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# The Effects of Fiscal Policy in Sri Lanka: Evidence from a VAR Model

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***Abstract:*** The empirical literature on the effects of monetary policy and fiscal policy on economic activity, has not received much attention. Although a lot has been published on how fiscal policy impacts on economic activity in developed countries and emerging economies, little has been done on developing countries. This paper examines the effects of a government expenditure shock and tax revenue shock on real Gross Domestic Product (GDP), inflation and real interest rate by applying a Vector Autoregression (VAR) methodology to Sri Lankan data. We found that the impact of fiscal shocks on macroeconomic variables is medium-sized and the fiscal multipliers are moderate. A shock to government expenditure has significant effects on economic activity while a shock to tax revenue wields negligible effects on all the variables. Hence, government revenue does not have a more influential role than government expenditure on controlling the economy in Sri Lanka.

## 1. Introduction

The intent of the macroeconomic policy is essential to stimulate economic and social development. These policy interventions are used to either expand or reduce economic activity to counter the business cycle's impact on GDP, interest rate and inflation. Of all the policy tools, fiscal policy can play an important role in supporting strong, lasting, and equitable growth. Hence, economic policymakers must deal with important tasks in terms of fiscal policy adjustment and implementation (Jayaraman, Choong and Budhoo, 2012). This especially applies to policymakers in developing countries because they do not have enough funds to cover essential expenses such as infrastructure, health care, education, welfare, etc. Compared to the world's advanced economies, tax revenues in most developing countries are low due to people generally having low-income levels. However, when compared with existing studies on the effects of fiscal policy on the economy, developing countries have received much less attention. It is evident that empirical studies do not yet agree about the effects of fiscal

policy on macroeconomic variables. Hence, this study seeks to examine the effects of a government expenditure shock and tax revenue shock on economic activity by applying a VAR approach to Sri Lankan data for the period 1960 to 2018.

According to the IMF, fiscal policy is the use of government spending and taxation to influence the economy. Thegovernment typically uses fiscal policy to promote a healthy rate of economic growth and reduce poverty (Honda *et al.*, 2020). A fiscal policy shock occurs when an unexpected change in government spending or the tax rates greatly affect the macroeconomic variables, i.e. economic growth, inflation, interest rate, etc. We consider the impact of government spending and government tax revenue shocks on the Sri Lankan economy. It is measured by a positive reaction of the impulse response function.

There are two main arguments in the economic literature concerning the effectiveness of the fiscal policy. According to the real business cycle theories developed by Keynesian and neo-Keynesian economists, an increase in government purchases rises the demand for goods. Hence, to achieve equilibrium in the goods market, the real interest rate must rise, which reduces consumption and investment. At a higher real interest rate, working today becomes relatively more attractive than working in the future; therefore, today's labor supply increases. This increase in labor supply causes to rise equilibrium output and employment (Mankiw 1989). Conversely, based on the neoclassical model a positive fiscal policy shock is regarded as a negative wealth shock because an increase in government spending will need to be financed by higher taxes in the future (Perotti 2005). This negative wealth effect causes labor supply to shift out, and output and employment to increase. Nevertheless, the same negative wealth effect implies that private consumption must fall and private investment increases if the shock is sufficiently persistent (Baxter and King 1993). In addition, to finance government spending, the government would be borrowing through the sale of bonds and securities. If the borrowing comes from the domestic market, this will increase the demand for loanable funds, which will increase the real rate of interest on bonds and securities. Higher interest rates will result in a decline in each component of private expenditures[1] (Mankiw, 2007).

Based on controversial theoretical arguments, several empirical studies have investigated the effects of fiscal policy on the economy in developed countries (FatasandMihov, 2001; Blanchard andPerotti, 2002; Perotti, 2005; Hernandez

and de Castro Fernandez, 2006; Wolff, TenhofenandHeppke-Falk, 2006; Gali, Lopez-Salidoand Valles, 2007; Giordano, Momigliano, NeriandPerotti, 2007). A few studies have evaluated the same issue in an emerging economy (see, Mirdala, 2009; Cuaresma, Eller, and Mehrotra, 2011; Boiciuc, 2015). Most studies applied the VAR model to test fiscal policy shocks on the economy but their conclusions are mixed. The focus of empirical analyses on fiscal policy on economic activity has mainly been on developed countries, whichhave greater access to international capital markets. Therefore, policy inferences based on those studies have limited relevance to developing countries. However, there are limited studies discuss the effect of fiscal policy on economic activity in developing countries (Kuismanen and Kämppi 2010; Hemming, Kell and Mahfouz 2002; Jha 2007)[2]. This study aims to fill the gaps in our knowledge by examining the effects of fiscal policy on economic activity. It does so by applying a VAR methodology to Sri Lankan data.

Past studies on the empirical literature have noted the effects of fiscal policy in both emerging economies and developed countries. However, the conclusions of studies on developed countries and emerging markets have been controversial, especially with reference to how fiscal policy influences the economy, which is much debated. Based on the findings of previous studies, we can conclude that expansionary fiscal policies lead to rising output in the short-term and rising inflation and real interest rates. Many studies have documented results that supported the Keynesian hypothesis while a few analyses have evidence that confirms the neoclassical theory. To the best of the author's knowledge, there are limited studies that focus primarily on fiscal policy on the economy in Sri Lanka (Sriyalathaand Torii 2019; Hussain 2014[3]). With all the above issues in mind, the current study addresses the gaps in the existing literature by focusing on the effects of fiscal policy on the Sri Lankan economy for a longer period of time. Hence, our study differs in significant ways from other research.

Sri Lanka is a developing country in the South Asian region. Sri Lanka's fiscal balance has been structurally in a deficit excess of 5% of GDP and the current account deficit increased to 3% of GDP in 2018 (Central Bank annual report, 2019). Higher fiscal deficits are mainly driven by higher government expenditures while government revenue remains relatively stable. As well, Sri Lanka's debt-to-GDP ratio exceeded 87% of GDP in 2019.The government's public debt is the second-highest within the region and continues to rise. Hence, our sample consists of Sri Lankan macroeconomic data spanning the period from 1960 to 2018. We applied the VAR model for a longer time period because

this issue has garnered much attention in policy circles that deal with the Sri Lankan economy following the economic liberalization and pro-market policies of the 1980s, the Asian Financial Crisis (AFC) in 1997-98 and Global Financial Crisis (GFC) period in 2008-09.

On one hand, the theoretical arguments relating to fiscal policy are debatable. On the other hand, the conclusions of empirical studies regarding fiscal policy on the economy are mixed. As well, a few studies have discussed this issue in developing countries where limited fiscal variables over a short time period were taken into account. This issue is particularly important for Sri Lanka, given that it greatly depends on fiscal policy to offset adverse macroeconomic effects on the economy. Hence, this paper seeks to contribute to the literature on the effects of fiscal policy by applying a VAR approach to Sri Lankan data.

We used annual data for five variables: real output, inflation, real interest rate, government expenditure and tax revenue to identify the effects of fiscal policy on Sri Lanka's economy. We applied a recursive approach and the results are consistent with economic theory, yet the responses are less persistent and the fiscal multipliers are quite modest. The remainder of the paper is organized as follows. Section 2 reviews the prior literature on fiscal policy and highlights the empirical research gaps. Section 3 discusses the dataset, variables, and sources employed. Section 4 outlines the theoretical framework and empirical methodology. Section 5 presents the empirical results by modelling the effects of fiscal policy on the Sri Lankan economy. Section 6 concludes the paper with a summary of the main themes covered here and important policy implications are noted.

## 2. Empirical Literature Review and Research Gaps

There are several significant studies have been published on the impacts of fiscal policy on the economy, which are strongly linked to developed nations rather than developing countries.The VAR models with a different scheme or rationale for identifying the shocks are commonly used to estimate the effects of fiscal policy on economic activity in developed countries and emerging economies. The VAR models have recently gained widespread acceptance in empirical business cycle analysis, and they have proven to be especially useful for analysing the dynamic behaviors of economic time series. Apart from this, VAR models can describe the rich dynamic structure of relationships between economic variables. These causal impacts are usually presented through impulse responses (measuring the response of one variable to an orthogonal shock in another variable while keeping

all others constant), and variance decomposition, which measures the fraction of the overall forecast variance for a variable that can be recognized by each driving shock (Bjornland, 2000). Consequently, a VAR approach has been utilized in other studies to assess the effects of fiscal policy. Hence, we believe that a VAR approach is better suited for investigating fiscal policy in Sri Lanka.

The seminal paper on fiscal policy using Structural Vector Autoregression (SVAR) approaches were done by Blanchard and Perotti (2002). They employ a three-variable VAR, which includes GDP, government expenditure and tax revenue. They examined the dynamic effects of shocks in government spending and tax revenues using US quarterly data for the period 1947 to 1997. A principal finding of this study was that positive government spending shocks exert a positive effect on output, while positive tax shocks have a negative effect on the US economy. This methodology is used in many other developed country studies to identify the impulse response functions. Perotti (2005) investigated the effects of fiscal policy shocks on GDP, inflation, and interest ratesin five Organisation for Economic Co-operation and Development (OECD) countries, using a SVAR approach.He uses a five-variable VAR that incorporates GDP, inflation, government expenditure, taxrevenue and the interest rate.According to the findings: firstly, the effects of government spending shocks and tax cuts on GDP and its components have become substantially weaker; and secondly, there is evidence for government spending exerting positive effects on interest rates for the years 1960 to 2003.

Controversially, Gali, Lopez-Salido, and Valles (2007) discovered that the effects of government expenditure led to a relatively large positive reaction of private consumption and no response of investment in OECD countries using the same approach. They use a four-variable VAR, which includes GDP, government expenditure, employment and the real interest rate to evaluate the effects of fiscal policy in France. Using a VAR method, Hernandez and Castro (2006) studied the economic effects of exogenous fiscal shocks on Spain's economy, and concluded expansionary government expenditure shocks did have positive effects on output in the short-term. Yet this was at the cost of higher inflation and public deficits and poorer output in the medium- and long-term. Further, they concluded that tax increases are found to be a drag on economic activity in the medium-term and only temporarily improving the desired balanced budget in Spain.

Wolff, Tenhofen, and Heppke-Falk (2006) have undertaken similar research on the German economy following the SVAR approach devised by Blanchard

and Perotti (2002). They found that direct government expenditure shocks increase output while private consumption has only low statistical significance. In the meantime, they reduce private investment, although insignificantly. However, the effects of expenditure shocks are only short-lived and revenue shocks do not affect output with any statistical significance. Nevertheless, Giordano, Momigliano, Neri and Perott (2007) – who analysed the effects of fiscal policy on private GDP, inflation and the long-term interest rate in Italy using a SVAR model - found significant results for the effects of fiscal policy on the macroeconomy. Importantly, they reported that a shock to government purchase has a sizeable effect on economic activity. The effects on employment, private consumption and investment are positive and the response to inflation is also positive but small and short-lived. However, shocks to net revenue have negligible effects on all the variables.

Based on the findings of developed countries concerning the effects of fiscal policy, are well documented when compared with the literature on emerging economies. Only a few studies have examined the effects of fiscal policy shocks in the European Transition Economies (see Mirdala, 2009; Cuaresma, Eller, and Mehrotra, 2011). Mirdala (2009) analysed the effects of fiscal policy shocks in the EU (European Union) member countries for the years 2000-2008by applying a VAR model. This analysis has documented similar results in that fiscal multipliers are positive but small. Hence, the effect of fiscal policy shocks on economic activity is reduced in the world's emerging economies. However, Eller and Mehrotra (2011) assessed the effect of a foreign fiscal policy shock to key macroeconomic variables applying the SVAR model in EU member countries. They found that a foreign fiscal shock affects domestic fiscal variables and vice versa.

On the other hand, some academics and policymakers have paid a great deal of attention to the link between fiscal policy and economic growth. Engen and Skinner (1992) noted that a balanced budget increasing government spending and taxation is predicted to reduce output growth rate applying the OLS model. Benos (2009) looked at the effect of public spending and revenues on economic growth using data on 14 EU countries during 1990-2006, compared using the OLS method and panel techniques (fixed effects, random effects and GMM model).The results support endogenous growth models: the positive relationship between expansionary fiscal policy and output growth. Similarly, according to the findings of the empirical research undertaken by Ocra (2011) when applying a VAR model, the effect of fiscal policy on output appears to be quite modest but persistent.

Based on the findings of previous studies, we conclude that empirical evidence does not provide an accepted conclusion on the effects of fiscal policy in developed or developing countries.However, reviewed empirical studies adopt a methodology (VAR model) quite similar to the effects of fiscal policy. In particular, evidence concerning the developing countries is mixed and limited. In most comparable VAR studies, authors examined the effects of fiscal policy applying a VAR model, which includes GDP, inflation, interest rate, government expenditure and tax revenue. Taking into account all of the above, the current study examines the effects of fiscal policy on the Sri Lankan economy applying a five-variable VAR model for more than half a century of data.

However, our study differs in significant ways from other researchwhich has addressed these issues with the same methodological application. There are some gaps in the empirical literature related to the impact of fiscal policy on economic activity: few independent variables are tested, the time period covering secondary data is limited and the studies do not consider the inflation effect on independent variables. A few studies are based on a strong theoretical background and others test data without providing any theoretical arguments relating to the fiscal policy shocks. Nevertheless, some research has been done on the impact of fiscal policy on economic activity, and there are strong similarities here for emerging economies and developed countries rather than only developing countries. Hence, the current study addresses the gaps in the existing literature by focusing on the presence of fiscal policy shocks in the Sri Lankan economy using more dependent and independent variables for a longer period of time by applying a VAR model.

## 3. Dataset, Variables, and Sources

Since the study is based on major macroeconomic variables, the data required for this research were collected from available secondary sources. The annual data for the years 1960 to 2018 is used for estimation purposes. The set of macroeconomic variables, i.e. government expenditure (GE), real output (RGDP), inflation rate (CPI), government tax revenue (GR) and real interest rate (RIR), serve to investigate the dynamic effects of fiscal policy on the Sri Lankan economy. Time series for the government expenditure, tax revenue, real output, and GDP deflator were drawn from the Central Bank of Sri Lanka's website and annual reports. Data for the real interest rates were derived from the World Development Indicators website. Output and interest rate are stated in real terms.

Figure 1 below displays the government expenditure and tax revenue as a proportion of the GDP. We noticed that government expenditure and tax revenue increased sharply during the period 1978 to 1981, due to economic liberalization policies. However, one significant issue that has arisen is the continuing decline in the trend of government expenditure and tax revenue afterward.

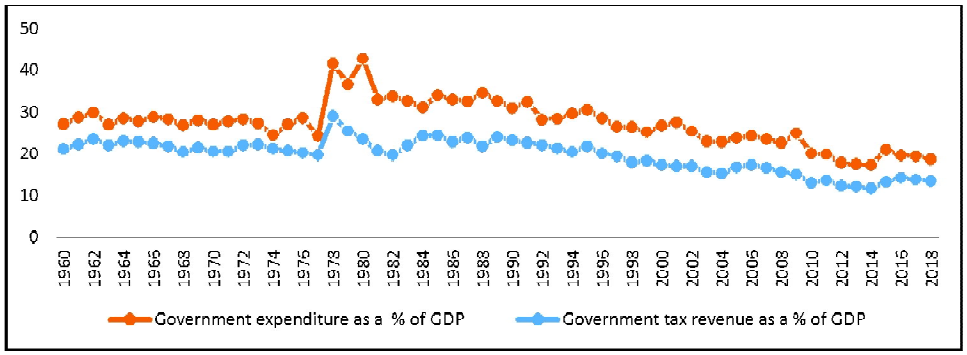


**Figure 1: Government Expenditure and Tax Revenue as a Percentage of GDP in Sri Lanka**

We begin with a stationarity test of the variables as a first step prior to VAR modelling. We start our analysis by applying the Augmented Dickey-Fuller test to indicate there is a unit root in the level of variables. Table 1 reveals that other than inflation, all the variables at their levels are non-stationary. After the conversion into the first difference, all the non-stationary variables became stationary at the 1% level. Given that the series are stationary, the VAR approach is used and the model is estimated in levels of first difference. According to the Akaike Information Criterion and Schwarz Information Criterion a 4-lag vector autoregressive model is estimated.

**Table 1: Unit Root Tests**

| *Variables* | *Level* | | | | *First Difference* | | | |
|---|---|---|---|---|---|---|---|---|
| | *Test statistics* | *Critical values* | | | *Test statistics* | *Critical values* | | |
| | | *10%* | *5%* | *1%* | | *10%* | *5%* | *1%* |
| Government Expenditure | -3.119 | -3.175 | -3.492 | -4.132 | -12.537*** | -3.176 | -3.493 | -4.135 |
| Tax Revenue | -3.097 | -3.175 | -3.492 | -4.132 | -8.780*** | -3.176 | -3.493 | -4.135 |
| Real GDP | -1.932 | -3.175 | -3.492 | -4.132 | -10.420*** | -3.176 | -3.493 | -4.135 |
| Inflation | -4.672*** | -3.175 | -3.492 | -4.132 | | | | |
| Real Interest Rate | -2.936 | -3.175 | -3.492 | -4.132 | -9.9807*** | -3.176 | -3.493 | -4.135 |

*Note:* *** denotes rejection of the null hypothesis of a unit root at the 1% level of significance.

In addition, the descriptive statistics results for the main variables are reported in Table 2. It is important to note that the average value for government expenditure is greater than the average value of government revenues, which suggests that the fiscal deficit in Sri Lanka is persistent.

**Table 2: Summary Statistics**

| *Variable* | *Mean* | *Std. Dev.* | *Min* | *Max* |
|---|---|---|---|---|
| GDP (USD bn) | 19.78 | 25.98 | 1.41 | 88.9 |
| Inflation | 8.53 | 5.80 | -1.6 | 25.9 |
| Interest rate | 9.88 | 5.31 | 2.6 | 21.3 |
| Government spending (% of GDP) | 27.37 | 5.36 | 17.3 | 42.7 |
| Government revenue (% of GDP) | 19.60 | 3.89 | 11.6 | 28.9 |
| Observations | 59 | | | |

## 4. Theoretical Framework and Empirical Methodology

Sims (1980) introduced a VAR in time series data settings and we rely on a VAR modelling approach to investigate the effects of fiscal policy on economic activities in Sri Lanka. The representation of a VAR model is shown below:

$$A_0\, Y_t = A(L)\, Y_{t-1} + B_t \tag{1}$$

where $A_0$ is the matrix of contemporaneous change between the variables, and $Y_t$ is a $(n\times1)$ vector of the endogenous macroeconomic variables (real output, real interest rate, inflation rate, government spending, and tax revenue). $A(L)$ is a$(n\times n)$ matrix of lag-length $L$, representing impulse-response functions of the shocks to the elements of $Y_t$. $B$ is a $(n\times n)$ matrix that captures the linear relationships between shocks and those in the reduced form. By multiplying equation (1) by an inverse matrix $A^{-1}_0$ we obtain the reduced form of the VAR model:

$$Y_t = A_0^{-1}\ A(L)Y_{t-1} + A_0^{-1}B\varepsilon_t = D(L)Y_{t-1} + u_t \tag{2}$$

where is again a matrix representing the relationships among the variables on the lagged values. is a vector of normally distributed shocks that are serially uncorrelated but can be contemporaneously correlated with each other:

$$E(u_t) = 0,\ E(u_t\, u_t') = \Sigma_u = \begin{bmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{13} \\ \sigma_{12} & \sigma_1^2 & \sigma_{23} \\ \sigma_{13} & \sigma_{23} & \sigma_1^2 \end{bmatrix},\ E(u_t\ u_s') = [0]\forall_t \neq s \tag{3}$$

Equation (2) shows the relationship between reduced-form VAR disturbances and structural disturbances $\varepsilon_t$, which is given by the following equation (4):

$$u_t = A_0^{-1} B \varepsilon_t, \; or \; A_0 u_t = B \varepsilon_t \tag{4}$$

Based on the Cholesky decomposition of innovations, we apply recursive approach, one that makes it possible to identify structural shocks hitting the model. Furthermore, the Cholesky decomposition of variance-covariance matrix of VAR residuals is defined as follows: matrix as a lower triangular matrix and matrixas k-dimensional identity matrix. The lower triangularity of indicates a recursive scheme among variables that has clear economic implications and has to be tested empirically as with any other relationship. Identification scheme of the matrix indicates that some structural shocks have no contemporaneous effects on some endogenous variables given the ordering of the endogenous variables. The off-diagonal elements of are all zero, suggesting that we do not allow for the structural shocks to be mutually correlated simultaneously. This hypothesis is consistent with empirical results: the correlation between government spending and tax revenue shocks is not statistically different from zero (Mirdala, 2009).

Hence, equation (4) can be rewritten as follows:

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ a_{21} & 1 & 0 & 0 & 0 \\ a_{31} & a_{32} & 1 & 0 & 0 \\ a_{41} & a_{42} & a_{43} & 1 & 0 \\ a_{51} & a_{52} & a_{53} & a_{54} & 1 \end{bmatrix} \begin{bmatrix} u_{g,t} \\ u_{y,t} \\ u_{g,t} \\ u_{t,t} \\ u_{i,t} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \begin{bmatrix} \varepsilon_{y,t} \\ \varepsilon_{y,t} \\ \varepsilon_{g,t} \\ \varepsilon_{t,t} \\ \varepsilon_{i,t} \end{bmatrix} \tag{5}$$

We consider the Cholesky decomposition to identify orthogonal shocks and study their effect on the remaining variables in the system holding other shocks constant. We focus on impulse response functions to analyse the response of one variable to an orthogonal shock in another variable. We generate confidence intervals for the orthogonalized IRFs with Monte Carlo simulations, the objective being to identify the response to one shock at a time while holding other shocks constant. Variables that enter first are assumed to be the most exogenous and affect the following variables both contemporaneously and with a lag. Variables that are ordered later are less exogenous and affect previous variables only with a lag (Hamilton, 1994).

Based on the assumptions of existing studies, we believe that government expenditure does not respond contemporaneously to the shock derived from any otherendogenous variable of the model. Then, we assume that real output is contemporaneously affected only by the government expenditure shock with a lag and does not respond contemporaneously to inflation, tax revenue, and interest rate shocks. Next, we assume that inflation is contemporaneously affected by the government expenditure and real output shocks with a lag. Inflation is not contemporaneously affected by the tax revenue and interest rate shocks. Furthermore, tax revenue is contemporaneously affected by all the shocks of the model with a lag except the interest rate shock. Finally, interest rates are contemporaneously affected by the shocks from all the endogenous variables of the model with a lag and it is simultaneously influenced by all the other variables. Consequently, real interest rate is the most endogenous variable in the system, thus capturing all available information. In other words, the variables that appear earlier in the system are more exogenous while the ones appearing later are more endogenous. The list of the variables comprises government expenditure, real output, inflation, government tax revenues, and real interest rate where the contemporaneously exogenous variables are ordered first.

## 5. Empirical Results and Discussion

### *5.1. Granger Causality*

There are three schools of thought on the direction of causation between government expenditure and revenue. Friedman (1978) leads the tax-and-spend hypothesis, which contends that raising taxes will simply lead to more spending. However, Peacock and Wiseman (1961, 1979) develop the spend-and-tax hypothesis, one that argues expenditure causes revenue: the government first engages in spending and then later, to pay for this spending, raise taxes to boost government revenue. The third hypothesis is known as the fiscal synchronization hypothesis (Meltzer and Richard, 1981; Musgrave, 1966). It argues that revenues and expenditures are adjusted simultaneously. This implies bidirectional causality between government expenditure and revenue.

Based on the results of Granger Causality Wald test (see Table 3), we find that the government expenditure 'Granger causes' the tax revenue and the opposite does not hold, so uni-directional causality is signified and confirmed the spend-and-tax hypothesis. These results are not surprising because a number of empirical studies have presented unidirectional causality relationships between

government expenditure and tax revenue (Aziz, Habibullah, Azman-Saini, andAzali, 2000; Aisha & Khatoon, 2009; Richter andPaparas, 2013; Lukoviæ and Grbiæ, 2014; Bishnoi andJuneja, 2016). Furthermore, there is no significant causality relationship running from government expenditures to real GDP or real GDP to government expenditures based on the sample data. In addition, government expenditures do not Granger cause inflation but the opposite holds. We also find a significant causality relationship running from inflation to tax revenue, but the opposite does not hold. An increase in prices will lead to a rising fiscal deficit through its effect on government expenditure and revenue. Additionally, a rise in the fiscal deficit leads to higher rate of inflation because the government's fiscal deficit is often financed by borrowing from the Central Bank or from abroad (Alavirad, 2003). Further, we find evidence of direct Granger causality is running from the real interest rate to government expenditure and the opposite does not hold. Higher interest rates increase the cost of government borrowings (public debt servicing cost) and this could lead to higher taxes in the future.

**Table 3: Granger Causality Wald Test**

| *Equation \ Excluded* | *chi2* | *df* | *Prob > chi2* |
|---|---|---|---|
| **Government Expenditure** | | | |
| *Real GDP* | 1.267 | 2 | 0.531 |
| *Inflation* | 0.63 | 2 | 0.73 |
| *Tax Revenue* | 9.065 | 2 | 0.011** |
| *Real Interest Rate* | 1.66 | 2 | 0.436 |
| *All* | 16.14 | 8 | 0.040** |
| **Real GDP** | | | |
| *Government Expenditure* | 3.315 | 2 | 0.191 |
| *Inflation* | 0.367 | 2 | 0.833 |
| *Tax Revenue* | 2.634 | 2 | 0.268 |
| *Real Interest Rate* | 2.619 | 2 | 0.27 |
| *All* | 12.397 | 8 | 0.134 |
| **Inflation** | | | |
| *Government Expenditure* | 8.625 | 2 | 0.013** |
| *Real GDP* | 1.072 | 2 | 0.585 |
| *Tax Revenue* | 6.02 | 2 | 0.049** |
| *Real Interest Rate* | 1.035 | 2 | 0.596 |
| *All* | 18.442 | 8 | 0.018** |

*contd. table 3*

| *Equation \ Excluded* | *chi2* | *df* | *Prob > chi2* |
|---|---|---|---|
| **Tax revenue** | | | |
| *Government Expenditure* | 0.978 | 2 | 0.613 |
| *Real GDP* | 0.098 | 2 | 0.952 |
| *Inflation* | 2.437 | 2 | 0.296 |
| *Real Interest Rate* | 0.092 | 2 | 0.955 |
| *All* | 6.811 | 8 | 0.557 |
| **Real Interest Rate** | | | |
| *Government Expenditure* | 9.375 | 2 | 0.009* |
| *Real GDP* | 0.267 | 2 | 0.875 |
| *Inflation* | 6.19 | 2 | 0.045** |
| *Tax Revenue* | 4.096 | 2 | 0.129 |
| *All* | 18.461 | 8 | 0.018** |

*Note:* ** and * denote rejection of the null hypothesis of a unit root at the 5% and 10% levels of significance, respectively. Ho: excluded variable does not Granger cause equation variable, Ha: excluded variable Granger causes equation variable.

## *5.2. VAR Estimation*

Table 4 presents the results of the VAR model. The observed impacts are positive and significant between government expenditures and inflation. A 1 percent increase in government expenditures will lead to a rise in inflation by 0.3% with statistical significance at the 5% level. If government expenditure increases, it leads to rising government debt to the Central Bank and turns this brings about an increase in the monetary base and improved money supply. An increase in the money supply will lead to an increase in inflation (Friedman, 1981). Therefore, government expenditure has an inflationary effect on the Sri Lankan economy. There are positive relationships between government expenditure and real interest rate, but they are not statistically significant. Increasing government expenditure leads to more borrowings from domestic and external sources leading to higher public debt[4]. Moreover, the increase in government expenditure will reduce "Public Saving". An increase in government expenditure is not accompanied by an increase in taxes, the government finances additional spending through borrowing. That will lead to reducing public savings. The fall in Public Saving will cause National Saving to fall, the supply of loanable funds will decrease and interest rates will go up. The higher interest rates will discourage private borrowing and tend to "crowd out" some private investment (Mankiw, 2007).

The Keynesian hypothesis and endogenous growth theory argue that larger government expenditure increases economic growth. Our results, however, find

that the negative and insignificant relationship between government expenditures and real GDPsuggest that increasing government expenditure leads to reduced private consumption, private sector investment, net exports, and output level through the 'crowding out' effect of government spending (Fan, Hazell andThorat, 2000). Furthermore, according to Barro (1989), GDP growth is negatively related to government consumption expenditure. He argues that government consumption introduces distortions but does not provide an offsetting stimulus to investment and growth. Similar findings are reported by Grier and Tullock (1989) using the pooled regression model for 113 countries and they discovered that government expenditure has a negative impact on economic growth. As well, Miller and Russek (1997) indicated that debt-financed increases in government expenditure impede economic growth for developing countries employing a pooled cross-section, time-series sample and fixed- and random-effect methods.

There is a positive relationship between tax revenues, real GDP, real interest rates and inflation but it is not statistically significant. Further, an increase in real interest rates will lead to an increase in real GDP and inflation with a statistical significance at the 5% level. The McKinnon-Shaw hypothesis claims that liberalization of the domestic financial system especially in developing countries, allows banks to raise real interest rates to reasonable market-clearing levels. This in turn will stimulate higher economic growth since the liberalization of the finance sector will lead to higher savings, encourage investments and trigger economic growth (Pill, 1997).

**Table 4: VAR Estimations**

| *Variables* | *GE* | *RGDP* | *CPI* | *GR* | *RIR* |
|---|---|---|---|---|---|
| *Lagged GE* | 0.078 | -0.176 | 0.180 | 0.136* | 0.024 |
| | [0.168] | [0.240] | [0.210] | [0.106] | [0.140] |
| *Lagged RGDP* | -0.009 | 0.986*** | 0.201 | 0.222 | 0.184** |
| | [0.117] | [0.167] | [0.216] | [0.733] | [0.097] |
| *Lagged CPI* | 0.294*** | 0.121* | 0.153 | 0.093 | 0.168** |
| | [0.093] | [0.133] | [0.172] | [0.058] | [0.078] |
| *Lagged GR* | 0.312* | 0.147 | -0.739 | 0.0414 | -0.271 |
| | [0.330] | [0.469] | [0.607] | [0.206] | [0.278] |
| *Lagged RIR* | 0.190 | -0.335 | 0.468 | 0.131 | 0.235* |
| | [0.247] | [0.233] | [0.302] | [0.103] | [0.136] |
| *Observations* | 55 | 55 | 55 | 55 | 55 |

*Note:* Standard errors in parentheses. Note: ***, **, and * indicate significance at the 1%, 5% and 10% levels, respectively.

Finally, we check the stability of the estimated VAR. The graph of eigenvalues confirms that the estimate is in fact stable. All the eigenvalues lie inside the unit circle (see Figure 2). The VAR model satisfies the requirement for stability.

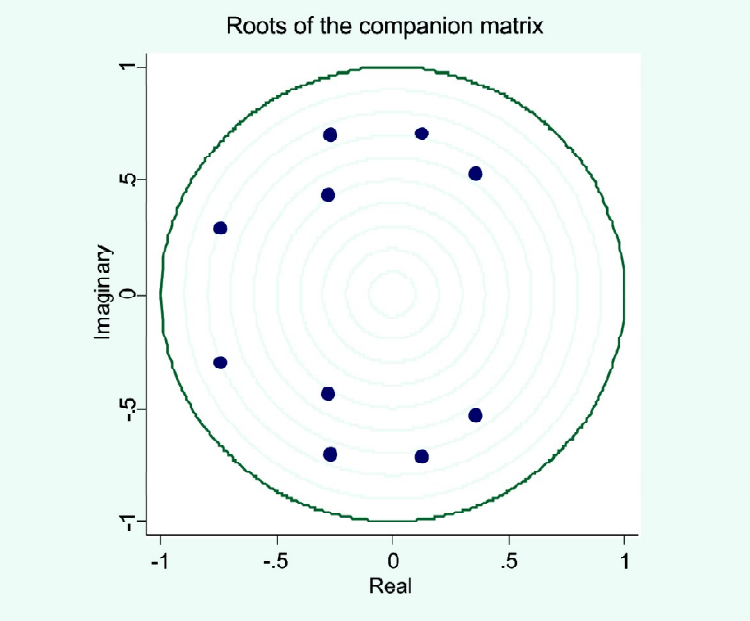


**Figure 2: The Graph of Eigenvalues**

### *5.2.1. Forecast Error Variance Decomposition (FEVD) and Impulse Response Functions (IRF)*

A forecast error variance decomposition measures the fraction of the overall forecast variance for a variable that can be recognized by each of the driving shocks. Further, it explains how much of the forecast error variance of each variable can be described by exogenous shocks to another variable. We account for the FEVD over the 10 years and Figure 3 presents the variance decomposition for the primary variables in the VAR system. We find that the variation of the government expenditure forecast error variance is mostly explained by shocks to its own lags; up to 63% of the explained variance is explained by its own shock. This is followed by tax revenues (up to 27%), real GDP (up to 5%), inflation (up to 4%) and shocks to real interest rate (up to 1%). The variation in the tax revenues appears to be driven by its own shocks; up to 60% of its forecast error variance is explained by its own shock. This is

followed by government expenditure (up to 29%), real GDP (up to 8%), inflation (up to 2%) and shocks to real interest rates (up to 1%). Finally, it can be seen that both GE and GR are the main drivers of their respective forecast error variance, influencing each other more significantly than the other variables.

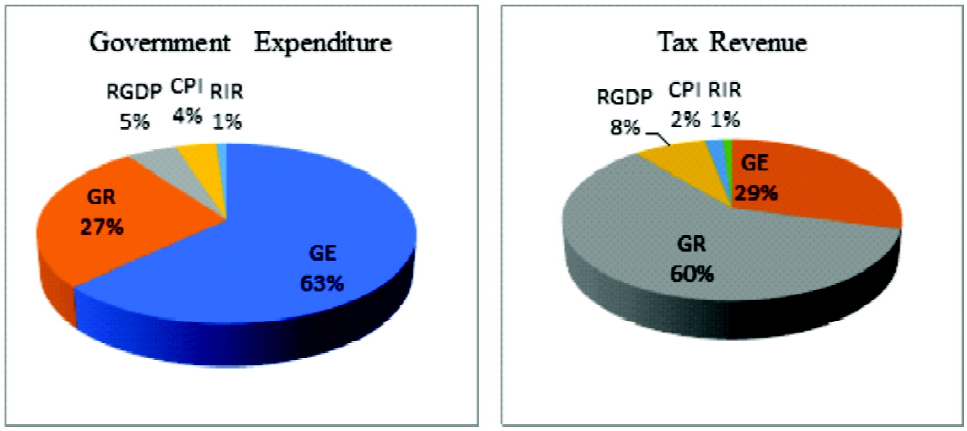


**Figure 3: Variance Decomposition of Government Expenditure and Tax Revenue**

We focus our discussion on the impulse response functions, which define the shock of one variable to the innovations in another variable in the system while holding all other reactions equal to zero results. We present graphs of impulse response functions and the 5% error bands generated by Monte Carlo simulation. IRFs results are reported in Figures 4 and 5 (see below), and which consider contemporaneous as well as lagged responses.

First, we discuss how the shock of one standard deviation of positive government expenditures responds to real GDP, inflation, government revenue, and real interest rate, respectively. The real GDP responds negatively to one standard deviation of positive government expenditure shock for all periods, signifying that increasing government expenditure leads to reduced private consumption, private investment, net exports, and output level through the 'crowding out' effect of government spending (Fan, Hazell and Thorat, 2000). The inflation rate has a significant positive response on one standard deviation of positive government spending shock (the response persists for 1-3 years). We observe that the real interest rate significantly increases in response to a positive shock to government spending. A rise in government spending leads to increased tax revenue because governments finance those expenditures

through tax collection based on the spend-revenue hypothesis developed by Peacock and Wiseman (1979) and Barro (1974).

Second, we explain how the shock of one standard deviation of positive government revenue responds to real GDP, inflation, government spending, and real interest rate, respectively. A one standard deviation positive shock to tax revenue results in higher real GDP (the response significantly persists for 1-2 years). A one standard deviation positive shock to tax revenue causes a negative real interest rate response. The response significantly lasts 1-5 years, suggesting that increased tax revenue has a negative long-term impact on the real interest rate. Inflation is a response to a positive tax revenue shock in the short run. Rising tax revenue will lead to a significant rise in government expenditure (MR, 2014). According to Friedman (1978) when government revenue is increasing, government expenditure also rises. This positive causality indicates that an increase in tax revenue leads to the fiscal deficit.

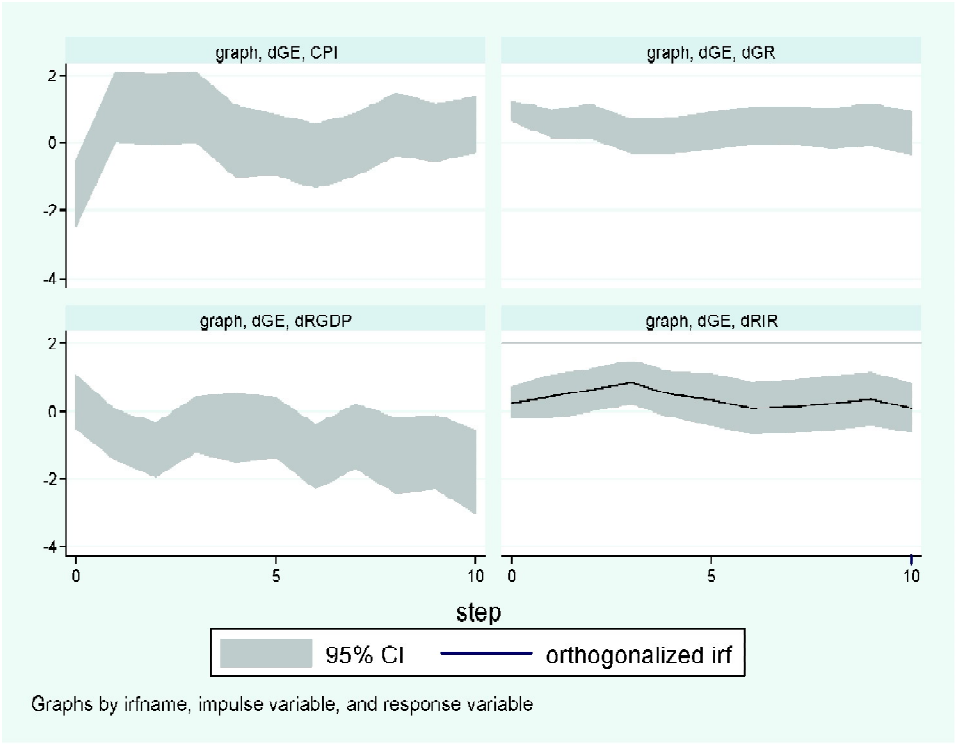


**Figure 4: Impulse Response of Endogenous Variables to the Government Expenditure Shock**

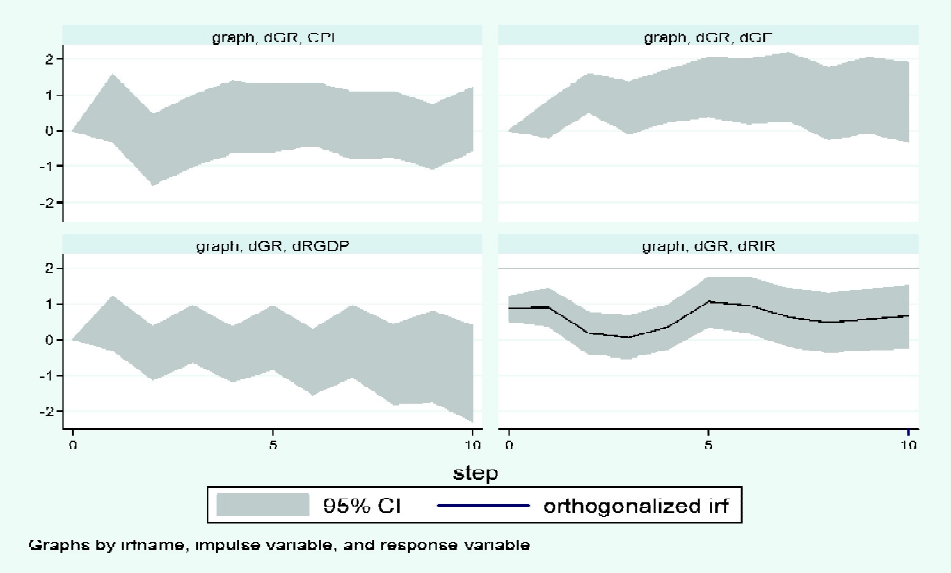


**Figure 5: Impulse Response of Endogenous Variables to the Tax Revenue Shock**

To conclude, the effect of fiscal policy on economic activity in developing economies like Sri Lanka is moderate. However, the effects of expenditure shock on the endogenous variables are consistent with the economic theory: inflation, tax revenues and interest rate increase and real GDP decrease in the short-term (Murtyand Nayak, 1990). The effects of tax revenue shocks on endogenous variables are very small. Our findings are consistent with the spend-revenue hypothesis and neo-classical economists' theories related to the fiscal policy shocks. It is suggested that: firstly, increasing government spending leads to increased tax revenues; and secondly, higher government spending leads to reduced private investment, net exports, private consumption and real output through interest rate and exchange rate channels.

On the other hand, if public expenditure has only financed unproductive spending, especially on the revenue front, it may cause an increase in taxation in the subsequent years. Unproductive government expenditures indicate that a larger fiscal deficit or higher taxation than when these expenditures are productive. Moreover, maintaining a high taxation system limits the resources available for the private sector. The outcome may well be less private investment, poorer economic growth, and a bigger debt burden in the future (Ke-Young *et al.*, 1995). By reducing or eliminating unproductive public expenditures, a country can reduce its budget deficit without cutting the provision of essential public programs.

## 6. Conclusion

This paper contributes to the literature by demonstrating the effects of fiscal policy on economic activity in Sri Lanka based on the recursive Cholesky approach of a VAR model. Based on contrasting theoretical backgrounds of the effect of fiscal policy, a number of empirical studies have examined the relationship between fiscal policy and economic growth in developed countries rather than developing counties. To the best of our knowledge, the present paper stands out as the first attempt to look at the issue in Sri Lanka. We use annual data for selected fiscal variables (government spending, tax revenue, inflation rate, real interest rate and real GDP) for the period 1960 to 2018. The construction largely depends on the information contained in the Central Bank's annual reports.

The results of the ADF test confirm that all selected fiscal variables are stationary at first differences, which fulfills the basic requirements for applying the VAR model. We observe that unidirectional causality relationships between government expenditure and tax revenue are based on the results of the Granger causality test. We find that government expenditure 'Granger causes' the tax revenue and the opposite does not hold. We then modelled a VAR approach with forecast error variance decomposition and impulse response function.

The key outcomes of the study can be summarized as follows. Our results regarding forecast error variance decomposition suggest that the variation of the government spending is mostly explained by shocks to its own lags while the variation of the government revenue appears to be driven by its own shocks in the long-term. A response of RGDP for one standard deviation of positive government expenditure shock is significantly negative. Although the response of the real output in Sri Lanka seems to be different in comparison with other studies which concentrate on developed countries and emerging market economies, our results are consistent with the neoclassical model. A positive fiscal policy shock is regarded as a negative wealth shock because an increase in government spending needs to be financed by higher taxes in the future. Based on this assumption, households reduce their current consumption and it will lead to lower aggregate demand (Gali, Lopez-Salidoand Valles, 2007).

The effects of expenditure shock on the inflation, tax revenue, and interest rate are positive, moderate, and significantly persist for 1 to 4 years. However, we found that shocks to tax revenue have a relatively small effect on economic activity with low statistical significance. Nevertheless, our data sample covers annual data and is limited to five selected macroeconomic variables. Future

research can test quarterly data, add more macroeconomic variables, and restrict the VAR model in some ways to obtain outcomes that are more reliable.

We reach the following conclusions. It is important to note that there is a positive relationship between government spending and government tax revenue, which implies when government spending rises it will lead to an increase in tax rates. Nevertheless, low government revenue has been a unique feature of many developing countries like Sri Lanka. Hence, policymakers should concentrate on reducing government expenditure in order to rein in the fiscal deficit and maintain sustainable economic growth. In particular, fiscal policy should focus on increasing the level of government spending for productive purposes. To achieve a healthy rate of economic growth, government-spending policies should focus on infrastructure development (i.e., roads and railways, irrigation and power projects), efficient and productive public enterprises and the development of competitive agriculture industry in Sri Lanka.

Conversely, it is critically important to reduce large fiscal deficits by introducing a better tax collection system, because tax bases are small, tax exemptions are common and tax evasion is widespread in Sri Lanka. Sri Lanka's policymakers should make more effort to strengthen revenue collection, improve tax administration, and implement liability management operations to control high budget deficits and high public debt. The government should encourage private sector investment and exports. However, the challenging political environment remains a key source of risk (Central Bank of Sri Lanka, 2019).

Following the current devastating COVID-19 pandemic, fiscal sustainability is an issue that has arisen in policy discussions in both developed and developing countries. In particular, countries with escalating fiscal debt are most susceptible to abandoning sustainable fiscal policy because their governments have been forced to make huge public expenditures through the pandemic because in 2020 the world economy basically shut down. Sri Lanka's policymakers are currently dealing with massive challenges in the fight against COVID-19 and needs to consider innovative policies and different ways of solving problems. While the focus has been on stopping the spread of COVID-19, the danger remains that fiscal policy will simply be unsustainable (World Bank, 2020).

## *Notes*

1. This is known as financial crowding out.
2. Kuismanen and Kamppi (2010) investigate whether fiscal policy decisions have real effects on the economy of Finland by utilizing Vector Stochastic Process with Dummy Variables (VSPD) method.

Hemming, Kell and Mahfouz (2002) review the theoretical and empirical literature on the effectiveness of fiscal policy and size of the fiscal multiplier in both developed and developing countries.

Jha (2007) discusses some of the major challenges that developing countries facesome key areas of fiscal policy: tax, expenditure and intergovernmental transfer policies.

3. Sriyalatha and Torii (2019)examine the long-term impacts of fiscal variables oneconomic growth in Singapore and Sri Lanka by applying the ARDL-ECM approach.

   Hussain (2014) examines the relationship between fiscal – monetary policies and output on five SAARC (South Asian Association of Regional Cooperation) countries by using a standard unrestricted VAR model.

4. The current public debt-to-GDP ratio is 87% in Sri Lanka (CBSL Annual Report 2020).

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