



Analysis of the Effect of ROA, ROE, NIM, LDR, and Interest Rates on the Stock Prices of KBMI 3 and KBMI 4 Banks in Indonesia Before, During, and After the COVID-19 Pandemic (2019-2023)

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Abstract

This study is important in analyzing the effect of return on assets, return on equity, net interest margin, loan-to-deposit ratio, and interest rate on the stock prices of banks categorized under KBMI 3 and KBMI 4 in Indonesia before, during, and after the COVID-19 pandemic from a financial perspective for the period 2019-2023. This study uses a quantitative approach with panel data regression analysis to evaluate the effects of the selected financial ratios and stock prices. Data were collected from the financial reports of selected banks, with additional stock price data sourced from IDX and interest rate data from Bank Indonesia (the central bank). The analysis uses panel data regression, incorporating the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) to identify the most suitable model for this study. REM is the chosen model, and the findings reveal that ROE, interest rate, and LDR significantly influence stock prices, with ROE and interest rate having a positive effect while LDR has a negative effect. Conversely, ROA and NIM have no significant impact on stock prices within the sample. The F-test results indicate that the model is statistically significant. Banks' stock prices before, during, and after the COVID-19 pandemic are not statistically different.¹

Keywords: Interest Rate, KBMI Banks, LDR, NIM, ROA, ROE, Stock Prices

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1. Introduction

Data from the Indonesia Stock Exchange (IDX) as of January 2024 indicate that banking sector stocks, including Bank Central Asia (BBCA), Bank Rakyat Indonesia (BBRI), Bank Mandiri (BMRI), and Bank Negara Indonesia (BBNI), rank among the top ten by market capitalization. This level of investor interest underscores the sector's significance within the broader economic landscape (IDX, 2024). In this context, investment decisions, defined as the commitment of resources to assets with the expectation of future returns, have become increasingly crucial for market participants (Jones, 2014).

The banking industry in Indonesia has undergone significant changes in categorization, shifting from the previous BUKU classification system based on the core capital (KBMI) to the latest regulation, POJK No. 12/POJK.03/2021. Under this regulation, banks are grouped into four categories based on their core capital, with KBMI 3 and KBMI 4 banks the focus of this study. KBMI 3 includes prominent banks such as PT Bank CIMB Niaga Tbk, Bank OCBC NISP, PT Bank Permata Tbk, and PT Bank Danamon Indonesia Tbk, while KBMI 4 includes major banks such as Bank Central Asia, Bank Rakyat Indonesia, Bank Mandiri, and Bank Negara Indonesia. The COVID-19 pandemic had a profound impact on the global economy, including Indonesia's banking sector. From its onset in March 2020, as declared by the World Health Organization (WHO), to its official conclusion in May 2023, the pandemic created challenges such as economic disruptions, decreased loan demand, and increased non-performing loans due to widespread financial instability (WHO, 2023). These challenges necessitated a re-evaluation of the factors influencing stock prices in the banking sector.

Key financial ratios, including Return on Assets (ROA), Return on Equity (ROE), Net Interest Margin (NIM), Loan to Deposit Ratio (LDR), and interest rates, are widely recognized as critical determinants of a bank's financial health and its influence on stock prices. Previous studies have yielded mixed results on how these variables affect stock prices. For example, Aswal and Sharma (2020) found that ROE positively influences stock prices, while Parapat et al. (2022) observed that NIM has a positive but statistically insignificant effect on stock prices. Additionally, Chucks et al. (2021) reported that interest rates have an insignificant and negative impact on share prices.

Based on this context, research analyzing the determinants of stock prices for banks in the KBMI 4 and KBMI 3 categories during 2019-2023 is important for understanding market dynamics and helping investors make more informed decisions.

2. Literature Review

The causal relationship between financial ratios and stock prices in the banking sector has been extensively studied, with researchers reporting mixed results.

Return on Assets (ROA) and Stock Prices

ROA is a profitability ratio that measures how efficiently a company uses its assets to generate earnings. Prior studies have shown varying degrees of influence of ROA on stock prices. Adhi Widyakto et al. (2023) found that ROA has a significant effect on the prices of banking stocks listed on the Indonesia Stock Exchange. Similarly, Kusumawardhani and Yuninda (2021) found that ROA and asset growth have positive and significant effects on stock prices. Additionally, Digdowiseiso (2021) found that ROA had a positive and significant effect on banking stock prices.

Furthermore, Olimsar et al. (2022) found that ROA partially affects stock prices. In contrast, Choiriyah et al. (2020) found no significant effect of ROA on stock prices. Moreover, Said et al.

(2019) found that ROA does not affect banking stock prices. Their findings indicate a negative and statistically insignificant correlation between ROA and banking stock prices. Based on the description above, the hypothesis in this study is:

H1: ROA does not significantly affect the stock prices of KBMI 3 and KBMI 4 category banks in Indonesia.

Return on Equity (ROE) and Stock Prices

ROE measures a company's profitability relative to shareholders' equity and is often used as an indicator of financial performance. A study by Azmeh and Hamada (2022) found that ROE had a negative effect on stock prices in the banking sector. This effect was significant for fully listed banks in the Abu Dhabi and Dubai markets. Similarly, Wijaya et al. (2021) concluded that ROE significantly affected the stock prices of banking companies listed on the Indonesia Stock Exchange during 2017-2019. Hakim and Susilowati (2023) also found that ROE positively and significantly influences the stock prices of banking companies listed on the Indonesia Stock Exchange. In contrast, Wibowo et al. (2022) examined the impact of Return on Equity (ROE), earnings per share (EPS), and net profit margin on the stock prices of banking companies listed on the Indonesia Stock Exchange from 2018 to 2020. Their findings revealed that ROE did not significantly influence the stock prices of these banking companies during the specified period. Based on the description above, the hypothesis in this study is:

H2: ROE does not significantly affect the stock prices of KBMI3 and KBMI4 category banks in Indonesia.

NIM and Stock Prices

NIM is a financial metric that assesses how effectively a financial institution, such as a bank, earns net income from its lending activities relative to the expenses incurred to obtain funds. Catriwati (2017) found that NIM significantly and positively affects stock prices. Similarly, Widyakto et al. (2023) found that NIM significantly affects banks' stock prices on the Indonesia Stock Exchange. By contrast, Ariana et al. (2023) concluded that NIM did not significantly affect the stock prices of banks listed on the Indonesia Stock Exchange during the 2019-2021 period. This suggests that NIM did not influence share prices in that timeframe. Akbar, A. B. (2019) found that NIM had a negative but insignificant effect on the stock prices of BUMN banks from 2008 to 2015. Based on the above, the hypothesis in this study is:

H3: NIM does not significantly affect the stock prices of KBMI 3 and KBMI 4 category banks in Indonesia

Interest Rates and Stock Prices

Interest rates are the percentage cost of borrowing, calculated as a proportion of the principal over a specific period. Interest is the price the borrower pays the lender for using the funds. Research on the impact of interest rates on stock prices has produced mixed findings. Ugha et al. (2023) demonstrated a positive and significant effect of interest rates on stock prices, suggesting that rising interest rates can lead to higher stock prices. However, other studies have reported contrasting results. Rachmawati (2018) found that interest rates negatively affect banking stock prices, indicating that higher interest rates may lead to lower stock prices in the banking sector. Similarly, Sugeng et al. (2019) identified a negative correlation between the BI rate and stock market performance, highlighting the detrimental effect of increased interest rates on stock prices.

These discrepancies underscore the complexity of the relationship between interest rates and stock prices, which may vary by context and sector. Therefore, the hypothesis proposed in this study is:

H4: Interest rate significantly and positively affects the stock prices of KBMI 3 and KBMI 4 category banks in Indonesia.

Loan to Deposit Ratio (LDR) and Stock Prices

The LDR measures a bank's liquidity, indicating the proportion of loans relative to deposits. Previous studies on the effect of the LDR on banking stock prices have yielded mixed results. Wahyudhianty and Diyani (2023) found that LDR has a significant partial effect on stock prices, suggesting that higher LDR values are associated with notable changes in banking stock prices. In contrast, Digdowiseiso (2019) observed a positive but statistically insignificant effect of LDR on stock prices for several banks listed on the IDX from 2015 to 2019. Similarly, Djamaluddin Said and colleagues concluded that LDR does not significantly affect banking stock prices. Aryanti et al. (2022) also reported that statistical tests indicated no significant impact of LDR on banking stock prices. These varying results highlight the complexity of the relationship between LDR and stock prices and suggest that other factors may also play a crucial role in determining stock price movements. Based on the description above, the hypothesis in this study is:

H5: Loan to Deposit Ratio (LDR) significantly and negatively affects the stock prices of KBMI 3 and KBMI 4 category banks in Indonesia.

Based on the literature review above, the sixth hypothesis is developed for testing as follows:

H6: ROA, ROE, NIM, Interest rate, and LDR variables simultaneously have a significant influence on the Stock Prices of KBMI 3 and KBMI 4 category banks in Indonesia.

3. Methods

The dependent variable is the Stock Prices of KBMI 3- and KBMI 4-category banks in Indonesia. This study employs a quantitative research method. According to Creswell (2009), quantitative research evaluates objective concepts by examining the correlation between variables. Table 1 presents the measurement variables in this research.

Table 1. Operational Definition

Variable	Definition	Formula
Stocks	Stocks can be defined as a sign of capital participation by an individual or entity (business organization) in a company or limited liability corporation. By contributing capital, the party has a claim on the company's earnings, a claim on the company's assets, and the right to attend the General Meeting of Shareholders (GMS).	$\frac{\text{Stock Closing Price}}{\text{price per quarter}} =$

ROE	ROE is a metric used to compare a company's net income with the total capital invested by investors/owners.	$= \frac{\text{Return on Equity Net Income (annual)}}{\text{Shareholders' Equity}}$
ROA	Return on Assets (ROA) is a profitability ratio that measures a company's ability to generate profit from its total assets.	$= \frac{\text{Return on Assets Net Income}}{\text{Total Assets}}$
NIM	Net Interest Margin (NIM) is a metric that assesses the difference between the interest income a bank generates and the interest it pays to its creditors.	$= \frac{\text{Net Interest Margin IR} - \text{IE}}{\text{Average Earning Assets}}$
LDR	This ratio assesses a bank's liquidity and measures its banking intermediation function. The Loan to Deposit Ratio (LDR) compares total loans disbursed with total funds received.	$= \frac{\text{Loan to Deposit Ratio Total Loans}}{\text{Total Deposits}}$
Interest Rates	Interest rates represent the cost of borrowing money as a percentage of the principal amount over a specific period. Bank Indonesia has the authority to set the scope of monetary policy tools to maintain Rupiah stability. It also sets its own benchmark interest rate, referred to as the BI Rate.	

The data used in this research is secondary. Secondary data, as defined by Kothari, C. R. (2004), are information that has already been collected and evaluated by others and is readily available. Stock data are obtained from the Indonesia Composite Stock Price Index, while historical price data for each bank are taken from Yahoo Finance. Furthermore, the statistics for ROA, ROE, NIM, and LDR are sourced from the officially released financial statements of banks categorized under the KBMI 3 and KBMI 4 classifications. Interest rate data were obtained from Bank Indonesia (the central bank).

The data analysis was conducted in several stages starting with Descriptive Analysis. This step summarizes the collected data, outlining the trends in stock prices and financial ratios (ROA, ROE, NIM, LDR, and interest rates) over the study period. The next step is to test the Common Effect Model (CEM), Fixed Effect Model (FEM), and Random Effect Model (REM) to determine the best fit for the data. Several tests are conducted. The first is Chow Test. In panel data regression, the Chow test determines whether to use the Fixed Effect Model (FEM) or the Common Effect Model (CEM). This test uses an F-statistic to assess the significance of the FEM (Madany et al., 2022). The second is Hausman Test. The Hausman test helps in deciding between REM and FEM by examining whether there is any correlation between the errors in the model and one or more of the explanatory (independent) variables. The null hypothesis for this test asserts that there is no correlation between

the explanatory variables and the model errors. (Madany et al., 2022). The third is Lagrange Multiplier (LM) Test. Breusch and Pagan created the Lagrange Multiplier (LM) test, which is also known as the significance test for random effects. This test assesses whether the Random Effect Model provides a better fit than the Common Effect Model.

The Classical Assumption Test is also conducted. This is to ensure validity of the regression model, this study performs tests for normality and multicollinearity. The normality test checks whether the data follows a normal distribution, while the multicollinearity test assesses if there are strong correlations between independent variables. Furthermore, Multiple regression analysis is performed. It aims to understand how changes in the independent variables influence the dependent variable. The formula for the multiple regression analysis is as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Where:

Y : Stock Price

β_0 : Constant

$\beta_1 - \beta_5$: Regression coefficient

X_1 : ROA

X_2 : ROE

X_3 : NIM

X_4 : Interest Rate

X_5 : LDR

ϵ : Random error

Lastly, F-test, T-test and Coefficient of Determination (R^2) are assessed to evaluate whether all independent variables simultaneously affect the stock prices, measure the impact of each independent variable on stock prices and determine how much of the variance in stock prices is explained by the variance of the independent variables respectively.

4. Results and Discussion

Descriptive Analysis

The descriptive analysis reveals notable variations in stock prices, ROA, ROE, NIM, interest rates, and LDR among the banks studied.

Table 2. Descriptive Analysis

	ROA	ROE	NIM	IR	LDR	STOCK_PRICES
Mean	1.055 827	0.124 657	2.839 071	0.046 375	0.900 135	3106.555
Median	0.021 2	0.113 35	0.048 55	0.043 75	0.852 95	2730
Maximum	186	0.273 1	502	0.06	1.690 9	9400

Minimum	0.0054	0.0004	0.0362	0.035	0.6054	615
Std. Dev.	13.86194	0.058399	37.43131	0.00988	0.214487	2079.001

The descriptive data in Table 2 reveal the characteristics of the analyzed variables, namely ROA, ROE, NIM, Interest Rate, LDR, and Stock Price, collected quarterly from 2019 to 2023. These data reflect the distribution of values for each variable, covering the minimum, maximum, mean, and variation (standard deviation) over the specified time. There are four variables in the Std. Dev less than mean; these indicate that the variable values cluster closely around the mean, except for ROA and NIM.

Table 3. The Kruskal-Wallis test

	STOCKS_PRICE
Kruskal-Wallis H	.691
Df	2
Asymp. Sig.	.708

The Kruskal-Wallis test examined whether stock prices differed significantly across three periods (before, during, and after the pandemic) from 2019 to 2023. The test shows a Kruskal-Wallis H value of 0.691 and a significance level (Asymp. Sig.) of 0.708, which is greater than 0.05. This indicates no statistically significant difference in stock prices over the three periods.

Panel Data Method Estimation

Chow Test

Table 4. Chow Test Result

Effects Test	Statistic	d.f	Prob
Cross-section F	67.093189	(8,166)	0.0000
Cross-section Chi-Square	259.741265	8	0.0000

The Cross-section Chi-Square probability in the Chow test results table is 0.0000, which is below 0.05. Therefore, the Fixed Effect Model (FEM) is selected, leading to the next step of performing the Hausman test.

Hausman Test

Table 5. Hausman Test Result

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob
Cross-section random	9.040028	5	0.1075

According to the Hausman test results, since the Cross-section random probability is 0.1075, which exceeds 0.05, the Random Effect Model (REM) is the appropriate model.

Lagrange Multiplier Test

Table 6. Lagrange Multiplier Test Result

	Cross-section	The Hypothesis Time	Both
Breusch-Pagan	751.5606 (0.0000)	1.885867 (0.1697)	753.4465 (0.0000)

Based on the LM test results, with a Breusch-Pagan value of 0.000 (below 0.05), the Random Effect Model is chosen for this analysis.

Classical Assumption Test

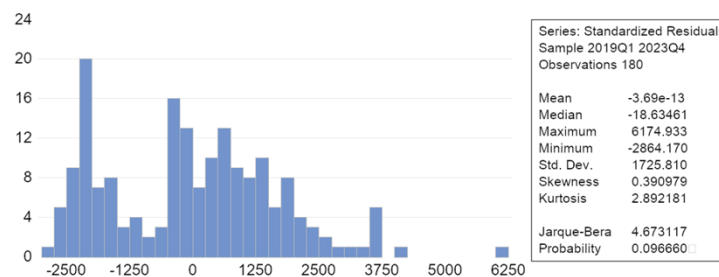


Figure 1. Normality Test

The probability value in the histogram is 0.09660, which exceeds the 0.05 significance level. Therefore, the distribution of both the independent and dependent variables in this study follows a normal distribution.

Table 7. Multicollinearity Test

	ROA	ROE	NIM	IR	LDR
ROA	1.000000	-0.022922	-0.005621	-0.085232	-0.056334
ROE	-0.022922	1.000000	-0.015488	0.260581	-0.238922
NIM	-0.005621	-0.015488	1.000000	-0.010297	0.014975
IR	-0.085232	0.260581	-0.010297	1.000000	0.127035
LDR	-0.056334	-0.238922	0.014975	0.127035	1.000000

According to Widarjono (2013, as cited in Oktafia & Apry, 2020), the correlation coefficient between independent variables should have an absolute value below 0.85, indicating no multicollinearity issues. Since none of the independent variables show a correlation greater than 0.85 and the model does not present multicollinearity, the entire matrix can still be considered indicative of a reliable regression model.

Hypothesis Testing

Table 8. Results of Panel Data Regression Analysis Using the REM Model

Dependent Variable: Y
 Method: Panel EGLS (Cross-section random effects)
 Date: 08/23/24 Time: 13.13
 Sample: 2019Q1 2023Q4
 Periods included: 20
 Cross-sections included: 9
 Total panel (balanced) observations: 180
 Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob
C	2899.187	866.8551	3.344488	0.0010
ROA	-0.747374	4.292732	-0.174102	0.8620
ROE	12027.48	1910.505	6.295446	0.0000
NIM	-0.451203	1.592220	-0.283380	0.7772
IR	24486.45	7063.390	3.466671	0.0007
LDR	-2694.521	877.9414	-3.069136	0.0025
Effects Specification				
			S.D.	Rho
Cross-section random			1293.966	0.7364
Idiosyncratic random			774.2598	0.2636
Weighted Statistics				
R-squared	0.340993	Mean dependent var		411.9791
Adjusted R-squared	0.322056	S.D. dependent var		953.8720
S.E. of regression	785.3933	Sum squared resid		1.07E+08
F-statistic	18.00669	Durbin-Watson stat		0.900434
Prob (F-statistic)	0.000000			
Unweighted Statistics				
R-squared	0.310909	Mean dependent var		3106.555
Sum squared resid	5.33E+08	Durbin-Watson stat		0.161143

The above is the result of panel data regression with the REM model, which produces the following regression equation:

$$Y = 2899.18669209 - 0.747373592767ROA + 12027.4826455ROE - 0.451203399851NIM + 24486.4484557IR - 2694.52125241LDR + \varepsilon$$

Discussion

For the ROA variable (X_1), the analysis yields a coefficient of -0.747374, a T-statistic of -0.174102, and a probability (Prob.) of 0.8620. This negative coefficient suggests that a one-unit increase in X_1 is expected to reduce the dependent variable by 0.747374 units. A probability value of 0.8620 exceeds the 0.05 significance level, indicating that the ROA variable does not significantly influence the stock prices of KBMI 3 and KBMI 4 category banks. This result suggests that stock price variation is driven by supply and demand (Anisa et al., 2022). In the short term, stock price movements are not directly affected by ROA, since banks' financial statements are issued after the accounting period closes.

The ROE variable (X_2) has a coefficient of 12027.48, a t-statistic of 6.295446, and a probability (Prob.) of 0.0000. The positive coefficient indicates that an increase of 1 unit in X_2 is predicted to increase the dependent variable by 12027.48 units. A probability value of 0.0000 is below the 0.05 significance level, suggesting that the result is statistically significant.

The NIM variable (X_3) has a coefficient of -0.451203, a T-statistic of -0.283380, and a probability of 0.7772. This negative coefficient suggests that a one-unit increase in X_3 will reduce the dependent variable by 0.451203 units. However, the probability of 0.7772 exceeds the 0.05 significance level, indicating that this result is not statistically significant.

The analysis of the Interest Rate variable (X_4) shows a coefficient of 24486.45, a T-statistic of 3.466671, and a probability (Prob.) of 0.0007. The positive coefficient indicates that a 1-unit increase in X_4 is predicted to increase the dependent variable by 24486.45 units. The probability value of 0.0007 is well below the 0.05 significance threshold, indicating that the result is statistically significant.

The analysis of the LDR variable (X_5) shows a coefficient of -2694.521, a T-Statistic of -3.069136, and a probability (Prob.) of 0.0025. The negative coefficient indicates that a 1-unit increase in X_5 is predicted to reduce the dependent variable by 2694.521 units. The probability of 0.0025 is below the 0.05 significance level, indicating that this result is statistically significant.

Based on the F-test results, the model has an F-statistic of 18.00669 with a p-value of 0.000000. This indicates that the overall regression model is statistically significant, suggesting that ROA, ROE, NIM, Interest Rate, and LDR simultaneously and significantly influence the stock prices of KBMI 3 and KBMI 4 category banks.

According to the data presented in Table 8, the adjusted R-squared value is 0.322056, signifying that the variation of independent variables, ROA, ROE, NIM, Interest Rates, and LDR, explain 32.20% of the variation in the dependent variable. Unexamined factors influence the remaining 67.80% of the variation in this research.

5. Conclusion

This study examines how financial performance indicators, including ROA, ROE, NIM, LDR, and Interest Rate, affect the stock prices of banks in KBMI 3 and KBMI 4 from 2019 to 2023. The analysis covers three key periods: pre-pandemic (2019), the COVID-19 pandemic—from WHO's March 11, 2020, declaration to its end on May 5, 2023—and the post-pandemic phase (late 2023). The Kruskal-Wallis test shows no significant difference in stock prices across these periods. The findings indicate that ROE, Interest Rate, and LDR significantly influence stock prices, with ROE and Interest Rate showing a positive relationship and LDR a negative one. Conversely, ROA and NIM have no significant impact on stock prices in the sample. The F-test indicates that the model is statistically significant. This conclusion is further supported by the Adjusted R-squared value of 0.322056, which is moderate and indicates that approximately 32.20% of the variation in stock prices can be explained by the variation in the independent variables included in the model. Future studies could examine the impact of these variables on other sectors or extend the analysis to a longer time frame. Researchers may also consider including additional variables, such as market sentiment or economic indicators, to gain a more comprehensive understanding of stock price determinants.

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