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THE MACRO-PRUDENTIAL POLICY
AND BANK NON-PERFORMING ASSETS IN INDONESIA

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Abstract: *This study examines the effect of the Macro-prudential Intermediation Ratio (MIR) as an instrument of Bank Indonesia's macro-prudential regulation on Non-Performing Assets (NPA) as one of the banking industry performance indicators in Indonesia. In addition, this study also examines several other independent variables such as bank assets as an indicator of bank size, Bank Indonesia interest rates (BI rate), and inflation as macroeconomic indicators and their effect on NPA. The NPA, MIR, and bank asset data used in this study consist of 109 commercial banks operating in Indonesia during the period from January 2015 to December 2020. This study uses an Ordinary Least Square (OLS) analysis approach by undertaking classical assumption tests and statistical tests. The results show that (1) MIR, bank assets, BI rate, and inflation simultaneously have a significant effect on NPA (2) Partially, bank assets have a negative and significant effect on NPA while other variables including macro-prudential policy have no significant effect on NPA (3) Variable MIR, bank assets, BI rate, and inflation can explain variations of NPA variable by 34% (4) Larger bank size encourages prudent financing and reduces NPA.*

Keywords: *Macro-Prudential, Bank, Non-Performing Asset, Policy*

INTRODUCTION

The banking industry is an important sector of the economy and the stability of the banking system affects a country's economy (Monnin & Jokipii, 2016). Its main role is as an intermediary institution, namely raising funds and then providing financing for consumption and production activities (Kasmir, 2014). Financing channeled to the consumption sector will increase the demand side which in turn will move the supply side so that there is a balance in the economy. Furthermore, the financing channeled for production activities will increase national production. So it is clear that both consumption and production financing will ultimately improve the economy.

Figure 1. Loan and Banking Assets Development (Billion Rupiah)
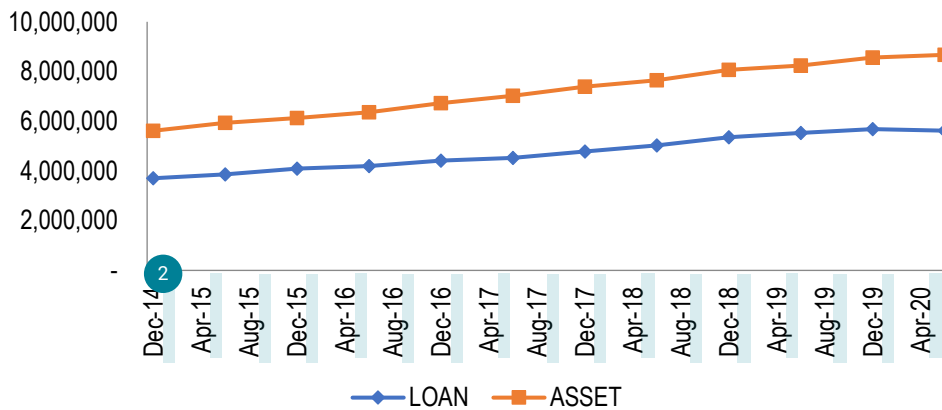
Source: OJK (2021)

The COVID-19 pandemic has impacted almost all economic sectors, including the financial sector. During the 2014 – 2019 period, generally lending and banking assets both experienced an increasing trend (OJK, 2020). In March 2020 credit distribution was recorded at IDR 5,781 trillion or a growing 3% from the previous month. In March the first case of Covid-19 was found in Indonesia, and as a result from April to the end of 2020 credit distribution continued to decline. This condition occurred due to the sluggish economy as a result of the initial impact of the Covid-19 pandemic in Indonesia. However, during the second semester of 2020, national banking assets still experienced an increase. At the end of 2020, national banking assets reached 9,177 trillion rupiahs which grew by 7% from the previous year as well as Islamic banks that convincing performance during the pandemic (Wahyudi et al., 2021). The increase in assets in 2020 amid this pandemic provides positive hope that the national banking system will be able to weather the economic shocks caused by the pandemic.

Large assets must be supported by good asset quality because asset quality affects the financial system (Kadioglu et al., 2017). The greater the productive assets, the higher profit generated from the management of these banking assets. The increased performance of the banking industry will bring many benefits, initially, the public has trust in placing their funds in the banks so that the potential funds can be managed and channeled to the business sector will be even greater. Furthermore, investors will be interested in investing in the banking industry so that banking capital will be stronger and it will be easier for them to expand their business. The last, the role of banks as development agents will be more significant in line with the higher funds being managed.

Figure 2. Bank's Non-Performing Assets (Billion Rupiah)
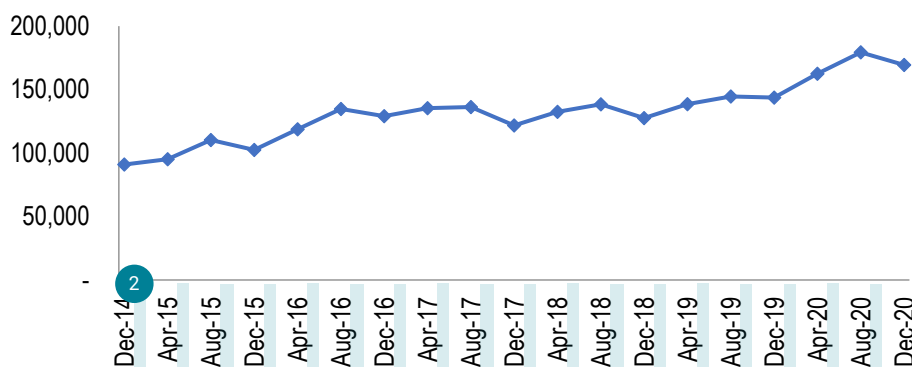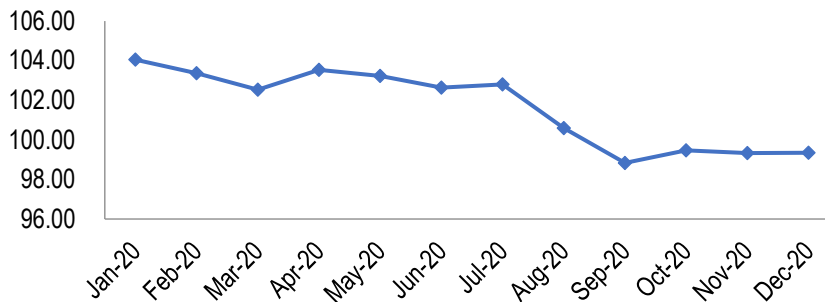

Source: OJK (2021)

Non-Performing Assets (NPA) value from 2014 to 2020 tends to increase; this is certainly unprofitable for the banking industry. The percentage of NPA at the end of 2020 reached 3.05% or an increase of 0.53% from the end of 2019. Although this percentage is considered to be still at a fairly safe level because Bank Indonesia limits the level of NPA to a maximum of 5%, banks still have to continue to be alert to the possibility of worsening NPA values.

The high NPA is one of the indicators that a financial crisis has occurred and the bank's risk has become greater (Ghosh, 2015). The decline in bank credit accompanied by an increase in the NPA number indicates that banking conditions in Indonesia are experiencing a decline in performance. An increase in NPA will have an impact on bank profitability (Johan, 2021; Lestari & Setianegara, 2020; Nurhasanah & Maryono, 2021) and bank efficiency (Riani & Maulani, 2021). This should be a concern for the government considering that the banking industry has an important role in moving the wheels of the economy.

Various policies and regulations have been implemented to protect the banking industry from economic shocks. Not only during this pandemic but long before that the government has made policies and regulations that focus on maintaining the stability of the financial system. One of the policies implemented by Bank Indonesia is a macro-prudential policy that focuses on regulating the financial system so that it does not have a systemic impact on other sectors. Since 2018 Bank Indonesia has officially introduced the Macro-prudential Intermediation Ratio (MIR) as a form of strengthening financial ratios, which was known as the Loan to Deposit Ratio (LDR). This policy aims to enable the banking industry in Indonesia to carry out a balanced and quality intermediation function. Banks

must meet the MIR between 84% -94%, meaning that the ratio of funding compared to financing should not be below 84% or above 94%. If the ratio is below 84%, it means that the banking intermediation function is not running well. This condition indicates that third-party funds or other funding sources are not redistributed by banks in the form of financing/securities. If this condition occurs, the bank will be fined a disincentive in the form of MIR current account deposit.

Figure 3. Bank's Macro-prudential Intermediation Ratio (Percent)

Source: OJK (2021)

Although this MIR policy has been issued since 2018, the average ratio of conventional and Islamic commercial banks in Indonesia is still outside the set range. From January 2015 to August 2020 MIR was above 100%, down to 99% from September 2020 to December 2020. These numbers are certainly outside the provisions set by Bank Indonesia, namely 84% - 94%.

The high intermediation ratio shows that the funds raised in the form of third-party funds, issuance of securities, and debts received are almost all channeled through financing & purchase of securities. This means that the banking intermediation function is currently still high and it is not in line with the direction of macro-prudential policies targeted by the government. A high MIR, especially if it is out of Bank Indonesia regulations, will increase liquidity risk for the banking industry. It is feared that the bank will not have sufficient funds for customers' withdrawals because all the funds are channeled into credit or loans.

Banks are required to implement macro-prudential policies to follow the direction that has been announced by the government, even though rules contravening do not have an impact on the bank's performance (Nurdin et al., 2018). Banks must have a business strategy so that their assets have high productivity because a high NPA is a business barrier for the banking industry. Banks must incur high costs for the funds that have been raised, if the assets managed cannot generate income, the bank will experience a negative spread or loss. Of course, many factors influence this, for example, internal company factors, national and global economic conditions as well as fiscal and monetary policies, both directly and indirectly.

Previous research was conducted to see how MIR and other factors affect banking performance. Bolarinwa et al. (2021) examine the inter-time relationship between NPA and other factors in the Nigerian banking industry, the result shows that bank size, leverage ratio, and liquidity affect NPL as well as inflation and economic growth. Corrado & Schuler (2017) analyze the effects of macro-prudential policies on the banking sector and its relationship to the macro-economy and the finding states that when liquidity is tightened, it can mitigate interbank loan failures.

Using an Ordinary Least Square (OLS) analysis approach, this research will focus on the effect of the MIR as an instrument of Bank Indonesia's macro-prudential regulation, bank assets as an indicator of bank size, Bank Indonesia interest rates (BI rate) and inflation as macroeconomic indicators on NPA as one of the banking industry performance indicators in Indonesia and their effect on NPA. By knowing how the MIR and other variables determine banking performance, banks can sort out and focus on which the best portfolios to hold to get optimum profit. This is intended so that MIR remains following government regulations but also remains profitable in business.

LITERATURE REVIEW

The 2007 global crisis changed the supervisory system of the micro and macro-prudential sector in several countries (Cosmin, 2018). Previous studies have shown that macro-prudential policies can mitigate interbank loan failures (Corrado & Schuler, 2017) and reduce the probability of a systemic crisis (Gauthier et al., 2012; Peydró,

2016). The MIR policy and credit growth in some countries show a positive relationship (Avdjiev et al., 2017; Cerutti et al., 2015, 2016; Zhang & Zoli, 2016). Other studies show that the tightening of macro-prudential policies has an impact on credit decline(Akinci & Olmstead-Rumsey, 2015) and effectively suppresses the growth rate of banking assets (Claessens et al., 2013).

Why Macro-prudential Policy Matters in the Economy

The Global Crisis is seen by many as the result of regulatory failures to address financial imbalances. Weaknesses in the regulatory framework, particularly the lack of understanding of macro-prudential regulations and systemic risks create fragility in the financial system. All correlated risks in the financial system that may arise must be considered early so that accumulation impact does not occur. Systemic risk will disrupt financial stability and its negative impact will spread to every sector of the economy, so it is necessary to carry out more macro-prudential regulation and supervision, namely by taking into account the stability of the financial system as a whole and its relation to the economy at large (Freixas et al., 2015).

Research by Peydró (2016) provides strong evidence that macro-prudential policies can mitigate risk and have a positive effect on the performance of banking companies. The macro-prudential policy is carried out in three stages, namely monitoring, evaluation, and supervision of financial stability. Supervision policies are in the form of risk assessment, analysis of banking industry activities and subsequent recommendations. This aims to reduce the potential for failure of the banking system and limit its adverse effects so it is important to implement countercyclical fiscal and monetary policies adequately (Beridze, 2020).

MIR policy is intended for banks to carry out their intermediation function following the targets set by the government. However, whether this policy will have a positive impact on banking performance or vice versa needs to be proven by scientific research. Claessens et al. (2013) have conducted research using panel data of 2800 banks in 48 countries the results show that macro-prudential policies reduce asset growth in the banking sector. Total assets are an indicator of the size of a bank (bank size) and play an important role in determining income and expenses in the banking industry (Naruševičius, 2018). MIR is calculated based on several variables including total credit, securities held, third-party funds, securities issued, and loans received. MIR can also be a measure of banking liquidity, namely how much funds are disbursed in the form of credit sourced from savings funds (Makri et al., 2014).

Application of Macro-prudential Policy in Indonesia

The central bank is the main actor as a regulator who must ensure financial system stability is in the right position in terms of macro-prudential supervision so that risks to the entire financial system can be identified (Cosmin, 2018). In Indonesia, the implementation of macro-prudential policies is carried out using several instruments (Bank Indonesia, 2020), namely:

- Countercyclical Capital Buffer (CCB)
  Additional capital is used as a buffer to anticipate losses in the event of excessive growth in banking financing to disrupt financial system stability. The CCB amount is dynamic, ranging from 0% to 2.5% of the bank's Risk-Weighted Assets (RWA). This provision is set in PBI No.17/22/PBI/2015 dated December 23rd, 2015.
- Loan/Financing to Value (LTV)
  LTV is the ratio between the total financing disbursed to the value of the collateral, in the form of property based on the latest assessment results. Down payments for motor vehicle financing are advance payments from debtors/customers in the amount of a certain percentage of the price of motorized vehicles. LTV for property financing is 5%, for motor vehicles are 5-10%, as well as additional LTV ratio relief for property and motor vehicle financing with an environmental perspective of 5% each. This policy is set on PBI No.21/13/PBI/2019 dated December 2nd, 2019, as an amendment to PBI No.20/9/PBI/2018.
- Macro-prudential Intermediation Ratio (MIR)
  A macro-prudential instrument aims to ensure that the banking intermediation function is in line with the capacity and target of economic growth but still maintains the precautionary principle. This ratio compares the total loans and securities held to the total third-party funds, securities issued and loans received. The macro-prudential intermediation ratio is set at 84% to 94%. These regulations are contained in PBI No.21/12/PBI/2019 dated November 25th, 2019 as an amendment from PBI No.20/4/PBI/2018.

- Macro-prudential Liquidity Buffer (MPLB)
Macro-prudential Liquidity Buffer is a minimum liquidity reserve that must be maintained by banks in the form of securities in Rupiah that can be used in monetary operations, the amount of which is determined by Bank Indonesia at a certain percentage of third-party funds. These provisions are set out in PBI No. 20/4/PBI/2018 dated April 3rd, 2018.
- Short-Term Liquidity Assistance (STLA)
STLA is loans from Bank Indonesia to commercial banks to address short-term liquidity problems. Short-term liquidity difficulty is a condition where the bank experiences a smaller inflow of funds compared to the outflow of funds and makes the bank unable to meet its statutory reserve requirement. This policy is stipulated in PBI No.20/4/PBI/2018 dated 21st December 2018.

This study uses one of those macro-prudential policy instruments, namely MIR. MIR is a ratio comparing the total loans and securities held to the total third-party funds, securities issued, and loans received by the bank. The MIR is used in this analysis since this ratio can show the banking intermediation function, to raise funding from society which surplus of funds in form of third fund party and distribute in form of a loan. The higher the ratio means the high the intermediation function of the bank. Furthermore, a study by Zhang & Zoli (2016) conducted a review of macro-prudential instruments in 46 countries since 2000 and concluded that MIR is an effective instrument.

RESEARCH METHODS

This study uses descriptive qualitative and quantitative analysis techniques with the Ordinary Least Square (OLS) estimation method approach. Statistical analysis in this study used the E-Views 11 software. Model feasibility is tested by classic assumption, the conditions that must be met in the OLS linear regression model so that the model becomes valid as an estimator (Ghozali, 2018). This test consists of multicollinearity, autocorrelation, normality, linearity, and heteroscedasticity test. The model is statistically tested as well consists T-test, F-test, and Determination Coefficient Test.

The data type in this study is the monthly time series data and the data period is from January 2015 to December 2020. This time span is chosen because the MIR policy has been issued by Bank Indonesia since 2018, therefore the research only takes some period before and after the MIR policy launching. It uses the provided data by the Indonesian Banking Statistics (SPI) report published by the Financial Services Authority (OJK) consists of 109 commercial banks operating in Indonesia. Other macro variables such as inflation and Bank Indonesia rate are obtained from the Financial Statistics Report of Bank Indonesia (SEKI) issued by Bank Indonesia. The proposed model for this research is as follows:

$$NPA = \alpha + \beta 1MIR + \beta 2BA + \beta 3BIR + \beta 4INF + \varepsilon \ldots\ldots\ldots\ldots\ldots. (1)$$

The model shows how the influence of MIR as the macro-prudential intermediation ratio, BA as the bank asset, BIR as the Bank Indonesia rate, and INF as the inflation rate on NPA as the bank non-performing asset. Figure 4 describes the research framework of how variable independent such as MIR, bank assets, Bank Indonesia rate, and inflation simultaneously and partially influence the NPA.

Research Variables

- Non-Performing Asset
The quality of bank assets disbursed through credit is divided into five categories (known as collectability) namely current, special mention, substandard, doubtful, and loss. NPA is loans with substandard, doubtful, and bad collectability categories.
- Macro-prudential Intermediation Ratio (MIR)
Bank Indonesia implements macro-prudential policies to several instruments, namely Countercyclical Capital Buffer (CCB), Loan/Financing to Value (LTV), Macro-prudential Intermediation Ratio (MIR), Macro-prudential Liquidity Buffer (MPLB), and Short-Term Liquidity Assistance (STLA).
- Bank Asset
The bank asset variable is the total assets of Conventional Commercial Banks and Islamic Commercial Banks in Indonesia.

- Bank Indonesia Rate
  Bank Indonesia rate is the Bank Indonesia reference of policy rate well known as BI-7 Day Reverse Repo Rate (BI7DRR).
- Inflation
  The inflation rate is measured by the percentage change of the Consumer Price Index (CPI).

RESULTS AND DISCUSSION

- **Classic assumption test**

  The results of the Ramsey Reset test show the F-statistic probability value is 0.4327 greater than 5 percent alpha, meaning that the proposed model has met the linearity assumption. The probability value by using the test Jarque-Bera is 0.372784 greater than 5 percent alpha, meaning that the data in the model is normally distributed. The test results using Breusch-Pagan-Godfrey obtained a probability F value of 0.1120 greater than 5 percent alpha, meaning that the model does not experience heteroscedasticity problems.

  The result values of centered VIF on the multicollinearity test are MIR by 1.389969, bank asset by 1.325973, Bank Indonesia rate by 1.015259, and inflation by 1.043863. Those numbers are not greater than 10 means there is no multicollinearity problem in the model. The probability F value using the Brusch-Godfrey method or the Lagrange Multiplier is 0,5105 greater than 5 percent alpha, thus the model is free from autocorrelation problems.

Table 1. Model Feasibility Test Results

Test	Probability Value

Variance Inflation Factors:
    MIR
    Bank Asset
    Bank Indonesia rate
    Inflation
	
	1.389969
	1.325973
	1.015259
	1.043863

Jarque-Bera	0.372784
Brusch-Godfrey	0.5105
Breusch-Pagan-Godfrey	0.1120
Ramsey Reset	0.4327

Source: data processed (2021)

- **Statistic test**

  The results of the model estimation using regression showed in Table 2. The T-test is used to see the effect of MIR, bank assets, CBR, and inflation on NPA partially. The regression results show T-test probability value of MIR is 0.4635, the Bank Indonesia rate by 0.1879, and inflation by 0.1447 greater than 5 percent alpha mean those variables do not have a significant effect on NPA. Furthermore, the bank asset T-test probability value is 0.0000 less than 5 percent alpha means only bank assets have a significant effect on NPA while other variables are not significant.

Variable	Coefficient	Std. Error	t-Statistics	Prob.
MIR	-540.6299	733.2461	-0.737310	0.4635
Bank Asset	-0.032588	-0.005902	-5.521518	0.0000
Central Bank Rate	-2691.225	2022,605	-1.330574	0.1879
Inflation	1666,771	1129.162	1.476113	0.1447
C	2748,323	527,9110	5.206034	0.0000
F-statistic				0.000002
Adjusted R-square				0.340002

Table | Source: data processed (2021) | 2.

Statistic Test Results

Meanwhile, the F-test result shows the probability value of 0.000002 less than 5 percent alpha means simultaneously the MIR, bank assets, CBR, and inflation variables have a significant effect on NPA. The adjusted R-square value or the coefficient determination is 0.340002, this number shows that variable independent (MIR, bank assets, CBR, and inflation) can explain the dependent variable variation by 34%. Based on that value it can be concluded that there are many other factors outside the model that affect the bank's unproductive assets. Based on the regression results the following model is obtained:

$$NPA = 2748 - 540MIR - 0.03BA - 2691CBR + 1666INF + \varepsilon \ldots\ldots(2)$$

Assets are called productive if these assets can provide returns or benefits for banks such as loans that can provide interest which is the main source of income for banks. The higher the productive assets owned the more benefits can be obtained from the results of managing these assets. From the regression results, it is found that bank assets have a significant effect on NPA with a negative coefficient, meaning that if there is an increase in bank assets, it will reduce NPA. This happens because the greater the assets owned; the bank has flexibility to channel credit. Banks that have large assets have good management as well so asset management can be carried out more professionally and profitably.

The bank asset coefficient value is -0.032588 means that when the value of the bank's assets increases by one rupiah, it will reduce the NPA by 0.032588 rupiahs. A bank with a huge number of assets also has the chance to choose which portfolio or economic sector that can give high returns and low risk. They can do selective credit by focusing only on the potential and secure sector in distributing their financing. This privilege will help more prudence so the asset work more productively and NPA can be suppressed. Great assets also provide opportunities for banks to employ professional staff so that credit management can be better handled. Adequate infrastructure is also possible for banks to own if they have high assets so that services can outreach to the community and can be further improved.

Regression results show that MIR and CBR have no significant effect on NPA. Previous research by Karadima & Louri (2021) and Makri et al. (2014) also shows the same thing where LDR or currently called MIR has no significant effect on unproductive banking assets. A different result by Ghosh (2015) stated that MIR had a significant impact on NPA. MIR reflects how much the banking sector has carried out its intermediation function. The higher the intermediation ratio means that the funds that have been raised have been redistributed in the form of financing or securities. The high distribution of financing will be beneficial if the credit is productive so that it can make the banking business more expansive. However, if the financing is high but the quality has many problems, the assets distributed will become unproductive and will harm the bank.

The high MIR ratio not only creates a liquidity risk for banks but also feared that the bank is too expansive in lending. Credit expansion must be balanced with a prudent process because it will increase non-performing loans due to customer defaults. This condition will certainly have an impact on the high NPA. However, the T-test shows that the MIR policy by the central bank does not significantly prove, therefore high MIR only indicates the credit quantity, not credit quality.

The interest rate effect theory stated that a low level of interest will expand credit (Mankiw, 2016). The lower the interest the more loans are demanded because the cost that must be paid to the bank is cheaper and it can be a benefit for the debtor. However, based on the T-test in this research, the CBR variable does not significant effect on NPA. During the research period, the CBR has not undergone drastic changes hence it has not had a large impact on credit quality. On average, Bank Indonesia changed the CBR by 0.25 basis points and was only carried out on a few occasions; this enabled the banking industry to adjust its productive asset management so that it would not have an impact on NPA.

The theory of the relationship between the price level and investment (the interest rate effect) states that when inflation occurs, it will encourage the central bank to raise interest rates, as a result, the credit disbursed by

banks will be smaller (Mankiw, 2016). Lower lending will also reduce the risk of unproductive assets. On the other hand, when the interest rate is low, the demand for credit will increase, as a result, the risk of NPA will also increase. Research on the relationship between inflation and NPA has been carried out by Ghosh (2015) who found that inflation, unemployment, and government debt had a positive and significant effect on NPA. However, the regression results in this study indicate that inflation has no significant effect on NPA. This condition is also supported by several previous studies, namely Karadima & Louri (2021), Anastasiou et al. (2019), Perić & Konjušak (2017), Dimitrios et al. (2016), Makri et al. (2014). Inflation in Indonesia during the 2015-2020 period had a downward trend and was relatively low over the last few years, which was below 5%. Inflation conditions that are not too volatile are what make credit quality less affected so that it does not have a significant impact on NPA.

CONCLUSION

This study aims to examine the effect of macro-prudential policy in the form of MIR on NPA. In addition, the impact of bank asset variables and macro variables (CBR and inflation) as independent variables on NPA as the dependent variable is also seen. The study uses time-series data from 109 commercial banks operating in Indonesia from January 2015 to December 2020. The test results using the OLS method show that simultaneously the variables of MIR, bank assets, CBR, and inflation have a significant impact on NPA with a coefficient of determination of 34%.

Partially, only bank asset has a significant effect on NPA with a coefficient value of -0.032588, while the other independent variables, including macro-prudential policy in the form of setting the limit on the intermediation ratio (MIR) were not proven to have a significant effect. Assets are one of the variables that affect NPA because assets are an indicator of bank size, the bigger a bank, the better the management in it, including more selective (prudent) lending policies. Under these conditions, banks with large assets can mitigate the risk of NPA so that the quality of their assets can be maintained properly.

MIR is one of five macro-prudential policy instruments by Bank Indonesia to maintain financial system stability. Future research can focus on other macro-prudential policy instruments such as CCB, LTV, MPLB also SLTA to see how they impact the banking industry in Indonesia. Bank Indonesia as a monetary authority in Indonesia can apply the micro and macro-prudential policy mix to strengthen Indonesia's financial system and the economy as well.

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