

Economic Pressure on the Interest Margin of Banks in IndonesiaFaizul Mubarak^{1✉}, Ety Fatimah²^{1,2}Department of Management, Faculty of Economics and Business, Universitas Islam Negeri Syarif Hidayatullah, Jakarta, Indonesia**Article Information***Article history:*

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Abstract

Net Interest Margin (NIM) is a profitability ratio to compare interest-based income and total assets owned. This study analyzes economic conditions on the Net Interest Margin (NIM) of conventional banking in Indonesia. This study uses the Vector Error Correction Model method with monthly data from 2008 to 2020. The long-term results are only inflation, which does not affect, while all variables do not affect the short-term. The Impulse Response Function results show that the exchange rate positively shocks the Net Interest Margin while interest rates, gold prices, oil prices, and inflation negatively shock NIM. The Forecast Error Variance Decomposition results found that inflation gave the second-largest variation while interest rates provided the minor variation.

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INTRODUCTION

Banking institutions must maintain relationships with customers, especially significant customers nurtured for a long time by the bank (Tileagă, Nițu, & Nițu, 2013; Zephaniah, Ogba, & Izogo, 2020). In general, main customers and corporate customers receive a credit line facility, which must be available if they need funds according to the credit line ceiling (Werner, 2016). If the bank cannot fulfill its commitment to the customer's facilities, then the impact is that the customer relationship with the bank will be less valuable (Abdullateef, Muktar, Yusoff, & Ahmad, 2014; Rita, Oliveira, & Farisa, 2019).

Further impact, customers will seek and use facilities from other banks (Ozili, 2018). If this happens, the bank's business volume will decrease, and eventually, the bank's profitability will decrease (Tan, 2016). To ensure the availability of funds needed by customers, banks must adequately manage the liability's side, especially non-traditional sources of funds, by obtaining internal bank borrowing line facilities from other banks (Sufian, Kamarudin, & Nassir, 2016; Werner, 2016). Banking must prioritize the relationship between the bank and the primary customer because it benefits from interest spreads, deposited funds, and fees for its banking services (Silva & Lucinda, 2017; Thakor, 2020).

Banking has two main business activities: raising funds and channeling funds (Wasiaturrahma, Sukmana, Ajija, Salama, & Hudaifah, 2020). These banking activities differentiate banking institutions from other financial institutions. Banks' distribution of funds is one of the primary forms of business activity because, from this activity, banks get high-profit margins (Abor, Agbloyor, & Kuipo, 2014; Nguyen, 2018). Banks with high-profit margins will positively improve their performance (Le & Ngo, 2020). Banking makes the distribution of funds a source of income (Amidu & Wolfe, 2013).

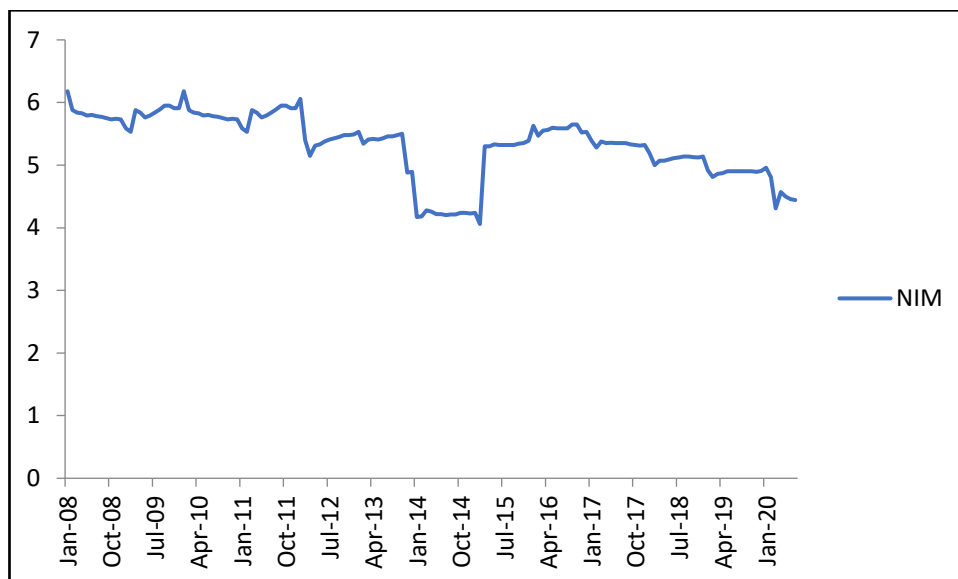


Figure 1. Movement of Net Interest Margin

The measurement of bank income derived from interest is called the Net Interest Margin (NIM) ratio (Ghosh, 2016). This ratio divides the income derived from interest by the company's net assets. In Indonesia, the growth in the NIM ratio at conventional commercial banks has fluctuated. Banks need to pay more attention to NIM's instability because the effects can spread to several things, such as declining public consumption and stagnant company growth. Also, the NIM ratio related to credit can increase productivity. High and controlled credit is a positive indication that a country's economy is experiencing growth.

A profitability ratio is a ratio to measure the company's ability to generate profits using its resources, such as assets, capital, or company sales (Dalnial, Kamaluddin, Sanusi, & Khairuddin, 2014; Ferry & Wahyu, 2018; Restianti & Agustina, 2018). The relationship between the bank and the primary customer must be prioritized because it benefits from interest spreads, deposited funds, and fees for the primary customer's banking services (Nguyen, 2018; Were & Wambua, 2014). One measure of bank income that comes from interest is the Net Interest Margin (NIM) ratio.

Net Interest Margin (NIM) is the ratio used to measure bank management's ability to manage its productive assets to earn net interest (Nassar et al., 2017). Net interest income is derived from interest income, less interest

expense (Hijazeen, 2017). The greater the NIM ratio, the higher the interest income or productive assets managed by the bank so that a bank's possibility in a problematic condition is getting smaller (Hussain, 2014; Papavangjeli & Leka, 2016). According to Bank Indonesia regulations, a bank's Net Interest Margin (NIM) value is healthy if it has a NIM ratio of above 2 percent.

Research related to Net Interest Margin (NIM) has been conducted by Widyanto, Agung, and Alwiyah (2020) found that capital, bank size, and operational efficiency (BOPO) did not have a significant effect on Net Interest Margin (NIM), while Loan Deposit Ratio (LDR) and Non-Performing Loan (NPL) had a significant effect on NIM. Liu and Sathye (2019) find that the growth of Gross Domestic Product (GDP), inflation, and the proportion of national savings have a significant effect on Adjusted Interest Spread (AIS) as a proxy for Net Interest Margin (NIM) in China.

Dewi and Triaryati (2017) found that Gross Domestic Product (GDP) and inflation have a positive but insignificant effect on NIM because Gross Domestic Product (GDP) is experiencing a slowdown while Net Interest Margin (NIM) fluctuates. A sharp decline in inflation has been anticipated by banking. Nugrahaning and Wahyudi (2016) found that operational efficiency (BOPO) and Return on Assets (ROA) have a significant effect on the Net Interest Margin (NIM).

Papavangjeli and Leka (2016) found that real economic growth has a significant negative effect on Net Interest Margin (NIM) in Albania because economic growth will improve bank credit performance. Meanwhile, Zeb and Bashir (2016) found that the reference interest rate significantly affects Pakistan's Net Interest Margin (NIM), while inflation and economic growth do not affect it. Hussain (2014) found that Gross Domestic Product (GDP) and credit growth had an effect on Net Interest Margin (NIM) in Pakistan.

Then research related to macroeconomic influence on Net Interest Margin (NIM) has also been carried out by Aviliani et al. (2015), where researchers using Vector Error Correction Model (VECM) found that the Net Interest Margin (NIM) variable has the weakest response to macroeconomics. Hijazeen (2017) found that there was no effect on the Customer Price Index (CPI) on the Net Interest Margin (NIM) in Jordan. Nassar et al. (2017) found that real Gross Domestic Product (GDP) does not have a significant effect on Net Interest Margin (NIM). However, inflation significantly affects Honduras's Net Interest Margin (NIM).

This study aims to analyze the effect of macroeconomic variables on banks' profitability in Indonesia both in the short and long term, analyze the response of bank profitability in facing macroeconomic variable shocks, and analyze macroeconomic variables in explaining the diversity of bank profitability in Indonesia. This research tries to study by adding the variables studied and using the latest data for an extended period from the research that has been done. This research adds to the variables of world oil prices and gold prices in which banks channel their investment to the sector. This study provides the first contribution to provide banking benefits in anticipating shocks that occur in profitability. Second, knowing the macroeconomic factors that affect bank profitability in both the short and long term. Third, as a reference for further research.

METHOD

This study uses a sample of conventional commercial banks in Indonesia. The research data comes from the Indonesian banking statistical reports issued by the Financial Services Authority, Bank Indonesia, and the Central Statistics Agency. This study uses the variable Net Interest Margin (NIM), inflation (INL), interest rates (BIR), exchange rates (ECR), oil prices (OL), and gold prices (GLD). This study uses monthly data from January 2008 to June 2020.

This study uses the Vector Error Correction Model (VECM) to answer the research objectives. Several steps must be done before testing using VECM. First, the stationarity test uses the Augmented Dickey-Fuller (ADF). Second, the optimal lag test using the Likelihood Ratio (LR), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), Final Prediction Error (FPE), and Hannan-Quinn Information Criterion (SC). The optimal lag selection criteria are the largest LR or AIC, SC, FPE, and HQ have the smallest value. Third, the cointegration test using the Johansen Cointegration test to find convergence in long-term relationships. Fourth, VECM modeling with restrictions because the data is not stationary but cointegrated. Fifth, the impulse response function to observe the response of the shocks that occur. Sixth, forecast error variance decomposition to study the diversity of each variable.

If the data is non-stationary but cointegrated, it uses the Vector Error Correction Model (VECM). Where y_t is the vector containing the analyzed variables, m_{0x} is the intercept vector, $m_{1x}t$ is the regression coefficient vector, t is the time trend, II_x is $\alpha_x\beta'$ with β' contains the long-run cointegration equation, y_{t-1} is the in-level variable, τ_{ix} is

the regression coefficient matrix, $k-1$ is the VECM order of VAR, and e_t is the error term. Where y_t is a vector of size $(n*1)$ containing n variables, A_0 is the size $(n*1)$, A_1 is the size $(n*n)$ parameter matrix for each i , and e_t is the error vector of size $(n*1)$.

$$\Delta y_t = m_{0x} + m_{1x}t + I_{ix}y_{t-1} + \sum_{i=1}^{k-1} \tau_{ix}\Delta y_{t-1} + e_t$$

RESULT AND DISCUSSION

Table 1 shows the descriptive statistics of the use of each variable. The exchange rate has a standard deviation higher than the average, so the volatility of the exchange rate tends to be volatile. This volatile exchange rate data is due to daily changes in foreign exchange trading. Besides, all variables except the exchange rate have a mean value more significant than the standard deviation, which indicates that the data distribution results are pretty good.

Table 1. Descriptive statistics

Indicator	NIM	BIR	GLD	OL	INL	ECR
Mean	5.325828	6.365894	1296.983	72.59781	5.14457	11682.6
Median	5.41	6.5	1280.2	69.8	4.42	11977
Maximum	6.18	9.5	1964.9	140	12.14	16367.01
Minimum	4.06	4	730.75	20.48	1.54	8508
Std. Dev.	0.509918	1.257237	243.6602	23.82662	2.365311	2150.024

Table 2 shows the results of the data stationarity test. The data stationarity test results show that all variables are not stationary at the level (ADF Statistic is less than t-statistic 5%). All variables which are not stationary are tested again at the level of difference.

Table 2. Stationarity Test Results

Variable	Level			Difference		
	ADF Statistic	t-statistic 5%	Results	ADF Statistic	t-statistic 5%	Results
NIM	-2.0228	-2.8807	No	-13.586	-2.8809	Stationary
BIR	-1.0372	-2.8809	No	-6.7966	-2.8809	Stationary
GLD	-1.3353	-2.8807	No	-13.75	-2.8805	Stationary
OL	-0.3053	-2.8815	No	-8.9776	-2.8815	Stationary
INL	-1.871	-2.8809	No	-7.6355	-2.881	Stationary
ECR	-0.9168	-2.8807	No	-12.595	-2.8809	Stationary

The data stationarity test results at the difference level indicate that all variables are stationary (the ADF Statistic is greater than the t-statistic 5%). So, stationary data shows that the average variance value has not changed systematically or is constant. The optimal lag length test results are based on the smallest values of AIC and SC. Based on the results of the processing that has been done, the optimal lag in this study is lag 1 (Table 3).

Table 3. Optimal lag test results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2418.753	NA	27349033	34.15145	34.27635*	34.20220
1	-2348.702	133.1961	16938076*	33.67186*	34.54612	34.02712*
2	-2315.534	60.26220	17673429	33.71175	35.33537	34.37153
3	-2292.408	40.06344	21327283	33.89307	36.26606	34.85736
4	-2272.042	33.56096	26916529	34.11327	37.23562	35.38207
5	-2253.947	28.28999	35358006	34.36545	38.23716	35.93876

6	-2216.892	54.79940*	35931350	34.35059	38.97167	36.22841
7	-2181.616	49.18818	37925471	34.36078	39.73123	36.54311
8	-2149.704	41.79973	42639933	34.41837	40.53818	36.90521

After getting the optimal lag value, the next step is to test the stability of the VAR. VAR is considered stable if the modulus value is below 1. The VAR stability test results show that lag 1 has a modulus value below one, so it can be said that VAR is stable at lag 1 (Table 4).

Table 4. VAR Stability Test Results

Root	Modulus
-0.483635	0.483635
0.477654	0.477654
0.342777	0.342777
-0.101027 - 0.082332i	0.130327
-0.101027 + 0.082332i	0.130327
-0.098421	0.098421

The data stationarity test results on the stationary test show that they are stationary at the difference, so the next step is to do the Johansen Cointegration test. The Johansen Cointegration test functions to find convergence in long-term relationships based on the Vector Autoregression (p) (VAR (p)) model from a set of variables that are not stationary (Johansen & Juselius, 1990).

Table 5. Cointegration test results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.634421	478.4328	95.75366	0.0001
At most, 1 *	0.500084	329.5045	69.81889	0.0001
At most, 2 *	0.418718	226.8939	47.85613	0.0001
At most, 3 *	0.377665	146.6010	29.79707	0.0001
At most, 4 *	0.312412	76.40803	15.49471	0.0000
At most, 5 *	0.132123	20.97241	3.841466	0.0000

The Johansen Cointegration test focuses on the cointegration testing process where there is a change from the VAR model to VECM. Data processing using VECM requires cointegration equations. So, cointegration to see equations in the long run. The cointegration test results using the Johansen Cointegration test found the cointegration equation to continue the research to the VECM test (Table 5).

Long Term and Short Term Results

Effect of interest rates on Net Interest Margin (NIM). The VECM test results show that interest rates significantly affect NIM in the long run. However, in the short term, it does not affect. The Indonesian bank rate (BI Rate) is the benchmark interest rate in Indonesia, where the BI Rate regulates the interest rates for deposits and loans. When the loan interest rate increases, the interest-based bank income will increase. In the long term, the BI Rate will affect the decline or increase in credit interest rates, which will impact the rise and fall of interest-based income. When the BI Rate as the reference interest rate decreases, it will usually be followed by a lower deposit interest rate change, which is then followed by a decrease in loan interest rates. When loan interest rates fall, banks' funds or costs to fund deposits also decrease. Banks can use this reduction to reduce loan interest rates, affecting the NIM.

Effect of gold prices and oil prices on Net Interest Margin. The VECM test results show that gold prices and oil prices have a significant positive effect on NIM in the long run. However, in the short term, it does not affect. Although there is no strong correlation between the gold price and the oil price on NIM, a positive effect is possible because several banks in Indonesia have gold lending services. When the non-real sector market is uncertain, some

investors buy gold as a hedge (Gokmenoglu & Fazlollahi, 2015). Likewise, with the oil price, when crude oil prices rise, companies related to oil exports will make many loans to banks to expand their companies (Idrisov, Kazakova, & Polbin, 2015; Ratti & Vespignani, 2016).

Effect of inflation on Net Interest Margin (NIM). From the results of VECM testing on the long and short term, it does not affect. When inflation falls, the central bank tends to lower interest rates to spur people to be consumptive. A decrease in interest rates is in line with a decrease in the interest rate given when making loans, reducing the Net Interest Margin (NIM).

Table 6. Long Term and Short Term Results

Variable	Coefficient	t-statistic	t-table
Short Term			
D(NIM(-1))	0.08375	0.94661	1.97601
D(BIR(-1))	0.07343	0.42957	1.97601
D(GLD(-1))	0.00022	1.66044	1.97601
D(OL(-1))	0.02451	0.82987	1.97601
D(INL(-1))	0.02306	1.14240	1.97601
D(ECR(-1))	3.8E-05	1.07460	1.97601
C	0.01398	0.89135	
Long Term			
*BIR(-1)	0.34252	2.13188	1.97601
*GLD(-1)	0.00145	-3.67965	1.97601
*OL(-1)	0.03206	-8.74749	1.97601
INL(-1)	0.16407	0.00680	1.97601
*ECR(-1)	0.00032	-7.62087	1.97601
C	46.06767		

*Significant at 5 percent

Effect of exchange rates on Net Interest Margin (NIM). The long-term VECM test results show that the exchange rate has a significant positive effect on NIM. However, in the short term, it does not affect. The exchange rate affects the quality of loans provided by banks (Abuka, Alinda, Minoiu, Peydró, & Presbitero, 2019). If the domestic currency depreciates, it can reduce the quality of loans, which will lead to a lower NIM.

Impulse Response Function

Net Interest Margin (NIM) responds negatively to interest rate shocks in the 2nd month until the 60th month. In the second month, NIM responded negatively to the interest rate shock of -0.0036 percent and continued to decline until the 10th month to -0.00608 percent. NIM began to stabilize in response to interest rate shocks when it entered the 11th month until the 60th month.

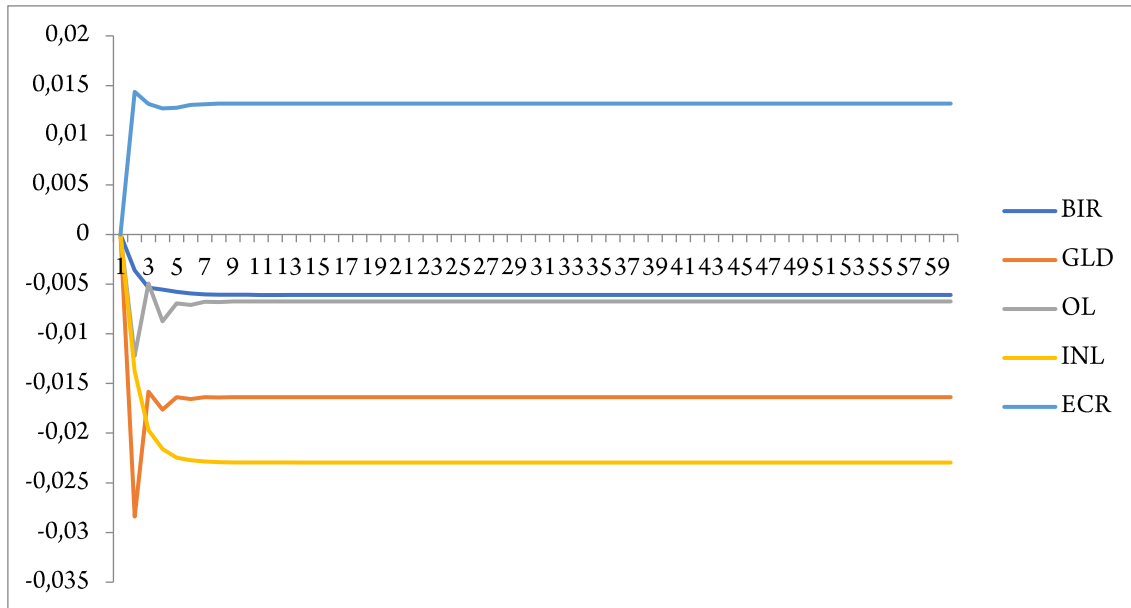


Figure 2. Impulse Response Function

Net Interest Margin (NIM) responded negatively to the gold price in the 2nd month until the 60th month. In the second month, NIM responded to the gold price shock of -0.0284 percent and continued to increase until the ninth month of -0.01637 percent. NIM began to stabilize in response to gold price shocks when it entered the 10th month until the end of the observation.

Net Interest Margin (NIM) responded negatively to oil prices in the second month until the 60th month. In the second month, NIM responded to the oil price shock of -0.01222 percent and continued to decline until the 12th month of -0.00674 percent. NIM started to stabilize in response to oil price shocks when it entered the 12th month until the 60th month.

Net Interest Margin (NIM) responded negatively to inflation in the 2nd month until the 60th month. NIM began to stabilize in response to inflation shocks when it entered the 12th month until the 60th month. In the second month, NIM responded to inflation shocks of -0.01378 percent and continued to increase until the 11th month by -0.02296 percent.

Net Interest Margin (NIM) responded positively to the exchange rate in the 2nd month until the 60th month. NIM responded to exchange rate shocks of 0.014364 percent in the second month and declined until the 11th month of 0.013187 percent. NIM began to stabilize in response to exchange rate shocks when it entered the 12th month until the 60th month.

NIM's negative response to inflation and interest rate variable shocks is because the NIM will increase if these two variables decrease. A reduction in inflation and interest rates is possible if the economy improves. When the economy improves, the number of non-performing loans will decrease. The decline in non-performing loans will make banks increase lending by lowering lending rates to get a risk-free NIM.

Meanwhile, NIM's positive response to exchange rate variable shocks is due to loans using foreign currencies, which fluctuate if they experience. If there is appreciation (an increase in the exchange rate), the bank's interest income will also increase. Indonesian conventional banking does provide loan services using foreign currencies.

Forecast Error Variance Decomposition

Forecast Error Variance Decomposition (FEVD) analysis helps explain each variable's contribution to the shocks it causes to the main observed endogenous variables. This analysis predicts how much the contribution of each variable's variance affects other variables at the present and future periods.

Figure 3 explains the FEVD test results where the NIM itself influenced the contribution of NIM variance in the first period. However, other variables began to influence with increasing periods, although the magnitude was not as large as the NIM's effect. Inflation is the second-largest variable that affects NIM, where the effect of inflation in the second period is 0.88 percent, and at the end of the period, it is 3.34 percent. Meanwhile, the interest rate is the variable

with the minor effect, which at the end of the period is 0.01 percent. The small influence of each macroeconomic variable on NIM shows that whatever changes in these variables significantly affect NIM.

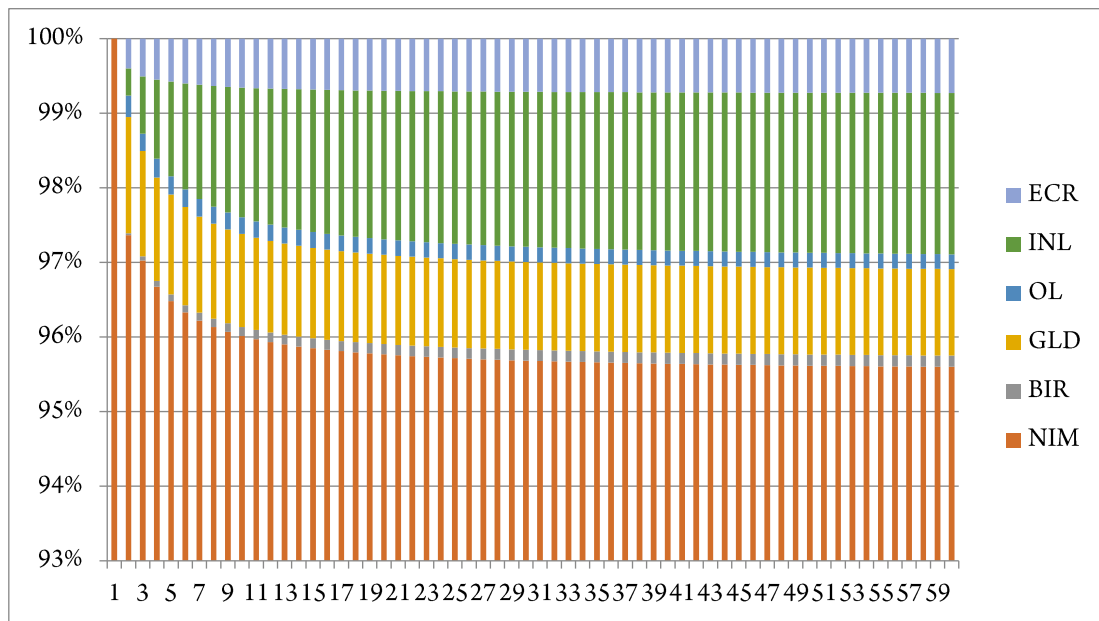


Figure 3. Forecast Error Variance Decomposition

Interestingly, the low influence of interest rates on NIMs, although interest rates regulate loan interest rates, which reference the amount of interest on bank lending, credit interest rates cannot immediately decrease (Tan, 2016; Were, 2015). There are two main factors for indirect credit interest rates falling. First, contractual agreements between customers before making a loan and Indonesian banks' liquidity problem (Salman & Nawaz, 2018; Wahyudi & Sani, 2014). If the customer agrees to make a loan with a fixed rated interest system in the loan contract, the impact is that if the reference interest rate drops, the interest rate that has occurred will not change (Gayaker, Yalcin, & Berument, 2020; Roy & Kemme, 2020; Sonaglio, Campos, & Braga, 2016). Therefore the bank NIM value can remain. The second cause is the high value of Indonesia's Loan to Deposit Ratio (LDR). The LDR ratio shows the number of funds channeled in proportion to the funds raised (Driver, Grosman, & Scaramozzino, 2020; Grundy & Verwijmeren, 2020). If the funds channeled are greater than those collected, the bank will experience liquidity problems, and customers who have deposits in the bank cannot withdraw them (Brown, Guin, & Morkoetter, 2020; Werner, 2016).

CONCLUSIONS AND RECOMMENDATION

The results of the long-term equation variable interest rates, oil prices, gold prices, and exchange rates have a significant positive effect on Net Interest Margin (NIM). However, none of them affects the Net Interest Margin (NIM) in the short term. The results of the Impulse Response Function (IRF) test found that the Net Interest Margin (NIM) responded positively to exchange rate shocks while the interest rate, gold price, oil price, inflation, and exchange rate negatively. The results of the Forecast Error Variance Decomposition (FEVD) test found that the variable that gave the most considerable variance effect after Net Interest Margin (NIM) was inflation, and the smallest was the interest rate variable.

The net interest margin (NIM) trend for banks decreases in line with global economic pressures. The decline in credit quality and the restructuring scheme implemented by banks will further erode margins. Banks need to revise the NIM target to suit global economic conditions. Banks need to focus on the cost of funds as one of the main strategies in maintaining margin growth. Banks need to consider the reference interest rate, liquidity conditions and monitor interest rates in the market in determining the cost of funds. With the decline in the benchmark interest rate and the adjustment of interest rates on the market, banks certainly need to adjust to the interest rates offered.

Also, to maintain the stability of NIM, banks can carry out a strategy from two sides, namely the cost side and the interest income side. In terms of costs, banks need to increase the composition of cheap cost of funds by optimizing the banking network and digital initiatives to more effectively capture the potential of existing retail funds. From the

income side, banks can remain focused on lending, especially micro-credit, and strive to maintain credit quality by actively restructuring customers who need them.

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