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Credit risk and liquidity risk with firm size as moderator variable on profitability in state-owned banking

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ABSTRACT
This study aims to examine the effect of credit risk and liquidity risk on profitability, with firm size as a moderating variable, in state-owned banks listed on the Indonesia Stock Exchange during the 2015–2024 period. The objective of this study is explicitly to analyze both the direct effects of financial risks and the moderating role of firm size in influencing bank profitability, providing a more comprehensive understanding of banking performance. The study provides a comprehensive understanding of how firm-specific characteristics influence the relationship between financial risks and profitability. Grounded in Agency Theory, this study emphasizes that information asymmetry between principals and agents can lead to inefficient risk-taking decisions, where credit risk (proxied by Non-Performing Loans/NPL) and liquidity risk (proxied by Loan to Deposit Ratio/LDR) directly affect profitability (measured by Return on Assets/ROA) through increased costs and reduced financial efficiency. Firm size, measured as the natural logarithm of total assets, is expected to moderate these relationships because larger banks generally possess stronger asset structures, better governance mechanisms, and greater risk absorption capacity. A quantitative approach was employed using secondary data from the annual reports of four state-owned banks over a ten-year period, specifically covering the 2015–2024 observation years, resulting in 40 observations, and analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS version 4.1.1.6. The findings indicate that credit risk and liquidity risk have a significant negative effect on profitability, while firm size significantly weakens this negative impact, demonstrating a quasi-moderating role. This indicates that firm size acts as a buffering variable that reduces the intensity of risk effects rather than eliminating them entirely, highlighting its strategic importance in banking stability. The study contributes both theoretically and practically by strengthening the application of Agency Theory in explaining risk–profitability relationships and by providing empirical evidence on the moderating role of firm size in state-owned banks in Indonesia, which remains relatively underexplored in prior research.

Keywords: Credit risk, liquidity risk, firm size, profitability, agency theory.

1. Introduction

The banking sector plays a crucial role in a nation's economic development, acting as an intermediary by collecting funds from the public and providing them as credit to businesses and individuals [1]. State-owned banks, in particular, have a strategic role because they are under government supervision and contribute significantly to maintaining financial stability [2]. The performance of banks in executing this intermediary function is often measured by profitability, a key indicator of a bank's health and operational effectiveness. Profitability also reflects how efficiently banks manage their assets and risks, especially in balancing lending activities and liquidity needs. Stable profitability is essential because it determines the bank's ability to survive during economic uncertainty and financial shocks.

Table 1. Return on Asset

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
BRI	4,19	3,84	3,69	3,68	3,5	1,98	2,72	3,76	3,93	3,76
BNI	2,7	2,6	2,7	2,8	2,4	0,5	1,4	2,5	2,6	2,5
BTN	1,61	1,76	1,71	1,34	0,13	0,69	0,81	1,02	1,07	0,83
MANDIRI	3,15	1,95	2,72	3,17	3,03	1,64	2,53	3,3	4,03	3,59

Source: Annual Report of State-Owned Banking Companies 2015-2024

As shown in Table 1, profitability has fluctuated significantly over the past decade. In particular, decreases were observed in 2016, 2019, 2020, and 2024, which indicate that banks face ongoing challenges that may lead to liquidity shortages or higher credit risks [3] [4]. These fluctuations underline the importance of risk management, specifically credit risk and liquidity risk, in influencing profitability. Empirical findings show that increases in credit risk can significantly reduce profitability, where one study reported a negative coefficient of -0.131352, indicating that higher risk directly lowers ROA [5]. This decline occurs because banks must allocate higher reserves for bad loans, reducing income and weakening overall financial performance.

According to Agency Theory, conflicts of interest between principals (shareholders) and agents (management) can create moral hazards and adverse selection, affecting corporate financial decisions [6]. In banking, the management of credit and liquidity risks reflects management's responsibility to the shareholders. Proper risk management ensures that management can optimize the use of bank assets to maximize profitability [7]. Empirical evidence supports this theory by showing that inefficient risk management leads to poor financial outcomes, especially when credit risk is not properly controlled, resulting in declining profitability and increased financial pressure [5]. Effective governance therefore becomes essential to ensure that risk-taking behavior remains within acceptable limits and aligns with shareholder interests.

Credit risk is defined as the potential loss due to a borrower's failure to repay a loan or meet contractual obligations. It is commonly measured by Non-Performing Loans (NPLs), with Indonesian banking regulations limiting NPLs to a maximum of 5% [8]. High NPLs indicate poor credit management, which can reduce profitability. Empirical studies confirm that higher NPL levels negatively affect profitability because they increase loan loss provisions and reduce interest income, which are the main sources of bank revenue [5], [9]. However, some findings indicate that the effect of NPL on profitability is not always significant, suggesting that banks with better credit management systems are able to control the impact of bad loans[10]. This shows that the relationship between credit risk and profitability depends on the effectiveness of risk management practices.

Liquidity risk is the potential inability of a bank to meet its short-term obligations due to cash flow mismatches or asset-liability imbalances. It is commonly measured by the Loan to Deposit Ratio (LDR), which should remain between 89% and 110% based on Bank Indonesia Regulation No. 15/15/PBI/2013 [11], [12] . Liquidity risk can arise from factors such as high customer withdrawals, reliance on short-term funding, deterioration in asset quality, and difficulty selling assets at acceptable prices [11]. Poor liquidity management can also reduce profitability. Empirical evidence shows that liquidity has a positive coefficient of 0.490090 on profitability, indicating that optimal fund allocation can increase ROA when managed efficiently[5]. However, other studies find that liquidity risk has no significant effect on profitability, which suggests that liquidity alone is not sufficient without strong operational efficiency[10]. This indicates that the impact of liquidity risk depends on how well banks manage their funding and lending strategies.

Profitability, often measured using Return on Assets (ROA), shows how efficiently a bank's management utilizes all assets to generate profits [13]. Ineffective management of credit and liquidity risks increases operating costs and diminishes earnings. Firm size, measured as the natural logarithm of total assets, can moderate the relationship between risks and profitability. Larger banks typically have more diversified assets, better risk control, and access to better funding sources, which can either strengthen or weaken the impact of risks on profitability [14]. Empirical findings show that firm size has a positive coefficient of 0.490090 on profitability, indicating that larger banks tend to have stronger financial performance due to economies of scale and better access to capital [5]. Larger banks are also more capable of absorbing financial shocks, reducing the negative impact of credit and liquidity risks on profitability [15].

Previous research supports these relationships. Studies show that credit risk negatively affects profitability [1], liquidity risk reduces profitability [16], liquidity risk reduces profitability [17], and the interaction between credit and liquidity risks influences financial performance in rural banks in Bali [18]. Research on firm size as a moderator in the coal mining sector also indicates that larger firms reduce the moderating effect of liquidity on profitability [19]. Recent studies also highlight inconsistencies in empirical findings, where credit risk consistently shows a negative effect, while liquidity risk shows both significant and insignificant relationships depending on the sample and period studied [5], [10]. These inconsistencies indicate that the relationship between risk and profitability is complex and influenced by multiple internal and external factors.

Although several studies have investigated determinants of bank profitability, evidence specific to state-owned banks in Indonesia remains limited. Previous studies reported that credit risk and liquidity negatively affect profitability in Indonesian state-owned banks, but firm size did not always significantly influence profit outcomes [20]. Other studies showed that firm size moderates the effect of non-performing loans on profitability but did not examine liquidity risk or both risks simultaneously [21]. Research focusing on Islamic banks confirms that credit and liquidity influence profitability but does not cover state-owned conventional banks [22]. Furthermore, some studies indicate that firm size moderates the effect of LDR on profitability, but a comprehensive analysis examining both major risk types in state-owned banks is scarce [23]. Empirical evidence from recent studies also shows that NPL may not always significantly affect profitability, while liquidity can have varying impacts, indicating the need for a more comprehensive model that integrates both risks and moderating variables simultaneously [10], [24]. This gap highlights the importance of examining these variables together in a single research framework.

Given the fluctuating profitability of state-owned banks, the prevalence of credit and liquidity risks, and the potential moderating effect of firm size, this topic warrants further research. Analyzing the interplay of credit risk, liquidity risk, and firm size provides insights that can guide management decisions and enhance financial stability, particularly in state-owned banks that have a critical role in national economic development. This study contributes by providing updated empirical evidence using recent data and integrating multiple risk variables with firm size as a moderating factor. The findings are expected to help bank management improve risk management strategies and support policymakers in maintaining financial system stability [5], [15].

2. Method

The research employed a quantitative approach using secondary data to examine the impact of credit and liquidity risk on profitability in state-owned banks, with firm size as a moderating variable. Purposive sampling was applied based on corporate criteria, analyzing state-owned banking firms listed on the Indonesia Stock Exchange from 2015 to 2024. A total of forty research samples were collected over ten years [25]. The sample selection focused on banks that consistently published complete financial statements, ensuring data consistency and comparability across the observation period.

To provide a clear understanding of variable measurement, the operational definitions of the variables used in this study are presented in Table 2. ensure the validity and comparability of the results.

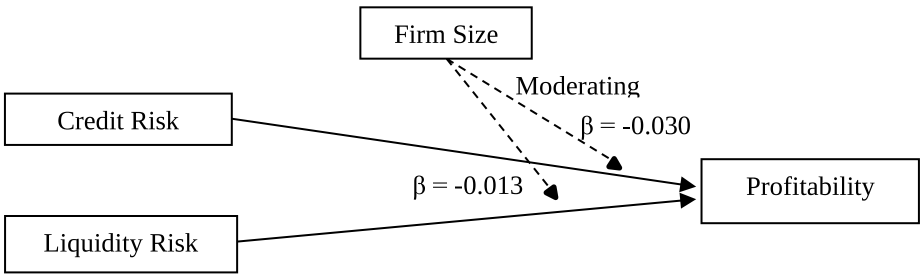
Table 2. Operational Variables

No.	Variables	Indicator	Resource
1.	Credit Risk(X_1)	NPLs = Non-Performing Loans/Total Loans	[2], [3], [4]
2.	Liquidity Risk (X_2)	LDR = Total Loans/ Total Deposits	[1], [16]
3.	Firm Size (M)	Size = Ln (Total Assets)	[19], [21]
4.	Profitability (Y)	ROA = Net Profit After Tax / Total Assets	[5], [10], [13], [17]

Source: Processed secondary data, 2025

Table 2 presents the operational definitions of the variables used in this study. Credit risk is measured using NPLs, liquidity risk using LDR, firm size using the natural logarithm of total assets, and profitability using ROA. These proxies are commonly used in banking research and ensure the validity and comparability of the results.

Furthermore, data analysis was conducted using Structural Equation Modeling via Smart Partial Least Square (SEM-PLS) version 4.1.1.6, which is considered appropriate for testing complex models involving moderating variables and latent constructs simultaneously [10]. This approach allows the estimation of both direct and interaction effects, making it suitable for analyzing the role of firm size as a moderator in the relationship between risk and profitability.



Source: Processed secondary data, 2025

Figure 1. SEM-PLS Inner Model of Credit Risk, Liquidity Risk, Firm Size, and Profitability

Figure 1 and the subsequent analysis show that Firm Size (M) moderates the relationship between Credit Risk (X1), Liquidity Risk (X2), and Profitability (Y). The inner model illustrates the structural relationships between variables, where arrows represent causal links and interaction terms indicate moderating effects, making the analysis easier to interpret visually. The path coefficients for the moderation effects are negative: -0.030 for X1×M → Y and -0.013 for X2×M → Y, with T-Statistics of 5.056 and 3.364, and P-values of 0.000 and 0.001, respectively. All statistical indicators meet the significance criteria (T-statistics > 1.96 and p-value < 0.05), confirming that the moderating effects are statistically valid. These negative coefficients indicate a weakening moderation effect, meaning that larger banks slightly reduce the negative impact of credit and liquidity risks on profitability. This finding clearly shows that firm size acts as a buffer variable rather than a strengthening factor in the relationship between risk and profitability.

In other words, while Credit Risk and Liquidity Risk negatively affect Profitability, the moderating effect of Firm Size buffers these adverse effects. This scenario is categorized as quasi-moderation, since both the direct effect of the risk variables and the moderated effect by Firm Size are statistically significant. Quasi-moderation occurs when the moderating variable has both a direct effect on the dependent variable and an interaction effect, which is evident in this study through the significant coefficients of both paths. Empirical findings indicate that credit risk has a negative coefficient (−0.131352) on profitability, while liquidity effects may vary depending on management efficiency, supporting the presence of partial moderation rather than full moderation [5], [10]. This condition indicates that firm size does not eliminate risk effects but reduces their magnitude.

From a practical perspective, larger banks tend to have more diversified portfolios, stronger risk management systems, and greater access to capital, enabling them to absorb losses arising from non-performing loans more effectively and thereby mitigating the negative impact of credit risk on profitability. Diversification of assets allows large banks to spread risk across multiple sectors, reducing dependence on a single source of income and minimizing financial shocks. In addition, larger banks are generally able to maintain sufficient cash reserves and have better access to interbank or market funding, which allows them to meet short-term obligations even during periods of liquidity stress and consequently reduce the adverse effect of liquidity risk on profitability. Empirical evidence shows that larger banks tend to achieve higher profitability due to economies of scale and more efficient financial resource allocation [15].This confirms that firm size plays a critical role in stabilizing financial performance under risk exposure conditions.

From a theoretical standpoint, these findings are aligned with Agency Theory: larger banks, due to better governance and oversight, can reduce the negative consequences of adverse selection and moral hazard associated with credit and liquidity risks. Stronger internal control systems in larger institutions improve monitoring of management decisions, thereby reducing inefficiencies and aligning managerial actions with shareholder interests [5]. This condition reinforces the argument that firm size contributes not only operationally but also institutionally in improving banking performance. As a result, larger banks are better positioned to manage risks and maintain stable profitability.

In conclusion, the moderation analysis confirms that Firm Size weakens the negative effects of Credit Risk and Liquidity Risk on Profitability, and the results highlight the importance of considering quasi-moderating variables in risk management studies of state-owned banks. The findings indicate that the role of firm size is more likely to reduce the intensity of risk impact rather than completely eliminate it, emphasizing its function as a buffering variable. This study also suggests that improving asset scale and operational efficiency can enhance the effectiveness of risk management strategies in banking institutions [5], [15]. Therefore, integrating moderating variables such as firm size provides a more comprehensive understanding of financial performance in the banking sector.

3. Results and Discussion

Descriptive Statistic Analysis

Table 3. Descriptive Statistic

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
Credit Risk(X_1)	40	.600	4.500	2.336	1.006
Liquidity Risk (X_2)	40	79.880	112.240	92.913	7.646
Firm Size (M)	40	18.960	21.610	20.573	.691
Profitability (Y)	40	.070	3.080	1.732	.796
Valid N (Listwise)	40				

Source: Processed secondary data, 2025

Table 2 shows The credit risk (X1) results of this descriptive statistical test have a mean of 2.336 and a standard deviation of 1.006, with a minimum value of 0.600 and a maximum value of 4.500 from the 2015–2024 timeframe. Liquidity risk (X2) has an average value of 92.913 and a standard deviation of 7.546 for the years 2015–2024, with a minimum value of 79.880 and a maximum value of 112.240. Firm size (M) has an average of 20.573 and a standard deviation of 0.691 during the 2015–2024 period, with a minimum value of 18.960 and a maximum value of 21.610. Profitability (Y) has an average of 1.732 and a standard deviation of 0.796 during the 2015–2024 period, with a minimum value of 0.070 and a maximum value of 3.080. These results indicate that variability in profitability is relatively high compared to firm size, suggesting that financial performance is more sensitive to risk factors than to structural differences among banks. The variation in liquidity risk, with values exceeding the ideal LDR threshold in some periods, also reflects potential inefficiencies in fund allocation. Empirical studies confirm that fluctuations in risk variables, particularly credit risk, significantly influence profitability levels in banking institutions [5]. This indicates that risk management plays a crucial role in maintaining stable financial performance.

Structural Model Evaluation (Inner Model)

R-Square Analysis

Table 4. R-Square

Variabel	R-square	R-square adjusted
Profitability	0.900	0.890

Source: Processed secondary data, 2025

The test result R Square shows that the Profitability variable is 0.890, meaning that the variability of the Profitability construct is 89%. This means that it has a strong effect. An R-Square value of 0.890 indicates that the model has a very high explanatory power, meaning that credit risk, liquidity risk, and firm size collectively explain most of the variation in profitability. This result suggests that the selected variables are highly relevant in predicting banking performance. Empirical evidence also supports that financial risk variables significantly contribute to profitability variations in banking sectors [10]. However, the remaining 11% indicates that other factors such as operational efficiency or macroeconomic conditions may also influence profitability.

Multicollinearity (Collinearity)

Table 5. VIF

Variabel	VIF
Liquidity Risk ->Profitability	1,344
Credit Risk -> Profitability	1,777
Fim Size -> Profitability	2,178
Firm Size x Liquidity Risk-> Profitability	1,313
Firm Size x Credit Risk -> Profitability	1,481

Source: Processed secondary data, 2025

The multicollinearity test results show that the VIF value for each variable is below 5. Therefore, it can be said that there is no strong multicollinearity between variables. Low VIF values indicate that the independent variables are not highly correlated with each other, ensuring that each variable contributes uniquely to the model. This strengthens the validity of the regression results and reduces the risk of biased estimations. The absence of multicollinearity also confirms that credit risk, liquidity risk, and firm size represent distinct constructs in banking analysis. This condition is essential for ensuring accurate interpretation of the moderating effects in the model.

Predictive Relevance (Q Square)

Table 6. Q-Square

Variabel	Q^2predict
Profitabilitas	0.999

Source: Processed secondary data, 2025

The Q Square value for Profitability is 0.999. Therefore, since Q Square = 0.999 > 0, it can be concluded that the model has predictive relevance. A Q-Square value close to 1 indicates that the model has excellent predictive capability in estimating profitability outcomes. This suggests that the model is not only statistically strong but also practically useful in forecasting banking performance. Empirical research supports that models incorporating risk variables tend to have high predictive relevance due to the strong influence of financial risks on profitability [10]. This reinforces the robustness of the research model used in this study.

Effect Size (F Square)

Table 7. F-square

Variabel	F-Square
Liquidity Risk ->Profitability	2219,012
Credit Risk -> Profitability	1883,812
Firm Size -> Profitability	412,179
Firm Size x Liquidity Risk-> Profitability	0,729
Firm Size x Credit Risk -> Profitability	2,256

Source: Processed secondary data, 2025

The Liquidity Risk Variable has a high impact on profitability, according to the F Square test, with a F Square value of 2219.012. The Credit Risk Variable on Profitability has a significant influence (F Square = 1883.812). The Liquidity Risk Variable, controlled by Firm Size, has a substantial effect on Profitability (F Square = 0.729). The Credit Risk Variable, moderated by Firm Size on Profitability, shows a substantial effect (F Square value = 2.256). These findings indicate that liquidity risk has the strongest direct influence on profitability compared to other variables. However, the relatively smaller effect size in the interaction terms suggests that the moderating role of firm size, although significant, is more limited in magnitude. Empirical studies confirm that while risk variables strongly affect profitability, moderating variables tend to reduce rather than dominate the relationship [5]. This highlights the importance of interpreting moderation effects carefully in financial research.

Goodness Of Fit (Fit Model)

Table 8. Fit Model

	Saturated model	Estimated model
SRMR	0,000	0,001

Source: Processed secondary data, 2025

The Goodness of Fit test results show that an SRMR value of 0.001 indicates an exceptionally high level of fit (perfect fit), meaning that the test results can be declared to be in compliance with the criteria. An SRMR value close to zero indicates that the difference between the observed data and the model estimation is minimal, confirming the accuracy of the model. This suggests that the proposed structural model is highly suitable for explaining the relationship between variables. A good model fit strengthens the credibility of the research findings and supports further interpretation of the results. This also indicates that the SEM-PLS approach is appropriate for this study.

Hypothesis Test (Direct Effect)

Table 9. Path Coefficient

Variable	Original sample	Sample mean	Standard deviation	T statistics	P values	Accepted/ Rejected
Firm Size x Liquidity Risk-> Profitability	-0.013	-0.014	0.004	3.364	0.001	Accepted
Firm Size x Credit Risk -> Profitability	-0.030	-0.030	0.006	5.056	0.000	Accepted

Source: Processed secondary data, 2025

The T-Statistic and P-Value values for each variable effect are presented based on the path coefficient test results. The T-Statistic value for the relationship between Firm Size (M) and Profitability (Y) is greater than 1.65 (7.938 > 1.65), while the P-Value is less than 0.1 (0.000 < 0.1). Therefore, it can be concluded that the profitability of state-owned banks is significantly influenced by Firm Size (M). The T-Statistic value for the relationship between Credit Risk (X1) and Profitability (Y) is greater than 1.65 (8.571 > 1.65), and the P-Value is less than 0.1 (0.000 < 0.1). Thus, it can be stated that credit risk has a significant effect on profitability. Similarly, the T-Statistic value for the relationship between Liquidity Risk (X2) and Profitability (Y) is greater than 1.65 (7.938 > 1.65), while the P-Value is less than 0.1 (0.000 < 0.1). Therefore, liquidity risk also has a significant effect on profitability. These findings are consistent with Agency Theory, which suggests that ineffective risk management leads to reduced financial performance due to inefficiencies in decision-making [6]. Empirical evidence also shows that credit risk has a significant negative impact on profitability, while liquidity risk may vary depending on management efficiency [5], [10]. This confirms that both risk variables play a crucial role in determining banking performance.

Moderating Effect Test (Interaction Effect)

Table 10. Moderating Effect

Variable	Original sample	Sample mean	Standard deviation	T statistics	P values	Accepted/ Rejected
Liquidity Risk ->Profitability	-0.809	-0.818	0.102	7.938	0.000	Accepted
Credit Risk -> Profitability	-0.858	-0.871	0.100	8.571	0.000	Accepted
Firm Size-> Profitability	-0.444	-0.455	0.080	5.536	0.000	Accepted

Source: Processed secondary data, 2025

Based on the moderation test results, the Firm Size variable was found to significantly moderate the effect of Credit Risk and Liquidity Risk on Profitability. For Credit Risk, the Original Sample value is -0.030, with a T-Statistic of 5.056 and a P-Value of 0.000, indicating that the moderating effect of Firm Size is statistically significant. The negative coefficient suggests that Firm Size weakens the impact of Credit Risk on Profitability, meaning that larger firms can mitigate the negative effect of credit risk on profitability. This scenario can be categorized as quasi-moderation, since both the direct effect of Credit Risk and its moderating effect by Firm Size are significant. This finding indicates that firm size acts as a buffering variable, reducing the intensity of credit risk rather than eliminating its impact. Empirical studies confirm that larger banks are better able to absorb credit losses due to stronger capital

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structures and diversified portfolios [5], [15]. This supports the argument that firm size enhances resilience in banking operations.

Similarly, for Liquidity Risk, the Original Sample value is -0.013, with a T-Statistic of 3.364 and a P-Value of 0.001, indicating a significant moderating effect. The negative coefficient implies that Firm Size reduces the effect of Liquidity Risk on Profitability, showing that larger firms are better able to absorb liquidity risk, thereby reducing its negative impact on financial performance. Like the Credit Risk moderation, this also represents quasi-moderation, as both the direct effect and the moderating effect are significant. Empirical evidence shows that effective liquidity management in larger banks contributes to stable profitability, particularly through better access to funding sources and improved cash flow management [10]. This reinforces the importance of firm size in mitigating financial risks.

The strengths of these results lie in their high level of statistical significance, demonstrating that Firm Size reliably influences the relationship between risk and Profitability. This provides practical insight for risk management strategies in state-owned banks. Furthermore, the presence of quasi-moderation strengthens the theoretical contribution of Firm Size as a moderating variable. However, the analysis also reveals that the moderating effect is relatively small compared to direct effects, indicating that risk variables remain the primary determinants of profitability. This suggests that improving risk management practices should remain the main priority for banking institutions.

However, there are some limitations. The negative moderation coefficient indicates a weakening effect, but the study does not quantify the extent to which Firm Size mitigates the risks. Additionally, the moderating effect was tested only for Firm Size, while other factors such as corporate governance or capital structure could also influence the risk-profitability relationship. Finally, the relatively small sample size (N=40) limits the generalizability of the findings to the entire population of state-owned banks. Future research is recommended to include additional moderating variables and use larger sample sizes to improve generalizability. The use of graphical interaction plots is also suggested to better visualize how firm size influences the relationship between risk and profitability.

Discussion of Research Results

The Effect of Credit Risk on Profitability

The results of this study indicate that an increase in the Non-Performing Loan (NPL) ratio has a negative impact on Profitability, confirming that Hypothesis 1 (H1) is accepted. High NPLs reflect low-quality bank assets and borrowers' inability to meet their loan obligations, which leads to an increase in loan loss reserves and a reduction in the company's asset value. From the perspective of Agency Theory, this situation illustrates adverse selection, where bank managers (agents) may select debtors inadequately due to information asymmetry between the bank and its clients. Loans extended to high-risk borrowers without proper risk assessment increase the bank's credit risk and ultimately decrease profitability. Empirical evidence strengthens this finding by showing that credit risk has a negative coefficient of −0.131352 on profitability, indicating that an increase in NPL directly reduces bank performance due to rising provisioning costs and declining interest income [5]. This condition highlights that ineffective credit screening and monitoring systems remain a major source of financial inefficiency in banking operations.

These findings are consistent with previous research. For example, [19] reported that credit risk negatively affects business profitability, and [18] found that credit risk significantly and adversely impacts the profitability of banking firms. Consequently, the lower the NPL ratio of a bank, the higher its profitability, which can enhance investor confidence in the bank's management and overall financial performance. However, some empirical studies indicate that the effect of credit risk is not always significant when banks implement strong risk management and operational efficiency practices, suggesting that internal control systems play a crucial role

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in mitigating risk impacts [10]. This indicates that the relationship between credit risk and profitability is conditional, depending on the quality of risk governance within the bank.

The Effect of Liquidity Risk on Profitability

Based on the results of the analysis of Liquidity Risk on Profitability, H2 can be accepted, so it can be concluded that Liquidity Risk has a negative impact on Profitability. Based on the results of this analysis, the interpretation is that the higher the ratio of Loans to Deposits in the form of credit to third parties, the lower the bank's profitability. This means that banks with low liquidity tend to have less ability to pay their short-term obligations, which will reduce their operational efficiency. As implied by agency theory, moral hazard means that managers (agents) have the potential to make strategic decisions in lending without considering liquidity risk in order to improve short-term performance. Empirical findings show that liquidity risk can significantly affect profitability, where inefficient liquidity allocation reduces the bank's ability to generate optimal returns from its assets [10]. This indicates that excessive lending without proper liquidity planning may increase financial vulnerability and reduce overall bank performance.

The study's findings are consistent with those of [13] who claimed that between 2013 and 2020, liquidity risk significantly and negatively affected state-owned banks' profits. This is comparable to study by [26] which claims that the profitability of banking firms in the MENA region is significantly impacted negatively by liquidity risk. The decline in profitability can be caused by a high LDR value, which leads to high risk. If the loans disbursed are problematic or fail, the bank will have difficulty returning the funds deposited by customers, which will ultimately impact the company's profitability. However, other studies show that liquidity risk may also have a positive or insignificant effect when managed efficiently, particularly when banks are able to optimize loan distribution and maintain balanced funding structures [5]. This highlights that liquidity risk does not always reduce profitability, but depends on the effectiveness of liquidity management strategies.

The Effect of Firm Size as a Moderating Variable in the Effect of Credit Risk on Profitability

The analysis shows that Firm Size significantly moderates the relationship between Credit Risk and Profitability, confirming that Hypothesis 3 (H3) is accepted. The results indicate that Firm Size acts as a quasi-moderator, meaning that it both moderates the effect of Credit Risk and coexists with a significant direct effect of Credit Risk on Profitability. In other words, while Credit Risk negatively affects Profitability, the moderating effect of Firm Size reduces the magnitude of this negative impact, but does not completely eliminate it. Empirical evidence supports this finding, showing that larger banks tend to have stronger financial performance and better capacity to absorb credit losses due to higher capital and diversified portfolios [15]. This suggests that firm size functions as a buffering variable that stabilizes profitability under high-risk conditions.

Larger banks, characterized by greater total assets and sufficient levels of cash or cash equivalents, are better able to withstand the negative consequences of Credit Risk on financial performance. This is because larger banks are not entirely dependent on productive assets to generate income and also maintain adequate liquidity reserves, which function as a buffer against potential losses from non-performing loans. As a result, the adverse effect of Credit Risk on bank profitability becomes less pronounced as firm size increases. Empirical findings also indicate that larger banks benefit from economies of scale, allowing them to distribute risk more efficiently across different asset portfolios [5]. This strengthens the argument that scale plays a critical role in enhancing financial resilience.

From the perspective of Agency Theory, this finding suggests that effective mitigation of adverse selection occurs in larger banks. When banks accurately assess borrower quality despite information asymmetry, the negative consequences of high-risk lending are partially offset. Thus, the detrimental effects of risky managerial behavior and errors in credit risk assessment on Profitability are mitigated by the scale of the business. Stronger governance systems in large banks improve monitoring and reduce information asymmetry, thereby minimizing inefficient lending decisions [5]. This supports the theoretical assumption that firm size contributes to reducing agency conflicts.

These findings are in line with previous studies. For instance, [17] found that Credit Risk reduces the effect of Liquidity on the financial performance of Bali's traditional rural banks. According to study by [27] reported that the negative impact of Credit Risk on investor confidence in banks listed on the Indonesia Stock Exchange between 2020 and 2023 was mitigated by Firm Size. These results highlight the effectiveness of governance, risk management, and the application of agency theory in reducing conflicts of interest and maintaining the stability of bank profitability. However, the moderating effect is relatively small compared to the direct effect, indicating that credit risk remains a dominant factor influencing profitability.

The Effect of Firm Size as a Moderating Variable in the Effect of Liquidity Risk on Profitability

The analysis indicates that Firm Size significantly moderates the relationship between Liquidity Risk and Profitability, confirming that Hypothesis 4 (H4) is accepted. The results classify Firm Size as a quasi-moderator, meaning that it both moderates the effect of Liquidity Risk and coexists with the significant direct effect of Liquidity Risk on Profitability. In other words, although Liquidity Risk negatively affects Profitability, the moderating effect of Firm Size reduces this negative impact, but does not entirely remove it. Empirical evidence shows that larger banks are better able to manage liquidity due to access to diverse funding sources and more efficient cash flow management systems [10]. This indicates that firm size enhances a bank’s ability to maintain liquidity stability during financial pressure.

Larger banks, which have greater total assets and stronger liquidity reserves, are better equipped to absorb the adverse effects of Liquidity Risk on financial performance. These banks implement more rigorous risk management practices and maintain access to diverse funding sources, including third-party deposits and interbank money markets. Consequently, even when liquidity pressures increase, large banks can meet short-term obligations efficiently, thereby mitigating the negative impact of Liquidity Risk on Profitability. Empirical findings confirm that firm size positively influences profitability by improving financial flexibility and operational efficiency [15]. This reinforces the argument that larger institutions are more resilient to liquidity shocks.

From the perspective of Agency Theory, particularly moral hazard, larger banks operate under stricter regulatory supervision and enhanced shareholder oversight. This oversight reduces excessive risk-taking by management that could harm the interests of capital providers. Therefore, the quasi-moderating role of Firm Size indicates that while Liquidity Risk continues to suppress Profitability, its negative effect is partially buffered by firm scale and effective governance mechanisms. This finding highlights that governance quality plays an important role alongside firm size in reducing agency problems in banking operations.

These findings are consistent with previous studies. For example, [28] reported that in food and beverage companies listed on the Indonesia Stock Exchange (IDX), the negative effect of liquidity risk on financial distress is weakened by company size. Similarly, [29] found that Firm Size reduces the moderating effect of liquidity risk on Profitability in transportation companies listed on the IDX from 2017 to 2020. In the banking context, larger banks demonstrate greater resilience in managing liquidity risk, as well as enhanced oversight that minimizes conflicts of interest between management and investors. Nevertheless, the moderating effect remains limited, indicating that improving liquidity management practices is still essential for sustaining profitability.

4. Conclusion

Based on the discussion in the previous chapter, the study concludes that Credit Risk negatively affects Profitability. An increase in Non-Performing Loans (NPLs) not only raises credit loss reserves but also reduces the bank's ability to generate stable income, which ultimately weakens overall financial performance. Liquidity Risk also negatively impacts Profitability, as higher Loan to Deposit Ratios (LDRs) constrain the bank's capacity to generate income. While Firm Size shows a negative direct effect on Profitability, it mitigates the adverse impacts of both Credit Risk and Liquidity Risk. This indicates that Firm Size functions as a buffering variable that reduces the intensity of risk effects rather than eliminating them entirely, and the presence of quasi-moderation confirms that Firm Size plays a dual role in influencing profitability both directly and indirectly.

The findings of this study provide several important implications for policy makers, bank management, and future research. For policy makers and regulators, the results suggest the need to strengthen risk management frameworks for state-owned banks. This can be achieved by improving internal controls, enforcing stricter prudential standards in credit allocation, monitoring liquidity ratios more effectively, and ensuring that banks maintain sufficient liquidity buffers. In addition, the development of early warning systems based on financial risk indicators is essential to anticipate potential banking instability, and promoting good corporate governance and enhancing oversight at the board and management levels can reduce moral hazard, support operational efficiency, and encourage responsible risk-taking. Stronger supervisory mechanisms are also needed to ensure that risk exposure remains within acceptable limits.

For bank management, the study highlights the importance of leveraging firm size strategically. Larger banks can use their scale to implement stronger risk mitigation measures, maintain liquidity reserves, and optimize asset management to minimize the negative impacts of Credit and Liquidity Risk on profitability. Digital innovation and advanced risk monitoring systems are also recommended to improve operational resilience. Management should also prioritize improving credit evaluation processes and maintaining an optimal balance between lending and liquidity, so that excessive risk exposure can be avoided. Efficient cost management and asset diversification strategies are equally important in sustaining profitability under fluctuating economic conditions.

For future research, several directions are suggested. Subsequent studies could incorporate additional determinants of Profitability, such as capital structure, corporate governance quality, firm value, digital risk management, inflation, and interest rates. Expanding the observation period and increasing the sample size would also improve the robustness and generalizability of the findings. Furthermore, further examination of Firm Size as a moderating variable could provide deeper insight into how large banks maintain profitability stability under varying levels of Credit and Liquidity Risk. Future studies are also encouraged to examine alternative moderating variables, such as governance mechanisms and operational efficiency, and the use of comparative or cross-country analysis may provide broader insights into banking performance dynamics.

Overall, the study emphasizes that both firm-specific characteristics and effective risk management play critical roles in sustaining profitability in the banking sector, offering practical guidance for regulators and managers while providing a foundation for future academic research. The integration of risk management strategies with organizational capacity, particularly firm size, becomes a key factor in achieving sustainable financial performance in the long term.

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