

THE ROLE OF FIRM SIZE IN MODERATING CREDIT RISK, OPERATIONAL EFFICIENCY, AND PROFITABILITY ON THE FIRM VALUE OF BANKING COMPANIES

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Abstract

Firm value is one of the indicators reflecting market assessment of the performance and prospects of banking companies. Firm value may be influenced by credit risk, operational efficiency, and profitability, while firm characteristics may determine the strength of the relationships between these factors and firm value. This study aims to analyze the effects of credit risk, operational efficiency, and profitability on firm value and to examine the role of firm size in moderating these relationships. This study employs a quantitative approach using secondary data obtained from annual reports of banking companies listed on the Indonesia Stock Exchange for the 2021–2024 period. The sample was selected using purposive sampling, resulting in 172 observations. Credit risk is measured using Non-Performing Loan (NPL), operational efficiency using Operating Expenses to Operating Income (BOPO), profitability using Return on Assets (ROA), firm value using Price to Book Value (PBV), and firm size using SIZE. Data analysis was conducted using multiple linear regression and Moderated Regression Analysis (MRA). The results show that credit risk has a positive effect on firm value, while operational efficiency has a negative effect on firm value. Profitability has a positive effect on firm value. Furthermore, firm size strengthens the effects of credit risk, operational efficiency, and profitability on the firm value of banking companies.

Keywords: Credit Risk; Operational Efficiency; Profitability; Firm Value; Firm Size

1. INTRODUCTION

Firm value is one of the important indicators reflecting market perceptions of a company's performance and prospects. For banking companies, firm value has strategic significance because banks' primary activities are related to fund management, credit distribution, risk control, and profit generation. These fundamental conditions constitute information considered by investors when assessing a company's prospects. Therefore, identifying factors that affect the firm value of banking companies is important, particularly factors related to risk and financial performance.

One factor that may be associated with firm value is credit risk. In this study, credit risk is proxied by Non-Performing Loan (NPL), which reflects the level of non-performing loans in the banking portfolio. An increase in NPL generally indicates a higher risk of payment default and a potential decline in asset quality. However, the relationship between credit risk and firm value does not always exhibit a consistent direction. Previous studies have produced mixed findings regarding the relationship between credit risk and firm value, making this relationship relevant for further examination among banking companies in Indonesia.

In addition to credit risk, operational efficiency is also an important factor in assessing the condition of banking companies. Operational efficiency is proxied by the ratio of Operating Expenses to Operating Income (BOPO). A higher BOPO indicates greater operating expenses relative to operating income, which may signal declining efficiency. This condition may constrain the company's ability to generate profits and subsequently affect market perceptions. Conversely, the ability to control operating expenses may reflect better resource management. Previous research on BOPO and firm value also indicates that this relationship requires further examination in the context of banking companies with different characteristics.

Another factor is profitability, which in this study is proxied by Return on Assets (ROA). Profitability describes a company's ability to generate profit through its assets. A higher level of profitability may provide a positive signal regarding management's ability to manage company resources and generate profits. This condition may increase investor confidence and ultimately enhance firm value. The thesis research also shows that ROA has a positive and significant effect on PBV.

Although these three factors may explain firm value, the relationships between credit risk, operational efficiency, profitability, and firm value do not necessarily have the same strength across companies. Differences in firm characteristics may cause markets to respond differently to fundamental information disclosed by companies. One relevant characteristic is firm size. Banks with larger assets have different resources and operational capacities than banks with smaller asset scales. This condition allows firm size to play a role in determining the extent to which information about risk and financial performance is translated by the market into firm value.

Several previous studies have examined the effects of fundamental banking factors on firm value. Wiadnyani and Artini (2023), for example, examined NPL, BOPO, LDR, and ROA in relation to firm value among banking subsector companies listed on the Indonesia Stock Exchange during 2019–2021. Other studies have also examined the relationships between credit risk, operational efficiency, liquidity, and profitability and firm value among banking companies during 2021–2024. These findings indicate that risk and financial performance factors have received considerable attention in research on banking firm value. However, research on these relationships can still be developed by considering firm characteristics as factors determining the strength of the relationships between fundamental variables and firm value.

Based on this rationale, this study positions firm size as a moderating variable to examine whether firm scale strengthens or weakens the relationships between credit risk, operational efficiency, profitability, and firm value. This approach extends the examination of direct relationships by considering the conditions under which the effects of these fundamental factors occur in companies of different sizes. Thus, the study focuses not only on whether credit risk, operational efficiency, and profitability affect firm value, but also on whether firm size changes the strength of these relationships.

This study aims to analyze the effects of credit risk, operational efficiency, and profitability on the firm value of banking companies and to examine the role of firm size in moderating each of these relationships. The study uses banking companies listed on the Indonesia Stock Exchange during 2021–2024 and applies multiple linear regression and Moderated Regression Analysis (MRA).

2. RESEARCH METHOD

Research Type and Approach

This study employs a quantitative approach with a causal research design and an explanatory research method. The quantitative approach is used to examine relationships and effects among variables through statistical analysis. This study aims to analyze the effects of credit risk, operational efficiency, and profitability on firm value and to examine the role of firm size as a moderating variable among banking subsector companies listed on the Indonesia Stock Exchange (IDX).

Population and Sample

The population in this study comprises all banking subsector companies listed on the Indonesia Stock Exchange (IDX) during 2021–2024. Based on the data used in the study, 48 companies constitute the population.

The sample was selected using purposive sampling with a non-probability sampling method. This technique was used because the sample was selected based on criteria relevant to the research objectives. The sample selection criteria are presented in Table 1.

Table 1. Sample Selection Criteria

No.	Sample Selection Criteria	Number
1	Banking subsector companies listed on the IDX during 2021–2024	48
2	Companies without consistent annual financial statements during 2021–2024	(5)
3	Companies without complete data for the research variables during 2021–2024	0
4	Companies that were delisted or subject to trading suspension for more than one year during the research period	0
	Number of companies meeting the sample criteria	43
	Observation period	4 years
	Number of research observations	172

Source: *Data Processed, 2026*

Based on these criteria, 43 companies met the requirements for inclusion in the sample. With a four-year observation period, the study generated 172 observations.

Data Type and Source

This study uses secondary data. The research data were obtained through documentation of annual reports and financial statements of banking subsector companies listed on the Indonesia Stock Exchange during 2021–2024. The data were obtained from the official Indonesia Stock Exchange website and the official websites of the sampled companies.

Research Variables and Measurement

This study consists of a dependent variable, independent variables, and a moderating variable. The dependent variable is firm value, while the independent variables comprise credit risk, operational efficiency, and profitability. Firm size is used as the moderating variable.

Firm Value (PBV)

Firm value is measured using Price to Book Value (PBV), a ratio comparing the market price per share with the book value per share. PBV is used to describe market valuation of a company relative to its book value.

Credit Risk (NPL)

Credit risk is proxied by Non-Performing Loan (NPL). NPL represents the level of non-performing loans held by a bank relative to total loans extended. A higher NPL indicates a higher level of credit risk faced by the company.

Operational Efficiency (BOPO)

Operational efficiency is proxied by the ratio of Operating Expenses to Operating Income (BOPO). This ratio indicates the company's ability to control operating expenses in generating operating income. A lower BOPO indicates a higher level of operational efficiency.

Profitability (ROA)

Profitability is proxied by Return on Assets (ROA). ROA indicates the company's ability to generate profits through its assets. A higher ROA indicates better ability to utilize assets to generate profits.

Firm Size (SIZE)

Firm size is used as the moderating variable and is measured based on company asset size. This variable is used to determine whether firm size can strengthen or weaken the effects of credit risk, operational efficiency, and profitability on firm value.

Data Analysis Technique

Data analysis was conducted in several stages. The first stage was descriptive statistical analysis, used to provide an overview of the characteristics of the research data through minimum, maximum, mean, and standard deviation values.

Classical assumption tests were then conducted, including tests for normality, multicollinearity, heteroscedasticity, and autocorrelation. These tests were conducted to ensure that the regression model met the required statistical assumptions. The autocorrelation test used the Durbin-Watson method.

Hypothesis testing was conducted using multiple linear regression to examine the effects of credit risk, operational efficiency, and profitability on firm value. Moderating variable testing was subsequently conducted using Moderated Regression Analysis (MRA). MRA was used to determine whether firm size moderates the relationship between each independent variable and firm value.

The multiple linear regression model in this study is formulated as follows:

$$PBV = \alpha + \beta_1 NPL + \beta_2 BOPO + \beta_3 ROA + \beta_4 SIZE + \varepsilon$$

The moderation regression model is formulated as follows:

$$PBV = \alpha + \beta_1 NPL + \beta_2 BOPO + \beta_3 ROA + \beta_4 SIZE + \beta_5 (NPL \times SIZE) + \beta_6 (BOPO \times SIZE) + \beta_7 (ROA \times SIZE) + \varepsilon$$

Description:

PBV = Firm value

NPL = Credit risk

BOPO = Operational efficiency

ROA = Profitability

SIZE = Firm size

α = Constant

β = Regression coefficient

ε = Error term

Model fit was assessed using the coefficient of determination (Adjusted R^2) and the F-test. Hypotheses were tested using the t-test to determine the partial effects of the independent variables on firm value, as well as interaction coefficients in the MRA model to determine the moderating effect of firm size. All statistical tests were conducted at a 5% significance level ($\alpha = 0.05$).

3. RESULTS AND DISCUSSION

RESULTS

Descriptive Statistics

Descriptive statistics were used to provide an overview of the characteristics of the research data through minimum, maximum, mean, and standard deviation values. This study uses 172 observations from 43 banking companies during 2021–2024.

Table 2. Descriptive Statistics

Variable	N	Minimum	Maximum	Mean	Std. Deviation
PBV	172	0.50	6.50	3.7842	1.10047
BOPO	172	0.34	2.87	0.9012	0.33388
ROA	172	-0.03	0.06	0.0150	0.01499
NPL	172	0.00	1.31	0.0837	0.04399
SIZE	172	22.73	39.27	31.0000	2.99756

Source: Data Processed, 2026

Based on Table 2, PBV has a mean value of 3.7842 with a standard deviation of 1.10047. BOPO has a mean of 0.9012, ROA of 0.0150, NPL of 0.0837, and SIZE of 31.0000. Data variation is reflected in the standard deviation values of each variable.

Classical Assumption Tests

Normality Test

Normality testing was conducted on the model residuals using the Normal Probability Plot and One-Sample Kolmogorov-Smirnov Test. The initial test results indicated that the residuals did not meet the normality assumption. This was reflected in the P-P Plot, where the points deviated from the diagonal line, and was supported by an Asymp. Sig. (2-tailed) value of 0.000, which is below 0.05.

Because the initial test indicated that the residuals were not normally distributed, data transformation was performed to obtain a residual distribution more consistent with the normality assumption. After transformation, the P-P Plot showed that the residual points were distributed around and followed the direction of the diagonal line, indicating that the normality assumption was visually satisfied.

The result was then confirmed using the One-Sample Kolmogorov-Smirnov Test. After transformation, the Test Statistic was 0.045 with an Asymp. Sig. (2-tailed) of 0.200. Because this value is greater than 0.05, the residuals were considered normally distributed. The Monte Carlo Sig. value of 0.552 further supports this conclusion. Thus, after data transformation, the model satisfied the normality assumption.

Multicollinearity Test

The multicollinearity test results show that all variables have Variance Inflation Factor (VIF) values ranging from 1.00 to 1.01. These values are below the applicable threshold, indicating no evidence of multicollinearity in the research model.

Heteroscedasticity Test

The heteroscedasticity test using the Glejser Test produced significance values of 0.798 for BOPO, 0.114 for ROA, 0.713 for NPL, and 0.450 for SIZE. All significance values are greater than 0.05, indicating that the model does not exhibit heteroscedasticity.

Autocorrelation Test

The autocorrelation test produced a Durbin-Watson value of 2.025. This value is close to 2, indicating that the regression model does not show evidence of autocorrelation.

Multiple Linear Regression Analysis

The regression analysis produced the following equation:

$$PBV = 0,366 - 0,313 \text{ BOPO} + 58,614 \text{ ROA} + 0,598 \text{ NPL} + 0,094 \text{ SIZE} + \varepsilon$$

The BOPO coefficient is negative, whereas the ROA, NPL, and SIZE coefficients are positive. This indicates that, in terms of direction, an increase in BOPO tends to be followed by a decrease in PBV, whereas increases in ROA, NPL, and SIZE tend to be followed by increases in PBV, assuming other variables remain constant.

Model Fit Test

The F-test produced an F value of 2,501.708 with a significance value of 0.000, which is below 0.05. Thus, the regression model is statistically significant overall and suitable for explaining the relationships among the research variables.

An Adjusted R² value of 0.983 indicates that 98.3% of the variation in firm value can be explained by the variables included in the model, while the remaining 1.7% is explained by factors outside the research model.

Hypothesis Testing

Table 3. Hypothesis Testing Results

Hypothesis	Variable	Coefficient	t	Sig.	Decision
H1	NPL → PBV	0.598	6.529	0.000	Rejected
H2	BOPO → PBV	-0.313	-57.207	0.000	Accepted
H3	ROA → PBV	58.614	80.434	0.000	Accepted

Source: Data Processed, 2026

The results show that NPL has a positive and significant effect on PBV, so H1 is rejected. BOPO has a negative and significant effect on PBV, so H2 is accepted. Meanwhile, ROA has a positive and significant effect on PBV, so H3 is accepted.

Moderation Testing

Table 4. Results of Moderated Regression Analysis

Hypothesis	Interaction	Coefficient	Sig.	Moderating Effect	Decision
H4	NPL × SIZE	0.1076	0.0002	Strengthens	Rejected
H5	BOPO × SIZE	-0.0046	0.0139	Strengthens	Accepted
H6	ROA × SIZE	0.9289	0.0008	Strengthens	Accepted

Source: Data Processed, 2026

The MRA results show that all interaction terms have significance levels below 0.05. The NPL × SIZE interaction has a positive coefficient of 0.1076, indicating that SIZE strengthens the positive relationship between NPL and PBV. Because this direction differs from H4, which predicts that SIZE weakens the negative effect of NPL on PBV, H4 is rejected.

The BOPO × SIZE interaction has a negative coefficient of -0.0046 and a significance value of 0.0139. This result indicates that SIZE strengthens the negative effect of BOPO on PBV, so H5 is accepted.

The ROA × SIZE interaction has a positive coefficient of 0.9289 with a significance value of 0.0008. This result indicates that SIZE strengthens the positive effect of ROA on PBV, so H6 is accepted.

DISCUSSION

Effect of Credit Risk on Firm Value

The results show that credit risk proxied by NPL has a positive and significant effect on firm value. This finding does not support H1, which predicts a negative effect.

This finding indicates that an increase in NPL among the banking companies in the sample is not automatically perceived as a condition that reduces firm value. Investors may consider NPL together with the bank's risk management capability and lending activities. Thus, an increase in credit risk may be viewed as part of intermediation activities that have

the potential to generate economic benefits as long as the risk remains within the bank's risk management capacity.

From the perspective of Signaling Theory, NPL information is not necessarily interpreted solely as a negative signal. Investors may assess this information together with other fundamental conditions. Meanwhile, Trade-off Theory explains that risk may provide economic benefits as long as its increase remains commensurate with the benefits obtained. The results suggest that, within the sample, the benefits of lending activities may still be more dominant in investor assessments.

Effect of Operational Efficiency on Firm Value

BOPO has a negative and significant effect on firm value, so H2 is accepted. This means that an increase in BOPO, reflecting higher operating expenses relative to operating income, is accompanied by a decrease in firm value.

This finding supports Signaling Theory because operational efficiency can serve as information used by investors to assess the quality of bank management. A higher BOPO indicates that the company requires greater expenses to generate income, which may reduce perceptions of company performance.

This finding can also be explained through Agency Theory. Management, as the agent, is responsible for managing company resources efficiently. An inability to control operating costs may indicate suboptimal resource management and ultimately reduce the economic benefits available to shareholders.

Effect of Profitability on Firm Value

Profitability proxied by ROA has a positive and significant effect on firm value, so H3 is accepted. The greater the bank's ability to generate profits through its assets, the higher its firm value.

This finding supports Signaling Theory because high profitability provides a positive signal regarding management's ability to manage assets and generate profits. Investors may use this information to form more favorable expectations about the company's prospects.

This finding is also consistent with Agency Theory because management's ability to generate profits through assets entrusted by shareholders may demonstrate successful execution of its management function. In addition, the Valuation Theory perspective used in the thesis explains that profitability is related to a company's ability to create economic benefits and future cash flows, thereby increasing firm value.

Firm Size Moderates the Effect of Credit Risk on Firm Value

The MRA results show that the $NPL \times SIZE$ interaction is significant with a positive coefficient. This means that firm size strengthens the positive relationship between NPL and firm value. Therefore, H4 is rejected.

This result indicates that larger companies may have greater resource capacity to face and manage credit risk. Therefore, an increase in NPL at large banks is not necessarily perceived negatively by investors. Firm size may provide additional information that helps investors assess a bank's ability to manage risk.

This finding demonstrates that firm size acts as a factor that changes investor responses to credit risk information. Thus, the effect of NPL on firm value is determined not

only by the level of credit risk but also by the characteristics and capacity of the company to manage that risk.

Firm Size Moderates the Effect of Operational Efficiency on Firm Value

The $\text{BOPO} \times \text{SIZE}$ interaction produces a negative and significant coefficient. This indicates that firm size strengthens the negative effect of BOPO on firm value, so H5 is accepted.

This finding indicates that the larger the company, the higher investors' expectations regarding management's ability to manage resources efficiently. When a large company exhibits high BOPO, this condition may provide a stronger signal of inefficiency because the company has relatively greater resources to support its operations.

Thus, firm size does not necessarily provide a protective effect against the negative consequences of inefficiency. In large companies, high operating costs relative to income may instead receive greater attention from investors.

Firm Size Moderates the Effect of Profitability on Firm Value

The test results show that the $\text{ROA} \times \text{SIZE}$ interaction has a positive and significant effect. Thus, firm size strengthens the positive effect of profitability on firm value, so H6 is accepted.

This result indicates that high profitability in companies with larger asset sizes receives a stronger positive response from investors. Large companies have broader resources and operational capacity, so their ability to generate profits may be viewed as an indicator of their ability to maintain performance.

From the perspective of Signaling Theory, the combination of high profitability and large firm size may provide a stronger signal regarding management quality and company prospects. Therefore, an increase in ROA at large banks tends to produce a stronger increase in firm value.

4. CONCLUSION

Based on the results, credit risk proxied by Non-Performing Loan (NPL) has a positive and significant effect on firm value, so the hypothesized negative effect is not supported. Operational efficiency proxied by BOPO has a negative and significant effect on firm value, whereas profitability proxied by Return on Assets (ROA) has a positive and significant effect on firm value. These results indicate that the firm value of banking companies is associated with their ability to manage risk, maintain operational efficiency, and generate profits.

Firm size is proven to moderate all relationships tested. Firm size strengthens the positive relationship between NPL and firm value, so H4 is not supported, and strengthens the negative effect of BOPO on firm value, so H5 is accepted. In addition, firm size strengthens the positive effect of ROA on firm value, so H6 is accepted. These findings indicate that firm scale is an important factor shaping investor responses to risk and financial performance. Therefore, banking management should pay attention to credit risk management, operational efficiency, and profitability enhancement while considering firm size characteristics to maintain and increase firm value.

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