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How Firm Size Moderates Low-Cost Growth and Non-Performing Loans in Determining Bank Profitability

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Abstract

This study aims to analyze the effect of low-cost funds, credit distribution growth, and non-performing loans on bank profitability as measured by Return on Assets (ROA), and to examine the role of firm size as a moderating variable. The research was conducted on 18 banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period. The study employed a quantitative approach using multiple linear regression and Moderated Regression Analysis (MRA). The results show that low-cost funds and credit growth have a significant positive effect on profitability (ROA), while non-performing loans have a significant negative effect. Furthermore, firm size moderates the relationship between the independent variables and profitability, indicating that larger banks are more capable of optimizing low-cost funding and credit expansion while mitigating the negative impact of non-performing loans. These findings provide managerial implications for banking institutions to enhance profitability through efficient fund management, prudent lending, and effective risk control. For regulators, the results offer insights into developing supervision policies that consider firm size as a determinant of financial performance and stability.

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INTRODUCTION

The banking industry plays a crucial role in Indonesia's financial system as an intermediary institution that channels funds from surplus units to deficit units. A sound and efficient banking sector is essential to maintaining financial stability and supporting sustainable economic growth. In 2023, the capital adequacy ratio (CAR) of Indonesian banks reached 27.69%, well above the minimum requirement of 8% set by the Financial Services Authority (OJK). Meanwhile, total credit grew by 10.38% year-on-year, reaching IDR 7,090 trillion, driven primarily by investment and working capital loans.

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The non-performing loan (NPL) ratio remained relatively stable at 2.19% (gross), indicating that credit quality was under control.

Despite these positive indicators, the banking sector faces challenges such as increasing competition, rapid technological changes, and the need for sustainable financial practices. Maintaining profitability is therefore essential for banks to remain competitive and resilient. Profitability, as measured by Return on Assets (ROA), reflects a bank's ability to generate income efficiently from its total assets. However, ROA performance fluctuated during 2019–2023 due to macroeconomic pressures and operational inefficiencies, particularly during and after the COVID-19 pandemic. Previous studies have identified several key determinants of profitability, including the composition of low-cost funding, credit growth, and asset quality represented by the NPL ratio. Banks that successfully mobilize low-cost funds such as savings and current accounts tend to enjoy lower funding costs, thereby increasing their net interest margin and profitability. Similarly, sustainable credit growth contributes positively to interest income, provided that credit risk is managed effectively. Conversely, a high level of non-performing loans weakens bank profitability by increasing loan-loss provisions and reducing interest income.

In addition to internal factors, firm size is expected to moderate these relationships. Larger banks typically have greater access to funding, stronger risk management systems, and economies of scale that enhance efficiency. Therefore, firm size may strengthen the positive impact of low-cost funds and credit growth, while mitigating the adverse effect of NPLs on profitability.

Although prior research has examined each determinant separately, few studies have tested the moderating effect of firm size in the context of Indonesian banking, particularly during the post-pandemic period. This study aims to fill that gap by investigating the effect of low-cost funds, credit distribution growth, and non-performing loans on profitability (ROA) with firm size as a moderating variable, using data from banks listed on the Indonesia Stock Exchange (IDX) during 2019–2023.

LITERATURE REVIEW

1. Low-Cost Funds and Profitability

Low-cost funds refer to third-party funds obtained through current and savings accounts, which carry lower interest expenses compared to time deposits. According to the Loanable Funds Theory, a bank's ability to mobilize low-cost funds determines its lending capacity and interest margin. When a higher proportion of deposits is composed of low-cost funds, the cost of funds decreases, allowing banks to generate higher net interest income.

Empirical studies support this view. Putra and Sampurno (2021) and Parenrengi (2022) found that low-cost funds significantly increase Return on Assets (ROA) in Indonesian commercial banks. Conversely, when the composition of time deposits dominates, banks face higher interest expenses, which suppress profitability. Therefore, efficient management of low-cost funds is essential for improving ROA performance.

2. Credit Growth and Profitability

Credit distribution represents the primary source of income for banks. The Financial Intermediation Theory suggests that profitability is largely determined by a bank's ability

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to allocate its funds into productive loans. A higher credit growth rate typically contributes to greater interest income, provided that credit quality remains sound. Studies by Astutik et al. (2019) and Handayani (2020) confirm that sustainable credit expansion has a positive and significant impact on ROA. However, excessive credit growth without adequate risk control may lead to deteriorating loan quality, which ultimately reduces profitability. Thus, credit growth must be balanced with prudent lending practices to maintain profitability.

3. Non-Performing Loans (NPL) and Profitability

Non-performing loans represent loans that are past due or have defaulted, reflecting inefficiencies in credit risk management. According to the Credit Risk Theory, a higher NPL ratio increases the burden of loan-loss provisions and decreases net interest income. Consequently, NPLs are expected to have a negative relationship with profitability.

Empirical evidence from Hamdani and Wulandari (2020) and Rahmawati (2021) demonstrates that NPLs significantly reduce ROA, as banks must allocate greater reserves to cover potential credit losses. Therefore, maintaining a low NPL ratio is crucial for sustaining profitability and ensuring financial stability.

4. Firm Size as a Moderating Variable

Firm size, typically measured by the natural logarithm of total assets, indicates the scale and capacity of a bank to manage operations and absorb risks. Larger firms tend to enjoy economies of scale, easier access to funding, and better diversification. According to the Resource-Based View (RBV), larger organizations possess more resources to exploit market opportunities and mitigate operational risks.

Empirical studies such as Yulianti (2021) and Setiawan (2022) reveal that firm size strengthens the positive effect of low-cost funds and credit growth on ROA, while weakening the negative impact of NPLs. This suggests that large banks can operate more efficiently, leverage their brand reputation, and manage risk exposure better than smaller institutions. Therefore, firm size is expected to moderate the relationship between low-cost funds, credit growth, and NPLs on profitability.

5. Research Gap and Hypothesis Development

Previous research has predominantly analyzed the direct effects of low-cost funds, credit growth, and NPLs on profitability. However, limited studies have explored the moderating role of firm size, particularly within the context of Indonesian banking during the 2019–2023 post-pandemic recovery. This study addresses this gap by integrating firm size as a moderating variable, providing a more comprehensive understanding of how internal banking factors interact to influence profitability (ROA).

Previous research has predominantly analyzed the direct effects of low-cost funds, credit growth, and non-performing loans (NPLs) on profitability. However, limited studies have examined the moderating effect of firm size in the Indonesian banking context, particularly during the post-pandemic recovery period (2019–2023). This study fills this gap by integrating firm size as a moderating variable to provide a more comprehensive understanding of the determinants of profitability (ROA).

Based on the theoretical framework and previous empirical findings, the conceptual model of this study is illustrated as follows:

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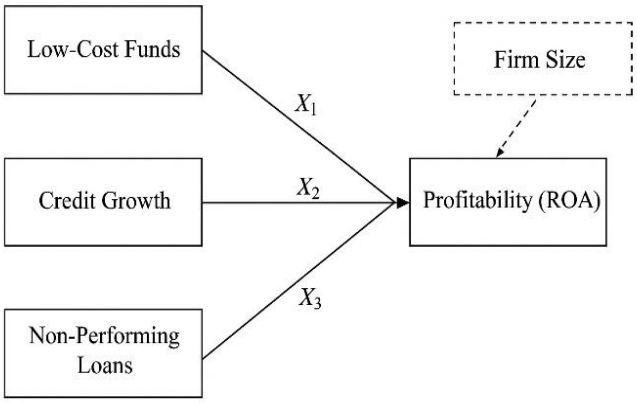
Figure 1. Conceptual Framework of the Study



The conceptual framework in Figure 1 shows that low-cost funds (X_1), credit growth (X_2), and non-performing loans (X_3) are the main independent variables that influence profitability (ROA) as the dependent variable (Y). Firm size (Z) serves as a moderating variable that is expected to strengthen or weaken the relationship between these independent variables and profitability. This framework underpins the development of hypotheses and statistical testing in the subsequent sections of this study.

METHODS

This study employed a quantitative research approach with an associative–causal design, aiming to examine the influence of low-cost funds, credit growth, and non-performing loans (NPLs) on bank profitability (ROA), as well as to test the moderating role of firm size. The research was conducted on banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period. This period was selected because it represents a dynamic phase in the Indonesian banking industry, covering both the COVID-19 crisis and post-pandemic recovery, thereby allowing for a comprehensive evaluation of financial performance trends.

The study used secondary data obtained from annual financial reports published by each banking company through the official IDX website (*www.idx.co.id*). The data were collected using the documentation technique, focusing on key variables including total third-party funds, composition of current and savings accounts, total loans disbursed, non-performing loans, total assets, and profitability ratios.

The population of the study consisted of 43 banking companies listed on the IDX. Sampling was carried out using the purposive sampling method, with specific criteria: (1) banks that consistently published complete annual financial statements during 2019–2023, (2) banks reporting Return on Assets (ROA) data, and (3) banks disclosing information on NPL and low-cost fund composition. Based on these criteria, a final sample of 18 banks was selected for analysis.

Each research variable was operationally defined and measured using financial ratios. Low-cost funds (X_1) were measured as the proportion of current and savings

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accounts to total third-party funds. Credit growth (X_2) was measured as the annual percentage increase in total loans disbursed. Non-performing loans (X_3) were represented by the ratio of NPL to total loans. Profitability (Y) was measured by Return on Assets (ROA), representing the company's efficiency in generating income from total assets. Firm size (Z), as the moderating variable, was measured by the natural logarithm of total assets (Ln Total Assets).

Data analysis was performed using Statistical Package for the Social Sciences (SPSS). The analytical process included several stages: descriptive statistics, classical assumption tests (normality, multicollinearity, heteroskedasticity, and autocorrelation), and multiple linear regression analysis to test the main effects. To examine the moderating effect of firm size, the study applied Moderated Regression Analysis (MRA) by including interaction terms between firm size and each independent variable.

The regression model was structured as follows:

$$ROA = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon \quad (1)$$

ROA = *Profitability (Return on Assets)*
α = *Constant (intercept)*
$\beta_1, \beta_2, \beta_3$ = *Regression coefficients*
X_1 = *Low-Cost Funds*
X_2 = *Credit Growth*
X_3 = *Non-Performing Loans*
ε = *Error term*

$$ROA = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 Z + \beta_5 (X_1 \times Z) + \beta_6 (X_2 \times Z) + \beta_7 (X_3 \times Z) + \varepsilon$$

Explanation of the Model

The above equation represents the Moderated Regression Analysis (MRA) model, which is used to test whether the variable firm size (Z) moderates the relationship between each independent variable and the dependent variable (ROA).

The first model tests the direct effects of low-cost funds, credit growth, and non-performing loans on profitability. The second model tests the moderating effect of firm size on these relationships. The significance level (α) was set at 5%, and hypothesis testing was based on t-statistics and p-values.

The quantitative approach and statistical analysis applied in this study are expected to provide robust empirical evidence on the factors influencing profitability in Indonesian banking, particularly during the post-pandemic period.

RESULT AND DISCUSSION

Result

1. Descriptive Analysis

Descriptive statistics describe the characteristics of each variable used in this study. Table 1 presents the minimum, maximum, mean, and standard deviation values of all variables.

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Table 1. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean	Std. Deviation
ROA	90	0.11	3.87	1.82	0.91
Low-Cost Funds (X_1)	90	45.20	79.40	62.40	8.27
Credit Growth (X_2)	90	2.10	15.70	8.70	3.42
Non-Performing Loans (X_3)	90	1.00	4.50	2.25	0.71
Firm Size (Z)	90	28.95	32.18	30.76	0.79

The results in Table 1 show that during 2019–2023, Indonesian banking companies maintained an average ROA of 1.82%, indicating a moderate profitability level. The dominance of low-cost funds (62.4%) suggests efficient funding structure, while credit growth (8.7%) reflects balanced expansion. The NPL average of 2.25% indicates healthy credit quality, and the firm size average (Ln = 30.76) confirms that most sample banks belong to the large-scale category.

2. Classical Assumption Test

Before regression analysis, classical assumption tests were conducted to ensure the reliability of the regression model. The summary results are presented in Table 2.

Table 2. Summary of Classical Assumption Tests

Test	Method	Criteria	Result	Conclusion
Normality	Kolmogorov–Smirnov	Sig. > 0.05	0.179	Normal
Multicollinearity	VIF < 10	VIF X_1=1.842, X_2=1.526, X_3=1.661	-	No multicollinearity
Heteroskedasticity	Glejser	Sig. > 0.05	0.132–0.287	No heteroskedasticity
Autocorrelation	Durbin–Watson ≈ 2	-	1.982	No autocorrelation

The results indicate that all classical assumptions were fulfilled: residuals are normally distributed, there is no multicollinearity or heteroskedasticity, and no autocorrelation problem was detected. Therefore, the model is suitable for further regression analysis.

3. Multiple Regression Results (Direct Effects)

The multiple regression analysis examines the direct effects of low-cost funds, credit growth, and non-performing loans on profitability (ROA). The results are summarized in Table 3.

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Table 3. Results of Multiple Linear Regression (Direct Effects)

Variable	Coefficient (β)	t-Statistic	Sig.	Result
Constant	1.041	1.451	0.156	Not Significant
Low-Cost Funds (X_1)	0.312	3.225	0.003	Significant Positive
Credit Growth (X_2)	0.278	2.312	0.027	Significant Positive
Non-Performing Loans (X_3)	-0.470	-3.118	0.004	Significant Negative

$R^2 = 0.379$ | Adjusted $R^2 = 0.355$ | $F = 5.710$ | Sig. $F = 0.003$ | $\alpha = 0.05$

The regression results show that low-cost funds (X_1) and credit growth (X_2) have positive and significant effects on profitability, while non-performing loans (X_3) negatively affect ROA. These findings align with previous studies, confirming that efficient fund structure and prudent credit growth are crucial for improving bank performance.

4. Moderation Test (MRA)

To test whether firm size moderates the relationship between independent variables and profitability, a Moderated Regression Analysis (MRA) was conducted. The results are displayed in Table 4.

Table 4. Results of Moderated Regression Analysis (MRA)

Variable	Coefficient (β)	t-Statistic	Sig.	Interpretation
Low-Cost Funds (X_1)	0.295	2.963	0.006	Positive Significant
Credit Growth (X_2)	0.256	2.118	0.040	Positive Significant
Non-Performing Loans (X_3)	-0.422	-2.984	0.005	Negative Significant
Firm Size (Z)	0.118	2.476	0.019	Positive Significant
$X_1 \times Z$	0.142	2.651	0.011	Strengthens Effect
$X_2 \times Z$	0.109	2.214	0.032	Strengthens Effect
$X_3 \times Z$	-0.095	-2.437	0.020	Weakens Negative Effect

Adjusted $R^2 = 0.441$ | $F = 6.820$ | Sig. $F = 0.000$ | $\alpha = 0.05$

The MRA results indicate that firm size moderates all relationships. The positive coefficients of $X_1 \times Z$ and $X_2 \times Z$ suggest that larger banks can better leverage low-cost funds and manage credit expansion to increase profitability. Meanwhile, the negative coefficient of $X_3 \times Z$ implies that firm size mitigates the negative effect of NPLs, demonstrating stronger resilience among larger banks.

Discussion

The findings confirm that low-cost funds and credit growth are primary profitability drivers, while NPLs remain the major constraint. Firm size strengthens positive effects

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and weakens negative ones, highlighting the strategic importance of scale in banking operations. This evidence supports the Resource-Based View (RBV), Financial Intermediation Theory, and Credit Risk Theory, all emphasizing the role of internal resources and risk management in shaping profitability. These results provide managerial implications for banks to optimize low-cost fund mobilization, maintain prudent credit policies, and control NPL ratios within safe levels. Regulators such as OJK and Bank Indonesia should consider firm size differences when designing policies and supervision frameworks.

CONCLUSION

This study aimed to analyze the effect of low-cost funds, credit growth, and non-performing loans (NPLs) on bank profitability as measured by Return on Assets (ROA), with firm size as a moderating variable. The analysis was conducted on 18 banking companies listed on the Indonesia Stock Exchange (IDX) during the 2019–2023 period using multiple linear regression and Moderated Regression Analysis (MRA).

The results reveal that low-cost funds and credit growth have positive and significant effects on profitability, implying that efficient management of low-cost deposits and sustainable credit expansion enhance a bank's ability to generate earnings. Conversely, non-performing loans exert a negative and significant effect on ROA, indicating that rising credit risk reduces bank profitability through increased loan-loss provisions and lower interest income.

Furthermore, firm size was found to moderate these relationships. Larger banks are more capable of optimizing the use of low-cost funds and expanding credit portfolios effectively, while also being more resilient to the negative effects of NPLs. This finding supports the Resource-Based View (RBV), highlighting that organizational size and resources provide a strategic advantage in managing profitability.

Theoretically, this study reinforces existing financial and risk management theories by demonstrating that internal factors, funding structure, credit policy, and risk control are interrelated and collectively determine financial performance. Practically, the findings suggest that bank managers should prioritize low-cost funding strategies, maintain prudent credit growth, and control NPL levels to sustain profitability. Regulators such as OJK and Bank Indonesia should also consider firm size heterogeneity when formulating supervisory frameworks and prudential guidelines.

This study, however, has several limitations. It focuses solely on internal financial variables and excludes macroeconomic or external factors such as interest rates, inflation, or GDP growth that may also affect profitability. In addition, the study uses secondary data limited to five years, which may not fully capture long-term structural changes.

Future research is recommended to incorporate macroeconomic indicators and corporate governance factors, as well as employ longitudinal or panel data approaches to better understand dynamic interactions among variables. Further studies may also explore comparative analyses between conventional and sharia banks to broaden the generalizability of the findings.

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