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Does Size Matter? How Bank Size Moderates Liquidity Risk and Credit Risk on Bank Profitability

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ABSTRACT

Objective – The objective of this study is to analyze the effect of liquidity risk and credit risk on bank profitability, with bank size as a moderator variable, among conventional banks listed on the Indonesia Stock Exchange during the 2020–2024 period, encompassing both the COVID-19 pandemic and the subsequent recovery phase.
Design/Methodology/Approach – This quantitative study uses panel data from 42 conventional banks listed on the Indonesia Stock Exchange as the research sample. The sampling technique employed was purposive sampling, along with Moderated Regression Analysis, with the Fixed Effects Model (FEM) selected as the best model.
Findings/Results – Bank profitability is not significantly affected by liquidity risk (LDR), and credit risk (NPL) also has no significant effect on bank profitability during the 2020-2024 period, spanning the COVID-19 pandemic and post-pandemic recovery phase. Bank size has a positive and significant effect on bank profitability. However, it was not found to significantly moderate the relationship between either liquidity risk or credit risk and bank profitability.
Originality/Value – This study presents empirical evidence on the direct impact of bank size on profitability and tests its moderating role in the relationships between liquidity risk and credit risk and profitability, while also confirming the limited role of bank size as a risk mitigation factor during the pandemic and post-pandemic recovery period, namely 2020-2024, in the Indonesian banking sector.

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1. Introduction

The World Health Organization (WHO) has officially declared the 2019 coronavirus disease (COVID-19) outbreak a global pandemic. The COVID-19 outbreak has led to a decline in economic activity, particularly in Indonesia. According to the Central Statistics Agency (BPS), Indonesia's Gross Domestic Product (GDP) experienced a drastic decline in 2020, falling from a stable 5.02% in 2019 to -2.07%. Many companies suffered losses, leading to layoffs. With needs remaining stable but income decreasing, bank customers simultaneously withdrew their money, which in turn impacted the banking sector.

The banking sector has a significant impact on the Indonesian economy, particularly in terms of economic stability and growth. Banks act as intermediaries by collecting funds from those with excess capital and channeling them as loans to those in need of financial support (Diamond & Dybvig, 1983). In this role, banks must maintain stable performance to earn customer trust. Profitability is a key indicator for banks in assessing the performance and sustainability of the banking industry (Junaeni, 2021). A bank's ability to generate profits reflects how well it manages its assets and conducts its operations efficiently. Furthermore, profitability serves as a primary signal for customers in making decisions. However, one of the main issues customers often face is information asymmetry, where internal parties possess more information than external parties. In line with signaling theory, internal parties with more information tend to send signals to external parties to minimize information asymmetry (Spence, 1973). In the banking industry, these signals are typically conveyed through a company's financial statements or annual reports. These reports contain various pieces of information about the bank, including information related to the bank's risks and performance, which can be gauged through its profitability levels.

This research focuses on conventional banks in Indonesia during the 2020-2024 period. This timeframe is particularly relevant as it captures the acute disruption of the COVID-19 pandemic, namely 2020-2021, as well as the gradual normalization and post-pandemic recovery phase, namely 2022-2024. However, in practice, a bank's profitability is significantly influenced by various risks inherent in financial intermediation activities, one of which is liquidity risk (Junaeni, 2021). Liquidity risk arises when a bank's liquid assets are insufficient, leaving it unable to meet customer demands. However, in this context, liquidity risk is not a risk that must be eliminated, but rather one that needs to be managed. As emphasized by risk management theory, banks should view liquidity risk not only as a benchmark but also as a strategy to maintain and enhance profitability (Mousa et al., 2025). Furthermore, in addition to acting as intermediaries, banks also play a role in creating liquidity (Berger & Bouwman, 2007). In this role, banks are authorized to channel funds collected from parties with excess funds to parties experiencing a deficit in the form of loans with specific maturities and interest rates. Uniquely, in this role, banks promise depositors that they may withdraw their deposits at any time. This creates a maturity transformation and can lead to liquidity risk in the event of a massive withdrawal of funds (a bank run). This phenomenon occurred in Indonesia in 1992 and 1997–1998, which subsequently escalated into the worst banking crisis in the history of the Indonesian banking sector (Simorangkir, 2011). A bank run also nearly occurred during the outbreak of the 2019 coronavirus disease (COVID-19). However, this was addressed through a restructuring policy issued by the Financial Services Authority (OJK) No. 11/POJK.03/2020, Chapters 2 and 3, regarding the Determination of Asset Quality and the Restructuring of Loans or Financing. This policy outlines flexibility in assessing borrower criteria and determining borrower status for those affected by COVID-19, including micro, small, and medium-sized enterprise

(MSME) borrowers. This policy is temporary and will remain in effect until March 2024. However, banks must remain vigilant, as the COVID-19 pandemic could also hinder Indonesia's economic activity. These conditions underscore the importance of managing liquidity risk if left unchecked, it could affect a bank's stability and profitability.

A bank's profitability can also be affected by credit risk (Dwi et al., 2023). When credit risk is high, a bank's asset quality assessment provisions will also be high. Financial Services Authority Regulation No. 40/POJK.03/2019 on the Assessment of Commercial Bank Asset Quality stipulates that banks are required to calculate asset quality assessment provisions for Earning Assets and Non-Earning Assets with minimum requirements of 1% of earning assets classified as Current Assets, 5% of assets in the Special Mention category after deducting collateral, 15% of assets in the "Substandard" category after deducting collateral, 50% of assets in the "Doubtful" category after deducting collateral, and 100% of assets in the "Loss" category after deducting collateral. This indicates that if the total amount of non-performing loans continues to rise unchecked, the asset quality allowance, or as it is typically referred to in financial statements, the allowance for impairment losses, will also increase in tandem with the rise in loans based on the collectibility levels determined by the OJK. Furthermore, when the reserve fund for impairment losses is large, it will hinder banks from extending new loans with specific terms and interest rates to the public. This will impede the growth of the bank's profitability.

Furthermore, high credit risk can indicate poor banking sector health, in accordance with Financial Services Authority (OJK) standards, which set a maximum NPL ratio of 5% of total loans disbursed. Therefore, when a bank is unable to keep credit risk below 5%, customer confidence in the bank is likely to erode. Consequently, the presence of non-performing loans can lead to a decline in customer confidence in the bank, which can make it difficult for the bank to secure funding. This can have a negative impact on the bank's profitability. Similar findings were analyzed by Allen & Gale (2004), who explained that when credit risk is high, banks will struggle to obtain additional funds, whether from customers or through loans from other banks.

However, some previous studies have yielded conflicting results. Safitri et al. (2020) found that liquidity risk has a positive impact on banks' financial performance. However, this contradicts the findings of Mousa et al. (2025), whose study revealed that liquidity risk reduces bank profitability in the MENA region. Their research explains that an increase in liquidity risk can reduce a bank's financial performance. The study revealed that liquidity risk can enhance profitability. Additionally, Dwi et al. (2023) found that high liquidity exposure negatively though not significantly affects financial performance due to liquidity risk.

Similarly, research on the impact of credit risk on bank profitability has yielded conflicting results. Junaeni (2021) found in a study that credit risk (non-performing loans) has a negative impact on bank profitability (non-asset profit). This suggests that a high NPL ratio indicates a high risk of problem loans faced by banks, which can lead to a decline in profitability. Meanwhile, Maria & Cofitalan (2022) state in their study that credit risk does not affect bank profitability, with commercial banks in Timor-Leste as the focus of their research.

Thus, the discrepancy in these research findings indicates a research gap. The direct impact of liquidity risk, credit risk, and bank profitability is believed to be influenced by other factors, which account for this inconsistency. The researchers argue that this inconsistency is most likely influenced by the bank's internal characteristics, one of which is bank size.

Bank size can also affect a bank's efficiency in managing profitability (Connell, 2023). Bank

size can be assessed based on each bank's total assets, which reflect the bank's operational scale, as banks are considered businesses whose core operational activity is managing assets (Almaqtari, 2019). This is also supported by research conducted by Dietrich & Wanzenried (2014), who measured bank size using the natural logarithm of the asset values of the banks studied. Banks with high total assets have an efficiency advantage because growth in bank size can help them leverage economies of scale (Almaqtari, 2019). Economies of scale refer to a condition where operational costs per customer can be reduced as the bank's size grows. In their operations, every bank inevitably incurs costs to support its operations, including advertising costs, information and communication technology development costs, human resource development costs, and other expenses. However, the costs borne by large banks are considered relatively small because they are believed to be able to attract more customers. Therefore, large banks tend to be able to optimize costs and increase profitability.

In addition, larger banks can more easily diversify their asset portfolios and have a broader network than smaller banks (Berger, 2009). Thus, thanks to the various advantages possessed by large banks including economies of scale, the ease of diversifying their asset portfolios, and extensive networks large banks are able to maintain stable profitability levels even when facing pressures from liquidity risk and credit risk. Consequently, researchers have identified bank size as a moderator variable in the relationship between liquidity risk and credit risk on bank profitability.

However, previous studies have shown varying relationships regarding how bank profitability is influenced by bank size. According to Koroleva et al. (2021), profitability can be enhanced by large banks in China, particularly state-owned banks. Shehzad et al. (2013) also agree that large banks can have a positive impact on bank profitability. Their research indicates that large banks in the Organization for Economic Cooperation and Development (OECD) can achieve higher profitability compared to smaller banks. Meanwhile, Athanasoglou & Brissimis (2004) state that as a bank grows into a very large institution, its size actually has a negative impact on profitability due to increasingly stringent bureaucratic regulations and other factors. In their study, Dietrich & Wanzenried (2014) examined the financial performance of banks in 118 countries over the 1998–2012 period under various influences and found no evidence of a positive effect of bank size on bank profitability in low-, middle-, and high-income countries. Therefore, in this study, bank size is tested as a moderator variable between the effects of bank liquidity risk and bank credit risk on bank profitability. It is hoped that this study will provide a more comprehensive understanding of the mechanisms linking risk and bank performance and can assist business owners and investors in the banking sector in their decision-making.

2. Literature Review & Hypothesis Development

The theoretical foundation underlying this study is signaling theory, which was first introduced by Spence (1973), in the context of information asymmetry in the labor market. Spence (1973) argued that in a market characterized by information asymmetry, the party with better information will send observable signals to the other party to reduce uncertainty in decision-making. Within Spence (1973) framework, a signal is effective only if the cost of obtaining it is negatively correlated with the underlying quality it is intended to convey, thereby ensuring that only high-quality parties find it rational to send signals. This condition creates a self-reinforcing equilibrium, in which the market learns to interpret observable characteristics as credible indicators of unobservable attributes. Although Spence (1973), initially applied this framework to the labor market, subsequent literature has extended

signaling theory to financial markets and the banking industry, where information asymmetry between internal parties (bank management) and external parties (investors and customers) is widespread. In the banking context, banks convey signals to external stakeholders primarily through published financial statements and annual reports, which contain information regarding risk exposure and financial performance, including profitability.

In line with this perspective, a bank's profitability serves as a key indicator of the quality of its asset management and operational efficiency. In addition, observable risk indicators such as liquidity risk and credit risk serve as signals that shape external parties' perceptions of a bank's financial health. Well-managed liquidity risk signals to customers and investors that the bank is capable of meeting its obligations and maintaining stable operations, which in turn has a positive impact on profitability. Furthermore, bank size serves as an observable characteristic that modifies the informational content of these signals. Larger banks have easier access such as broader funding networks and superior risk management capabilities and are perceived as more credible and stable entities compared to smaller banks. Consequently, this can reinforce the positive signaling effect on bank profitability. Consequently, signaling theory provides a conceptual framework for examining how liquidity risk, credit risk, and bank size interact in shaping bank profitability in the Indonesian banking sector during the 2020-2024 period, spanning the pandemic and post-pandemic recovery phase.

In banking, profitability is fundamentally determined by the trade-off between risk and return. Banks generate profits by converting liquid deposits into loans that yield higher returns. However, this process inevitably exposes banks to liquidity risk and credit risk. Risk management theory states that profitability is maximized not by eliminating risk, but by maintaining risk at an optimal level where expected returns exceed potential losses. Therefore, liquidity risk and credit risk are expected to influence profitability through different economic mechanisms.

Based on the risk-return trade-off theory, banks can increase profitability by allocating a larger proportion of third-party funds to income-generating loans, provided that liquidity exposure remains at a manageable level. A higher Loan-to-Deposit Ratio (LDR) reflects greater liquidity exposure because more deposit funds are converted into relatively less liquid loan assets. However, with the implementation of prudent liquidity management, these lending activities generate higher interest income, thereby increasing profitability. This argument is highly relevant to the banking sector in Indonesia during the COVID-19 pandemic, when accommodative monetary policy and various banking support measures helped banks maintain liquidity despite increased lending activity. Therefore, in the observed banking environment, liquidity risk is estimated to have a positive relationship with bank profitability.

A bank's profitability can reflect its performance. When a bank's profitability is low around 1.5% its performance is considered relatively unhealthy. However, in practice, a bank's profitability can be influenced by liquidity risk (Junaeni, 2021). Liquidity risk is one of the risks closely linked to fluctuations in a bank's profitability. Risk management theory emphasizes that banks should consider liquidity risk not only as a benchmark but also as a strategy for managing bank profitability (Tewu et al., 2024). Furthermore, a bank's role as a liquidity provider can trigger liquidity risk if decisions are not made appropriately (Berger & Bouwman, 2007). In this role, banks convert liquid assets into illiquid assets by channeling funds from parties with excess funds to those with a shortage of funds in the form of loans.

However, banks also promise parties with excess funds or those who deposit their liquid assets at the bank the ability to withdraw those assets at any time. This creates a maturity transformation and can give rise to liquidity risk in the event of a mass withdrawal of funds (a bank run). Therefore, when a bank faces high liquidity risk, it indicates that the bank is experiencing difficulty in meeting its obligations to customers because a significant portion of its liquid assets has been converted into illiquid assets. In this study, liquidity risk is proxied by the Loan-to-Deposit Ratio (LDR). The LDR measures the proportion of customer deposits allocated to lending. A higher LDR indicates that a significant portion of deposits has been converted into relatively illiquid loan assets. Consequently, this increases the bank's exposure to liquidity pressures in the event of unexpected fund withdrawals. Consequently, in this study, the LDR is interpreted as a proxy for liquidity risk, not as a direct measure of the intensity of credit extension or liquidity creation. Thus, since lending is a bank's primary intermediation activity, changes in the LDR also reflect the extent to which deposits are used for income-generating loans.

H1: Higher liquidity risk (proxied by the LDR) is associated with higher profitability during the COVID-19 period

Similarly, excessive credit risk does not generate additional returns because it reflects a decline in loan quality rather than productive lending activity. Banking theory shows that an increase in nonperforming loans reduces interest income while increasing loan loss reserves, thereby lowering profitability. Furthermore, according to signaling theory, higher credit risk indicates weak asset quality and poor risk management, which in turn erodes stakeholder confidence. Although Indonesia implemented credit restructuring policies during the COVID-19 pandemic, these policies were designed to mitigate the adverse effects of deteriorating credit quality, not to eliminate the underlying negative relationship between credit risk and profitability. Therefore, credit risk is expected to have a negative impact on bank profitability. Furthermore, credit risk can also influence fluctuations in a bank's financial performance (Dwi et al., 2023). One example is that when a bank's credit risk is high, its provisions for impairment losses will also be high. When provisions for impairment losses are high, the funds allocated for lending will decrease, thereby hindering the growth of the bank's profitability. Furthermore, credit risk can also trigger a loss of customer confidence in the bank because, when credit risk is high, the bank exhibits a relatively low level of financial health. According to Financial Services Authority (OJK) standards, the Non-Performing Loan (NPL) ratio is capped at a maximum of 5% of total loans disbursed. Therefore, when a bank cannot keep its credit risk below 5%, customer confidence in that bank is likely to erode. This, in turn, can lead to a reduction in the bank's liquid assets. Unlike liquidity risk which, according to risk management theory, reflects productive risk-taking within controllable limits credit risk that exceeds regulatory thresholds is an uncontrollable risk that erodes financial health rather than generating returns. Consequently, it is expected to reduce, rather than increase, a bank's profitability.

An increase in the Non-Performing Loan (NPL) ratio reflects a deterioration in the quality of the bank's earning assets, which in turn requires the bank to set aside a larger amount of Allowance for Impairment Losses (CKPN) in accordance with Financial Services Authority Regulation No. 40/POJK.03/2019 on the Assessment of Commercial Bank Asset Quality. This increase in provisioning expenses (CKPN) directly erodes the bank's operating profit. Meanwhile, loans that have been classified as non-performing prevent the bank from realizing the interest income it should receive from borrowers. It is this combination of rising provisioning expenses and deferred interest income that ultimately significantly pressures

the bank's profitability. Furthermore, high NPLs serve as a negative signal indicating weak asset management quality and risk governance to investors, depositors, and regulators. This negative signal has the potential to trigger an increase in the cost of funds, as fund providers demand higher risk premiums, and to reduce customer confidence in mobilizing third-party funds. This argument is also supported by Febo et al. (2026), which confirms the relationship between institutional quality and credit quality on a bank's financial performance. Furthermore, Maria & Cofitalan (2022) also reinforce that credit risk has a significant impact on the decline in a bank's profitability.

H2: Higher credit risk (proxied by NPL) reduces bank profitability.

Bank size can also influence a bank's ability to manage its profitability (Connell, 2023). Bank size can be measured by each bank's total assets to indicate the scale of its operations, as banks are considered businesses whose core operational activity is managing assets (Almaqtari, 2019). This is also supported by research by Dietrich & Wanzenried (2014), which indicates that banks with high total assets have an efficiency advantage because growth in bank size can help banks leverage economies of scale (Almaqtari, 2019). In their day-to-day operations, every bank inevitably incurs costs to support its operations, whether in the form of advertising expenses, information and communication technology development costs, human resource development costs, or other expenses. However, the costs incurred by large banks are considered minimal because they are able to optimize costs and enhance the bank's profitability. Additionally, large banks can more easily diversify their asset portfolios compared to small banks (Berger, 2009). In line with the research by Koroleva et al. (2021), it is stated that large banks in China can increase their profitability compared to small banks, particularly state-owned banks. Shehzad et al. (2013) also agree that large banks can have a positive impact on bank profitability. Their research demonstrated that large banks in the Organization for Economic Co-Operation and Development (OECD) achieve higher profitability compared to small banks.

H3: Larger bank size (as measured by the natural logarithm of total assets) increases bank profitability

In addition to its role in the direct relationship between risk and profitability, bank size also functions in line with signaling theory as an observable characteristic that shapes how external stakeholders interpret a bank's risk signals. Banks, acting as intermediaries, face liquidity risk as their profitability increases. Risk management theory emphasizes that banks must consider liquidity risk not only as a benchmark but also as a strategy for managing bank profitability (Tewu et al., 2024). However, not all banks can effectively mitigate liquidity risk. This ability depends on the bank's size (Koroleva et al., 2021). In his study, Berger (2009) supports this, stating that large banks tend to have broader networks than small banks. A broad network can provide large banks with easier access to funding, whether from capital markets or other external sources. Consequently, larger banks are better able to reduce their exposure to liquidity risk and maintain a balanced cash flow. Therefore, the researchers argue that the impact of liquidity risk on bank profitability will not be the same for every bank but will vary depending on the bank's asset size. Thus, bank size is predicted to play a role in moderating the effect of liquidity risk on bank profitability.

H4: Bank size moderates the relationship between liquidity risk and bank profitability.

In line with signaling theory, the credibility derived from a large asset base can also mitigate the negative signals typically associated with credit risk exposure. The researchers identified bank size as a moderator variable because they hypothesized that banks with high total assets could strengthen their defenses against credit risk. Large banks tend to be better able

to diversify their assets, including spreading their loans across various industries (Berger, 2009). However, when a bank faces high credit risk or a large volume of nonperforming loans, this can lead to an increase in loan loss reserves in accordance with the percentage set by the Financial Services Authority. The financial performance of larger banks remains unaffected by this factor. In contrast to banks with low assets, non-performing loans can affect a bank's profitability stability (Koroleva et al., 2021). Therefore, bank size is predicted to be a factor that moderates the effect of credit risk on profitability.

H5: Bank size moderates the relationship between credit risk and bank profitability.

3. Methodology

This study employs a quantitative approach. It focuses on banks listed on the Indonesia Stock Exchange (IDX) during the 2020–2024 period. The selection of this research subject is considered appropriate because banks listed on the IDX tend to have high levels of operational activity and can influence economic stability at the national level. The secondary data used in this study were obtained from the banks' annual financial reports published on the Indonesia Stock Exchange (IDX) for the 2020–2024 period. The population in this study is defined as all 44 conventional banks listed on the IDX. The population consists of all objects or subjects that are the focus of the study for analysis and drawing conclusions. Meanwhile, a sample is a subset of the population selected based on specific criteria and typically consists of a smaller number of units than the population. The sample in this study was selected using purposive sampling based on criteria predetermined by the researcher (Sugiyono, 2013). The sampling criteria for this study were conventional banks listed on the Indonesia Stock Exchange that consistently published their financial reports during the 2020–2024 period.

Table 1. Research Sample

No	Description	Number
1	Conventional banks listed on the Indonesia Stock Exchange from 2020 to 2024	44
2	Conventional banks that did not consistently publish financial statements during the 2020–2024 period	(2)
	Total Sample	42
	Number of samples during the study period (2020–2024)	210

Source: Author's own work

Based on the sampling criteria, 42 conventional banks consistently published financial reports during the 2020-2024 period, showing varying levels of profitability, with some banks reporting losses and other reporting profits. The data used in this study is panel data, which is a combination of cross-sectional data representing the 42 banks that met the sampling criteria and time-series data covering the 2020–2024 period.

This study employs a moderated regression analysis (MRA) model using a regression analysis approach as a data processing technique (Hayes, 2022). Data processing began with calculating the ratios of each variable, followed by the use of EViews 12, which encompassed several analytical stages, including model selection, testing of classical assumptions, and hypothesis testing. The data used in this study underwent centering to address multicollinearity issues among the independent variables and interaction terms. Liquidity risk and credit risk were used as independent variables in this study, while bank profitability served as the dependent variable. Additionally, bank size acted as a moderator in the relationships among the variables., in measures data, researchers use several financial

ratios, such as Return on Assets (ROA) to measure bank profitability, Loan to Deposits Ratio (LDR) to measure liquidity risk, Non-Performing Loans (NPL) to measure credit risk, and the Natural Logarithm of Assets to measure bank size. Liquidity risk is proxied by the Loan-to-Deposit Ratio (LDR). Although a higher LDR reflects greater liquidity exposure because a larger proportion of third-party funds is channeled into loans, this ratio also indicates more intensive financial intermediation. Therefore, the interpretation of the LDR must take both of these dimensions into account. A positive coefficient does not mean that liquidity risk itself increases profitability. Rather, it indicates that banks operating with a higher intensity of credit disbursement while maintaining liquidity within manageable limits can generate greater interest income.

Table 2. Operational Definitions

Variables	Operational Definitions	Measurement Formula	Reference
Liquidity Risk	Loan-to-Deposit Ratio (LDR)	LDR = Total loans / third-party funds	(Yosen et al., 2022)
Credit Risk	Non-Performing Loans (NPL)	NPL = Non-performing loans / Total loans	(Mousa et al., 2025)
Profitability	Return on Assets (ROA)	ROA = Pre-tax Profit / Total Assets	(Junaeni, 2021)
Bank Size	Natural Logarithm of Total Assets	LN (total assets)	(Almaqtari, 2019)
Equity to Asset	Equity to Asset Ratio (EAR)	EAR = Total Equity / Total Assets	(Mousa et al., 2025)
GDP	GDP growth rate tahunan	GDP = [(GDP_t – GDP_t-1)/ GDP_t-1] × 100	(Mousa et al., 2025)
Inflation Rate	Annual percentage change in the Consumer Price Index (CPI)	Inflation Rate = [(CPI_t – CPI_t-1) / CPI_t-1] × 100	(Mousa et al., 2025)

Source: Author's own work

4. Results and Discussion

4.1 Result

This study uses panel data, which is a combination of cross-sectional and time-series data. Consequently, the data in this study will vary significantly due to differences among banks that may affect banking financial ratios. Therefore, the data in this study requires a model selection analysis first. According to Gujarati & Porter (2009), panel data estimation consists of three models the pooled OLS model (pooled OLS), the fixed-effects model (FEM), and the random-effects model (REM). The pooled OLS model, also known as the Common Effects Model (CEM), combines all data from various individuals or, in the context of this study, several banks and across various time periods without accounting for differences between individuals or over time. The FEM assumes that the data in this study exhibit unique characteristics for each individual that are fixed and correlated with the independent variables. Meanwhile, the REM model assumes that the data in this study are random for each individual and are not correlated with the independent variables. Therefore, to determine the best model for analysis, the researcher conducted model selection tests using the Chow test, the Hausman test, and the Lagrange multiplier test for each equation.

The Chow test is used to determine the best model between the combined OLS model commonly known as CEM and FEM. In this Chow test, if the significance value of the cross-sectional F statistic is < 0.05, then FEM is the best model. However, if the probability value of the cross-sectional F statistic is > 0.05, the Combined Effects Model (CEM) is considered the most appropriate model.

Based on the Chow test in Table 3, it can be seen that the cross-sectional F significance value is 0.0000. This indicates that the significance value is < 0.05. Therefore, the most appropriate model for this study is FEM. The Chow test indicates that the FEM is the most appropriate model the researcher must proceed to the next stage of model estimation testing the Hausman test to determine whether the FEM or REM is more reliable for use in this study.

The Hausman test was conducted to determine the best model between FEM and REM. In this Hausman test, the Fixed-Effects Model (FEM) is considered the most optimal model if the significance value obtained from the random cross-section is < 0.05. In contrast, the Random-Effects Model (REM) is more recommended if the significance value is > 0.05. Based on the Hausman test in Table 3, the probability value is > 0.05 with a significance score of 1.0000. However, in this Hausman test, the following message was obtained "cross-section test variance is invalid. Hausman statistic set to zero." From an econometric perspective, this condition occurs because the variance of the random effects model (REM) estimates is greater than that of the fixed effects model (FEM) estimates. This results in an invalid or negative variance difference. Based on the econometric literature Greene (2012); Wooldridge (2010), when the covariance matrix in the Hausman test is invalid, the fundamental assumption of the REM regarding the absence of correlation between individual-specific effects and independent variables cannot be guaranteed to be accurate. To avoid the risk of bias due to specification bias and to maintain the consistency of the estimated parameters, the FEM was selected and used for further analysis.

Table 3. Test results for Chow, Hausman, and LM

Chow Test			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	3.923778	(41,160)	0.0000
Hausman Test			
Test summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-sectional random	0.000000	8	1.0000

Source: Processed data (2026)

Based on the model selection results confirmed by the Chow and Hausman tests reported above, the Fixed Effect Model (FEM) is adopted as the best model for this study. Therefore, to proceed with hypothesis testing, classical assumption tests must be conducted to ensure that the research model used meets the statistical data validity requirements and is free from bias. The tests conducted included the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test. The normality test aims to determine whether the data in the sample are normally distributed and can represent the population in a study. Based on the results of the normality test using the Jarque-Bera statistical method, if the probability value is > 0.05, the data are normally distributed. However, if the probability value is < 0.05, the data are not normally distributed. The normality test in this study used the Jarque-Bera test.

Based on the results of the normality test in Table 4, the initial test found that the data were not normally distributed due to the presence of extreme values in the banking financial ratios. Consequently, the researcher reanalyzed the data using the winsorization method on

the financial ratio variables to mitigate some of the extreme values. The variables to be winsorized are the credit risk (x2) and bank profitability (Y), with percentile value is 1% and 99%. The results of the normality test after applying winsorization showed a significant decrease in the Jarque-Bera value from 8430.246 to 564.3033, although the probability value remained 0.0000 < 0.05, which is due to the natural heterogeneity among banks. Thus, based on the Central Limit Theorem (CLT), the assumption of normality can be relaxed for large sample sizes. A sample is considered large when the total number of observations in the study exceeds NxT=100. in this study, the data consist of 42x5=210 observations. The CLT guarantees that the sampling distribution will asymptotically approach a normal distribution (Kwak & Kim, 2017). Therefore, the asymptotic properties ensure that statistical inferences from hypothesis testing remain robust against non-normality.

Table 4. Normality test result

Evaluation Stage	Jarque-Bera	Skewness	Kurtosis	Prob.
Before Winsorization	8430.246	-3.569719	33.20737	0.00000
After Winsorization	564.3033	-1.550655	10.40768	0.00000

Source: Processed data (2026)

The multicollinearity test is used to determine whether there is a correlation among the independent variables in the research model. The multicollinearity test in this study uses the correlation matrix method. In this method, if the correlation matrix value is > 0.80, multicollinearity exists if the correlation matrix value is < 0.80, multicollinearity does not exist. Based on the results of the multicollinearity test in Table 5, it is evident that all correlation coefficients between the independent variables are less than 0.80. The correlation coefficient between liquidity risk (X1C) and credit risk (X2C) is -0.02165, between liquidity risk (X1C) and bank size (ZC) is -0.13293, and between liquidity risk (X1C) and liquidity risk*bank size (X1Z_C) is -0.73566, and between liquidity risk (X1C) and credit risk*bank size (X2Z_C) is 0.00483. The correlation between credit risk (X2C) and bank size (ZC) is -0.15733, between credit risk (X2C) and liquidity risk*bank size (X1Z_C) is 0.00488, and between credit risk (X2C) and credit risk*bank size (X2Z_C) is -0.58829. Furthermore, the correlation between bank size (ZC) and liquidity risk*bank size (X1Z_C) is 0.16331, and between bank size (ZC) and credit risk*bank size (X2Z_C) is 0.03738. The correlation between liquidity risk*bank size (X1Z_C) and credit risk*bank size (X2Z_C) is 0.02905. Thus, it can be concluded that all correlation coefficients for the independent variables are less than 0.80. This means that there is no multicollinearity in the data for this study.

Table 5. Results of the multicollinearity test (the correlation matrix method)

	X1C	X2C	ZC	X1Z_C	X2Z_C	K1	K2	K3
X1C	1.00000							
X2C	-0.02165	1.00000						
ZC	-0.13293	-0.15733	1.00000					
X1Z_C	-0.73566	0.00488	0.16331	1.00000				
X2Z_C	0.00483	-0.58829	0.03738	0.02905	1.00000			
K1	0.45426	0.06330	-0.54786	-0.62248	-0.08002	1.00000		
K2	-0.10304	0.10090	-0.05553	0.07177	0.05157	-0.07518	1.00000	
K3	0.03550	0.00143	-0.00792	0.00082	-0.03309	-0.03184	0.30896	1.00000

Source: Processed data (2026)

In addition, this study also conducted a multicollinearity test by examining the variance inflation factor (VIF) values after the main variables and moderating variables were

transformed using the mean-centering method. In this test, a regression model is considered free of multicollinearity if the centered VIF value is below 10. Based on the test results in table 6, it can be seen that all study variables have relatively low centered VIF values. The liquidity risk variable (X1C) is 3.409868, the credit risk (X2C) is 1.341715, and the moderating variable for bank size (ZC) is 1.297313. For the interaction variables, the VIF value for liquidity risk*bank size (X1Z_C) is 4.391718 and the VIF value for credit risk*bank size (X2Z_C) is 1.334516. As for the VIF values for the control variables, the VIF values for Equity to Asset (K1), GDP (K2), and inflation rate (K3) are 2.011004; 1.294526; and 1.156390, respectively. Therefore, it can be concluded that all centered VIF values for each variable are well below 10. This indicates that there are no signs of multicollinearity among the variables in this moderation regression model. Thus, this model is free from multicollinearity issues.

Table 6. Result of the multicollinearity test (Variance Inflation Factor)

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	1.87E-05	3.441783	NA
X1C	4.99E-06	3.409868	3.409868
X2C	0.014494	1.341715	1.341715
ZC	3.26E-06	4.424761	1.297313
X1Z_C	0.005591	1.338354	4.391718
X2Z_C	2.18E-06	1.297313	1.334516
K1	0.000257	4.423880	2.011004
K2	1.04E-10	1.302532	1.294526
K3	1.45E-10	1.493481	1.156390

Source: Processed data (2026)

The heteroscedastisity test aims to determine whether there is unequal variance in the residuals within this research model. A good research model is one that is free from heteroscedasticity. The method used to test for heteroscedasticity in this study was the Glejser test. In the Glejser test, if the probability value is > 0.05, there is no heteroscedasticity. If the probability value is < 0.05, heteroscedasticity is present. Based on the results of the heteroscedasticity test in Table 3, the probability value for X1C is 0.9594 > 0.05, the probability value for X2C is 0.0768 > 0.05, the probability value for ZC is 0.0039 < 0.05, the probability value for X1Z_C is 0.9922 > 0.05, the probability value for X2Z_C is 0.4843 > 0.05, the probability value for K1 is 0.6126 > 0.05, the probability value for K2 is 0.1092 > 0.05, and the probability value for K3 is 0.1773 > 0.05. These results indicate that the variable ZC has a probability value < 0.05, meaning this study suffers from heteroscedasticity.

Table 7. Result of heteroscedasticity test

Variable	Std. Eror	Prob.
C	0.003841	0.0294
Liquidity risk (X1C)	0.002395	0.9594
Credit risk (X2C)	0.106585	0.0768
Bank Size (ZC)	0.003714	0.0039
Liquidity Risk*Bank Size (X1Z_C)	0.002028	0.9922
Credit risk*Bank Size (X2Z_C)	0.063288	0.4843
Equity to Asset (K1)	0.016714	0.6126
Gross Domestic Product (K2)	9.05E-06	0.1092
Inflation (K3)	1.01E-05	0.1773

Source: Processed data (2026)

The results of the cross-sectional dependence test in Table 8 show a Breusch-Pagan LM statistic of 1315.499 with a probability value of 0.0000 and a Pesaran CD statistic of 4.158364 with a probability value of 0.0000. This indicates the presence of cross-sectional dependence in the model residuals. Similarly, the previous test, the heteroscedasticity test, indicated the presence of heteroscedasticity. Therefore, given that the panel data structure of this study is characterized by the number of firms studied (N) being greater than the number of observation periods (T), the Panel-Corrected Standard Errors (PCSE) estimator based on Cross-Section SUR was applied in estimating the fixed-effects model. This approach was chosen to address the technical limitations of the covariance matrix in short panel data. This PSCE adjustment improves inference robustness against potential standard error biases arising from heteroscedasticity and residual cross-sectional dependence.

Table 8. Results of the cross-sectional dependence test

Test	Statistic	d.f.	Prob.
Breusch-Pagan LM	1315.499	861	0.0000
Pesaran-scaled LM	10.95257		0.0000
Bias-corrected scaled LM	5.702572		0.0000
Pesaran CD	4.158364		0.0000

Source: Processed data (2026)

Hypothesis testing was conducted to examine the relationships among the variables. Data analysis was performed using EViews 12 software. As presented in Table 7, the results of the hypothesis testing indicate the presence of several direct and indirect effects. Additionally, there are several insignificant relationships among the variables. The first relationship is the effect of liquidity risk (X1) on bank profitability (Y), which shows a coefficient value of -0.003862 and a significance p-value of 0.1791 > 0.05. This indicates that liquidity risk does not affect bank profitability. This finding, hypothesis 1 in this study, is rejected.

Furthermore, the relationship between credit risk (X2) and bank profitability (Y) shows a coefficient of 0.033402 with a significance value of 0.7935 > 0.05. This finding indicates that credit risk does not affect bank profitability. This implies that Hypothesis 2 in this study is rejected.

Meanwhile, the relationship between bank size (Z) and bank profitability (Y) shows a coefficient of 0.010970 with a significance level of 0.0145 < 0.05. This finding indicates that bank size has a positive and significant effect on bank profitability. This indicates that Hypothesis 3 in this study is accepted.

The effect of bank size (Z) as a moderator variable on the relationship between liquidity risk (X1) and bank profitability (Y) is indicated by a coefficient of -0.003245 with a p-value of 0.1824 > 0.05. Thus, this means that bank size does not moderate (weaken) the relationship between liquidity risk and bank profitability. This indicates that Hypothesis 4 in this study is rejected.

Furthermore, the effect of bank size (Z) as a moderator variable in the relationship between credit risk (X2) and bank profitability (Y) is reflected by a coefficient of -0.046353 and a p-value of 0.5408 > 0.05. This indicates that bank size does not moderate (weaken) the effect of credit risk on bank profitability. This means that Hypothesis 5 in this study is rejected.

The adjusted R-squared value of 0.591814 is shown by the results of the coefficient of determination test. This indicates that the independent variables in this study, particularly

those related to liquidity risk and credit risk, can explain 59.1814% of the variation in profitability. Meanwhile, 40.8186% is explained by other factors not included in this study.

Table 8. Hypothesis Test & R-Square Test

Variable	FEM	
	Coefficient	Prob.
C	0.005804	0.2078
Liquidity risk (X1)	-0.003862	0.1791
Credit risk (X2)	0.033402	0.7935
Bank Size (Z)	0.010970	0.0145
Liquidity Risk*Bank Size (X1Z)	-0.003245	0.1824
Credit risk*Bank Size (X2Z)	-0.046353	0.5408
Equity to Asset (K1)	0.011658	0.5602
Gross Domestic Product (K2)	-3.31E-05	0.0026
Inflation (K3)	2.18E-05	0.0733
R-squared	0.687513	
Adjusted R-squared	0.591814	
F-statistic	7.184124	
Prob(F-stat)	0.000000	

Sources: Processed data (2026)

In addition, the researcher also conducted a robustness check. A robustness check was conducted to test the consistency of the FEM estimates as the primary model by comparing them with an alternative model specification, namely the REM. Based on the results of the robustness check in Table 9, the estimation results generally show a high level of consistency for the primary banking variables and the moderating variables. The bank size variable showed statistically consistent results. In the FEM model, bank size has a positive and significant effect on bank profitability. Similarly, the results of the test using the REM model showed the same direction of relationship. Furthermore, credit risk and interaction terms, whether in the relationship between liquidity risk and bank profitability with bank size as a moderating variable or in the relationship between credit risk and bank profitability with bank size as a moderating variable, all consistently show the same direction of relationship in both model specifications.

However, the relationship between liquidity risk and profitability differs between the two models. In the REM model, liquidity risk has a negative and significant effect, whereas in the FEM model, the coefficient remains negative, but the p-value is greater than 0.05. The difference in significance levels indicates the presence of unobserved bank-specific characteristics that are correlated with a bank's liquidity management. Since the FEM can fully control for individual bank-specific characteristics, the FEM specification remains the most reliable primary model for inference.

Table 9. Robustness Check

Variable	FEM		REM	
	Coefficient	Prob.	Coefficient	Prob.
C	0.005804	0.2078	0.000906	0.8683
Liquidity risk (X1)	-0.003862	0.1791	-0.003271	0.0289
Credit risk (X2)	0.033402	0.7935	-0.286259	0.1547

Bank Size (Z)	0.010970	0.0145	0.005722	0.0022
Liquidity Risk*Bank Size (X1Z)	-0.003245	0.1824	-0.002753	0.0944
Credit risk*Bank Size (X2Z)	-0.046353	0.5408	-0.154102	0.2801
Equity to Asset (K1)	0.011658	0.5602	0.032528	0.0843
Gross Domestic Product (K2)	-3.31E-05	0.0026	-2.77E-05	0.0853
Inflation (K3)	2.18E-05	0.0733	1.81E-05	0.2658
R-squared	0.687513		0.202642	
Adjusted R-squared	0.591814		0.170906	
F-statistic	7.184124		6.385302	
Prob(F-stat)	0.000000		0.000000	

Sources: Processed data (2026)

4.2 Discussion

Liquidity Risk and Bank Profitability

The empirical results of this study show that liquidity risk, proxied by the Loan to Deposit Ratio (LDR), does not have a statistically significant effect on bank profitability. Viewed through the risk-return trade-off lens, this outcome suggests that LDR movements during 2020-2024 did not translate into significant profitability effects because lending intensity in this period was largely regulator-guided rather that purely profit-driven. In the aftermath of COVID-19 recovery period, credit restructuring policy together with broader macroprudential liquidity requirements pushed banks toward more conservative loan to deposit positions, so that variation in the LDR reflected compliance-driven caution rather that a straightforward profit-maximizing calculus (Qadri et al., 2023). Under such constrained conditions, the presumption that greater liquidity exposure translates linearly into greater interest income is weakened, since credit expansion was tempered by heightened prudence in loan disbursement.

In addition, the primary function of banks, converting short term deposits into loan term loans, structurally exposes them to maturity mismatch risk. However, during a recovery period characterized by high funding costs and more cautious deposit mobilization, banks tend to maintain liquidity reserves above the regulatory minimum rather that maximizing LDR in pursuit of returns. This aligns with the view of Berger & Bouwman (2007), who regard liquidity creation as a deliberate balancing act, in which banks limit the conversion of liquid liabilities into illiquid assets to maintain stability, a behavior that dampens the statistically detectable relationship between the LDR an ROA. From a signaling theory perspective, a moderate and well-managed LDR is typically expected to signal sound intermediation capacity to investors and depositors. However, during the 2020-2024 period, most banks in the sample operated within a similarly conservative LDR range under comparable regulatory guidelines. Consequently, this situation narrowed the cross-sectoral variation that would otherwise allow the market to distinguish the quality of liquidity management among banks. As a results, the LDR lost much of its signaling value as a basis for differentiating bank performance (Mousa et al., 2025).

This non-significant finding is generally consistent with Dwi et al. (2023), who also reported a negative but statistically insignificant effect of liquidity exposure on bank performance. However, these results differ from the findings of Safitri et al. (2020), who noted a significant positive relationship between liquidity and performance. This discrepancy most likely reflects variations in the sample periods. Their pre-pandemic data encompassed market driven variations in LDR, whereas the 2022-2024 period examined here was more heavily influenced by extraordinary monetary accommodation and regulatory forbearance that by typical market

mechanisms. Furthermore, the increase in funding costs resulting from intense competition in mobilizing third-party funds during the post-pandemic period may have offset the additional interest income generated by higher credit extension intensity, thereby further weakening the statistical relationship between liquidity risk and profitability (Tewu et al., 2024). Overall, these results indicate that in the context of the Indonesian banking sector during the 2020-2024 period, liquidity risk should be understood not as a direct driver of profitability, but rather as a prudential buffer formed as a result of regulatory intervention and post-crisis prudential measures.

Credit Risk and Bank Profitability

The effect of credit risk on bank profitability in this study showed no significant results. This indicates that, empirically, no evidence was found of a direct impact of credit risk on bank profitability in the sample studied. Theoretically, signaling theory suggests that an increase in credit risk can create a negative perception among investors and customers, which in turn has the potential to reduce a bank's profit performance. This pattern is consistent with the findings of Ramadhanti & Hidayati (2019), who showed that credit risk has a negative and significant effect on bank profitability. However, that previous study examined banks listed on the BEI during the 2015-2017 period. These conditions differ from the time frame of this study, which covers the period 2020-2024, encompassing the dynamics of the COVID-19 phase through to the post-pandemic recovery. During this period, the Financial Services Authority (OJK) issued various new policies, including a credit restructuring policy via OJK regulation No. 11/POJK.03/2020, which provides flexibility in assessing asset quality for borrowers affected by COVID-19 through March 2024.

In this context, the insignificant impact of credit risk on bank profitability can be interpreted contextually as a reflection of the presence of credit restructuring policy interventions during that period (Qadri et al., 2023). These credit restructuring policies have the potential to temporarily mitigate the direct impact of credit risk on banks financial performance reports. Therefore, these results do not directly prove a causal relationship stemming from the restructuring policies. Rather, they indicate that the application signaling theory to explain credit risk during the 2020-2024 period must be understood by taking into account the dynamics of the regulatory environment and the post-COVID-19 economic transition.

Bank Size and Bank Profitability

Research findings indicate that bank size has a positive effect on bank profitability. This means that the larger a bank is, the higher its profitability will be. This finding is also supported by, El-chaarani et al. (2023), who state that size can have a positive effect on bank profitability. This indicates that larger banks possess greater resilience and are able to enhance their profitability due to their diversified revenue streams and the adoption of more advanced technology. Additionally, banking research in India has also revealed a significant relationship between bank size and profitability (Almaqtari, 2019). These findings indicate the applicability of the concept of economies of scale in Indonesia's banking sector during the 2020–2024 period. Banks with larger total assets are able to reduce marginal operating costs per customer through efficient allocation of expenses related to information technology, marketing, and human resource management. From the perspective of signaling theory, holding large assets signals a strong reputation and sound financial capacity to the public. This not only makes it easier for large banks to attract third-party funds but also boosts investor confidence, thereby driving sustainable growth in bank profitability.

Bank Size Moderates the Relationship Between Liquidity Risk and Bank Profitability

Research findings indicate that bank size does not moderate the relationship between

liquidity risk and bank profitability. Although signaling theory suggests that large banks serve as a positive signal of effective risk management, the non-significant results in this study indicate disruptions in the transmission of information from banks to investors and customers. These results indicate that a bank's size whether large or small does not automatically mitigate the negative impact of liquidity risk on profitability during the post-COVID-19 pandemic recovery period. The existence of comprehensive liquidity regulations that apply to all banks regardless of their asset size means that the economies of scale enjoyed by large banks such as broader access to funding do not always result in significant differences in managing liquidity pressures compared to small banks (Berger, 2009). In this regard, regulators require every bank to hold high-quality liquid assets to fund cash outflows for the next 30 days and ensure that the bank has stable long-term funding to finance its activities.

Additionally, in terms of operational cost structure, large-scale banks generally bear more complex operational burdens, including a broader branch network and a larger organizational structure. As liquidity pressures increase due to competition for third-party funds during the post-pandemic recovery period, large banks may also experience a rise in the cost of funds. Consequently, the potential cost-efficiency advantages held by large banks may not be sufficient to mitigate the impact of liquidity risk on profitability significantly. Thus, funding cost pressures during this period may affect banks across the board, from large to small institutions. In line with the study by Dietrich & Wanzenried (2014), their study found no strong evidence that bank size consistently strengthens or weakens the relationship between risk and bank profitability across various groups of countries. Therefore, the results of this study indicate that, in the context of strict and uniformly applied liquidity regulations following the COVID-19 pandemic, bank size is not a relevant factor in determining the extent to which liquidity risk affects bank profitability.

Bank Size Moderates the Relationship Between Credit Risk and Bank Profitability

The effect of credit risk on bank profitability, with bank size as a moderating variable, yielded nonsignificant results. Theoretically, particularly within the framework of signaling theory, a large bank size should ideally serve as a positive signal of superior risk management capacity. However, the nonsignificant results in this study suggest the possibility of dynamics that hinder the effective transmission of this signal to investors and customers. This finding aligns with Berger (2009) argument, which suggests that behavioral differences between large and small banks may blur under certain conditions, such as when there is comprehensive regulatory intervention during specific periods.

In the context of the Indonesian banking sector from 2020 to 2024, the OJK implemented widespread credit restructuring and regulatory policies. These regulations provided similar room for adjustment across banks of various sizes. Thus, contextually, they have the potential to minimize the sensitivity of credit risk impacts on profitability, for both large and small banks. On the other hand, referring to the arguments of Febo et al. (2026), large banks sometimes tend to take on higher risks due to the "too big to fail" perception. This tendency toward higher risk-taking has the potential to provide a counter-signal that balances the reputation of large banks assets. Consequently, customers and investors no longer view bank size as the sole determining factor in moderating the impact of credit risk on profitability during this observation period.

5. Conclusion and Recommendations

5.1 Conclusion

This study investigated the impact of liquidity risk and credit risk on profitability, as well as the moderating role of bank size, among commercial banks listed on the IDX during the 2020-2024 period, encompassing both the pandemic and post pandemic recovery phase. The empirical findings reveal that bank size has a positive and statistically significant effect on bank profitability, confirming that economies of scale, operational cost efficiency, and asset diversification remain the primary structural drivers of banking performance in Indonesia. Conversely, neither liquidity risk nor credit risk exhibits a statistically significant direct relationship with bank profitability. Furthermore, bank size does not significantly moderate the relationship between either risk indicator and profitability.

From an economic perspective, these non-significant risk estimates do not imply that credit or liquidity risks are irrelevant to bank profitability. Instead, they can be plausibly interpreted within the specific macroeconomic and regulatory context of the 2020-2024 observation period. During this post-COVID-19, temporary regulatory interventions, most notably the Financial Services Authority (OJK) credit restructuring policy, along with broader macroprudential support, provided an extraordinary stabilizing framework for the banking sector. Contextually, these regulatory measures likely cushioned banks financial statement from the immediate earnings shocks typically associated with elevated Non-Performing Loans, thereby dampening the statistically observable relationship between traditional risk indicators and profitability without implying a direct causal evaluation of the policy itself. Theoretically, this study contributes to signaling theory and risk management by suggesting that during periods of extensive regulatory forbearance, the informational signaling capacity of conventional risk ratios may become homogeneous, thereby limiting their effectiveness in differentiating bank profitability across varying institutional asset sizes.

5.2 Recommendations

Based on the findings and existing limitations, several practical recommendations are proposed for various stakeholders. For banking practitioners and management, the top priority should be directed toward improving structural efficiency, adopting digital technology, and optimizing business scale to maximize economies of scale, while maintaining an independent risk mitigation framework without relying solely on asset size. For financial regulators such as the OJK and Bank Indonesia, it is important to continue monitoring the structural impact of the end of post-pandemic relaxation policies and to encourage banks to strengthen their credit assessment standards organically. Meanwhile, for investors and the general public, the evaluation of Indonesian banking stocks should focus more on total asset growth, cost efficiency, and structural economies of scale, rather than relying solely on short-term fluctuations in NPL or LDR ratios, which were heavily influenced by regulatory relaxation policies during the recovery period.

6. Limitations and Future Research

This study is limited by the number of independent variables used, meaning it cannot comprehensively describe all factors affecting banking profitability. Given these limitations, future researchers are encouraged to include additional explanatory factors, both internal and external. This aims to provide a broader and more in-depth picture and to improve the explanatory power (R-Square) of research models regarding the factors affecting bank profitability.

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