

# The Influence of Macroeconomic Indicators and Bank Internal Factors on Credit Risk in Developing Countries

The Influence of  
Macroeconomic  
Indicators

Henny Setyo Lestari  
Universitas Trisakti; Jakarta, Indonesia  
E-Mail: henny\_setyo\_lestari@trisakti.ac.id

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Bahtiar Usman  
Universitas Trisakti; Jakarta, Indonesia  
E-Mail: bachtiar.usman@trisakti.ac.id

Wafi Suryo Laksono  
Universitas Trisakti; Jakarta, Indonesia  
E-Mail: 022002101182@stdtrisakti.ac.id

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M. Hussin Abdullah  
Malaysian Institute of Management; Selangor, Malaysia  
E-Mail: mhussin@edidik.edu.my

## ABSTRACT

*This study aims to analyze the determinants of credit risk in commercial banks in Indonesia as measured by Non-Performing Loans (NPL), as the main indicator of banking system stability. This study uses a quantitative method with a panel data regression approach to evaluate the influence of various factors on credit risk. Data were obtained from financial statements and annual reports of banks listed on the Indonesia Stock Exchange. The sample consisted of 36 banks during the period 2019–2023, resulting in 180 observations. The analysis was conducted using multiple linear regression with fixed and random effect models through EViews software. The results of the analysis show that variables such as interest rates, bank size, return on assets (ROA), loan loss provisions (LLP), capital adequacy ratio (CAR), and asset quality have a significant effect on NPL. In contrast, gross domestic product (GDP) and inflation do not show a significant effect. These findings indicate that interest rates and ROA are significant new contributors to NPL fluctuations in the Indonesian banking sector during the study period.*

**Keywords:** Credit Risk, Inflation, Interest Rates, NPL, Return on Assets.

## ABSTRACT

*Studi ini bertujuan untuk menganalisis faktor-faktor penentu risiko kredit pada bank umum di Indonesia yang diukur melalui Non-Performing Loans (NPL), sebagai indikator utama stabilitas sistem perbankan. Penelitian ini menggunakan metode kuantitatif dengan pendekatan regresi data panel untuk mengevaluasi pengaruh berbagai faktor terhadap risiko kredit. Data diperoleh dari laporan keuangan dan laporan tahunan bank-bank yang terdaftar di Bursa Efek Indonesia. Sampel terdiri dari 36 bank selama periode 2019–2023, menghasilkan 180 observasi. Analisis dilakukan menggunakan regresi linier berganda dengan model efek tetap dan acak melalui perangkat lunak EViews. Hasil analisis menunjukkan bahwa variabel seperti suku bunga, ukuran bank, return on assets (ROA), loan loss provision (LLP), capital adequacy ratio (CAR), dan kualitas aset memiliki pengaruh signifikan terhadap NPL. Sebaliknya, produk domestik bruto (PDB) dan inflasi tidak menunjukkan pengaruh yang signifikan. Temuan ini mengindikasikan bahwa suku bunga dan*

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## INTRODUCTION

Banking plays a vital role in linking the economy with society. As a key financial intermediary, banks provide fair, transparent financial services to meet community needs. They support financing mechanisms across sectors such as trade, services, industry, food, and energy. Traditional banks are essential for economic growth through their role in providing financial facilities to companies and individuals (Shaheen et al., 2024). Banks collect deposits from customers and channel them into loans for others who need funds (Alhadab & Alsahawneh, 2020). The main goal of business organizations, including banks, is to generate profits, primarily through lending activities. However, large-scale loans increase the risk of default, potentially threatening financial stability. A solution to mitigate this is the use of loan loss reserves. According to Tirwa et al. (2022), non-performing loans are a significant issue in banking. Credit risk is one of the most critical risks, as banks finance various projects that drive economic growth (Puspitasari & Firmansyah, 2025).

Credit risk poses a significant threat to financial stability and the sustainability of financial institutions, increasing alongside the rise in bank credit levels. Non-Performing Loans (NPLs) are a key indicator of credit risk and are crucial for maintaining economic stability (Akram & Rahman, 2020; Daeng & Mahjudin, 2017; Alwaini et al., 2023). Since the 2007 Asian financial crisis, NPLs have remained a persistent challenge for banks (Endut et al., 2021). This study analyzes the determinants of credit risk in Indonesian banking by examining variables such as GDP, inflation, interest rates, and profitability. Additional factors considered include Loan Loss Provisions (LLP), Bank Size (S), Asset Quality (AQ), Capital Adequacy Ratio (CAR), and Return on Assets (RoA), analyzed using Ordinary Least Squares (OLS) (Bhattacharya et al., 2023; Shaheen et al., 2024).

GDP positively influences credit risk because economic growth promotes increased lending and employment, thereby improving borrowers' repayment ability (Priyadi et al., 2021). Inflation, defined as a sustained rise in general price levels (Longo et al., 2022), typically leads to higher interest rates. This pushes banks to provide more credit at higher rates to enhance performance (Kwashie et al., 2022a). Inflation raises credit risk by reducing purchasing power and increasing borrowing costs, which can result in delayed payments or defaults. Bank-specific factors such as size, ROA, LLP, CAR, and asset quality are also vital in assessing credit risk. Larger banks may face greater credit risk due to expanded financing activities, although some studies report an inverse relationship (How et al., 2015; Alzoubi & Obeidat, 2020; Siddique et al., 2022; Shaheen et al., 2024). ROA reflects profitability and efficiency in generating earnings, significantly impacting NPLs (Natufe & Evbayiro-Osagie, 2023). Higher profitability helps control credit risk (Tirwa et al., 2022). LLP is positively associated with credit risk, as banks with riskier portfolios allocate more provisions to cover potential losses (Alhadab & Alsahawneh, 2020; Misman & Bhatti, 2020).

Capital Adequacy Ratio (CAR) is the minimum capital required by financial authorities to ensure banks avoid high-risk investments (Bhattacharai, 2019; McKillop et al., 2024). CAR positively affects credit risk, as it reflects a bank's ability to absorb unexpected losses (Shaheen et al., 2024). A higher CAR enables banks to manage financing more effectively, reducing credit risk (Effendi et al., 2022). Asset Quality (AQ), which indicates potential credit risk from loans and investments, has a positive but insignificant effect on credit risk. Ekinçi and Poyraz (2019a) explain that banks make large profits from part of their income from interest income. So, the higher the expected ratio, the more efficient it is in making a profit and has a positive effect on profits. The higher the quality of assets, the lower the credit risk.

Bhattarai (2019), Effendi et al. (2022), and Shaheen et al. (2024) emphasize the link between Capital Adequacy Ratio (CAR) and credit risk, while also highlighting the role of Asset Quality (AQ) in mitigating such risk. However, findings on AQ's significance remain inconsistent. Ekinici and Poyraz (2019a) found the effect of AQ on credit risk to be insignificant, despite theoretical assumptions. Research exploring the simultaneous impact of CAR and AQ on credit risk, especially in developing countries, is still limited. Therefore, this study examines how CAR and AQ affect credit risk (NPL) in Indonesian commercial banks.

## **LITERATURE REVIEW & HYPOTHESIS DEVELOPMENT**

### **Gross Domestic Product and Inflation on Credit Risk**

Gross Domestic Product (GDP) measures the total monetary value of goods and services produced within an economy over a specific period. Generally, bank performance improves with economic growth (Kwashie et al., 2022b). GDP reflects a country's economic health, where higher GDP indicates higher income levels. Studies by Gazali (2023) show that increased GDP leads to higher household income and greater corporate profitability, boosting demand for goods and services and increasing business revenue. Improved financial conditions enhance borrowers' ability to repay debts, resulting in a negative relationship between GDP and Non-Performing Loans (NPL), a credit risk indicator (Lee et al., 2020). Similarly, Artenisa and Hyrije (2023) found a significant negative relationship between GDP and NPL. Amin et al. (2021) observed a positive but insignificant effect of GDP on credit risk. Strong macroeconomic conditions allow borrowers to expand businesses and investments with stable income, improving loan repayments (Messai & Gallali, 2019; Barngetuny, 2025).

Inflation is the persistent rise in average prices in an economy. Since lenders adjust interest rates to protect profits, inflation can exceed nominal rates, increasing borrowers' burdens and NPLs (Gazali et al., 2023). Shaheen et al. (2024) found a positive and significant relationship between inflation and credit risk. Conversely, Ari et al. (2021) reported a negative effect, arguing inflation reduces real debt value, easing repayment (Amuakwa-Mensah et al., 2017; Ghosh, 2017; Jabbouri & Naili, 2019a; Gashi et al., 2021). Nevertheless, inflation can raise nominal rates and worsen credit conditions, making uncontrolled inflation a major NPL risk factor.

H1: Gross Domestic Product has a positive and significant effect on credit risk.

H2: Inflation has a positive and significant effect on credit risk.

### **Interest Rates and Bank Size on Credit Risk**

Interest rates are fees charged by lenders on top of the principal to borrowers. From the depositor's side, customers who put money in the bank also get additional income called interest. The interest rates on loans and deposits can be adjusted based on the purpose and recipient of the funds. According to Shaheen et al. (2024), interest rates have a significant and positive effect on credit risk because an increase in interest rates affects the borrower's ability to meet installment obligations. Umaternate and Mongid (2023) emphasized a positive correlation between interest rates and the level of credit risk, where an increase in a country's interest rate causes an increase in NPLs. Higher borrowing costs make it difficult for debtors to meet their obligations, so that credit quality decreases (Sinkey & Greenawalt, 1991; Bege & Borye, 2007; Messai & Jouini, 2013). Therefore, effective risk management is important, especially when monetary policy is tight. Bank size (S) is measured by the logarithm of total assets and reflects the bank's ability to diversify its financing portfolio (Ekinici & Poyraz, 2019; Freeman et al., 2021). Shaheen et al. (2024) found a positive relationship between bank size and credit risk, due to higher productivity. However, Alzoubi and Obeidat (2020) showed an insignificant negative relationship because large banks can reduce risk through diversification, capital access, and investment opportunities (Jiang & Han, 2018; Hunjra et al., 2021). Nguyen et al.

(2023) added that large banks are better equipped to utilize advanced technology for non-traditional services.

H3: Interest rate has a positive and significant effect on credit risk.

H4: Bank size has a positive and significant effect on credit risk.

#### **Return on Assets (ROA) and Loan Loss Provision (LLP) on Credit Risk**

Return on Assets (ROA) is a profitability indicator that measures a company's efficiency in generating profits. Kwashie et al. (2022) stated that ROA reflects the income generated from the utilization of bank assets in a certain period and shows how effectively assets are used to generate profits. ROA is important in determining the profitability ratio in the banking sector. Healthy financial performance and a stable financial system are often reflected in increasing ROA (Singh et al., 2021). Shaheen et al. (2024) found a positive relationship between ROA and credit risk, while Singh et al. (2021) and Bao et al. (2025) reported a negative effect of ROA on credit risk. Alwaini et al. (2023) and Mondal and Mim (2024) showed that higher profitability improves banks' ability to manage credit risk, thereby reducing Non-Performing Loans (NPLs). Profitable banks face lower revenue pressures and tend to invest in low-risk loans. Malenković (2023) confirmed a negative relationship between credit risk and ROA in 26 Turkish commercial banks, using ROA as a proxy for credit risk and an indicator of financial performance. Loan Loss Provisions (LLP) are reserves for potential loan losses such as bad debts or debtor bankruptcy. LLP is updated based on default history and payment statistics to maintain the bank's financial position (Danisman et al., 2021). LLP is positively related to credit risk and NPL (Ekanayake & Azeez, 2015; Tao, 2020). An increase in credit risk causes banks to increase LLP as a protection against default, and an increase in NPL is usually followed by an increase in LLP (Bist, 2024).

H5: Return on assets has a positive and significant effect on credit risk.

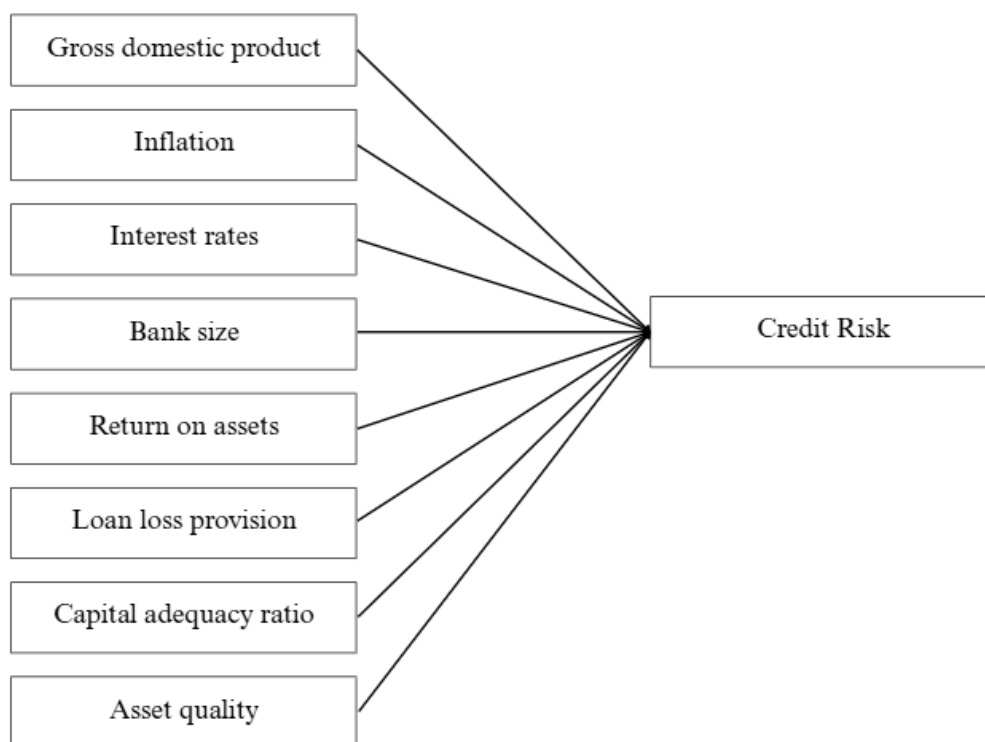
H6: Loan loss provision has a positive and significant effect on credit risk.

#### **Capital Adequacy Ratio (CAR) and Asset Quality on Credit Risk**

Capital Adequacy Ratio (CAR) is a key banking indicator showing a bank's ability to cover unexpected losses. Gharaibeh (2023) studied factors influencing CAR globally and in Jordan. Alzoubi (2020) identified risk, return, and activity as key factors affecting CAR in Jordanian banks, with return on average assets (RoA) having the greatest impact. Effendi et al. (2022) stated that a higher CAR helps banks manage non-performing loans (NPL), reducing credit risk. Shaheen et al. (2024) also found a positive relationship between CAR and credit risk indicators. Additionally, Constant and Ngomsi (2012) and Akhter (2023) reported a positive correlation between CAR and NPL, suggesting banks with higher CAR and strong cash flow reserves can reduce NPL (Madugu et al., 2020). However, Koju et al. (2018), Kumar and Kishore (2019), Mukoka (2020), and Putri et al. (2025) contradicted this, finding a negative relationship between CAR and NPL. Asset quality reflects potential credit risk based on a bank's loans and investments (Shaheen et al., 2024) and influences liquidity (El-Chaarani, 2019; Badunencko et al., 2022). NPLs measure asset quality and bank performance (Permana et al., 2022). Ekinci and Poyraz (2019) explained that higher asset quality leads to better profit efficiency through interest income. Shaheen et al. (2024) and Ahiase et al. (2024) confirmed a significant positive correlation between asset quality and credit risk, consistent with previous studies.

H7: The capital adequacy ratio has a positive and significant effect on credit risk.

H8: Asset quality has a positive and significant effect on credit risk.



**Figure 1.** Research Framework

The Figure 1, hypothesis diagram that shows the hypothesis of this study with the variables Gross domestic product, Inflation, Interest rates, Bank Size, Return on asset, Loan loss provision, Capital adequacy ratio and Asset quality as dependent variables and credit risk as independent variables. The hypothesis above explains that gross domestic product affects credit risk. Inflation affects credit risk. Interest rates affect credit risk. Bank Size affects credit risk. Return on asset affects credit risk. Loan loss provision affects credit risk. Capital adequacy ratio affects credit risk. Asset quality affects credit risk.

## **RESEARCH METHOD**

This study uses a quantitative method with a focus on banking companies listed on the Indonesia Stock Exchange (IDX) for the 2019-2023 period. Sampling was carried out using the purposive sampling method, so that the research sample consisted of banking companies that met certain criteria. The research data were obtained from the financial statements and annual reports of banking companies on the IDX. The sample was determined based on the Slovin formula, with a sample size of more than 30 and less than 500. The initial population consisted of 47 banking companies listed on the IDX for the 2019-2023 period. Screening was carried out based on criteria, namely banks that had not published financial statements for five consecutive years, banks that would be delisted, financial statements not in Rupiah, and banks with incomplete data. After screening, 37 banks were obtained with a total of 185 observations (37 banks x 5 years). This study identified two categories of variables: dependent and independent variables. The dependent variable is credit risk, measured by non-performing loans (NPL) divided by total assets. Independent variables include Gross Domestic Product (GDP), inflation, interest rates, bank size (natural logarithm of total assets), return on assets (net income divided by total assets), loan loss allowance (loan loss allowance divided by total loans), capital adequacy ratio, and asset quality (total loans divided by total assets). These variables are selected based on theoretical and practical relevance in analyzing credit risk. Panel data regression analysis is conducted using EViews 9 software to test the hypothesis. The research procedure begins with the Panel Model Result Test, F Test, Goodness of Fit Test, Descriptive Statistics Test, and T Test. Variable measurements use financial ratios

commonly used in business and management literature. This study aims to provide insight into the factors that influence credit risk in banking companies in Indonesia.

## RESULTS

The Chow and Hausman tests are used to determine the most appropriate panel data regression model: fixed effects, common effects, or random effects. The Chow test compares fixed effects with common effects to detect significant individual differences. Significant results support fixed effects. Meanwhile, the Hausman test compares fixed effects with random effects to evaluate the consistency of estimates. A significant Hausman test indicates the fixed effects model is preferable; otherwise, the random effects model is better. Together, these tests ensure the most suitable model is chosen based on the data's characteristics.

**Table 1.** Panel Model Test Results

Test	Effect Test	Prob.	Conclusion
Chow Test	Cross-Section Chi-Square	0.0000	H <sub>0</sub> Rejected
Hausman Test	Cross-Section Random	1.0000	H <sub>a</sub> Accepted
LM Test	Cross-Section Breusch-Pagan	0.0000	H <sub>0</sub> Rejected

Table 1 shows the Chow test (p-value = 0.0000 ≤ 0.05), rejecting H<sub>0</sub>, so the fixed effect model is better than the common effect model. However, the Hausman test (p-value = 1.0000 > 0.05) accepts H<sub>0</sub>, indicating the random effect model is more consistent. In case of conflicting results, the Hausman test is prioritized; thus, the best model is the random effect. The Lagrange Multiplier test (p-value = 0.0000 < 0.05) also supports the random effect model. Therefore, the random effect model is the most appropriate and selected for this study.

**Table 2.** F Test and The Goodness of Fit Test Result

Variable Dependent	Credit Risk	
F Test	Effect Test	Prob. (F-Statistic)
	Prob	0.0026
	Conclusion	H <sub>0</sub> Rejected
Coefficient of Determination	Testing	Adjusted R-Squared
	Value	0.786653

The F-test results in Table 2 show a Prob (F-Statistic) of 0.0026 < 0.05, indicating that H<sub>0</sub> is rejected and at least one independent variable significantly affects credit risk. The model is considered feasible. The Adjusted R-squared of 0.786653 shows that GDP, inflation, interest rates, bank size, ROA, LLP, CAR, and asset quality explain 78.6% of the variation in credit risk. Panel data regression is used as it combines time-series and cross-section data, and helps address heterogeneity and autocorrelation through lag variables. Descriptive statistics in Table 2 present the mean, standard deviation, minimum, and maximum values for each variable.

**Table 3.** Research Achievement Indicators

Variables	Mean	Maximum	Minimum	Std. Dev
CR	0.027740	0.249320	7.00E-05	0.029723
GDP	0.033800	0.053000	-0.021000	0.028031
INF	0.028780	0.055100	0.016800	0.013805
INT	-0.55868	0.976170	-26.06364	2.982039
SIZE	17.99331	24.05602	14.74261	1.953006
ROA	0.005779	0.041880	-0.08699	0.018069
LLP	0.041954	0.276790	0.000140	0.035074
CAR	0.298698	1.274250	0.072860	0.168793
AQ	0.573159	1.069550	0.180480	0.118638

Table 3 presents descriptive statistics of research variables that reflect banking and macroeconomic conditions during the observation period. Credit Risk (CR) has a mean

of 0.0277 and standard deviation of 0.0297, with the highest at 0.2493 (PT. Bank Victoria International, Tbk, 2020) and the lowest at 0.00007 (PT. Bank Raya Indonesia, Tbk, 2021). GDP averaged 0.0338 and inflation 0.0288, both peaking in 2022. Interest Rate (IR) had a mean of -0.5587 with high variability (SD 2.9820), ranging from -26.0636 (PT. Bank IBK Indonesia, Tbk, 2019) to 0.9762 (PT. Bank JTrust Indonesia, Tbk, 2022). Bank Size (SIZE) averaged 17.993. Other indicators include ROA (mean 0.0058), LLP (0.0419), CAR (0.2987), and AQ (0.5732). These variables are analyzed further using the T-test to determine the significance of their influence on credit risk.

Table 4. T Test Result

Variable	Coefficient	Prob	Conclusion
GDP	-0.042615	0.3819	no effect
INF	-0.025826	0.7880	no effect
IR	0.000598	0.0456	Positive influence
SIZE	-0.001762	0.0422	Negative influence
ROA	-0.363181	0.0018	Negative influence
LLP	0.023754	0.0067	Positive influence
CAR	0.004597	0.0069	Positive influence
AQ	0.009977	0.0052	Positive influence

The T-test results in Table 4 show that the GDP ( $p = 0.3819$ ) and inflation ( $p = 0.7880$ ) variables do not have a significant effect on the dependent variable. Interest rates (IR) have a positive and significant effect ( $p = 0.0456$ ), meaning that an increase in interest rates increases the dependent variable. Company size (SIZE) has a significant negative effect ( $p = 0.0422$ ), indicating that larger companies have lower dependent variable values. ROA has a significant negative effect ( $p = 0.0018$ ), indicating that profitability decreases the dependent variable. LLP ( $p = 0.0067$ ), CAR ( $p = 0.0069$ ), and asset quality (AQ) ( $p = 0.0052$ ) all have a significant positive effect on the dependent variable.

## DISCUSSION

The results of the study show that Gross Domestic Product (GDP) affects credit risk, as measured by Non-Performing Loans (NPL), because favorable macroeconomic conditions help borrowers operate their businesses and repay loans on time (Messai & Gallali, 2019; Attur et al., 2024). However, inflation does not have a significant effect on credit risk (Shaheen et al., 2024), although several studies, such as Amuakwa-Mensah et al. (2017), Ghosh (2017), Jabbouri and Naili (2019a), and Gashi et al. (2021), state that high inflation can increase NPL. Interest rates are found to have a positive effect on credit risk, in line with the findings of Umaternate and Mongid (2023) and Shaheen et al. (2024), who reported that rising interest rates reduce borrowers' ability to repay, thus increasing NPL. Similarly, Sinkey and Greenawalt (1991) found that high interest rates led to loan losses in large U.S. banks. Comparable findings occurred in Norway (Berge & Boye, 2007) and the Gulf Cooperation Council (GCC) countries. Rising interest rates raise borrowing costs, impair repayment capacity, and elevate credit risk, particularly under floating rate regimes (Messai & Jouini, 2013).

Bank size was found to have a significant negative effect on credit risk. This supports the research of Alzoubi and Obeidat (2020), which indicates that larger banks experience lower NPL levels, possibly due to better risk management, more diversified credit portfolios, and greater operational efficiency. This finding is also consistent with Shaheen et al. (2024), who suggest that larger banks tend to achieve better financial performance and credit quality.

Return on Assets (ROA) has a significant negative effect on NPL, aligning with Singh et al. (2021), Malenković (2023), and Bao et al. (2025), who found that higher ROA reduces credit risk. Studies by Alwaini et al. (2023) and Mondal and Mim (2024) also show that higher profitability enhances banks' ability to manage credit risk. Conversely, Ahmad (2015) reported opposite findings, while Berger and DeYoung (1997) argued that

higher income might lead to riskier lending. Profitability can support sound credit policies, both for income and reputation.

Loan Loss Provisions (LLP) show a positive relationship with credit risk, consistent with Bist (2024), Ekanayake and Azeez (2015), Shaheen et al. (2024), and Tao (2020). However, LLP allocation is not the main factor determining credit quality, as external macroeconomic conditions and government policies play a larger role. The Capital Adequacy Ratio (CAR) has a positive effect on credit risk, in line with Alzoubi (2021) and Singh et al. (2021), who argued that increasing credit risk leads banks to raise capital. However, findings remain mixed—Makri et al. (2014) found a negative effect, Constant and Ngomsi (2012) reported a positive mutual relationship between CAR and NPL, while Koju et al. (2018) and Kumar and Kishore (2019) found a negative effect. Furthermore, asset quality has a positive effect on NPL, supporting Ekinici and Poyraz (2019), El-Chaarani (2019), Ahiase et al. (2024), Shaheen et al. (2024), and Badunenko et al. (2022), as poor asset quality increases credit risk.

## CONCLUSION

This study examines the influence of bank-specific and macroeconomic variables on credit risk in banks listed on the Indonesia Stock Exchange during 2019–2023. Using purposive sampling, banks were selected based on specific criteria to ensure data relevance. The variables analyzed include GDP, inflation, interest rate growth, bank size, Return on Assets (ROA), Loan Loss Provision (LLP), Capital Adequacy Ratio (CAR), and asset quality. Results show that GDP and inflation had no significant effect on credit risk, suggesting that stable macroeconomic conditions did not directly influence banks' credit portfolios. In contrast, interest rate growth had a positive effect on credit risk, aligning with the notion that higher borrowing costs increase default risk. Among bank-specific variables, size and profitability negatively affected credit risk, indicating that larger and more profitable banks manage risk more effectively. Meanwhile, CAR, LLP, and asset quality were positively associated with credit risk, possibly reflecting reactive measures to rising risk levels rather than preventive actions. The study concludes that internal bank factors play a more dominant role in influencing credit risk than macroeconomic conditions. For broader insights, future studies should consider cross-country comparisons, longer data periods, and advanced analytical techniques to deepen the understanding of credit risk determinants.

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