



INTERNAL AND EXTERNAL DETERMINANTS OF PROFITABILITY: EVIDENCE FROM KBMI 4 BANKS IN INDONESIA

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ABSTRAK

Penelitian ini menganalisis faktor-faktor yang memengaruhi profitabilitas bank di Indonesia dengan fokus bank kategori KBMI 4 periode 2017–2024. Profitabilitas diukur menggunakan Return on Assets (ROA) dan Return on Equity (ROE) untuk menggambarkan kinerja dari sisi pemanfaatan aset dan perspektif pemegang saham. Penelitian menggunakan data panel triwulanan dengan metode Fixed Effect Model dan robust standard errors untuk menguji pengaruh faktor eksternal dan internal profitabilitas bank. Faktor eksternal yang dianalisis meliputi BI Rate dan inflasi, sedangkan faktor internal meliputi efisiensi operasional (BOPO), risiko kredit (Non-Performing Loans/NPL), struktur modal (Total Assets terhadap Total Equity), dan ukuran bank. Selain itu, digunakan variabel dummy Covid-19 untuk mengontrol dampak pandemi. Hasil penelitian menunjukkan bahwa faktor internal bank lebih dominan dalam menentukan profitabilitas dibandingkan faktor makroekonomi eksternal. Efisiensi operasional dan risiko kredit memiliki pengaruh negatif dan signifikan terhadap ROA dan ROE, sehingga peningkatan biaya operasional dan penurunan kualitas aset dapat menurunkan profitabilitas bank. Struktur modal dan ukuran bank berpengaruh negatif signifikan terhadap ROA, namun tidak signifikan terhadap ROE. Sementara itu, BI Rate dan inflasi tidak berpengaruh signifikan terhadap kedua ukuran profitabilitas. Variabel Covid-19 menunjukkan pengaruh positif dan signifikan terhadap ROA, namun tidak terhadap ROE, yang mengindikasikan bahwa dukungan kebijakan selama pandemi membantu menjaga kinerja operasional bank.

Kata kunci: Keuntungan Bank; ROA; ROE; KBMI 4; Data Panel

ABSTRACT

This study analyzes factors influencing bank profitability in Indonesia, focusing on KBMI 4 category banks period 2017–2024. Profitability is measured using Return on Assets (ROA) and Return on Equity (ROE) to reflect performance from perspectives of asset utilization and shareholders. The study uses quarterly panel data and applies Fixed Effect Model with robust standard errors to examine influence of external and internal factors on bank profitability. External factors include BI Rate and inflation, while internal factors consist of operational efficiency (BOPO), credit risk measured by Non-Performing Loans (NPL), capital structure measured by Total Assets to Total Equity, and bank size. A Covid-19 dummy variable is also included to control for impact of pandemic. The results show that internal bank factors are more dominant than external macroeconomic in determining profitability. Operational efficiency and credit risk have a negative and significant effect on both ROA and ROE. Capital structure and bank size negatively and significantly affect ROA but are not significant for ROE. Meanwhile, BI Rate and inflation do not significantly influence either profitability measure. The Covid-19 variable has a positive and significant effect on ROA but not on ROE, indicating that policy support during pandemic helped maintain banks' operational performance.

Keywords: *Bank Profitability; ROA; ROE; KBMI 4; Panel Data*

I. INTRODUCTION

The banking sector plays a strategic role in the Indonesian economy through its financial intermediation function, the maintenance of financial system stability, and the transmission of monetary policy. Banks mobilize funds from the public and channel them to productive sectors, making banking performance a key determinant of sustainable national economic growth (Jusni et al., 2019; Karamoy & Tulung, 2020). A sound banking system also contributes to financial stability through effective credit risk and liquidity management, particularly in the face of economic pressures and global uncertainty (Kalkan, 2025; Sewanyina et al., 2025).

Within Indonesia's banking industry structure, KBMI 4 banks with the largest core capital play a systemic role, as they account for more than half of total national banking assets (Otoritas Jasa Keuangan, 2025). These banks not only dominate market share but also serve as key pillars of financial system stability and as the primary channels of monetary policy transmission, particularly through interest rate mechanisms and liquidity management (Gumilang et al., 2025; Utari & Viverita, 2024). The characteristics of large banks, including substantial asset size, broader income diversification, and greater operational complexity, imply that the determinants of profitability for KBMI 4 banks may differ from those of smaller banks (Bikker & Vervliet, 2018; Kumar & Bird, 2020). Given their dominant position, fluctuations in the profitability of KBMI 4 banks affect not only internal banking performance but also market confidence and overall macroeconomic resilience.

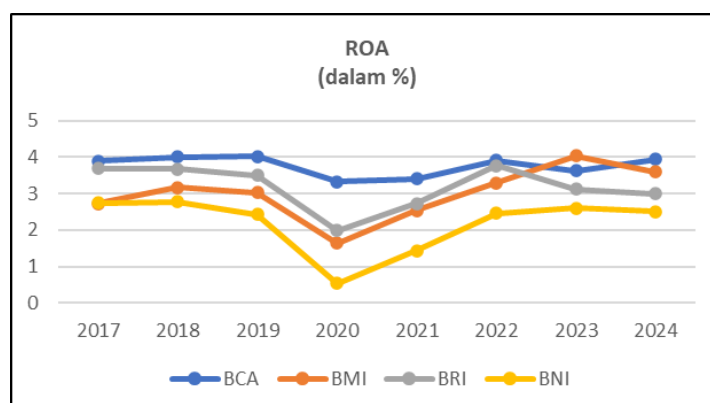


Figure 1. Trends in ROA of KBMI 4 Banks (2017–2024)

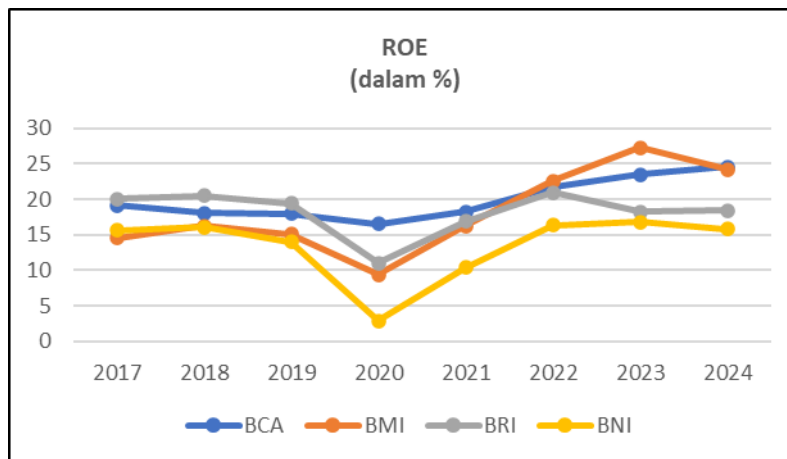


Figure 1. Trends in ROA of KBMI 4 Banks (2017–2024)

Figures 1 and 2 present the fluctuations in Return on Assets (ROA) and Return on Equity (ROE) of KBMI 4 banks over the period 2017–2024. Both profitability indicators exhibit relatively stable movements during the pre-pandemic period, followed by a marked decline during the Covid-19 shock, reflecting a deterioration in bank performance amid heightened credit risk and weakened economic activity. In the post-pandemic phase, ROA and ROE gradually recover, although their movements remain volatile, indicating ongoing adjustments to changing macroeconomic conditions and monetary policy tightening. These fluctuations suggest that bank profitability is shaped not only by external economic shocks but also by internal bank-specific factors, underscoring the importance of examining both internal and external determinants across different economic phases.

The period 2017–2024 represents a critical phase for Indonesia’s banking industry, encompassing the pre-pandemic period, the Covid-19 shock, and the subsequent recovery accompanied by monetary policy tightening. The Covid-19 pandemic exerted significant pressure on banking performance through increased credit risk, declining interest margins, and a slowdown in credit demand due to contractions in economic activity (Nurdiniah & Pangestu, 2024; Rohman et al., 2022). At the same time, fiscal and monetary stimulus measures, including credit restructuring policies and liquidity provision, played an important role in mitigating the decline in banking profitability during the crisis period (Bank Indonesia, 2022; Otoritas Jasa Keuangan, 2020). In the post-pandemic phase, the shift toward tighter monetary policy has reintroduced challenges for banks in balancing risk,



efficiency, and profitability amid rising inflationary pressures and global uncertainty (Farooq et al., 2021; Utari & Viverita, 2024).

From a theoretical perspective, bank profitability is influenced by both external and internal factors. External factors such as policy interest rates and inflation affect funding costs, credit demand, and asset quality through monetary policy transmission mechanisms, including the interest rate channel and the bank lending channel (Mishkin, 2016). Internal factors, such as operational efficiency, credit risk, capital structure, and bank size, reflect managerial capability in allocating resources and managing risk to maximize profits, as outlined in *A Theory of the Banking Firm* (Klein, 1971). However, the relationship between these factors and bank profitability is not always linear or uniform across different economic periods.

Empirical studies on the determinants of bank profitability report mixed findings for both external and internal factors. With respect to external factors, BI Rate has been found to positively affect bank profitability by enhancing net interest margins (Priharta & Gani, 2023). Conversely, other studies document negative effects due to higher funding costs and weaker credit demand (Bikker & Vervliet, 2018), or insignificant effects, particularly during crisis periods when monetary policy transmission weakens (Farooq et al., 2021). Similar inconsistencies are observed for inflation, which has been reported to positively affect profitability under moderate inflation conditions (Mariska et al., 2025), negatively affect profitability by increasing operational costs and credit risk (Fitriany & Nawawi, 2021), or exert no significant effect in countries with relatively strong macroeconomic stability (Nawir et al., 2025).

Regarding internal factors, empirical evidence is also not entirely uniform. Operational efficiency, commonly measured by the BOPO ratio, and credit risk proxied by non-performing loans (NPL) are relatively consistently found to have a negative impact on bank profitability (Do et al., 2020; Rustendi & Ilyas, 2023). In contrast, the effects of capital structure measured by the Total Assets to Total Equity (TA/TE) ratio vary across studies, with positive (Nouaili & Khemiri, 2025), negative (Utari & Viverita, 2024), and insignificant results (Kosumi & Zharku, 2024). Similarly, bank size has been associated with positive effects through economies of scale (Kumar & Bird, 2020), negative effects due to managerial inefficiencies and operational complexity (Saputro et al., 2022), or insignificant effects in certain contexts (Kosumi & Zharku, 2024). These inconsistencies indicate that



the relationship between internal factors and bank profitability is highly contingent on bank characteristics, market structure, and the observation period.

Based on the mixed empirical evidence and the systemic role of KBMI 4 banks in Indonesia's banking industry, this study is highly relevant in providing updated empirical insights. This study aims to examine the effects of external factors, namely the Bank Indonesia policy rate and inflation, and internal factors, including operational efficiency, credit risk, capital structure, and bank size, on the profitability of KBMI 4 banks in Indonesia. Bank profitability is measured using ROA and ROE to capture asset efficiency and equity returns. By incorporating a Covid-19 dummy variable as a control, this study seeks to provide a more comprehensive understanding of the determinants of profitability of large banks in Indonesia over the period 2017–2024.

II. LITERATURE REVIEW

2.1 Theoretical Framework

This study is grounded in A Theory of the Banking Firm proposed by Klein (1971), which views banks as financial intermediaries oriented toward profit maximization. Within this framework, bank profitability is determined by management's ability to balance fund mobilization and credit allocation while considering risk, cost efficiency, and market as well as macroeconomic conditions. Banks make optimal decisions on both the asset and liability sides to achieve maximum profit, implying that internal factors such as operational efficiency, credit risk, capital structure, and business scale are key determinants of profitability performance.

In addition, this study is supported by the theory of monetary policy transmission mechanisms as explained by Mishkin (2016). Through the interest rate channel, changes in policy interest rates affect banks' funding costs and lending rates, thereby influencing interest margins and profitability. Through the bank lending channel, monetary policy affects banks' lending capacity by altering liquidity conditions. Meanwhile, the balance sheet channel explains how macroeconomic conditions, such as inflation, influence asset quality and credit risk, which ultimately affect bank profitability. Accordingly, this framework provides a theoretical basis for the inclusion of macroeconomic variables such as BI Rate and inflation as indirect determinants of bank profitability through changes in intermediation behavior and risk exposure.



2.2 Bank Profitability

Profitability is a primary indicator of bank financial performance, reflecting a bank's ability to generate sustainable earnings over time. It indicates the extent to which banks can utilize their assets and capital to generate income while maintaining financial stability (Puspitasari et al., 2021). In this study, bank profitability is assessed using ROA and ROE, which capture profitability from the perspectives of asset efficiency and shareholders' returns, respectively (Elseoud et al., 2020; Rustendi & Ilyas, 2023). The use of these indicators allows for a more comprehensive assessment of bank profitability by simultaneously reflecting managerial performance and equity returns.

2.3 External Factors and Bank Profitability

External factors commonly examined in studies of bank profitability include policy interest rates and inflation. According to the theory of monetary policy transmission, changes in policy interest rates influence bank profitability through their effects on funding costs, net interest margins, and credit demand (Mishkin, 2016). Empirical evidence on the relationship between policy interest rates and bank profitability remains mixed. Some studies report a positive effect due to improved net interest margins (Priharta & Gani, 2023), while others find a negative effect resulting from higher funding costs and weakened credit demand (Bikker & Vervliet, 2018), or insignificant effects during crisis periods when monetary policy transmission weakens (Farooq et al., 2021).

Inflation is another macroeconomic variable that potentially affects bank profitability. Moderate inflation may enhance bank revenues through credit growth and interest rate adjustments, whereas high inflation can increase operating costs and credit risk (Fitriany & Nawawi, 2021). Empirical studies report inconsistent results, with inflation found to have positive (Mariska et al., 2025), negative (Fitriany & Nawawi, 2021), or insignificant effects on bank profitability (Nawir et al., 2025).

2.4 Internal Factors and Bank Profitability

Internal factors reflect management's ability to efficiently allocate resources and manage risks to achieve optimal profitability. Operational efficiency, measured by BOPO, is one of the most important determinants of bank profitability. A higher BOPO ratio indicates higher cost burdens, which ultimately reduce bank profits (Febrianto et al., 2022; Rustendi & Ilyas, 2023). Numerous



studies consistently show that BOPO has a significant negative effect on ROA and ROE (Siauwijaya et al., 2023).

Credit risk, proxied by NPL, is also negatively associated with bank profitability. An increase in NPL reflects deteriorating asset quality, leading to lower interest income and higher loan loss provisions (Do et al., 2020). This finding is consistent with studies by Jasman & Murwaningsari (2022), which identify credit risk as one of the most dominant factors affecting bank profitability.

Capital structure, measured by TA/TE, reflects the degree of leverage used by banks to support asset expansion. While optimal leverage may enhance profitability, excessive leverage can increase risk and suppress earnings performance (Utari & Viverita, 2024). Prior empirical studies report mixed effects of capital structure on bank profitability, including positive (Nouaili & Khemiri, 2025), negative (Utari & Viverita, 2024), and insignificant relationships (Kosumi & Zharku, 2024).

Bank size is often associated with the concept of economies of scale, whereby larger banks benefit from greater efficiency and income diversification (Kumar & Bird, 2020). However, excessive size may also generate diseconomies of scale due to increased organizational complexity and managerial costs (Saputro et al., 2022). Empirical evidence suggests that the effect of bank size on profitability remains inconclusive, with positive, negative, and insignificant findings depending on the context and period of observation (Kosumi & Zharku, 2024)

III. RESEARCH METHODOLOGY

3.1 Data and Sample

This study employs panel data, combining cross-sectional and time-series observations. The data are quarterly and cover the period from 2017 to 2024. The research sample consists of four banks classified under KBMI 4, namely Bank Rakyat Indonesia (BRI), Bank Central Asia (BCA), Bank Mandiri, and Bank Negara Indonesia (BNI). The selection of KBMI 4 banks is based on their systemic importance in Indonesia's banking industry and their dominance in terms of total national banking assets.

Internal bank data include ROA, ROE, BOPO, NPL, TA/TE, and Size, which are obtained from the quarterly financial statements of each bank. External data, consisting of the BI Rate and inflation, are sourced from official publications of Bank Indonesia. Macroeconomic data available on a monthly

basis are converted into quarterly data by using quarterly averages to ensure consistency with banks' financial reporting periods.

3.2 Definition and Measurement of Variables

The dependent variable in this study is bank profitability, measured using ROA and ROE. ROA captures a bank's ability to generate profits from its total assets, while ROE reflects the return earned by shareholders on invested equity.

The independent variables consist of external and internal factors. External factors include the BI Rate and inflation. Internal factors comprise operational efficiency proxied by BOPO, credit risk measured by NPL, capital structure measured by the TA/TE ratio, and bank size measured by the natural logarithm of total assets (Size). In addition, a Covid-19 dummy variable is included as a control variable, taking a value of 1 during the pandemic period (2020–2022) and 0 otherwise, to capture the impact of the Covid-19 crisis on bank profitability.

Variabels	Unit	Proxy / Measurement	Data sources
ROA	Percentage	Net Profit / Total Assets	Financial Statements
ROE	Percentage	Net Profit / Total Equity	Financial Statements
BI RATE	Percentage	Bank Indonesia Policy Rate	Bank Indonesia
INFLASI	Percentage	Quarterly Inflation Rate	Bank Indonesia
BOPO	Percentage	Operating Expenses / Operating Income	Financial Statements
NPL	Percentage	Non-Performing Loans / Total Loans	Financial Statements
TA/TE	Percentage	Total Assets / Total Equity	Financial Statements
SIZE	IDR	Natural Logarithm of Total Assets	Financial Statements

Table 1. Description Variables

3.3 Data and Sample

This study employs panel data regression as the main analytical method. The use of panel data allows for controlling unobserved heterogeneity across banks and improves estimation efficiency compared to pure cross-sectional or time-series approaches (Gujarati & Porter, 2009). Panel data regression is particularly suitable for banking studies, as it captures both cross-bank differences and time dynamics in profitability.



To determine the most appropriate estimation model, the Chow test and the Hausman test are conducted. The results of these tests indicate that the Fixed Effect Model (FEM) is the most suitable specification for this study. Accordingly, FEM is employed to estimate the relationship between external and internal factors and bank profitability.

The panel regression models estimated in this study are specified as follows:

Model 1:

$$ROA_{it} = \alpha + \beta_1 BIR_{it} + \beta_2 INF_{it} + \beta_3 NPL_{it} + \beta_4 BOPO_{it} + \beta_5 TA/TE_{it} + \beta_6 \ln SIZE_{it} + \beta_7 D_COVID_{it} + \epsilon_{it}$$

Model 2:

$$ROE_{it} = \alpha + \beta_1 BIR_{it} + \beta_2 INF_{it} + \beta_3 NPL_{it} + \beta_4 BOPO_{it} + \beta_5 TA/TE_{it} + \beta_6 \ln SIZE_{it} + \beta_7 D_COVID_{it} + \epsilon_{it}$$

In Which:

ROA	= Return on Asset
ROE	= Return on Equity
α	= constant term
β	= regression coefficient of the independent variables
i	= KBMI 4 banks
t	= observation period (2017–2024)
ϵ	= error term
BIR	= BI Rate
INF	= Inflation
NPL	= Non Performing Loan
BOPO	= operating expenses to operating income
TA/TE	= Total Asset to Total Equity
lnSIZE	= Natural Logarithm of Total Assets
D_Covid	= Dummy Covid 2020 – 2022

In both models, the Covid-19 dummy variable is included as a control variable. Classical assumption tests are conducted to ensure model validity, with a focus on multicollinearity and heteroskedasticity tests. As the test results indicate the presence of heteroskedasticity, the regression models are estimated using robust standard errors to ensure that the estimation results remain consistent and unbiased.

IV. HASIL DAN PEMBAHASAN

4.1 Descriptive Statistics

Descriptive statistics were carried out to calculate and analyze the mean, maximum, minimum, and standard deviation for each variable used in the study, as shown in Table 2.

	ROA	ROE	BI RATE	INF	BOPO	NPL	TA/TE	LNSIZE
Mean	3.041094	17.55742	4.898438	2.959375	65.90422	2.462422	6.712734	20.90652
Max	5.26	27.31	6.25	5.95	93.31	4.25	8.13	21.61
Min	0.54	2.86	3.50	1.33	41.08	0.97	5.23	20.24
Std. dev	0.7132252	4.104549	0.9918157	1.167316	1.167316	0.7513251	0.7585323	0.3229081

Table 2. Descriptive Statistics

The descriptive statistics indicate that ROA has a mean value of 3.04 percent with a standard deviation of 0.71, suggesting that asset-based profitability among KBMI 4 banks remains relatively stable over the observation period. The highest ROA of 5.26 percent was recorded by Bank Mandiri in 2020Q1, while the lowest value of 0.54 percent occurred at BNI in 2020Q4, coinciding with the peak of the Covid-19 shock. This sharp decline reflects the substantial pressure on bank performance during the pandemic, particularly due to rising credit risk and declining economic activity. Overall, the average ROA of KBMI 4 banks is relatively high compared to banking institutions in developing countries, where average ROA typically ranges between 1 and 2 percent (Le & Ngo, 2020). This comparison indicates that large Indonesian banks exhibit relatively strong asset utilization efficiency.

ROE records an average value of 17.56 percent with a standard deviation of 4.10, indicating a wider dispersion in equity profitability across banks. The maximum ROE of 27.31 percent was observed at Bank Mandiri in 2023Q4, reflecting a strong recovery in shareholder returns during the



post-pandemic period. In contrast, the minimum ROE of 2.86 percent was again recorded at BNI in 2020Q4, reinforcing evidence that the pandemic exerted significant pressure on equity-based profitability. The greater variability in ROE compared to ROA suggests that changes in capital structure and leverage play an important role in shaping equity returns during periods of economic stress and recovery.

With respect to macroeconomic variables, the BI Rate shows an average of 4.89 percent with a standard deviation of 0.99, highlighting the dynamic stance of monetary policy over the sample period. The BI Rate reached its highest level of 6.25 percent in 2024, reflecting the tightening phase aimed at controlling inflationary pressures, while the lowest level of 3.50 percent occurred in 2021 during the accommodative monetary policy period designed to support economic recovery. Inflation has an average value of 2.96 percent with a standard deviation of 1.17, peaking at 5.95 percent in 2022Q3 amid heightened global inflationary pressures, and reaching its lowest level of 1.33 percent in 2021Q2 when price pressures remained subdued following the pandemic.

Regarding internal bank-specific variables, BOPO records an average value of 65.90 with a standard deviation of 9.78, indicating substantial variation in operational efficiency across KBMI 4 banks. The highest BOPO value of 93.31 was observed at BNI in 2020Q4, reflecting a significant increase in operating costs relative to income during the peak of the pandemic. In contrast, the lowest BOPO value of 41.08 was recorded by BCA in 2024Q2, suggesting a high level of cost efficiency in the post-pandemic period. These differences underscore the heterogeneous efficiency levels among large banks despite their similar asset size classifications.

NPL averages 2.46 percent with a standard deviation of 0.75, indicating moderate credit risk across the sample. The highest NPL value of 4.25 percent occurred at BNI in 2020Q4, consistent with heightened credit risk during the pandemic period. Conversely, the lowest NPL value of 0.97 percent was recorded by Bank Mandiri in 2024Q3, reflecting improved credit quality during the recovery phase. This pattern suggests that credit risk management improved as economic conditions stabilized.

The TA/TE ratio, which reflects bank leverage, has an average value of 6.71 with a standard deviation of 0.75. The maximum value of 8.13 was recorded by Bank Mandiri in 2022Q2, while the minimum value of 5.23 occurred at BCA in 2019Q1, indicating variation in capital structures across



banks. These differences imply that banks adopt different leverage strategies in response to regulatory requirements and economic conditions.

Bank size, measured by the natural logarithm of total assets, records an average value of 20.90 with a standard deviation of 0.32. The largest size value of 21.61 is observed at Bank Mandiri, while the smallest value of 20.24 is recorded at BNI in 2017Q1, reflecting differences in asset scale among KBMI 4 banks. Despite these differences, the relatively low dispersion in bank size suggests that the sample consists of banks with broadly comparable asset scales.

4.2 Panel Regression Model Selection

Test	Signifikansi Level	Hausman Prob	Chow Prob
ROA	Prob>Chi2	0,000	0,000
ROE	Prob>Chi2	0,000	0,000

Table 3. Chow and Hausman tests

To determine the most appropriate panel data estimation method, the Chow and Hausman tests were conducted for both ROA and ROE models. The results of the Chow test indicate statistically significant probabilities for both profitability measures, suggesting that the Fixed Effect Model is preferred over the Common Effect Model. Furthermore, the Hausman test results also show significant probabilities, indicating that the Fixed Effect Model is more appropriate than the Random Effect Model.

Based on the consistent results of both tests, the Fixed Effect Model is selected for estimating the determinants of bank profitability in this study. The Lagrange Multiplier test is therefore not reported, as the selection outcomes from the Chow and Hausman tests already provide a clear indication of the most suitable estimation model.

4.3 Classical Assumption Tests

	VIF	
	ROA	ROE
BI RATE	3,07	3,07
INFLASI	1,18	1,18
BOPO	2,80	2,80
NPL	2,07	2,07
TA/TE	1,38	1,38
LNSIZE	1,80	1,80

Table 4. Multicollinearity Test

The multicollinearity test was conducted using the Variance Inflation Factor (VIF). The results indicate that all independent variables have VIF values well below the critical threshold, suggesting that multicollinearity is not a concern in both the ROA and ROE models.

	Signifikansi Level	Prob
ROA	Prob > Chi2	0,0000
ROE	Prob > Chi2	0,0005

Table 5. Heteroskedasticity Test

The heteroskedasticity test results reveal statistically significant probabilities for both ROA and ROE models, indicating the presence of heteroskedasticity. To address this issue and ensure reliable inference, the regression models are estimated using robust standard errors.

4.4 Panel Data Regression Results

Table X presents the fixed effects panel regression results for ROA and ROE. Robust standard errors are applied to address heteroskedasticity. The within R-squared values indicate a strong explanatory power of the model for both profitability measures.

VARIABLES	ROA	ROE
Constanta	33.64821	76.68666
BI RATE	0.0220326 (0.266)	-0.093737 (0.592)
INFLASI	0.0073187 (0.677)	0.1293062 (0.165)
BOPO	-0.0590393 (0.009)	-0.4217239 (0.004)
	**	**
NPL	-0.4364986 (0.015)	-1.711662 (0.010)
	*	**
TA/TE	-0.4027699 (0.009)	0.2027989 (0.595)
	**	
LNSIZE	-1.110102 (0.005)	-1.365264 (0.211)
	**	
D_COVID	0.3763646 (0.016)	0.3655 (0.469)
	*	
F Test	0.000	0.000
	**	**
Witihin R Squared	0.8334	0.9094

Note: ** Significant at 1%, * significant at 5%

Table 6. Regression Statistics

Based on the data analysis, as presented in Table 6, the obtained regression models are as follows:

$$\widehat{ROA}_{it} = 33.6482 + 0.0220 \text{ BIR}_{it} + 0.0073 \text{ INF}_{it} - 0.0590 \text{ BOPO}_{it} - 0.4365 \text{ NPL}_{it} \\ - 0.4028 \text{ TA/TE}_{it} - 1.1101 \text{ lnSIZE}_{it} + 0.3764 \text{ D_COVID}_{it}$$

$$\widehat{ROE}_{it} = 76.6867 - 0.0937 \text{ BIR}_{it} + 0.1293 \text{ INF}_{it} - 0.4217 \text{ BOPO}_{it} - 1.7117 \text{ NPL}_{it} + 0.2028 \text{ TA/TE}_{it} \\ - 1.3653 \text{ ln SIZE}_{it} + 0.3655 \text{ D_COVID}_{it}$$

The panel data regression results using the Fixed Effect Model indicate that the profitability of KBMI 4 banks during the period 2017–2024 is more strongly driven by internal factors than by external factors. This finding suggests that the ability of large banks to manage operational efficiency, credit risk, capital structure, and business scale plays a dominant role in determining profitability performance, while macroeconomic conditions exert a relatively more limited influence.



4.5 Effects of External Factors on Profitability

The results show that the BI Rate does not have a significant effect on either ROA or ROE. This finding indicates that changes in the policy interest rate are not directly reflected in the profitability performance of KBMI 4 banks. The weak impact of the BI Rate can be attributed to the weakening of monetary policy transmission, particularly during the pandemic and post-pandemic periods, when credit restructuring policies and liquidity easing reduced banks' sensitivity to interest rate movements. This result is consistent with the findings of Farooq et al. (2021), Fitriany & Nawawi (2021), and Nawir et al. (2025), which report that policy interest rates do not significantly affect bank profitability during periods of crisis and economic recovery.

Inflation is also found to have no significant effect on ROA or ROE. This result suggests that KBMI 4 banks are able to manage the impact of price fluctuations through interest rate adjustments, cost management, and income diversification. The finding is consistent with studies by Nawir et al. (2025) and Utari & Viverita (2024), which argue that inflation does not necessarily have a significant effect on bank profitability, particularly in countries with relatively strong macroeconomic stability and well-developed banking systems.

4.6 Effects of Internal Factors on Profitability

Internal bank-specific factors are found to have a stronger and more consistent influence on the profitability of KBMI 4 banks. Operational efficiency and credit risk emerge as the main determinants of profitability, while capital structure and bank size exhibit more selective effects depending on the profitability indicator used.

Operational efficiency, proxied by BOPO, has a negative and significant effect on both ROA and ROE. This finding indicates that higher operating costs relative to operating income directly reduce bank profitability from both asset-based and equity-based perspectives. Cost efficiency therefore becomes a key factor in maintaining the profitability of large banks, in line with A Theory of the Banking Firm. This result is supported by Rustendi & Ilyas (2023), Febrianto et al. (2022), and Siauwijaya et al. (2023), who find that BOPO is a major determinant of declining bank profitability in Indonesia.



Credit risk, measured by NPL, also has a negative and significant effect on ROA and ROE. This result implies that an increase in non-performing loans not only reduces interest income but also raises loan loss provisioning expenses, which directly erode bank profits. The higher sensitivity of ROE to NPL suggests that credit risk has a stronger impact on equity returns. This finding is consistent with Do et al. (2020), and Jasman & Murwaningsari (2022) who emphasize that asset quality is a crucial factor in determining bank profitability.

Capital structure, proxied by the TA/TE ratio, has a negative and significant effect on ROA but is not significant for ROE. This finding indicates that higher leverage tends to reduce asset efficiency in generating profits, although its impact on equity returns is not always significant. The result suggests the existence of a trade-off between asset expansion and risk exposure faced by banks. This finding is in line with Utari & Viverita (2024), Nouaili & Khemiri (2025), and Kosumi & Zharku (2024), which report that the effect of leverage on bank profitability remains context-dependent and varies across banks' capital structures.

Bank size, measured by the natural logarithm of total assets, has a negative and significant effect on ROA but is not significant for ROE. This result indicates that larger banks do not necessarily achieve higher asset efficiency in generating profits. The finding points to potential diseconomies of scale, whereby increased organizational complexity and higher operating costs in large banks may suppress profitability. This result is consistent with Saputro et al. (2022), Kosumi & Zharku (2024), and Kumar & Bird (2020), who document that excessive bank size can reduce efficiency and profitability performance.

The simultaneous tests indicate that all independent variables jointly have a statistically significant effect on bank profitability at the 1 percent significance level. The within R-squared values show that the model explains approximately 83.34 percent of the within-bank variation in ROA and 90.94 percent of the within-bank variation in ROE, while the remaining variation is influenced by other factors not captured in the model, as documented in previous studies on bank profitability (Le & Ngo, 2020).



4.7 Effect of the Covid-19 Dummy Variable

The Covid-19 dummy variable has a positive and statistically significant effect on ROA, but shows no significant effect on ROE. This finding indicates that asset-based profitability of KBMI 4 banks was relatively preserved during the pandemic period, supported by policy stimulus measures, credit restructuring programs, and liquidity support provided by monetary authorities and regulators. However, these policy interventions are not fully reflected in equity-based returns, suggesting that shareholders continued to face profitability pressures during the crisis period.

V. CONCLUSION

This study aims to examine the effects of external and internal factors on the profitability of KBMI 4 banks in Indonesia over the period 2017–2024 using a panel data regression approach with the Fixed Effect Model. Bank profitability is measured using ROA and ROE to capture earnings performance from both asset-based and equity-based perspectives.

The results indicate that internal bank-specific factors play a more dominant role than external factors in determining the profitability of KBMI 4 banks. Operational efficiency, proxied by BOPO, and credit risk, measured by NPL, are found to have negative and significant effects on both ROA and ROE. These findings emphasize that management's ability to control operating costs and maintain asset quality is a key determinant of profitability in large banks. In addition, capital structure, measured by the TA/TE ratio, and bank size have negative and significant effects on ROA but do not significantly affect ROE, indicating a trade-off between asset expansion, risk exposure, and asset-based profitability efficiency.

In contrast, external factors, namely the BI Rate and inflation, do not show significant effects on either ROA or ROE. This result suggests that changes in macroeconomic conditions are not directly reflected in the profitability performance of KBMI 4 banks during the observation period, particularly during the pandemic and post-pandemic phases when monetary policy transmission tended to weaken. The Covid-19 dummy variable has a positive and significant effect on ROA but is insignificant for ROE, indicating that banking support policies were more effective in preserving operational stability than in improving equity returns.



The managerial implications of this study emphasize the importance of strengthening operational efficiency and credit risk management as key strategic priorities for improving the profitability of KBMI 4 banks. Enhancing operational efficiency can be achieved through the optimization of cost structures, the digitalization of banking services, and the integration of advanced financial technologies to streamline internal processes and reduce operational expenses. At the same time, effective credit risk management requires strengthening credit evaluation procedures, improving loan monitoring systems, and implementing more robust risk assessment frameworks to preserve asset quality and minimize potential non-performing loans. By improving operational efficiency and maintaining prudent credit risk practices, banks are better positioned to sustain long-term profitability and resilience in a changing economic environment.

From a policy perspective, the findings suggest that monetary policy does not automatically translate into higher bank profitability, underscoring the need for continued policy coordination between monetary authorities and banking regulators to maintain financial stability and banking sector performance.

This study has several limitations, including a sample restricted to KBMI 4 banks and a relatively limited set of macroeconomic variables. Future research is therefore encouraged to expand the sample to include other bank groups and to incorporate a broader range of macroeconomic and institutional variables in order to provide a more comprehensive understanding of the determinants of bank profitability in Indonesia.

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e-ISSN 2722-6328

SCIENTIFIC JOURNAL OF ECONOMICS, MANAGEMENT, BUSINESS, AND ACCOUNTING

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VOL. 16 NO. 01 YEAR OF 2026

PUBLISHED BY:

FACULTY OF ECONOMICS AND BUSINESS FLORES UNIVERSITY

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