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Analysis of the Effect of Interbank Market Interest Rates And Government Bond Maturity Yields On Net Interest Margin In ASEAN

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Abstract

This study aims to determine the effect of interbank market interest rates and yield to maturity of government bonds on the net interest margin of banks in ASEAN. The interbank market interest rate is calculated by looking at the 3-month interbank rate, besides that the yield to maturity of government bonds which is calculated by looking at the interest rate on 10-year maturity bonds. In this study there are five control variables, namely Loan to Assets (LAR), Deposit to Liabillities (DTL), Non Interest to Interest Income, Log (Assets), Dummy Interest Rate. This research uses descriptive quantitative research with dynamic panel data regression models using the Generalized Method Of Moment (GMM) estimation method. There are 88 banking companies in ASEAN which are the population in this study. The population sample selection was carried out using purposive sampling method, so that 80 banking companies were obtained that met the criteria according to what the researchers had set. This study uses secondary data in the form of annual financial publication reports of each bank. The results obtained show that the interbank interest rates has a significant positive effect on the net interest margin. Furthermore, it is obtained that the variable yield to maturity of government bonds has a significant positive effect on the net interest margin.

Keywords: Interbank Interest Rate; Net Interest Margin; General Method of Moment (GMM)

1. Introduction

Since the global financial crisis, interest rates in many developed countries have been falling for almost a decade [1]. Central banks in advanced economies have kept policy rates near the lower bound since the global financial crisis. After the financial crisis of 2008, US banks operated with lower interest rates close to zero. This also resulted in the average net interest margin of US banks falling. This accommodative stance began to reverse with the federal reserve's decision to raise policy rates at the end of 2015 [2]. An increase in interest rates will also result in an increase in interest so that this can increase the Net Interest Margin (NIM) of banks. The upward trend in US government bond yields has resulted in capital flows from developing countries continuing to enter the United States, triggered by a slowdown in inflation which has led the US to keep its key interest rates high in the long term. The increase in US interest rates automatically resulted in an increase in BI's benchmark interest rate, in an effort to maintain exchange rate stability and keep inflation under control.

The high increase in interest rates in the past year increased interest expenses that continue to have a positive influence on the NIM of banks in Indonesia even though the Bank Indonesia (BI) benchmark interest rate is still high. There are a number of factors contributing to the high net interest margin of banks in Indonesia despite rising interest rates. The main factor is the high operational costs in Indonesian banking. The second factor causing the high NIM in Indonesia is the high cost of provisioning for non-performing loans (NPL). A high NIM is not always positive. On the one hand, high margins are always associated with low efficiency levels and uncompetitive market conditions. The high NIM in Indonesia has caused the government through OJK made a policy to reduce net interest margin to improve efficiency in order to compete in the ASEAN economic community.

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An increase or decrease in the benchmark interest rate usually directly affects market interest rate movements. Low interbank market interest rates can stimulate the economy and will improve bank balance sheets by reducing bad debts. However, low interest rates can also erode banks' net interest margins [3]. Net interest margin is an important indicator of bank profitability to evaluate the bank's ability to manage interest rate risk. When interest rates are low, the bank's interest income and interest expenses will change. However, when both interest income and costs rise, interest rates will rise because some of the bank's assets and liabilities will be valued at a higher rate which will ultimately affect the NIM of a country [4]. Between interest income and interest expense will cause a difference called net interest margin. The Net Interest Margin ratio with the level of bank health has a unidirectional relationship, when the Net Interest Margin ratio is high, the bank's health level is also high [5].

2. Literature Review

A theory that discusses the theory of equilibrium, one of which is the general equilibrium theory by Arrow-Debreu which is a development of the walrasian economic equilibrium system. Development of the Walrasian economic equilibrium system. In his theory successfully proved the existence of equilibrium to be an important part of the theory of general equilibrium economics since the 1950s. General equilibrium theory of the economy since the 1950s. At about the same time 1959, the economist Lionel McKenzie proved the existence of the equilibrium of the general equilibrium model using the same technique, so the Arrow-Debreu model is sometimes also called the Arrow-Debreu model. The Arrow-Debreu model is sometimes also called the Arrow-Debreu McKenzie model. The application of the Arrow - Debreu - McKenzie general equilibrium theory is called Computable General Equilibrium (CGE), which is the achievement of equilibrium for all types of goods in all markets. On all types of goods in all markets that apply to producers and consumers. General equilibrium theory is a theory that explains how supply and demand conditions interact with the market simultaneously. Market equilibrium will be achieved if the number of products demanded is equal to the number of products offered, or the price of products offered is equal to the price of products demanded. Conditions for the existence of general equilibrium that is, if the economy is in a perfectly competitive state where there are no indivisibilities and no increasing returns to scale (increasing returns to scale).

From a bank perspective, banks supply through lending in the form of credit and demand in the form of deposits through deposits and bond issuance to maximise profits. Various factors can affect the maximum profit of a financial institution. The most important is supply and demand. If there is greater demand for deposits compared to loans, then income will decline, as the bank has to pay more interest than it receives, than it receives. Conversely, if there is a higher demand for for loans compared to deposits, where more consumers borrow than save, then bank income will increase. more consumers borrow than save, then the bank's income will increase. Banks and other financial institutions can also use maturity transformation to profit from the interest rate differential between loans and deposits. to benefit from the interest rate differential between loans and deposits. This condition reflects banks in generating profitability. Bank profitability can be measured through the Net Interest Margin variable. Net interest margin is the difference (Spread) between lending rates (credit interest) and deposit rates (cost of funds). Banks charge deposits as the cost of interest expense and interest income from loans as the largest expense.

The formula formulated by Arrow-Debreu to maximise banking profits is to reduce the amount of supply by demand. The supply in question is the interest rate on loans in the form of credit that is demand is the interest rate on deposits in the form of deposits and bonds, while Net Interest Margin is measured by reducing interest income and interest expenses. When related to the Arrow-Debreu model the supply channeled in the form of credit will generate interest income and the demand for deposits and bonds will cause interest expenses for banks. In a sense, the maximum profit of the bank will be obtained if the general equilibrium is achieved. General equilibrium can be achieved if there is a balance between the demand for credit and the supply of deposits at an interest rate where the amount of deposits offered is equal to the amount of credit requested. At this equilibrium point the bank will earn a zero margin, because the interest rate on loans given is equal to the interest rate on deposits that must be paid. To make a profit the bank must set a higher interest rate for loans than for deposits.

[6] examined the relationship between interest rates and net interest margin and successfully proved that in the long run, Net Interest Margin will not be affected by changes in interest rates. However, in the short term, interest rates will affect Net Interest Margin. This happens because when interest rates increase in the short term, banks will experience losses, but in the long term, banks can actually reap profits when interest rates are high.

[2] and [1] also conducted research by stating a positive but non-linear relationship between interest rates and bank interest margins, low interest rates have a much greater impact on bank net interest margins than high interest rates. Similar results obtained by [7] for banks in the United States and [8] for banks in Germany found that banks with low interest rates will experience a decrease in the bank's net interest margin. As the banking sector progresses, both increased productivity and competition among banks in the sector lead to increased profitability and decreased net interest margins. Several recent studies have focussed on the impact of low interest rates on banks' interest margins such as [9] and [10], both studies suggest that low interest rates can reduce banks' net interest margins. However, [10] concluded that the overall profitability of banks is not affected by low interest rates, as banks can offset the decline in net interest margins.

[11] also conducted a study using a sample of 288 banks in Europe, concluding that interest rates and yields do not affect NIM, if economic and financial conditions are not under control. This is in line with Tan who found that bank NIM is not affected by interest rates, except for a subsample of relatively well-capitalised banks. On the other hand, [12] found that there is a close

relationship between interest rates and bank NIM stating that, any increase in interest rates will lead to a decrease in bank NIM which is in line with research conducted by Banca D'Italia using a sample of banks in Italy, 8 out of 11 banks found a positive effect of interest rates stating that an increase in interest rates will lead to an increase in the net interest margin of the banks themselves.

3. Research Method

3.1. Data

The type of research used in this research is descriptive research with quantitative research methods. Descriptive research is research that intends to collect various data and information by describing and analysing facts.This research was conducted in the city of Medan, North Sumatra with the object of research being banking companies in 5 ASEAN. In this study, the data used were 80 banks in 5 ASEAN countries registered with the World Bank for the period 2015 - 2022.

This study uses one dependent variable, that's the net interest margin which is calculated by the bank's net income divided by the total average earning assets. Two independent variables, the interest rate and imposed by banks on other banks that lack liquidity in terms of borrowing and lending funds in the interbank money market and yield to maturity (YTM) are used to determine the value of yields received by bond investors until the maturity period arrives and five control variables, namely loans to assets, deposits to liabilities, log (assets), non-interest income to interest income, dummy interest rate.

Table 1. Description of the variables

Variables	Description	Source
Net Interest Margin (NIM)	Net Interest Margin refers to the ratio of net interest income to average earning assets so as to get net profit.	Refinitiv (LSEG)
Interbank Market Rate	The interest rate determined and charged by banks to other banks that lack liquidity in terms of borrowing and lending funds in the interbank money market.	Refinitiv (LSEG)
Yield to Maturity	Determine the return value received by bond investors until the maturity period arrives.	Refinitiv (LSEG)
Loan to Assets (LAR)	The ratio used to measure how much the ability of a bank to meet the demand for credit using the total assets owned by the bank.	Refinitiv (LSEG)
Deposits to Liabillities (DTL)	The ratio between the amount of total deposits to total liabilities expressed in percent. This ratio is used to measure the ratio of customer deposits to total liabilities.	Refinitiv (LSEG)
Log (Assets)	Bank size refers to a variable that describes the size of the company based on certain things. Usually, total assets, market value, shares, total sales, total revenue and others.	Refinitiv (LSEG)
Non Interest Income to Interest Income	Bank profits obtained from interest income are obtained from the difference in profit on deposits and interest on loans (spread based) while non-interest income is obtained from administrative fees, transfer fees, fees and commissions, rental fees and collection fees.	Refinitiv (LSEG)
Dummy Interest Rate	Dummy Interest Rate is a dummy variable that is worth 1 if the bank has an interest rate below 1.25% and worth 0 if above 1.25%	Refinitiv (LSEG)

3.2. Hypothesis

When interbank rates rise, banks have to pay more to lend funds between banks, which may cause their funding costs to rise. For this reason, banks tend to raise their lending rates to maintain the interest margin that banks earn. This explains that the higher the 3 Months PUAB, the greater the bank's net interest margin. A higher interest rate will lead to higher net interest income generated by the bank. This result is consistent with research conducted by [3] which states that PUAB 3 Months has a positive effect on bank net interest margins.

Hypothesis I: Interbank Money Market Rate is positively and significantly correlated to Net Interest Rate Government Maturity Yield to Net Interest Rate

When yields on government maturities rise, people tend to invest in government bonds. Banks must compensate for the increase by raising interest rates on deposits or savings. But this causes the costs incurred by banks to increase. To cover the bank's costs, the bank also raises interest rates on loans, so that funding interest income from loans disbursed can cover the bank's costs. If the income from high interest rates on customer loans is greater than the level of costs incurred through deposits or savings, the net interest margin will increase. If the income from high interest rates on customer loans is greater than the level of costs incurred

through deposits or savings, the net interest margin will increase.

Hypothesis II: Government Maturity Yield is positively and significantly correlated to Net Interest Margin

3.3. Methodology

In this study, researchers conducted data processing and hypothesis testing using the help of Microsoft Office Excel 2019 and Stata 17 applications. To process and calculate secondary data as independent variables, dependent variables, and control variables, researchers used Microsoft Office Excel 2019. While hypothesis testing and estimation of panel data regression analysis, researchers used Stata 17. The use of panel data regression analysis using a static model is not very effective because it can cause several econometric problems. The inclusion of lags in the dependent variable in a model where there are individual effects will lead to biased effects. Ordinary Least Square assumptions such as heteroscedasticity and autocorrelation will be difficult to meet in panel data regression analysis due to the tendency of influence between individuals and between time observations in the model.

The Generalised Method of Moment (GMM) method is an estimation method that can overcome the bias problem in panel data models. Generally, the GMM model is used for large amounts of data, so if this model is used for small data observations it is often not more efficient than other models. GMM is the best estimation method for panel data that involves time-bound variables, namely the presence of autocorrelation due to the lag in the dependent variable, causing a dynamic relationship between data. Dynamic relationships lead to endogeneity problems, so if estimated with static panel data analysis, it will produce biased and inconsistent estimators. The lag in the dependent variable means that the model depends not only on the current period but also on the previous period. There are 2 GMM approach models that can be used to analyse dynamic panel data, namely First Difference GMM (FD-GMM) and System GMM (Sys-GMM). In this study, researchers used the Sys-GMM estimation technique.

To examine the determinants of net interest margin, this study uses dynamic panel regression. With the following estimation model:

$$\mathrm{NIMit} = \beta 0 + \beta 1\mathrm{NIMit\text{-}1} + \beta 2\mathrm{IRi,t} + \beta 3\mathrm{YTMi,t} + \beta 4\mathrm{LARi,t} + \beta 5\mathrm{DTLi,t} + \beta 6\mathrm{Ln(Assets)i,t}$$

$$+ \beta 7\mathrm{NITOIIi,t} + \beta 8\mathrm{D.\ IRi,t} + \mathrm{ui,t}$$

In the above equation i,t describes the combination of cross section and time series data, i indicates cross section, and t indicates time or time series with the following information:

NIM	= Net Interest Margin
$\beta 0$	= Constanta
$\beta 1 - \beta 8$	= Coefficient of Regression
NIMit−1	= Prior Period Net Interest Margin
IR	= 3-month Interbank Money Market Rate
YTM	= 10-year Maturity Yield
LAR	= Loan to Assets
DTL	= Deposits to Liabilities
Ln(Assets)	= Bank Size
NIITOII	= Non Interest Income to Interest Income
D.IR	= Dummy Interest Rate
ui,t	= Error term

Hypothesis testing in this study as for the criteria set in decision making is at the α = 5% or 1% level in the hope that the hypothesis is accepted. Statistical testing is a very important step in analyzing quantitative data generated in research. This test aims to determine and determine whether the data being analyzed is outside the projection and range of values predicted by the hypothesis.

4. Results and Discussion

Descriptive statistical analysis in this study aims to provide an overview of the estimated value of statistical data in the form of mean value, minimum value, maximum value and standard deviation value calculated according to each variable processed by the Stata 17 application. Descriptive analysis in this study was carried out by describing the statistical data of banks that became research samples in the 2015-2022 period.

The average fluctuation of the value of the NIM variable as the dependent variable and the 10 Years Rate and 3 Months interbank rate as an indicator of interest rates which are independent variables. (independent) time period 2015-2022. The graph shows that the NIM variable tends to decrease from 2015 to 2020. Then it rose again in 2021 and increased again in 2022. NIM banking in ASEAN is still ideal to prevent the threat of AEC because it ranges between 3%-5%.

The magnitude of the net interest margin ratio ratio shows the amount of net interest income on productive assets owned by a bank to measure the amount of the bank's profitability ratio. A bank to measure the amount of the bank's profitability ratio. For the 10 Years Rate and 3 Months PUAB variables, the average value fluctuates from year to year. which fluctuates from year to

year, where the two variables experience a decreased from 2015-2018 and increased in 2019. The variable 10 years rate and PUAB 3 Months in 2020 has decreased this can be caused by COVID-19 that occurs throughout the world. Of course this will have an impact on the economy and economic activities carried out in ASEAN countries. Then in 2021-2022 the 10-year maturity variable experienced an increase in the average value but not with the 3 Months PUAB variable which actually experienced a decrease even though it increased again in 2022, this is due to the difference in maturity between the two variables which caused the difference in maturity between the two variables.

Table 2. Descriptive Analysis Results

Variabels	Mean	Std. Deviasi	Minimum	Maximum
Net Interest Market (NIM)	0,048856	0,046654	0,0019	0,41490
3 Months- Interbank Money Market Rate	0,062162	0,03459	0,000405	0,08857
10 Year Maturity Yield	0,057463	0,029281	0,00842	0,08872
Loan to Assets (LAR)	0,628406	0,13495	0,10326	0,82803
Deposits to Liabillities (DTL)	0,893617	0,09414	0,57279	1,000
NonIntctoInc (NIITOII)	0,36412	0,42124	0,00812	3,26882
Ln (Assets)	15,5916	2,80595	8,25325	21,41268
Dummy Interest Rate (D.IR)	0,3375	0,47584	0	1,000

Source: Research Processed Data With Stata 17

Table 3. Regression Estimation

Variabel	*1st Estimation*	*2nd Estimation*
Net Interest Margin $(NIM)_{t-1}$	0,7757118	0,783548
	(0,000***)	(0,000***)
10 Year Maturity	0,1149681	
	(0,000***)	
3 Months Interbank Money Market Rate		0,094092
		(0,000***)
Loan to Assets (LAR)	0,0141867	0,008530
	(0,031*)	(0,186)
Deposits to Liabillities (DTL)	0,0422023	0,040922
	(0,000***)	(0,000***)
Non Interest Income to Interest Income (NIITOII)	0,0016719	0,001465
	(0,279)	(0,351)
LN (Assets)	0,0002812	0,000545
	(0,292)	(0,042**)
Dummy Interest Rate	-0,000709	0,000191
	(0,389)	(0,821)

Source: Research Processed Data With Stata 17

Based on the results of the tests that have been carried out, it can be seen that the net interest margin of the bank in the previous period has a positive and significant effect on the net interest margin for all experimental models. it explains that the greater the net interest margin of the bank in the previous period, the greater the net interest margin of the bank. This indicates that the bank has managed its interest income and funding costs well, which can give investors or creditors confidence that the bank may be able to maintain its net interest margin over a long period of time.

GMM test results, it can be seen that 10 Year Maturity has a positive and significant effect on the bank's net interest margin in the first model. This explains that the more 10 Year Maturity increases, the greater the bank's net interest margin. A higher interest rate will lead to higher net interest income generated by the bank. If the income from high interest rates on customer loans is greater than the level of costs incurred through deposits or savings, the net interest margin will increase. In research conducted by [3] which states that 10 Year Maturity has a positive effect on bank net interest margins. When government maturity yields rise, people tend to invest in government bonds. Banks must certainly compensate for this increase by increasing deposit or savings rates. But this causes the costs incurred by the bank to also increase. To cover the bank's costs, the bank also raises interest rates on loans, so that funding interest income from loans disbursed can cover the bank's costs. 3 Months interbank rate has a positive and significant effect on the bank's net interest margin. When interbank rates rise, banks have to pay more to lend funds between banks, which can cause their funding costs to rise. For this reason, banks tend to raise their lending rates to maintain the interest

margin that banks earn. This explains that the more PUAB 3 Months increases, the greater the bank's net interest margin. Higher interest rates will lead to higher net interest income generated by the bank. The research used a sample of banks in countries that are members of an OECD group with annual data for the period 1995-2019, in his research using panel data using a sample of 7,919 banks and contrary to research conducted by [6] with a 40-year time series for banks in Germany, where short-term interest rates have a negative effect on bank net interest margins.

Based on the GMM test results, for the loan to assets variable, there are different results for the two models. Where in 1st estimation a positive and significant relationship is found. However, this research contradicts the results obtained in 2nd estimation, where in the model obtained positive and insignificant results, which means that in model II of this study loan to assets has no effect on net interest margin. There are several factors that make LAR insignificant to NIM, such as overall economic conditions can have a greater impact on NIM than LAR. Deposits from customers are usually one of the cheapest sources of funding for banks. If a bank has a high DTL, it means that it gets some of its funding from deposits. This can reduce bank financing, because the interest rates paid to customers tend to be lower than other funding such as bonds or interbank loans. For the Deposit to Liabillitites variable, it can be seen that it has a positive and significant relationship with the bank's net interest margin for 1st and 2nd estimation. So it can be concluded that every one point or one percent increase in Deposit to Liabillitites will indirectly increase the amount of the bank's net interest margin. Non Interest to Interest Income has a positive but insignificant effect on bank net interest margin in 1st and 2nd estimation. Log (Assets) has a positive and insignificant effect on bank net interest margin has a positive and significant effect. Dummy Interest Rate negatively and insignificantly affects the bank's net interest margin in 1st estimation . This explains that the greater the dummy interest rate, the lower the net interest margin. In 2nd estimation, the Interest Rate dummy variable has a positive and insignificant effect. This can happen when interest rates do not experience significant variations during the time period studied, so the dummy variable may not have enough variation to have a significant effect on NIM.

5. Conclusions

The Results in this study shows that the 10-year maturity variable has a positive and significant effect on the net interest margin variable. Loan to Asset and Deposit to Liabillities variables have a positive and significant effect on net interest margin. Non Interest to Interest Income and LN (Assets) variables have a positive but insignificant effect, so they are said to be insignificant to the net interest margin. Dummy Interest Rate control variable has a negative and insignificant effect, so it is said to be insignificant to the net interest margin. 3 Months PUAB variable has a positive and significant effect on the net interest margin variable. Deposit to Liabillities and LN (Assets) variables have a positive and significant effect on net interest margin. Loan to Assets, Non Interest to Interest Income and Dummy Interest Rate variables have a positive but insignificant effect, so it is said to be insignificant to the net interest margin.

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