Do Interest Rate Policy and Liquidity Affect Banking Credit Risk in Indonesia?

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Abstract

Lending plays a vital role for banks as a source of income from deposits or interest paid by debtors. This study aims to analyze the effect of policy interest rates and liquidity from the money supply on bank credit risk in Indonesia in the short and long term. This study uses the Autoregressive Distributed Lag method and the Granger Causality test as analytical tools. The data used are policy interest rates, total money supply, and total non-performing loans. The data period under study is 2017-2022. The study results show that in the short term, policy interest rates and the money supply negatively affect bank credit risk in Indonesia. However, in the long term, policy interest rates have a negative effect, and the money supply does not affect bank credit risk in Indonesia. Policy interest rates have a one-way causality relationship with bank credit risk. Meanwhile, bank credit risk has a one-way causality relationship to the money supply. This condition represents that policy interest rates can reduce bank credit risk in Indonesia. The Bank of Indonesia, as the monetary authority, needs to pay attention to fluctuations in policy interest rates and mitigate excess money supply so that credit risk does not increase.

Keywords:

policy interest rate; money supply; non-performing loans

INTRODUCTION

Monetary policy is the basis for developing a framework for thinking about a financial system. If the stability of economic conditions is disrupted, monetary policy is used to restore the economy (Bekaert et al., 2013). The influence of monetary policy is reflected in the banking sector. The role of the banking sector is to realize its main function as an intermediary or intermediary agency between debtors and creditors (Disemadi & Shaleh, 2020). Banking is an institution that regulates financial system traffic, controls the economy, and circulates and distributes funds to the public to encourage stable economic development (Arthasari, 2021).

Banking has an important role in the banking financial system's stability during changes in the global cycle, which is reflected in the failure of world banks due to the domino effect of banking in the United States. One of the factors causing the current economic crisis came from bank credit. Credit or loans is a form of business as well as a primary source of income that is managed by banks themselves. Credit is the largest asset and the main source of income for banks. Any provision of credit indirectly poses a credit risk to the banking financial system.

In general, credit risk is projected on the ratio of NPLs (Non-Performing Loans), which is the ratio of total non-performing loans to total loans disbursed by creditors. Banks carry out their duties by extending credit to customers so that they can create credit risks which create obstacles, and delays in the return process or each credit settlement transaction (Otieno et al., 2016). Credit effects are generally defined as a breakdown in the payment of credit or what is called non-performing financing. In this case, several aspects lead to the formation of the NPL itself (Dewi & Ramantha, 2015). Credit growth can also be limited by reducing risk-weighted assets which will affect the level of credit supply. According to Andries et al. (2018), the wealth of the loan market affects the preference of companies for shadow banking or capital markets to raise the necessary funds and asset prices.

Bank Indonesia ensures that a bank must have an NPL value below 5 percent. This policy was issued because the higher the value of bad loans or NPLs at a bank, the greater the risk to the bank. If the borrower experiences a late payment it will create a problem with receivables, or what is known in the banking world as collectibles, which are simply bills that need to be billed. In accounting, receivables are categorized by period. Bank Indonesia is an institution that has the authority to carry out important monetary policies.

Bank Indonesia practices several monetary policies to mitigate risks on the balance sheet, protect the availability of liquidity, and suppress economic development so that it is more balanced and sustainable (Berger & Bouwman, 2017). The implementation of monetary policy in Indonesia is a consequence of an economic crisis which occurred in Indonesia in 1998. During this period there was a decline in investor confidence which affected many sectors including the financial and banking sectors. Hardt et al. (2015) state that macroprudential policy and monetary policy are fundamentally related because they use the same transmission mechanisms to achieve their goals (asset prices, credit, and financial intermediation).

Credit risk is what occurs when the bank zone has interrelated macroeconomic conditions that occur in many countries simultaneously (Bucur & Dragomirescu, 2014). Changes in macroeconomic circumstances create an economy that is very sensitive to any shocks or fluctuations that may occur. The transformation of this macroeconomic situation looks at changes in policy interest rates and banking liquidity, thus creating a banking situation that also faces transformation (Purnawan & Nasir, 2015). A comparison of the macro situation itself with the risk on bank credit can be seen in how the pre-recession phase was very different from the post-recession phase in 2008 (Wulandari, 2016). This increase in credit was directly offset by an increase in non-performing loans (Guo, 2016). Figure 1 shows the bad loans used by commercial banks in Indonesia.

Figure 1. Development of Non-Performing Loans in Indonesia 2011-2020
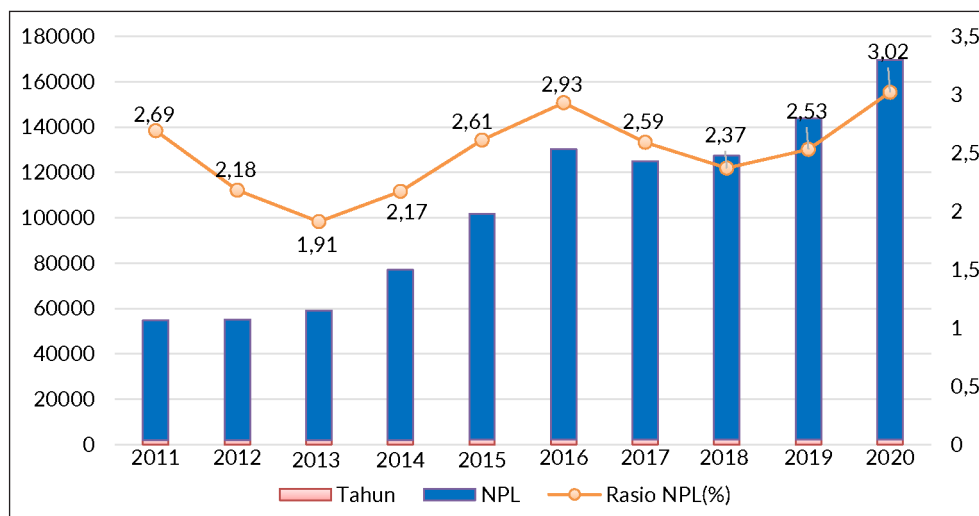
Based on Figure 1, explains the development of bank credit risk or NPL in Indonesia from 2011-2020. According to data from the Financial Services Authority, it can be concluded that NPLs in Indonesia have experienced significant ups and downs. In 2016 the NPL ratio was 2.93 percent, and a decrease in the NPL ratio in the 2017 period was 0.34 percent. During the last ten years, the lowest NPL ratio was in 2013 which was 1.91 percent and the highest NPL ratio was in 2020 which was 3.02 percent, or experienced an increase from the previous year of 0.49 percent.

Changes in this macro situation must be considered in the short term or long term. The length of credit can be determined by the total monthly payments that can be made by the prospective debtor. If the payment period is smoother, repayment of funds to the bank will be faster and the bank's record of customer collectability is high. If the debtor takes longer to pay in installments, the lower bank's ability to recover it (Dharma, 2018). The length of time for credit repayment has an indirect impact on credit risk in the short and long term. This policy interest rate is used as a standard interest rate reference for government and private banks (Khan & Sattar, 2014). Changes in policy interest rates will also affect bank credit risk in Indonesia (Puspitasari et al., 2019).

Various factors can affect the demand for and the provision of credit in banking, including macro factors such as interest rates (Messai & Jouini, 2019). The policy interest rate where the interest rate is set directly by Bank Indonesia as the basic benchmark for interest rates on loans and deposits by banks and financial institutions in Indonesia (Bank Indonesia, 2020). An increase in the policy interest rate will cause an increase in bank interest rates. Banks can raise interest rates on deposits or loans. Research by Dewi & Ramantha (2015) shows that the policy interest rate has a positive effect on bank credit risk. But Arthasari (2021), the results show that the policy interest rate has a significant negative effect on bank credit risk. Wulandari (2016) shows that the money supply has no significant effect on bank credit risk. The results of previous studies still produce different findings, so it is interesting for researchers to re-test at different times and use different research methods.

The increase in deposit rates will encourage people to postpone consumption activities because they prefer to save in banks (Raza et al., 2019). In making this decision the central bank must also consider how its actions run stably in the entire banking financial system. Therefore, changes in the money supply each year will have an impact on the bank's liquidity. Unstable liquidity has a negative impact on banks so credit risk (NPL) cannot be controlled. Liquidity, which is reflected in the money supply, is one of the bank's assets that can affect the bank's non-performing loans (NPLs). Therefore, the need for banks to pay attention to the growth of the money supply. It is interesting to further analyze the impact of one of the macro indicators, namely the policy rate and liquidity of the bank as an illustration of future credit risk management, because it can affect the possibility of banking profit and loss (Tovar et al., 2012). This is because the role of banking is very large as a determinant of economic development, economic growth and can improve welfare in society. Thus it can be hypothesized that changes in interest rates and liquidity can affect the credit risk of banks in Indonesia.

Several previous studies on credit risk (NPL) in Indonesia and other countries have been carried out to determine the effect of macroeconomic factors on non-performing loans, including the BI rate (Wijaya, 2019), and the impact of non-performing loans on the banking sector in Turkey, such as capital adequacy (Wijaya, 2019; Yurtadur et al., 2019). Another empirical study was conducted to measure the impact of interest rates on the lending market in Rhode Island (Fekrazad, 2020), and earlier research examined the transmission of capital shocks to credit supply in Indonesia (Catalan et al., 2020; Sobarsyah et al., 2020; Matousek, 2019). The dynamics of non-performing loans during the banking crisis increased the resolution of banking credit risk (Ari et al., 2021). The difference in this study, besides using the policy interest rate variable, this research also uses bank liquidity variables and long-term and short-term effects that have been proven using the method of Autoregressive Distribution Lag (ARDL). Simultaneously, this study also tested and analyzed using Ganger Causality to see the causal relationship between the variables studied to answer the question of whether there is a relationship between these variables.

This study aims to identify and analyze the effect of policy interest rates and liquidity on bank credit risk in Indonesia in the short and long term. It also examines the causal

relationship between policy interest rates, liquidity, and bank credit risk in Indonesia. As a contribution, this research becomes a reference for banking in maintaining the financial system in a stable condition so that every credit risk can be controlled. In addition, most of the previous studies only discussed the effect of policy interest rates without including the influence of the bank's liquidity. This is the critical point of empirical research that underlines policy interest rates and liquidity on the rate of bank credit risk. The results of this research are expected to the development of knowledge about bank credit risk in Indonesia and as a consideration in decision making. Banking parties must be more careful in extending credit to the public to overcome the problem of bad credit in Indonesia.

METHODS

This research is a quantitative analysis that uses secondary data in the form of monthly data that spans a period of 61 months, to analyze and determine the magnitude of the influence of policy interest rate settings and liquidity on bank credit risk in Indonesia. The data used in this study is in the form of monthly time series data for the period of 2017 to 2022. Data collection was carried out from January 2017 to January 2022. Data in this study, namely secondary data, can be obtained from the official websites of institutions such as Bank Indonesia (BI), the Financial Services Authority (OJK), and the Central Bureau of Statistics (BPS).

This study uses the variable bank credit risk or Non-Performing Loan as the dependent variable, while the independent variables in this study are policy interest rates and the money supply. Bank credit risk is measured using a ratio in percentage units. The policy interest rate is the BI7-Day (Reverse) Repo Rate, which is measured in percentage units. The amount of money in circulation (M1) is the total amount of money in circulation during the time this study was conducted and is measured in units of billions of rupiah. The initial hypothesis of this study is that there is an influence of policy interest rates and liquidity on bank credit risk in Indonesia in the long and short term. Also, there is a causality relationship between research variables.

The data analysis method in this research is the regression analysis method with the ARDL model. The test stages carried out were the causality tests, classic assumption tests, and hypothesis testing (Nkoro, 2016). The following is a model (see equation 1) that will be used in the ARDL approach referring to research (Zaretta & Yovita, 2019) to test short-term and long-term relationships, namely:

$$\Delta Y_t = \beta_0 + \sum_{t=1}^{p} \beta_1 \Delta Y_{t-1} + \sum_{t=1}^{P} \delta_1 \Delta X_{t-1} + \varphi_1 Y_{t-1} + \varphi_2 X_{t-1} + \varepsilon_t \qquad (1)$$

To explain the variables of Non-Performing Loans, Policy Interest Rates, and Money Supply in this study, the ARDL equation model (see equation 2), is as follows:

$$\Delta NPL_t = \beta_0 + \sum_{t=1}^{p} \beta_1 \Delta NPL_{t-1} + \sum_{t=1}^{p} \delta_1 \Delta SK_{t-1} + \sum_{t=1}^{p} \delta_2 \Delta JUB_{t-1} + \varphi_1 NPL_{t-1} + \varphi_2 SK_{t-1} + \varphi_3 JUB_{t-1} + \varepsilon_t \qquad (2)$$

Where NPL_t is the value of the ratio of Non-Performing Loans at the time t, NPL_{t-1} is the value of the ratio of Non-Performing Loans at t-1; SK_{t-1} is the value of the Policy

Interest Rate at t-1; JUB_{t-1} is the value of the Amount of Money Supply in circulation at t-1; β_0 is constant; β_1, δ_1, δ_2 are short run coefficients; φ1, φ2, φ3 are Long term coefficients; ε_t is Error Correction Term.

Based on the model conditions, the suitability of the ARDL model can be checked by running the following stability test: The cumulative sum on recursive residues (CUSUM) as well as the cumulative sum on the squared times of recursive residues (CUSUMQ). The stability test helps to determine the stability of short-term and long-term parameters. If the CUSUM plot has a significant value at the 5 percent confidence level, it indicates that the parameter is stable (Nur & Sukmana, 2020). Before estimating the stationarity test, the length of the lag must be determined, and a bound test must be performed. The first condition for using the ARDL method is that the data must be stationary at the level or stationary at the first difference and it is better not to suggest being stationary at the second difference only (Gourgoura & Nikolaidou, 2017).

This study also conducted the Granger causality test, which is an analytical method that describes whether the variables are interrelated (have a two-way relationship) or only have one direction. The causality test is designed to see how the past affects the current situation, so the data used is time series data. The presence or absence of a causal relationship can be tested by F-test or confirmed by probability. Three things can be interpreted from the results of the Granger causality test (Gujarati, 2013: 315): (a) The one-way causality relationship between X to Y is expressed as unidirectional causality; (b) Bidirectional causality is a two-way causality also called mutual influence; (c) *No causality* means that there is no relationship between these variables.

Initial equation form (see equation 3) model Granger causality test refers to research by Apriansyah & Bachri (2006), as follows:

$$\Delta Y_t = a_0 + \sum_{j=1}^{m} a_j \Delta y_{t-j} + \sum_{i=0}^{n} b \Delta x_{t-j} + U_t \qquad (3)$$

The equation model is formulated (see equation 4) in this study to explain the reciprocal relationship between the variables of Non-Performing Loans, Policy Interest Rates, and the Money Supply to become:

$$\Delta NPL_t = a_0 + \sum_{j=1}^{m} a_j \Delta NPL_{t-j} + \sum_{i=0}^{n} b \Delta SK_{t-j} + \sum_{i=0}^{n} c \Delta JUB_{t-j} + U_t \qquad (4)$$

Where *NPL* is the ratio value of Non-Performing Loans, *SK* is the value of the Policy Interest Rate, *JUB* is the value of the total money supply, *Ut* is error term (interference error), and *tj* is lagging operation (lag/past).

RESULT AND DISCUSSION

The results of this study are based on data analysis that has been carried out using the ARDL method and the Granger Causality test. From these tests, the ARDL estimation results show that the policy interest rate variable has a negative and significant effect on NPL in the long and short term. Meanwhile, the ARDL estimation test results show that the money supply variable has a negative and significant effect on NPL in the short term and a negative and insignificant effect on NPL in the long term. The results of the Granger

causality test show that policy interest rates and bank credit risk have a one-way causality relationship. Bank credit risk and the money supply have a one-way causality relationship. Meanwhile, the policy interest rate and the money supply do not have a causal relationship.

A stationary test using the unit root test (PP) is shown in Table 1, and from these results it can be seen that the stationary variables are at different levels. JUB is stationary at level and NPL and SK at first difference. It can be concluded that the ARDL model is suitable for use in this study because it has a stationary value, not at the second difference (Saadaoui & Mokdadi, 2022).

Table 1. Stationary Data Test Results

Variable	Probability	Levels	First Difference
NPL	0.0000	Not Stationary	Stationary
JUB	0.0444	Stationary	
SK	0.0005	Not Stationary	Stationary

Determination lags are very important in the ARDL model to determine the optimum lag length used for further analysis. According to Table 2, after the Length Criteria lag test was carried out the test results show that the lag with the most stars is lag 4 so the next cointegration test will use lag 4. The lag will be used in ARDL estimation.

Table 2. Optimum Lag Determination Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	11.15687	NA	0.000151	-0.286206	-0.178677	-0.244417
1	196.8533	345.3302	3.06e-07	-6.486081	-6.055965*	-6.318923
2	213.5113	29.22463	2.35e-07	-6.754784	-6.002081	-6.462258*
3	223.3016	16.14541	2.30e-07	-6.782514	-5.707224	-6.364619
4	235.8253	19.33483*	2.06e-07*	-6.906152*	-5.508275	-6.362889

At this cointegration testing stage, there is a goal to see the long-term correlation between research variables. The results of the Bound Test in Table 3 produce a value in the F-statistic of 8.375, which has an F-statistic value that must be bigger than the value I (0) and I (1). Thus, it can be concluded that the variables in this study indicate that they have cointegrated.

Table 3. Cointegration Test Results

Test Statistics	Value	Prob.	I(0)	I(1)
F Statistics	8.375	10%	4.19	5.06
K	2	5%	4.87	5.85
		2.5%	5.79	6.59
		1%	6.34	7.52

Testing of the consistency of the parameters can be seen in the CUSUM Test and CUSUMsq Test. This can be seen on the CUSUM line (blue line) which is between the 5 percent significant line (red line). In Figure 2 it can be seen as well as Figure 3 the test results on the consistency of the parameters. According to Figure 2 and Figure 3, it can be seen that each cumulative value in CUSUM and CUSUMsq is in a significant area. It can be concluded that there is consistency in the parameter estimates within this study period. After going through all the testing stages, the ARDL model can be used in research.

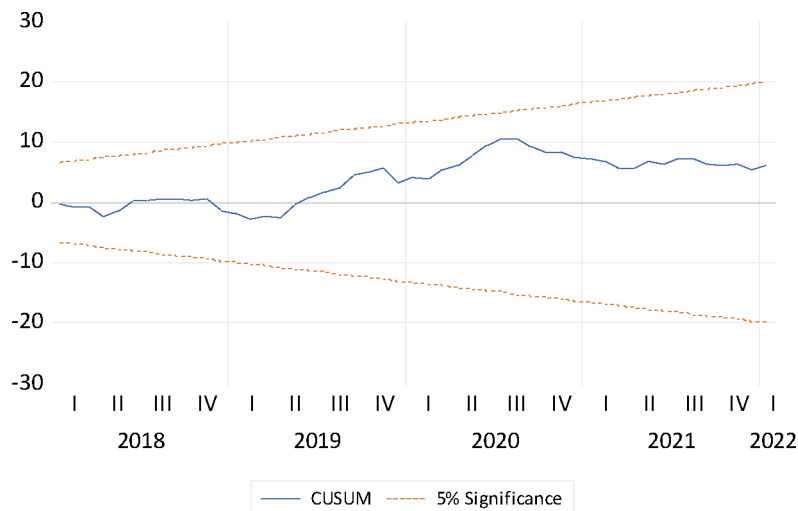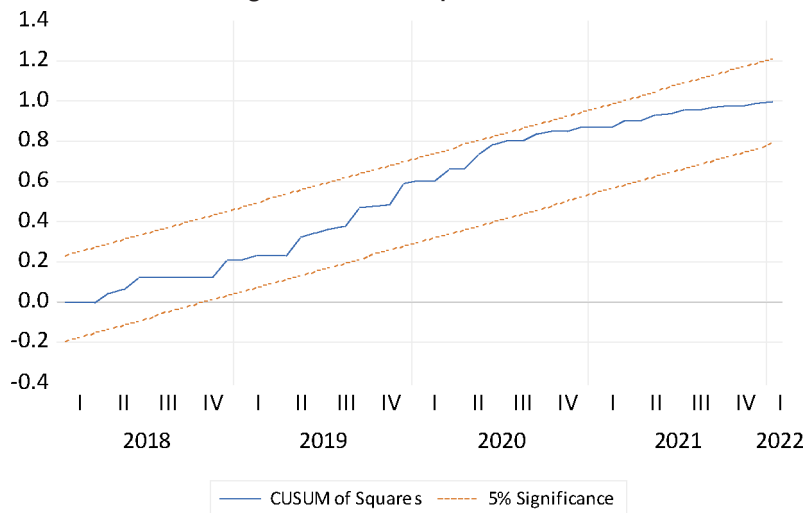**Figure 2. CUSUM Test Results**

Figure 3. CUSUMsq Test Results

The results of estimating ARDL have obtained two models, namely to describe the relationship between variables in the short term and long term. Based on the results from Table 4, the long-term estimation results can be seen that the policy interest rate shows a negative and significant effect on NPLs in the long term. The results of this study are in line with the research by Nurismalastri (2017) and Arthasari (2021) showing that

policy interest rates have a negative and significant influence. The results of this study are also in line with the theory put out by Keynes, namely the theory of interest rates. Keynes said that the interest rate can affect the decision of the debtor.

Table 4. Long-Term Estimation Results

Variable	Coefficient	Std-Error	t-Statistics	Prob.	Information
SK	-0.394402	0.134717	-2.927642	0.0052	Significant
LJUB	-6.383234	4.729795	-1.349579	0.1834	Not significant

The implementation of the interest rate policy issued by Bank Indonesia is one of the ways to suppress increasing credit growth accompanied by increasing credit risk in banks. However, the money supply is shown not to have an effect on NPLs in the long term. The results of this study are in line with Wulandari (2016), which shows that the money supply has no significant effect on bank credit risk. If the money supply in the community increases, it will have an impact on the movement of credit, so it is necessary to pay attention to the amount of money in circulation so that it may be balanced so as not to cause changes in banking performance to reduce NPL increases.

Table 5. Short-Term Estimation Results

Variable	coefficient	std. Error	t-Statistics	Prob.	Information
NPL(-1)	0.503400	0.119249	4.221436	0.0001	Significant
NPL(-2)	0.119624	0.130002	0.920175	0.3620	Not significant
NPL(-3)	0.434781	0.123974	3.507020	0.0010	Significant
NPL(-4)	-0.259580	0.117534	-2.208556	0.0319	Significant
SK	-0.079581	0.029760	-2.674042	0.0102	Significant
LJUB	-1.287980	0.389946	-3.302968	0.0018	Significant
C	18.95326	5.320213	3.562501	0.0008	Significant
@TREND	0.011489	0.003286	3.496110	0.0010	Significant

The ARDL model in the short term can be seen in Table 5. ARDL estimation results in the short term are used to describe the short-term relationships between the variables studied. In general, policy interest rates have an effect on NPLs in the short term. The policy interest rate shows a negative and significant effect on NPL in the long and short term. The results of this study are in line with Dewi & Ramantha (2015) and Madeira (2019) which show that policy interest rates affect bank credit risk. If the policy rate increases, people usually don't want to borrow money from the bank because interest rates also increase. When policy interest rates increase, people usually tend to want to save (Aizenman et al., 2017). Therefore, an increase in SK will reduce non-performing loans which are marked by a decrease in NPLs.

The tightening of monetary policy has affected the lending capacity of banks. This is especially true for banks that rely heavily on deposits for loans. This tightening of

monetary policy affects every bank's lending capacity. This is especially true for banks that rely heavily on deposits for loans (Iddrisu & Alagidede, 2020). The policy interest rate has a coefficient that shows the value where the policy interest rate increases, and the NPL decreases. When credit interest rates rise, the obligation to pay interest expenses also increases. Therefore, an increase in this policy interest rate causes people to want to save or save their money in banks. When an increase in interest rates occurs, the amount of people who use credit also decreases so that the risk of non-performing loans can also be controlled. This can be seen from the value of the NPL ratio which continues to decline.

Based on the estimation results in Table 5, it can be concluded that the money supply has a negative and insignificant effect on NPLs in the long run. Meanwhile, in the short term, the money supply has a negative and significant effect on NPL. This is in line with the results of research by Poudel (2013) and Yurdakul (2014). Therefore, if the money supply increases, it can reduce bank non-performing loans, which are marked by a decrease in NPLs. The money supply can not only be determined by central bank policies but can also be influenced by people's behavior (Nurschafia & Abduh, 2014). If the money supply increases, people will pay for their credit, so credit risk to banks will decrease. When the money supply continues to increase, it will become a problem.

Wulandari (2016) shows that the money supply has no significant effect on bank credit risk, contrary to the results of this study. The results of this study support the theory that fluctuations in the money supply have an effect on NPLs in Indonesia. When the money supply increases, NPL decreases in the short term. This can be interpreted as when people hold money, they will channel the money to repay credit. Meanwhile, interest rate policy has a negative effect on credit risk. Banks with high credit risk will issue a policy of increasing interest rates to stabilize the money supply (Taiwo et al., 2017).

Partially, the coefficients of the independent variables describe a significant influence on NPLs in the long run. Estimates from the ARDL estimation results based on Table 5 are free from model specification errors. The value of the Coefficient of Determination (R^2) indicates that the variation in changes in the rise and fall of NPLs can be explained by policy interest rates and the money supply of 91.35 percent. Meanwhile, the remaining 8.65 percent is explained by other variables not examined in the study. This study shows very good estimation results.

The causality test method of analysis is carried out to determine the variables that have a two-way relationship or only have one direction. The importance of this test is to find out the effects of the past compared to the present, using data called this time series. Table 6 can be concluded after testing that the variables that have a causal relationship are variables that have a smaller probability value than the alpha value of 0.05. Therefore, it can be seen from Table 4.6 that SK significantly affects NPL with a probability of 0.0073 < 0.05, but NPL does not significantly affect SK with a greater probability (Column 4). It can be concluded that SK and NPL only have a one-way causality relationship. This policy interest rate can affect credit risk, so it is necessary to have a monetary policy that controls the increase in credit through policy interest rates.

If the level of interest rates experiences a high increase, it can result in high credit interest rates as well, thus in this condition non-performing loans (NPL) are formed. What happens in this scenario is that debtors will experience difficulties in paying off loans taken to banks because credit interest rates rise, so financing to pay off credit also increases. Based on Table 6, JUB also does not significantly affect NPL, while NPL significantly affects JUB. It can be concluded that JUB and NPL have a one-way causality relationship. Furthermore, it can be seen in Table 6 that JUB does not significantly affect SK, and SK also does not significantly affect JUB with a greater probability (Column 4). The results of this study are in line with Yurdakul (2014) and Guerra (2017).

Table 6. Causality Test Results

Null Hypothesis	Obs	F-Statistic	Prob.
SK does not Granger Cause NPL	60	7.73755	0.0073
NPL does not Granger Cause SK		1.03845	0.3125
LJUB does not Granger Cause NPL	60	2.92499	0.0927
NPL does not Granger Cause LJUB		4.65390	0.0352
LJUB does not Granger Cause SK	60	2.07006	0.1557
SK does not Granger Cause LJUB		0.95785	0.3319

The results of this study have determined using the classical assumption test. Classical assumption testing provides certainty that the equation in the regression obtained in the test has accestimation, accuracy, is consistent, and is not biased. This study passed the classical assumption test. To strengthen the results of this study, a robustness test was conducted. Robustness testing in this study is used to test the robustness or validity of the research results using the main model (Saragih & Khoirunurrofik, 2022). The Robustness test is carried out by using t-test, F test, and the coefficient of determination (Afiska et.al, 2021).

Table 7. Robustness Check-NPL

Variable	Coefficient	t-Statistic	Prob.
SK	-0.285645	-2.674042	0.0000
LJUB	-0.163058	-3.302968	0.2215
F-Statistic	73.91108		
Adj. R Squared	0.901126		

The results of the robustness test strengthen the results of the main method of this study. Based on the estimation results in Table 7, the policy interest rate is significantly negatively related to bank credit risk. Meanwhile, the money supply has a negative and insignificant effect on bank credit risk. The results of this robustness are in line with the regression results of the main method of this study. The t-test was conducted to see the effect of the independent variables partially on the dependent variable of this study.

The t-table value for this research is 1.67943. Based on the results of testing, it can be seen that policy interest rates and the money supply have a partial effect on bank credit risk (NPL) in Indonesia. This can be seen from the t-statistic value of each (Table 7) which is greater than the t-table value. The estimation results in Table 7 show that the F-statistic, namely 73.91108 is greater than 3.204317 in the F-table, which means that policy interest rates and the money supply have a simultaneous effect on bank credit risk (NPL) in Indonesia. Furthermore, the value of Adjusted R-squared was recorded at 0.901126, which means variations in the bank's credit risk can be explained by policy interest rates and the money supply by 90.11 percent. Meanwhile, the other 9.89 percent can be explained by other variables not examined in this study.

The results of this study are based on data analysis that has been carried out using the ARDL method and Granger Causality test. Each variable interacts with the other so that the growth of non-performing loans can be controlled. It can be concluded from this test that the estimation results show that the policy interest rate variable has a negative and significant effect on NPL in the long term and short term. The increase in the policy interest rate set by the central bank has a direct effect on the financial sector, especially in the banking system. The results of this study are in line with Bekaert et al. (2013). This indicates that the policy interest rate is used as a reference in the use of credit by the public because if the policy interest rate rises, the rate of return on funds will also be greater. This happens because of the limited means in which the community can earn a decent income. When credit interest rates rise, the obligation to pay interest expenses also increases. Therefore, the increase in policy interest rates causes people to want to save or save their money in banks. When an increase in interest rates occurs, the use of credit also experiences a decrease so that the risk of non-performing loans can also be controlled.

Meanwhile, the ARDL estimation test results show that the money supply variable has a negative and significant effect on NPL in the short term and has a negative and insignificant effect on NPL in the long term. Policy interest rates and the money supply have a partial influence and jointly have an influence on bank credit risk (NPL) in Indonesia. Developments in the money supply in society can affect bank credit risk. Of course, the risk of bad credit will be detrimental to the bank. Meanwhile, these bad loans can result in higher costs for banks to produce the production assets they have to provide, reduce profit potential, and reduce the capital available to banks. Instability in the money supply will increase a bank's production costs, thereby affecting bank credit risk.

CONCLUSION

The results of this study indicate that policy interest rates and liquidity have an influence on credit risk in the short and long term. In the short term, policy interest rates and the money supply have a negative effect on bank credit risk in Indonesia. In the long term, the policy interest rate has a negative effect, while the money supply does not affect credit risk in Indonesia. Therefore, policy interest rates and the money

supply can affect the growth of bank credit risk in each period. Policy interest rates and banking credit risk have a one-way causality relationship. Meanwhile, bank credit risk and the money supply have a one-way causality relationship. The policy interest rate and the money supply do not have a causal relationship. This means that interest rates can affect credit risk conditions and this condition will have an impact on the money supply.

The results of this study can be an important reference to be applied to banking. Bank Indonesia as the central bank needs to maintain macroeconomic flexibility, especially for policy interest rates and the money supply, and pay attention to credit risk conditions in containing external and internal shocks in the banking sector. Policy management on credit must be good, especially risk assessment and mitigation to prevent a buildup in the level of non-performing loans in the banking sector. Bank Indonesia must also implement strategic steps with great care in the macroeconomic sphere, in order to encourage more responsible lending amid increasing global economic challenges.

One factor that can reduce bank credit risk so that it can be controlled is the fact that the bank also needs consistently monitor economic conditions. This is done to make macroeconomic guidelines more effective. The low level of public awareness in reducing credit risk will have an impact on the economy. Therefore, the banking sector needs to be aware of the important role it plays in controlling credit risk. It is important to pay attention to fluctuations in policy interest rates and mitigating excess money supply because these two factors have a significant influence on the level of non-performing credit risk in banks. Further research is neeeded to understand the influence of other variables such as inflation, industrial production index, and other variables that can affect non-performing loans.

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