

The Influence of Monetary Policy Instruments on Economic Growth in Indonesia: Comparison between Islamic and Conventional Monetary Instruments

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Monetary policy has an important role in a country's economy. The central bank plays a role in carrying out monetary policy for price stability through various mechanisms. This study aims to determine the contribution of conventional and Islamic monetary instruments to economic growth in Indonesia. This study uses time series data from January 2013 to December 2020 and is analyzed using the Vector Error Correction Model (VECM) method. From the results of the analysis that has been carried out, it can be seen that in the long run, interest rates, exchange rates, the Islamic Interbank Money Market (PUAS), and Bank Indonesia Sharia Certificates (SBIS) have a significant effect on economic growth. IRF results show that exchange rates react negatively to shocks from GDP over 48 periods. The FEVD results show that the interbank money market (PUAB) has the most significant contribution after GDP in explaining the 10 percent variability of economic growth.

Keywords: Monetary Policy; Dual Monetary System; Indonesia; VECM

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INTRODUCTION

The real sector represents a society's welfare because the real sector is a picture of the amount of production of goods and services in a certain area. When a country's productivity level increases, this will affect its Gross Domestic Product (GDP) increase. [Samuelson and Nordhaus \(2005\)](#) explain that GDP is a measuring tool for assessing overall economic performance. In its journey to encourage a country's economic growth, the government formulates and implements monetary policy. [Warjiyo and Solikin explain in Roedyhantoro and Cahyono \(2018\)](#) that the central bank's monetary authority policy in monetary control is for efforts to control monetary amounts in achieving the desired economic conditions of a country.

Monetary policy has several instruments for controlling the monetary system: first, open market operations. Second, the discount policy. Third, the cash reserve policy. Fourth, tight credit policies. Fifth, the moral encouragement policy. The instrument was set with the goal of a better economy than in previous years. One of the forms of this policy was controlling the Money Supply (JUB), Investment (I), and Interest Rate (r).

Indonesia implements a dual monetary system, namely the conventional and Islamic monetary systems. The conventional monetary system uses the element of interest, while the Islamic monetary system uses the element of *ju'alah*. [Chouwduary \(1997\)](#) reveals the endogenous money theory, which states that monetary policy is only a representation of the real sector, so there should not be a dichotomy between the monetary sector and the real sector because in essence these two sectors must be interrelated. This means that the financial sector should not develop faster than the real sector itself, as is the case in the conventional financial system. The character of Islamic finance shows a direct link between the monetary sector and the real sector ([Beik, 2010](#)).

This research is important to do considering monetary policy is very important in the economy because it can stabilize economic conditions. Monetary policy was first felt by the banking sector, which was then transferred to the real sector. Monetary policy aims to achieve high economic growth in a sustainable manner by maintaining price stability by balancing the money supply or regulating the amount of money in circulation with the supply of goods in order to prevent inflation. Several previous studies from [Roedyhantoro & Cahyono \(2018\)](#); [Akalpler & Duhok \(2018\)](#); [Cobham & Song \(2021\)](#); [Mohseni & Cao \(2020\)](#) show that monetary policy can improve economic performance through

various instruments such as interest rates and money supply. Therefore, considering the very important contribution of monetary instruments, this research will discuss the contribution of monetary instruments to economic growth in Indonesia. This study aims to determine the contribution of monetary instruments, both conventional and sharia instruments, to economic growth in Indonesia.

LITERATURE REVIEW

[Akpan and Atan \(2011\)](#) investigated the effect of exchange rate movements on real output growth in Nigeria from 1986 to 2010. This research examines the possible direct and indirect relationship between the exchange rate and GDP growth. The study was conducted using the Generalized Method of Moments (GMM) method. The estimation results show that there is no evidence of a strong direct relationship between exchange rate changes and output growth. In contrast, Nigeria's economic growth is directly influenced by monetary variables. [Lee and Werner \(2017\)](#) examine how lower interest rates result in higher growth and vice versa in the United States, United Kingdom, Germany, and Japan over the last half-century using the DCC-GARCH method. The results of this study found that interest rates follow GDP growth and are consistently positively correlated with GDP growth. [Habib, Mileva, & Stracca \(2017\)](#) investigated the impact of real exchange rate movements on economic growth based on five-year average data for panels in 150 countries in the post-Bretton Woods period. This study uses the Generalized Method of Moments (GMM) dynamic panel data method. The results of the study found that exchange rate appreciation would significantly reduce annual real GDP growth. [Akalpler & Duhok \(2018\)](#) investigated the relationship between monetary policy and economic growth in Malaysia. This study uses quantitative Ordinary Least Square (OLS) analysis to determine the relationship between GDP growth and monetary policy instruments, especially interest rates, money supply, and inflation rates. The results of the study show that inflation and the money supply are positive and significant factors in economic growth. [Mohseni & Cao \(2020\)](#) investigate the effectiveness of monetary policy in a modified neoclassical economic growth framework by extending the two-asset model to a three-asset model by adding the bond market under various parameters and show that the impact of monetary expansion on inflation is complete in the two-asset model but incomplete in the three-asset model. In addition, it is also found that in these two models, the

impact of monetary policy (or equivalent inflation) on economic growth is ambiguous due to fiscal policy interventions, and public expectations play an important role in the effectiveness and transmission of monetary policy in the economic growth model. Cobham & Song (2021) conducted a monetary policy analysis of developed and developing countries. This study uses a difference-in-differences (DID) approach. The results of the study show that monetary policy has a small effect on developed countries and an insignificant effect on developing countries

METHODS

Data were analyzed using the Vector Autoregression (VAR) and Vector Error Correction Model (VECM) methods when the data were stationary and cointegrated. The data analysis starts from the data stationarity test to ensure that the estimation of the time series econometric model can be processed, namely the fulfillment of the assumptions of normally distributed or stable (stationary) data on the variables forming the regression equation. The stationary series results will be continued with data processing using VAR with the standard method. While the non-stationary series results will lead to two choices, namely VAR or VECM. Then proceed with optimal lag testing to determine the optimal number of lags used in the model. Next is the VAR stability test to test the stability of the model. Furthermore, a cointegration test is carried out to find out whether the variable is not stationary at the cointegrated level or not. Then, the Vector Error Correction Model (VECM) model is used in the non-structural VAR model where the time series data is not stationary at the level, but is stationary at the difference

and cointegrated data. This shows that there is a relationship between variables. The VECM model, which is a non-structural VAR model, is called a restricted VAR model. The VECM model specification restricts the long-term behavioral relationship between variables so that it converges into a cointegration relationship but allows dynamic changes in the short term. Thus there will be an error correction because if there is a deviation in the long term it will be corrected gradually through short-term partial adjustments (Widarjono, 2013). Then perform the Impulse Response Function (IRF), which is a method for tracking the response of an endogenous variable to a particular shock. The final step is to perform the Forecast Error Variance Decomposition (FEVD), which is a method for viewing changes in a variable as indicated by changes in the error variance that are influenced by other variables.

The data used in this study is secondary data in the form of monthly time series from January 2013 to December 2020. Next, the estimation process will be carried out by carrying out model specifications which can be formulated in this study as follows:

$$\begin{aligned} \Delta GDP_t = \alpha + & \sum_{i=1}^p \beta_{1i} \Delta BIRATE_{t-i} \\ & + \sum_{i=1}^p \beta_{2i} \Delta LN_EXC_{t-i} \\ & + \sum_{i=1}^p \beta_{3i} \Delta LN_M2_{t-i} \\ & + \sum_{i=1}^p \beta_{4i} \Delta LN_PUAB_{t-i} \\ & + \sum_{i=1}^p \beta_{5i} \Delta LN_PUAS_{t-i} \\ & + \sum_{i=1}^p \beta_{6i} \Delta SBIS_{t-i} + \varepsilon_t \quad (1) \end{aligned}$$

Table 1: Research Variable

Variable	Symbol	Proxy	Sources
GDP	GDP	GDP Growth (%)	Statistics Bureau
Interest rate	BIRATE	BI 7-day repo rate (%)	Bank Indonesia
Exchange rate	LN_EXC	IDR to USD	Yahoo Finance
Money Supply	LN_M2	Amount of Money in Circulation Broadly (Billion IDR)	Bank Indonesia
PUAB	LN_PUAB	Conventional Interbank Money Market Nominal (Billion IDR)	Bank Indonesia
PUAS	LN_PUAS	Nominal Sharia Interbank Money Market (Billion IDR)	Bank Indonesia
SBIS	SBIS	Yields of Bank Indonesia Sharia Certificates	Bank Indonesia
α	= Intercept	ε	= error
β	= Coefficient	t	= year of t
i	= length of lag (ordo) (i=1,2,3...)		

RESULTS

Rationality Test Result

The first step is to test the stationarity of all variables. The data stationarity test was conducted to see whether there was a unit root between variables based on the Augmented Dickey-Fuller (ADF) test at level and first difference levels. If the absolute value of the t-ADF

is greater than the absolute value of the MacKinnon Critical Values, then the data is stationary at a predetermined level of significance, namely 5 percent. The stationarity test can also be seen from the probability value of ADF which is less than the significant level. Stationary test results can be seen in the following table.

Table 2: Stationarity Test

Variable	ADF value	
	Level	1st Difference
GDP	-0.554170	-2.649051
BIRATE	-2.285754	-6.244998
LN_EXC	-2.479103	-9.110300
LN_M2	-2.658814	-14.58104
LN_PUAB	-6.680234	-14.74302
LN_PUAS	-9.262710	-8.318619
SBIS	-1.885135	-4.316295

Note: Bold indicates that the data is stationary at the 5% level

Based on the test results, there is one variable that is stationary at the PUAB level. Then the unit root test is continued at the first difference level. After all the variables were subjected to the unit root test at first difference with the ADF test, the test results showed that all variables were stationary at the first difference level. From the test results, the statistical ADF value of all variables is smaller than the critical value, so it can be concluded that the data does not contain a unit root in the first difference.

Optimum Lag Test Results

The optimum lag test is important because it is useful in identifying how long the reaction of one

variable is to another and for eliminating autocorrelation problems. The lag length test can be carried out using the available information criteria, namely the Likelihood Ratio (LR) criteria, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hannan-Quin Criterion (HQ).

Based on the results of the optimum lag test on the tested variable, the optimum lag in the equation is at lag three and lag six. Referring to AIC statistics, lag six was chosen to obtain significant VECM estimation results and adjustments from the short term to the long term. The optimum lag test results can be seen in the table below.

Table 3: Optimum Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	274.6999	NA	5.76e-12	-6.015728	-5.819992*	-5.936833
1	380.4554	192.4988	1.61e-12	-7.291133	-5.725249	-6.659970*
2	435.5266	91.57912	1.43e-12	-7.427565	-4.491533	-6.244135
3	492.0957	85.17143	1.27e-12*	-7.597656	-3.291477	-5.861959
4	519.9800	37.59686	2.26e-12	-7.123147	-1.446819	-4.835182
5	569.4208	58.88449	2.65e-12	-7.133052	-0.086576	-4.292819
6	639.6623	72.60924*	2.16e-12	-7.610390*	0.806234	-4.217890

Note: The asterisk (*) indicates the lag is optimum based on the Akaike Information Criterion (AIC) criteria

VAR Stability Test Results

The VAR stability test is carried out by calculating the roots and polynomial functions or known as the roots of characteristic polynomial. If all the roots of the polynomial function are in the unit circle or if the

absolute value is < 1 then the VAR model is considered stable so that the resulting Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) are valid.

Table 4: VAR Stability Test Results

Lag	Modul Range				
Lag 6	0.965029	0.934378	0.867862	0.821438	0.729629
	0.965029	0.930369	0.867862	0.816856	0.729629
	0.953762	0.930369	0.865446	0.816856	0.693904
	0.953762	0.910861	0.865446	0.807337	0.693904
	0.950314	0.910861	0.850651	0.807337	0.584283
	0.950314	0.894031	0.850651	0.803832	0.017727
	0.938667	0.894031	0.841203	0.803832	
	0.938667	0.870567	0.841203	0.742916	
	0.934378	0.870567	0.821438	0.742916	

Cointegration Test Results

The cointegration relationship in a system of equations implies that in that system there is an error correction model that describes the short-term dynamics consistent with the long-term relationship. The cointegration test was carried out using the Johansen

Cointegration Test method by comparing the value of the trace statistic to its critical value. If the value of the trace statistic is greater than the critical value, then there is cointegration in the model. In this study there are four cointegration equations.

Table 5: Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.553880	244.6620	125.6154	0.0000
At most 1 *	0.517345	172.8241	95.75366	0.0000
At most 2 *	0.410691	107.9918	69.81889	0.0000
At most 3 *	0.339697	60.92820	47.85613	0.0019
At most 4	0.151650	23.98815	29.79707	0.2009
At most 5	0.069464	9.351056	15.49471	0.3339
At most 6	0.032533	2.943549	3.841466	0.0862

VECM Analysis

After cointegration testing was carried out and it was proven that each equation had cointegration, then the analysis of monetary policy responsiveness to GDP was carried out using VAR modeling and the VECM estimation approach. Later the processed VECM results will provide two main estimation outputs, namely

measuring cointegration or the effect of the long-term balance between variables, and measuring the error-correction or the speed at which these variables move towards their long-term balance. In this study, the significance used was at the five percent level of significance.

Table 6: VECM Analysis results

Long-Term					
Variable	Coefficient	T-Statistics	Variable	Coefficient	T-Statistics
BIRATE(-1)	-1.791883	[-4.41750]	LN_PUAS(-1)	-1.637277	[-2.15714]
LN_EXC(-1)	-23.41339	[-3.49312]	SBIS(-1)	5.74533	[8.18893]
LN_M2(-1)	9.07155	[1.86054]	C	76.7738	
LN_PUAB(-1)	-0.437056	[-0.28015]			
Short-Term					
Variable	Coefficient	T-Stats	Variable	Coefficient	T-Stats
CointEq1	-0.00164	[-0.03494]	D(LN_M2(-4))	3.858582	[0.51046]
D(GDP(-1))	0.709751	[4.50834]	D(LN_M2(-5))	0.476025	[0.06698]
D(GDP(-2))	0.42203	[2.18639]	D(LN_M2(-6))	6.655441	[0.98697]
D(GDP(-3))	-0.86097	[-3.88326]	D(LN_PUAB(-1))	0.413662	[1.84235]
D(GDP(-4))	0.20444	[0.85084]	D(LN_PUAB(-2))	0.402193	[1.53802]
D(GDP(-5))	0.101594	[0.44695]	D(LN_PUAB(-3))	0.212858	[0.81163]
D(GDP(-6))	-0.19627	[-1.23343]	D(LN_PUAB(-4))	-0.02299	[-0.08683]
D(BIRATE(-1))	0.107066	[0.32937]	D(LN_PUAB(-5))	-0.12737	[-0.53064]
D(BIRATE(-2))	0.1322	[0.41164]	D(LN_PUAB(-6))	0.040885	[0.19125]
D(BIRATE(-3))	-0.29036	[-0.88629]	D(LN_PUAS(-1))	0.017348	[0.15852]
D(BIRATE(-4))	-0.29751	[-0.88690]	D(LN_PUAS(-2))	-0.04754	[-0.39820]
D(BIRATE(-5))	0.374086	[1.06910]	D(LN_PUAS(-3))	-0.12614	[-1.11221]
D(BIRATE(-6))	0.335459	[0.88346]	D(LN_PUAS(-4))	-0.01907	[-0.17289]
D(LN_EXC(-1))	-10.2379	[-3.02303]	D(LN_PUAS(-5))	0.020298	[0.20353]
D(LN_EXC(-2))	0.402749	[0.09816]	D(LN_PUAS(-6))	0.022227	[0.28106]
D(LN_EXC(-3))	1.320085	[0.31114]	D(SBIS(-1))	0.312614	[0.81386]
D(LN_EXC(-4))	-3.83598	[-0.93760]	D(SBIS(-2))	-0.27403	[-0.77445]
D(LN_EXC(-5))	0.746148	[0.19340]	D(SBIS(-3))	0.468289	[1.30446]
D(LN_EXC(-6))	-3.16915	[-0.86416]	D(SBIS(-4))	0.207262	[0.58481]
D(LN_M2(-1))	-1.24702	[-0.17019]	D(SBIS(-5))	-0.16442	[-0.42328]
D(LN_M2(-2))	3.631113	[0.44943]	D(SBIS(-6))	-0.11219	[-0.30008]
D(LN_M2(-3))	7.563104	[1.00472]	C	-0.13758	[-0.79386]

Based on the results of the VECM estimation in the table above, it can be seen that in the short term the GDP variable has a significant effect on itself, namely GDP in the 1st to 3rd lag. In addition, in the short term the exchange rate variable (LN_EXC) has a significant effect on GDP at lag 1. Furthermore, in the long run the variables BIRATE, LN_EXC, LN_PUAS and SBIS have a significant effect on GDP.

VECM Long Term Model

In the long-term estimation, the model used in this study is as follows:

$$Y = \beta_0 + \beta_1 BIRATE + \beta_2 LN_EXC + \beta_3 LN_M2 + \beta_4 PUAB + \beta_5 PUAS + \beta_6 SBIS + \varepsilon$$

After long-term estimation of VECM, the following is the long-term model in this study:

$$Y = 76.77 + (-1.79)(BIRATE) + (-23.41)(LN_EXC) + 9.07(LN_M2) + (-0.43)(PUAB) + (-1.63)(PUAS) + 5.74(SBIS) + \varepsilon$$

To be able to interpret the results, the ceteris paribus assumption can be used, for example as in the money supply variable (LN_M2). If interest rates increase by 1 (one) percent, it will increase GDP by 9.07 percent. Furthermore, if the interest rate (BIRATE) rises by one percent, it will reduce GDP by 1.79 percent. The relationship increases or decreases based on the sign on the constant of each variable, if there is a minus sign, it means that the relationship between the independent

variable and the dependent variable (GDP) will decrease, and vice versa if there is no minus sign it means the relationship is positive.

Impulse Response Function

In identifying the response of monetary policy indicators to GDP, the Cholesky Decomposition

standard is used. The Cholesky Decomposition aims to generate impulse responses that depend crucially on the sequence of variables in the system. In this study, the timeframe used in analyzing monetary policy on GDP is projected in the next 48 months (four years).

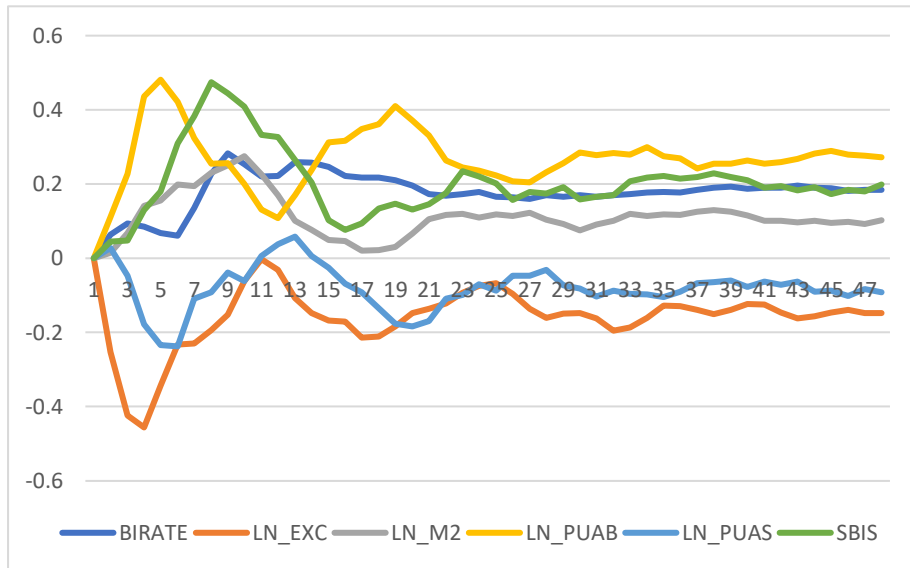


Figure 1: IRF analysis results

In the figure above, it can be seen that the first month, GDP has not responded to shocks to all monetary policy variables. In the 2nd month, the variable that gives a negative response to GDP is LN_EXC. This variable continues to give a negative response until the end of the observation period. Furthermore, variables that respond positively to GDP in the 2nd month are BIRATE, M2, PUAB, PUAS, and SBIS. These variables continued to give a positive response until the end of the observation period except for the PUAS variable. All of the variables above began to reach stability in the 46th period.

Forecast Error Variance Decomposition (FEVD)

FEVD analysis in this study aims to explain the contribution of each monetary policy variable in

explaining the variation in its effect on GDP. FEVD observations were carried out for 48 periods (four years). FEVD results can be seen in the image below.

In the first month, the variance of 100 percent GDP is only affected by the variable itself. GDP which is affected by other variable shocks is only responded to in the second period. At the end of the observation, the largest response was still influenced by GDP at 71.27 percent. The second largest response at the end of the observation was PUAB which contributed 10.26 percent. The third largest response was SBIS which contributed 6.42 percent. Furthermore, the following are the variables that give shock responses at the end of the observation.

Variable	Respons
GDP	71.27045
LN_PUAB	10.26154
SBIS	6.417862
BIRATE	4.499475
LN_EXC	4.177323
LN_M2	2.061802
LN_PUAS	1.311549

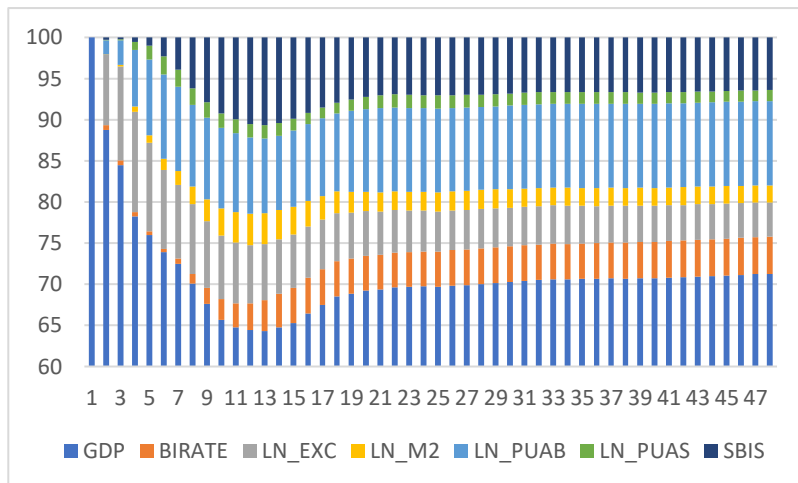


Figure 2: FEVD output results

DISCUSSION

Based on the long-term VECM estimate, interest rates have a negative effect on GDP. This means that high interest rates will have an impact on declining GDP growth. These results are in accordance with research from [Obansa, Okoroafor, Aluko, & Eze \(2013\)](#) who examined the relationship between interest rates and economic growth in Nigeria. An increase in interest rates will be followed by a decrease in the money supply. this will cause a decrease in the demand for goods and services caused by the reluctance of the public to buy these goods and services because saving money in a bank will be more profitable than spending that money. In addition, high interest rates will increase the company's capital costs and production costs, hinder the investment climate, and ultimately reduce economic growth.

Then, based on the long-term VECM estimation, the exchange rate has a negative effect on GDP. This means that high pressure on the exchange rate will affect the decline in GDP growth. The IRF results also illustrate a negative reaction between exchange rates and economic growth over 48 periods. These results are consistent with research from [Akpan and Atan \(2011\)](#) regarding the relationship between exchange rates and economic growth in Nigeria. Theoretically, an increase in the supply of foreign exchange should lead to an increase in money growth, however, when the demand for foreign exchange exceeds its supply, a depreciation of the local currency will occur.

The VECM results also show that SBIS yields can have a positive effect on economic growth in the long term. The results of this analysis are not in accordance with research from [Sudarsono \(2017\)](#). Generally, when BI increases SBIS yields, Islamic banks will respond by

channeling their funds in the form of SBIS. This happens because SBIS is considered profitable compared to channeling funds in the form of financing, so Islamic banks will deposit their funds with BI. If Islamic banks channel more funds to SBIS and tend to depend on passive income from SBIS, the funds channeled in the form of financing will tend to decrease and the acceleration of funding in the business sector will be low so that the impact will be low on real economic growth.

The VECM results also show that a high number of Islamic Interbank Money Market (PUAS) transactions will have a negative impact on economic growth. The results of this study are consistent with [Ehigiamusoe & Kizito \(2013\)](#) which show that although there is a long-term relationship between the money market and economic growth, the money market in Nigeria has a negative impact on economic growth. The relationship between the money market and the real sector of the economy is still very weak. This implies that the market has not yet developed enough to generate the required growth that will propel the economy due to several challenges.

CONCLUSION

Monetary policy has an important role in a country's economy. Monetary policy is central bank activity in influencing real economic activity and prices through various mechanisms. If a monetary policy is implemented properly, it can create price stability, financial markets and the foreign exchange market, and even create economic growth. The purpose of this study is to determine the contribution of monetary instruments to economic growth in Indonesia. From the

results of the analysis that has been carried out, it can be seen that in the long run, interest rates, exchange rates, Islamic Interbank Money Market (PUAS), and Bank Indonesia Sharia Certificates (SBIS) have a significant effect on economic growth. This means that monetary policy through sharia instruments has more influence on economic growth, this is also supported by the FEVD results where SBIS contributes to explaining the variability of six percent on economic growth. Then, the IRF results show that only the exchange rate variable reacts negatively to shocks from GDP for 48 periods. The results of this study also prove the relationship between monetary policy and economic growth in accordance with the economic theory contained in previous studies.

Based on the findings of this study, recommendations can be made that can become policy instruments for Indonesia's economic development. Although monetary policy instruments are very important in influencing changes in prices, output and economic developments, the central bank still needs to carry out comprehensive monitoring of monetary aggregates. For example, policy implementation can be focused on controlling and manipulating short-term interest rates, both in the form of the prime lending rate and the treasury bills rate, as the main instrument of monetary transmission for the economic performance of the domestic economy. Monetary authorities should focus their efforts on increasing the influence of money supply growth on the country's economic growth. The money supply is a very important tool because of the flexibility and ease with which monetary authorities can manipulate it to suit the current prevailing economic situation. For future research, it is important to use better methods and models such as Markov Switching VAR to see the possibility and prediction of shocks (Nurfalah & Rusydiana, 2021; Rusydiana et al., 2021; Nurfalah et al., 2018). Likewise the use of more updated data.

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