The Influence of Macroeconomic Conditions on the Level of NPL in ASEAN-6

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Abstract. ASEAN is the country with the third largest trade volume in the world after the European Union and America, the increasing economic activity in ASEAN which continues to increase causes an increase in activity in the banking sector. This causes changes in NPL in ASEAN. This study aims to determine the effect of macroeconomic conditions on NPL using the panel data regression method. The results of the study indicate that economic growth has a negative and significant effect on NPL, the exchange rate has a positive and significant effect on NPL, interest rates have a negative and insignificant effect on NPL, and inflation has a positive and insignificant effect on NPL. The government should evaluate macroeconomic policies to maintain the stability of the financial system in ASEAN. The central bank can provide policy recommendations to regulate bank capital adequacy ratios, regulate liquidity policies, and create better supervisory guidelines.

Keywords: NPL, Economics Growth, Exchange Rate, Interest Rate, Inflation.

1. Introduction

According to Law no. 10 of 1998 concerning Amendments to Law no. 7 of 1992 [1] concerning Banking, banking is an activity to collect funds from the public in the form of savings and distribute them to the public in the form of loans and/or other forms to raise people's living standards. However, not all of the loan funds available to the public can be returned to the bank without difficulty. Often loan payments by bank customers are difficult to fulfill, resulting in an increase in Non-Performing Loans (NPL). ASEAN is the world's third largest trading region after the European Union and North America, with trade reaching US$2.8 trillion in 2022 [2]. Southeast Asian economy is expected to grow by 5.3% in 2024, driven by recovering domestic demand and regional trade [3]. Increased economic and trade activity in ASEAN can increase cash flow and profits for companies in the region. The economic conditions in the ASEAN region that are experiencing continuous increases can affect NPL in ASEAN countries.

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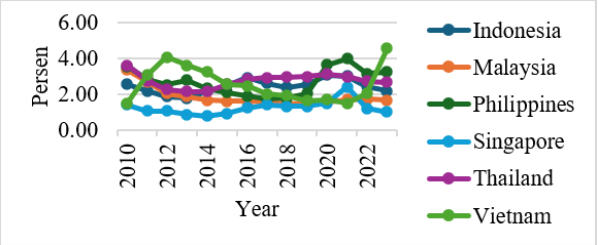

Figure 1. Non-Performing Loans Ratio in 6 ASEAN Countries in 2019-2023.

The data above is the development of NPL in ASEAN countries for 5 years from 2019- 2023. The NPL data shows relatively balanced fluctuations for each country. Of the six ASEAN countries above, Vietnam has the highest NPL rate among the 6 ASEAN countries from 2019 to 2023, with a peak of 4.55% in 2023. This increase in NPL is mainly due to disruptions in global supplies due to the US-China trade war, which reduces demand for Vietnamese exports [4]. Since the export sector contributes greatly to Vietnam's economy, this disruption reduces the ability of companies, especially in the manufacturing sector, to repay their loans, thus increasing NPL in banking [5]. In contrast, Singapore has the lowest NPL rate in 2023 at 1%. This is due to strict banking regulations and a supervisory system that ensures healthy asset quality and risk profiles. These strict regulations are important to maintain the quality of bank assets [6]. Singapore's strong and stable economy, with solid GDP growth, also contributes to the ability of borrowers to meet their credit payment obligations. So it is important to see the influence of macro conditions on NPL levels.

Based on this, further analysis of macroeconomic factors that can affect NPL needs to be done. [7] There is a macroeconomic influence on banking NPL. [8] The importance of considering macroeconomic variables in analyzing and monitoring NPL levels to maintain financial and economic stability. Macroeconomic factors such as economic growth, inflation, interest rates, and exchange rates can affect NPL [9]. The first macroeconomic factor is economic growth, strong economic growth will increase the ability of debtors to repay their loans. When the economy grows, debtors' income and cash flow will increase, so they have a better ability to meet loan repayment obligations. However, when the economy experiences a slow increase or even a recession, NPL will increase. This is because the debtor's ability to repay loans will decrease due to decreased income and cash flow [10]. [11] Economic growth has a significant negative influence on NPL.

Inflation is one of the factors that can affect the NPL level in the financial sector. When the inflation rate increases, people's purchasing power will decrease, so that their ability to repay the loans they have will also decrease. This can lead to an increase in the number of bad debts or NPL [12]. In addition, inflation can also reduce the value of the collateral used to obtain loans, so that banks will be more careful in providing loans. On the other hand, an increase in interest rates due to inflation can make it difficult for debtors to pay installments, which ultimately triggers an increase in NPL [13]. [14] Inflation has a significant positive effect on NPL. [15] Inflation has an insignificant negative effect on NPL.

Interest rates have a significant impact on the quality of banking assets, which is

reflected in the NPL ratio. When interest rates rise, the cost of borrowing that must be paid by debtors will also increase. This can make it difficult for debtors to meet their loan payment obligations, thereby increasing the risk of bad debt or NPL [16]. Conversely, a decrease in interest rates can help debtors pay their loans, thereby reducing the NPL ratio. However, a decrease in interest rates can also encourage increased demand for loans, which if not managed properly can lead to an increase in NPL in the future [17]. Therefore, the government must consider the impact of interest rates on the quality of banking assets when determining interest rate policy. [7] Interest rates have a significant positive effect on NPL.

Exchange rate has a significant role in NPL. A depreciation of the domestic currency can increase the NPL ratio, because it makes it more difficult for borrowers to repay loans denominated in foreign currency. This is because a depreciation of the currency will increase the value of loans in the domestic currency, making it more burdensome for borrowers. On the other hand, an increase in the domestic currency can reduce the NPL ratio, because it makes it easier for borrowers to repay loans denominated in foreign currency. A rise in the currency can increase the debt burden of borrowers with loans denominated in foreign currency, which can lead to an increase in NPL [5]. [18] The exchange rate has a positive and significant effect on the NPL level. Based on the background description above, the overall purpose of this study is to analyze the influence of macroeconomic conditions including economic growth, inflation and exchange rates on the value of NPL in ASEAN.

2. Literature Review

2.1 NPL

NPL are loans where principal and interest payments have been delayed for > 90 days. NPL is one of the important measuring tools in the financial health of a bank or other financial institution. The higher the NPL ratio, the worse the quality of the bank's credit assets. This can increase the cost of loss reserves and decrease the value of assets, which will reduce bank profits [19]. Therefore, good NPL management is very important for the balance of the financial system.

2.2 Solow's Economic Growth

The Solow theory of economic growth, developed by economist Robert Solow in 1956, explains how long-run economic growth is influenced by capital accumulation, population growth, and technological progress [20]. According to Solow, the more physical and human capital invested, and the faster technological progress, the higher the level of output or per capita income that a country can achieve. This model also emphasizes the importance of savings and investment in driving long-run growth. Increases in capital accumulation, steady population growth, and continued technological progress will drive economic growth.

Empirically, the Solow model has been shown to be able to explain most of the variation in economic growth across countries [21].

[20] In Solow's theory of economic growth, one of the important factors influencing long-term economic growth is capital accumulation. This capital accumulation can come from

savings and investment in the economy. The higher the level of savings and investment, the faster the growth of physical capital and human resources, which will ultimately increase per capita income.

The concept of NPL in banking is closely related to capital accumulation in Solow's theory [22]. In relation to NPL, strong economic growth will increase the company's income and profitability as well as its ability to repay loans. This will reduce the NPL ratio. Conversely, slowing economic growth will increase credit risk and cause an increase in NPL [23]. [8] Economic growth has a significant negative effect on NPL. When the economy grows, the quality of bank loans increases and NPL tend to decrease.

2.3 Inflation

Inflation is a common phenomenon that occurs in modern economies, characterized by continuous increases in the prices of goods and services [24]. Inflation can have a significant impact on the stability of a country's economy, making it a major concern for economic policymakers. Understanding the causes and dynamics of inflation is important so that effective control efforts can be made. Inflation is an important issue in modern economies because of its significant impact on economic stability. High and unstable inflation rates can result in distortions in the prices of goods and services, as well as result in suboptimal allocation of economic resources [25]. Therefore, the government and central bank are always trying to maintain the rate of inflation at a reasonable level through various monetary and fiscal policies. Inflation is generally measured by the consumer price index, producer price index, and GDP Deflator [25]. Some ways to measure inflation in an economy are as follows:

a) Consumer Price Index (CPI) CPI is an index that measures the change in the price of a basket of goods and services consumed by the average household consumer. CPI reflects the change in the cost of living for consumers. It is the most widely used and monitored indicator of inflation by policymakers.

b) Producer Price Index (PPI) PPI is an index that measures price changes at the producer level. PPI captures price changes at various stages of production, from raw materials, intermediate goods, to finished goods. This index can provide an earlier signal of inflation trends than CPI.

c) GDP Deflator GDP deflator is a measure of inflation derived from the change in the value of nominal Gross Domestic Product (GDP) relative to real GDP. It captures price changes for the entire output of goods and services in the economy, rather than just the household consumption basket like CPI. GDP deflator provides a broader picture of inflation in the economy as a whole.

When inflation is high, people's purchasing power will decrease because the prices of goods and services increase. This happens because inflation causes a decrease in the value of the currency, so consumers have to spend more money to get the same goods and services [26]. Thus, the real income of debtors (after deducting inflation) will decrease. A decrease in the real income of debtors can reduce their ability to repay their loans from banks. [27] High inflation

has a negative impact on the quality of bank credit, which is indicated by an increase in the ratio of bad debts or NPL. This happens because debtors have difficulty in meeting their credit payment obligations due to a decrease in their purchasing power and real income. This condition can increase the risk of bad debts or NPL in the banking sector. In addition, [28] High inflation has a positive relationship with the level of NPL in the banking sector. When inflation increases, debtors will face a decrease in purchasing power and real income, which can ultimately cause them difficulty in repaying loans. This supports the argument that high inflation can increase the risk of bad debts or NPL in banking.

2.4 Interest Rate

Interest rates are the price that must be paid for the use of money for a certain period of time [29]. In general, interest rates can be divided into two, namely nominal interest rates and real interest rates. Nominal interest rates are interest rates that have not been adjusted for inflation, while real interest rates are interest rates that have taken into account the impact of inflation [30]. The central bank has an important role in determining the benchmark interest rate that is the benchmark for various interest rates in the market [31]. In Indonesia, the benchmark interest rate used is the BI 7-Day Reverse Repo Rate set by Bank Indonesia.

This benchmark interest rate will affect various other interest rates, such as credit interest rates and deposit interest rates [32]. Real interest rates are an important indicator in analyzing the rate of return on investment after taking inflation into account [30]. Higher real interest rates have a positive impact on people's savings rates. This is because high real interest rates will increase the rewards for people who save, thus encouraging them to save more. On the other hand, low real interest rates tend to reduce incentives for people to save, and instead will encourage people to consume more [33].

Interest rates also have an important influence on the level of NPL or problematic loans.[34] An increase in interest rates tends to increase the risk of problematic loans. This is because when interest rates increase, the burden of installment payments for borrowers will also increase. This condition can make it difficult for debtors to meet their loan payment obligations, so that it can increase the amount of problematic loans in the banking system [35]. On the other hand, when interest rates are low, the burden of installments for debtors will also be lower. This can ease the burden of debtor loan payments and reduce the risk of problematic loans [23]. Therefore, the interest rate policy set by the monetary authority has an important role in maintaining the stability of the banking sector through its influence on the NPL level.

2.5 Exchange Rate

In addition to inflation, changes in currency exchange rates can also affect the risk of bad debts or NPL in banking. When the domestic exchange rate weakens against foreign currencies, this can have a negative impact on debtors who have loans in foreign currencies. Depreciation of the exchange rate causes the amount of domestic currency that must be paid to repay loans in foreign currencies to be greater, thereby increasing the burden of installment payments for debtors.

[36] Domestic exchange rate depreciation is positively related to an increase in the ratio

of NPL or NPL in banking. When the domestic exchange rate weakens, debtors who have loans in foreign currency will face a greater payment burden in domestic currency, increasing their risk of defaulting on loans. This condition can cause debtors to have difficulty in fulfilling their loan payment obligations. [23] Domestic exchange rate depreciation had a significant effect on the increase in NPL in Greek banking. This is because debtors who have loans in foreign currency will have difficulty in paying loan installments when the domestic exchange rate weakens. Thus, fluctuations in the domestic currency exchange rate against foreign currencies can be one of the factors that affect the risk of NPL or NPL in the banking sector.

2.6 Empirical Findings

Previous research is a reference for determining the influence of macroeconomic factors on NPL in ASEAN countries. [7] Economic growth has a significant negative effect on the level of banking NPL. Meanwhile, inflation and interest rates have a significant positive effect on the level of banking NPL. [37] Economic growth has a negative and significant effect on NPL. Meanwhile, inflation has a positive and significant effect on NPL. [38] Exchange rate and GDP growth have a positive but insignificant effect on NPL. The interest rate has a significant positive effect on NPL. [39] Macro factors such as interest rates and exchange rates have a positive effect. Meanwhile, GDP growth has a negative effect on NPL. [40] Economic growth has a negative and significant effect on NPL. Meanwhile, inflation and interest rates have a positive and significant effect. [41] Economic growth has a significant negative effect on NPL levels. Inflation and interest rates have a significant positive effect on NPL levels. Based on the formulation of the problem, theory and empirical studies that have been conducted in the previous section regarding the influence of macroeconomic factors on NPL, the hypothesis in this study is Macroeconomic conditions including economic growth, inflation, interest rates, and exchange rates are suspected to have an influence on NPL.

3. Research Methodology

3.1 Data Types and Source

Types of data used in secondary data research. Secondary data obtained from CEIC. There are several variables used in this study, including NPL as the dependent variable, and economic growth, inflation, interest rates, and exchange rates as independent variables. The data used is panel data, with a combination of time series data (time span) and cross-section data (between individuals) to be able to determine the differences in data between countries within a certain time. Time series data is used to observe changes in data over 13 years, from 2010 to 2023.

Table 1. Data Sources Used in Research

Variable	Description	Unit	Labels	Source
NPL	Non-Performing Loans (NPLs) are loan accounts that have matured, whose principal and/or interest have not been paid	%	NPL	CEIC
Economics Growth	Economic Growth of Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam	%	GDPGrowth	CEIC
Variable	**Description**	**Unit**	**Labels**	**Source**
Inflation	Annual consumer price index (YoY) growth	%	INF	CEIC
Real Interest Rate	The difference between nominal interest rates and the rate of inflation	%	RATE	CEIC
Nominal Exchange Rate	Domestic currency exchange rate against the dollar	LCU/USD	EXC	CEIC

3.2 Methodology

This study uses a quantitative method to analyze the influence of macroeconomic conditions on the NPL ratio in ASEAN countries. This study utilizes panel data from 6 ASEAN countries, namely Indonesia, Malaysia, Singapore, the Philippines, Thailand, and Viet Nam, in the period from 2010 to 2023. Panel data is a collection of data that includes observations on several entities (such as individuals, companies, or countries) over a period of time [42]. The use of panel data allows researchers to analyze changes that occur in entities over time. The panel data method is considered to have advantages over cross-section or time-series data because it can provide more information, reduce collinearity between variables, and increase estimation efficiency [43].

3.3 Research Model

The model equation in this study is used to analyze and determine the effect of macroeconomic conditions on NPL in ASEAN countries in 2010-2023. The model used is as follows:

$$NPL = \alpha + \beta_1 GDPGrowth_{it} + \beta_2 INF_{it} + \beta_3 Rate_{it} + \beta_4 Ln\_EXC_{it} + \varepsilon_{it}$$

.....(1)

In which:

NPL	: Non-Performing Loans
GDPGrowth	: Gross Domestic Product Growth
INF	: Inflation
Rate	: Interest rate
EXC	: Exchange rate
Ln	: Natural Logarithm
ε	: Error Term
α	: Constant
$\beta_1, \beta_2, \beta_3, \beta_4$	: Slope
i	: Indonesia, Malaysia, Filipina, Singapura, Thailand, dan Vietnam
t	: 2010-2023

3.4 Classical Specification Test

Table 2. Model Specification Test

Model Suitability Test	*Chi-Square*	Model
Chow Test	0,0015	*Fixed Effect Model*
Hausman Test	0,2282	*Random Effect Model*
LM Test	0,0084	*Random Effect Model*

Tal est with a sig ese results indicate that the hypothesis taken is to accept H0, the best model chosen is the Fixed Effect Model (CEM). Furthermore, the Hausman test is carried out to determine the best model between the Common Effect Model (CEM) or the Random Effect Model (REM). After the Hausman test is carried out, it is known that with a significance level of 5%, the chi-square probability value> p-value, then using the Random Effect Model (REM) model. Furthermore, the LM test is carried out to determine the best model between the Common Effect Model (CEM). After the LM test is carried out, it is known that with a significance level of 5%, the chi-square probability value < p-value, then the best model is the Random Effect Model (REM). Based on the tests that have been carried out, it can be concluded that the best model used is the Random Effect Model (FEM).

3.5 Classic Assumption Test

Table 3. Classic Assumption Test

Normality Test		**Prob>*chi2***	
Skewness Test		0, 3610	
Multicolinearity Test		**Prob>*chi2***	
Variance Inflation Factor (VIF) Test	Variable	VIF	1/VIF
	GDPGrowth	1, 51	0, 857630
	rate	1, 22	0, 822632
	Inf	1, 42	0, 703645
	Ln_exc	1, 17	0, 660791
	Mean VIF	1, 33	

Before conducting panel data analysis, it is necessary to conduct a classical assumption test to ensure that the data used meets the basic assumptions in regression. The classical assumption tests commonly performed in panel data analysis are the normality test, multicollinearity test, heteroscedasticity test, and autocorrelation test [43].

The normality test is performed to check whether the residuals of the regression model are normally distributed. This can be done using the skewness test [44]. The multicollinearity test is performed to check whether there is a high correlation between independent variables, which can cause the estimate to become unstable. The multicollinearity test can be performed by examining the Variance Inflation Factor (VIF) value [44]. The heteroscedasticity test is performed to check whether the residual variance is not constant (homoscedastic). This is done using the Breusch-Pagan test [44]. The autocorrelation test is conducted to check whether there is a correlation between the residuals at time t and the residuals at time t-1. The autocorrelation test can be conducted using the Durbin-Watson test or the Breusch-Godfrey test [44].

In this study, it is known that the random effect model (REM) was selected as the best model. REM has been free from heteroscedasticity and autocorrelation problems because its estimation uses Generalized Least Squares (GLS). In addition, [45] also stated that autocorrelation testing on non-time series data, such as cross-section data or panel data, will not provide meaningful results. This is because panel data, although containing time series elements, is not considered a pure time series. So, it can be concluded that in this study, the BLUE assumption has been met because the selected REM model is free from heteroscedasticity and autocorrelation problems.

3.6 Hypothesis Test

3.7 Regression Model

Table 4. Regression Model

Variable	Coefficient	Prob>*chi2*
Gdpgrowth	-.0641196	0.011 **
rate	-.2828163	0.101
Inf	.0721318	0.128
Ln_exc	.0967222	0.096 *
Constant	2.310779	0.000
Prob>F		0.0205
R-Squared		0.3383

In which: * : shows significant variables at the level of 90%

* * : shows significant variables at the level of 95%

Statistical tests conducted on the model include the t-statistic test, simultaneous F test and coefficient of determination test. The results of the improvements for the classical assumption test are in table 4.3. The F test is conducted to test the influence between independent variables on the dependent variable in the model. Based on the results of the simultaneous test, the prob value> F with a significance level of 5% of 0.0205. Indicates that simultaneously there are several independent variables that influence the dependent variable in the model. For the partial test, the results show that there are several independent variables that have a significant effect on the dependent variable. Furthermore, the R^2 estimation results are 33.83%. While the remaining 66.17% can be explained by other variables that are not in the model. [44] R-square is not the main measure in assessing the success of econometric analysis. Low R-square values are often found in research in the social sciences.

4. Macroeconomic Influence on NPL

4.1 The Impact of Economic Growth on NPL

The economic growth variable has a regression coefficient result of -0.0641196, meaning that every 1 percentage point increase in economic growth will reduce NPL by 0.064 percentage points. With a probability value of 0.011, it means that the economic growth variable has a significant negative effect on NPL because the significance level is less than 0.05. [37]

Economic growth has a significant negative effect on NPL. Positive economic growth can have a negative effect on NPL in the banking sector.

When the economy is growing, demand for credit and investment tends to increase. This can increase the ability of borrowers to pay off their obligations to banks [46]. In addition, low unemployment rates and higher incomes during times of economic growth can increase the ability of borrowers to repay their loans [23]. Thus, strong economic growth can reduce credit risk and lead to a decrease in the NPL ratio in the banking sector.

4.2 The Effect of Interest Rates on NPL

The interest rate variable has a regression coefficient of -0.2828163, meaning that every 1 percentage point increase in interest rates will reduce NPL by 0.28 percentage points. However, with a probability value of 0.101, it means that the interest rate variable does not have a significant negative effect on NPL because the significance level is less than 0.1. [47] Interest rates have a negative and insignificant effect on NPL. This is due to several factors, including stable economic growth, effective monetary policy, and a healthy banking market structure. [48] Strong economic growth in the ASEAN region has helped maintain the quality of banking assets, so that the NPL level remains at a low level even though interest rates have changed. In addition, Central Banks in ASEAN countries have also implemented tight monetary policies to maintain financial stability, including strict supervision of the banking sector [49]. The banking market structure in ASEAN, which is dominated by large banks, also influences resilience to changes in interest rates [50].

4.3 The Effect of Inflation on NPL

The inflation variable has a regression coefficient of 0.0721318, meaning that every 1 percentage point increase in inflation will increase NPL by 0.07 percentage points. However, with a probability value of 0.128, it means that the inflation variable has a positive and insignificant effect on NPL because the significance level is less than 0.1. [7] Inflation has a negative and insignificant effect on NPL. There are several factors that cause inflation to have no significant effect on NPL in ASEAN countries. First, several ASEAN countries have a banking system that is quite strong and resistant to economic turmoil. This is supported by strict banking regulations and supervision as well as adequate bank capital [51]. Second, most banks in ASEAN have also diversified their loan portfolios so that credit risk is well distributed. In addition, effective credit risk management is also an important factor in maintaining the quality of bank assets despite inflation [52].

4.4 The Effect of Exchange Rates on NPL

The exchange rate variable has a regression coefficient of 0.967222, meaning that every 1 percentage point increase in the exchange rate will increase the NPL by 0.0097 percentage points. With a probability value of 0.096, it means that the inflation variable has a positive and significant effect on NPL because the significance level is less than 0.01. This is in line with research conducted by [47] which found that the exchange rate has a positive and significant effect on NPL. When the domestic currency exchange rate weakens against foreign currencies,

especially the currency used in loans, this can increase the burden of installment payments for debtors who have loans in foreign currencies [53]. The increase in the burden of payments can make it difficult for debtors to meet their obligations, potentially increasing NPL. In addition, the weakening of the exchange rate can also reduce the ability of debtors to make payments, especially for debtors who have income in domestic currency [54]. Therefore, exchange rate stability is an important factor in maintaining the quality of banking assets and reducing the NPL level.

5. Conclusion and Recommendations

Based on the discussion and results presented in the previous chapter on the influence of macroeconomic conditions and on NPL for the period 2010-2023, the results of the study show that several macroeconomic conditions have a significant influence on NPL. Economic growth has a negative and significant influence on NPL. A weak economy will make it difficult for debtors to pay off their obligations to banks, so that the portion of NPL in bank capital will increase. However, good economic growth will increase credit demand and encourage expansion of credit distribution by banks. Thus, good economic growth can contribute to maintaining the stability of banking asset quality by reducing the NPL ratio. Then interest rates have a negative and insignificant influence on NPL. stable economic growth, effective monetary policy, and a healthy banking market structure. Strong economic growth can help maintain the quality of banking assets, so that the NPL level remains at a low level even though interest rates change.

Then inflation has a positive and insignificant effect on NPL. The banking system is quite strong and resistant to economic turmoil. This is supported by strict banking regulations and supervision as well as adequate bank capital. Then, diversification of the loan portfolio can distribute credit risk well. In addition, effective credit risk management is also an important factor in maintaining the quality of bank assets despite inflation. Finally, the exchange rate has a positive and significant effect on NPL. Exchange rate stability is important in maintaining the quality of banking assets and suppressing the NPL level, because the weakening of the exchange rate can increase the burden of installment payments for debtors who have loans in foreign currencies, thereby increasing credit risk.

The results of this study have important implications for the government, central banks and further research. For the government, it can evaluate macroeconomic policies to maintain the stability of the financial system in ASEAN. In addition, it can implement macroprudential policies aimed at maintaining the stability of the financial system as a whole such as regulating the capital adequacy ratio, limiting credit growth, and other macroprudential policy instruments. For the central bank, it can provide policy recommendations based on the results of the study, for example regulating the bank's capital adequacy ratio, regulating liquidity policies, and creating better supervisory guidelines. For further research, it is to expand the independent variables by using internal bank factors to see their impact on the value of NPL.

References

[1] Undang-Undang Nomor 10 Tahun 1998 tentang Perubahan atas Undang- Undang Nomor 7 Tahun 1992 tentang Perbankan.

[2] ASEAN Secretariat. (2023). ASEAN statistical highlights. https://www.aseanstats.org/publication/ash-2023/.

[3] Asian Development Bank. (2023). Asian Development Outlook 2023: Harnessing the New Global Trade Landscape. https://www.adb.org/publications/asian-development-outlook-2023.

[4] World Bank. (2021). Non-performing loans in East Asia and the Pacific: Practices and lessons in times of COVID19. https://documents1.worldbank.org/curated/en/275161635138844218/pdf/ Non-Performing Loans-in-East-Asiaand-the-Pacific-Practices-and- Lessons-in-Times-of-COVID-19.pdf

[5] International Monetary Fund (IMF). (2018). *The Dynamics of Non- Performing Loans during Banking Crises: A New Database.* https://www.imf.org/en/Publications/WP/Issues/2019/12/06/The- Dynamics-of-Non-Performing-Loans-duringBanking-Crises-A-New- Database-48839

[6] Ghosh, A. (2015). Banking-industry specific and regional economic determinants of non-performing loans: Evidence from US states. *Journal of financial stability*, *20*, 93-104.

[7] Ginting, A. M. (2017). Pengaruh makroekonomi terhadap non-performing loan (NPL) perbankan. *Jurnal Ekonomi Dan Kebijakan Publik*, *7*(2), 159- 170.

[8] Salas, V., & Saurina, J. (2002). Credit risk in two institutional regimes: Spanish commercial and savings banks. *Journal of financial services research*, *22*(3), 203-224.

[9] Hernando, A., Miranda, E., Theodora, L. L. A., Kadarusman, Y. B., & Ariyan, G. A. (2020). Dampak Faktor Makroekonomi terhadap Non Performing Loan pada Kredit Produktif Bank Umum di Indonesia. *Studi Akuntansi dan Keuangan Indonesia*, *3*(1), 1-28.

[10] Bank Indonesia. (2023). *Laporan Kebijakan Moneter Triwulanan*. https://www.bi.go.id/id/publikasi/laporan/Pages/Laporan-Kebijakan- Moneter-Triwulan-IV-2023.aspx

[11] Khawaja, M. I., & Din, M. U. (2007). Determinants of interest spread in Pakistan. *The Pakistan Development Review*, 129143.

[12] Bank Indonesia. (2019). *Laporan Kebijakan Moneter Triwulan IV 2019*. https://www.bi.go.id/id/publikasi/laporan/Pages/Laporan-Kebijakan-Moneter- Triwulan-IV-2019.aspx

[13] Bank Indonesia. (2024). Laporan Kebijakan Moneter Triwulan I 2024. Diakses dari https://www.bi.go.id/id/publikasi/laporan/Pages/Laporan-Kebijakan-Moneter- Triwulan-I-2024.aspx

[14] Shingjergji, A. (2013). The Impact of Macroeconomic Variables on the Non Performing Loans in the Albanian Banking System During 2005- 2012. *Academic Journal of Interdisciplinary Studies*, *2*.

[15] Rizal, A., Zulham, T., & Asmawati, A. (2019). Analisis pengaruh pertumbuhan ekonomi, inflasi, dan suku bunga terhadap kredit macet di Indonesia. *Jurnal Ekonomi Dan Kebijakan Publik Indonesia*, *6*(1), 1-16.

[16] Maudos, J., & Solís, L. (2009). The determinants of net interest income in the Mexican banking system: An integrated model. *Journal of Banking & Finance*, *33*(10), 1920-1931.

[17] Foos, D., Norden, L., & Weber, M. (2010). Loan growth and riskiness of banks. *Journal of Banking & Finance*, *34*(12), 2929-2940.

[18] Abid, L., Ouertani, M. N., & Zouari-Ghorbel, S. (2014). Macroeconomic and bank-specific determinants of household's non-performing loans in Tunisia: A dynamic panel data. *Procedia Economics and Finance*, *13*, 58- 68.

[19] Berger, A. N., & DeYoung, R. (1997). Problem loans and cost efficiency in commercial banks. *Journal of banking & finance*, *21*(6), 849-870.

[20] Solow, R. M. (1956). A contribution to the theory of economic growth. *The quarterly journal of economics*, *70*(1), 65-94.

[21] Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A contribution to the empirics of economic growth. *The quarterly journal of economics*, *107*(2), 407-437.

[22] Lucas Jr, R. E. (1988). On the mechanics of economic development. *Journal of monetary economics*, *22*(1), 3-42.

[23] Louzis, D. P., Vouldis, A. T., & Metaxas, V. L. (2012). Macroeconomic and bank-specific determinants of non-performing loans in Greece: A comparative study of mortgage, business and consumer loan portfolios. *Journal of Banking & Finance*, *36*(4), 1012-1027.

[24] Lipsey, R. G., & Chrystal, K. A. (2011). *Economics (12th ed.).* Oxford University Press.

[25] Mankiw, N. G. (2020). *Macroeconomics (10th ed.).* Worth Publishers.

[26] Dornbusch, R., Fisher, S., & Startz, R. (2004). Makroekonomi, edisi bahasa indonesia. *PT. Media Global Edukasi, Jakarta*.

[27] Aisen, M. A., & Franken, M. (2010). *Bank credit during the 2008 financial crisis: A cross-country comparison*. International Monetary Fund.

[28] Bhattarai, K. (2011). Impact of exchange rate and money supply on growth, inflation and interest rates in the UK. *International Journal of Monetary Economics and Finance*, *4*(4), 355-371.

[29] Mishkin, F. S. (2016). *The Economics of Money, Banking, and Financial Markets (11th ed.).* Pearson.

[30] Mankiw, N. G. (2021). *Macroeconomics (10th ed.)*. Worth Publishers.

[31] Krugman, P. R., & Wells, R. (2018). *Macroeconomics (5th ed.).* Worth Publishers.

[32] Mishkin, F. S. (2007). *The economics of money, banking, and financial markets*. Pearson education.

[33] Loayza, N., Schmidt-Hebbel, K., & Servén, L. (2000). *What drives private saving around the world?* (Vol. 2309). World Bank Publications.

[34] Laryea, E., Ntow-Gyamfi, M., & Alu, A. A. (2016). Nonperforming loans and bank profitability: evidence from an emerging market. *African Journal of Economic and Management Studies*, *7*(4), 462-481.

[35] Karim, M. Z. A., Chan, S. G., & Hassan, S. (2010). Bank efficiency and non-performing loans: Evidence from Malaysia and Singapore. *Prague Economic Papers Issue 2, 2010, Pages 118-132*.

[36] Babihuga, R. (2007). *Macroeconomic and financial soundness indicators: An empirical investigation* (IMF Working Paper No. 07/115). International Monetary Fund. Available at SSRN: https://ssrn.com/abstract=995618.

[37] Isnaini, F., Sahara, S., & Nursyamsiah, T. (2019). Faktor-faktor yang Memengaruhi Tingkat Non Performing Financing dan Non Performing Loan pada Dual Banking System di Indonesia. *Al-Muzara'ah*, *7*(1), 47-59.

[38] Madi, R. A., & Ahmadi, K. A. (2019). Pengaruh Makro Ekonomi Dan Fundamental Bank Terhadap Non-Performing Loan.

[39] Ahmed, S., Majeed, M. E., Thalassinos, E., & Thalassinos, Y. (2021). The impact of bank specific and macro-economic factors on non-performing loans in the banking sector: Evidence from an emerging economy. *Journal of Risk and Financial Management*, *14*(5), 217.

[40] Bhattarai, B. P. (2018). Assessing banks internal and macroeconomic factors as determinants of non-performing loans: Evidence from Nepalese commercial banks. *International Journal of Accounting & Finance Review*, *3*(1), 13-32.

[41] Anjom, W., & Karim, A. M. (2016). Relationship between non-performing loans and macroeconomic factors with bank specific factors: a case study on loan portfolios–SAARC countries perspective. *ELK Asia Pacific Journal of Finance and Risk Management*, *7*(2), 1-29.

[42] Baltagi, B. H., & Baltagi, B. H. (2008). *Econometric analysis of panel data* (Vol. 4, pp. 135-145). Chichester: Wiley.

[43] Wooldridge, J. M. (2016). *Introductory econometrics: A modern approach (6th ed.)*. Cengage Learning.

[44] Gujarati, D. N., & Porter, D. C. (2009). *Basic econometrics*. McGraw-hill.

[45] Basuki, Agus Tri and Prawoto, Nano 2016. Analisis Regresi Dalam Penelitian Ekonomi & Bisnis: Dilengkapi Aplikasi SPSS & EVIEWS. Depok: PT Rajagrafindo Persada.

[46] Demirgüç-Kunt, A., & Detragiache, E. (1998). The determinants of banking crises in developing and developed countries. *Staff Papers*, *45*(1), 81-109.

[47] Nugroho, I. A., Sutanto, A., & Riduan, R. (2021). Determinan Volatilitas Makro Ekonomi Terhadap NPL Bank Jateng. *Jurnal Proaksi*, *8*(2), 498- 511.

[48] Bernanke, B. S., & Gertler, M. (1995). Inside the black box: the credit channel of monetary policy transmission. *Journal of Economic perspectives*, *9*(4), 27-48.

[49] Claessens, S., Kose, M. A., & Terrones, M. E. (2012). How do business and financial cycles interact?. *Journal of International economics*, *87*(1), 178-190.

[50] Acharya, V., & Naqvi, H. (2012). The seeds of a crisis: A theory of bank liquidity and risk taking over the business cycle. *Journal of financial economics*, *106*(2), 349-366.

[51] Berger, A. N., & Bouwman, C. H. (2013). How does capital affect bank performance during financial crises?. *Journal of financial economics*, *109*(1), 146-176.

[52] Acharya, V. V., Berger, A. N., & Roman, R. A. (2018). Lending implications of US bank stress tests: Costs or benefits?. *Journal of Financial Intermediation*, *34*, 58-90.

[53] Klein, N. (2013). *Non-performing loans in CESEE: Determinants and impact on macroeconomic performance*. International Monetary Fund.

[54] Ozili, P. K. (2019). Non-performing loans and financial development: new evidence. *The Journal of Risk Finance*, *20*(1), 59-81.