Formosa Journal of Multidisciplinary Research (FJMR)
Vol. 5 No. 5, 2026: 1361-1376

The Effect of Credit Growth, LDR and Interest Rates on Non-Performing Loans (NPL) in KBMI IV Banks in Indonesia

Eclesia Eva Celia Putri[1]*, Tony Seno Aji[2]
Economics, Faculty of Economics and Business, State University of Surabaya, Surabaya, Indonesia
Corresponding Author: Eclesia Eva Celia Putri eclesiaevaceliaputri@gmail.com

A R T I C L E I N F O

Keywords: Non-Performing Loan (NPL), Credit Growth, LDR, Interest Rates, KBMI IV

Received : 29, March
Revised : 30, April
Accepted: 23, May

A B S T R A C T

This study examines the impact of credit growth, Loan to Deposit Ratio (LDR), and interest rates on Non-Performing Loans (NPL) in KBMI IV banks. It uses a quantitative approach with panel data regression and secondary data from annual financial reports and OJK publications. The sample includes banks classified as KBMI IV within a specified period. The results show that credit growth and LDR negatively and significantly affect NPL, indicating that increased lending supported by effective risk management and optimal intermediation can reduce bad loans. Meanwhile, interest rates do not significantly influence NPL, suggesting limited direct impact on repayment ability. Simultaneously, all variables significantly affect NPL, highlighting the importance of selective lending, prudent liquidity management, and appropriate interest rate policies.

DOI: https://doi.org/10.55927/fjmr.v5i5.73
ISSN-E: 2829-8896
https://journalfjmr.my.id/index.php/fjmr

INTRODUCTION

Banking is one of the main pillars of a country's financial system, as it plays a vital role as a financial intermediary. Banks collect funds from surplus units (savers) and channel them to deficit units (borrowers) in the form of credit, thereby facilitating the flow of funds in the economy (Mishkin, 2022). This activity not only maintains the circulation of money but also drives economic growth through consumption, investment, and trade financing. Moreover, banking serves as a key channel for monetary policy transmission, influencing interest rates, inflation, and overall price stability. Mishkin (2022) emphasizes that the role of banking extends beyond financial intermediation, serving as a primary channel for monetary policy transmission that influences interest rates, inflation, and price stability.

In Indonesia, the banking sector clearly dominates the financial system, accounting for more than 50% of the total assets of national financial institutions (OJK, 2023). Under POJK 12/POJK.03/2021 concerning Commercial Banks, banks in Indonesia are classified based on core capital (KBMI) to map their intermediation capacity, business complexity, and level of systemic importance. KBMI is divided into four groups (KBMI I, KBMI II, KBMI III, and KBMI IV) with KBMI IV consisting of banks with very large core capital (≥ IDR 70 trillion) that dominate total assets, third-party funds and credit distribution in the industry. This group includes BRI, BCA, Mandiri, and BNI. Due to their scale of operations and extensive service networks, KBMI IV banks play a crucial role as the main channel for monetary policy transmission, for example through the BI7DRR to the real sector, while also maintaining financial system stability (Mishkin, 2022).

At the industry level, official data presented by KBMI group facilitates cross-group comparisons, making KBMI IV a benchmark for assessing the condition of the national banking sector. Maulana & Salim (2025) also examine the population of KBMI III–IV banks over the 2019–2023 period, highlighting academic attention on large-core-capital banks that play a crucial role and remain the primary focus of supervision. Banks within the KBMI IV group exhibit distinct characteristics compared to smaller banks. Their large asset base and extensive service networks make them key representatives of national credit distribution. In addition, KBMI IV banks generally have substantial exposure to strategic sectors such as infrastructure, manufacturing, international trade, and large-scale corporate financing. Given this position, changes in the financial condition of KBMI IV banks not only affect their internal performance but also have the potential to influence overall financial system stability. Therefore, the dynamics of KBMI IV banks' financial performance can be viewed as an important indicator in assessing the condition of the national banking sector. Furthermore, the nature of bank lending and the tendency for shifts in loan supply across financial institutions suggest that policy or liquidity issues in large banks can quickly spread and affect the broader financing system. This mechanism is particularly relevant for large banks such as those in the KBMI IV group (Ahn, Kim, & Lim, 2025). With a clear regulatory framework, the availability of comparative data, and support from prior research findings, KBMI IV banks are both relevant and appropriate for further study.

The vital role of banking as a key pillar of the national economy and as a financial intermediary connecting creditors and borrowers makes banking health a fundamental reflection of financial system stability and economic growth. The main indicator consistently used to assess bank soundness and asset quality is the Non-Performing Loan (NPL) ratio. NPL, which represents the proportion of problematic loans relative to total lending, directly measures the credit risk faced by banks. Significant fluctuations and increases in NPL levels require in-depth analysis, making it an essential issue to study in order to identify underlying problems and formulate appropriate mitigation policies.

During the 2015–2019 period, total bank lending grew strongly, entering 2019 with a relatively low industry NPL ratio of around 2.59%, indicating that asset quality remained under control prior to the pandemic shock (OJK, 2023). However, in 2020–2021, the pandemic triggered a slowdown in credit distribution and placed pressure on asset quality, as reflected in rising NPL levels in many countries, including Indonesia.

The development of NPL ratios among KBMI IV banks shows varying dynamics across banks, yet all reflect a cyclical pattern with the greatest pressure occurring during the pandemic period. BRI remained relatively stable at around 2.1–2.5% during 2015–2019, then increased to approximately 3.0–3.2% in 2020–2021 and stayed slightly above 3% through 2024. BNI exhibited more fluctuation, ranging between 2.7–3.0% in 2015–2017, declining to around 2% before 2019, then rising sharply to 3.3–3.6% at the peak of the pandemic before gradually falling to below 2% by 2024. BCA showed a more gradual upward trend, from below 1% in 2015 to around 2.0–2.3% after 2020, indicating increased risk but still relatively low compared to other banks. Meanwhile, Bank Mandiri recorded the highest NPL in the group during 2016–2017 (around 3.5–3.7%), but then declined consistently to about 1% in 2023–2024. Overall, these data confirm that the COVID-19 pandemic shock led to rising NPL levels across all KBMI IV banks, followed by a phase of adjustment and improvement in credit quality at different speeds and magnitudes. Evidence from studies on rural banks (BPR) also shows that the pandemic affected NPL ratios, suggesting that the surge in NPL during 2020–2021 can be understood as a response to shocks in borrowers' income and cash flows during the crisis. Furthermore, financial stability literature emphasizes that high NPL levels negatively affect bank profitability, liquidity, and capital, and may constrain credit supply, thereby impacting real economic activity. Therefore, post-crisis monitoring of NPL is essential to ensure the sustainability of financial intermediation (Júlio et al., 2025).

In general, the level of Non-Performing Loans (NPL) is influenced by a combination of internal bank factors and macroeconomic conditions. Internal factors include lending policies, the quality of creditworthiness assessment, the effectiveness of credit monitoring, and the bank's liquidity and capital conditions. Meanwhile, external factors encompass economic growth, interest rates, inflation, and real sector conditions that affect borrowers' repayment capacity. Recent studies indicate that when economic growth slows and interest rates rise, the risk of borrower default tends to increase, thereby pushing NPL levels upward. Conversely, effective credit risk management and adequate

liquidity conditions can help contain the growth of non-performing loans (Lestari et al., 2025). These findings confirm that NPL is the result of a complex interaction between bank-specific factors and macroeconomic conditions; therefore, risk management strategies must consider both aspects simultaneously.

As an internal bank factor, the development of credit growth in KBMI IV banks during the 2015–2024 period shows a fluctuating pattern. During 2015–2019, credit growth remained relatively stable at a moderate level. Entering 2020, credit growth declined sharply approaching zero or even turning negative in some banks due to weakened economic activity caused by the COVID-19 pandemic. In the 2021–2022 period, credit growth began to recover, and in 2023–2024 it recorded a stronger increase in line with improving economic conditions and rising financing demand. These changes in credit growth have implications for banking asset quality. Increasing credit growth reflects more aggressive lending expansion, which, if not accompanied by careful creditworthiness assessment, may raise the risk of future non-performing loans. Conversely, a slowdown in credit growth reflects a more cautious lending stance but may also indicate weakening business conditions among borrowers, potentially affecting the quality of existing loan portfolios. Therefore, the dynamics of credit growth play an important role in influencing Non-Performing Loans (NPL) through their impact on lending behavior and the underlying economic conditions affecting borrowers' repayment capacity.

In addition, the relationship between credit growth and credit quality is not always linear in the short run. During the post-pandemic economic recovery phase, an increase in credit growth may reflect banks' efforts to restore their intermediation function; however, the resulting credit quality largely depends on the composition of financed sectors and each bank's risk management strategy. If credit expansion is directed toward sectors that are relatively resilient to economic shocks, increased lending may gradually improve portfolio quality.

Another internal factor that determines credit quality is the Loan to Deposit Ratio (LDR). The development of LDR among KBMI IV banks during 2015–2024 shows an upward trend in 2015–2019, followed by a decline in 2020–2021, and a subsequent increase in 2022–2024. These changes reflect the dynamics of credit distribution and banking liquidity conditions. When LDR rises, a larger proportion of funds is channeled into loans, thereby reducing liquidity buffers. This constraint may limit banks' ability to absorb risks and effectively monitor credit, potentially increasing the likelihood of non-performing loans (NPL). Conversely, when LDR is lower, liquidity conditions are more ample, allowing banks greater flexibility in managing credit risk and maintaining loan portfolio quality. Therefore, LDR dynamics play an important role in influencing NPL through their impact on liquidity conditions and the effectiveness of credit risk management. Akmal & Kusumastuti (2024) emphasizes that under conditions of economic stress, liquidity constraints can accelerate the increase in Non-Performing Loans (NPL).

In addition to internal factors, policy interest rates as an external factor also play a role in determining the cost of funds and borrowers' ability to meet

their obligations. An increase in interest rates raises debt servicing costs, thereby increasing the risk of default if the value of borrowers' assets does not grow in line with their obligations (Mishkin, 2022). Anwar et al. (2023) also states that interest rate shocks can lead to an increase in Non-Performing Loans (NPL).

The development of Bank Indonesia's policy interest rate during the 2015–2024 period shows a declining trend until 2017, followed by fluctuations and a renewed increase in 2022–2024. Changes in the policy rate affect the banking sector through adjustments in deposit and lending rates. When the policy rate rises, lending rates tend to increase, leading to higher debt servicing burdens for borrowers and potentially weakening their repayment capacity. This decline in repayment ability may increase the risk of default and drive up the Non-Performing Loan (NPL) ratio. Conversely, during periods of relatively low policy interest rates, lending rates become more affordable, helping maintain borrowers' cash flows and reducing the risk of non-performing loans. Therefore, the dynamics of policy interest rates play an important role in influencing NPL movements through the transmission mechanism of monetary policy to both the real sector and the banking sector.

According to credit risk theory, excessively rapid credit growth can reduce the rigor of creditworthiness assessments, thereby increasing the risk of adverse borrower selection. This condition indicates that an increase in credit volume is not always accompanied by an improvement in loan portfolio quality. As a result, even when the intermediation function strengthens, the risk of non-performing loans remains an important issue to be carefully monitored.

In addition, changes in policy interest rates and banking liquidity dynamics further complicate this relationship. The increase in policy rates during the 2022–2024 period may raise borrowers' debt servicing burdens, while a higher LDR reflects tighter bank liquidity. The combination of these factors can intensify pressure on credit quality, particularly in sectors that are sensitive to financing costs. Thus, NPL movements are not driven by a single variable, but by the interaction between credit growth, liquidity, and monetary policy.

Differences in NPL patterns across KBMI IV banks also indicate that internal factors, such as lending strategies and risk management practices, play a crucial role in determining asset quality. Although these banks belong to the same core capital group, their responses to changes in economic conditions and monetary policy are not always uniform. This suggests that the relationship between credit growth, LDR, and interest rates with NPL is complex and not always linear, as assumed in conventional theory.

Therefore, the phenomenon of NPL movements that do not fully align with credit growth, LDR, and interest rate changes reveals an empirical issue that requires further investigation. This study is important to examine whether the effects of credit growth, LDR, and interest rates on NPL in KBMI IV banks are direct and consistent, or influenced by bank-specific characteristics and particular economic conditions.

Previous studies show mixed results regarding the factors influencing Non-Performing Loans (NPL). For the credit growth variable, Poerba dan Kurniasih (2019) find that credit growth has a significant negative effect on NPL

in BUKU II banks in Indonesia, indicating that increased lending accompanied by effective risk management can reduce non-performing loans. In contrast, Christodoulou-Volos (2025) di Cyprus finds that credit growth does not have a significant effect on NPL in Cyprus, as an increase in lending is not always associated with improvements in loan portfolio quality.

For the LDR variable, Anwar et al. (2023) and Agustuty (2022) find that LDR has a significant negative effect on NPL, implying that more optimal banking intermediation can help reduce the risk of non-performing loans. However, Harahap et al. (2020) in a study on banking in developing countries, find that LDR does not have a significant effect on NPL, as increased lending does not necessarily reflect better borrower quality.

For the interest rate variable, Putri & Zakik (2023) find that interest rates have a significant negative effect on NPL in Indonesia, suggesting that higher interest rates may increase banks' prudence in lending, thereby reducing default risk. However, Soekapdjo & Tribudhi (2020) report different results, showing that interest rates do not have a significant effect on NPL, as changes in interest rates do not necessarily have an immediate impact on borrowers' repayment capacity in the short run. These differing findings indicate that the effects of credit growth, LDR, and interest rates on NPL are highly influenced by the characteristics of the banking system, macroeconomic conditions, and the observation period of each study.

These differences in research findings indicate the existence of a research gap. Most previous studies rely on annual data, which may not fully capture the short-term dynamics between credit growth, liquidity changes, and interest rate transmission on NPL. In addition, many studies do not differentiate banks based on core capital groups, even though the risk characteristics and intermediation behavior of KBMI IV banks differ from those of smaller banks.

This study uses the 2015–2024 period based on the consideration that it encompasses the pre-COVID-19 phase (2015–2019), the pandemic crisis period (2020–2021), and the economic recovery phase (2022–2024), thereby capturing the dynamics of banking credit quality under different economic conditions. In addition, this period coincides with important policy changes in the banking sector, particularly the implementation of bank classification based on core capital (KBMI), as well as fluctuations in Bank Indonesia's policy interest rates. The availability of consistent data from the Financial Services Authority (OJK) and Bank Indonesia is also a key consideration, making the 2015–2024 period relevant and representative for examining the effects of credit growth, LDR, and interest rates on Non-Performing Loans (NPL) in KBMI IV banks. Therefore, this study offers novelty by employing quarterly panel data from 2015–2024 for KBMI IV banks to re-examine the effects of credit growth, LDR, and interest rates on NPL based on credit risk theory.

LITERARTUR REVIEW

Credit Risk Theory

Robert C. Merton's theory views corporate equity as an "option" on the value of a firm's assets. As long as asset value is sufficient to cover liabilities at maturity, equity retains value; otherwise, default occurs. This intuition places

credit risk on a concrete foundation namely the firm's asset and debt positions, as well as uncertainty in asset values over time (Merton, 1974). From this perspective, default probability is not only estimated from historical patterns but is derived from fundamental conditions, which is why Merton's framework is known as a structural model of credit risk.

According to Merton (1974), three main factors determine the likelihood of default: the leverage ratio, asset value volatility, and time to maturity. Higher leverage reduces the protection buffer, greater asset volatility increases the chance that firm value will fall below its obligations, and longer maturity increases exposure to potential shocks. This reflects a simple yet powerful relationship between a firm's balance sheet and credit risk, rooted in modern option pricing theory.

Black and Cox (1976) later extended the model by proposing that default does not have to wait until maturity. Instead, default can occur at any time when asset value falls below a minimum threshold implied in debt covenants. This extension remains within the structural framework and provides a more realistic explanation of how contractual obligations influence the timing of default.

The Merton framework is closely linked to modern bank risk management practices. In banking, expected loss is summarized through PD–LGD–EAD, probability of default, loss given default, and exposure at default. Structural models provide a fundamental basis for estimating PD, while global regulatory frameworks such as Basel II/III formalize the use of PD, LGD, and EAD in risk-based capital calculations, supported by stress testing and liquidity buffers to enhance resilience.

Credit growth can either increase or decrease NPL depending on whether expansion shifts the portfolio toward riskier borrowers with higher leverage and unstable cash flows, or toward more stable segments. In Merton's framework, if credit expansion worsens debt structure and increases volatility, default probability rises, leading to higher NPL. LDR influences credit risk through pricing and selection: liquidity pressure may lead to higher lending rates and more aggressive borrower selection, increasing effective debt burden and cash flow volatility, thus raising PD and NPL. However, during economic recovery, rising LDR from a low level may coincide with improved debt structure and portfolio stability, reducing PD and NPL. Interest rates affect both simultaneously: higher rates increase debt servicing burdens and reduce the present value of assets and collateral, effectively raising leverage and potential losses. If rate increases are fully passed on to borrowers, default probability and NPL are likely to rise.

METHODOLOGY

The method used in this study is a quantitative approach with a causal framework. This method is chosen because it emphasizes objective hypothesis testing based on non-experimental (observational) data through statistical analysis. Panel data are selected due to their advantages, including being more informative, providing greater variability, offering more degrees of freedom, improving estimation efficiency, being more suitable for analyzing dynamic changes, and capturing heterogeneity across subjects (Gujarati & Porter, 2009).

This study employs secondary data obtained from official sources, namely Bank Indonesia Statistics (BI) and the Financial Services Authority (OJK) data portal.

Before conducting panel data regression, the most appropriate model is determined using the Chow test and the Hausman test. This is followed by classical assumption tests, including multicollinearity and heteroskedasticity tests, as well as hypothesis testing using the t-test, F-test, and coefficient of determination. The following regression equation is obtained from the panel data estimation results :

$$\boldsymbol{NPL_{it} = 10.31097_{it} - 0.249705Growth_{it} - 0.031621LDR_{it} - 0.193930BI7DRR_{it}}$$

Description:
NPL : Non-Performing Loan (NPL)
Growth : Credit Growth
LDR : Loan to Deposit Ratio (LDR)
BI7DRR : Interest Rate

RESEARCH RESULT

Chow Test

Table 1. Chow Test

Effect Test	Prob.
Cross-section Chi-square	0.0000

Based on the test results, the probability value is 0.0000, which is below the significance level of 0.05. Therefore, H_0 is rejected, indicating significant differences in characteristics across banks. Accordingly, the Fixed Effect Model (FEM) is selected as the most appropriate model for this study.

Hasuman Test

Table 2. Hausman Test

Test Summary	Prob.
Cross-section random	0.0001

Based on the test results, the probability value is 0.0001, which is below the significance level of 0.05. Therefore, H_0 is rejected, and the Fixed Effect Model (FEM) is considered the most appropriate model. Accordingly, based on the results of the Chow Test and the Hausman Test, this study employs the Fixed Effect Model (FEM) without the need to proceed to the Lagrange Multiplier test.

Multicollinearity Test

Table 3. Multicollinearity Test

	Growth	LDR	BI7DRR
Growth	1.000000	0.171091	-0.208309
LDR	0.171091	1.000000	0.100610
BI7DRR	-0.208309	0.100610	1.000000

Based on the correlation matrix, the correlation values among the independent variables are below 0.80. Therefore, it can be concluded that the

model does not exhibit multicollinearity issues, and the independent variables are suitable for use in the regression analysis.

Heteroscedasticity Test

Table 4. Heteroscedasticity

Variable	Coefficient	Std.Error	t.Statistic	Prob.
C	-3.105513	1.771118	-1.753420	0.0815
Growth	0.040552	0.020667	1.962118	0.0516
LDR	0.001740	0.005013	0.347000	0.7291
BI7DRR	0.156186	0.082488	1.893449	0.0602

Based on the heteroskedasticity test results, variable X1 has a probability value of 0.0516, variable X2 has a probability value of 0.7291, and variable X3 has a probability value of 0.0602. Since all probability values are greater than 0.05, it can be concluded that the regression model in this study does not suffer from heteroskedasticity.

Panel Data Regression Result

Table 5. Panel Data Regression Result

Variable	Coefficient	Std.Error	t-Statistic	Prob.
C	10.31097	3.278732	3.144804	0.0020
Growth	-0.249705	0.038260	-6.526538	0.0000
LDR	-0.031621	0.009281	-3.407232	0.0008
BI7DRR	-0.193930	0.152703	-1.269979	0.2060
R Square	0.533297			
Adjusted R Square	0.514994			
F-statistic	29.13855			
Prob (F-statistic)	0.000000			

Source: Data Processing Results, E-views 12

Partial Test (T-test)

Based on the panel data regression results, the credit growth variable has a probability value of 0.0000, which is less than 0.05, with a regression coefficient of -0.249705. This indicates that credit growth has a negative and significant partial effect on NPL. The LDR variable has a probability value of 0.0008, which is also below 0.05, with a negative regression coefficient of -0.031621, indicating that LDR has a negative and significant effect on NPL. Meanwhile, the interest rate variable (BI7DRR) has a probability value of 0.2060, which is greater than 0.05, indicating that interest rates do not have a significant partial effect on NPL. Thus, the hypothesis stating that interest rates have a partial effect on NPL is rejected.

Simultaneous Test (F-test)

Based on the regression results, the F-statistic value is 29.13855 with a Prob (F-statistic) of 0.0000, which is less than the significance level of 0.05. Therefore,

it can be concluded that credit growth, LDR, and interest rates simultaneously have a significant effect on NPL. This indicates that the regression model used is appropriate and capable of explaining the relationship between the independent and dependent variables collectively.

Coefficient of Determination (R^2)

Based on the regression results, the R-squared value is 0.533297 and the Adjusted R-squared is 0.514994, indicating that approximately 51.49% of the variation in NPL can be explained by credit growth, LDR, and interest rates in the model. The remaining 48.51% is explained by variables outside this study. These results suggest that the model has a strong explanatory power for the variation in the dependent variable.

DISCUSSION

The Effect of Credit Growth on NPL

This study finds that credit growth has a negative and significant effect on NPL, indicating that higher credit growth in KBMI IV banks tends to be associated with a decline in the ratio of non-performing loans. According to Merton (1974), default risk arises when the value of a borrower's assets falls below their obligations. Thus, these results suggest that credit expansion in KBMI IV banks is directed toward financially stronger borrowers with more stable assets and repayment capacity. As a result, the likelihood of asset values falling below liabilities decreases, reducing default risk and lowering NPL. In other words, although lending increases, borrower quality is maintained, preventing a rise in bad loans.

From a policy perspective, this finding can be explained by the implementation of prudential principles required by the POJK NO 40/POJK.03/2019 and PBI NO 13/23/PBI/2011, which mandate comprehensive creditworthiness assessments, effective credit risk management, and continuous loan monitoring. Banks are also required to align lending with borrowers' repayment capacity and sectoral conditions, thereby preventing the accumulation of non-performing loans.

Furthermore, the Financial Services Authority implemented credit restructuring policies during and after the COVID-19 pandemic, providing relaxation in asset quality assessment so that restructured loans were not immediately classified as non-performing. During the economic recovery period (2022–2024), credit growth in KBMI IV banks tended to be more selective, focusing on existing borrowers and relatively stable sectors. With strong regulatory oversight and asset quality requirements, credit growth could occur without increasing NPL.

These findings are consistent with previous empirical studies. Hakim et al., (2023) and Poerba (2019) also find that credit growth has a negative and significant effect on NPL, indicating that banks capable of managing credit expansion effectively tend to experience lower NPL levels. This reinforces the view that credit growth does not necessarily lead to higher non-performing loans, but rather depends on borrower quality and the effectiveness of credit risk management.

The Effect of LDR on NPL

This study finds that LDR has a negative and significant effect on NPL, indicating that higher LDR in KBMI IV banks tends to be associated with lower non-performing loan ratios. According to Merton (1974), default occurs when the value of a borrower's assets falls below their obligations. In this context, LDR reflects the proportion of public funds channeled into loans. The findings suggest that an increase in LDR in KBMI IV banks does not lead to lending toward high-risk borrowers, but rather coincides with credit allocation to borrowers with stronger assets and better repayment capacity. As a result, the likelihood of asset values falling below liabilities decreases, reducing default risk and lowering NPL.

From a policy perspective, the negative relationship between LDR and NPL can be explained by regulatory requirements that oblige banks to maintain a balance between lending activities and liquidity capacity. OJK and BI impose limits and supervision on LDR to prevent excessive lending without proper risk consideration. Banks are also required to apply prudential principles in borrower selection and maintain credit quality even when the proportion of funds disbursed increases. Thus, a higher LDR does not necessarily indicate more aggressive lending to risky borrowers, but rather reflects more efficient allocation of funds to quality loans.

These findings are consistent with previous studies. Sofyan & Purwanto (2023) find that LDR has a negative effect on NPL in Indonesian commercial banks, indicating that banks with effective fund management and borrower selection can expand lending without increasing non-performing loans. Similar results are reported by Soekapdjo & Tribudhi (2020), who argue that higher LDR does not necessarily increase credit risk as long as banks maintain borrower quality and conduct continuous credit monitoring. Therefore, the negative relationship between LDR and NPL observed in this study remains consistent with Merton's theory, as higher LDR in KBMI IV banks reflects lending to more creditworthy borrowers rather than a decline in asset values.

The Effect of Interest Rates on NPL

This study finds that interest rates do not have a significant effect on NPL in KBMI IV banks. This implies that changes in interest rates are not directly followed by changes in the level of non-performing loans. According to Merton (1974), default occurs when the value of a borrower's assets falls below their obligations. Theoretically, interest rates can influence this condition, as higher interest rates increase debt servicing burdens and may put pressure on borrowers' cash flows or asset values. However, the results of this study indicate that this mechanism is not strongly observed in KBMI IV banks, suggesting that interest rate changes are not substantial enough to significantly affect borrowers' repayment capacity or the likelihood of default.

From a policy perspective, this can be explained by how banks determine lending rates, which do not solely follow changes in benchmark rates but also consider borrowers' repayment capacity and credit risk at the initial stage of lending. Banks are required by OJK to set interest rates fairly and transparently, aligning them with borrowers' ability to pay so that repayment burdens do not

increase sharply when interest rates change. In addition, many loans are medium- to long-term with relatively fixed or gradually adjusted interest rates, meaning that the impact of interest rate changes on borrowers' installments is not immediately felt. Under these conditions, changes in interest rates do not directly reduce borrowers' asset values or significantly increase default risk.

These findings are consistent with previous studies. Soekapdjo & Tribudhi (2020) find that interest rates do not have a significant effect on NPL in Indonesian commercial banks, as borrowers' repayment capacity is more influenced by business conditions and income than by interest rate changes. Similar results are reported by Safitri et al. (2023) who argue that the effect of interest rates on non-performing loans becomes weaker when banks implement strict borrower selection and continuous credit monitoring. Therefore, the insignificance of interest rates in this study suggests that credit risk in KBMI IV banks is more determined by borrower quality and credit management practices than by interest rate movements alone, which remains consistent with Merton's framework emphasizing borrower asset conditions as the primary driver of default.

The Effect of Credit Growth, LDR and Interest Rates on NPL

Simultaneously, the test results show that the combination of credit growth, LDR, and interest rates has a significant effect on Non-Performing Loans (NPL) in KBMI IV banks. This finding indicates that NPL cannot be explained by a single factor in isolation, but rather results from the interaction between lending policies, the management of third-party funds, and the cost of credit reflected in interest rates. In other words, changes in NPL are influenced by how banks simultaneously allocate credit, manage liquidity, and determine lending rates. Therefore, although interest rates are not significant in partial analysis, they still contribute to explaining NPL variation when analyzed jointly with credit growth and LDR.

This condition reflects the complexity of factors influencing credit risk in banking. In the context of KBMI IV banks, credit growth represents financing expansion strategies, LDR reflects the bank's ability to manage and channel collected funds into loans, and interest rates represent the pricing of credit for borrowers. These variables do not operate independently but interact in shaping borrowers' repayment capacity. High credit growth without proper risk management may increase NPL, while sound LDR management and appropriate interest rate policies can help mitigate default risk. Thus, NPL is formed through a combination of internal bank policies and the financial conditions faced by borrowers.

Furthermore, the simultaneous test results indicate that the regression model used in this study is appropriate for explaining the relationship between independent and dependent variables. Credit growth, LDR, and interest rates collectively provide a more comprehensive explanation of changes in NPL in KBMI IV banks during the observation period compared to using a single variable.

The relatively high Adjusted R^2 further supports that the model has strong explanatory power in capturing NPL variation. This suggests that a substantial portion of changes in non-performing loans can be explained by variations in credit growth, LDR, and interest rates. However, part of the variation in NPL is still influenced by other factors outside the model, such as macroeconomic conditions, borrower income levels, sectoral stability, bank credit management quality, and credit restructuring policies. These factors were not included in this study, representing a limitation as well as an opportunity for future research to incorporate additional variables for a more comprehensive understanding of NPL dynamics. Nevertheless, these findings remain consistent with Merton's framework, which emphasizes borrower asset conditions as the primary determinant of default risk.

CONCLUSIONS AND RECOMMENDATIONS

Based on the panel data analysis of credit growth, LDR, and interest rates on Non-Performing Loans (NPL) in KBMI IV banks, several conclusions can be drawn. Partially, credit growth has a negative and significant effect on NPL, indicating that increased lending in KBMI IV banks is accompanied by a decline in non-performing loans. LDR also has a negative and significant effect on NPL, meaning that a higher proportion of third-party funds channeled into credit is associated with lower NPL levels, reflecting effective fund management and quality lending. Meanwhile, interest rates do not have a significant partial effect on NPL, suggesting that changes in interest rates do not directly influence the level of non-performing loans.

Simultaneously, credit growth, LDR, and interest rates have a significant effect on NPL, confirming that non-performing loans are not determined by a single factor but result from the interaction between lending policies, fund management, and the cost of credit faced by borrowers.

Based on these findings, several recommendations can be proposed. For banking practice, KBMI IV banks should continue to manage credit growth selectively and prudently, focusing on stable borrowers and sectors, supported by thorough credit assessments and continuous monitoring. LDR management should maintain a balance between fund collection and lending, combined with strong credit risk management to ensure both liquidity and asset quality. Interest rate setting should consider borrowers' repayment capacity and business conditions to minimize credit risk.

ADVANCED RESEARCH

For future research, it is recommended to include additional macroeconomic variables such as inflation and economic growth to provide a more comprehensive analysis of NPL determinants. Expanding the observation period or including other bank groups, such as BUKU II, BUKU III, or rural banks (BPR), may improve the generalizability of findings. Future studies may also incorporate other internal bank variables, such as Capital Adequacy Ratio (CAR), operational costs, or efficiency ratios, to further examine their simultaneous effects on NPL.

REFERENCES

Agustuty, L. (2022). *Pengaruh Faktor Internal dan Eksternal terhadap Kredit Bermasalah*. www.onlinedoctranslator.com

Ahn, J. Bin, Kim, Y., & Lim, H. (2025). Assessing the bank lending channel of macroprudential policy: Evidence from the loan-to-deposit ratio regulation in Korea. *Journal of Banking and Finance*, *180*. https://doi.org/10.1016/j.jbankfin.2025.107541

Akmal, M., & Kusumastuti, S. Y. (2024). Pengaruh Faktor Internal Dan Faktor Eksternal Terhadap Non Performing Loan Pada Industri Perbankan Tahun 2021-2023. *Oktober*, *4*(2), 1265–1280. https://doi.org/10.25105/jet.v4i2.20884

Anwar, C. J., Suhendra, I., Didu, S., Sayektiyani, A., & Kholishoh, L. N. (2023). The Impact of Monetary Policy and Credit Risk on Bank Credit Behavior: An Analysis of Banks Listed on the Indonesian Stock Exchange. *Cogent Economics and Finance*, *11*(1). https://doi.org/10.1080/23322039.2023.2220250

Arfan Harahap, & Anjur Perkasa Alam. (2020). Analisis Pengaruh Inflasi, Kurs, Suku Bunga, Margin Bagi Hasil Terhadap Non Performing Financing Pada Bank Syariah. *Jurnal Syntax Admiration*, *1*(3).

Black, F., & Cox, J. C. (1976). Valuing Corporate Securities: Some Effects of Bond Indenture Provisions. *The Journal of Finance*, *31*(2), 351–367. https://doi.org/10.1111/j.1540-6261.1976.tb01891.x

Christodoulou-Volos, C. (2025). Determinants of Non-Performing Loans in Cyprus: An Empirical Analysis of Macroeconomic and Borrower-Specific Factors. *International Journal of Economics and Financial Issues* , *15*(1), 190–201. https://doi.org/10.32479/ijefi.17398

Dodiputera Poerba. (2019). Faktor Penentu Non Performing Loan Perbankan BUKU II Terdaftar di Bursa Efek Indonesia Determining Factors of Non Performing Loan Banking BUKU II Listed in Indonesia Stock Exchange. In *Universitas Mercu Buana Jakarta Tanjung Benoa-Bali* (Vol. 29).

Dodiputera Poerba dan Augustina Kurniasih, A. (2019). Faktor Penentu Non Performing Loan Perbankan BUKU II Terdaftar di Bursa Efek Indonesia Determining Factors of Non Performing Loan Banking BUKU II Listed in Indonesia Stock Exchange. In *Universitas Mercu Buana Jakarta Tanjung Benoa-Bali* (Vol. 29).

Gujarati, D., & Porter, D. (2009). *Basic Econometrics*.

Hakim, M. N., Hidayat, A., Asngari, I., & Shodrokova, X. (2023). Economics Development Analysis Journal Non-Performing Loans Indonesian Banking Industry: Before and During Covid-19 Pandemic. *Economics Development Analysis Journal Vol*, *12*(4). http://journal.unnes.ac.id/sju/index.php/edaj

Júlio, P., Maria, J. R., & Santos, S. (2025). Risk shocks, due loans, and policy options: When less is more! *Journal of Financial Stability*, *80*. https://doi.org/10.1016/j.jfs.2025.101439

Lestari, H. S., Usman, B., Laksono, W. S., & Abdullah, M. H. (2025). The Influence of Macroeconomic Indicators and Bank Internal Factors on Credit Risk in Developing Countries. *Jurnal Ilmiah Manajemen Kesatuan*, *13*(3), 1399–1410. https://doi.org/10.37641/jimkes.v13i3.3178

Merton, R. C. (1974). *On the Pricing of Corporate Debt: The Risk Structure of Interest Rates*.

Mishkin, F. S. (2022). *The Economic of Money, Banking and Financial Markets*.

OJK. (n.d.). *Indonesia Financial Sector Development*. Retrieved https://ojk.go.id/IRU

PBI NOMOR 13/23/PBI/2011. (2011). *PERATURAN BANK INDONESIA*.

Peraturan Otoritas Jasa Keuangan Nomor 12 /Pojk.03/2021 Tentang Bank Umum. (n.d.).

POJK NOMOR 40 /POJK.03/2019. (2019). *PERATURAN OTORITAS JASA KEUANGAN REPUBLIK INDONESIA TENTANG PENILAIAN KUALITAS ASET BANK UMUM*.

Putri, D. M. N., & Zakik, Z. (2023). Analisis Pengaruh Indikator Makroekonomi Terhadap Non Performing Loan (NPL) Di Indonesia Tahun 2016-2020. *Buletin Ekonomika Pembangunan*, *3*(2). https://doi.org/10.21107/bep.v3i2.18394

Safitri, R., Sulastri, & Andriana, I. (2023). The Influence of Operational Costs on Operating Income and Interest Rates on Non-PerformingiLoans in Banking Companies listed on thei Indonesian Stock Exchangei. *Ilomata International Journal of Tax and Accounting*, *4*(4), 771–781. https://doi.org/10.52728/ijtc.v4i4.909

Soekapdjo, S., & Tribudhi, D. A. (n.d.-a). Pengaruh Faktor Eksternal Dan Internal Terhadap Kredit Bermasalah Perbankan Konvensional Di Indonesia. *J A*, *17*(2), 2020–2278. Retrieved http://journal.feb.unmul.ac.id/index.php/KINERJA

Soekapdjo, S., & Tribudhi, D. A. (n.d.-b). Pengaruh Faktor Eksternal dan Internal terhadap Kredit Bermasalah Perbankan Konvensional di Indonesia. *J A*, *17*(2), 2020–2278. Retrieved http://journal.feb.unmul.ac.id/index.php/KINERJA

Sofyan, M., & Purwanto, B. H. (2023). Internal Factors Affecting the NPL of State-Owned Commercial Banks. *Ilomata International Journal of Management*, *4*(2), 195–206. https://doi.org/10.52728/ijjm.v4i2.737

Statistik Perbankan Indonesia - Desember 2023. (n.d.).

Yusuf, M., & Salim, M. N. (2025). The influence of CAR, LDR, OER, and Bank Size on NPL mediated by GCG in KBMI III and IV. *International Journal of Entrepreneurship and Business Management*, *4*(1), 79–96. https://doi.org/10.54099/ijebm.v4i1.1336