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The Effect of Bank Liquidity Creation and Bank Funding Diversity on Non-Performing Loan with Bank Size as Moderating Variable

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Abstract
This study aims to analyze the effect of Bank Liquidity Creation (BLC) and Bank Funding Diversity (BFD) on Non-Performing Loans (NPLs), as well as the moderating role of Bank Size in strengthening or weakening these relationships. The research uses a quantitative approach with secondary data obtained from the financial statements of national private commercial banks in Indonesia for the 2022–2024 period. The sample was selected using a purposive sampling method, resulting in 58 banking units observed over three years. The dependent variable in this study is Non-Performing Loans, while the independent variables consist of Bank Liquidity Creation and Bank Funding Diversity, with Bank Size serving as the moderating variable. Data were analyzed using panel data regression with the assistance of EViews 12 and the Random Effect Model (REM) was identified as the most appropriate model. The results show that Bank Liquidity Creation has a positive but insignificant effect on NPLs, while Bank Funding Diversity has a negative and significant effect on NPLs. Bank Size is found to have a positive but insignificant direct effect on NPLs. Bank Size does not significantly moderate the relationship between Liquidity Creation and NPLs, but it significantly strengthens the negative effect of Funding Diversity on NPLs. These findings highlight the importance of diversified funding structures and effective risk management practices in reducing credit risk within the Indonesian banking sector.

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PENDAHULUAN

The Indonesian banking industry has experienced significant growth and transformation in recent years, driven by economic expansion, digitalization of financial services, and increasing public demand for accessible credit facilities (OJK, 2024). As a core component of the national financial system, the banking sector plays an essential role in mobilizing funds, facilitating economic activities, and maintaining financial stability. However, these advancements also bring challenges, particularly related to credit risk, which remains a persistent concern for banks. One of the key indicators used to evaluate credit risk is the Non-Performing Loan (NPL) ratio, which reflects the quality of a bank's credit portfolio. An elevated NPL level can weaken bank profitability, disrupt liquidity, and potentially threaten systemic stability.

Within the framework of financial intermediation theory, liquidity creation is a central function of banking institutions. Banks transform liquid liabilities into illiquid assets by extending credit, thereby supporting economic activity. According to Berger and Bouwman (2009), effective liquidity creation strengthens a bank's intermediation role. Nevertheless, if liquidity creation is conducted aggressively without adequate risk assessment, it may increase exposure to credit default. This makes the relationship between Bank Liquidity Creation (BLC) and NPL particularly relevant in understanding bank risk-taking behavior, especially during periods of economic volatility.

Another factor that influences credit quality is the structure of a bank's funding. Bank Funding Diversity (BFD) describes the extent to which a bank relies on multiple and varied sources of funding rather than concentrating on a single type. Previous studies, such as Doumpos et al. (2016) and Duong et al. (2022), emphasize that a more diversified funding structure enhances financial resilience by reducing exposure to liquidity shocks. Banks with diversified funding sources are better positioned to allocate credit selectively and sustain stable operations, which can ultimately reduce credit risk. However, funding diversification can also introduce complexity in liquidity management, particularly when market conditions become uncertain.

Bank Size is another key determinant that may influence the relationship between liquidity creation, funding structure, and credit risk. Larger banks typically possess stronger capital buffers, broader funding access, and more advanced risk management systems. Despite these advantages, literature also suggests that large banks may engage in more aggressive lending strategies, motivated by growth targets and market competition (Kapoor & Peia, 2021). Such expansion may increase the potential for deteriorating credit quality if risk governance is not sufficiently robust. Therefore, bank size may either strengthen or weaken the effects of BLC and BFD on NPLs, making it an important moderating variable to investigate.

Considering these theoretical perspectives and empirical developments, this study examines the effect of Bank Liquidity Creation and Bank Funding Diversity on Non-Performing Loans, with Bank Size serving as a moderating variable. The study focuses on national private commercial banks in Indonesia during the period 2020–2022, a period marked by economic uncertainty following the COVID-19 pandemic and shifts in banking behavior. This research aims to provide empirical evidence on how internal bank factors interact to influence credit risk and to contribute to the broader understanding of financial intermediation dynamics in emerging markets.

The findings of this research are expected to offer theoretical contributions by enriching literature on liquidity creation, funding structure, and credit risk, as well as practical insights for banks and regulators in formulating risk-management strategies that promote sustainable and resilient banking practices.

Income Anticipation Theory

The Income Anticipation Theory introduced by Libby (1979), explains that banks evaluate a borrower's repayment ability based on their expected future income. The theory emphasizes that forecasting a debtor's cash inflows is essential for assessing creditworthiness and predicting potential default risk. This theory is directly related to

Non-Performing Loans (NPLs) because accurate assessment of a borrower's anticipated income enables banks to identify clients with a high default probability, thereby reducing the likelihood of loans becoming non-performing. This aligns with regulatory guidance from the OJK (2023), which states that maintaining NPLs below 5% reflects healthy credit quality.

This theory is relevant because the study analyzes how Bank Liquidity Creation, Bank Funding Diversity, and Bank Size influence NPLs. These variables all relate to how effectively banks manage and evaluate credit risk. Income Anticipation Theory provides the conceptual foundation for explaining why proper assessment of borrowers' income capacity is essential for preventing increases in NPLs and ensuring sound lending practices.

Shiftability Theory of Liquidity

The Financial Stability Theory, introduced by Allen & Gale (2004), explains that the financial system's stability relies heavily on the ability of banks to manage liquidity creation and allocate risks efficiently. The theory emphasizes that an imbalance between liquidity risk and credit risk can trigger financial instability, especially in imperfect market conditions. Thus, decisions related to liquidity creation play a central role in determining the resilience of the banking sector and the broader financial system. This theory is strongly linked to Non-Performing Loans (NPLs). As noted by Khairi et al. (2021), excessive liquidity creation or dependence on short-term funding structures can increase a bank's credit risk exposure. Similarly, Acharya & Naqvi (2012) showed that banks engaging in aggressive liquidity creation tend to face higher default risks, particularly during economic downturns. Vazquez & Federico (2015) further highlighted that financial stability depends on both the structure of bank funding and the effectiveness of credit risk management mechanisms. The theory aligns with regulatory standards set by the OJK (2023), which consider an NPL ratio below 5% to be healthy. Maintaining this threshold reflects the core principle of the Financial Stability Theory—that banks must balance liquidity creation with asset quality to prevent systemic risk.

When liquidity creation supports lending without compromising credit quality, financial stability is preserved. However, if liquidity creation leads to NPL levels exceeding the 5% threshold, it indicates a breakdown in the balance between credit expansion and risk control. Thıs theory underpins the relationship between Bank Liquidity Creation, Bank Funding Diversity, Bank Size, and NPLs, reinforcing the idea that financial stability relies on how well banks manage liquidity and credit risks simultaneously.

Non-Performing Loans

Non-Performing Loans (NPLs) refer to loans in which borrowers fail to meet theirpayment obligations, indicating deterioration in the bank's credit portfolio quality (Kumar Sarker, 2019). As a key indicator of credit risk, NPLs reflect a bank's financial soundness and its ability to manage lending activities effectively (Carannante et al., 2024). High NPL ratios reduce profitability, limit lending capacity, and may hinder economic growth because banks tend to adopt more conservative lending policies when credit quality declines (Okyere & Mensah, 2022).

In this study, NPLs serve as the dependent variable and are measured using the following formula:

$$\textbf{NPL RATIO} = \frac{\textit{Total NPL}}{\textit{Total Loans}} \times \textbf{100}$$

A higher NPL ratio signals increased credit risk and potential financial instability (Park & Shin, 2021). Understanding the factors influencing NPLs particularly Bank Liquidity Creation and Bank Funding Diversity, along with the moderating role of Bank Size provides valuable insights for strengthening credit risk management and maintaining banking sector stability.

Bank Liquidity Creation

Bank liquidity creation refers to the capacity of banks to convert liquid assets into less liquid loans to effectively satisfy consumer requirements (Kapoor & Peia, 2021). This concept aligns with the Shiftability Theory of Liquidity, which argues that banks should hold assets readily convertible to cash so they may meet liquidity needs without compromising operational effectiveness. As one of the primary banking functions, liquidity creation plays a vital role in driving economic growth by generating liquid assets for borrowers and liquid liabilities for depositors. Through this process, banks bridge liquidity gaps between savers and borrowers, carrying out their intermediary function (Beck et al., 2023).

Bank liquidity creation is commonly measured using a ratio that represents the percentage of liquid assets transformed into loans (Berger & Bouwman, 2009). A higher ratio indicates greater liquidity transformation, which can increase loan availability but also raise credit risk if risk controls are inadequate. The formula is expressed as:

LC = [½ × (illiquid asset + liquid liability + illiquid OBS) + 0 × (semiliquid asset + semiliquid **liability + semiliquid OBS) – ½ × (liquid asset + illiquid liability + liquid OBS)] / total asset**

Although liquidity creation enables banks to meet customer needs and perform their intermediary role, excessive liquidity creation, particularly through high-risk lending can heighten credit risk (Umar et al., 2017). Examining the relationship between Bank Liquidity Creation and Non-Performing Loans provides deeper insight into credit risk management and highlights the need to maintain balance between liquidity provision and financial stability.

Bank Funding Diversity

Bank funding diversification refers to the process by which banks obtain funding from various source such as deposits, bonds, and interbank loans allowing them to reduce dependence on a single funding channel and enhance liquidity management (Vazquez & Federico, 2015). By distributing risk across multiple sources, diversified funding provides a more stable financial foundation that supports banks even in volatile market conditions (Xie et al., 2022).

Funding diversification is essential for maintaining financial health because it reduces the danger of overreliance on one funding source and strengthens banks' ability to absorb liquidity shocks. Banks with diverse financing sources are better able to manage resources, ensure consistent liquidity, and lower the risk of Non-Performing Loans (NPLs), making diversification a crucial tool for credit risk control (Holmström & Tirole, 2000).

The degree of diversification is commonly measured using the Herfindahl-Hirschman Index (HHI):

$$\text{HHI} = \sum_{i=1}^{n} (\text{Funding Share}_i)^2$$

Higher HHI values indicate less diversity and greater concentration. Bank funding diversification (X2) is expected to have a negative effect on non-performing loans (Y), as diversified funding supports stable liquidity and reduces borrowers' default risk (Imbierowicz & Rauch, 2014). Bank Size (M) further strengthens this effect, as larger banks having greater resources and wider funding access can enhance the stabilizing benefits of diversification.

Overall, funding diversification plays a crucial role in strengthening banking stability by mitigating credit risk, maintaining liquidity, and reducing exposure to market volatility.

Bank Size

Bank size refers to the scale of a bank's operations, commonly measured by total assets, total deposits, or market share, reflecting its capacity to manage liquidity, mitigate credit risk, and operate efficiently. Larger banks generally handle credit and market risks more

effectively due to greater resources, diversified income streams, and access to financial instruments (Laeven et al., 2016). In this study, bank size is measured using:

$$\boldsymbol{Bank\ Size = In\ (Total\ Assets)}$$

Bank size plays an important role in financial risk management because economies of scale allow large banks to reduce operating costs, maintain strong credit portfolios, and access broader funding sources (Dwinanda & Sulistyowati, 2021). These advantages make them more resilient to loan defaults and economic shocks, supporting long-term financial stability.

As a moderating variable, bank size influences the relationship between bank liquidity creation (X2) and bank funding diversification (X1) with non-performing loans (Y). Larger banks can manage diverse funding portfolios more effectively, reducing liquidity risks linked to concentrated funding sources. They also control the risks associated with liquidity creation through advanced risk assessment tools and stricter lending procedures.

Thus, bank size strengthens the stabilizing effects of funding diversification and mitigates the potential risks of liquidity creation, ultimately contributing to lower NPLs and improved financial stability (Laeven et al., 2016; Damayanti et al., 2022).

METHOD

Operational Definitions and Variable Measurements

Three different types of variables were used in this study: dependent, independent, and moderating variables. Non-Performing Loans are the dependent variable, and Bank Funding Diversification and Bank Liquidity Creation are independent variable. Bank size is one of the moderating variable. The population of this study consists of State Owned Bank & National Private Commercial Banks in Indonesia that are actively participacing in the Otoritas Jasa Keuangan (OJK) and have consistently produced yearly financial reports in the 2022–2024 period.

Population and Sample

The focus of this research is on State Owned Bank & National Private Commercial Banks in Indonesia that are actively participacing in the Otoritas Jasa Keuangan (OJK) and have consistently produced yearly financial reports in the 2022–2024 period. With a population of 72 banks and a sample of 58 banks. In addition, in determining samples using purposive sampling is a method of selecting samples based on certain criteria that are relevant to the purpose of the research. The criteria that are the basis for sampling consist of:

- Total of bank in Indonesia used for this research (State Owned Bank & National Private Commercial Banks)
- Banks that doesn't use Sharia principles because of differences in their financing principles
- Banks that show extreme outliers in the main variables (e.g., NPL >9% which can interface with statistical validity)

Data Types and Sources

The quantitative data used in this research comes from annual banking financial reports publiced by the Financial Services Authority (OJK) from 2022 to 2024. The information for this era comes from the official website of the Financial Services Authority (OJK), namely www.ojk.go.id.

Method of Collecting Data

This research will use a documentation approach that includes total assets, non-performing loans, liquidity ratios, and funding sources in the financial and historical data of the companies used to collect data for this research. In addition, supporting information is collected using literature analysis, namely by looking at previous studies that are relevant to this research.

Data Analysis Technique, Model Equation and Hypothesis Testing

This study uses quantitative-based analysis techniques using analysis techniques through statistical approaches and assisted by software data analysis techniques used by the author in this study, namely panel data regression analysis techniques and hypothesis testing.

Panel Data Regression

Panel data regression is a collection of data that is cross-time (time series) and cross-individual data (cross section). There are three model approaches in panel data regression, namely (1) Common Effect Model (CEM), (2) Fixed Effect Model (FEM), and (3) Random Effect Model (REM) and in the three panel data models above are tested with the Chow test and the Hausman test.

Equation Model

The equation model used in this study is sourced from as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \ldots + \beta_n X_n + e$$

Then the model is reduced to the following equation model:

$$NPLs = \alpha + \beta_{1B} LC_{i,t} + \beta_2 BFD_{i,t} + \beta_3 SIZE_{i,t} + \beta_{4B} LC_{i,t} * SIZE_{i,t} + \beta_5 BFD_{i,t} * SIZE_{i,t} + e \ldots\ldots\ldots \quad 3.2$$

Hypothesis Testing

This hypothesis is tested by the F and T tests. In statistical testing F shows that all the independent variables included in the model have an influence on the dependent variables at the same time. Assuming that the other independent variables are constant, which in statistical testing t presents the impact of the independent variable on the dependent variable. In the study conducted by the author, the significant level set was 5% (0.05). A value that refers to (sig.) < 0.05 will be considered as H1 is accepted, meaning that there is an influence between independent and dependent variables, while if it is known that the value refers to (sig.) > 0.05 then H0 is accepted, meaning that there is no influence between independent variables and dependent variables.

RESULT AND DISCUSSION

Statistics Descriptive

Table 1. Descriptive Statistic

	LC	HHI	NPL	SIZE	LCSIZE	HHISIZE
Mean	1.56E+09	3359.727	2.296228	17.60940	2.55E+10	59280.13
Median	9600632.	1128.673	1.990000	17.07317	1.63E+08	21046.18
Maximum	2.43E+11	7831.737	9.560000	21.35311	3.93E+12	167232.0
Minimum	-1702039.	1118.771	0.004700	15.01354	-29998788	16796.72
Std. Dev.	1.89E+10	3171.818	1.690292	1.514422	3.06E+11	56492.70
Observation	165	165	165	165	165	165

Descriptive statistics are used to see an overview of the data being analyzed, including the amount of data, maximum value, minimum value, mean value, and standard deviation of each variable. The results of the above descriptive statistics indicate the value of Non-Performing Loan (NPLs) variable has a mean of 2.29% with a standard deviation of 1.69%, a skewness of 1.65, and kurtosis of 7.32, indicating positive skewness and a leptokurtic distribution. Bank Liquidity Creation (BLC) variable has a mean of 1.56E+09 and a high standard deviation of 1.89E+10, with a skewness of 12.73 and kurtosis of 162.97, showing a highly non-normal distribution with extreme outliers. Bank Funding Diversity variable (HHI) shows a mean of 3359.73, a standard deviation of 3171.82, skewness of 0.71, and kurtosis of 1.5, indicating slight right skewness and a relatively flat curve. Bank Size (SIZE) variable has a mean of 17.61, standard deviation of 1.51, skewness of 0.72, and kurtosis of 2.79, suggesting a near-normal distribution. For the moderating variables, LCSIZE

shows extreme characteristics similar to LC, with skewness of 12.72 and kurtosis of 162.94, while HHISIZE has skewness of 0.74 and kurtosis of 1.51.

Model Selection

Table 2. Result of Chow Test

Redundant Fixed Effects Tests

Test cross-section fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.453889	(59,115)	0.0000
Cross-section Chi-square	240.209314	59	0.0000

Table 3. Result of Hausman Test

Correlated Random Effects - Hausman Test

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.389094	5	0.9956

Classic Assumption Test

Table 4. Result of Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	2.367658	138.4504	NA
LC	4.84E-23	1.014215	1.007356
HHI	1.72E-09	2.136269	1.003490
SIZE	0.007539	137.7018	1.004901

Table 5. Result of Heteroscedasity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	0.757173	Prob. F (3,161)	0.5197
Obs*R-squared	2.295566	Prob. Chi-Square (3)	0.5134
Scaled explained SS	7.254071	Prob. Chi-Square (3)	0.0642

Regression Results and Hypothesis Testing

Table 6. Hasil Analisis Regresi Data Panel

Bound Variables	Independent Variables	Coefficient	t-Statistic	Prob.	Sign	Description
NPL	C	1.210593	0.331143	0.7720	(+)	Non Sig
	LC	5.08E-09	1.548518	0.2616	(+)	Non Sig
	HHI	-0.000547	-10.88511	0.0083	(-)	Sig
	SIZE	0.086732	0.440229	0.7028	(+)	Non Sig
	LCSIZE	-3.14E-10	-1.548929	0.2615	(-)	Non Sig
	HHISIZE	2.53E-05	11.13710	0.0080	(+)	Sig
R-squared		0.748371				
Adjusted R-squared		0.608335				
F-statistic		5.344107				
Prob. (F-Statistic)		0.000000				

Using the Random Effect Model (REM), this study examines the effect of bank liquidity creation (BLC), bank funding diversity (BFD), and bank size (SIZE) as a moderating variable on non-performing loans (NPLs).Bank Liquidity Creation (BLC) has a regression coefficient of -0.171137 with a probability value of 0.0157, indicating a significant negative effect on

NPLs. This shows that higher BLC reduces non-performing loans. Bank Funding Diversity (BFD) has a regression coefficient of -0.000551 and a probability of 0.7345, meaning it has a negative but insignificant effect on NPLs. Bank Size (SIZE) shows a regression coefficient of -1.308654 with a probability of 0.0000, indicating a highly significant negative effect on NPLs. The interaction LC*SIZE has a coefficient of 0.030689 with a probability of 0.0000, showing that bank size weakens the negative effect of BLC on NPLs. The interaction BFD*SIZE has a coefficient of -0.007764 with a probability of 0.0000, indicating that bank size strengthens the negative effect of BFD in reducing NPLs. The model has an R-squared of 0.413655, meaning 41.37% of NPL variation is explained by the variables. The F-statistic of 36.23761 (p = 0.000000) confirms the model is statistically significant. The results of the calculation through regression testing, the research model is as follows:

NPL = 1.210593 + 5.08E-09LC + -0.000547HHI + 0.086732SIZE + -3.14E-10LCSIZE + 2.53E-05HHISIZE + e

So that with this a hypothesis testing table is obtained as follows:

Table 7. Hypothesis Testing

Hypothesis	Statement	Result
Hypothesis 1	Bank Liquidity Creation (X1) has a negative effect on Non-Performing Loans (Y)	Rejected
Hypothesis 2	Bank Funding Diversification (X2) has a negative but insignificant effect on Non-Performing Loans	Accepted
Hypothesis 3	Bank Size (M) has a positive effect on Non-Performing Loans (Y)	Rejected
Hypothesis 4	Bank Size (M) weakens the negative effect of Bank Liquidity Creation (X1) on Non-perfoming Loans (Y)	Rejected
Hypothesis 5	Bank Size (M) strengthens the negative effect of Bank Funding Diversification (X2) on Non-Performing Loans (Y)	Accepted

Discussion

Effect of Bank Liquidity Creation to Non-Performing Loans

The hypothesis is rejected because, based on the regression data, the probability value (0.2616) is above the 5% significance level meaning the relationship is statistically insignificant. The regression results show that Bank Liquidity Creation (BLC) has a negative coefficient but is not statistically significant toward Non-Performing Loans (NPLs). Based on these findings, banks are advised to strengthen their credit risk management framework before aggressively converting liquidity into credit expansion. Liquidity creation should not be seen merely as an opportunity to extend more loans, but it must be accompanied by selective lending and strict monitoring of high-risk sectors.

Compared with previous studies Davydov et al. (2021), which suggested that efficient liquidity creation should lower credit risk, the findings of this research are not fully aligned. Instead, they reflect that liquidity creation in Indonesian banks during 2020–2022 has not directly contributed to improving credit quality. Vuong et al. (2023) found that bank liquidity creation has a significant negative relationship with NPLs, meaning that the greater the bank's ability to create liquidity, the lower the level of problem loans. However, this result is more dominant in countries with stable banking systems. Conversely, Widarjono and Rudatin (2021) discovered that excessive liquidity creation without adequate risk management may increase financing risk. These studies highlight that the effect of BLC on NPLs is not universal, but rather contingent on context and the quality of risk management practices.

The rejection of the hypothesis in this study can also be explained through theoretical perspectives. Income Anticipation Theory (Libby, 1979) states that banks should assess borrowers' repayment ability based on projected future income in order to reduce credit risk. However, during the 2022–2024 period, persistent economic uncertainty particularly due to post-pandemic recovery and macroeconomic fluctuations made it difficult to accurately predict borrowers' income. This condition limited banks' ability to apply income

anticipation effectively, so that even though liquidity creation occurred, credit quality did not automatically improve. This is consistent with the findings of this study, which show that BLC has a negative coefficient but is statistically insignificant toward NPLs. Meanwhile, the Shiftability Theory of Liquidity (Allen & Gale, 2004) emphasizes the importance of asset flexibility in responding to liquidity pressures. In practice, Indonesian banks during the research period tended to adopt a cautious stance by maintaining liquidity reserves for stability rather than channeling them aggressively into productive credit. This explains why the coefficient of BLC in this study is negative but insignificant because the liquidity created was not sufficiently accompanied by effective credit allocation to improve asset quality. Thus, the findings support the theoretical view that liquidity creation without balanced asset management does not automatically reduce NPLs.

Effect of Bank Funding Diversity to Non-Performing Loans

The hypothesis is accepted because the regression coefficient for BFD is negative (-0.000547) and statistically significant with a probability value of 0.0083 (below the 5% significance level). The regression results indicate that Bank Funding Diversity (BFD) has a significant postive effect on Non-Performing Loans (NPLs). This means that the more diversified a bank's funding sources are, the lower its potential credit risk. This finding is consistent with the hypothesis (H2), which posited that funding diversification reduces NPLs. By utilizing a mix of instruments such as demand deposits, savings, time deposits, bonds, and interbank loans, banks can maintain liquidity flexibility and reduce credit risk exposure. The data show that banks with more complex and diversified funding structures tend to have lower NPL ratios, as they are better able to adjust their lending strategies to market changes which found that banks with more diversified funding structures maintain more stable asset quality compared to those heavily dependent on a single funding sources.

Compared with previous studies Duong et al. (2022), which emphasized that more diversified funding structures enhance banks' resilience to liquidity pressures, allowing them to allocate credit more selectively. Therefore, the results confirm the proposed hypothesis and are consistent with prior empirical evidence. The findings of this study are consistent with previous research. Duong et al. (2022) emphasized that funding diversification enhances banks' resilience to liquidity pressures, enabling them to maintain greater financial stability. Similarly, Vuong et al. (2023) found that funding diversification significantly reduces NPLs when properly managed. These studies reinforce the idea that more diversified funding not only provides liquidity flexibility but also contributes to improving banks' asset quality.

From a theoretical perspective, the results are also aligned with the Income Anticipation Theory (Libby, 1979), which explains that diversified funding allows banks to be more selective in assessing borrowers' repayment capacity. With stable sources of funds, banks are not forced to extend credit to high-risk segments, thereby reducing the likelihood of problem loans. Furthermore, the Shiftability Theory of Liquidity (Allen & Gale, 2004) highlights the importance of asset and liquidity flexibility. Funding diversification strengthens this flexibility by reducing dependence on a single funding source, making it easier for banks to maintain credit quality under liquidity pressures. Therefore, the acceptance of the hypothesis in this study confirms that funding diversification is an effective strategy to strengthen banking stability and reduce NPLs in Indonesia during the 2022–2024 period.

Bank Size Has Positive Effect on Non-Performing Loans

The hypothesis is rejected because the regression results indicate an insignificant relationship. The regression results show that the Bank Size (SIZE) variable has a coefficient of 0.086732 with a probability of 0.7028. The direction indicates that larger banks tend to have a higher likelihood of Non-Performing Loans (NPLs). But, since the probability value exceeds the 5% significance level, this relationship is not statistically significant. Therefore, the initial hypothesis (H3), which stated that bank size has a positive effect on NPLs, is rejected.

Compared with previous studies Kapoor & Peia (2021) found that aggressive credit expansion by larger banks could increase NPLs. Similarly, Wu et al. (2024) emphasized that larger bank size entails a higher risk of problem loans if not supported by strong risk governance. However, the present study shows that although the coefficient of bank size is positive, its effect on NPLs is not statistically significant. This suggests that large banks in Indonesia are able to mitigate the potential increase in credit risk through stronger internal governance and diversified loan portfolios.

From a theoretical perspective, this result can be explained by the Income Anticipation Theory (Libby, 1979), which states that larger banks, equipped with greater resources, are able to conduct more accurate projections of borrowers' future income. This capability helps suppress NPL risk even when credit expansion takes place. In addition, consistent with the Shiftability Theory of Liquidity (Allen & Gale, 2004), larger banks also have greater liquidity flexibility due to more diverse and liquid assets. This enables them to maintain credit quality even under liquidity pressures. Therefore, while previous studies and theoretical frameworks suggest that larger banks may face higher risks of NPLs, the findings of this study indicate that internal factors such as risk governance, diversification, and liquidity flexibility have offset those potential risks.

Effect of Bank Size to Bank Liquidity Creation and Non-Performing Loans

The hypothesis is rejected because the probability value of 0.2615 exceeds the 5% significance level. The regression results show that the interaction variable between Bank Liquidity Creation and Bank Size (LCSIZE) has a negative coefficient of –3.14E-10 with a probability value of 0.2615 (> 0.05). This indicates that directionally, larger banks tend to weaken the effect of Bank Liquidity Creation on Non-Performing Loans (NPLs). However, the effect is not statistically significant. The hypothesis stating that Bank Size weakens the effect of Bank Liquidity Creation on NPLs is rejected. This finding is not fully consistent with previous studies, such as Kapoor & Peia (2021), which argued that larger banks, due to stronger risk management systems, should be able to better control liquidity expansion and thereby mitigate credit risk.

Compared with previous studies Vuong et al. (2023) found that the interaction between bank size and liquidity strategies significantly affects asset quality, with larger banks being more stable in managing NPLs. Similarly, Widarjono & Rudatin (2021) showed that the effect of BLC on credit risk is influenced by banks' management capacity, where bank size can either strengthen or weaken the effect depending on the context. However, this study reveals that the moderating role of bank size on the relationship between BLC and NPLs is not statistically significant.

From a theoretical, this result can be explained by the Income Anticipation Theory (Libby, 1979). Larger banks, equipped with stronger analytical resources, should theoretically be able to more accurately predict borrowers' repayment capacity, thereby moderating the impact of BLC on NPLs. Yet, due to economic uncertainty during 2022–2024, this moderating role was not significant. Furthermore, with the Shiftability Theory of Liquidity (Allen & Gale, 2004), bigger banks with more diverse assets are expected to have greater flexibility in channeling liquidity effectively. However, in practice, Indonesian banks tended to use this flexibility primarily for internal stability rather than for improving credit quality, which weakened the moderating effect. Therefore, although both theory and prior studies support the existence of such moderation, the findings of this research highlight that contextual conditions in Indonesia made the relationship statistically insignificant.

Effect of Bank Size to Bank Funding Diversity and Non-Performing Loans

The hypothesis is accepted because the probability value of 0.0080 is below the 5% significance threshold, confirming statistical significance. The regression results show that the interaction variable between Bank Funding Diversification and Bank Size (HHISIZE) has a positive coefficient of 2.53E-05 with a probability value of 0.0080 (< 0.05), indicating statistical significance at the 5% level. This means that bank size strengthens the effect of funding diversification on Non-Performing Loans (NPLs). The larger the bank, the stronger

the role of funding diversification in reducing credit risk. This finding supports the proposed hypothesis (H5) and is consistent with prior studies that highlight how larger banks, with more diverse funding sources, are better equipped to maintain credit quality.

Based on these results, large banks are encouraged to continue expanding their funding diversification strategies to ensure credit stability. Diversification should be seen as a key tool for mitigating credit risk, especially under conditions of economic uncertainty.

The findings of this study are supported by prior research. Duong et al. (2022) demonstrated that funding diversification strengthens banks' resilience to liquidity pressures. Furthermore, Vuong et al. (2023) emphasized that funding diversification is more effective in reducing NPLs in larger banks due to their stronger risk management capacity. This is consistent with the results of this study, which show that bank size strengthens the positive effect of funding diversification in lowering credit risk.

From a theoretical perspective, the results are aligned with the Income Anticipation Theory (Libby, 1979), which states that larger banks can morecarefully evaluate borrowers repayment capacity since they have access to a wider ranger of funding sources, making funding diversification more effective in reducing NPLs. In addition, the Shiftability Theory of Liquidity (Allen & Gale, 2004) is also relevant, as larger banks with more diversified assets enjoy greater liquidity flexibility. Funding diversification further enhances this flexibility, enabling larger banks to better maintain credit quality even under liquidity pressures. Therefore, the acceptance of the hypothesis in this study indicates that bank size plays a crucial role in optimizing the benefits of funding diversification for asset quality stability.

CONCLUSIONS

Based on the results of the panel data analysis and the discussion that has been described in the previous chapter, the following conclusions can be drawn:

1) Bank Liquidity Creation (BLC) shows a positive effect on Non-Performing Loans (NPLs). This result indicates that an increase in liquidity creation reduce credit risk, it significantly increase it. The finding suggests that banks tend to maintain liquidity reserves for operational stability rather than channeling them directly into credit expansion. This contradicts the initial hypothesis, which expected a negative effect, and diverges from previous studies that highlighted the role of liquidity creation in lowering credit risk.
2) Bank Funding Diversification (BFD) has a positive effect on NPLs. This implies that the more diversified a bank's funding structure, the lower its level of credit risk. The result confirms the initial hypothesis and aligns with previous studies emphasizing that funding diversification enhances resilience against liquidity pressures and improves credit selectivity.
3) Bank Size shows a negative effect on NPLs. Although larger banks have greater lending capacity, the findings reveal that bank size alone does not significantly determine the level of credit risk. Both large and small banks face similar challenges in managing NPLs, depending more on internal management quality and risk governance than on total assets.
4) The interaction between Bank Size and BLC produces a negative effect on NPLs. This means that bank size does not significantly moderate the relationship between liquidity creation and credit risk.
5) Bank Size positive moderates the relationship between BFD and NPLs. This indicates that in larger banks, higher funding diversification is correlated with an increase in NPLs.

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