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Does Fiscal Policy Matter? A Study on Economic Crises in Indonesia

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Abstract

Using the Structural VAR approach, this study attempts to compare the impact of fiscal policy shock on GDP, inflation, and interest rate within two periods of economic crisis. Period I is for 1993Q1-2018Q4, which includes the Asian Financial Crisis and the Global Financial Crisis as the financial-related crisis. While Period II is for 2019M1-2021M12, which includes the COVID-19 Pandemic crisis as the health-related crisis. This study concludes with three points. First, the contemporaneous effects of fiscal policy shock on GDP in Period I are larger than in Period II. In contrast, the dynamic movement of GDP in both periods is dominated by spending shock. Second, fiscal policy, mainly revenue, has greater influence on the dynamic movement of inflation during the COVID-19 Pandemic. Last, fiscal policy has a minor role in affecting the interest rate. From the results obtained, this study suggests the Government use more spending than revenue policy in affecting the movement of GDP during a crisis, uses revenue policy in influencing the prices during health-issues crisis, and not use fiscal policies to intervene interest rates in every crisis.

Key words : Fiscal Policy, Economic Crises, Structural Vector Autoregression

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INTRODUCTION

Indonesia was once categorized as one of the East Asian Miracle countries for its success stories of economic development. In 1996, the Indonesian economy raised on average by 7.6%, with the poverty rate declining to only 17.5%. However, the Asian Financial Crisis, which hit Indonesia a year later, has turned this condition upside down (Basri, 2013). This crisis has brought Indonesia to its lowest point of the last thirty years, with a decline in annual economic growth up to -13.13% and interest rate up to -24.6%, while inflation increased sharply up to 75.27% (The World Bank, 2022). To overcome this crisis, from the monetary side, Bank Indonesia, as the central bank, raised

the interest rates to the highest level. While on the fiscal side, the government reversed surplus budget to a large deficit budget and tightened their spending, which worsened the Indonesian economy (Basri, 2013).

In 2008, ten years since the last crisis occurred, Indonesia was affected by a crisis with a much larger scale and magnitude, which was called the Global Financial Crisis (Basri, 2013). The crisis started in the US and has been the worst since the Great Depression. However, the impact on the Indonesian economy is limited compared to other ASEAN countries, such as Singapore, Malaysia, and Thailand. Although Indonesian economic growth was forecasted to fall by 1.5%, it could be maintained at 4.6% in 2009. Contrary to the AFC, to encounter the GFC, the Indonesian central bank reduced the interest rate and ensured enough funds in the financial sector. While on the fiscal side, the government issued a countercyclical fiscal policy by providing a fiscal stimulus package of up to Rp73.3 trillion (Basri, 2013).

Recently, in 2019, countries in the world again experienced a crisis. Unlike the two previous financial-related crises, this latest crisis is related to health issues. It is due to the Corona Virus Disease (COVID-19) outbreak, which originated in Wuhan, China (Wu et al., 2020). The virus then spread throughout the world, so the World Health Organization (WHO) declared it as a pandemic on March 11, 2020 (Cucinotta & Vanelli, 2020). The first case was found in Indonesia in early 2020. Since then, the government has imposed restrictions on people's social interactions to reduce the spread of the virus (Olivia et al., 2020). This policy deteriorated several sectors, such as social services, trade, and tourism (Basri & Fitrania, 2022). Indonesian economic face a downturn of up to -2.1% in 2020 (The World Bank, 2022). By that time, Indo nesia again unveiled fiscal stimulus packages, which enlarged the budget deficit to 6.34% of GDP.

During every crisis, the Indonesian government struggled to reduce the economic impact and maintain macroeconomic stabilization (Basri, 2013). Before the GFC, monetary policy was frequently managed to achieve economic stability in many countries. The fiscal policy, on the other side, got a lack of interest due to the lag in its implementation to combat the crisis. Nonetheless, since the GFC, several countries, especially Japan and the US, have experienced a liquidity trap. Since then, the use of monetary policy has been reduced and replaced with fiscal policy (Bergman & Hutchison, 2015). Specifically, in Indonesia, during the COVID-19 Pandemic, the impact of monetary policy is muted, so fiscal policy is highly relied upon to stimulate the economy out of recession (Crystallin, 2022).

However, in contrast to the effects of monetary policy, which have been agreed upon by many studies, the effect of fiscal policy is still debatable (Ferrara et al., 2021). Theoretically, there are different views on the role of fiscal policy in an economy. The role of government is essential in the New Keynesian theory, while the Neoclassical theory holds a different view. Based on New Keynesian, an increase in government expenditure increases aggregate demand and demand in the labor market so wages and consumption will rise and ultimately increase the output. On the other hand, the Neoclassical theory believes that the demand will meet the supply through a market mechanism. The stimulus from the government is considered a waste because, in the next period, it will be paid off by the higher tax (Heijdra, 2017; Mankiw, 2016; Melvin & Boyes, 2013).

Several studies with various methods seek to see the impact of fiscal policy on a country's economy. The results also differ by the characteristics of the economic agents in the countries. Some studies, in line with New Keynesian theory, have proven that an increase in spending and tax

cuts is effective in raising the aggregate demand and output, as well as price and interest rate (Ben Zeev & Pappa, 2017; D'Alessandro et al., 2019; Nakamura & Steinsson, 2014; Ferrara et al., 2021). Despite that, the multiplier value experiences a decline after the Global Financial Crisis due to the accumulation of government debt (Ouliaris & Rochon, 2021; V. Ramey & Zubairy, 2014).

However, other studies have found the opposite. The effect of tax shocks on output is found to be non-linear (Gunter et al., 2021). In terms of price and interest rates, several studies found that prices and interest rate do not increase in response to fiscal expansion (D'Alessandro et al., 2019; Dupor & Li, 2015; Jørgensen & Ravn, 2022; Murphy & Walsh, 2022).

To answer the debate between the two theories, some studies suggest a countercyclical fiscal policy: tighten the budget when the economy is at the peak of the cycle and provide stimulus when the economy experiencees a depression. Whereas some studies take a different view and propose a procyclical fiscal policy since countercyclical policies are not suitable for developing countries, includeing Indonesia (Abdurohman & Resosudarmo, 2017; Bergman & Hutchison, 2015).

Despite much debate on fiscal policy, governments still use it to alleviate the impact of the crisis and to maintain economic stabilization (Andersson, 2022). Nonetheless, the studies on the effect of fiscal policy, especially in the post-crisis, are very limited. In Indonesia, studies on the impact of fiscal policy have been carried out for the most part during the Asian Financial Crisis and the Global Financial Crisis (Setiawan, 2018; Tang et al., 2013). There are only a few studies on the impact of fiscal policy in Indonesia, including the COVID-19 period (Basri & Fitrania, 2022).

One of the reasons for the lack of studies related to fiscal policy is the difficulty of collecting long-series data. The fiscal policy needs to be seen as a dynamic stochastic system, which includes present and past shocks as well as future impacts. Therefore, it needs sufficient data for a long-time span. In addition, studies related to fiscal policy find it challenging to identify the shock because of its endogeneity (Rahaman & Leon-Gonzalez, 2021).

To answer these issues, this study uses Structural Vector Autoregressive (SVAR) model with shock identification under Blanchard-Perotti's approach (2002) which has been developed by Perotti (2004) and have been widely used by several studies (Boiciuc, 2015; Da Silveira Barros & Correia, 2019; Abdurohman 2011; Setiawan, 2018). This approach uses contemporaneous restrictions based on the institutional information of government spending and revenue, as well as its timing and responses to economic activity. There are several reasons for using the SVAR approach in this study. First, it accommodates decision lag and implementation lag on fiscal policy. Second, this method describes real economic conditions, where fiscal policy and macroeconomic indica-tors have a relationship with each other. Third, this approach can reduce the effects of subjectiv-ity by not using any dummy variables as well as assumptions to order the variables. Last, this approach uses restrictions based on existing economic theory and institutional information.

Research related to the impact of fiscal policy, including the COVID-19 pandemic period, is very limited (Basri & Fitrania, 2022). To the best of our knowledge, no research has investigated the impact of fiscal policy in Indonesia using the SVAR approach, including the COVID-19 pandemic crisis period. Therefore, this study seeks to fill in some of the gaps. Using the SVAR approach, this study investigates the effects of fiscal policy shocks on GDP, inflation, and interest rates. Specifically, in this study, we scrutinize the differences in the impacts of fiscal policy between financial-related crises and health-rela-

ted crises. The research period will be divided into two parts: Period I is for 1993Q1-2018Q4, which consists of the Asian Financial Crisis and the Global Financial Crisis, while Period II is for 2019M1-2021M12, which consists of the COVID-19 Pandemic crisis. To do so, we employ a long research period using high-frequency budget data from the Ministry of Finance of Indonesia, which is not openly accessible.

METHOD

This study uses five variables: government spending (G_t), government revenue (T_t), private GDP (Y_t), price level (P_t), and interest rate (R_t). All variables are in log forms, except interest rate. We use Indonesian data from 1993 to 2021 and divide it into two periods: Period I is for 1993Q1-2018Q4 using quarterly data, and Period II is for 2019M1-2021M12, using monthly data. The data for each variable were collected from the MoF, BPS, Bank Indonesia, and CEIC data base, and are mostly quarterly data. We obtained the monthly data for real GDP by transforming quarterly data into higher frequency using Chow & Lin (1971) method. This method interpolates the series using a monthly indicator as a reference. To do so, we use the industrial production index (IPI 2010-100), which is available in CEIC data base. We also used this method to transform quarterly nominal GDP data into monthly data. The result will be used to calculate the monthly GDP deflator by using the formula: monthly nominal GDP divided by monthly real GDP.

The government spending, government revenue, and private GDP use real and per capita terms to ignore the effects of inflation and population growth and to make the comparisons more meaningful. Seasonal adjustment using Census X-12 is applied for government spending, government revenue, and private GDP due to the seasonal pattern of the data. Further explanations regarding the description of each variable and data are provided in Table 1.

This study uses Structural Vector Autoregression (SVAR) model with shock identifi-cation under Blanchard & Perotti (2002) approach which has been developed by Perotti (2004). This approach uses contemporaneous restrictions bas-ed on the institutional information of the government spending and revenue, as well as its timing and responses to economic activity.

Table 1. Variables and Data Definition

No	Variables	Explanation	Unit	Sources
1.	G_t	Log of total real government spending per capita (total government expenditure minus debt payment) This study equates the base year for real GDP data in Period I (1993-2018) to the base year 2000, while for Period II, to the base year 2015.	Indonesian Rupiah	Fiscal Policy Agency, Ministry of Finance.
2.	T_t	Log of total real net revenue per capita (tax and non-tax revenue)	Indonesian Rupiah	Fiscal Policy Agency, Ministry of Finance.
3.	Y_t	Log of real private GDP per capita, which is calculated as total GDP minus government spending.	Indonesian Rupiah	Indonesian Bureau of Statistic and CEIC data base.
4.	P_t	Log of GDP deflator, to measure inflation.	Percentage	Indonesian Bureau of Statistic and CEIC data base.
5.	R_t	The average rupiah loan interest rate.	Percentage	Statistik Ekonomi Keuangan Indonesia (SEKI), Bank of Indonesia.

Source: Author

The first step to build the SVAR model is to construct a matrix form of five simultaneous equations, which represent the relationship between observed variables, as follows:

$$AX_t = B_0 + BX_{t-i} + e_t \quad (1)$$

where: X_t is a vector of variables included in the SVAR model (G_t, T_t, Y_t, P_t, R_t); A is a matrix of contemporaneous coefficients; B_0 is a vector of intercept terms; B is a matrix of coefficient on lag variables (structural shocks); and e_t is a vector of error terms.

The reduced form of VAR can be determined by multiplying both sides of equation (1) with A^{-1}, and the result is as follows:

$$X_t = A^{-1}B_0 + A^{-1}BX_{t-i} + A^{-1}e_t \quad (2)$$

Defining $Z_0 = A^{-1}B_0$, $Z_1 = A^{-1}B$, and $u_t = A^{-1}e_t$, the equation (2) can be written as follows:

$$X_t = Z_0 + Z_1X_{t-i} + u_t \quad (3)$$

From equation (3), we can define Z_1 as lag polynomial and u_t is the vector of reduced form residuals. Following the AB-Model (Lütkepohl, 2005), the reduced form residuals u_t and the structural shocks e_t can be expressed as follows:

$$Au_t = Be_t \quad (4a)$$

$$u_t = A^{-1}Be_t \quad (4b)$$

Based on Perotti (2002), the residuals of the G_t and T_t equations, u_t^G and u_t^T can be thought of as linear combinations of three types of shocks. The first one is the automatic response of government spending and taxes to GDP (u_t^Y), inflation (u_t^P), and interest rates (u_t^R). The second one is the systematic discretionary response of fiscal policy to GDP, inflation, and interest rate innovations. The last one is random discretionary shocks to fiscal policies, which are the structural forms e_t^G and e_t^T are indentified.

The reduced form residuals of the G_t and T_t are expressed as follows:

$$u_t^G = a_{gy}u_t^Y + a_{gp}u_t^P + a_{gr}u_t^R + b_{gt}e_t^T + e_t^G \quad (5a)$$

$$u_t^T = a_{ty}u_t^Y + a_{tp}u_t^P + a_{tr}u_t^R + b_{tg}e_t^G + e_t^T \quad (5b)$$

Where e_t^G and e_t^T are structural shocks to government spending and revenue. To estimate the effects of unexpected exogenous changes in fiscal policy, we can recover the series of the shocks e_t^G and e_t^T.

According to Perotti (2004), the reduced form of fiscal policy shocks, equation (5a) and (5b) can be written as cyclically adjusted reduced form:

$$u_t^{G,CA} \equiv u_t^G - (a_{gy}u_t^Y + a_{gp}u_t^P + a_{gr}u_t^R) = b_{gt}e_t^T + b_{gg}e_t^G \quad (6a)$$

$$u_t^{T,CA} \equiv u_t^T - \left(a_{ty}u_t^Y + a_{tp}u_t^P + a_{tr}u_t^R\right) = b_{tg}e_t^G + b_{tt}e_t^T \quad (6b)$$

The next step is to assume the order of shocks in fiscal policy. This is because Perotti (2004) used semi-recursive in SVAR approach. If the government firstly made decisions related to government spending, then b_{gt}=0. Otherwise, if the decisions related to government revenue come first, then b_{tg}=0. However, Perotti (2004) argues that the results are not sensitive to the ordering of fiscal policy shocks.

If we assume that spending decision comes first, b_{gt}=0, then we can estimate $u_t^{G,CA}$ as follows:

$$u_t^{G,CA} = b_{gg}e_t^G \quad (7a)$$

$$u_t^{T,CA} = b_{tg}e_t^G + b_{tt}e_t^T \quad (7b)$$

The remaining equations of reduced form innovations (for output, price, and interest rate) are as follows:

$$u_t^Y = a_{yg}u_t^G + a_{yt}u_t^T + b_{yy}e_t^Y \quad (7c)$$

$$u_t^P = a_{pg}u_t^G + a_{pt}u_t^T + a_{py}u_t^Y + b_{pp}e_t^P \quad (7d)$$

$$u_t^R = a_{rg}u_t^G + a_{rt}u_t^T + a_{ry}u_t^Y + a_{rp}u_t^P + b_{rr}e_t^R \quad (7e)$$

Equation (7a) – (7e) can be used to construct the AB Model for SVAR estimation, as follows:

$$\begin{bmatrix} u_t^G \\ u_t^Y \\ u_t^P \\ u_t^T \\ u_t^R \end{bmatrix} = \begin{bmatrix} 1 & a_{gy} & a_{gp} & 0 & 0 \\ a_{yg} & 1 & 0 & a_{yt} & 0 \\ a_{pg} & a_{py} & 1 & a_{pt} & 0 \\ 0 & a_{ty} & a_{tp} & 1 & 0 \\ a_{rg} & a_{ry} & a_{rp} & a_{rt} & 1 \end{bmatrix}^{-1}$$

$$\begin{bmatrix} b_{gg} & 0 & 0 & 0 & 0 \\ 0 & b_{yy} & 0 & 0 & 0 \\ 0 & 0 & b_{pp} & 0 & 0 \\ b_{tg} & 0 & 0 & b_{tt} & 0 \\ 0 & 0 & 0 & 0 & b_{rr} \end{bmatrix} \begin{bmatrix} e_t^G \\ e_t^Y \\ e_t^P \\ e_t^T \\ e_t^R \end{bmatrix} \quad (8)$$

The short-run restrictions used in the model, which is needed to formulate matrix A are as follows. First, the contemporaneous effects of revenue to spending shock (a_{tg}) and the effects of spending to revenue shock (a_{gt}) are set to be zero (0). It is according to the budget mechanism. If there is a change in spending, it will not affect revenue in the same period, and vice versa.

Second, Based on Perotti (2004), it is important to use exogenous elasticities of fiscal variables with respect to output and prices (a_{ty}, a_{tp}, a_{gy}, a_{gp}). The elasticity of tax revenue in relation to output (a_{ty}) and inflation (a_{tp}) is calculated using simple regression and the result is 0,92 for a_{ty} and 1,29 for a_{tp}. The elasticity of government spending in relation to output (a_{gy}) is set to zero, because government spending is purely exogenous. The elasticity of government spending in relation to inflation (a_{gp}) is set to 0.5. This is according to assumption used by Perotti (2002). The reason for using this assumption is that several components of government spending use nominal terms, while others (such as wages) are indexed to the consumer price (CPI).

The estimation procedures performed in this study is the same as the procedure for VAR in general. They will be imposed for each period (Period I and Period II).

The very first step is stationarity test. In the time series approach, stationarity testing is used to avoid spurious regression. It is one of the requirements before starting the VAR estimation (Enders, 2015). In this study, the author uses two tests. The first one is the augmented dickey fuller (ADF) test, as the most frequently used test in several studies. The second one is Zivot-Andrews (ZA) test, which recognizes the structural break.

The next step is to select the lag length. It is important to determine the optimum lag length in analyzing time-series data. Estimating causality and cointegration in time series is very sensitive to the lag length differentiating (Enders, 2015). In this study, we use criteria provided in EViews 10.0, among others: 1) Akaike Information Criteria (AI C), 2) Schwarz Information Criteria (SC), and 3) Hanan-Quinn Information Criteria (HQ). To ensure the optimum lag used in the model, we employ the normality test and autocorrelation test using Lagrange Multiplier on the selected lag length.

After selecting the optimum lag length, we estimate the SVAR model using the ordering and restrictions from previous section. From the estimation, we will derive two types of coefficients. The first one is the contemporaneous effect, and the other one is the dynamic effect. The contemporaneous effect is a linear change occurred on variables in an equation when there is a shock on an exogenous variable (Enders, 2015). Contemporaneous effects appear immediately without waiting for any time lag. In this study, the author only focuses on the effects of fiscal policy shocks (government spending and government revenue).

On the other hand, the dynamic effects show the response of each variable by including time lag. In a VAR model, including structural VAR, coefficients in the simultaneous equation cannot be interpreted directly (Enders, 2015). Consequently, in this study, the author uses two tools: variance decomposition and the impulse response functions (IRF) to analyze the dynamic effects.

Variance decomposition depicts a comprehensive overview about how the forecast error of each variable is explained by other variables in the model. The idea of the variance decomposition in SVAR model is to determine the percentage of the variability of the errors in forecasting y_1 and y_2 at time $t + i$, according to information at t that is due to variability in the structural shocks ε_1 and ε_2 between times t and $t + i$.

Impulse response function is closely related to variance decomposition. IRF represents the reactions of the variables to shocks hitting the system. Through IRF, one can determine how the dynamic response is described in a movement during a specific period.

The last step of this study is to compare both contemporaneous and dynamic effects of each variable in different periods (1993-2018 and 2019-2021). To do so, the author develops some hypotheses, as follows. H1: An increase in government spending positively affects GDP, while an increase in government revenue negatively affects GDP; H2: An increase in government spending positively affects inflation, while an increase in government revenue negatively affects inflation; H3: An increase in government spending positively affects the interest rates, while an increase in government revenue negatively affects the interest rates.

When the government decides to raise its spending or lower the tax rate, it will increase people's aggregate demand in the amount of spending multiplier. The increase in aggregate demand will raise the price and stimulate the production of goods and services. The rising aggregate production in a country will cause the GDP or total income to rise. The increase in total income will affect the quantity of money demanded. While the supply of money remains unchanged. Therefore, according to the equilibrium of the money market, the increasing money demand will raise the interest rate. Furthermore, when the interest rate rises, firms will reduce their investment plans. This is what we call with crowding-out effect of fiscal policy (Mankiw, 2016).

RESULTS AND DISCUSSION

As already mentioned in the previous chapter, in this study, we divide the research period into two: Period I is for 1993Q1-2018Q4, which went through the period of the Asian Financial Crisis (1998) and the Global Financial Crisis (2008), while Period II is for 2019M1-2021M12, which went through the period of the COVID-19 Pandemic (2020).

Before we estimate the SVAR model, it is necessary to test the stationarity of the data for each period and determine the optimal lag length. To do the stationarity/unit root test, we employ two tests: the Augmented Dickey-Fuller (ADF) test and Zivot-Andrews (ZA) test. The results of the unit root test for both periods are provided in Table 2.

For Period I, both ADF and ZA tests show that all variables except the interest rate (R) are stationary at the 1st difference I(1). While for period II, both ADF and ZA tests show that all variables except government spending are stationary at the 1st difference I(1). This result has met the requirements for using the VAR approach, that, one of the variables is stationary or does not have a unit root at I(0) (Ekananda & Suryanto, 2021). It also means that we do not need to perform cointegration tests. Thus, we can continue to apply short-term restrictions to the SVAR model.

In addition, the ZA test also provides information about the breakpoints of each variable. For Period I, fiscal policy variables (spending and revenue) have breakpoints around 2009, which means around the GFC, while the macroeconomic variables have breakpoints around 1999-2000, which means around the occurrence of the AFC. For Period II, the interest rate has a breakpoint on February 2021, while the remaining variables have breakpoints in June and October 2020.

Table 2. Unit Root Test

Var	Period I					Period II				
	ADF test		ZA test			ADF Test		ZA test		
	Level	1st diff	Level	1st diff	Break Point	Level	1st diff	Level	1st diff	Break Point
G_t	-2.622	-14.230*	-4.463	-10.369*	2009Q1	-5.469*	-8.844*	-5.850	-5.006*	2020M10
	(0.272)	(0.000)	(0.005)	(0.001)		(0.000)	(0.000)	(0.161)	(0.005)	
T_t	-2.689	-18.155*	-4.362*	-7.106*	2009Q1	-1.795	-8.613*	-3.380	-3.123**	2020Mo
	(0.244)	(0.000)	(0.003)	(0.001)		(0.685)	(0.000)	(0.0737)	(0.023)	6
Y_t	-1.744	-15.877*	-5.213	-16.671*	2000Q2	-3.010	-7.088*	-4.066	-8.492*	2020M10
	(0.726)	(0.000)	(0.008)	(0.008)		(0.122)	(0.000)	(0.0474)	(0.008)	
P_t	-0.965	-6.447*	-5.354**	-7.240*	1999Q1	0.388	-5.392*	-5.177*	-7.319**	2020Mo
	(0.943)	(0.000)	(0.035)	(0.000)		(0.998)	(0.000)	(0.000)	(0.020)	6
R_t	-4.444*	-5.706*	-7.289*	-7.826*	2000Q1	-2.208	-7.434*	-5.209*	-8.746*	2021M02
	(0.003)	(0.000)	(0.000)	(0.000)		(0.470)	(0.000)	(0.001)	(0.009)	

Source: Processed data
Notes: Numbers in parentheses are p-values; *significant at α=1%; **significant at α=5%;
ADF test with trend and maximum lag 10
ZA test Model C (trend and intercept) with maximum lag 4

Table 3. Lag Length Selection

Lag	Period I				Period II			
	FPE	AIC	SC	HQ	FPE	AIC	SC	HQ
0	3.72e-12	-12.12803	-11.99697	-12.07501	2.22e-18	-26.46130	-26.23001*	-26.38590
1	1.53e-13	-15.31954	-14.53314*	-15.00136	9.81e-19*	-27.30150	-25.91377	-26.84913*
2	1.14e-13	-15.61482	-14.17309	-15.03149*	1.67e-18	-26.90426	-24.36009	-26.07493
3	9.98e-14	-15.76008	-13.66301	-14.91160	3.58e-18	-26.52990	-22.82929	-25.32359
4	9.33e-14*	-15.84576*	-13.09336	-14.73213	3.88e-18	-27.3697*	-22.51270	-25.78647

Source: Processed data; *selected lag length

The next step is to determine the optimal lag length for the model. Table 3 shows lag length recommendation based on four criteria: Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC) and Hannan-Quinn Information Criterion (HQ).

For both periods, we choose lag 1 as an optimal lag length. We also employed a normality test using Cholesky Orthogonalization to ensure the use of this lag length.

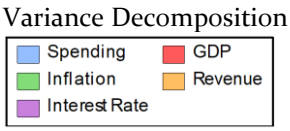
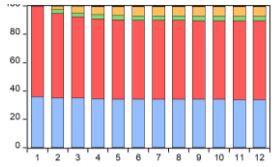
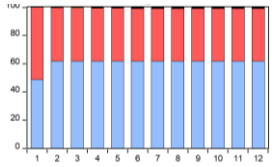
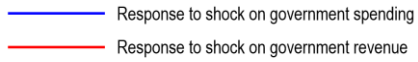
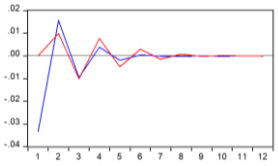
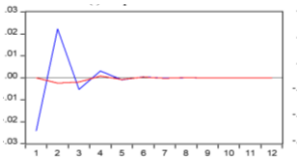
After we ensure the stationarity of the data and choose the optimal lag length, we proceed to the SVAR estimation. The main outputs of the SVAR approach are contemporaneous effects and dynamic effects. We provide the result of both contemporaneous and dynamic effects in the following sub-section, as well as the comparison of the result for both periods. We compare the result that shows the effects of fiscal policy shock on GDP, inflation, and interest rate, separately. For contemporaneous analysis, we use the contemporaneous coefficients from SVAR estimation. While for dynamic effect analysis, we use variance decomposition and impulse response function.

This result is consistent with previous studies showing a reduction in the impact of fiscal policy after the GFC, one of which was due to the accumulation of government debt (Ouliaris & Rochon, 2021; V. Ramey & Zubairy, 2014). The other reason is that during the pandemic, the government mostly reallocated the budget with a total realization that was not much different from what had been budgeted. This condition means that the deviation changes in spending during pandemic are not too significant. Therefore, the spending multiplier is moderate. On the other hand, the government revenue experienced a considerable change, which widened the budget deficit. However, the change on the revenue side is not due to

a decrease in tax rates, but rather to a shortfall in revenue due to weakening activity.

The dynamic effect of fiscal policy shocks on GDP is shown by variance decomposition and impulse response. From variance decomposition, in Period I, the forecast error of GDP is explained by around 55% by itself and 35% by government spending, while the remaining 10% is explained by government revenue (around 6%), inflation (3%), and interest rate (1%). In Period II, private GDP is also largely explained by itself at around 37% and government spending at around 61%, while the remaining 2% is explained by government revenue, inflation, and interest rate.

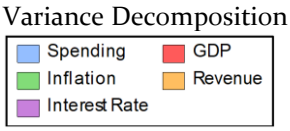
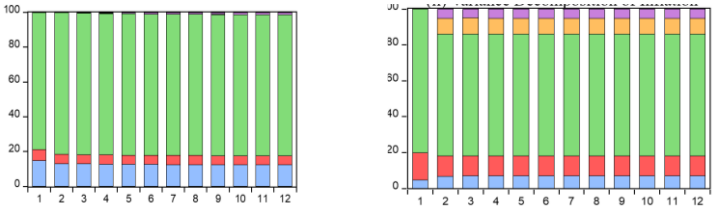
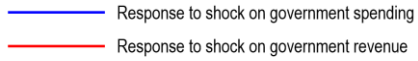
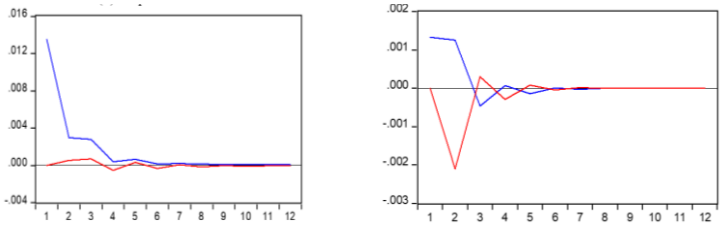
Table 4. The Effect of Fiscal Policy Shock on GDP

	Period I (1993Q1-2018Q4)	Period II (2019M1-2021M12)
Contemporaneous Effect:		
Spending Shock	0.277* (0.000)	0.171* (0.000)
Revenue Shock	-0.217* (0.000)	-0.098* (0.004)
Dynamic Effect:		
Variance Decomposition		 
Impulse Response		 

The impulse response for Period I show that the response of GDP to spending shock in period 1 (t-1) is -0.0334. It increases sharply in period 2 to a positive value of 0.0156, then fluctuates. On the other hand, the response of GDP to revenue shock is 0 in period 1. It moves to 0.0098 in period 2, then fluctuates. The responses of GDP to both spending and revenue shocks have stopped fluctuating since period 8, and the value is close to zero. It means that the fiscal shock will have a dynamic effect on GDP over 8 quarterly periods, or equivalent to 2 years. The impulse response function also provides information on the actions that need to be taken by the government to intervene in each indicator. From the response of private GDP to both spending and revenue shocks, it can be seen that after an increase in t=1 to t=2, private GDP experienced a sharp decline at t=3. Therefore, when the government increases spending, then after 2 periods, the government needs to take action to prevent a decline in private GDP in the next period.

The impulse response for Period II shows the response of GDP to spending shock at t=1 is -0.0240. It increases sharply at t=2 to a positive value of 0.02225, then fluctuates throughout 5 periods. On the other hand, the response of GDP to revenue shock starts at 0 in period 1. Its movement for 12 periods is only around 0. It slightly fluctuates along the initial 5 periods. The responses of GDP to spending and revenue shocks stop fluctuating in 5 periods. It means that the fiscal shock will have a dynamic effect on GDP over 5 monthly periods.

Table 5. The Effect of Fiscal Policy on Inflation

	Period I (1993Q1-2018Q4)	Period II (2019M1-2021M12)
Contemporaneous Effect:		
Spending Shock	-0.013046 (0.6450)	-0.023050** (0.0116)
Revenue Shock	-0.122774* (0.0002)	-0.006447 (0.4192)
Dynamic Effect:		
Variance Decomposition		
Impulse Response		

Source: Processed data
The numbers in parentheses are p-values; *significant at α=1%; **significant at α=5%

In both periods, the variance decomposition and impulse response of GDP is dominated by itself and government spending. It means that the role of government spending in explaining the forecast error of GDP is better than the government revenue. From this finding, the author suggests the government use spending rather than revenue instruments to intervene in the dynamic movement of GDP. As also shown by Klein & Linnemann (2019), a shock to revenue policy resulted in a larger current account and budget deficit than the shock to spending policy. Hence, it is better for our government to use spending instruments more than revenue to affect GDP.

The variance decomposition also shows that the role of spending in the pandemic crisis is larger than in the previous crises. This shows that when the government faces a health-related crisis, expansionary policies by increasing spending to maintain economic stability are very appropriate because it has a considerable role in influencing GDP dynamically.

The effect of fiscal policy shocks on inflation for Periods I and II are provided in Table 5. For Period I, the contemporaneous effect of spending shock on inflation is not significant at any level, while it is significant with a negative value (-0.12) for revenue shock. On the contrary, in Period II, the contemporaneous effect of spending shock on inflation is significant with a negative value (-0.02), while it is not significant for revenue shock. The result of contemporaneous effects does not satisfy the H2 hypothesis completely, due to the non-direct transmission of fiscal shock to inflation. This result is consistent with previous studies, showing that spending shock has no effect or even reduces prices (D'Alessandro et al., 2019; Jørgensen & Ravn, 2022).

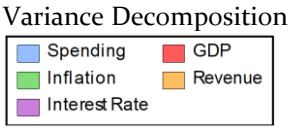
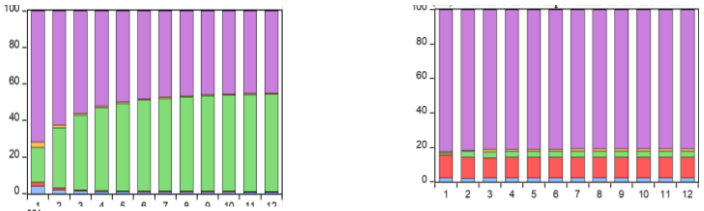
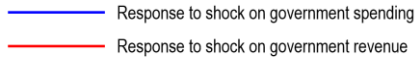
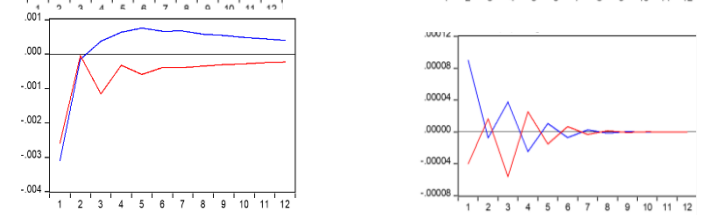
The minor role of fiscal policy in influencing the dynamic movement of inflation is also shown through variance decomposition and impulse response for both periods. In Period I, the forecast error of inflation is explained up to 81% by itself,

and the remaining 17% is from government spending and GDP, while government revenue and interest rate play marginal roles of less than 2%. In Period II, inflation is also explained mainly by itself at around 68%, private GDP is around 11%, and the remaining 21% is from government revenue, private GDP, and interest rate.

The impulse responses for both periods also give small deviations. In Period I, the response of inflation to government spending shock is positive (0.0135). The value continues to decrease until it approaches zero in the 6th period. On the other hand, the response to revenue shock only moves around zero since the early period. Both spending and revenue shocks have dynamic effects on inflation over 6 quarterly periods, or equivalent to 1.5 years. In Period II, the response of inflation to government spending shock is positive on t=1 (0.01326). The value continues to decrease until it approaches zero at t=6. On the other hand, the response of inflation to revenue shock starts at 0 at t=1. It drops at t=2 to the negative value of -0.0021, then fluctuates throughout 6 periods. Both spending and revenue shocks have dynamic effects on inflation over 6 monthly periods, equivalent to a half year.

From the dynamic movement of inflation, we know that the role of revenue shock in Period I is very limited, but it becomes bigger in Period II. On the other hand, the response to the spending shock in Period II becomes smaller than in Period I, giving room for the role of revenue shock. During the AFC and the GFC, the government's role is mainly implemented through spending policies. There were few changes in tax rates or tax incentives during the two crisis periods. However, the COVID-19 pandemic is different. The government provides various kinds of stimulus, both in terms of spending and revenue. This policy makes the role of the spending shock more minor in Period II, but it provides room for other variables, mainly revenue.

Table 6. The Effect of Fiscal Policy on Interest Rate

	Period I (1993Q1-2018Q4)	Period II (2019M1-2021M12)
Contemporaneous Effect:		
Spending Shock	0.004467 (0.6937)	-0.001899 (0.0635)
Revenue Shock	0.025856 (0.0479)	-0.000343 (0.6786)
Dynamic Effect:		
Variance Decomposition		
Impulse Response		

Source: Processed data

The result shows that in affecting inflation during the financial-related crises, the government could use revenue instruments, such as tax incentives and reductions, but only temporarily. On the other hand, during the health-related crises, the government could use revenue instruments continuously to support the supply side and affect the dynamic movement of inflation.

The effects of fiscal policy shock on the interest rate for Periods I and II are presented in Table 6. For Periods I and II, both government spending shock and government revenue do not contemporaneously affect the interest rate at any level of significance. This is due to the government's budgeting mechanism and also the determination of credit interest rates by banks. Changes in fiscal policy are not immediately responded to by banks, it takes time to adjust, and therefore the contemporaneous effects are insignificant.

From variance decomposition, in Period I, the interest rate is explained mainly by itself (around 53%) and inflation (45%). GDP and fiscal variables play a marginal role of less than 2% in explaining the interest rate. This is probably the reason why the contemporaneous effect of the fiscal variable on the interest rate is not significant. For Period II, the forecast error of interest rate is also largely explained by itself and inflation, with a total of 93%, while the remaining 7% is explained by private GDP and fiscal variables.

Impulse response for Period I shows that the changes in government spending and revenue have dynamic impacts on GDP and inflation over a certain period. However, after a certain period, GDP and inflation will return to their steady-state position. Different things are shown by the response of the interest rate. The final values of the two responses are not zero. As shown in panel (iii) Figure 4.4, both spending shock and revenue shock are responded negatively by interest rate at t=1. The value for spending shock is -0.0031, while for revenue shock is -0.0026. The values increase and stop fluctuating in the 8th period. The response to spending shock remains positive at around 0.0005, while the response to revenue shock remains negative at around -0.0003. Not much different from the previous period, the impulse response in Period II shows that though the graphs show fluctuating movements, the actual value is insignificant. The response for spending shock starts at a positive value (0.00 0089), while the response for revenue shock starts at a negative value (-0.000039).

From this result, we can conclude that fiscal variables, both spending and revenue, do not affect the interest rate, both contemporaneously and dynamically. This result does not satisfy the H3 hypothesis. Still, it is consistent with study from Murphy & Walsh (2022), which explained that an expansionary fiscal policy through an increase in government spending could be responded to negatively by interest rate. The increasing demand for credit due to higher government spending or tax cut may be offset by increasing supply due to higher income levels. Therefore, interest rates do not change to be higher, or even decrease.

CONCLUSION

Based on the empirical results from the previous chapter, we conclude several points as follows. First, in both periods, government spending and revenue shocks show significant contemporaneous effects on GDP with opposite signs. It is positive for spending shock and negative for revenue shock. The multiplier is higher in Period I. The influence of fiscal policy on the dynamic movement of GDP is more provided by spending shocks, compared to revenue shocks. Second, for Period I, the contemporaneous effect of spending shock on inflation is not significant at any level, while it is significant with a negative value for revenue shock. On the contrary, in Period II, the contemporaneous effect of spending shock on inflation is significant with a negative value, while it is not significant for revenue shock. The influ-

ence of fiscal policy shocks on the dynamic movement of inflation is moderate, only less than 20%. During the pandemic crisis, the role of revenue shock on inflation's movement becomes higher than in the previous crisis. Third, fiscal policy shocks do not affect the interest rate contemporaneously and dynamically.

From the results obtained, we suggest the Government use more spending than revenue policy in affecting the movement of GDP during a crisis, to use more revenue policy in influencing the prices during a health-issues crisis, and not use fiscal policies to intervene in interest rates in every crisis.

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