Journal of Ecohumanism
2024
Volume: 3, No: 5, pp. 13 – 29
ISSN: 2752-6798 (Print) | ISSN 2752-6801 (Online)
https://ecohumanism.co.uk/joe/ecohumanism
DOI: https://doi.org/10.62754/joe.v3i5.3635

The Effect of Fiscal Policy Shocks on Private Expenditure: A SVAR Study in Indonesia

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Abstract

This paper examines the effect of fiscal policy on private expenditure in a small open economy (i.e., Indonesia) through an open economy structural VAR (SVAR) study. The data set comprised a quarterly time series spanning from 2000:1-2022:4. Impulse response function (IRF) and variance decomposition (VDC) were used to analyze the effect of fiscal policy shocks on private expenditure. The main results indicated that government spending shocks crowded out private consumption. Domestic income gave a similar negative effect that can be explained by Ricardian equivalence theory which showed a reduction in private consumption. The effect of government tax revenue on private consumption was positive. The results supported the non-Keynesian effect which suggested that the increase in government tax revenue tended to increase private consumption. Similarly, domestic income showed a positive effect.

Keywords: *Fiscal Policy, SVAR Model, Crowding Out Effect, Crowding in Effect.*

Introduction

Crowding out generally refers to the effects of expansionary fiscal policy. If an increase in government expenditure financed by tax or issuance of bond fails to enhance economic growth, then private expenditure such as private investment and private consumption are showing crowding out effect. This situation may occur if the government runs a big budget deficit. It will then have to sell debts to the private sector and stimulate individuals and institutions to purchase these at higher interest rates. A rise in interest rates may then crowd out private investment and private consumption, offsetting the fiscal stimulus.

Figure 1 shows the slow increase in government expenditure in Indonesia from 2010 to 2022. Private investment trends also increased slowly from year to year over the same period. In 2020 during pandemic covid-19, Indonesia experienced its first economic contraction since the Asian financial Crisis in 1998. The GDP contracted by around 2.1% due to reduced consumption, disrupted supply chains and weakened exports. To mitigate the economic impact of the pandemic, the Indonesian government increased spending healthcare, social assistance, and economic stimulus packages. This surge in government expenditure aimed to support businesses, protect jobs, and provide relief to affected individuals and households. The substantial increase in government spending can crowd out private-sector investment. When the government spends more, it competes with private businesses for resources such as funds, materials, and labor. This can lead to higher borrowing costs for the private sector, reduced business investment, and slower economic growth in the long term.

Preliminary examination of these graphs may lead one to conclude that the crowding out effect is supported by data. However, these trends do not indicate that the existence of the crowding out effect was caused by government expenditure. This possible outcome was due to the inconsistent theoretical relationship between government expenditure and private expenditure during the period of study. Further studies need to be conducted through empirical estimation to obtain conclusive results. Furthermore, the existing empirical studies on this issue have produced mixed results and remained controversial.

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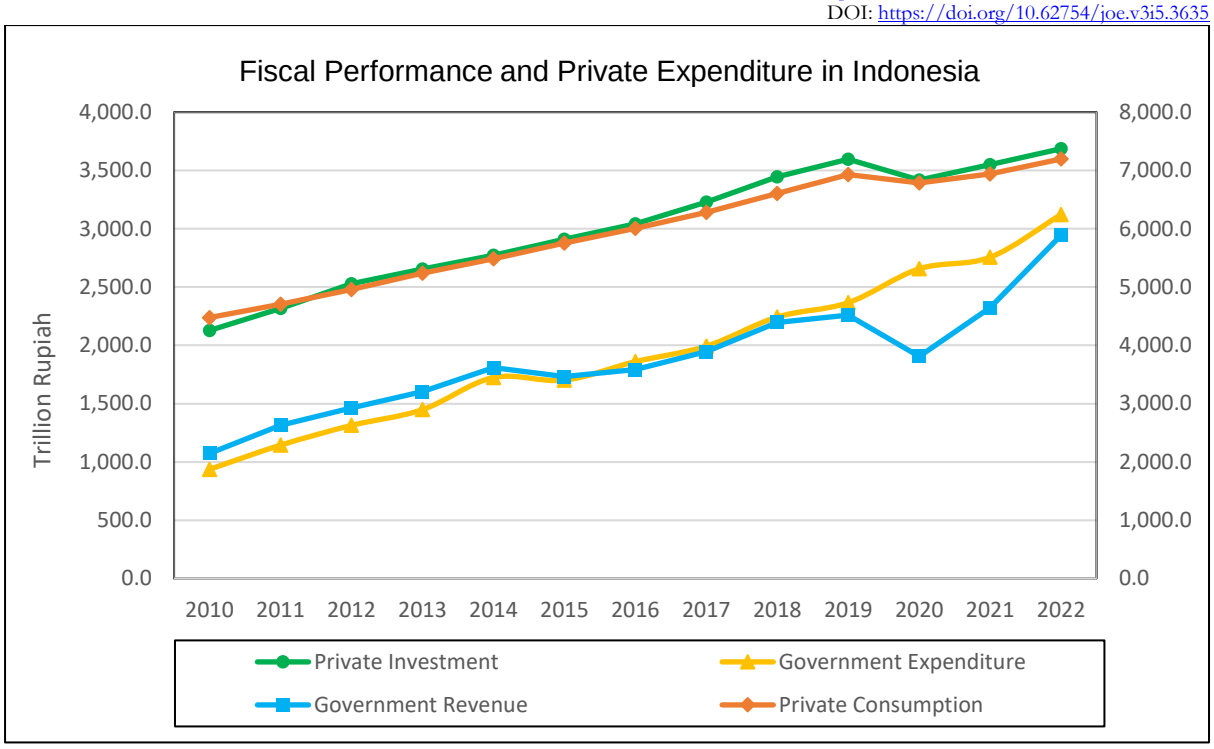

Figure 1. The Performance of Fiscal and Private Expenditure for Indonesia

Note: Secondary axis is private investment and private consumption

The aim of this study is to examine empirically the effect of fiscal policy shock on private expenditure in a small open economy with special reference to Indonesia. This study employed a non-recursive structural vector autoregressive (SVAR) modeling framework in nine variables which included two foreign variables, two fiscal policy variables and five macroeconomic variables. The effect of fiscal policy was analyzed for either a shock negative effect (crowding out effect) or a positive effect (crowding in effect) on private expenditure through using impulse response function (IRFs). The forecast error variance decomposition (FEVD) analysis was also used to measure the fraction of the forecast error variance of an endogenous variable that could be attributed to orthogonalized shocks on itself or to another endogenous variable.

This study significantly contributes to the literature through the improvements and extension of existing research. In the context of fiscal policy implementation, this study may provide the information for government to determine the effect of the fiscal policy implementation on private spending (Khan et al., 2020). For example, in Indonesia the large sum for public expenditure necessitates the government to gauge the effectiveness of government spending on economic growth. This is crucial since the net effect of increasing government spending is largely dependent on the response of private spending stimulated through changes in fiscal policy. For example, government expenditure financed through bond issue tends to raise the market interest rate which influences the trend in private spending. As a result, the maximum impact of increasing government spending on national income is not achieved since private investment is crowded out in response to rising borrowing costs. In this case, the government may provide financial assistance to the private sector since it is affected by the budget expansion policy. This study, through its innovations thus contributes to the extant literature on crowding out effect. It also makes specific improvements in considering the role of the private sector, such as private investment and private consumption, as distinct from past studies which mainly focused on economic growth. The contribution of the private sector in the Indonesia economy is crucial given the dependence of the government sector due to its very large spending in the economy. Without its intervention national economic growth may be severely restricted.

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The rest of the paper is organized as follows: Section 2 presents the literature review. Section 3 focuses on research methodology and data processing. Meanwhile, Section 4 presents the empirical results by focusing on structural impulse-response function and variance decomposition. Finally, Section 5 provides the summary and conclusion.

Literature Review

There are numerous studies that focused on closed economies and examined the effect of fiscal policy shocks through employing VAR and SVAR analyses. The more recent studies for example included Gali et al. (2007), Giordano et al. (2007), Afonso and Sausa (2011a) and Yadav et al. (2012).

Giordano et al. (2007) utilized quarterly data for selected fiscal variables such as private GDP, inflation rate, private employment, interest rate, government spending on goods and services, government wages and taxes for the period 1982:1 to 2004:4. They discovered that the shock of government purchases of goods produced a positive response to output, private consumption, private investment, employment, and inflation. However, the response of inflation is small and short-term. In contrast, public wages were lumped together with purchases in many studies, and showed no significant effect on output, private consumption, and private investment. In comparison, their effect on employment was negative after two quarters. The shocks on net revenue produced negligible effects on all the variables.

Afonso and Sausa (2011a) adopted the Bayesian Structural Autoregression model and a Fully Simultaneous System approach to analyze the macroeconomic effects of fiscal policy in closed economies. They established that positive government spending shocks exert a negative effect on real GDP thus leading to crowding out effects of private investment and private consumption. They also produce positive effect on price level and a mixed impact on the average financing cost of government debt.

Yadav et al. (2012) examined the impact of fiscal shocks on the Indian economy using SVAR methodology for 1997:1 to 2009:2. Two different identification schemes were used to assess the effect of government expenditure and tax revenue on output. The recursive scheme was based on the Cholesky decomposition, and the second identification scheme referred to the Blanchard and Perotti (1999) technique using information on the tax system to identify the SVAR model. Both identification schemes produced similar responses, but the values of the multipliers differed. The tax revenue shock showed a bigger impact on gross domestic product (GDP) than the government spending shock. In the short term, the impact of expansionary fiscal policy supports the Keynesian analysis but in long run the response is mixed.

A recent study by Tang et al. (2013) investigated the effectiveness of fiscal policy in five main ASEAN countries; mainly Malaysia, Indonesia, Thailand, Singapore, and Philippines. The study focused on small open-economy economies for the period 1990:1-2009:4. Using a structural vector autoregression, the positive shock of government spending produced a consistent pattern of output expansion with fiscal contraction, although the result was only statistically significant in Indonesia and Thailand. Further examination using a time-varying VAR model revealed that the positive impact from higher taxes on output mainly reflected on heightened concerns over public finance during the Asian Financial Crisis. However, in the case of Thailand there was some evidence that government spending can at times be useful as a tool for short-term countercyclical policy.

In the Malaysia context, Kaharudin et al. (2022) investigate the effectiveness of fiscal policy that is the government spending shocks and government revenue shocks on private investment. The study uses a SVAR model for 1991:1 to 2016:3. The results indicated that government spending shocks and government revenue shocks are found a negative effect for private investment while private consumption had a positive effect. Gali et al. also have the same results which found the government spending shocks had a positive effect on consumption while private investment had a negative effect.

There is a dearth in empirical studies in Indonesia that specifically investigate the effect of fiscal policy on economic activity and private expenditure. Given that private expenditure is the important macroeconomic variable in fostering economic growth, the contribution of the private sector is therefore crucial. In

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developed countries, the contribution of the private sector is important in improving economic activity. A recent study by Tang et al. (2013) on fiscal policy effect on economic growth did not specifically include private expenditure.

Although there have been many past studies that utilized the VAR and SVAR models in analyzing the effects of fiscal policy on macroeconomic variables, there is however a limited number of empirical studies which focused on foreign variables in a small open economy, especially so for Indonesia. Most of the earlier studies did not specify the variables according to the exchange blocks, such as domestic blocks and foreign blocks. However, the recent study by Tang et al. (2013) did examine fiscal policy shock on economic activities which included the global GDP as a foreign variable for the five ASEAN countries. In addition, their study further extended previous ones through the addition of new data and the relevant macroeconomic variables.

Given the context of the recent development, this study shall contribute to the existing literature through extending its examination into the effect of fiscal policy shocks on private spending (private investment and private consumption) which included foreign variables and the use of latest data. The study will focus on the crowding out effect or crowding in effect issue in response to the positive shock of government spending and government tax revenue on private expenditure.

Methodology

Data

Quarterly data spanning 2000:1 to 2022:4 was used in the study. These were collated from various sources including the ESDS database consisting of International Financial Statistics (IFS), Direction of Trades (DOTS), World Bank, World Development Indicators and websites from the Department of Statistics and Bank Negara Malaysia. All variables were transformed into log form except for interest rate (INT), which was in percentage points.

The variables were divided into two blocks, namely the foreign block, and domestic block. The former included the world oil prices (LOP) and foreign national income (LFY). The domestic block included target variables such as private investment (LPI) and private consumption (LPC), policy variables such as government tax revenue (LGR) and government expenditure (LGE), and three macroeconomic variables, comprising interest rate (INT), domestic income (LDY) and real effective exchange rate (LREER).

In addition to the endogenous variables, the model also included two dummy variables for breaks in intercept, which coincided with major economic events, namely, subprime mortgage crisis 2007/2008 and global financial crisis 2020. It was assumed these two events only influenced the domestic variable rather than the foreign variable.

SVAR Model

In the SVAR model, the dynamic relationship between fiscal policy and the macroeconomic variables in the structural model may be written as follows:

$$AY_t = C + \left(\Gamma_1 L + \Gamma_2 L^2 + \ldots \Gamma_k L^k\right) Y_t + \varepsilon_t \quad (1)$$

where A is a square matrix that captures the structural contemporaneous relationships among the economic variables in the system, Y_t is $n \times 1$ vector of endogenous variables $(LOP, LFY, LGR, LGE, INT, LPI, LPC, LDY)$, C is a vector of deterministic variable (constant, trend and

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dummy variable), ΓL is a kth order matrix polynomial in lag operator, and ε_t is a vector of structural innovation which satisfies the condition that $E(\varepsilon_t) = 0$, $E(\varepsilon_t \varepsilon_s') = \sum_\varepsilon$ for all $t = s$ and $E(\varepsilon_t \varepsilon_s') = 0$ otherwise.

In equation (1) the values for A, ΓL and ε_t cannot be directly estimated. The equation was thus indirectly estimated by transforming to the reduced form as follows:

$$\boldsymbol{Y_t = A^{-1}C + A^{-1}\left(\Gamma_1 L + \Gamma_2 L^2 + \ldots \Gamma_k L^k\right) Y_t + A^{-1}\varepsilon_t} \quad (2)$$

or,

$$\boldsymbol{Y_t = \pi_0 + \pi_1 Y_t + e_t} \quad (3)$$

where, $\pi_0 = A^{-1}C$, $\pi_1 = A^{-1}\left(\Gamma_1 L + \Gamma_2 L^2 + \ldots \Gamma_k L^k\right)$, $e_t = A^{-1}\varepsilon_t$ and

$E\ (\mu_t u_t') = A_0^{-1} \Omega A_0^{-1\prime} = \sum$.

The value $e_t = A^{-1}\varepsilon_t$ is a reduced form of VAR residual which satisfies the conditions that $E(e_t) = 0$, $E(\varepsilon_t \varepsilon_s') = \sum_e . \sum_e$ is a $(n \times n)$ matrix that can be estimated from the data. The relationship between the variance-covariance matrix of the estimated residuals, $\sum_e$ and the variance-covariance matrix of the structured innovation, $\sum_\varepsilon$ can be shown by the following equation:

$$\begin{aligned} \sum_{\boldsymbol{\varepsilon}} &= \boldsymbol{E(\varepsilon_t \varepsilon_t')} \\ &= \boldsymbol{E(A e_t e_t' A') = A E(e_t e_t') A'} \\ &= \boldsymbol{A \sum_e A'} \end{aligned} \quad (4)$$

The solution to the SVAR system can be generated through the recovery of the relationship between the reduced form residual (e_t) and the structural innovation (ε_t). This relationship can be estimated by using the equation (3), which is $e_t = A^{-1}\varepsilon_t$ or $A_0 e_t = \varepsilon_t$ using the maximum likelihood estimation method. This study employed the non-recursive SVAR-A model to identify the contemporaneous parameters. The coefficient A_{ij} indicates how variable j affects variable i, contemporaneously. This situation shows that the coefficients on the diagonal are normalized to unity, while the number of zero restrictions means that the variable does not have a contemporaneous effect on other variables. The identification of the SVAR model was used to identify the effects of a fiscal policy shock on private spending is shown in equation (5).

For the system to be identified, sufficient restrictions must be imposed to recover all structural shock, U_t from the reduced form of VAR residuals, V_t. According to the order condition, for the system to be just identified or exactly identified it may require $\frac{K(K-1)}{2}$. K is referred to as the number of endogenous variables in the system (Lutkepohl, 2005). Based on the order condition, the number of zero restrictions in

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equation (5) is 36 which is $\frac{K(K-1)}{2} = \frac{9(7)}{2} = 36$. However, since the contemporaneous matrix A in equation (5) has 44 zero restrictions, the SVAR models is thus over-identified.

$$A\begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ a_{31} & 0 & 1 & 0 & 0 & 0 & 0 & a_{38} & a_{39} \\ a_{41} & 0 & 0 & 1 & 0 & 0 & 0 & a_{48} & 0 \\ a_{51} & 0 & 0 & a_{54} & 1 & 0 & 0 & a_{58} & 0 \\ a_{61} & 0 & a_{63} & 0 & 0 & 1 & 0 & a_{68} & 0 \\ a_{71} & 0 & a_{73} & 0 & 0 & 0 & 1 & a_{78} & 0 \\ a_{81} & a_{82} & 0 & 0 & a_{85} & a_{86} & a_{87} & 1 & 0 \\ a_{91} & a_{92} & a_{93} & a_{94} & a_{95} & a_{96} & a_{97} & a_{98} & 1 \end{bmatrix}\begin{bmatrix} U_t^{LOP} \\ U_t^{LFY} \\ U_t^{INT} \\ U_t^{LGR} \\ U_t^{LGE} \\ U_t^{LPI} \\ U_t^{LPC} \\ U_t^{LDY} \\ U_t^{LREER} \end{bmatrix} = \begin{bmatrix} V_t^{LOP} \\ V_t^{LFY} \\ V_t^{INT} \\ V_t^{LGR} \\ V_t^{LGE} \\ V_t^{LPI} \\ V_t^{LPC} \\ V_t^{LDY} \\ V_t^{LREER} \end{bmatrix} \quad (5)$$

Identification Scheme

Based on matrix A, in Equation (5), the foreign variables have been assumed to be completely exogenous to the domestic variables and do not respond contemporaneously or have lags of movement, especially for small open economies such as Indonesia. The domestic variables are assumed to respond contemporaneously or with lags on two foreign variables comprising world oil price and foreign national income. The former is an exogenous variable that do not have a contemporaneous effect on endogenous variables such as foreign income (LFY), interest rate (INT), government revenue (LGR), government expenditure (LGE), private investment (LPI), private consumption (LPC), domestic income (LDY) and real effective exchange rate (REER). Conversely, foreign income can influence world oil price in lag. It is also assumed to respond contemporaneously to world oil price.

The monetary authority sets the interest rate after observing the current value of domestic variables such as domestic output, real effective exchange rate and world oil price. Interest rate is assumed to react negatively to changes in world oil prices. An increase in the prices will increase the price level on a regular basis and slow down economic growth. To stabilize this, as well as inflation rate, the monetary authority should increase the interest rates through monetary policy tightening. According to Tang et.al (2010), the policy is set to control inflation rate in the country. However, in the long run, an increase in interest rates will reduce output and investment and as such lower rates are necessary to offset the adverse effects. In contrast however, interest rate is assumed to react positively with domestic income based on Taylor rule. The lowering of interest rate is consistent with findings of Castro (2006). The effective interest rates and exchange rates are mutually dependent which indicates positive relationship. This is also consistent with past studies such as Kim and Roubini (200) and Brischetto and Voss (1999) and may contribute to solving the exchange rate puzzle. The government tax revenue is assumed to react contemporaneously to world oil price and domestic income while responding with lag to government spending and real effective exchange rate. The government tax revenue is assumed to respond positively to the world oil price since Indonesia is a net oil-exporting country. An increase in world oil price will thus lead to an increase in oil export earnings, increase in petroleum income tax by PERTAMINA and finally increase in government tax revenue. The increase in petroleum income tax in 2002 amounted to Rp16,114 billion, Rp18,144 billion in 2003 and Rp23,086 billion in 2004 in line with the respective increase in oil prices, namely USD24.99, USD28.85 and USD38.29 per barrel. According to macroeconomic theory, the net tax function is equal to $T = t_0 + t_1 Y$ where t_0 and t_1 are parameters that represent the tax structure. The parameter t_1 is the marginal net income tax rate, giving the increase in taxes per unit increase in incomes $(t_1 = \frac{\Delta T}{\Delta Y})$. This function indicates that an increase in domestic income will stimulate an increase in net tax collection and increase in budget surplus. The positive relationship between net tax revenue and economic activity will reduce transfer payment especially on non-working individuals.

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Government spending has been assumed to respond contemporaneously to world oil prices, government tax revenue and domestic revenues. It reacts negatively to current growth in world oil prices. The positive shocks of world oil prices may lead to increase in the price level leading to contraction of economic growth. This situation has induced the government to respond by reducing government expenditure to stimulate economic growth and stabilize inflation rate as consistent with Koeda et al. (2008). The study showed that an increase in world oil prices had adversely affected the performance of economic growth in Saudi Arabia through a direct impact on reduced government spending such as that for infrastructure. Government expenditure is also assumed to react positively to government tax revenue. This justification is consistent with the revenue-spend hypothesis proposed by Friedman (1978) which stated that an increase in government tax revenue will stimulate an increase in public spending but will not reduce fiscal deficit. Further, government spending is also assumed to respond positively to domestic income based on Wagner law which states that there are inherent tendencies for the activities of different level of a government to increase both intensively and extensively in economic growth. This situation indicates that government expenditure grows at a faster rate than economic growth.

Private investment is assumed to react contemporaneously to innovations in all foreign variables, interest rate and domestic income. It is assumed to respond negatively to world oil price due to the adverse supply shocks. For example, an increase in the world oil price will elevate production costs of firms which will subsequently respond by reducing their investment spending. The Keynesian and Classical economics theory assumed that private investment has negative relationship to interest rates. An increase in interest rate will decrease private investment, and vice versa. However, in the late 1930s economists doubted the importance of interest rate as a determinant to private investment. Hence, several alternative investment theories were proposed. According to the Neoclassical investment theory proposed by Jorgenson (1963), the desired capital stock in a firm is determined by output and price of capital goods. The price of capital goods depends on their cost, interest rates and corporate income tax. Any changes that occur in output and the price of capital services will change the capital stock (K), or also known as net private investment ($\Delta K = I$). In neoclassical investment theory, net investment thus depends on the level of income and user cost of capital. The Accelerator investment theory similarly explains that net investment depends on output or domestic income, meaning that the investment will increase with increase in output.

Private consumption is assumed to respond contemporaneously to foreign variables such as world oil price and domestic variables, i.e., interest rate and domestic income. Private consumption is assumed to react negatively to changes in world oil prices. An increase in world oil price will spike up the price level. This would decrease real income for consumption and consequently households will respond accordingly. In other words, consumer purchasing power should similarly decrease. However, Classical economic theory states that interest rate plays an important role in negatively influencing private consumption. Classical economists believe that increase in interest rate will intensify savings but decrease private consumption. According to Keynesian theory, private consumption has a positive relationship to current income which suggests that households set their consumption expenditure based on current income. In other words, current income plays an important role in influencing private consumption. For example, when household income increases, consumption spending will also increase. In general, most economists agree with the Keynesian assumption that household consumption expenditure or private consumption has positive relationship with household income.

Domestic income has been assumed to react contemporaneously to world oil price, foreign income, government spending, private investment, and private consumption. Positive increase in oil price is assumed to positively stimulate domestic income through increase in petroleum income tax leading to increase in export earnings. At the same time, domestic income is assumed to react positively to foreign income given that the Indonesian economy is highly dependent on those of the United States and Japan. In the Keynesian model, equilibrium level of output requires output (Y) equal to demand (E) i.e., $Y = E$ and the aggregate demand consists of three components, namely the use of consumption (C), investment (I) and government expenditure (G). Therefore, the equilibrium level of output is $Y = E = C + I + G$. According to Keynes, the level of household consumption is a stable function on disposable income (Y_D) which is domestic income minus tax $(Y_D = Y - T)$. Keynes believed that there are other factors or

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variables that could affect consumption, but he was convinced that domestic income is a dominant factor affecting consumption. In addition, Keynes also believed that investment is a component of aggregate demand which is not affected by income. Instead, investment is the factor responsible for income instability. Government spending is assumed to be controlled by policy makers and did not directly depend on domestic income. Keynes also mentioned that government expenditure led economic growth. Keynes' arguments and assumptions thus indicate that the three main components above would elicit contemporaneous response to domestic income.

Real effective exchange rate is assumed to respond contemporaneously to foreign variables and all domestic variables. This assumption is reasonable because the exchange rate is a fast-moving variable in the system. It is assumed to react positively to world oil price shocks. An increase in world oil price triggers increase in the price level causing supply for goods and services in the domestic market to be less competitive while increasing their demand in the international market. This situation leads to an increase in imports which tend to appreciate effective exchange rate. Meanwhile, interest rates are assumed to respond positively to the real effective exchange rate indicating that a higher interest rate will offer higher returns to borrowers as compared to those of other countries. As a result, more foreign capital will enter the country leading to increase in exchange rates. However, if the inflation rate in a country is higher than those in other countries, or if there are additional factors aimed at lowering value of the domestic currency, then a higher interest rate will be reduced. This situation indicates that the lower of interest rates is tending to reduce the exchange rates.

Empirical Results

Preliminary Results

The unit root test for each variable in this study was determined based on the Augmented Dickey Fuller (ADF) test. As shown in table 1 only three variables, namely foreign income, interest rate and private investment, were stationary at 10 percent significance at level form. The other variables remained stationary in the first difference form.

The optimum lag length in the VAR system adopted two methods namely, Akaike Information Criteria (AIC) and Schwarz Bayesian Criteria (SBC). Table 2 reports that the optimum lag length was two (2) when using AIC and one (1) when using SBC. Thus, we use two lag lengths for our model which are sufficient to capture the dynamics of the model without incurring the loss of too many degrees of freedom.

Table 1. Unit Root Test: Augmented Dickey Fuller

Variables	Level		First difference	
	Constant and no trend	Constant and trend	Constant and no trend	Constant and trend
LOP	-0.136 (2)	-3.137 (3)	-8.446* (1)	-5.526* (4)
LFY	-2.365 (2)	-3.692** (6)	-8.405* (1)	-8.607* (1)
INT	-3.435** (2)	-3.595** (2)	-3.875* (6)	-3.867** (6)
LGR	-0.914 (11)	-1.873 (8)	-3.778* (7)	-3.857** (7)
LGE	3.234** (11)	2.699 (11)	3.159** (11)	3.949** (11)
LPI	-0.590 (1)	-3.251** (1)	-5.795* (3)	-6.126* (3)
LPC	-1.321 (7)	-0.777 (7)	-4.583* (6)	-4.764* (6)
LDY	-0.807 (8)	-2.275 (8)	-3.957* (3)	-3.943** (3)
LREER	-2.289 (3)	-2.232 (3)	-6.274* (2)	6.255* (2)

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LREER	-1.634 (3)	-1.384 (3)	-6.368* (2)	-4.142* (7)

Notes: Denotes significant at the 1 percent level (*), significant at 5 percent level (**) and significant at 10 percent (***) which reject of the null hypothesis on non-stationary. Critical value τ for constant but no trend is -3.51, -2.89 dan -2.58 for 1 percent, 5 percent and 10 percent significant level respectively and critical value τ for constant and time trend is -4.07, -3.46 dan -3.15 1 percent, 5 percent and 10 percent significant level respectively.
Number in bracket ( ) is the optimum lagged based on Akaike Information Criterion (AIC).
LOP (World oil price), LFY (Foreign income), INT (interest rate), LGR (Government revenue), LGE (Government expenditure), LPI (Private investment), LPC (Private consumption), LDY (Domestic income), LREER (Real effective exchange rate)

Furthermore, the absolute eigenvalue values of the VAR companion matrix were less than unity. This provided evidence that the estimated VAR (2) model was stationary, and the models estimated were stable. Since the baseline SVAR Model was over-identified, it is necessary to test the validity of the over-identification restrictions by using the LR (Likelihood ratio test) test. The value of χ^2 (with eight degrees of freedom) was 11.8 and the p-value 0.16 which indicated that the over-identification restrictions were valid.

Table 2. Lag Length Tests: Akaike Information Criteria and Schwarz Bayesian Criteria

	AIC	**SBC**
k		
4	-3407.00	-3432.70
3	-3502.07	-3509.82
2	-3532.13	-3411.35
1	-3430.87	-3544.14

Structural Impulse Response Function

Figure 2 and Figure 3 illustrate the structural impulse responses functions of the endogenous variables in this study. The focus was to analyze the effect of the fiscal policy shocks i.e., government expenditure and government tax revenue, on private expenditure. However, this analysis was not only focused on private expenditure but also examined the macroeconomic variables.

With reference to Figure 2 and Figure 3, the solid line in the center represents the estimated responses while the two dashed lines represent the confidence bands or error bands. The error bands were derived through residual-based bootstrap method, which had an 84 percent confidence interval with 2500 bootstrap replications from the original sample data. The significance of impulse response functions is based on the upper boundary lines and the lower boundary lines. If the two lines are in one direction, either positive or negative, the impulse response functions are thus significant. If they are in opposite directions (for example, the upper boundary lines are positive and the lower boundary lines negative) then the impulse response functions are not significant.

Government Expenditure Shocks on Macroeconomics Variables

Figure 2 shows the impulse response function from the effect of government spending shock on macroeconomics variables. The response of interest rates to the innovation in government expenditure shocks is significantly positive at the beginning of the period. This can be explained by Keynesian theory in which an increase in interest rate increases the government expenditure. However, this response starts to decay and become non-significant after the 3rd quarter. Meanwhile, the response of government tax

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DOI: https://doi.org/10.62754/joe.v3i5.3635

revenue to the innovation in government expenditure is significant and negative in the 2nd quarter which indicates that Indonesia has a budget deficit. In other words, the government expenditure has exceeded the government tax revenue. However, after the 2nd quarter, the response becomes non-significant.

Furthermore, the response of private investment to the innovation in government expenditure is not significant although the direction in impulse response is positive. Similar to private investment, the response of private consumption at the beginning of the quarter was not significant. However, after the 10th quarter, private consumption responded significantly and negatively to a positive shock in government expenditure. The negative response can be explained by Classical theory and the rational behaviors of household which are likely to be Ricardian; i.e., The decrease in consumption is due to household expectation that government will increase its debt-financed spending to pay the cost of debt. After the 24th quarter, the response begins to decrease and eventually decay.

The response of domestic income at the beginning of the study period was not significant. But after the 15th quarter, domestic income responded significantly and negatively to government expenditure shocks. In other words, 1 unit of standard error in positive shock in government expenditure caused the reduction in domestic income. This response is consistent with that of private consumption and the additional effects of government spending can be entirely canceled due to the reduction in household spending. This suggests that the increase in government expenditure does not impact on the increase in output but caused the domestic income to reduce to zero. The response remains negative and decays until the 24th quarter. The real effective exchange rate responded positively to the government expenditure shocks after the 3rd quarter. This finding indicates that an increased government spending will lead to an increase in real effective exchange rate. An increase in real effective exchange rate is not only influenced by interest rates but also driven by additional factors such as inflation rate. If the inflation rate in Indonesia is low, then exports become more competitive and the demand for Rupiah to purchase Indonesian goods is increased. This causes the import of foreign goods becoming less competitive and is eventually reduced. Countries with low inflation rate will therefore tend to increase their exchange rates. The above external factor hence caused the real effective exchange rate to increase in mid-quarter. This response remained significant and positive but decays until the 24th quarter.

Government Tax Revenue Shocks on Macroeconomics Variables

Figure 3 describes the response of macroeconomics variables to the innovation in government tax revenue which resulted in significant and negative interest rates in the 3rd quarter. The response in interest rate is consistent with Keynesian theories which stated that its decrease will lead to increase in government tax revenue. After the 10th quarter the interest rate begins to reduce and decays to zero. The government expenditure responds positively and significantly to the positive shock in government tax revenue in the 3rd quarter thus indicating that Indonesia has a balanced budget. This response remained positive but begins to reduce and decay after the 20th quarter.

Private investment has responded non-significantly to government tax revenue shocks. The impulse response was however positive. The response in private consumption was significant in the 3rd quarter thus showing the existence of non-Keynesian effect. This finding is consistent with Giavazzi and Pagano (1990) who studied non-Keynesian effects on fiscal policy of Denmark, Ireland, and Sweden where the contradictory policy has caused the expansion in private consumption. This response remained positive and decays after the 15th quarter.

The response of domestic income has a positive effect on the innovation in government tax revenues. For example, 1-unit standard error of positive shock in government tax revenues will lead to increase in domestic income in the 2nd quarter. This finding is consistent with Afonso and Sausa (2011b) who stated that the positive innovation in government tax revenue responded positively to domestic income and private investment. This result is also consistent with Tang et al. (2013) who established that the domestic income in Indonesia has a positive effect which is sustained until it decays in the 24th quarter. The response of real effective exchange rate to the innovation in government tax revenue is negative in the 5th quarter. This result is also consistent with the response of interest rate which indicates the existence of positive

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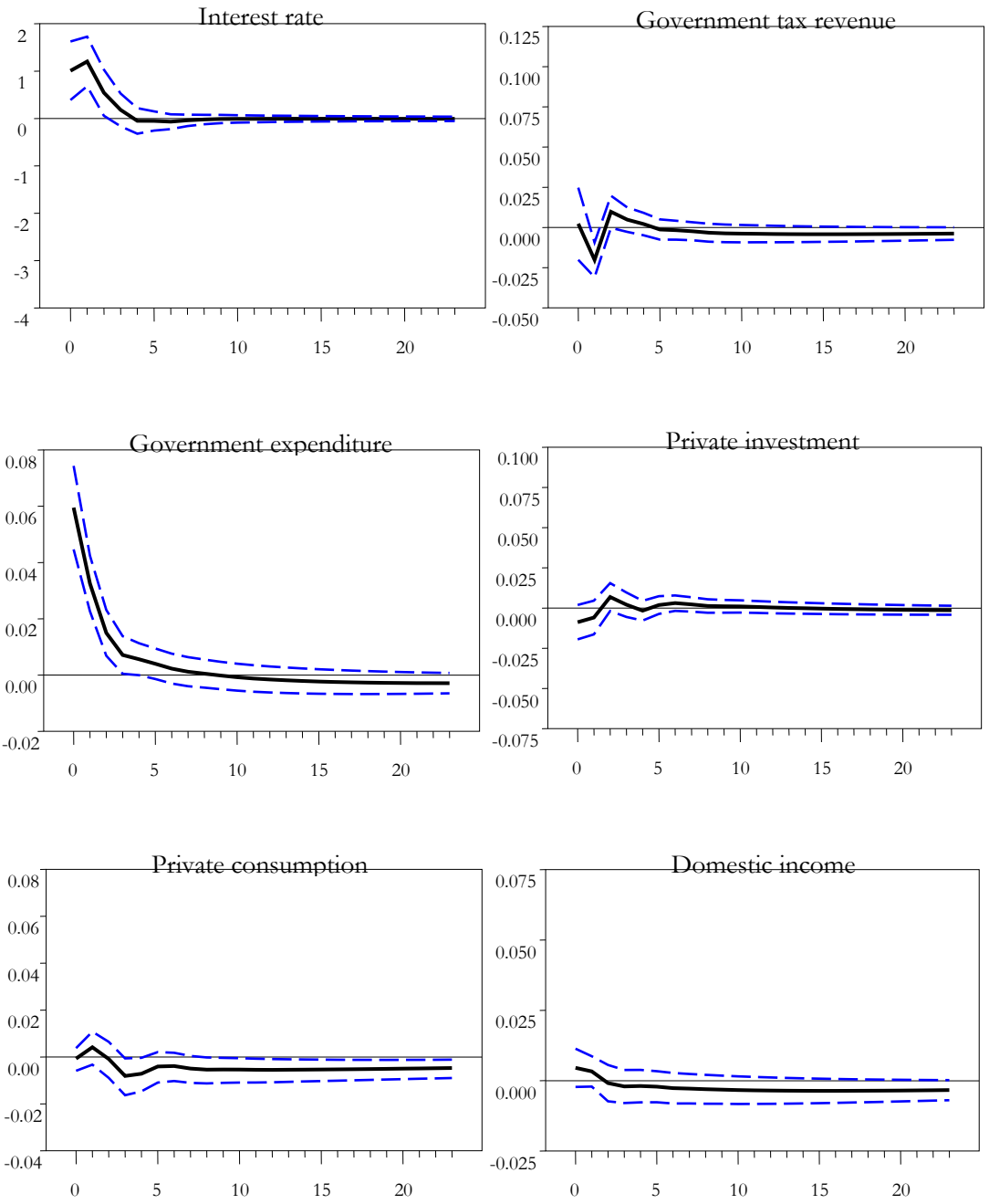
relationship between interest rates and real effective exchange rates. This suggests that when the monetary authority sets to lower interest rates to offset inflation rates, the real effective exchange rate will subsequently be decreased. This response remained negative until the 24th quarter.



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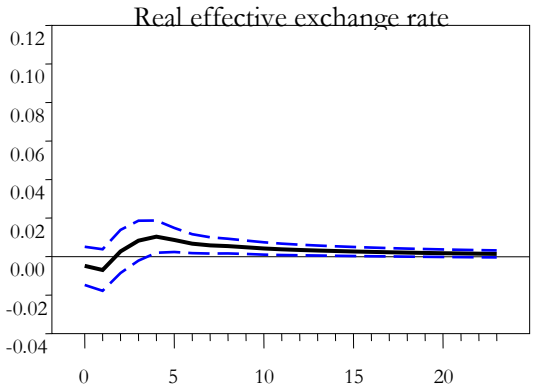
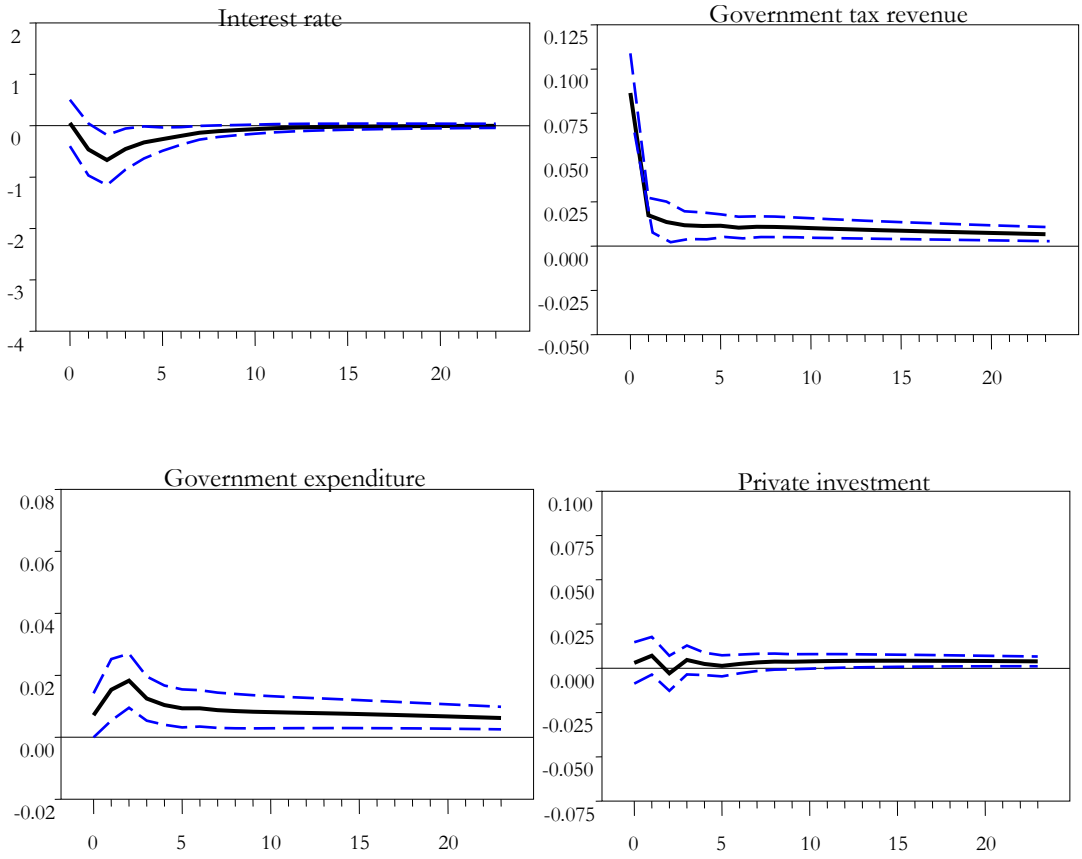


Figure 2. Structural Impulse Response Function: The Effect of Government Expenditure Shocks on Private Expenditure



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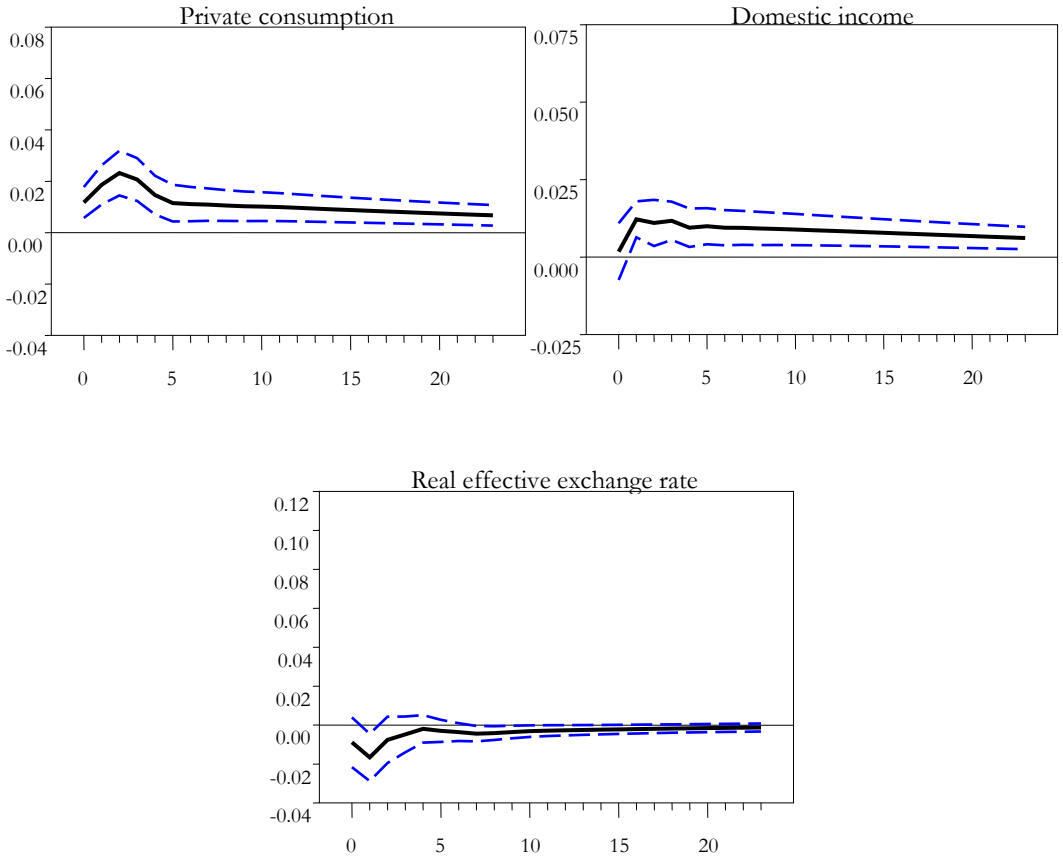

Figure 3. Structural Impulse Response Function: The Effect of Government Tax Revenue Shocks on Private Expenditure

Variance Decomposition

Table 3 presents the relative contribution of the variables to the forecast error variance in each of the domestic variable. The second last column in the table shows the sum of the contribution of the foreign variables (FF) to the forecast error variance in fiscal policy variable namely LGE and LGR. The last column shows the sum of contribution of domestic variables to the forecast error variance in fiscal policy variable excluding that variable's own contribution (DF). At the beginning of the study period the contribution of fiscal policy, i.e., government expenditure, showed that domestic shocks were a major contributor to the forecast error variance of about 2% whereas the contribution of foreign shocks was about 0.2%. Among the domestic variables, government tax revenue was the most important accounting for about 1%. This result is consistent with the revenue-spend hypothesis which indicates that the increase in government tax revenue will stimulate government spending. In the 8th quarter, domestic shock was still the major contributor to the forecast error variance in government expenditure at about 36%. Private investment (LPI) was about 23%. Domestic income and government tax revenue accounted for about 7% and 4% respectively.

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Table 3. Forecast Error Variance

Decomposition of Variance for Series LGE											
Step	LOP	LFY	INT	LGR	LGE	LPI	LPC	LDY	REER	FF	DF
1	0.16	0.01	0.000	1.09	97.64	0.61	0.00	0.48	0.01	0.17	**2.19**
4	7.50	0.52	0.07	4.82	60.32	21.72	1.17	3.32	0.56	8.02	**31.66**
8	29.29	0.91	0.55	4.42	33.47	23.14	0.65	7.21	0.36	30.2	**36.33**
12	42.11	4.67	1.62	3.77	19.92	17.25	0.38	9.77	0.52	**46.78**	33.31
16	46.68	10.56	2.56	3.16	12.96	12.54	0.25	10.56	0.72	**57.24**	29.79
20	47.46	16.87	3.08	2.66	9.14	9.40	0.18	10.36	0.84	**64.33**	26.52
24	46.76	22.68	3.28	2.27	6.89	7.34	0.14	9.75	0.89	**69.44**	23.67
Decomposition of Variance for Series LGR											
Step	LOP	LFY	INT	LGR	LGE	LPI	LPC	LDY	REER	FF	DF
1	0.12	0.07	0.00	90.80	0.05	4.99	0.00	3.89	0.06	0.19	**8.99**
4	9.27	0.54	3.28	59.20	0.26	9.56	1.49	15.89	0.50	9.81	**30.98**
8	20.39	4.26	6.05	34.93	0.37	8.67	0.91	22.91	1.52	24.65	**40.43**
12	27.50	10.13	7.34	22.85	0.28	6.89	0.58	22.53	1.89	37.63	**39.51**
16	31.45	16.44	7.49	16.31	0.20	5.35	0.41	20.40	1.94	**47.89**	35.79
20	33.46	22.33	7.15	12.43	0.15	4.24	0.31	18.08	1.85	**55.79**	31.78
24	34.40	27.49	6.64	9.95	0.12	3.45	0.25	15.99	1.71	**61.89**	28.16

In the 20th quarter, foreign shocks were major contributors to the forecast error variance in government expenditure accounting for about 64%. As expected, the world oil price was the major contributor at about 47%. The result was consistent with Koeda et al. (2008) who indicated that increase in world oil price around 1980s had affected the reduction in government spending such as in infrastructure expenditure, and adversely affected the performance of economic growth in Saudi Arabia.

For government tax revenue, domestic shocks comprise the largest contribution to forecast error variance at about 9% whereas foreign shocks contribute less than 1%. Among the domestic variables, private investment is the largest contributor at about 5%. In the 12th quarter, domestic shocks are still the major contributors to forecast error variance in government tax revenue at about 40% with domestic income accounting for about 23%. As expected, these variables are among the major contributors to government tax revenue. Previous studies, including Zulkefly and Aminuddin (2005), have shown that GDP growth affects the growth of federal government revenue. This suggests that increase in economic growth will stimulate government tax revenue collection and vice versa. In the 24th quarter, the foreign shocks become relatively more important in forecasting error variance which was about 62%. The components were world oil price at around 34% and foreign income at about 22%. This indicates that world oil price can affect government tax revenue in Indonesia. Currently, the country is net oil importing but the status may one day be changed to a net oil exporter.

Robustness Checking

For Robustness checking, there are several alternative procedures that were considered in this study; (i) alternative contemporaneous structural identification and (ii) model without monetary policy. Overall, the structural impulse response functions are robust but with baseline restriction.

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Conclusion

The study examined the effect of a fiscal policy shock on private expenditure in Indonesia. The SVAR panel model framework in a small-open economy was used to focus on fiscal policy such as government expenditure and government tax revenue, either through creating the crowding out effect or crowding in effect. In addition, this study also examined the effect of fiscal policy on several macroeconomic variables such as domestic income, interest rates and effective exchange rates.

There are several conclusions that can be drawn from the empirical results. Private consumption responded negatively to government expenditure shocks thus suggesting that increased government spending will lead to reduced private consumption. The response of private investment showed non-significant results. Similarly, domestic income gave the same response which was negative and that can be explained by Ricardian equivalence theory which predicted reduction in private consumption. This outcome was due to household expectations that the government will increase taxes in the future because of the high cost of debt. This was incurred to service large loans needed to manage government expenditure. As a result, decrease in private consumption will reduce domestic income.

The effect of government tax revenue on private consumption was positive thus supporting the non-Keynesian effect which found that increase in government tax revenue tends to increase private consumption. Similarly, the effect of domestic income was also positive whereas private investment showed non-significant results.

These findings have several implications for the public sector. First, the size of government expenditure is reduced since its large magnitude tends to crowd out private sector investment thus reducing its size. Further, the decrease in private investment also reduces private consumption.

Second, providing opportunity for withdrawal from direct involvement in economic activities that may create competition with the private sector. This suggests that the government needs to actively involve small traders to large enterprises through providing investment with modern and conducive environment so as to promote economic growth. Additionally, the government should provide the necessary support to the private sector through improving infrastructure facilities and providing more competitive fiscal and financial incentives for the industrial and service sectors so as to attract more domestic and foreign investments into the country.

There are also several policy implications for the private sector. First, increasing the active involvement of private sector in the country as well as assisting government's efforts to promote economic growth. For example, the increase in capital expenditure especially in productive sectors such as the service sectors, manufacturing and construction sectors to stimulate economic growth.

Second, promoting or encouraging large-scale enterprises, both domestic-oriented and export-oriented, to meet the largest demand for products and services. This initiative should encourage private investment to be the biggest contributor to total capital expenditure and thus to create sustainable economic growth.

It can be concluded from the study that for fiscal policy to be carried out effectively and efficiently to stimulate economic growth, the government needs to increase expenditure selectively or according to productive sectors rather than in the form of total aggregate expenditure.

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