

Analysis of the Effectiveness of Banking Credit Risk Control with Macroprudential Policy in Indonesia



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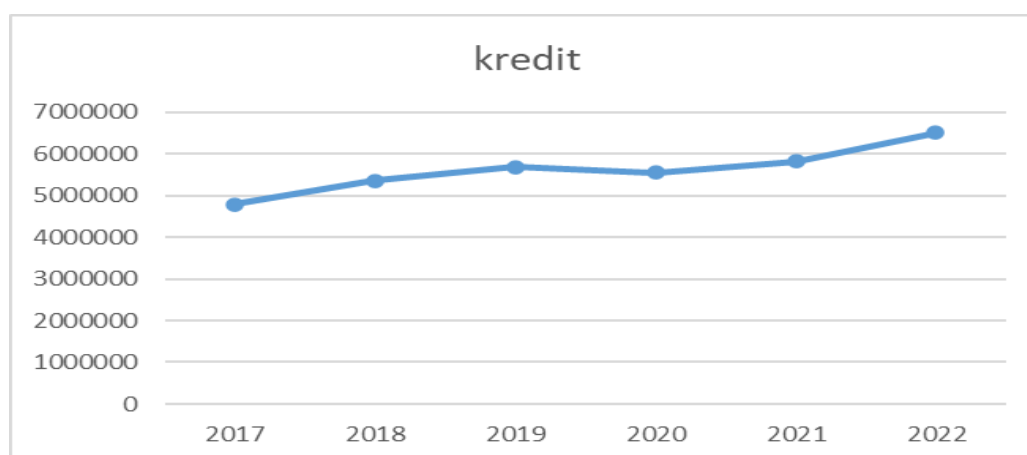
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ABSTRACT: High credit risk will affect the health of the bank which will be a factor causing systemic risk. This research aims to analyze the effectiveness of macroprudential policy in controlling banking credit risk in Indonesia. This research uses Non-Performing Loans (NPL) as an indicator of credit risk. Meanwhile, as indicators of macroprudential policy, policy instruments such as LTV (Loan to Value), RIM (Macroprudential Intermediation Ratio), DTI (Debt to Income), and COC (Ceilings on Credit). The analytical method used in this research is panel data regression analysis with a fixed effect model (FEM). The research results show that simultaneously each macroprudential policy instrument, be it RIM, DTI, and COC, influences banking credit risk in Indonesia, and easing policy on LTV is unable to reduce NPLs.

KEYWORDS: Credit Risk, Non-Performing Loan (NPL), Macroprudential Policy, Fixed Effect Model (FEM)

I. INTRODUCTION

A financial system is a set of institutions and other elements involved in the exchange of funds. A stable financial system is a stimulus for economic growth. Financial institutions are part of the financial system. The health of financial institutions and the stability of financial markets are important factors in financial system stability¹. One part of the financial institution in question is banking. Banking has a very dominating role in the financial system. Therefore, if there is turmoil in the banking system, it will affect the aggregate economy. A bank is an organization that works intending to help the community by collecting funds from the community as savings and providing these funds to the community as credit or in other forms to improve the community's standard of living.². Based on this understanding, the main function of banks is as an intermediation institution. In carrying out its function as an intermediation institution, banks' main focus is lending.



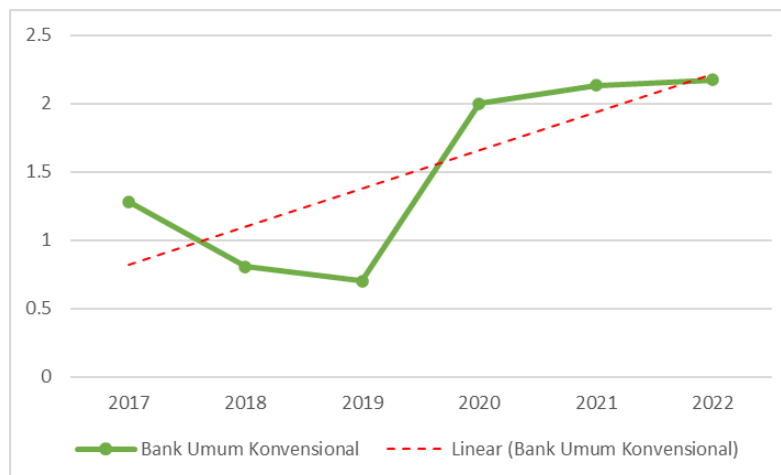
Figures 1. Development of Banking Credit in Indonesia 2017 – 2022

Source: Indonesian Banking Statistics (SPI), 2017 - 2022

Based on Figure 1, it can be seen that the development of banking credit over the last 6 years has increased. This increase was largely due to an increase in credit distribution, especially in the consumption, MSME, and corporate sectors. In distributing credit, banks will face credit risk. Based on POJK Number 18/POJK.03/2016, credit risk is a risk caused by the inability of other

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parties to fulfill their obligations to the bank. Credit risk is represented by a ratio, namely Non-Performing Loans (NPL), which is also an indicator in measuring banking credit risk³. The increase in NPL shows that banking performance is increasingly unfavorable⁴.



Figures 2. Development of NPL of Conventional Commercial Banks in Indonesia 2017 – 2022

Source: Indonesian Banking Statistics (SPI), 2017 – 2022

Based on Figure 2, NPL development is very fluctuating and tends to have an increasing trend over the last 6 years. A drastic increase in NPL occurred in 2020, namely 2 percent. This increase in NPL was caused by weakening real sector repayment capabilities amidst limited credit growth during the pandemic. Credit risk is one of the triggers for systemic risk, where systemic risk comes from credit growth and asset prices as a result of credit growth. To maintain financial stability, an effective policy is needed that can maintain financial system stability by preventing systemic risk.

In managing credit risk, banks are assisted by the central bank through policies set by Bank Indonesia, one of which is the macroprudential policy. Indonesia has implemented macroprudential policies implicitly since the 2000s. Macroprudential policy functions to reduce costs resulting from disruptions in financial services such as the provision of credit, insurance, and other payment services. According to Bank Indonesia, the main objective of macroprudential policy is to ensure that the financial system as a whole remains stable by controlling systemic risk. The urgency of establishing macroprudential policy began with The Global Financial Crisis (GFC) in 2007 - 2008. The Global Financial Crisis (GFC) in 2007 - 2008 has become a clear reminder of the dangers of systemic risk. in the stability of a country's financial system⁵. Therefore, there is a need for macroprudential policies that have the potential to maintain financial system stability by preventing systemic risks.

High credit risk will affect the health of the bank which will be a factor causing systemic risk. Based on Figure 2, NPL has not shown a tendency to decrease every year. Meanwhile, macroprudential policy has been determined and evaluated annually by Bank Indonesia. Based on this explanation, macroprudential policy is considered to be ineffective in controlling banking credit risk in Indonesia.

II. LITERATURE REVIEW

A. Financial System

The term financial system refers to a system consisting of financial markets, financial infrastructure, financial institutions, non-financial companies, and households that interact to support and provide funds for the economy. (Peraturan Bank Indonesia Nomor 16/11/PBI/2014, 2014). According to the International Monetary Fund (IMF), the financial system consists of various financial institutions such as banks, insurance companies, stock exchanges, investment banks, and clearing houses. A financial system is a network of financial institutions and procedures that work together to exchange and transfer capital from one place to another. Financial systems can be organized using market principles, central planning, or a combination of both⁷.

The World Bank explains that financial system stability has an important role in efficient resource allocation, assessing and managing financial risks, maintaining employment levels, and facilitating the flow of funds between savers and borrowers (World Bank, 2022). A stable financial system functions for the economy, both in safe economic conditions and in volatile economic conditions. Several factors can cause instability in the financial system. Rising interest rates, weakening bank balance sheets, negative shocks to non-bank balance sheets such as stock market declines, and increased uncertainty are some of the

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factors that typically trigger financial instability. Systemic failures, unpredictable or uncontrollable human behavior, incentives of economic actors to take too much risk⁸.

B. Systemic Risk

Systemic risks can arise unexpectedly or vice versa, develop slowly without being noticed or detected by something which can result in delays in implementing appropriate mitigation policies⁷. Systemic risk is the risk that an event at the company level can trigger instability that collapses entire industries and economies⁷. Bank Indonesia defines systemic risk as the possibility of instability due to disruption that spreads to half or the entire financial system. According to several studies, systemic risk can cause public trust to disappear and cause great uncertainty in the financial system, causing the financial system to not function as it should and hampering economic flows. ¹ The economic theory of systemic risk states that the behavior of financial institutions can contribute to the emergence and spread of systemic risk⁹.

Financial institutions, such as banks, are often faced with decisions involving risk and uncertainty, and their behavior in such situations can be influenced by various factors, including incentives, the regulatory environment, and economic conditions.¹⁰ Financial institutions will tend to move procyclically⁷. When economic conditions experience expansion, financial institutions will expand and increase their risk-taking behavior. Meanwhile, when the economy experiences contraction, financial institutions tend to restrain expansion and reduce risks, including reducing lending.

C. Macroprudential Policy

According to the European Systemic Risk Board (2014), the main objective of macroprudential policy is to contribute to maintaining overall financial system stability. This includes strengthening the resilience of the financial system and taming the buildup of vulnerabilities, as well as smoothing the financial cycle. These objectives are designed to ensure the financial sector's sustainable contribution to economic growth. Each type of instrument influences financial stability through different channels and means to ensure stable economic growth. The need for a macroeconomic approach to prudential financial regulation arises from various externalities that can spread vulnerabilities from individual institutions throughout the financial system.¹¹ The basis of macroprudential policy is divided into three main channels, namely: channels related to capital, liquidity, and credit¹².

- Capital related: caps on the loan-to-value (LTV) ratio, caps on the debt service to-income (DTI) ratio, caps on foreign currency lending, and ceilings on credit or credit growth.
- Liquidity-related: limits on net open currency positions/currency mismatch (NOP), limits on maturity mismatch, and reserve requirements.
- Capital-related: countercyclical/time-varying capital requirements, time-varying/dynamic provisioning, and restrictions on profit distribution.

D. Implementation of Macroprudential Policy in Indonesia

In general, the macroprudential policy framework in Indonesia consists of three pillars, namely: balanced and quality intermediation, financial system resilience, and economic and financial inclusion. Economic and financial inclusion consists of banking, economics, and sharia finance⁷. The various instruments used by Bank Indonesia are directed towards these three dimensions and apply to both conventional and sharia banks.

The first pillar focuses on efforts to encourage balanced and quality intermediation in potential sectors. In this pillar, there are instruments related to credit such as the Countercyclical Capital Buffer (CCyB) which is currently still applied at 0 percent, Loan-to-Value (LTV) for property credit/financing, down payments for motor vehicles, and the Macroprudential Intermediation Ratio (RIM). RIM is used to promote balanced intermediation. RIM can exceed the upper limit as long as the bank in question has a high capital ratio and a low level of non-performing loans.

The second pillar is a strategy to encourage financial system resilience which will be formulated and implemented through the Dynamic Systemic Risk Surveillance (DSRS) framework. In DSRS, supervision is carried out on individual banks and transmission through non-bank institutions. The instruments used to realize this pillar are the Macroprudential Liquidity Buffer (PLM) and the Ratio of Liquid Assets to Third Party Funds (DPK). Third-Party Funds as a monitoring tool.

The third pillar is related to the framework of the National Economic Strategy and the National Economic Strategy and Financial Inclusion. Further improvements in economic and financial inclusion economic and financial inclusion, to provide new sources of growth, are needed. Financial inclusion must be encouraged, including from the supply side by using the Macroprudential Inclusive Financing Ratio policy. This ratio is intended as a strengthening and innovation of the previously known Small and Medium Enterprises (SME) credit ratio⁷. Bank Indonesia implements several macroprudential policy instruments, namely Loan-to-Value (LTV), Countercyclical Capital Buffer (CCyB), Macroprudential Intermediation Ratio, Macroprudential Liquidity Buffer (PLM), and Short-Term Liquidity Loans (PLJP).

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E. Credit Risk

Credit risk is one of the three main risk classes faced by banks, alongside market risk and operational risk. Credit risk in banking can disrupt the stability of the financial system by producing a chain reaction of defaults and losses that can spread throughout the financial system¹³. According to Goodhart (2005), credit risk in banking can cause systemic failure in financial institutions which can then damage the financial system and economy. Goodhart (2005) also said that credit risk is one of the systemic risk categories.

F. Policy Effectiveness

Effectiveness can be defined as a measure of how far an organization's output, policies, and procedures achieve its goals. (Pekei, 2016). According to Kettner, Moroney, and Martin (2008), the evaluation of a program is said to be effective if it meets the five criteria, namely: the efforts made by the government in implementing the program by the objectives to achieve, cost efficiency, the results of implementing the program compared with previously determined results. , program cost-effectiveness, namely the number of costs incurred to achieve the goals, and the impact that can be felt directly. Effectiveness can also be defined as measures of the success or failure of an organization in achieving its goals¹⁵. The measure of effectiveness in the research of Sanim (1998) and Simatupang (2002) was obtained from the magnitude of the independent variable parameters in the regression equation. If the parameter number is large, then the influence of the independent variable on the dependent variable is said to be very effective. A similar measure of effectiveness was also used by Feri Anggriawan (2015) in his research which aims to analyze

III. METHOD

A. Research Scope

This research uses secondary data and is in the form of panel data. Panel data is a combination of time series data and cross-section data. The time series data used in this research spans 5 years with monthly data collection. Meanwhile, the cross-section data in this study is 4 groups of conventional commercial banks. Thus, the total number of observations in this research was 240. All data obtained in this research came from Bank Indonesia (BI), the Financial Services Authority (OJK), and the Central Statistics Agency (BPS).

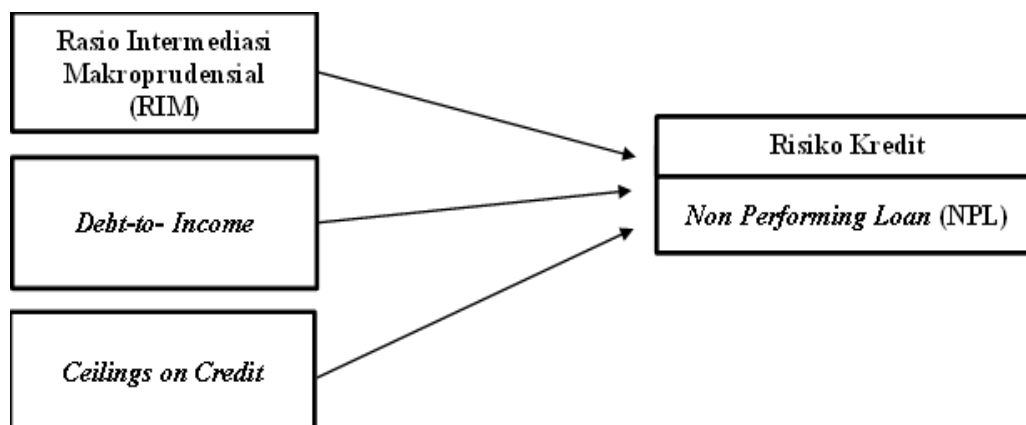
B. Analysis Method

This research uses panel data regression analysis techniques using the fixed effect model (FEM). Panel data is a combination of cross-section data with time series data, where the same cross-section units are measured at different times. In this research, Non-Performing Loans (NPL) are used as the dependent variable. Meanwhile, several macroprudential policy variables, such as the Macroprudential Intermediation Ratio (RIM), Debt-to-Income (DTI), and Ceilings on Credit (COC) are used as independent variables.

Non-Performing Loans(NPL), as a measure of banking credit risk in percent units. NPL is obtained from the division between total non-performing loans and total loans issued. In this research, Net NPL is used with the formula:

$$NPL\ Net = \frac{Total\ Kredit\ Bermasalah - CKPN}{Total\ Kredit} \times 100\% \quad (3.1)$$

CKPN: Allowance for Impairment Losses (Rp)



Figures 1. Research Framework

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Based on theory and Figure 3, the theoretical model can be straws:

$$Credit\ Risk = f(Macroprudential\ Policy) \quad (3.2)$$

$$NPL = f(RIM, DTI, Ceilings\ on\ Credit) \quad (3.3)$$

Table 1. Details of Variables and Units

Variable Type	Variable	Unit
Independent Variable	Macroprudential Intermediation Ratio (RIM)	Percent
	Debt to Income(DTI)	Percent
	Ceilings on Credit(COC)	Billion Rupiah
Dependent Variable	Non Performing Loans(NPL)	Percent

The FEM model is used when the researcher wants to control for unobserved and time-independent individual characteristics that can be correlated with the observed independent variables. The FEM model is a technique for estimating panel data using dummy variables to see intercept differences¹⁶.

By using the fixed effect model (FEM), equation 3.3 can be derived as follows:

$$Y_{it} = \beta_{0i} + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + u_{it}$$

$$Y_{it} = \alpha_1 + \alpha_2 D_{2i} + \alpha_n D_{ni} + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + u_{it}$$

$$NPL_{it} = \alpha + \beta_1 RIM_{it} + \beta_2 DTI_{it} + \beta_3 COC_{it} + \beta_4 D_{1i} + u_{it} \dots \dots \dots (3.4)$$

NPL : Non Performing Loans at Bank i in year t

RIM_{it} : Macroprudential Intermediation Ratio in Banks i in year t

DTI_{it} : Debt-to-Income(DTI) at Bank i in year t

COC_{it} : Ceilings on Credit(COC) at Bank i in year t

β_{0i} : Constant

u_{it} : Residual (error terms)

D1i : Dummy Variable

There are slight model differences in the Fixed Effect Model (FEM) equation. In the FEM equation there is a subscript i in the constant to indicate that each intercept of an individual object is different. To explain the differences for each intercept for each individual who is the object of research, can be done by deriving the equation using the dummy intercept derivation technique.

Thus the hypothesis of this research can be formulated as follows:

1. The Macroprudential Intermediation Ratio (RIM) is thought to have a positive and significant influence on banking credit risk (NPL).
2. Debt-to-income (DTI) is thought to have a negative and significant influence on banking credit risk (NPL).
3. Ceilings on credit (COC) are thought to have a negative and significant influence on banking credit risk (NPL).

IV. RESULT AND ANALYSIS

A. Research Result

Based on the results of determining the best model using the Chow test and Hausman test in Table 2, the best model used in this research is the fixed effect model (FEM). Therefore, dummy variables are used to complete the research model. The dummy variable in this research is the easing and tightening of Bank Indonesia's policies in issuing credit. The dummy is obtained from the LTV (Loan to Value) policy amount set by Bank Indonesia. For policy easing it is denoted by the number 1 and for no policy easing it is denoted by the number 0. After determining the best model to use for research, the next step is to test the classical assumptions. As seen in Table 3, there is no multicollinearity in the model. However, the research model suffers from heteroscedasticity and autocorrelation problems. So, to overcome the problems of heteroscedasticity and autocorrelation, treatment needs to be carried out. One way to overcome these two classical assumption test problems is to carry out Generalized Least Square (GLS) weighting. Furthermore, the model with GLS weighting heteroscedasticity and autocorrelation problems can be ignored.

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Table 2. Best Model Determination Test

Chow Test			Hausman Test		
F-Statistic	p-Value	Decision	F-Statistic	p-Value	Decision
(1)	(2)	(3)	(4)	(5)	(6)
109.996102	0.0000	Reject H₀	294.839191	0.0000	Reject H₀

Source: Testing with the E-Views 12 Program

Table 3. Classic assumption test

Assumption Classic Test	Testing Characteristic	Test Results	Conclusion
Multicollinearity	Nilai koefisien korelasi < 0,8 (tidak terjadi multikolinearitas)	Koefisien Korelasi > 0,8	Tidak terjadi multikolinearitas
Heteroskedasticity	Nilai koefisien korelasi > 0,8 (terjadi multikolinearitas) LR Test: Prob. > 0,05 (tidak terdapat heteroskedastisitas) Prob. < 0,05 (terdapat heteroskedastisitas)	Prob. < 0,05	Terdapat heteroskedastisitas
Autocorrelation	Breusch-Pagan LM test: Prob. > 0,05 (tidak terdapat autokorelasi) Prob. < 0,05 (terdapat autokorelasi)	Prob. < 0,05	Terdapat autokorelasi

Source: Testing with the E-Views 12 Program

B. Discussion

1) Macroprudential Intermediation Ratio (RIM)

According to the results of the regression estimates that have been carried out, the RIM instrument variable has a positive and significant influence on NPL. Every 1 percent increase in RIM will have an impact on increasing NPL by 0.04 percent. When the central bank's policy preference is to reduce risks in bank intermediation, the central bank sets higher disincentive parameters for RIM. RIM has a significant relationship because RIM is a policy that plays an important role in reducing NPL by increasing the resilience of the banking sector and mitigating the buildup of systemic risk. Therefore, RIM's policies will be more effective in controlling credit risk when RIM's policies are relaxed.

2) Debt-to-Income (DTI)

Based on the regression estimation results, DTI has a negative and insignificant effect. If you look at the coefficient, every 1 percent increase in DTI will result in a decrease in NPL of 0.053 percent. If we look at the coefficient, the relationship between the DTI ratio and NPL is negative. This is in accordance with the theory explained in the previous section. A decrease in the DTI ratio shows that bank income is greater than debt. High bank income will encourage banks to distribute credit. When credit distribution increases, credit risk will also increase. Therefore, a decrease in the DTI ratio will increase credit risk.

3) Ceilings on Credit (COC)

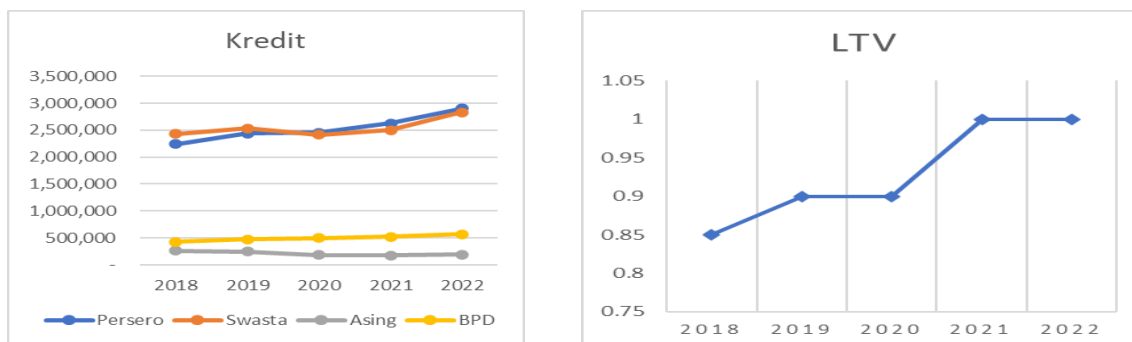
Based on the regression estimation equation, the COC variable has a negative and significant influence, although this influence is not too big. Every 1 billion rupiah increase in COC will have an impact on increasing NPL by 0.0000045 percent. Every increase in COC will increase NPL. Ceilings on Credit is the upper limit of credit provided to bank customers within the scope of the credit agreement. In this research, COC is described from the difference between TPF and the Minimum Statutory Reserve value, the percentage of which has been determined by Bank Indonesia. This difference is assumed to be the upper limit of credit provided by the bank. According to several experts, third-party funds, or what is abbreviated as DPK are funds saved by the public in banks in the form of current accounts, savings deposits, or time deposits. In terms of banking operations, DPK is a source of liquidity for the distribution of financing to Sharia-based commercial banks. When banks' ceilings on credit increase, borrowers

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can obtain larger loans. This allows them to invest in income-generating activities. This increase in income will increase the borrower's ability to repay the borrower.

4) Dummy

Based on the regression equation, it is known that the dummy variable does not statistically have a significant effect on NPL. Policy easing is marked with the number 1 and no policy easing is marked with the number 0. If you look at the coefficient, the coefficient on the dummy variable is negative. This shows that when policy is relaxed, the NPL value will decrease. This is with the assumption that the other independent variables are constant.



Figures 2. Development of BUK Credit and LTV Policy in Indonesia 2018 - 2022

Source: Indonesian Banking Statistics (SPI) & Bank Indonesia (BI), 2018 -2022

Based on the graph of credit development and LTV policy, it can be seen that the LTV policy is not responded to by banks. Several factors allow this to happen. One of them is the level of bank income which continues to increase so that banks will continue to increase their credit distribution even though Bank Indonesia does not relax the policy for LTV. In addition, the relaxation of LTV policies will allow borrowers to obtain credit more easily. This will encourage economic growth. When economic growth increases, borrowers will be more likely to make credit payments on time, thereby reducing the number of NPLs.

If we refer to the results of this research, the effectiveness of macroprudential policies can be achieved by tightening or loosening these policies. RIM's increase can be said to be a policy easing. The relationship between these two variables is positive, therefore, to control credit risk, the central bank needs to tighten policy using these two instruments. Likewise with a macroprudential policy with LTV instruments. Bank Indonesia can tighten the LTV policy so that the macroprudential policy is effective in controlling credit risk.

V. CONCLUSION

This research aims to analyze the influence of macroprudential policy on credit risk and analyze the effectiveness of macroprudential policy in controlling banking credit risk in Indonesia. The macroprudential policy instruments used in the research as independent variables are RIM (Macroprudential Intermediation Ratio), DTI (Debt to Income), and COC (Ceilings on Credit). Meanwhile, the dependent variable in this research uses NPL as an indicator of credit risk. The research results show that simultaneously each macroprudential policy instrument, be it RIM, DTI, and COC, influences banking credit risk in Indonesia. Partially, RIM has a positive and significant effect on credit risk. The COC variable has a negative and significant effect on credit risk (NPL). Based on the research results, easing the policy on LTV was not able to reduce the NPL value. So it can be concluded that macroprudential policy as a whole has not been effective in controlling banking credit risk in Indonesia during the research period, namely from 2018 to 2022. In the future, the effectiveness of macroprudential policy in controlling banking credit risk can be tightened and relaxed.

Based on the research results, the central bank is expected to be able to tighten macroprudential policy so that it is effective in controlling macroprudential policy. So it can be concluded that macroprudential policy as a whole has not been effective in controlling banking credit risk in Indonesia during the research period, namely from 2018 to 2022. In the future, the effectiveness of macroprudential policy in controlling banking credit risk can be tightened and relaxed.

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