
	BOPO	-.073	.005	-.939	-15,036	.000
	NPL	-.066	.074	-.049	-.891	.375

Source: Processed data, 2025

From the results of multiple linear analysis in table 7, the following equation can be formulated: Y = 7.803 + 0.002 X1 + -0.012 X2 + -0.073 X3 + -0.066 X4

Information:

Y = Profitability (ROA)

X1 = Liquidity (LDR)

X2 = Capital Adequacy (CAR)

X3 = Operational Risk (BOPO)

X4 = Credit Risk (NPL)

Based on the multiple linear regression equation above, the following analysis can be carried out.

1. The liquidity coefficient of 0.002 which has a positive value indicates a unidirectional relationship, if liquidity increases by 1 percent, then profitability will increase by 0.002 percent assuming that other variables are constant.
2. The capital adequacy coefficient of -0.012 which has a negative value indicates an inverse relationship, if capital adequacy increases by 1 percent, then profitability will decrease by -0.012 percent assuming other variables are constant.

3. The operational risk coefficient of -0.073 which has a negative value indicates an inverse relationship, if operational risk increases by 1 percent, profitability will decrease by -0.073 percent assuming other variables are constant.
4. The credit risk coefficient of -0.066 which has a negative value indicates an inverse relationship, if credit risk increases by 1 percent, profitability will decrease by -0.066 percent assuming other variables are constant.

Model Feasibility Test (F Test)

Table 8. Model Feasibility Test Results

ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	121,212	4	30.303	82,287	.000[b]
	Residual	33,512	91	.368		
	Total	154,724	95			

Source: Processed data, 2025

Based on the test results in table 8, the significance value of 0.000 is smaller than the significance level of 0.05. Thus, it can be concluded that the variables of liquidity, capital adequacy, operational risk and credit risk simultaneously affect profitability.

Multiple Determination Coefficient Test (R^2)

Table 9. Results of the Determination Coefficient Test (R^2)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.885a	.783	.774	.60685	1,938

Source: Processed data, 2025 (Appendix 15)

Based on the results presented in Table 9, the adjusted R^2 value is 0.774. This indicates that 77.4 percent of the variation in profitability of banking companies listed on the Indonesia Stock Exchange during the 2021–2023 period is explained by the variables of liquidity, capital adequacy, operational risk, and credit risk. The remaining 22.6 percent is influenced by other variables not included in the regression model.

Hypothesis Test (t-Test)

Based on the test results presented in Table 7, the partial hypothesis testing for each independent variable on the dependent variable is summarized as follows:

Liquidity (X1) on Profitability (Y)

Table 7 shows that the regression coefficient for X1 (liquidity) is 0.002, with a significance level of 0.272, which is greater than the significance threshold of $\alpha = 0.05$. This indicates that liquidity has no significant effect on profitability in banks listed on the Indonesia Stock Exchange during the 2021–2023 period. Therefore, the hypothesis stating that liquidity has a significant positive effect on profitability is rejected.

Capital Adequacy (X2) on Profitability

Table 7 shows that the regression coefficient for X2 (capital adequacy) is -0.012, with a significance level of 0.000, which is less than $\alpha = 0.05$. This indicates that capital adequacy has a significant negative effect on profitability in banks listed on the Indonesia Stock Exchange during the 2021–2023 period. Thus, the hypothesis stating that capital adequacy has a significant positive effect on profitability is rejected.

Operational Risk (X3) on Profitability

Table 7 shows that the regression coefficient for X3 (operational risk) is -0.073, with a significance level of 0.000, which is less than $\alpha = 0.05$. This indicates that operational risk has

a significant negative effect on profitability in banks listed on the Indonesia Stock Exchange during the 2021–2023 period. Therefore, the hypothesis stating that operational risk has a significant negative effect on profitability is accepted.

Credit Risk (X4) on Profitability

Table 7 shows that the regression coefficient for X4 (credit risk) is -0.066, with a significance level of 0.375, which is greater than $\alpha = 0.05$. This indicates that credit risk has no significant effect on profitability in banks listed on the Indonesia Stock Exchange during the 2021–2023 period. Therefore, the hypothesis stating that credit risk has a significant negative effect on profitability is rejected.

Table 7 presents the regression results for variable X4 (credit risk), which yield a coefficient of –0.066 and a significance value of 0.375. Since the p-value exceeds the significance threshold of $\alpha = 0.05$, it can be concluded that credit risk does not exert a statistically significant influence on profitability among banks listed on the Indonesia Stock Exchange during the 2021–2023 period. Consequently, the hypothesis proposing a significant negative impact of credit risk on profitability is not supported by the empirical evidence.

Discussion

Liquidity and Its Influence on Profitability

The analysis results reveal that liquidity, measured using the Loan to Deposit Ratio (LDR), does not exert a statistically significant influence on profitability as proxied by Return on Assets (ROA). The multiple linear regression test using SPSS generated a positive coefficient of 0.002 with a significance value of 0.272, which exceeds the 0.05 threshold. This finding indicates that, during the 2021–2023 observation period, liquidity had no meaningful effect on the profitability of banking institutions listed on the Indonesia Stock Exchange (IDX). Therefore, the first hypothesis is not supported by the data.

Although the coefficient is positive, indicating a tendency for liquidity and profitability to move in the same direction, the relationship is not statistically robust. This may suggest the presence of other, more dominant variables influencing profitability, such as the quality of risk control, asset management strategies, and operational efficiency. While maintaining liquidity is crucial for banking operations, its impact on profitability may not be straightforward and could be moderated by external and internal institutional factors.

Furthermore, although a high LDR signals the bank's active role in credit distribution, this does not automatically correlate with improved profitability. An excessively high LDR, if unmanaged, may increase liquidity risk, thereby reducing earnings. For this reason, banks need a comprehensive approach to managing their assets and liabilities to ensure sustainable financial performance. It is also worth noting that the research period coincides with the COVID-19 pandemic (2021–2022), which may have introduced additional external pressures on liquidity management.

These results are consistent with those reported by Desda et al. (2021), Anggraini et al. (2022), Putri and Pardede (2023), and Rerung (2022), who found that although LDR showed a positive direction, its effect on ROA was not statistically significant. Similar conclusions were also drawn by Ramadanti and Setyowati (2022).

Capital Adequacy and Its Impact on Profitability

The second result of this study demonstrates that the Capital Adequacy Ratio (CAR) significantly and negatively influences profitability (ROA). The regression coefficient was recorded at –0.012 with a significance level of 0.000, well below the 0.05 threshold. This indicates that, during the 2021–2023 period, capital adequacy had a significant inverse

relationship with profitability among banks listed on the IDX. Consequently, the second hypothesis must be rejected.

This inverse relationship suggests that the banks in the sample were unable to optimally utilize their capital to generate returns. Excess capital, while potentially enhancing financial stability, may remain under-deployed, leading to inefficiencies in asset utilization and lower profitability. High CAR may also encourage more conservative lending behavior, limiting exposure to higher-yield opportunities. Although compliance with regulatory capital requirements is critical, excessive capital buffers can reduce ROA, reflecting suboptimal earnings generation relative to capital held.

This finding also reflects the economic challenges of the pandemic period, especially in 2021 and 2022, which may have influenced the strategic deployment of capital. These results are consistent with the studies of Innayah et al. (2023), Rahman and Santoso (2020), Magdalena et al. (2019), and Anggraini et al. (2022), who also reported a significantly negative relationship between CAR and ROA.

Operational Risk and Its Effect on Profitability

The third result indicates a significant negative relationship between operational risk, proxied by the Operating Expenses to Operating Income ratio (BOPO), and bank profitability (ROA). The regression output shows a coefficient of –0.073 with a significance level of 0.000, confirming the third hypothesis.

This outcome implies that higher operational costs directly reduce bank profitability. Conversely, improvements in cost efficiency can positively impact earnings. A high BOPO ratio reflects a disproportionate share of operational expenses relative to income, signaling inefficiency and heightened operational risk. When operational expenses are not well managed, a larger share of resources is allocated to cost rather than income generation, resulting in a decline in asset performance. Therefore, managing operational efficiency remains a vital strategy in enhancing bank profitability.

These findings are in line with empirical evidence presented by Anggraini et al. (2022), Firmanila (2023), Badriyah and Firawati (2024), Khasanah et al. (2022), Wicaksana and Ramantha (2019), Prasetyo et al. (2015), Sante et al. (2021), Yuniar and Manda (2021), and Damayanti and Indrabudiman (2024), who similarly documented a significant negative association between BOPO and ROA.

Credit Risk and Its Relationship with Profitability

The fourth finding of the study reveals that credit risk, measured using the Non-Performing Loan (NPL) ratio, does not have a statistically significant effect on profitability (ROA). The analysis yields a negative coefficient of –0.066 with a p-value of 0.375, which exceeds the 0.05 significance level. This implies that credit risk, within the context of the observed banks from 2021 to 2023, did not significantly influence profitability, leading to the rejection of the fourth hypothesis.

While the direction of the relationship is negative, suggesting that an increase in NPL could reduce ROA, the effect is not strong enough to be deemed statistically significant. This finding suggests that fluctuations in credit risk levels were not a primary determinant of profitability during the study period. Nonetheless, sound credit risk management remains imperative to avoid deterioration in loan quality and protect earnings capacity in the long run.

The data analyzed from the pandemic years (2021–2022) may also have influenced the behavior of NPLs and their relationship with profitability. These findings are aligned with those of Sukma et al. (2019), Putri and Pardede (2023), Safitra and Kusno (2023), Ramadanti and Setyowati (2022), and Aztari and Idayati (2023), all of whom found that NPL had a negative but statistically insignificant impact on ROA.

5. Conclusion

This study examined the influence of liquidity, capital adequacy, operational risk, and credit risk on the profitability of conventional commercial banks listed on the Indonesia Stock Exchange (IDX) during the 2021–2023 period. Using Return on Assets (ROA) as the profitability metric and applying multiple linear regression analysis to data from 32 banks, the findings reveal a nuanced set of relationships.

Liquidity, measured by the Loan to Deposit Ratio (LDR), showed a positive but statistically insignificant effect on profitability. This suggests that while efficient fund allocation may enhance returns, excess liquidity does not guarantee improved performance. Capital adequacy, proxied by the Capital Adequacy Ratio (CAR), exhibited a significant negative effect on profitability, indicating that higher capital buffers may constrain lending activities and reduce earnings. Operational risk, assessed through the BOPO ratio, had a significant negative impact, affirming that cost inefficiencies erode profitability. Credit risk, represented by the Non-Performing Loan (NPL) ratio, showed a negative but statistically insignificant effect, implying that while poor credit quality poses a threat, its impact may be mitigated by effective risk management practices.

These findings align with the broader theoretical framework of financial intermediation and risk–return trade-offs. Profitability is shaped not only by financial ratios but also by strategic management of risk and capital. The study contributes to the ongoing discourse by reaffirming the critical role of operational efficiency and capital structure in sustaining bank performance, while highlighting the complex and context-dependent nature of liquidity and credit risk effects.

Implications

The results of this study offer several practical and theoretical implications:

For bank management: Emphasis should be placed on improving operational efficiency and optimizing capital structure. Excessive capital reserves may hinder profitability, so a balanced approach to capital adequacy is essential.

For regulators: While capital adequacy requirements are crucial for financial stability, flexibility in implementation may help banks maintain profitability without compromising resilience. For investors and stakeholders: Understanding the nuanced effects of liquidity and credit risk can inform investment decisions and risk assessments.

For future research: The insignificant effects of liquidity and credit risk suggest the need for further investigation into moderating variables such as bank size, governance quality, and macroeconomic conditions.

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