Journal of Economics and Business UBS
Vol. 15, No. 5, November 2026, pp. 1270-1284
e-ISSN 2774-7042
DOI: https://doi.org/10.52644/0k5c8v46

The Effect of Inflation, Interest Rates, and Exchange Rates on Company Value with Profitability as a Moderation Variable

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Keywords:
Inflation; Interest Rate; Exchange Rate; Profitability; Firm Value

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Abstract

Monetary policy adjustments and exchange rate volatility during the COVID-19 pandemic and subsequent economic recovery renewed concerns about the relationships between macroeconomic conditions and banking firm valuations in Indonesia. This study examined the associations between inflation, the policy interest rate, the Indonesian rupiah exchange rate, and firm value, while investigating the moderating role of profitability in these relationships. The analysis employed 72 bank-year observations from 12 banks purposively selected from the InfoBank15 Index over the 2020–2025 period. A random-effects panel regression model incorporating interaction terms was used, with firm value measured using Tobin's Q and profitability proxied by return on assets (ROA). The baseline regression results revealed a statistically significant negative association between the policy interest rate and firm value ($p = 0.0106$), whereas inflation and the exchange rate exhibited no statistically significant associations. The interaction between profitability and the exchange rate was negative and statistically significant ($p = 0.0420$), indicating that the estimated relationship between the exchange rate and firm value became more negative as profitability increased. In contrast, the interaction effects involving inflation and the policy interest rate were not statistically significant. The inclusion of interaction terms increased the adjusted R^2 from 12.45% to 26.18%, indicating an improvement in the model's explanatory power. These findings identified the policy interest rate as the only macroeconomic variable significantly associated with firm value in the baseline model and demonstrated that profitability moderated the relationship between exchange rates and banking firm valuations within the study sample.

INTRODUCTION

In recent years, the global economy has faced significant challenges, largely driven by monetary policy tightening across numerous countries. Indonesia was no exception, as the lingering effects of the COVID-19 pandemic and the global economic slowdown placed considerable pressure on its domestic economy (International Monetary Fund, 2023). What initially emerged as a public health crisis rapidly evolved into an economic crisis as mobility restrictions were implemented across regions to contain the spread of the virus. Although Indonesia demonstrated relatively strong post-pandemic economic resilience, supported by robust domestic demand and favorable commodity prices, the country continued to experience inflationary pressures, rupiah exchange rate volatility, adjustments to monetary policy rates, and heightened global economic uncertainty (International Monetary Fund, 2023). Economic activity contracted sharply in the first half of 2020, with year-over-year growth declining to −5.32% in the second quarter, marking the lowest level in two decades. Uncertainty

surrounding pandemic management further threatened financial system stability (LPEM FEB UI, 2021).

These sudden economic shocks compelled financial institutions, particularly banks, to confront numerous operational and financial challenges. Economic disruptions affected banking activities across countries and triggered precautionary responses among depositors (Baldwin & di Mauro, 2020; Barua & Barua, 2021; LPEM FEB UI, 2021). Meanwhile, banks were required to maintain operational efficiency, profitability, and adequate capitalization to ensure uninterrupted financial services throughout the pandemic (Elnahass et al., 2021). Banks play a crucial role in national economic development (Dang et al., 2020), serving as essential components of modern financial systems and facilitating economic growth in developing countries through financial intermediation (Barua & Barua, 2021). The banking sector channels funds between surplus and deficit economic units, thereby supporting investment, consumption, and improvements in living standards (Julia & Kassim, 2020). Accordingly, governments introduced various policies to strengthen banking efficiency and financial system resilience, particularly during the pandemic (Jamaruddin & Markom, 2020).

Indonesian banking indicators reflected the substantial economic fluctuations experienced during this period. Industry-wide net profit declined by 33.10% in 2020, primarily because banks increased provisions for expected credit losses. Profitability subsequently recovered, with net profit growth reaching 40.51% in 2022 before moderating to 8.51% in 2024 and 6.31% in 2025. This moderation coincided with the termination of COVID-19-related credit restructuring relief in March 2024 and increasing funding costs. The gross nonperforming loan (NPL) ratio increased to 3.06% in 2020 before gradually declining to 2.04% by the end of 2025. Meanwhile, the capital adequacy ratio (CAR) remained above 22% throughout 2018–2025, reaching its highest level of 27.65% in 2023 (Otoritas Jasa Keuangan, 2021, 2025). During the pandemic, banking profitability was adversely affected by heightened credit risk and increased impairment provisions. Nevertheless, the sector maintained relatively strong liquidity and capital resilience, which helped sustain investor confidence compared with other economic sectors (Bank Indonesia, 2022).

Firm value reflects investors' assessments of a company's financial performance, growth prospects, and future economic potential. In the banking sector, firm value is commonly assessed using market-based valuation indicators, including the price-to-book value (PBV) ratio and Tobin's Q, both of which respond to internal financial performance and external macroeconomic conditions. The average Tobin's Q of Indonesia's five largest banks by total assets remained below one in 2018 and 2019, at 0.825 and 0.813, respectively. It subsequently increased to 0.998 in 2020, reached 1.234 in 2021, and peaked at 1.239 in 2022. However, the ratio gradually declined to 1.208 in 2023, 1.133 in 2024, and 1.113 in 2025. This downward trend coincided with post-pandemic economic normalization, rising domestic and global interest rates, and the gradual withdrawal of economic stimulus measures. Nevertheless, Tobin's Q remained above one, suggesting that the market valuation of these banks continued to exceed the estimated replacement cost of their assets.

Macroeconomic instability during this period, reflected in fluctuations in inflation, policy interest rates, and the Indonesian rupiah–U.S. dollar exchange rate, potentially increased market uncertainty, affected corporate financial performance, and influenced firm value. However, the relationships between macroeconomic variables and firm value appeared more complex among large banks, including those represented in the InfoBank15 Index. Previous empirical studies reported inconsistent findings regarding these relationships. Higher inflation can increase operating costs, weaken purchasing power, and reduce profitability and investor confidence. Sartika et al. (2019) identified a statistically significant negative effect of inflation on firm value, whereas Murjiani and Adiyanto (2023) reported a negative but statistically insignificant effect. Similarly, Hiendrawati et al. (2024) found no statistically significant effect

in the banking sector, while Budiman and Rudiyanto (2023) reported a statistically significant positive effect. Empirical evidence regarding interest rates was similarly inconsistent. Sembiring (2021) identified a statistically significant negative effect, suggesting that higher interest rates increased the cost of capital and reduced investor demand for equities. Conversely, Sartika et al. (2019) and Murjiani and Adiyanto (2023) reported statistically significant positive effects. Regarding exchange rates, Murjiani and Adiyanto (2023) and Hiendrawati et al. (2024) reported negative or statistically insignificant effects, whereas Sartika et al. (2019) identified a statistically significant positive effect. Evidence from other financial markets further suggested that corporate responses to macroeconomic fluctuations varied according to firm-specific characteristics and industry conditions (Jayatri & Soma, 2025; Rahmi et al., 2023).

Previous findings concerning the moderating role of profitability were also inconclusive. Saputra et al. (2024) found that profitability moderated the relationships between interest rates, exchange rates, and firm value but did not moderate the relationship between inflation and firm value. This limited and partial evidence highlighted the need for further investigation into how profitability influences the relationships between macroeconomic conditions and banking firm valuations, particularly among banks included in the InfoBank15 Index. The index tracks the stock price performance of 15 banks selected based on fundamental performance and trading liquidity, providing investors with a benchmark for evaluating Indonesian banking equities (Bursa Efek Indonesia, 2021). Its constituents therefore provided a relevant sample for examining how relatively strong banking institutions responded to macroeconomic fluctuations.

The theoretical framework of this study integrated several complementary perspectives. Signaling theory (Spence, 1973) explains how investors interpret macroeconomic information and corporate financial performance as signals of future prospects. Banks that maintain high profitability during economic uncertainty may convey positive signals regarding managerial competence and financial resilience. Agency theory (Jensen & Meckling, 1976) provides a framework for understanding how managerial decisions and governance mechanisms influence shareholder interests, while sustained profitability may indicate effective resource management and reduced agency-related inefficiencies. Arbitrage Pricing Theory (Ross, 1976) proposes that expected asset returns are influenced by multiple systematic risk factors, providing a basis for examining how inflation, interest rates, and exchange rate movements relate to market valuations. The Fisher effect (Fisher, 1930) describes the relationship between expected inflation and nominal interest rates, while purchasing power parity (Cassel, 1918) provides a theoretical explanation for the relationship between relative price levels and exchange rates. Firm value represents the market's assessment of a company's capacity to generate economic benefits for shareholders (Brigham & Ehrhardt, 2024). In this study, firm value was measured using Tobin's Q (Chung & Pruitt, 1994; Tobin, 1969), which relates the market value of a firm's equity and debt to the replacement cost of its assets. Compared with PBV and the price-to-earnings ratio (PER), Tobin's Q provides a broader valuation perspective by incorporating both equity and debt components (Nuryaman et al., 2024). Profitability was measured using return on assets (ROA), which indicates a bank's ability to generate earnings from its asset base (Buchory, 2021; Kasmir, 2021). ROA also serves as an indicator of financial performance and may influence the extent to which macroeconomic risks are reflected in firm value.

The relationships between macroeconomic variables and firm value were developed based on established financial theories and previous empirical findings. Inflation can increase economic uncertainty and operating costs while reducing borrowers' purchasing power and repayment capacity, potentially weakening banking performance and market valuations (Mankiw, 2021; Mishkin, 2022). Higher policy interest rates can increase discount rates applied to expected future cash flows and encourage investors to reallocate capital from

equities to fixed-income securities, potentially reducing firm value (Brigham & Ehrhardt, 2024; Tandelilin, 2023). Depreciation of the Indonesian rupiah against the U.S. dollar may increase the domestic-currency burden of unhedged foreign-currency liabilities and heighten perceived financial risks, thereby influencing investor valuations (Krugman et al., 2023). Banks with higher profitability may possess greater financial capacity to withstand adverse macroeconomic conditions than less profitable institutions. Accordingly, six hypotheses were formulated: H1 proposed that inflation negatively affected firm value; H2 proposed that policy interest rates negatively affected firm value; H3 proposed that exchange rate increases, representing rupiah depreciation against the U.S. dollar, negatively affected firm value; H4 proposed that profitability moderated the relationship between inflation and firm value; H5 proposed that profitability moderated the relationship between policy interest rates and firm value; and H6 proposed that profitability moderated the relationship between exchange rates and firm value.

The novelty of this study was reflected in three principal aspects. First, it focused on banks included in the InfoBank15 Index, representing banking institutions selected for their fundamental performance and trading liquidity. Second, it examined the 2020–2025 period, encompassing the COVID-19 pandemic, subsequent economic recovery, and changes in monetary policy conditions. Third, it simultaneously investigated profitability as a moderating variable in the relationships between three macroeconomic indicators and firm value, using official economic indicators comprising inflation data from Statistics Indonesia (BPS), Bank Indonesia's policy interest rate, and the Jakarta Interbank Spot Dollar Rate (JISDOR). Specifically, the study aimed to examine the relationships between inflation, policy interest rates, exchange rates, and firm value among InfoBank15 Index banks listed on the Indonesia Stock Exchange during 2020–2025 and to determine whether profitability moderated these relationships.

METHOD

This study employed a quantitative explanatory research design to examine the relationships among the variables through hypothesis testing (Sekaran & Bougie, 2020; Sugiyono, 2023). The units of analysis were banks included in the InfoBank15 Index and listed on the Indonesia Stock Exchange (IDX) during 2020–2025. The study used secondary panel data comprising annual observations across banks over six years.

The study population consisted of 15 banks included in the InfoBank15 Index. Purposive sampling was applied based on three criteria: (1) inclusion in the index for at least three consecutive years during 2020–2025; (2) availability of complete annual financial statements containing the required variables; and (3) financial reporting in Indonesian rupiah. Two banks were excluded because of incomplete financial statements, and one was excluded because its financial statements were not reported in rupiah. The final sample comprised 12 banks, yielding 72 bank-year observations (12 banks × 6 years). The selected banks are presented in Table 1.

Table 1. Research sample

No	Code	Bank	No	Code	Bank
1	BBCA	Bank Central Asia Tbk.	7	BMRI	Bank Mandiri (Persero) Tbk.
2	BBNI	Bank Negara Indonesia (Persero) Tbk.	8	BNGA	Bank CIMB Niaga Tbk.
3	BBRI	Bank Rakyat Indonesia (Persero) Tbk.	9	BTPS	Bank BTPN Syariah Tbk.
4	BBTN	Bank Tabungan Negara (Persero) Tbk.	10	MEGA	Bank Mega Tbk.
5	BDMN	Bank Danamon Indonesia Tbk.	11	PNBN	Bank Pan Indonesia Tbk.
6	BJBR	BPD Jawa Barat dan Banten Tbk.	12	BRIS	Bank Syariah Indonesia Tbk.

Source: IDX, processed by the author (2026)

The study uses five variables: three independent variables, one dependent variable, and one moderating variable (Table 2). Data on inflation were obtained from Statistics Indonesia (BPS), the policy rate and the JISDOR exchange rate from Bank Indonesia, and ROA and Tobin's Q from the annual reports and stock-price data of the sample banks. The macroeconomic variables take the same annual value for all banks in a given year, and the exchange rate is expressed in natural logarithm.

Table 2. Operational definition of variables

Variable	Concept	Indicator	Scale
Firm value (Y)	Market valuation of the firm's success in managing resources to create value for shareholders (Brigham & Houston, 2022)	Tobin's Q = (MVS + D) / TA	Ratio
Inflation (X1)	General and continuous increase in prices of goods and services (Bank Indonesia, 2025)	Annual (year-on-year) CPI inflation published by BPS	Ratio
Interest rate (X2)	Price paid by borrowers to lenders for the use of funds (Mishkin, 2022)	BI 7-Day Reverse Repo Rate (BI7DRR)	Ratio
Exchange rate (X3)	Price of one currency in terms of another currency (Mankiw, 2021)	Ln of the annual average JISDOR rate (USD/IDR)	Ratio
Profitability (M)	Ability to generate profit from resources during a period (Brigham & Houston, 2022)	ROA = Net profit after tax / Total assets × 100%	Ratio

Note: MVS = market value of outstanding shares; D = total debt; TA = total assets.

Data were processed with EViews 13. The analysis comprised descriptive statistics, selection of the panel-data estimation model, classical assumption tests, and hypothesis testing at a 5% significance level (Ghozali, 2021). The Chow test was used to choose between the Common Effect Model (CEM) and the Fixed Effect Model (FEM), the Hausman test to choose between FEM and the Random Effect Model (REM), and the Lagrange Multiplier (LM) test to choose between CEM and REM (Baltagi, 2021). The direct effects were estimated with the following model:

$$Q_{it} = \alpha + \beta_1 INF_t + \beta_2 IR_t + \beta_3 ER_t + \beta_4 ROA_{it} + \varepsilon_{it}$$

The moderating role of profitability was tested with Moderated Regression Analysis (MRA), in which interaction terms between each macroeconomic variable and ROA are added:

$$Q_{it} = \alpha + \beta_1 INF_t + \beta_2 IR_t + \beta_3 ER_t + \beta_4 ROA_{it} + \beta_5 (INF \times ROA)_{it} + \beta_6 (IR \times ROA)_{it} + \beta_7 (ER \times ROA)_{it} + \varepsilon_{it}$$

where Q is Tobin's Q, INF is inflation, IR is the interest rate, ER is the natural log of the exchange rate, and ROA is profitability for bank *i* in year *t*. Moderation is supported when the coefficient of the interaction term is significant ($p < 0.05$). Partial effects were assessed with the t-test, joint effects with the F-test, and explanatory power with the adjusted R^2.

RESULTS AND DISCUSSION

Descriptive statistics**.** Table 3 summarises the descriptive statistics of the 72 observations. Average inflation was 2.60%, ranging from 1.57% (2024) to 5.51% (2022), with positive skewness (1.50) because of the 2022 spike. The interest rate averaged 4.92%, ranging between 3.50% and 6.00%, a spread of 2.50 percentage points. The log exchange rate averaged 9.6309 with a small standard deviation (0.0522), indicating relatively low dispersion compared with the other variables. ROA averaged 2.08% with a wide range (0.37%–8.41%) and strong positive skewness (2.09), indicating that a few banks were far more profitable than the rest. Tobin's Q averaged 1.02, meaning that, overall, the market valued the sample banks slightly above their assets.

Table 3. Descriptive statistics

Statistic	Inflation (X1)	Interest rate (X2)	Exchange rate (X3)	Firm value (Y)	Profitability (M)
Mean	2.603333	4.916667	9.630903	1.022893	2.082006
Median	2.125000	5.125000	9.653275	0.964732	1.688034
Maximum	5.510000	6.000000	9.687816	1.917965	8.409328
Minimum	1.570000	3.500000	9.554285	0.368628	0.372636
Std. Dev.	1.360824	1.013987	0.052244	0.291232	1.527535
Skewness	1.503519	−0.276624	−0.525860	0.760606	2.086427
Kurtosis	3.675438	1.418934	1.531510	4.884501	8.305216
Observations	72	72	72	72	72

Source: Data processed with EViews 13 (2026)

The movement of the three macroeconomic variables is shown in Figure 1. Inflation was low in 2020 (1.68%) and 2021 (1.87%) because weakened purchasing power during the pandemic restrained demand. It surged to 5.51% in 2022 owing to cost-push pressure from the Russia–Ukraine conflict and the September 2022 adjustment of subsidised fuel prices, then eased to 2.61% in 2023 and remained within Bank Indonesia's target range at 1.57% in 2024 and 2.38% in 2025. Bank Indonesia cut the policy rate to historic lows of 3.75% in 2020 and 3.50% in 2021, raised it aggressively to 5.50% in 2022 and 6.00% in 2023–2024 in response to domestic inflation and the US Federal Reserve's tightening, and began easing to 4.75% in 2025 (Bank Indonesia, 2024). The JISDOR rate was stable at Rp14,105–14,269 per US dollar in 2020–2021, depreciated by about 10.25% to Rp15,731 in 2022 amid capital outflows, strengthened slightly to Rp15,416 in 2023, and weakened again to Rp15,850 in 2024 and Rp16,120 in 2025.

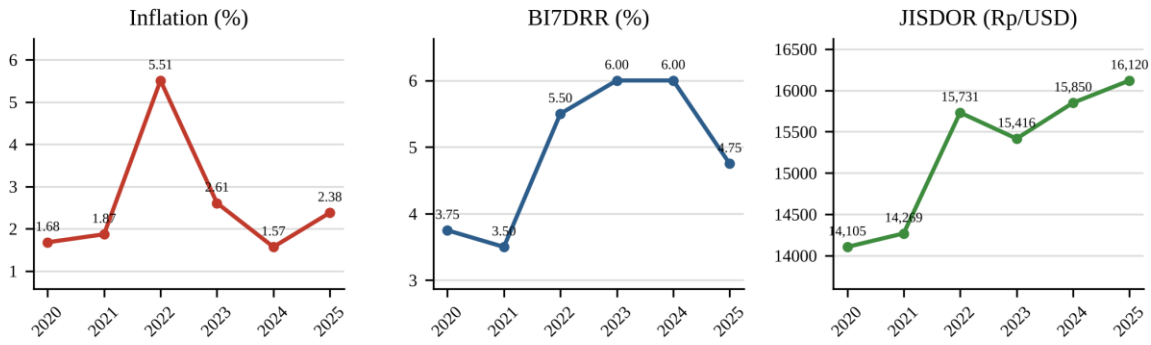


Figure 1. Inflation, BI 7-Day Reverse Repo Rate, and JISDOR exchange rate, 2020–2025

Source: BPS and Bank Indonesia, processed by the author (2026)

Table 4 presents the ROA of each bank. Average ROA rose from 1.53% in 2020 to a peak of 2.46% in 2022, then declined to 2.27% in 2023, 2.13% in 2024, and 2.08% in 2025, still above the 2020 level. Using the overall sample mean (2.08%) as a benchmark (Brigham & Houston, 2022), BTPS (6.11%), BBCA (3.18%), MEGA (2.61%), and BBRI (2.42%) were overperforming, while BMRI, BNGA, BBNI, BRIS, BDMN, PNBN, BJBR, and BBTN were below the sample mean. BTPS recorded the highest ROA of the period (8.41% in 2022), whereas BBTN had the lowest average (0.66%), and BJBR showed a declining trend from 1.20% to 0.54%. This classification is relative to the sample and does not imply that underperforming banks are financially unsound.

Table 4. Return on Assets (ROA) of InfoBank15 sample banks, 2020–2025 (%)

Bank	2020	2021	2022	2023	2024	2025	Mean
BBCA	2.52	2.56	3.10	3.46	3.78	3.63	3.18
BBNI	0.37	1.14	1.79	1.94	1.92	1.47	1.44
BBRI	1.16	1.83	2.76	3.08	3.04	2.65	2.42
BBTN	0.44	0.64	0.76	0.80	0.64	0.70	0.66
BDMN	0.54	0.87	1.73	1.65	1.36	1.53	1.28
BJBR	1.20	1.27	1.24	0.89	0.66	0.54	0.97
BMRI	1.19	1.77	2.26	2.76	2.52	1.97	2.08
BNGA	0.72	1.32	1.66	1.96	1.92	1.86	1.57
BTPS	5.20	7.90	8.41	5.04	4.88	5.20	6.11
MEGA	2.68	3.02	2.86	2.66	1.95	2.49	2.61
PNBN	1.43	0.89	1.54	1.35	1.18	1.22	1.27
BRIS	0.91	1.14	1.39	1.61	1.71	1.66	1.40
Average	**1.53**	**2.03**	**2.46**	**2.27**	**2.13**	**2.08**	**2.08**

Source: Processed by the author (2026)

Table 5 shows the Tobin's Q of each bank. The average was 1.03 in 2020, 1.06 in 2021, 1.03 in 2022, and 1.02 in 2023, fell below one to 0.96 in 2024, and recovered to 1.04 in 2025. BBCA recorded the highest value (1.92 in 2023) and, together with BBRI and MEGA, was consistently overvalued (Q > 1). BTPS was overvalued in 2020–2022, fell to 0.46 in 2024, and returned to 1.03 in 2025, while BRIS rose from the lowest value in the sample (0.37 in 2020) to 1.11 in 2025. BBTN, BDMN, BJBR, BNGA, and PNBN remained undervalued (Q < 1) throughout the period, while BBNI and BMRI fluctuated around one.

Table 5. Firm value (Tobin's Q) of InfoBank15 sample banks, 2020–2025

Bank	2020	2021	2022	2023	2024	2025
BBCA	0.98	1.56	1.63	1.92	1.64	1.46
BBNI	0.97	1.00	1.03	1.04	1.00	0.99
BBRI	1.16	1.20	1.24	1.28	1.15	1.10
BBTN	0.94	0.93	0.92	0.91	0.90	0.96
BDMN	0.94	0.88	0.89	0.90	0.89	0.95
BJBR	0.98	0.95	0.95	0.93	0.91	0.97
BMRI	0.96	0.96	1.01	0.89	0.99	1.05
BNGA	0.94	0.94	0.93	0.98	0.97	0.96
BTPS	1.92	1.62	1.15	0.74	0.46	1.03
MEGA	1.28	1.30	1.29	1.28	1.20	1.02
PNBN	0.90	0.85	0.89	0.84	0.90	0.89
BRIS	0.37	0.51	0.43	0.47	0.57	1.11
Average	**1.03**	**1.06**	**1.03**	**1.02**	**0.96**	**1.04**

Source: Processed by the author (2026)

Panel model selection. Table 6 reports the model selection tests. The Chow test yields a cross-section F probability of 0.0000 (< 0.05), so FEM is preferred over CEM, indicating heterogeneity across banks. The Hausman test yields a probability of 1.0000 (> 0.05), so REM is preferred over FEM. Because the two tests point to different models, the LM test was performed; the Breusch–Pagan cross-section probability of 0.0000 (< 0.05) confirms that REM is preferable to CEM. REM is therefore the best model for this study.

Table 6. Panel data model selection tests

Test	Statistic	d.f.	Prob.	Selected model
Chow (cross-section F)	8.278713	(11, 53)	0.0000	FEM
Chow (cross-section chi-square)	71.998456	11	0.0000	FEM
Hausman (cross-section random)	0.000000	7	1.0000	REM
LM Breusch–Pagan (cross-section)	54.00036	–	0.0000	REM

Source: Data processed with EViews 13 (2026)

Classical assumption tests**.** Because REM is estimated by Estimated Generalized Least Squares (EGLS), which explicitly models the error-component structure, the OLS normality and Durbin–Watson autocorrelation tests are not decisive for the validity of the estimates (Baltagi, 2021; Wooldridge, 2012). With a short panel (t = 6, n = 12), inference rests on the asymptotic properties of the GLS estimator rather than on strict normality (Greene, 2018; Gujarati & Porter, 2021). The assumption tests therefore focus on multicollinearity and heteroscedasticity. As shown in Table 7, the highest correlation among the independent variables is 0.7645 (X2 and X3), below the 0.85 threshold, so the model is free from multicollinearity (Gujarati & Porter, 2021). The Glejser test in Table 8 shows that all probabilities exceed 0.05, indicating that the model is free from heteroscedasticity.

Table 7. Multicollinearity test (correlation matrix)

	X1	X2	X3	M
X1	1.0000	0.3352	0.3570	0.1297
X2	0.3352	1.0000	0.7645	0.1300
X3	0.3570	0.7645	1.0000	0.1312
M	0.1297	0.1300	0.1312	1.0000

Source: Data processed with EViews 13 (2026)

Table 8. Heteroscedasticity test (Glejser)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	31.73569	36.55311	0.868208	0.4038
X1	0.086272	0.077844	1.108265	0.2914
X2	0.227110	0.227049	1.000264	0.3387
X3	−3.717683	3.849926	−0.965650	0.3550
M	0.058477	0.153816	0.380177	0.7111

Source: Data processed with EViews 13 (2026)

Hypothesis testing. Table 9 presents the REM estimates without interaction terms, yielding the equation Y = 1.343137 − 0.000971X1 − 0.039932X2 − 0.035736X3 + 0.107014M + e. Inflation has a negative coefficient (−0.000971) with a probability of 0.8373 (> 0.05), so its effect is not significant and H1 is not supported. The interest rate has a negative coefficient (−0.039932) with a probability of 0.0106 (< 0.05), so it has a negative and significant effect and H2 is supported. The exchange rate has a negative coefficient (−0.035736) with a probability of 0.8744 (> 0.05), so H3 is not supported. Profitability, included as an explanatory variable before the moderation test, has a positive and significant effect (0.107014; p = 0.0276).

Table 9. Random Effect Model estimation without moderation

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.343137	2.004858	0.669941	0.5326
X1 (Inflation)	−0.000971	0.004488	−0.216299	0.8373
X2 (Interest rate)	−0.039932	0.010044	−3.975850	0.0106
X3 (Exchange rate)	−0.035736	0.214840	−0.166340	0.8744
M (Profitability)	0.107014	0.034802	3.074954	0.0276

Source: Data processed with EViews 13 (2026)

Table 10 shows that both models are jointly significant. Without moderation, the F-statistic is 3.524847 (p = 0.011362), and with moderation it is 4.596615 (p = 0.000328). The adjusted R^2 increases from 0.124531 (12.45%) to 0.261772 (26.18%) when the interaction terms are included, meaning that profitability as a moderator improves the explanatory power of the model; the remaining variation is explained by factors outside the model, such as CAR, NPL, and firm size.

Table 10. F-test and coefficient of determination

Model	F-statistic	Prob. (F-statistic)	Adjusted R^2	Explained variation
Without moderation	3.524847	0.011362	0.124531	12.45%
With moderation (MRA)	4.596615	0.000328	0.261772	26.18%

Source: Data processed with EViews 13 (2026)

The MRA results in Table 11 yield the equation Y = −16.89111 − 0.017399X1 − 0.010090X2 + 1.854485X3 + 9.844242M + 0.009146X1M − 0.012042X2M − 1.010558X3M + e. The interaction between inflation and profitability (X1M) has a probability of 0.0830 (> 0.05), so H4 is not supported. The interaction between the interest rate and profitability (X2M) has a probability of 0.4514 (> 0.05), so H5 is not supported. The interaction between the exchange rate and profitability (X3M) has a coefficient of −1.010558 and a probability of 0.0420 (< 0.05), so H6 is supported.

Table 11. Moderated Regression Analysis (MRA)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	−16.89111	4.762126	−3.546968	0.0164
X1	−0.017399	0.005959	−2.919933	0.0330
X2	−0.010090	0.020443	−0.493535	0.6425
X3	1.854485	0.505598	3.667907	0.0145
M	9.844242	3.518887	2.797544	0.0381
X1M	0.009146	0.004231	2.161826	0.0830
X2M	−0.012042	0.014750	−0.816395	0.4514
X3M	−1.010558	0.372062	−2.716101	0.0420

Source: Data processed with EViews 13 (2026)

Table 12. Summary of hypothesis testing

Hypothesis	Path	Coefficient	Prob.	Decision
H1	Inflation → Firm value	−0.000971	0.8373	Not supported
H2	Interest rate → Firm value	−0.039932	0.0106	Supported
H3	Exchange rate → Firm value	−0.035736	0.8744	Not supported
H4	Inflation × ROA → Firm value	0.009146	0.0830	Not supported
H5	Interest rate × ROA → Firm value	−0.012042	0.4514	Not supported
H6	Exchange rate × ROA → Firm value	−1.010558	0.0420	Supported

Source: Processed by the author (2026)

The effect of inflation on firm value. Inflation has a negative but insignificant effect on firm value, so changes in inflation during 2020–2025 were not shown to affect the Tobin's Q of InfoBank15 banks significantly. Theoretically, inflation raises the general price level (Mankiw, 2021) and can affect debtors' purchasing power, credit demand, repayment capacity, and bank operating costs. However, these effects need not translate directly into firm value because they depend on each bank's fundamentals and strategies. From a financial-management perspective, financing decisions and risk management are central to preserving firm value (Brigham & Houston, 2022); banks that can adjust lending and deposit rates, maintain credit quality, and remain efficient can absorb inflationary pressure. In terms of signalling theory (Spence, 1973), investors do not respond to inflation alone but also to information on a bank's ability to sustain performance. Industry conditions support this interpretation: the banking CAR reached 25.81% and ROA 2.58% in June 2025 (Otoritas Jasa Keuangan, 2025), indicating that capital and profitability remained robust. This result is consistent with Salsabila et al. (2026) and Murjiani and Adiyanto (2023), who also found a negative but insignificant effect of inflation on firm value, but differs from Sartika et al. (2019). Thus, the negative direction of inflation is not accompanied by statistically sufficient evidence, and firm value should be read together with fundamentals such as profitability, asset quality, and capital adequacy.

The effect of the interest rate on firm value. The interest rate has a negative and significant effect on firm value, supporting H2. This effect can be explained through the monetary transmission mechanism: changes in interest rates affect consumption, investment, and overall economic activity (Mankiw, 2021). For banks, a higher policy rate raises the cost of funds when deposit rates must be adjusted to retain third-party funds, while higher lending rates increase debtors' repayment burden and the potential for non-performing loans. When funding costs rise faster than interest income, net interest margins come under pressure. In the capital market, a higher rate raises the discount rate and makes fixed-income instruments

relatively more attractive, so investors reprice bank shares (Brigham & Ehrhardt, 2024; Tandelilin, 2023). Consistent with Arbitrage Pricing Theory (Ross, 1976), the interest rate thus acts as a priced macroeconomic risk factor. The negative coefficient indicates that during 2020–2025 increases in the policy rate were associated with lower Tobin's Q, holding other variables constant, although the magnitude may differ across banks depending on their funding structures and asset–liability sensitivity (Otoritas Jasa Keuangan, 2025). This finding agrees with Basri et al. (2023), Yuniari et al. (2023), Silviyani (2022), and Sembiring (2021), but contrasts with Sartika et al. (2019) and Murjiani and Adiyanto (2023), who reported a positive effect.

The effect of the exchange rate on firm value. The exchange rate has a negative but insignificant effect on firm value, so H3 is not supported. Theoretically, exchange-rate movements affect banks through foreign-currency exposure, customer transactions, and the ability of debtors to service foreign-currency obligations (Madura, 2018). Rupiah depreciation may raise the burden of debtors whose income is not in the same currency, increasing credit risk. However, bank exposure is limited by the management of the net open position, the matching of foreign-currency assets and liabilities, and the natural hedging of debtors with foreign-currency income. Moreover, exchange-rate movements during the period coincided with changes in interest rates and inflation, so changes in firm value are more likely explained by a combination of factors than by the exchange rate alone. This finding is consistent with Faradilla and Meliza (2025), Hiendrawati et al. (2024), Saputra et al. (2024), and Murjiani and Adiyanto (2023), but differs from Sartika et al. (2019), who found a positive and significant effect. Exchange-rate risk nevertheless remains relevant to bank management.

The moderating role of profitability on the inflation–firm value relationship. Profitability does not moderate the effect of inflation on firm value, so H4 is not supported. Although the X1M coefficient is positive, its insignificance means that there is no adequate statistical evidence that ROA strengthens or weakens this relationship at the 5% level (Ghozali, 2021). High profitability reflects a bank's ability to generate profit from its assets but does not eliminate its exposure to macroeconomic change; the impact of inflation on performance and valuation also depends on credit quality, capital adequacy, liquidity, funding structure, and monetary policy. Because inflation is an external factor affecting the entire economy, whereas profitability reflects internal capability, differences in ROA across banks do not significantly alter the inflation–value relationship. This result is in line with Wardani et al. (2022), but differs from studies in which profitability played a broader moderating role.

The moderating role of profitability on the interest rate–firm value relationship. Profitability does not moderate the effect of the interest rate on firm value, so H5 is not supported. The interest rate is a key consideration for investors when allocating funds and assessing required returns (Bodie et al., 2018; Tandelilin, 2023), and a higher rate raises the relative attractiveness of interest-bearing instruments. In banking, interest-rate changes affect funding costs, interest income, credit demand, and debtors' repayment capacity. Banks with high ROA generate profits more effectively, yet high profitability alone is not sufficient to offset the effects of interest-rate changes, which also depend on funding structure, loan composition, asset–liability sensitivity, and risk-management strategy. The direct effect of the interest rate therefore remains significant regardless of profitability levels. This finding is consistent with Basri et al. (2023), but differs from Saputra et al. (2024), who found a significant moderating effect.

The moderating role of profitability on the exchange rate–firm value relationship. Profitability significantly moderates the effect of the exchange rate on firm value, so H6 is supported. The negative interaction coefficient indicates that higher ROA shifts the slope of the exchange rate–firm value relationship in a more negative direction, holding other variables constant. The direction and magnitude of the conditional effect at a given level of profitability,

however, cannot be determined from the interaction coefficient alone; it also depends on the main coefficients of the exchange rate and ROA and on the measurement of the exchange rate. The negative interaction therefore does not automatically mean that profitability acts as a buffer against exchange-rate risk. From a signalling perspective (Brigham & Houston, 2022), ROA conveys information about a bank's earning capacity, while exchange-rate movements reflect external conditions affecting risk and business prospects; signalling theory is used here as a plausible explanatory framework rather than a mechanism directly proven by the model. Notably, while the direct effect of the exchange rate is insignificant, its interaction with profitability is significant, showing that the exchange rate–value relationship is conditional on ROA. This result is consistent with Basri et al. (2023) and Saputra et al. (2024), who found that profitability moderates the effect of the exchange rate on firm value. Further analysis of marginal or conditional effects is needed to determine at which levels of profitability ROA strengthens or weakens the relationship.

CONCLUSION

This study concluded that, among banks included in the InfoBank15 Index during 2020–2025, the policy interest rate was the only macroeconomic variable exhibiting a statistically significant negative association with firm value, as measured by Tobin's Q. In contrast, inflation and the exchange rate exhibited negative but statistically insignificant associations with firm value. Profitability, proxied by return on assets (ROA), did not significantly moderate the relationships between inflation or policy interest rates and firm value. However, profitability significantly moderated the relationship between the exchange rate and firm value, indicating that the magnitude and direction of this relationship depended on banks' profitability levels. These findings suggested that bank management should strengthen interest rate risk management by evaluating funding structures, controlling funding costs, and improving asset–liability management. Banks should also monitor foreign currency exposures and maintain profitability through productive asset optimization, improved credit quality, and effective operating cost management. Investors were encouraged to consider policy interest rate movements, exchange rate fluctuations, ROA, asset quality, and capital adequacy when assessing banking firm valuations. Furthermore, Bank Indonesia and the Financial Services Authority (OJK) should consider the implications of monetary policy adjustments for bank funding costs and reinforce supervision of interest rate and foreign exchange risk exposures. Future research should expand the sample size and observation period, incorporate additional bank-specific variables such as credit risk, capital adequacy, liquidity, and operational efficiency, and examine the marginal effects of exchange rate movements on firm value across different profitability levels.

FUNDING

This research did not receive any specific funding from government, private, or other organisations.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest in the conduct of the research, the writing, or the publication of this article.

AUTHOR CONTRIBUTION

Siti Fatimah was responsible for the conceptualisation of the research, data collection and analysis, interpretation of the results, and preparation of the manuscript; the other contributors participated in reviewing, editing, and approving the final manuscript.

GENERATIVE ARTIFICIAL INTELLIGENCE USAGE STATEMENT

The author states that generative artificial intelligence (AI) was used in the preparation of this manuscript, solely to help translate the text into English and to improve language clarity and grammatical structure. The use complies with applicable ethical guidelines regarding the

use and disclosure of generative AI in scientific research. The entire content of the manuscript has been carefully reviewed to ensure its accuracy, and the author is solely responsible for the integrity and final content of the manuscript.

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