Research article

The Impact of Fiscal-Monetary Policy Interaction on the Indonesian Economy

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Abstract: This study seeks to examine the interactions between fiscal and monetary policies and their impact on output and inflation in Indonesia from 2003:4 to 2018:4 using Structural Vector Autoregression (SVAR). It is important to investigate the coordination between both because overall macroeconomic policy framework requires close coordination between monetary and financial policies. The variables utilized are government spending, debt, output gap, tax, inflation, interest rate, and exchange rate obtained from the Indonesian Ministry of Finance, the Indonesian Statistics, and Bank of Indonesia. Government spending as a proxy for fiscal policy and interest rate as a proxy for monetary policy have a strategic complement relationship, whereas tax revenue as a proxy for fiscal policy and interest rate as a proxy for monetary policy have a strategic substitutes relationship.

Keywords: Monetary, fiscal, SVAR, output, inflation

JEL Classification: C32; E23; E31 E63

Abstrak: Penelitian ini bertujuan untuk menganalisis interaksi kebijakan fiscal dan moneter serta dampaknya terhadap output dan inflasi di Indonesia selama periode 2003:4-2018:4. Metode yang digunakan adalah pendekatan Structural Vector Autoregression (SVAR). Variabel endogen yang digunakan adalah pengeluaran pemerintah, utang, output gap, pajak, inflasi, suku bunga dan nilai tukar yang diambil dari database Kementerian Keuangan Republik Indonesia, Badan Pusat Statistik, dan Bank Indonesia. Hasil penelitian menunjukkan bahwa pengeluaran pemerintah sebagai proksi kebijakan fiskal dan suku bunga sebagai proksi kebijakan moneter memiliki hubungan komplementer yang strategis. Sementara itu, penerimaan pajak sebagai proksi kebijakan fiskal dan suku bunga sebagai proksi kebijakan moneter memiliki hubungan substitusi.

Kata Kunci: Fiskal, moneter, SVAR, output, inflasi

1. INTRODUCTION

Macroeconomic policy plays a substantial role in catalysing a stable economic growth. In this condition the fluctuation of unemployment rate, production and prices can be minimalized and growth, real output potential can be reached (Adiningsih, 2012). Macroeconomic policy is used to solves some macroeconomic issues such as economic growth and inflation (Gujrati, 2015). Macroeconomic policy consists of monetary policy and fiscal policy. Fiscal policy can be defined as the use of taxation and government spending for the purposes of macroeconomic goals whereas monetary policy can be defined as the use of interest rate for the same purpose (Yanushevsky & Yanushevsky, 2018). Bonam & Lukkezen (2019) argued that the efficient pursuit of the objectives of

the authorities overall macroeconomic policy framework requires a close coordination of financial policies. However, monetary, and fiscal policies are designed and implemented by different official bodies, each with its own objectives, resources, constraints, and objectives. These objectives sometimes can be clashed with each other.

Monetary policy is conducted by central bank whereas fiscal policy is conducted by the government (Hubbard et al., 2012). According to Nash Equilibrium, in the economy, if there are 2 players then there could be 2 outcomes, that is *strategic complement* and *strategic substitute. Strategic complement* happened when two policies' objectives have a strengthening effect and *strategic substitute* happened when two policies' objectives have a contrasting effect (Nash, 1951; Scharpf, 2018). In the literature, we find a few studies that investigated the nature of monetary and fiscal policies interaction. Demid (2018) and Abdel-Haleim (2016) examines the interaction between monetary and fiscal policies and found that fiscal-monetary policies tend to have a contrasting objective. These studies are conducted in developed countries; therefore, it is imperative to investigate the nature of fiscal-monetary interaction in developing country.

Indonesia is a developing country. Throughout 1998-2016, there are two different policies that has been used, that is policy applied on economy crisis 1997 (first period) and global financial crisis 2008 (second period). Macroeconomy policy applied in Indonesia on 1st period is contractionary monetary policy and contractionary fiscal policy. On 2nd period government implemented an expansionary monetary policy, using interest rate reduction periodically from 8,75% on early 2009 to 6,5% in August 2009 and implemented an expansionary fiscal policy, using fiscal stimulus as much as 71,3 billion on 2009. Meanwhile through pandemic period, government, and central banking both implemented an expansionary fiscal and expansionary monetary policy. Figures 1 and 2 show the development of fiscal policy, monetary policy, and aggregate demand in Indonesia. Interest rate is used as a proxy for monetary policy and government spending is used as a proxy for fiscal policy. GDP is used as a proxy for aggregate demand.
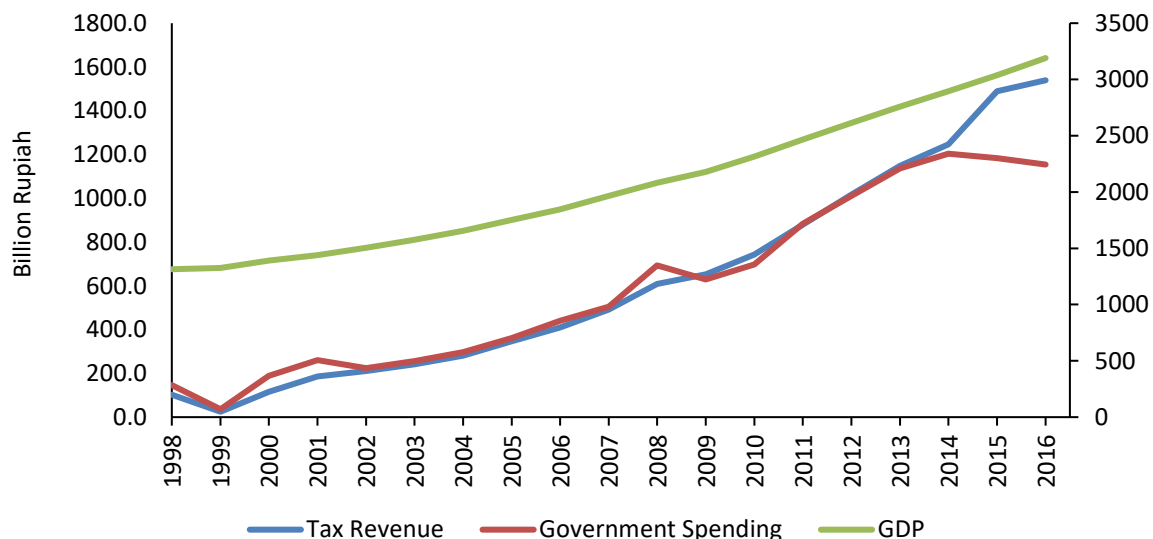

Figure 1. Tax Revenue, Government Spending, and GDP real (1998-2016)
Source: Ministry of Finance Indonesia (2017)

Figure 1 shows the relationship between tax revenue, government spending, and GDP constant 2010 throughout 1998 until 2016. Tax revenue and government spending is used as a representative for fiscal policy's instrument. Tax revenue and government spending has an upward trend throughout the period, except on 1998-1999, government spending and tax revenue has a drop from IDR.102,3 billion to IDR.24,9 billion for tax revenue and from IDR.172,6 billion to IDR.44,5 billion for government spending. GDP constant 2010 has a relatively stable upward trend and has an increase from IDR.1.314,2 billion to IDR.1.324,5 billion. There is an upward trend for all indicators but there is no overall consistency year on year.
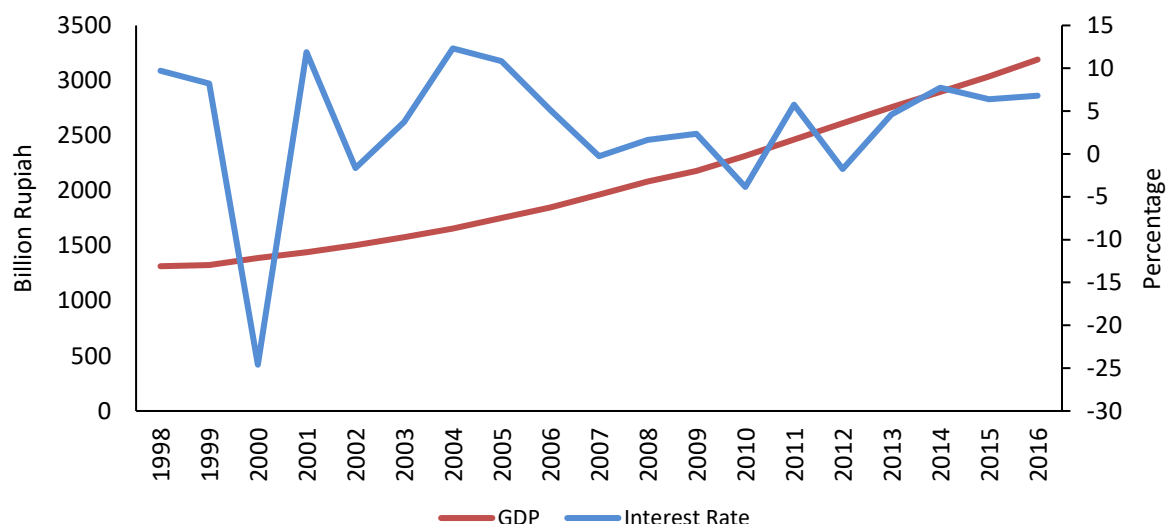
Figure 2. Interest Rate and GDP Constant 2010 (1998-2016)
Source: Bank of Indonesia (2017)

Figure 2 shows the relationship between interest rate as a representative for monetary policy instrument and GDP constant 2010. GDP has a relatively stable upward trend, whereas interest rate has a very fluctuated pattern for period 1998-2016. Many economists have tried to investigate fiscal-monetary interaction such as Arintoko & Insukindro (2017), who used *Structural Vector Auto Regression* (SVAR) to analyse the nature of relationship between fiscal and monetary policies. Even though, much research about fiscal-and monetary policies had been conducted before, there is no consensus. Thus, this paper aims to analyse the nature of relationship between fiscal-monetary policies and the effect of fiscal-monetary interaction to output and inflation in Indonesia.

Research on the interaction of monetary and fiscal policies using the VAR method has been done before. Kappel & Janků (2014) used game theory analysis tools and analyzed the mutual relationship between fiscal and monetary policies in Vise grad group countries (Czech Republic, Slovakia, Poland, and Hungary). The result is that monetary policy has a major stabilizing role relative to fiscal policy in these countries. Franta et al. (2018) examined the dynamics of the interaction of fiscal and monetary policies and several macroeconomic variables across time in six industrial countries (United States, Australia, United Kingdom, Japan, Canada, and Switzerland). Franta et al. classifying countries into two types, namely targets and non-targets. Target country is a country that has the framework of inflation targeting, while non-target countries are the opposite. Franta et al. found that for target countries monetary policy has a different response to government spending shocks from non-target countries. Targets tend to implement monetary policies that eliminate fiscal policies (strategic substitutes). Haug et al. (2013) combined the mechanism of transmission of fiscal policy through discretionary government spending and tax changes using the SVAR method in Poland. Haug et al. (2013) found that the multiplier of government expenditure reached the highest value of 0.48 and the multiplier for tax was 0.

Sen & Ayse, 2015 compare the effectiveness of monetary policy with fiscal policy in Turkey during the period 2001: 1 to 2014: 2. The result is monetary policy in the form of setting interest rates is relatively more effective in stimulating growth in the country of Turkey. Cazacu (2015) also uses the SVAR method with a long-term identification scheme finding that the strategic interactions between the two policies in Romania have no clear evidence. But the shock of monetary policy has a relatively greater impact. Jawadi et al. (2016) examined the effects of fiscal and monetary policy shocks in five countries (Brazil, Russia, China, India, and South Africa), and found that contractionary monetary policy had a negative impact on economic activity in the real sector, a slow decline in GDP deflators, and tighten liquidity conditions on the market. Unexpected expansionary fiscal policy causes an increase in real GDP, a positive impact on prices and fixed interest rates. Arora (2018) examines the effects of fiscal and monetary policy interactions on several macroeconomic variables in India. The method used is Structural Vector Autoregression (SVAR). Arora (2018) used interest

rates as a proxy of monetary policy and tax revenues and government spending as a proxy of fiscal policy. The estimation results show that when a tax decline occurs, monetary policy responds by reducing interest rates, so the relationship between fiscal policy and monetary is a strategic complement. As for the shocks from government spending, there was a negative response from monetary policy. Research in Indonesia has also been done before (Wijoyo, 2012; Kuncoro & Sebayang, 2013; Yunanto & Medyawati, 2013) to see the interaction of fiscal-monetary policy in Indonesia during 1990 until 2000. The results are monetary policy is more dominant. From some of the previous studies using the VAR method, it has not been able to conclude the impact of monetary and fiscal policies on the economy, especially output and inflation, this may be caused by different units of analysis and methods between studies. Thus, further research needs to be done.

2. RESEARCH METHODS

Our paper aims to determine the effect of Fiscal-Monetary Policy Interaction on Indonesia's Economy (Output and Inflation) during the period 2003:4-2018:4. The main variables are real government spending (BEL), real debt (UTA), real tax (PAJ), gap output (OUT), inflation (INF), real interest rate (INT) and real exchange rate (KUR). The data were obtained from the Bank Indonesia database and the Ministry of Finance Indonesia database. All the variables have been converted into real terms using the implicit GDP deflator. Fiscal policy is being proxied by government spending (BEL) shock and real tax (TAX) shock meanwhile monetary policy is being proxied by interest rate (INT) shock. It can be concluded that fiscal and monetary policy have a strategic complementary if output and inflation have a similar respond to shock from fiscal policy and monetary policy. On the other side, strategic substitute if likewise. Operational definition of variable is shown in the Table 1 as follows.

Table 1. Operational definitions of variables

Variable	Meaning	Definition	Source
GOV	Central Government Spending	Total real central government spending	Bank of Indonesia
DEBT	Debt	Real central government debt	Ministry of Finance
OUT	Output Gap	Difference between real actual GDP and real potential GDP	Bank of Indonesia
TAX	Tax	Total real tax	Bank of Indonesia
INF	Inflation	Consumer price index (CPI)	Bank of Indonesia
INT	Interest Rate	Real interest rate	Bank of Indonesia
EXC	Exchange Rate	Real exchange rate (Rupiah/Dollar)	Bank of Indonesia

This study used Structural Vector Autoregression (SVAR) to estimate the model and to build the impulse response function. The impulse response function used to identify the reaction of output and inflation in response to monetary shock and fiscal shock. If output or inflation respond in the same direction it means that fiscal policy and monetary policy have a strategic complement outcome and vice versa. Using a purely endogenous model proposed by (Arora, 2018; Juhro et al., 2022; Büyükbaşaran et al., 2020). VAR models are not without limitations. They are highly data determined and therefore, they could produce counter-intuitive results such as price puzzles. A careful application of sign restrictions reduces the probability of such puzzles (Arora, 2018). The mechanism transmission can be seen in Figure 3.
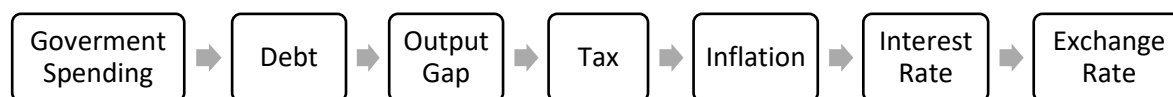
Goverment Spending → Debt → Output Gap → Tax → Inflation → Interest Rate → Exchange Rate

Figure 3. Mechanism Transmission

The model is specified as follows:

$$X_t = (GOV_t, DEBT_t, OUT_t, TAX_t, INF_t, INT_t, EXC_t) \tag{1}$$

Then, it can be form with the following equations:

$$e_{GOV} = b_{11}\varepsilon_{GOV} \tag{2}$$

$$\varepsilon_{DEBT} = b_{21}\varepsilon_{GOV} + \varepsilon_{DEBT} \tag{3}$$

$$e_{OUT} = b_{31}\varepsilon_{GOV} + b_{32}\varepsilon_{DEBT} + \varepsilon_{OUT} \tag{4}$$

$$e_{TAX} = b_{41}\varepsilon_{GOV} + b_{42}\varepsilon_{DEBT} + b_{43}\varepsilon_{OUT} + \varepsilon_{TAX} \tag{5}$$

$$e_{INF} = b_{51}\varepsilon_{GOV} + b_{52}\varepsilon_{DEBT} + b_{53}\varepsilon_{OUT} + b_{54}\varepsilon_{TAX} + \varepsilon_{INF} \tag{6}$$

$$e_{INT} = b_{61}\varepsilon_{GOV} + b_{62}\varepsilon_{DEBT} + b_{63}\varepsilon_{OUT} + b_{64}\varepsilon_{TAX} + b_{65}\varepsilon_{INF} + \varepsilon_{INT} \tag{7}$$

$$e_{EXC} = b_{71}\varepsilon_{GOV} + b_{72}\varepsilon_{DEBT} + b_{73}\varepsilon_{OUT} + b_{74}\varepsilon_{TAX} + b_{75}\varepsilon_{INF} + b_{76}\varepsilon_{INT} + \varepsilon_{EXC} \tag{8}$$

Here, X is $7x1$ vector variables; GOV_t is real government spending; $DEBT_t$ is real debt; OUT_t is output gap; TAX_t is real tax; INF_t is inflation; INT_t is real interest rate; and EXC_t is real exchange rate.

3. RESULTS AND DISCUSSION

Figure 4 shows the trend of real central government spending during the period 2003:4 to 2018:3. Real central government spending shows a volatile movement and tends to increase in this period. In general, there is an annual cycle pattern, namely the lowest value always in the first quarter and the highest value always in the fourth quarter. In 2003:4 the value of real central government spending was IDR 3,279.7 trillion and increased to IDR 19,841.5 trillion in the fourth quarter of 2018.
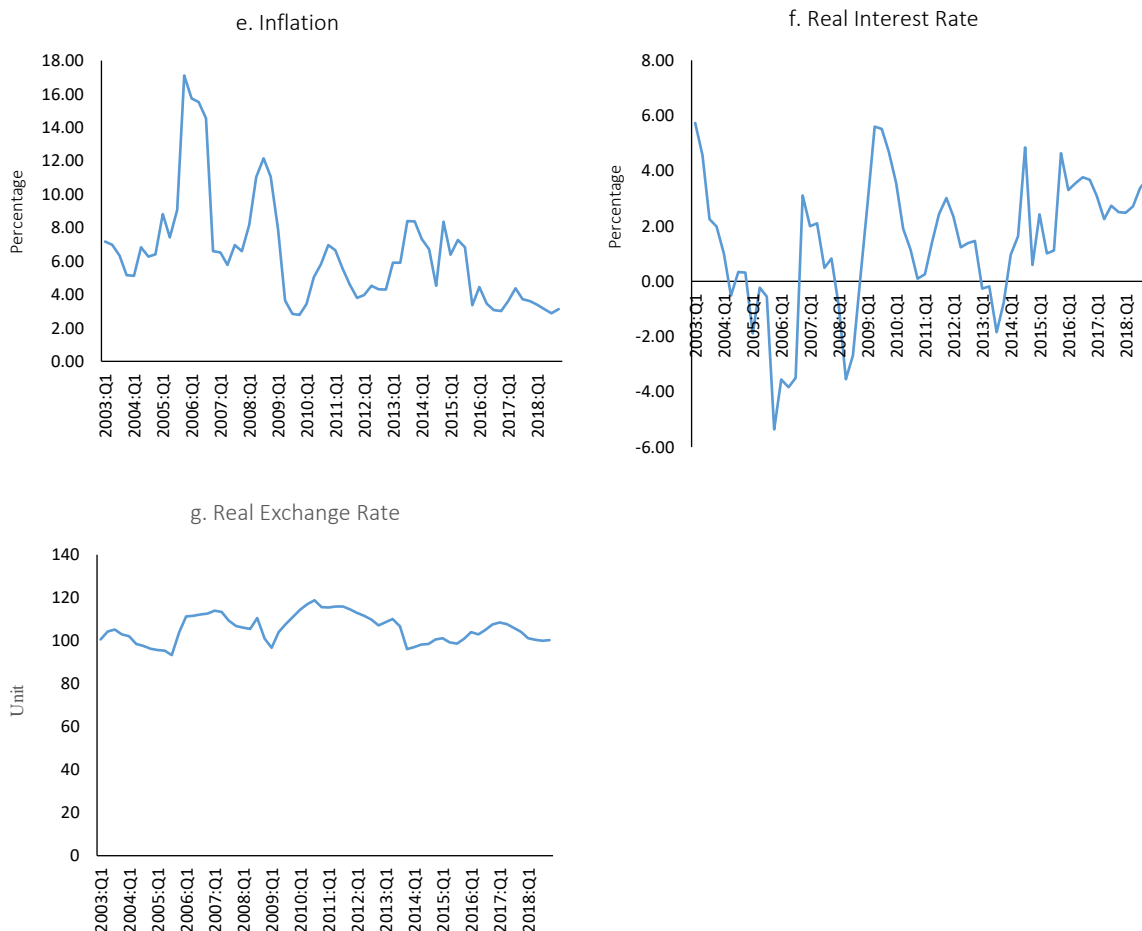

a. Real Government Spending

b. Real Debt

c. Real Output

d. Real Government Revenue

e. Inflation

f. Real Interest Rate

g. Real Exchange Rate
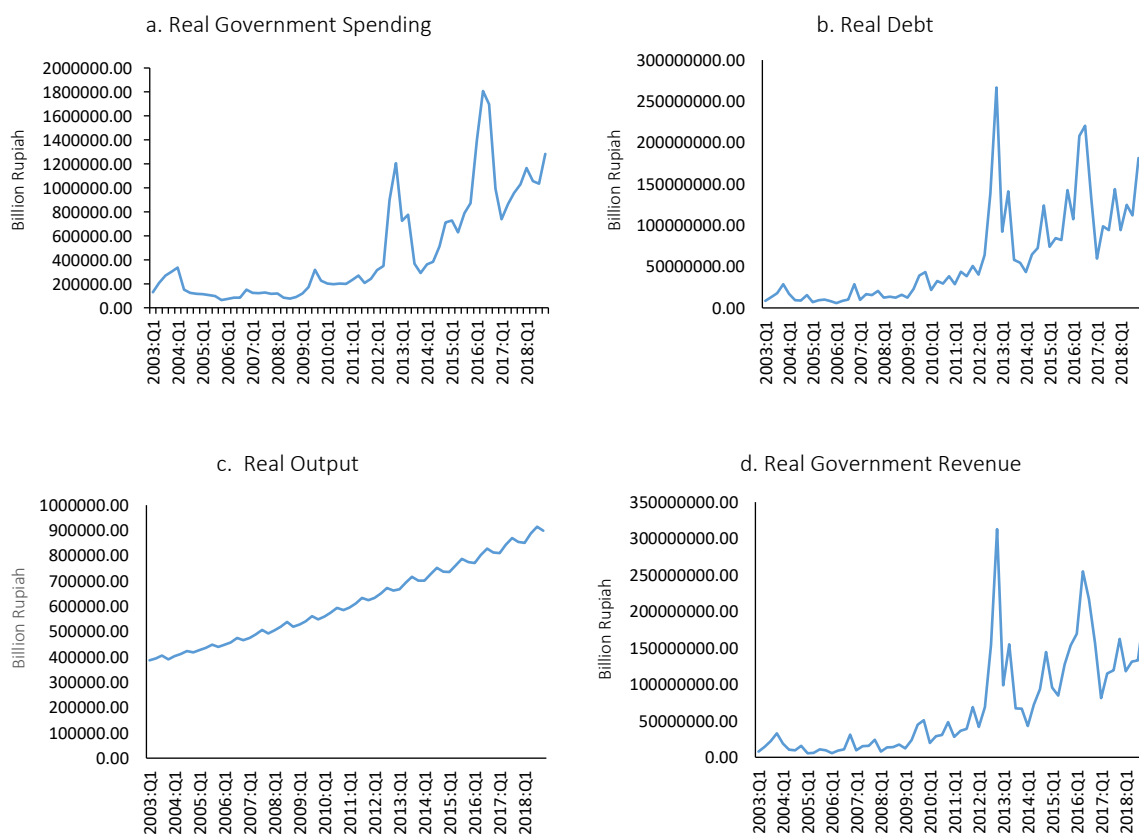
Figure 4. Trend of real government spending, real debt, real output, inflation, real government revenue, real interest rate, and real exchange rate (2003:4-2018:4)

Source: International Monetary Fund, Ministry of Finance and Bank Indonesia (2018)

Then, the trend of real debt had an increasing trend in the period 2003:4 to 2018:4. Real debt reached its highest value in 2016:2 as much as IDR.1,807.9 trillion. The real output trend shows a steady upward trend in the study period. Real output reached its highest value at the end of the 2018:4 period of IDR.899.2 billion and the lowest value in the 2003:4 period of IDR.390.1 billion. At the end of the research period, the government's real output increased from its lowest point of ±130 percent. Trends in real tax during the period 2003:4 to 2018:3 show a volatile movement and tend to increase during the period 2003:4 to 2018:3.

There is an annual cycle pattern where the highest value is always in the fourth quarter. In 2003:4 the value of real tax revenue was IDR 2,888.9 trillion and increased to IDR 18,138.3 trillion in the fourth quarter of 2018. Inflation shows a volatile movement during the study period. Inflation reached its highest value at the end of the 2005:4 period of 17.11 percent and the lowest value was in the 2009:4 period of 2.78 percent. Last, the trend of interbank money market interest rates and real exchange rates during the period 2003:4 to 2018:3 shows a volatile movement. Below is a data plots showing the patterns of GOV, DEBT, OUT, TAX, INF, INT, and EXC in Indonesia.

Table 2. Summary of unit root test

Variable		ADF test	PP test	KPSS test
GOV	Statistic	4,154*	-5,166*	0,103***
	(prob)	(0,009)	(0,000)	
DEBT	Statistic	-4,875*	-3,697**	0,136**
	(prob)	(0,001)	(0,030)	
OUT	Statistic	-3,525**	-10,568*	0,090***
	(prob)	(0,046)	(0,000)	
TAX	Statistic	-5,053*	-5,043*	0,108***
	(prob)	(0,000)	(0,000)	
INF	Statistic	-4,095**	-16,645*	0,008***
	(prob)	(0,010)	(-0,000)	
INT	Statistic	-4,875*	-3,953**	0,052***
	(prob)	(0,001)	(0,015)	
EXC	Statistic	-2,958**	-9,166*	0,109***
	(prob)	(0,045)	(0,000)	

Note: Stationary at level *1%, **5% and ***10%
Source: Authors calculation

Table 3. Summary of roots of characteristics polynomial test

Root	Modulus
0,911 − 0,013i	0,911
0,911 + 0,013i	0,911
0,720 − 0,224i	0,754
0,720 + 0,224i	0,754
-0,094 − 0,431i	0,442
-0,094 + 0,431i	0,442
0,057	0,057

Source: Authors calculation

Table 3 reports the results from roots of characteristics polynomial roots. Based on the results, all the unit roots are less than one. The result shows that VAR is stable.
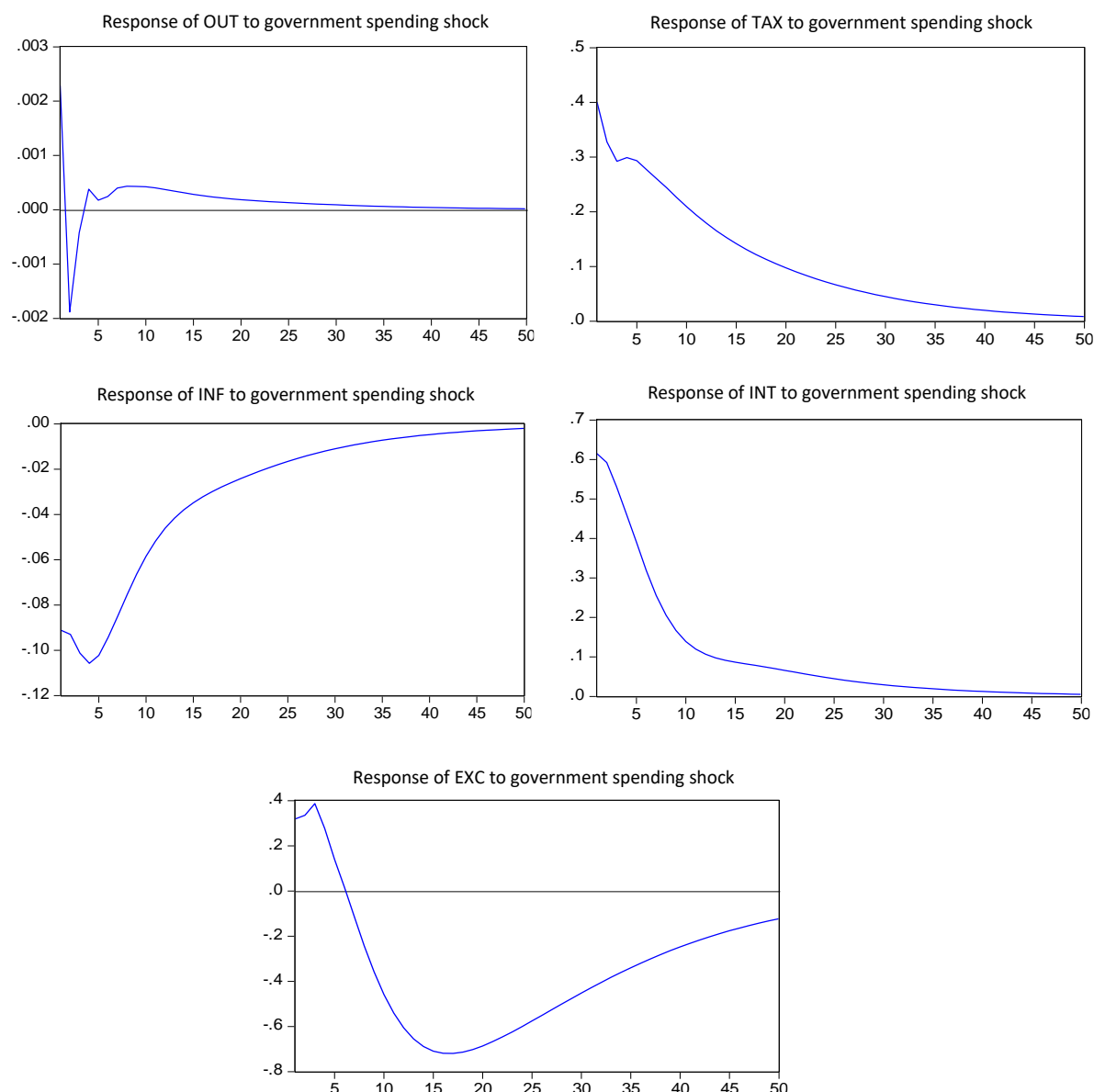

Response of GOV to government spending shock

Response of DEBT to government spending shock
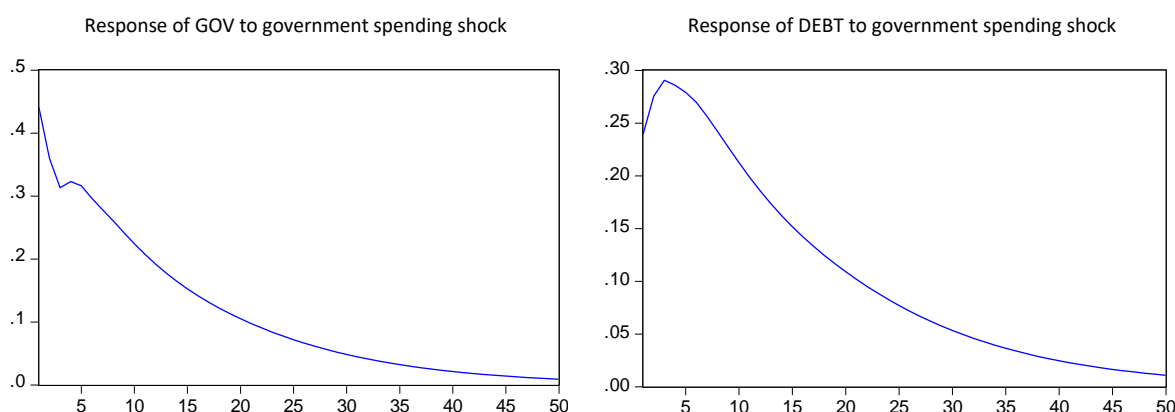
Figure 5. Impulse response to government spending shock
Source: Authors calculation

Figure 5 shows the dynamics response of several macroeconomic variables to a shock of one standard deviation from the government spending variable. Government spending will respond positively in period 1 and the impact of the shock will gradually decrease in the following period. Real debt will respond positively in period 1 and show a positive increase until it reaches a peak in period 3. The real debt responds to real government spending shocks decreases gradually in the following period until it reaches point 0. The output gap will respond positively in period 1 followed by a negative response in period 2. During periods 3 and 4 the output gap response is negative and followed by a positive response in the next period and has an impact of up to period 45. Real government revenue will respond positively in period 1 and slowly the impact of the shock will dissipate during the next period. Inflation will respond negatively in period 1 and the impact of the shock will decrease in the following period. Real interest rates will respond positively, and the impact of the shock will drastically decrease until period 11 and slowly decrease until it disappears in the next period. The effective real exchange rate responds positively up to period 6 and responds negatively in the next period. The response of the real exchange rate to shocks slowly dissipates in subsequent periods.
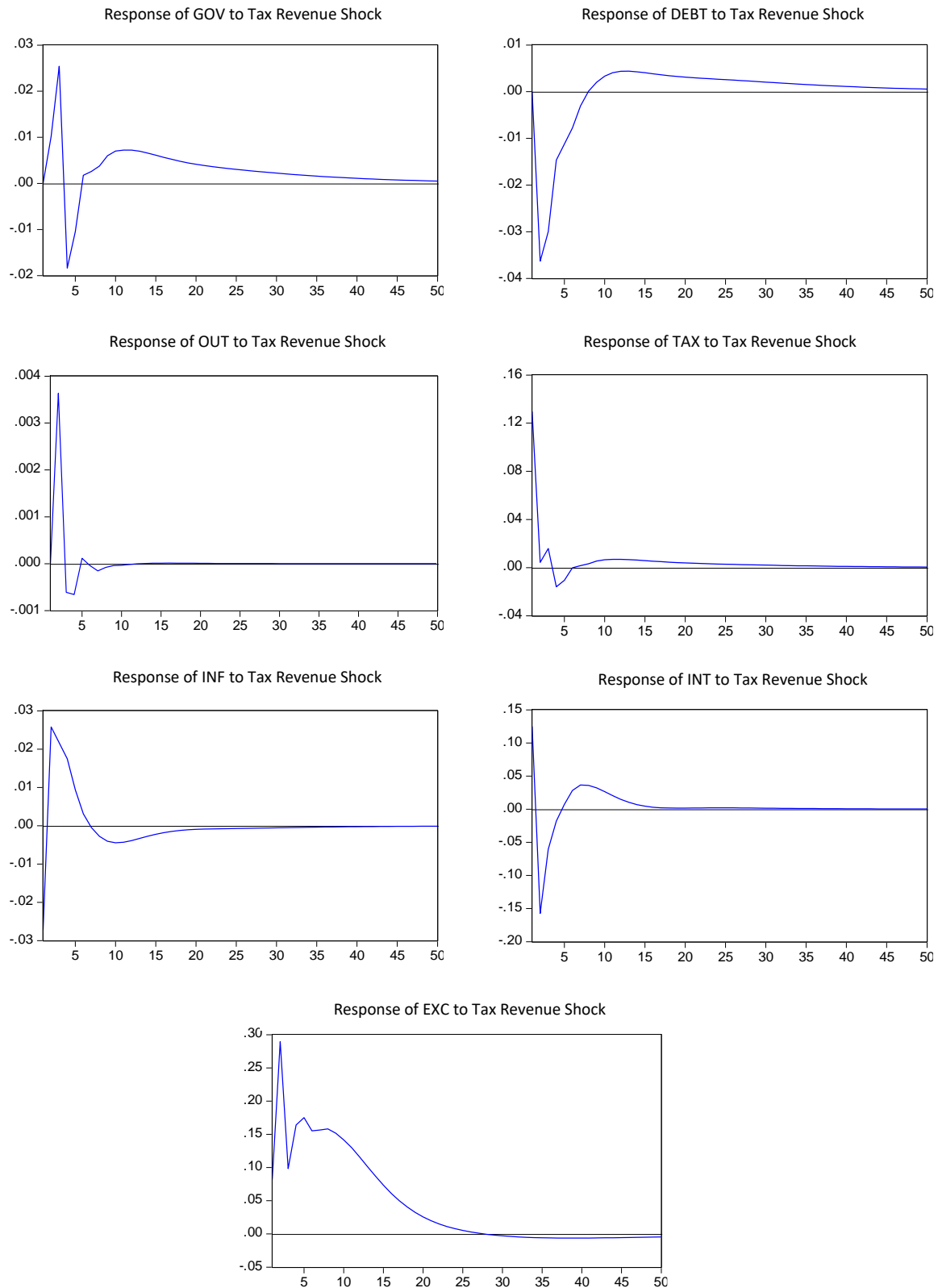
Figure 6. Impulse response to tax revenue shock
Source: Authors calculation

Figure 6 shows the dynamics response of several macroeconomic variables to a shock of one standard deviation from the real central government tax revenue. Government spending respond positively at the beginning of the period to period 3 followed by a negative response in periods 4, 5

and 6. The response of government spending to government revenue shock had a positive impact and slowly disappeared in the following period. Real debt responds negatively in period 1 to period 8. In the next period real debt has a small positive response until it slowly disappears. Output gap responds positively to shock in period 2 and negatively in period 3 to 5. The output gap responds in an oscillatory pattern until it disappears in period 12. Inflation responds positively in period 1 to period 7 and responds negatively in the following period. The inflation response to the shock impacts up to 40 periods. Real interest rates respond negatively up to period 5. Interest rate responds to shocks impact up to period 18. The real exchange rate responds positively until period 27 and responds negatively in the next period until the impact of the shock disappears.
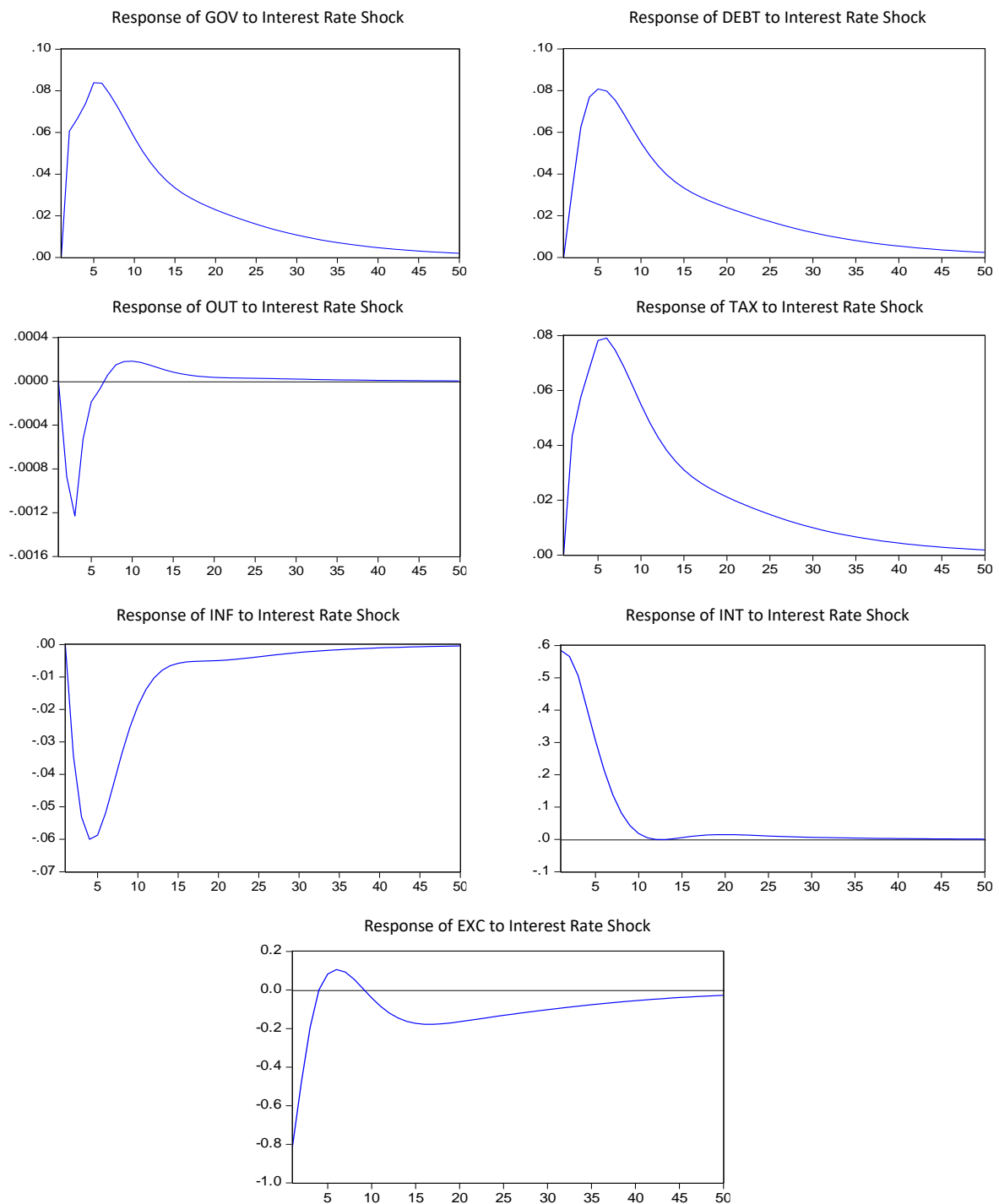

Figure 7. Impulse response to interest rate shock
Source: Authors calculation

Figure 7 shows the dynamics of the response of several macroeconomic variables to a shock of one standard deviation from the real interest rate variable. Real government spending and real debt respond positively so that the impact of the shock disappears during the next period. Output gap respond negatively up to period 7 and responds positively in the next period until it reaches convergence in period 33. Tax revenue responds in the same way as government spending, which is positive until the impact of the shock disappears during the next period. Inflation responds negatively until the impact of the shock disappears. The real exchange rate responds negatively until period 4 and is followed by a positive response that has an impact on period 9. The real exchange rate response is negative in the next period until the impact of the shock disappears.

Based on impulse response function results, output gap responds negatively to the shock of government spending and nominal interest rates. On the contrary, output gap responds positively to the real tax shock. It means that spending as proxy of fiscal policy and interest rates as a proxy of monetary policy have a strategic complementary relationship in influencing output. Tax as a proxy of fiscal policy and interest rate as a proxy of monetary policy has a strategic substitutes relation in influencing the output gap.

The movement of inflation response to government spending and real tax tends to move in an opposite sign. Inflation responds negatively to the shock from interest rates and government spending. This means that spending as a fiscal proxy and interest rate as a monetary proxy has a strategic complementary relations in influencing the inflation variable, whereas tax as a fiscal proxy and interest rate as a monetary proxy has a strategic substitutes relation. These results are like the study by Arora, 2018; Tan et al., 2020; Wang et al., 2023.

Output gap responds negatively to shock that comes from real government spending and real interest rates. This means that the increase in real government spending causes a reduction in the gap between actual output and expected output. Increasing government spending causes an increase in production so that the actual output will increase and will reduce the gap between actual output and expected output. Output gap responds positively to the shock that comes from real tax. This means that the increase in real tax causes an increase in the gap between actual output and expected output. Increasing taxes causes reduced production so that the actual output will decrease and will increase the gap between the actual output and expected output (Arora, 2018; Tan et al., 2020; Wang et al., 2023).

Inflation responds positively to shock from tax. This means that an increase in taxes causes increased inflation. Increased tax is seen as an increase in production costs by producers, thus causing an increase in selling prices of goods to consumers. Inflation responds negatively to the shock that comes from the proxy of fiscal policy in the form of government spending and real interest rates. This means that the increase in government spending will cause a decrease in inflation. This may be due to the multiplier effect of government spending on investments that is greater than in consumption, which contributes to reducing the price level of goods and services. Government debt respond positively to the shock of fiscal policy in the form of government spending and negatively to the shock of fiscal policy in the form of government revenues (Arora, 2018; Tan et al., 2020; Wang et al., 2023).

4. CONCLUSIONS

This paper has empirically analysed the impact of fiscal-monetary interaction to output and inflation in Indonesia. SVAR estimation analyses reveal that the relationship between government as a proxy for fiscal policy and interest rate as a proxy for monetary policy is strategic complementary regarding its effect to output, whereas tax revenue as a proxy for fiscal policy and interest rate has a strategic substitutes relationship. The relationship between government spending as a proxy for fiscal policy and interest rate as a proxy for monetary policy is strategic complementary regarding its effect to inflation whereas tax revenue as a proxy for fiscal policy and interest rate has a strategic substitutes relationship. Whereas output gap has a negative respond to shock from government spending and interest rate, and a positive respond to shock from tax revenue. Inflation has a negative respond to shock from government spending and interest rates, and a positive respond to shock from tax revenue. Finally, debt has a positive respond to shock from

government spending as a fiscal policy. This research is without its limitations. one improvement that can be done is to modify the variables and periods. The addition of variables can be done by adding other variables that may affect the transmission of shocks to the variables of the Indonesian economy in accordance with the theory. With the addition of variables, it is expected that the estimation results will be more valid and reduce bias. Other improvements that can be made include deepening the analysis and generally improving research so that the research results are more useful for those in need.

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