

Fiscal and Monetary Policy Interaction Post Indonesian Institutional Transformation: Vector Autoregression Approach

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Abstract

A consensus to separate fiscal and monetary authority emerged to achieve optimal macroeconomic conditions through credible policy. This paper aims to analyze the interaction between fiscal-monetary policy after the Indonesian institutional transformation in 1999 and its impact on GDP. Using the Vector Autoregression approach, this study utilizes seven variables from 1999 Q2 – 2019 Q4: government revenue, spending, and financing as fiscal policy variables; interest rate and money supply as monetary policy variables; GDP as a macroeconomic variable; and CPI to deflate all variables.

This study showed that fiscal and monetary policy in Indonesia tends to have a mixed interaction: the fiscal and monetary authorities not only jointly implement the same expansionary or contractive policy but also mutually substitute or implement opposing policies simultaneously. In terms of interactions with GDP, fiscal policy showed a stronger and more direct influence than monetary policy. Increasing government spending and money supply while reducing or maintaining the stability of government revenues, government financing, and interest rates is the best policy mix to support GDP growth in the short run. In the long run, all variables in the study, except money supply, support GDP growth. The results emphasize strengthening policy framework and coordination to achieve optimal GDP growth.

Keywords: Fiscal Policy; Monetary Policy; GDP Growth; Policy Interaction

JEL Classification: E52, E60, E62, E63

1. INTRODUCTION

The opinion of classical economists who rejected the role of authority in intervening in the economy (*laissez-faire*) faced a challenge when the Great Depression hit the United States in 1929. This depression became a starting point for Keynesian economics development, which emphasized the important role of authorities in directing the economy to its intended condition. The consensus to separate fiscal and monetary policy authorities began to develop in 1990 to maximize efforts to achieve economic growth at a stable price level (Alcidi & Thirion, 2016). This separation was also done to minimize the potential for the fiscal authority to influence the monetary authority's policies to fund government expenditures (Jazbec & Banerjee, 2017).

As an initial response to restore economic conditions after the 1997/1998 financial crisis, institutional transformation in Indonesia began in 1999. The transformation was first carried out by separating fiscal and monetary authorities through Law Number 23 of 1999 concerning Bank Indonesia. This law reinforces the role of Bank Indonesia as an independent Central Bank focusing on determining monetary policy. The institutional transformation from the fiscal side was carried out through fiscal decentralization by the mandate of Law Number 25 of 1999 concerning the Financial Balance between

Central and Regional governments. Those institutional transformations were followed by various policy transformations, such as the government's deficit budget principle and fiscal rules, Bank Indonesia's Inflation Targeting Framework (ITF), and benchmark interest rate adjustments. Various policy transformations then followed this institutional transformation. From the fiscal side, to increase transparency and public accountability, the fiscal authority has implemented the deficit budget principle since 2001 and fiscal rules since 2003. From the monetary side, Bank Indonesia has implemented the Inflation Targeting Framework (ITF) since 2005, which changed the target of Bank Indonesia's monetary operation from base money to using the reference interest rate. To strengthen monetary policy transmission to the economy, Bank Indonesia has made two adjustments to the benchmark interest rate, the SBI rate to the BI Rate and then the 7DRRR. Coordination of fiscal and monetary policies in Indonesia to achieve common perceptions of economic targets has been carried out through various ways such as coordination meetings, joint discussion of State Budget Macro Assumptions, government debt management cooperation, the formation of a Coordinating Team for Targeting, Monitoring and Controlling Inflation (TPI) in central and regional levels since 2005 and an active role in the Financial System Stability Committee (KSSK) since 2016.

A solid fiscal and monetary policy framework supports credible policy implementation. However, fiscal and monetary policy in Indonesia has slightly different objectives. Law number 12 of 2018 concerning the State Budget (APBN) for 2019 FY sets fiscal policy targets to achieve a higher quality of economic growth reflected in reduced poverty, unemployment rate, Gini ratio, and increased HDI. On the other hand, Law No. 23 of 1999 concerning Bank Indonesia sets a single monetary policy objective of achieving and maintaining the stability of rupiah. As stated in the law, separation of authority and different fiscal and monetary policy targets can potentially create tradeoffs that could negatively impact the economy.

This study aims to determine the interaction between fiscal and monetary policy in Indonesia after the period of institutional transformation and how the GDP responds to the shock that comes from the two policies. In addition, this study will also further identify a policy mix that could significantly support GDP growth in the short and long term. The study objective was to analyze economic data from 1999 to 2019, or since the beginning of Indonesia's institutional transformation in 1999, using the Vector Auto Regressive method.

2. LITERATURE REVIEW

2.1 The Theory of Economic Growth, Fiscal Policy, Monetary Policy, and the AD-US Balance and the IS-LM Model in the Economy

In his book, *The General Theory of Employment, Interest, and Money* (1936), John Maynard Keynes argues that aggregate expenditure, which is the sum of all expenditures made by households (C), business actors (I), and government (G), is the main factor affecting economy (Jahan et al., 2014). The emphasis that Keynes put on this theory is the importance of the role of government in overcoming short-term economic problems, especially when the economy is stagnating. A sufficient increase in government spending will increase the income of households and the business sector, then increase spending on consumption and investment, and ultimately increase economic output.

Fiscal policy is an economic policy to direct economic conditions by changing government income and expenditure (Rahayu, 2014). Based on theory, fiscal policy has three functions that were first put forward by Musgrave in 1957: overcoming short-term economic fluctuations, providing goods and services to the public in the most efficient way, and distributing income and wealth for society (International Monetary Fund, 2017). These three functions are carried out using the main instruments determined annually: government revenue through taxation policies, government spending, and government financing when government income is insufficient to fund its spending.

Monetary policy is a monetary authority or central bank policy controlling monetary quantities to achieve price stability, economic growth, and sufficient job opportunities (Warjiyo & Solikin, 2003). The monetary policy framework consists of policy instruments, operational objectives, intermediate

goals, and final objectives. If the final monetary policy targets are price stability and economic growth, the intermediate targets are M1, M2, credit, and interest rates. The central bank uses operational targets in the form of base money/M0 and/or a reference interest rate to transmit its policies. The economy's monetary policy transmission mechanism is transferred through several channels: interest rates, exchange rates, asset prices, credit, and expectations (Warjiyo & Solikin, 2003).

Aggregate Demand Balance (AD) and Aggregate Supply (AS) are macroeconomic tools for studying output fluctuations and price levels in an economy (Dornbusch et al., 2011). The AS curve describes the price adjustment mechanism in the economy. When Keynesian economists argue that the AS curve is horizontal due to price stickiness in the short run, the Classical economist argues that the AS curve is vertical due to the full employment conditions in the long run. In the long run, the shift in the AS curve is caused by several factors that change production input, such as labor, capital, natural resources, and the use of technology. The AD curve shows the combination of output at various price levels when the equilibrium of the goods and money markets occurs in the economy. The IS-LM model developed by Hicks (1937) and Hansen (1949) from Keynes' macroeconomic theory can be used to observe shifts in the AD curve. The changes in the IS-LM balance are influenced by several factors, such as changes in the price level, fiscal, and monetary policy (Ramayandi & Tjahjawardita, 2014). In the long run, both the AD and AS curves shift to the right. However, the AS curve generally only shifts slightly, while the size of the change in the money supply determines the size of the AD curve shift.

2.2 Empirical Study on the Interaction of Fiscal and Monetary Policy and Its Impact on GDP

Several studies on analyzing fiscal and monetary policy interaction have been done before in many countries.

Büyükbaşaran et al. (2020) found that Turkey's fiscal and monetary policy in 2003-2018 tends to implement complementary policies when the shock in the economy originates from AD and AS factors but will be mutually substituted if the shock is coming from the changes in opposing policies. In the US and European Union, Afonso & Gonçalves (2020) found that the two policies interact in a complementary manner due to the crisis conditions.

Tule et al. (2020), who conducted research on the Nigerian economy from 2003-2017, underline the importance of the portion of government policy to be able to influence the economy. The weak GDP response to fiscal policy shock indicates that the portion of Nigeria's budget for sectors that support economic growth is inadequate. Research conducted by Abdul (2019) on the Nigerian economy from 1981 to 2016 found that monetary policy shocks had a positive impact on GDP in the short and long term but had a negative impact on short-term fiscal policy. Thus, expansionary fiscal and monetary policies to increase aggregate demand should not be carried out simultaneously.

Research on the Serbian economy in 2007-2016 conducted by Bungin (2017) has similar results to domestic research on the Indonesian economy in 2001-2017 conducted by Setiawan (2018), where fiscal policy shock in the form of increasing government spending has a positive and significant impact on economic growth and the monetary policy shock in the form of increasing benchmark interest rate had the opposite effect. Akhyar et al. (2019) found that in Indonesia, fiscal policy was more effective in achieving a more rapid economic growth rather than monetary policy. However, it requires a balanced monetary policy so that monetary conditions do not affect welfare.

3. METHODOLOGY

3.1 Research Data

The data used in this study are secondary data from the Ministry of Finance, Bank Indonesia, the Central Bureau of Statistics, and CEIC in 1999: 2-2019:4.

TABLE-I: Research Data

Variable	Unit	Operational Definition
Government Revenue (GR)	billion IDR	Total cash come in state accounts: tax, non-tax receipts, and grants
Government Spending (GS)	billion IDR	Total expenditure: KL, non-KL, Regional Transfers, and Village Fund (Dana Desa) expenditures.
Government Financing (GF)	billion IDR	Government revenues & expenditures that need to be repaid and received back: debt, investment, loans, guarantees, & other financings.
Interbank Call Money Rate (R)	p.a.	Central bank monetary target at the operational level, the agreement price formed between banks in their lending and borrowing activities
Money Supply (M)	billion IDR	M1 includes: currency (metal and paper) and demand deposit (checks, current accounts, ATM cards, billiards, and electronic money)
Gross Domestic Product (GDP)	billion IDR	Real GDP, the total output of goods and services produced by an economy during a year
Consumer Price Index (CPI)	2012 =100	An index that shows changes in the prices of goods and services in an economy.

CPI variable is used to eliminate the impact of price on other variables. To eliminate the cyclicity that occurs in the quarterly data, all variables are then processed to real growth year-on-year units so that 2000-2019 data is obtained. Using the Vector Autoregression (VAR) approach, the selection of the data period will show the interaction between fiscal policy and monetary policy in Indonesia after the institutional transformation in 1999.

3.2 Data Analysis Method

This study is conducted using a descriptive and quantitative analysis approach. The VAR method is considered suitable for analyzing the interaction between variables in this research because it has four types of uses: forecasting, impulse response function (IRF), variance decomposition (VD), and Granger Causality Test (Firdaus, 2020). The VAR equation consists of a linear combination in the past (lagged) of a variable and other variables in the model and a stochastic term error (Gujarati & Porter, 2009). According to Firdaus (2020), one of the VAR method's weaknesses is the requirement for stationary and non-cointegrated data. For this reason, four steps need to be done before analyzing data with the VAR method: Stationarity Test, Optimum Lag Test, VAR Stability Test, and Cointegration Test.

Augmented Dickey-Fuller (ADF) stationarity test at the level and first difference are carried out to determine the behavior of the data and the possibility of a unit root in the time series to avoid a regression that does not reflect the real conditions. The Optimum Lag test is then carried out to avoid inaccurate lag selection and the loss of degrees of freedom, resulting in statistically insignificant coefficient values, multicollinearity, and errors in model specification. This study did a VAR stability test by observing the graphs of characteristic polynomial roots to ensure that the VAR model is stable at the optimal lag. The stable VAR model is a prerequisite for a valid result of Impulse Response Function (IRF) and Variable Decomposition (VD). Finally, Johanssen's Cointegration Test is carried out to ensure that long-term balance, the similarity of stability and movement between variables in the study, did not occur. If cointegration is detected, the more appropriate estimation method for the research is the Vector Error Correction Model (VECM). However, the significance of cointegration also needs to be considered in choosing the suitable estimation method. After the data meets the stationary and non-cointegrated requirements, VAR data processing can proceed with causality, IRF, and VD tests.

A causality test is conducted to determine the causality relationship between variables and the ability of each variable to influence other variables in the future. IRF analysis is performed to see the response of a variable when a shock occurs from other variables in the model and to find out how long the shock response lasts. VD analysis is carried out to measure each variable's contribution or proportion to other

variables in the model. To simplify the analysis of IRF and VD, the analysis is classified into three periods: short-term (less than four periods/less than 1 year), medium-term (5 to 20 periods/1 to 5 years), and long-term (more than 20 periods/5 years).

Furthermore, this research will focus on analyzing fiscal policy, monetary policy, and GDP responses to fiscal and monetary policy shocks. The interpretation of the regression and the VAR model specification is not the study's focus, so it will not be further analyzed.

4. RESULT OF ANALYSIS AND DISCUSSION

4.1 Descriptive Analysis

Descriptive analysis was carried out to find an overview of the condition and policy response of the Indonesian economy within the study period. Observation of economic conditions is carried out through periodization of research periods based on periods of institutional transformation and implementation of the National Medium-Term Development Plan (RPJMN).

a. Institutional Transformation Period (2000-2004)

During this period, Indonesian authorities' policies focused on efforts to restore economic conditions after the Asian financial crisis in 1997/1998. The crisis provides evidence of the importance of financial and banking sector stability and the importance of having the fiscal capacity to direct the economy. As a response to this urgency, the government carried out an institutional transformation both from the monetary and fiscal sides in the form of strengthening the independence of the central bank through the enactment of Law No. 23/1999 on Bank Indonesia, the establishment of the Deposit Insurance Corporation (LPS) which was established by Law No. 24/2004 on LPS, and the implementation of fiscal decentralization and regional autonomy as mandated by Law No. 25/1999 concerning Balancing Funds and Law no. 32/2004 concerning Financial Balance between Central and Regional Government. This institutional transformation was strengthened by a series of policy transformations in establishing fiscal rules by Law No. 17/2003 concerning State Finance. As a measure to ensure the welfare of society, in 2004, the government enacted Law 40/2004 on the National Social Security System.

b. Implementation Period of RPJMN I (2005-2009)

The commodity prices boom supported the recovery of the Indonesian economy during the implementation period of the RPJMN I. Indonesia export's structure in this period was dominated by natural resource export. However, Indonesia's economic growth then slowed down due to the world economic crisis in 2008. This event caused the rupiah exchange rate to fluctuate up to a level of Rp12,000 in 2008 from a level of Rp9,000 in 2005. In response to this condition, the government implemented several economic policy packages such as direct cash assistance (BLT) incentives to compensate the impact of the three times increasing subsidized fuel price, simplifying income tax rates (PPh), increasing non-taxable income taxes (PTKP) and various tax incentives. In 2005, Bank Indonesia implemented the Inflation Targeting Framework (ITF), which changed the operational target of monetary policy from base money (M0) to the benchmark interest rate. The government established procedures to handle crisis management through Perpu no. 4/2008 concerning Financial System Safety Net (JPSK) to strengthen the financial sector further.

The policies adopted by the Indonesian authorities positively impacted the economy. In the midst of the financial crisis that hit the world in 2009, Indonesia managed to grow at 4.6% YoY, the highest positive economic growth behind China and India.

c. Implementation Period of RPJMN II (2010-2014)

In the implementation period of the RPJMN II, the Indonesian economy experienced a slowdown caused by falling commodity prices in 2011. Moreover, high interest rates, slower growth in household consumption, and political turmoil in 2014 also contributed to the economic slowdown that occurred during this period. Inflation fluctuates in the range of 4.3% to 6.4% YoY. Indonesia's economic growth of 6.2% YoY in 2010 experienced a consecutive slowdown to 5% YoY in 2014. Nonetheless, the

Indonesian economy experienced a significant increase in foreign capital inflows, which became an opportunity as well as a challenge to grow the economy during this period.

During this period, government spending allocations were consistently allocated to fund the education sector and energy subsidies. Education spending has increased in line with the enactment of the 12 years compulsory education program in 2012. Although the government has adjusted electricity rates on a quarterly basis since 2013, the allocation of energy subsidies has increased due to the high oil prices. The government began focusing on infrastructure development by issuing Presidential Decree No. 32/2011 concerning the Master Plan for the Acceleration and Expansion of Indonesia's Economic Development 2011-2025 and the development of the Public-Private Partnership (PPP) scheme. The government established the Social Security Administration (BPJS) through Law No. 24/2011 concerning BPJS to create an integrated social security system. On the institutional side, to complement reforms in the financial system, in 2011, the Financial Services Authority (OJK) was established based on the enactment of Law No. 21/2011 concerning OJK with the mandate to regulate and supervise financial service providers in the banking, insurance, capital market, pension funds, financing, and other types of financial services sector.

d. Implementation Period of RPJMN III (2015-2019)

Although faced with a downward trend in commodity prices, a slowdown in global economic growth, particularly in China, and an escalation in the trade war between the United States and China, Indonesia's macroeconomic indicators show stability. Since 2016, Indonesia's economic growth has consistently been at 5% YoY, with an inflation rate of 4% YoY. Unlike the previous period, the rupiah exchange rates period also remained stable.

During this period, the government issued 16 economic policy packages intending to attract domestic investment, including the application of tax amnesty to expand the tax base and increase tax revenues in the long term, simplify investment provisions through deregulation, and debureaucratization, law enforcement, development various business sectors such as MSMEs and e-commerce. In addition, to accelerate village development and economic equality, since 2015, the government has disbursed Village Funds according to Law no. 6/2014 on Village. From the monetary side, to strengthen the transmission of monetary operations on the economy, Bank Indonesia changed the monetary policy instrument from the BI Rate to the 7DRRR, which became effective in August 2016. To strengthen reforms in the financial system, the government passed Law no. 9/2016 concerning Financial System Crisis Prevention and Management.

From the observations made in the four periods in the study period, it can be concluded that each period has its own challenges, resulting in policy responses that tend to be different from one another.

4.2 VAR Model Analysis

4.2.1 Preparation Data

a. Descriptive Statistics

There are 6 variables used in this study. Each of the variables is real and contains 79 quarterly data. In general, each variable showed a fluctuating trend depending on the dynamics of economic development.

TABLE-2: Descriptive Statistics

Variabel	N	Minimum	Maximum	Mean	Std. Dev.
GR	79	1,052.29	4,685.39	2,618.22	951.26
GS	79	1,034.96	5,289.92	2,914.69	1,186.33
GF	79	-1,263.79	1,531.75	315.74	544.91
R	79	(8.09)	10.52	0.16	3.02
M	79	3,356.42	11,286.74	6,498.59	2,483.51
GDP	79	1,007,082.60	2,818,887.40	1,755,744.93	534,289.79

Source: Data processed with Excel

GR showed a similar trend to GS in reaching its highest position in every 4th quarter of each year. During the observation period, GR fluctuated in the range of 1.05 – 4.69 trillion rupiah. The low GR at the beginning of the research period was due to fiscal transformation and Asian financial crisis recovery efforts. The highest GR that occurred in Q4 2018 was in line with the growth of revenues from all sectors, especially construction and real estate, and the increase in revenues from natural resources. On the other hand, GS reached its lowest value of 1 trillion rupiah in Q1 2005 due to the adjustment of subsidized fuel prices in March 2005 and reached its highest value of 5.3 trillion rupiah in Q4 2011 by the increase of all GS, especially on subsidies, social assistance, and transfer to the region in December 2011. After implementing a balanced budget policy in 2001, GF has fluctuated according to GR and GS realization. The highest and lowest GF during the observation period were in 2008, which was as low as -1.2 trillion rupiah in Q1 and as high as 1.5 trillion rupiah in Q4.

Real R experienced its lowest level in Q3 2006, which was -8.1 percent per year due to double-digit inflation in 2006 and was highest in Q1 2000 at 9.6 percent per year due to the implementation of tight monetary policy to control high inflation rates in previous quarters. Another monetary variable in this study, M, reached its lowest level in Q3 2000 at 3.4 trillion rupiah due to the increase in SBI interest rates. M at the highest level occurred in Q4 2019 at 11.2 trillion rupiah as the decrease of 7DRRR interest rate to ease economic uncertainty due to the trade war.

Constant GDP quarter to quarter during the observation tends to show an increasing trend, with the lowest value in Q2 2000 for 1,007 trillion rupiah and the highest value in Q3 2019 for 2,818.9 trillion rupiah. However, the highest level of economic growth occurred in Q4 2000, which was 16.03 percent q to q as evidence of recovery after the Asian financial crisis and then reached the lowest level in Q4 2001 at 1.56 percent q to q.

b. Stationarity Test and Degree of Integration

The stationarity of the study's data is identified by using the Augmented Dickey-Fuller Stationarity Test (ADF) with an α of 5%. The data is stationary if at $\alpha = 5\%$, the ADF statistical value < MccKinnon critical value and the probability value < significance value.

TABLE-3: Unit Roots Test Result

Unit Root	Level		
Variable	ADF Statistic	Prob.	Conclusion
GR	-3.035	0.0029	Stationary
GS	-3.157	0.0020	Stationary
GF	-7.501	0.0000	Stationary
R	-3.779	0.0003	Stationary
M	-3.480	0.0007	Stationary
GDP	-2.181	0.0290	Stationary

Source: Data processed with Eviews 11

The test results show that each variable in the study has an ADF statistical value smaller than the critical value of 5% and has a smaller probability value than the 5% significance value. Thus, all variables in the study have been stationary at the level.

c. Optimum Lag Test

Testing the optimal lag length for the VAR research model is carried out using the criteria of Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), and Hannan-Quinn Information (HQ).

TABLE-4: Optimum Lag Test Result

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1710.910	NA	5.72e+12	46.403	46.590	46.478
1	-1633.134	140.838	1.86e+12	45.274	46.582*	45.796*
2	-1606.110	44.5524	2.41e+12	45.517	47.945	46.485
3	-1558.125	71.3297	1.83e+12	45.193	48.742	46.608
4	-1501.127	75.484*	1.14e+12*	44.625*	49.295	46.488
5	-1473.482	32.128	1.69e+12	44.851	50.642	47.161

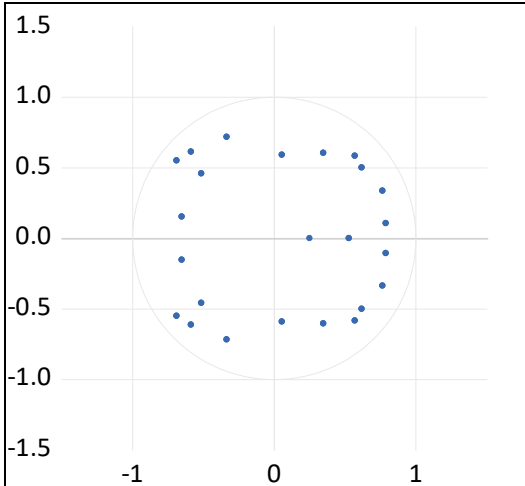
Source: Data processed with Eviews 11

Using the most reference guidelines, the results of Eviews processing show that the LR, FPE, and AIC criteria, or 3 of the 5 criteria choose 4 lags as the optimal lag for the VAR research model. Thus, this study will use an estimate with a lag of 4.

d. VAR Stability Test

The VAR stability test in this study is carried out by analyzing the roots of the polynomial function. Stability in the VAR model is detected if the test generated all the roots within the unit circle and all the modulus with a value of less than one.

TABLE-5: VAR Stability Test Result

Unit Circle	Roots	Modulus
	-0.688992 + 0.550717i	0.8820
	-0.688992 - 0.550717i	0.8820
	-0.586830 - 0.613170i	0.8487
	-0.586830 + 0.613170i	0.8487
	0.765959 - 0.335941i	0.8364
	0.765959 + 0.335941i	0.8364
	0.570237 - 0.583328i	0.8158
	0.570237 + 0.583328i	0.81578
	0.618630 - 0.500743i	0.7959
	0.618630 + 0.500743i	0.7959
	0.788694 - 0.105676i	0.7958
	0.788694 + 0.105676i	0.7958
	-0.334656 + 0.718078i	0.7922
	-0.334656 - 0.718078i	0.7922
	0.348297 - 0.603718i	0.6970
	0.348297 + 0.603718i	0.6970
	-0.514401 + 0.457892i	0.6887
	-0.514401 - 0.457892i	0.6887
	-0.651673 - 0.152409i	0.6693
	-0.651673 + 0.152409i	0.6693
	0.054625 - 0.590890i	0.5934
	0.054625 + 0.590890i	0.5934
	0.528426	0.5284
	0.249963	0.2500

Source: Data processed with Eviews 11

Using lag length of 4, the VAR model stability test results show that all the roots of the polynomial function are in the unit circle and have all the modulus with an absolute value less than 1. Thus, it can be seen that the VAR model at the 4th lag is stable.

e. Cointegration Test

Johanssen's Cointegration Test determines whether there is a long-term balance between the variables and selects the appropriate estimation method by looking at Trace and Max-Eigen statistic values. Cointegrated data is detected when Trace and Max-Eigen statistic value > critical value 5%.

TABLE-6: Cointegration Test Result (Trace)

Hypothesized No. of CE(s)	Trace Statistic	Critical Value 5%	Prob.
None *	106.6017	83.93712	0.0005
At most 1 *	60.44794	60.06141	0.0464
At most 2	38.33479	40.17493	0.0757
At most 3	19.78726	24.27596	0.1661
At most 4	6.836450	12.32090	0.3417
At most 5	0.178140	4.129906	0.7266

Source: Data processed with Eviews II

TABLE-7: Cointegration Test Result (Max-Eigen)

Hypothesized No. of CE(s)	Max-Eigen Statistic	Critical Value 5%	Prob.
None *	46.15375	36.63019	0.0029
At most 1	22.11316	30.43961	0.3743
At most 2	18.54753	24.15921	0.2398
At most 3	12.95081	17.79730	0.2310
At most 4	6.658310	11.22480	0.2807
At most 5	0.178140	4.129906	0.7266

Source: Data processed with Eviews II

The test output shows that based on the Trace Statistic value, there are at least two cointegration and based on the Max-Eigen Statistics value, at least one cointegration occurs between the variables in the study.

The cointegration between the research variables suggests using Vector Error Correction Model (VECM) estimation. VECM estimation is generated to ensure the significance of the cointegration.

TABLE-8: VECM Estimation

Error Correction	D(GR)	D(GS)	D (GF)	D(R)	D(M)	D(GDP)
CointEq1	0.52753	0.94403	15.4092	-0.04130	0.01093	-0.00532

Source: Data processed with Eviews II

The output of the VECM estimation model shows that not all error correction coefficients are significant and negative. This result indicates that the cointegration that occurs is insignificant. Thus, VECM analysis is not appropriate for use in research, so further research will use VAR analysis.

4.2.2 VAR Analysis

a. Causality Test

Pairwise Granger Causality Test was conducted using an F-table value of 2.3475 and a critical value of 5%. A causality relationship is then detected if the value of the F-statistic > the value of F-table and probability value < critical value 5%. The other way of causality test is by observing the t-statistic value of VAR Regression with the t-table value of 1.9949 and critical value of 5%. If t-statistic value > t-table value, causality can be concluded.

TABLE-9: Comparison of Causality Test Results

Dependent Variable	Independent Variable and the Casuality		Nature of Interaction
	<i>Pairwise Granger Causality</i>	<i>t-statistic</i> VAR Regression	
GS	GS does Granger cause M	M(-2): positive, significant	Complementary
R		GR(-2): negative, significant	Substitution
		GS(-3) positive, significant	Substitution
M		GR(-3): negative, significant	Complementary
		GS(-3) positive, significant	Complementary
GDP	GDP does Granger cause GR	GS(-3) positive, significant	-
	GDP does Granger cause GS		
	GDP does Granger cause GF		

Source: Data processed with Eviews II

The two tests show a similar result on a one-way relationship between money supply and government spending. It shows that government spending decisions are determined by existing economic conditions reflected by the size of the money supply. The theory of the goods market states that in a sluggish economic condition characterized by a low money supply, the government is encouraged to increase money supply by increasing government spending—and vice versa.

In terms of causality between monetary policy as the dependent variable and fiscal policy as an independent variable, only the *t*-statistic VAR Regression method shows a one-way relationship between all monetary policy variables to government revenue and expenditure. The interest rate is negatively influenced by government revenue at the second lag and positively influenced by government spending at the third lag. This result means that an increase in government revenue causes a decrease in interest rates. High government revenue reflects an increase in household and business income, which indicates economic growth. In a good economic condition, banks in Indonesia tend to respond by lowering or not raising interest rates. The interest rate, which is positively influenced by government spending in the third lag, shows conformity with the goods market theory. On the other hand, money supply is negatively influenced by government revenue at the third lag but positively influenced by government spending at the third lag. This result is also in accordance with the goods market theory, which states that fiscal policy in the form of government revenue and expenditure affects the money supply.

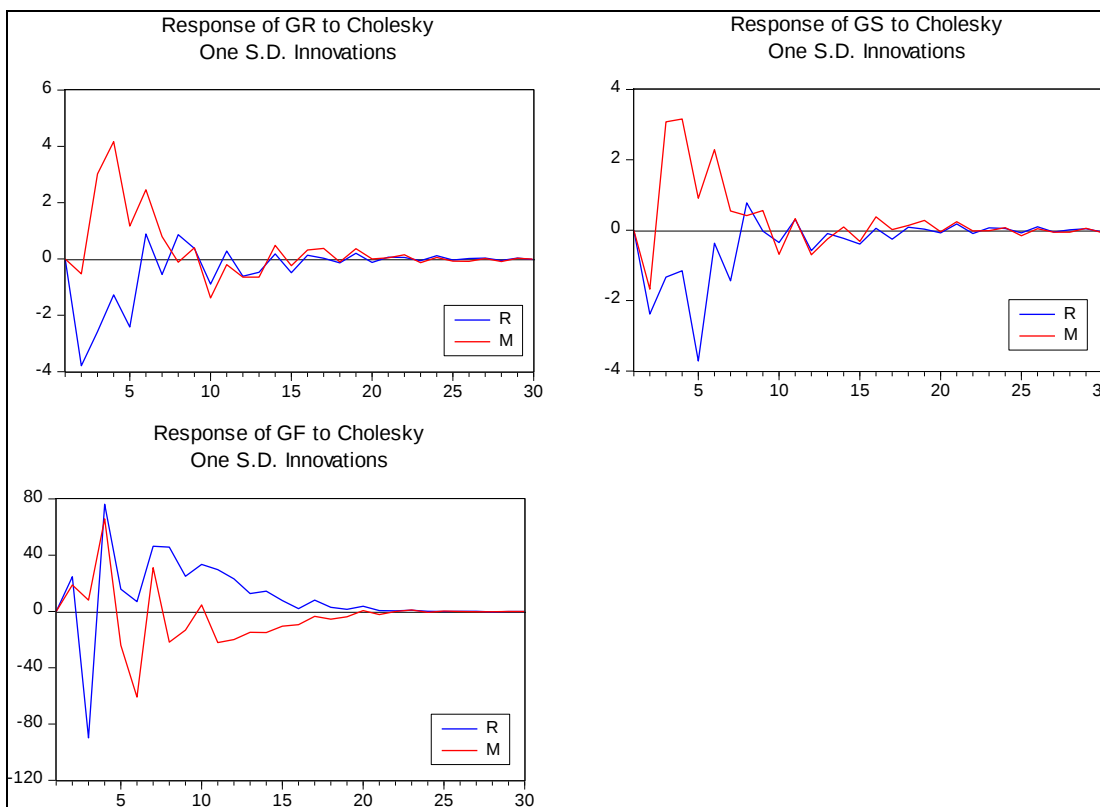
Significant variable coefficient indicates that while expansionary fiscal policy in the form of an increase in government spending is responded by an increase in interest rates (substituted) and an increase in money supply (complemented), contractionary fiscal policy in the form of an increase in government revenue is responded by a decrease in interest rates (substituted) and a decrease in money supply (complemented). Fiscal policy changes will be responded substitutionally by interest rates but complementarily by money supply.

In terms of the causality test between GDP and the two policies, when the *t*-statistic of the VAR regression method only detects a significant causal relationship between government spending and GDP, the Pairwise Granger Causality Test detects a significant causal relationship not only on government spending but on all fiscal policy variables. The absence of a significant causal relationship between monetary policy variables and GDP indicates that monetary policy instruments in this research do not directly and significantly influence GDP.

b. Impulse Response Function (IRF)

IRF analysis can be observed through the output of Eviews in the form of a graph with a horizontal axis as a period of time and a vertical axis as a percentage response value. A variable's response to shock will disappear when the impulse response graph movement is getting closer to the balance point or returning to the previous balance. To simplify the analysis, the IRF conclusions are obtained by averaging the impulses from each period.

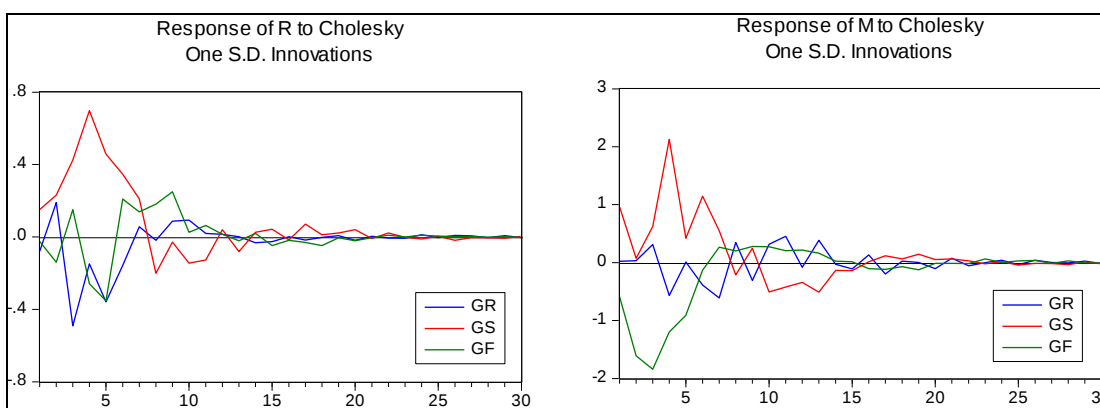
PICTURE-1: Fiscal Policy Response to Monetary Policy Shock



Source: Data processed with Eviews II

IRF analysis on fiscal policy response to monetary policy shock tends to show a similar result in the short term. In the short term, all fiscal policies respond positively to money supply shock and, unless government financing, respond negatively to interest rate shock. There are consistency in a short and medium term for the result of interest rate shock. Interest rate shock will negatively affect government revenues and expenditures not only in a short term but also in medium term.

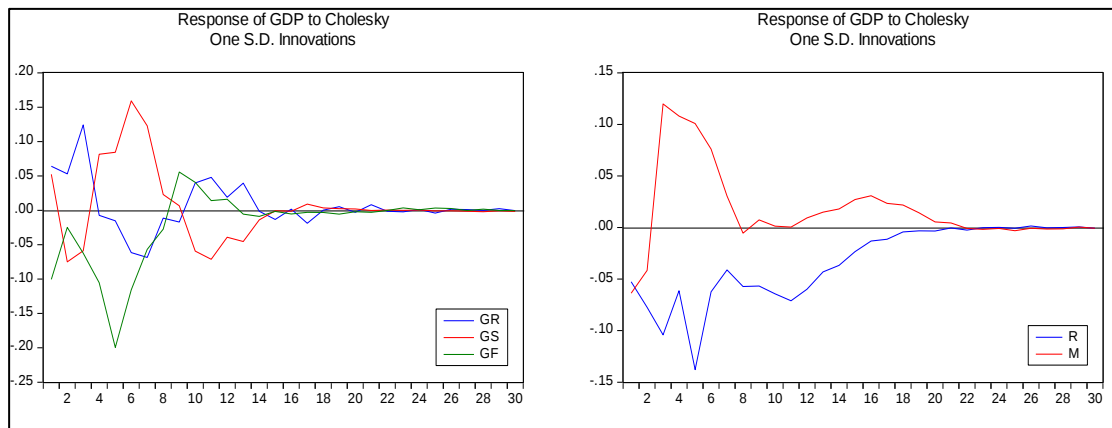
PICTURE-2: Monetary Policy Responses to Fiscal Policy Shock



Source: Data processed with Eviews II

IRF analysis on monetary policy response to fiscal policy shock shows that in a short term, monetary policy tends to respond negatively to government revenue and financing shocks but responds positively to government spending shocks. However, the opposite occurs in a long term.

PICTURE-3: GDP Response to Fiscal Policy and Monetary Policy Shock



Source: Data processed with Eviews II

IRF analysis of GDP response to fiscal and monetary policy shocks shows that government spending is the only variable that consistently supports GDP in a short, medium, and long term. Government revenue shows a positive impact on GDP in the short term. This implies the use of government revenue to fund government spending in the current year. In addition, it is also found that government revenue and financing support GDP in the long run. This relates to the long-term benefit of government capital expenditure and investment which is generally financed by government revenues and financing. The results of the IRF highlight interest rate as one of the variables that does not support GDP in a short and medium term but in a long term due to the reduced impact of price stickiness in the long run. When money supply positively impacts to GDP in a short and medium term, the contrary happens in a long term.

TABLE-10: Summary of IRF Analysis

Response	Shock	Time Period			Stability (Period of)	Nature of Interaction*
		Short	Medium	Long		
GR	R	-	-	+	25	Substitution
	M	+	+	-	27	Substitution
GS	R	-	-	+	24	Complementary, contractionary
	M	+	+	+	22	Complementary, expansionary
GF	R	+	+	+	25	Complementary, contractionary
	M	+	-	-	26	Substitution
R	GR	-	-	+	18	Substitution
	GS	+	+	-	21	Substitution
	GF	-	+	+	19	Substitution
M	GR	-	-	+	23	Complementary, contractionary
	GS	+	+	-	22	Complementary, expansionary
	GF	-	+	+	20	Complementary, contractionary
GDP	GR	+	-	+	18	contractionary
	GS	+	+	+	15	expansionary
	GF	-	-	+	15	contractionary
	R	-	-	+	18	contractionary
	M	+	+	-	20	expansionary

Source: Data processed with Eviews II

*in the short term

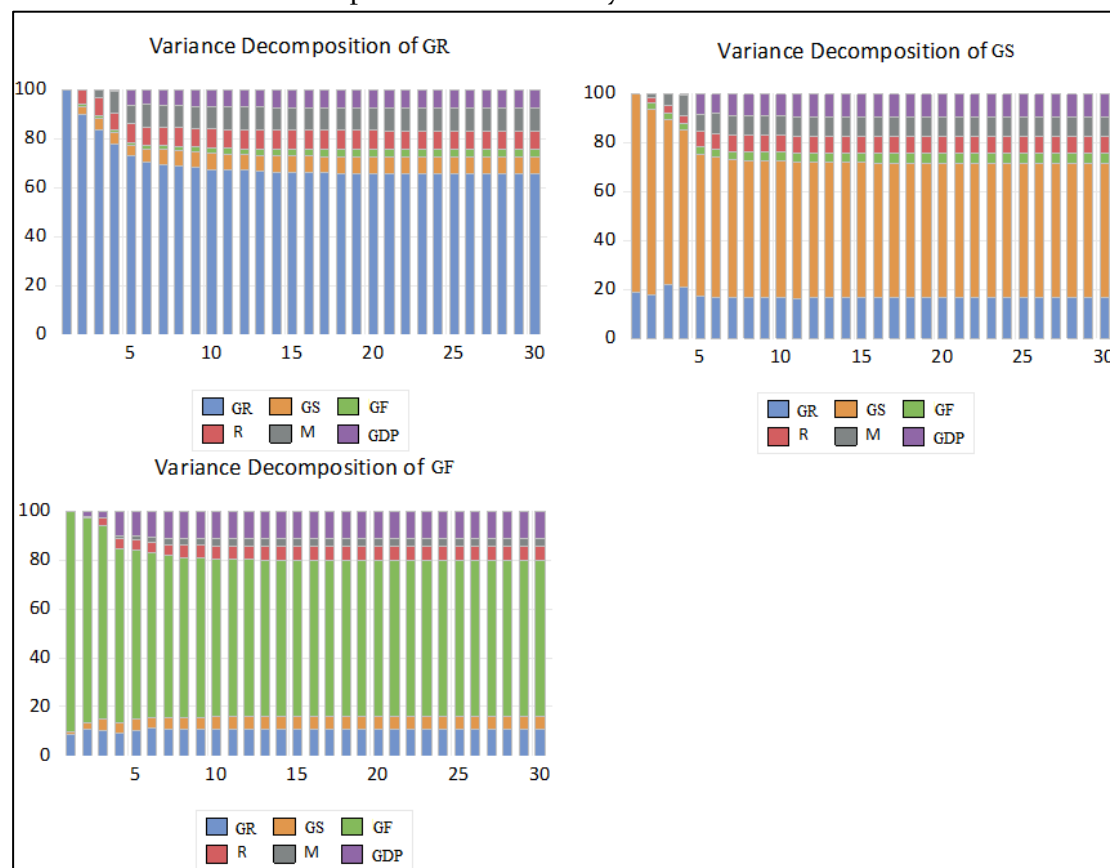
By averaging the value of impulse response to the shocks of opposing policies in the same period, it is found that, in the short term, fiscal and monetary policy show the same amount of interaction: 6 complementary and 6 substitutions. Meanwhile, 4 out of 6 complementary interactions are contractive policy. All variables in the study achieve stability in the medium-end and long-term time periods.

In general, 3 conclusions that can be drawn from IRF analysis. First, interest rate shock causes short and medium-term fluctuations of all fiscal policy variables in a negative area. On the other hand, in a short term, all monetary policy variables tend to respond to the shocks from government revenue and financing negatively but positively respond to the shocks from government spending. In general, all fiscal and monetary policy variables achieve stability in the medium-end and long term. Second, fiscal and monetary policy variables during the research period show a mixed interaction: the two authorities not only jointly implementing the same expansionary or contractive policy but also mutually substituting or implementing opposing policies simultaneously. This shows that policy intervention is not only carried out to balance the impact of the policy from the opposing authority but also to direct the economy to a predetermined level. Third, government revenue, government expenditure, and money supply support GDP in a short term. Government financing and interest rate support GDP only in a long term. Government spending is a consistent variable to support GDP in all terms.

c. Variance Decomposition (VD)

VD analysis is carried out to explain the size of the contribution of each variable to the variable itself and the other variables in the future (forecast).

PICTURE-4: Variance Decomposition of Fiscal Policy



Source: Data processed with Eviews 11

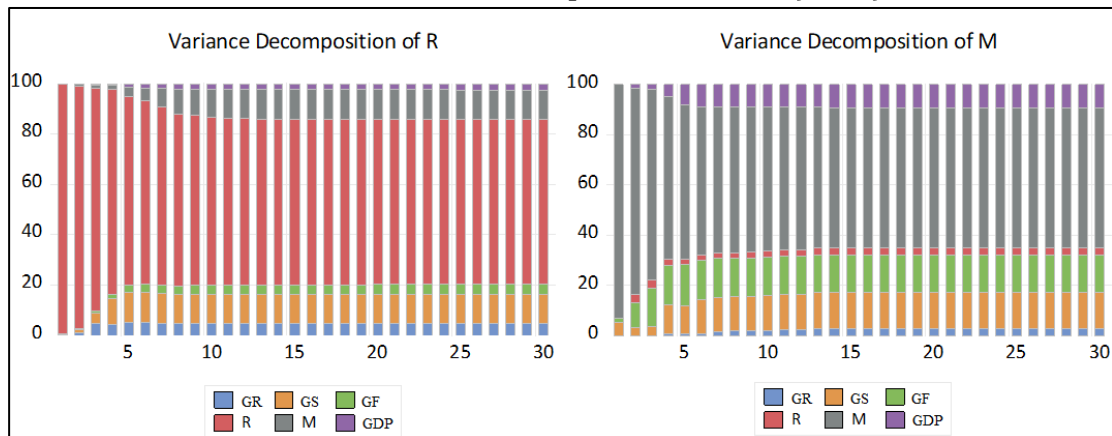
In the first period, the main contributor of government revenue is the variable itself. Money supply and interest rates are the 2nd and 3rd largest contributors in the short and long term which shows their relatively strong influence to government revenue. In the short term, government spending

contributes more than GDP in shaping government revenue. However, the opposite happens in the long run. Government financing has a small contribution of 1% in the short term and 3% in the long term.

The contributors of government spending in the first period are the variable itself for 81.1% and government revenue for 18.9%. In the short and long term, government revenue becomes the second largest contributor to government spending which confirm the IRF analysis that the primary source of government spending is government revenue. The contribution of the money supply is greater than government financing in the short term. However, the opposite happens in the long run. Government financing in the long term contributes more to government spending rather than in the short term. This shows that government financing is a long-term source of funding for government spending.

Government financing, revenue, and expenditure are 3 main contributors that shape government financing in the first period. This shows that in determining financing decisions in the very short term, the government will pay more attention to the existing conditions of government revenue and expenditure. Respectively, based on the highest contribution, GDP, government revenue, interest rate, government expenditure, and money supply managed to maintain the magnitude of their influence to shape government financing in the short and long term.

PICTURE-5: Variance Decomposition of Monetary Policy

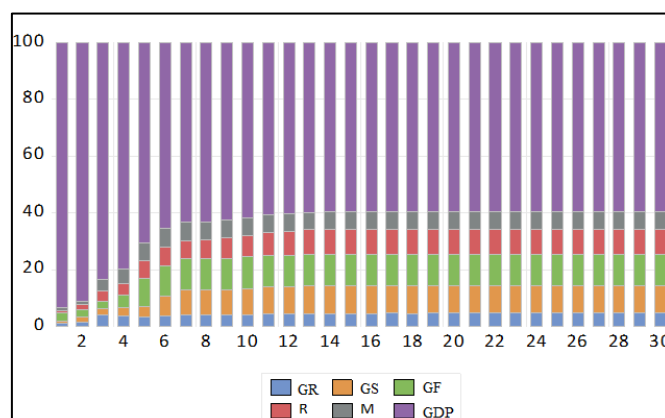


Source: Data processed with Eviews 11

In the first period, the most significant contributor to the interest rate is the variable itself for 99.3% and government expenditure and revenue for the rest. In the short term, all fiscal policy variables contributed 16.3%, and the money supply contributed only 1.5%. In the long run, money supply contributes more percentage rates rather than in the short term. In the short and long term, GDP makes the lowest contribution to interest rates.

The contribution of money supply in the first period is the variable itself for 92.9% and government expenditure and financing for the rest. Government financing, government spending, and GDP remain as the 2nd, 3rd, and 4th largest contributors in the short and long term. Interest rates are more capable of influencing money supply in the long run than in the short term.

PICTURE-6: Variance Decomposition of GDP



Source: Data processed with Eviews 11

All variables in the study have a contribution to GDP. In the first period, the contributors to GDP are GDP for 93.4%, government financing for 2.8%, government revenue and money supply for 1.1% each, and government spending and interest rates of 0.8% each. However, fiscal policy variables have a greater total contribution to GDP in the short and long term compared to monetary policy variables.

TABLE-11: Summary of VD Analysis

Variable	Variance Decomposition (%)					
	1 st period		Short term (4 th period)		Long term (21 st Period)	
GR	GR	100.0	GR	77.9	GR	65.7
			M	8.6	M	9.3
			R	7.3	R	7.8
			GS	4.6	GDP	7.4
			GF	1.0	GS	6.9
			GDP	0.7	GF	2.9
GS	GS	81.1	GS	64.2	GS	55.2
	GR	18.9	GR	20.9	GR	16.7
			M	8.2	GDP	9.6
			R	3.3	M	7.8
			GF	2.9	R	6.7
			GDP	0.5	GF	4.0
GF	GF	90.3	GF	71.0	GF	64.0
	GR	8.6	GDP	10.1	GDP	11.4
	GS	1.1	GR	9.4	GR	10.8
			R	4.1	R	5.7
			GS	4.0	GS	5.1
			M	1.3	M	3.0
R	R	99.3	R	81.5	R	65.7
	GS	0.5	GS	10.4	GS	11.6
	GR	0.1	GR	4.3	M	11.6
			GF	1.5	GR	4.6
			M	1.5	GF	3.9
			GDP	0.7	GDP	2.5
M	M	92.9	M	64.7	M	55.8
	GS	5.2	GF	15.5	GF	15.1

Variable	<i>Variance Decomposition (%)</i>					
	1 st period		Short term (4 th period)		Long term (21 st Period)	
GF	GF	1.9	GS	11.6	GS	14.4
			GDP	4.9	GDP	9.2
			R	2.4	GR	2.8
			GR	0.8	R	2.7
GDP	GDP	93.4	GDP	79.5	GDP	59.3
	GF	2.8	M	5.3	GF	10.9
	GR	1.1	GF	4.3	GS	9.8
	M	1.1	R	3.9	R	8.8
	R	0.8	GR	3.8	M	6.5
	GS	0.8	GS	3.1	GR	4.7

Source: Data processed with Eviews II

VD analysis concludes with several points. First, the most significant contributor of each variable in the study during the first, short-term, and long-term period is always the variable itself. However, the biggest contributor's impact decreased over time, indicating a relative change in influence between the variables over time. Second, while monetary policy variables become the 2nd and 3rd largest contributors only to government revenue, fiscal policy variables were found to be the 2nd most significant contributors to government spending, interest rates, and money supply. Third, in terms of fiscal and monetary policy impact on GDP, fiscal policy variables show a more significant contribution to GDP than monetary policy variables.

5. CONCLUSIONS AND RECOMMENDATIONS

There are at least 3 conclusions that can be drawn from this study. First, fiscal and monetary policy in Indonesia after the institutional transformation period tends to have a mixed interaction. The Government and the Central Bank of Indonesia were not only jointly implementing the same expansionary or contractive policy but also mutually substituting or implementing opposing policies simultaneously. As it is found that fiscal policy and monetary policy shock are considered capable of moving GDP, those mixed interactions were done not only to balance the impact of changes in opposing policies on the economy but also to direct the economy to predetermined levels. Second, fiscal policy significantly influence on GDP more rather than monetary policy. Monetary policy variables in this study, interest rates, and money supply do not directly and significantly affect GDP. Third, an increase in government spending and money supply could support GDP growth in the short term. To balance this policy, it is necessary to consider reducing or maintaining the stability of government revenues, government financing, and interest rates. In the long run, all policy variables, except the money supply, support GDP growth.

Government spending is still the most effective instrument in the short, medium, and long term in increasing GDP. For this reason, government spending should be allocated to productive sectors to achieve maximum multiplier effect in the economy. As the study shows that, first, the shock to government revenue and financing was responded positively by GDP but responded negatively by interest rates and the money supply, second, interest rate shocks can potentially reduce the government's ability to intervene in the economy in short to medium term, and, third, money supply supports GDP growth only in the short and medium-term, existing economic conditions and timings are crucial factors to consider in policy formulation.

The interaction between fiscal and monetary policy shows the importance of strengthening policy framework and coordination to achieve optimal GDP growth. A robust policy framework, such as a concrete market arrangement, will accelerate policy transmission to the economy. In addition, fiscal and monetary coordination should be strengthened, especially in money supply, interest rate, and financing

decisions. However, for credible policy making, the coordination should be done by maintaining central bank independence.

6. ACKNOWLEDGEMENT

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