DOI: 10.14293/S2199-1006.1.SOR-.PPAAPAV.v1
Preprint first posted online: 07 December 2021
Keywords: monetary policy, fiscal policy, PVAR, economic growth, SSA.

TITLE: -THE IMPACT OF MACROECONOMIC POLICY AND ECONOMIC GROWTH IN SUB-SAHARAN AFRICAN COUNTRIES

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Abstract

The prime purpose of this article was to investigate the monetary and fiscal policy interaction and their impact on economic growth in a panel of 35 sub-Saharan African economies from 1980 to 2018. To achieve this objective, the study employs a Panel Vector Autoregression (PVAR) estimation technique. Using a PVAR approach, we show that an expansionary fiscal policy through tax revenue and an unexpected expansionary monetary policy via broad money supply have a positive effect on gross national income, whereas an expansionary fiscal policy through the government spending have a contractionary impact on gross national income. We also find that an unexpected expansionary monetary policy via real exchange rate has no effect on gross national income. Finally, we show evidence that there is a negative and significant relationship between fiscal policy and monetary policy and thus supporting the need of policy coordination between fiscal and monetary policies. Therefore, to have continuous and sustainable economic growth, the coordination of monetary and fiscal policies is vital, and the lack of this coordination leads to a sharp downturn of overall economic performance, even can hurt the economy

The empirical results also show that the variation in gross national income is more explained by fiscal policy variables than monetary policy variables which show fiscal policy is more effective than monetary policy in influencing gross national income.

Keywords: monetary policy, fiscal policy, PVAR, economic growth, SSA.

1. INTRODUCTION

In a globalized economy, economic growth is determined in large part by factors outside of the context of a specific country. Economic growth can be clarified based on different theories: that is. classical growth theory, neoclassical growth model, endogenous growth theory, creative destruction, and economic growth, etc. Imperfection of these models is associated with their inability to capture business cycles, global economic downturns, and adverse supply or demand shocks as well as macroeconomic policy. The effect of macroeconomic policy (monetary and fiscal policies) on output is not perceived the same when viewed from Keynesian and classical perspective.

Indeed, different perceptions about outcomes of policy actions emanates from the fact that different schools of thought hold distinct assumptions about how the overall economy works. The views of different schools of thought about how fiscal and monetary policies alter real output are outlined below. Previous studies about the policy effects on economic growth have investigated the impact of monetary and fiscal policies separately, while this paper will study these policy effects on economic growth simultaneously in one model. Our study aims to provide empirical evidence on how monetary policy and fiscal policy shocks affect economic growth in SSA.

Against this background, the need of assessing whether fiscal policy and monetary policy can be influential tools for economic growth, especially for low-income economies, has been brought to the front line of the policy arena. Regarding macroeconomic policy, many questions are still left open, namely, regarding its effectiveness in boosting economic growth. Studies on the effects of fiscal and monetary shocks on economic growth abound for developed economies, such studies are few in the case emerging and developing economies, especially for African countries (see Anoruo & Ramchander 1998; Egwaikhide 1999, Yuan and Chen ,2015).

This paper is primarily aimed to establish whether or not macroeconomic policy actions significantly influence economic growth in the short run and in the long run. To realize the above stated purposes, a dataset from 35 SSA countries for a period from 1980 to 2018 is constructed. Therefore, it contributes to the literature on the effects of macroeconomic policies (fiscal and monetary policies) on economic growth in Africa, especially the Sub Sahara African economies, henceforth SSA countries. These countries are chosen due to the size of their economies (gross domestic product (GDP) in billions of US Dollars) (WDI, 2020) and availability of data. With Africa quickly emerging as a fast-growing economic hub, it is important to understand the dynamic relationship between policy transmissions and their impacts on economic growth in the SSA. The findings of this paper will reveal whether African economies differ from other

economies with regards to the role of macroeconomic policy in the economic growth of SSA countries. Moreover, the paper considers the dynamic transmission of fiscal and monetary shocks in a framework that accounts for endogenous reaction between key economic variables by making use of the panel vector autoregressive (PVAR). The present paper makes an empirical contribution to the existing debate by focusing on thirty-five SSA economies. More specifically, we evaluate the growth effects of monetary and fiscal policy shocks using a Panel Vector Auto-Regression (PVAR) model and a unified framework that tracks the developments and the potential spillovers between both policies.

The rest of this paper is organized as follows: Section 2 presents the related literature. Section 3 describes the methodology. Section 4 discusses the data and the empirical results. Section 5 provides conclusion.

2. LITERATURE REVIEW

2.1. THEORETICAL REVIEW

Monetary and fiscal policies are demand management policy that commonly implemented to bring macroeconomic stability in developing and developed countries. Over the last decades, the relative effectiveness of fiscal policy and monetary policy on economic growth has produced a large volume of both theoretical and empirical literature. There are several theoretical views on the effectiveness of the macroeconomic policy. These are The Classical, the Keynesians, the Monetarists, the neoclassical economists, the neo-Keynesians, and the New Consensus Model.

Classical economics illustrates the fact that free markets are efficient and self-regulatory because markets are perfectly competitive and prices, real wages and interest rates are flexible. As a result, fiscal and monetary policies have no impact on output growth due to the assumption that the market mechanism self-regulates the production of goods and ultimately achieves steady state equilibrium at full employment level.

According to the Monetarists view, only money matters for aggregate demand, thus the rise in money supply determines the growth of GDP growth. Monetary policy thus has a greater impact on economic activity. They did, however, understand the essence of fiscal policy, but claimed that if monetary changes were not agreed, there would be marginal impacts on output and prices. This suggests that, whenever all policies (monetary and fiscal) intersect, monetarists prefer monetary policy superiority. However, the second group of economists, Keynesians, had opposing viewpoints.

Keynesians claimed that fiscal policy had a significant impact on aggregate demand and prices. In contrast to monetarists view, Keynesian stated that output will usually be close to potential since prices and wages are relatively variable. Unlike the monetarist, the Keynesians also argue that relative to the monetary policies, fiscal policies are more effective instrument in influencing the economy especially during the liquidity trap; a condition of low-interest rates and high saving rates, making monetary policy ineffective which can be represented by horizontal LM curve in the IS-LM model. This shows that expansionary monetary policy will be ineffective in fostering interest-sensitive private investment and thus in achieving growth. At this point, in contrast to monetary policy, fiscal policy is fully operational in increasing output by a fiscal multiplier without creating a crowding effect.

The neoclassical economists criticize the Keynesians on the basis of the lags between changes in one variable which result in changes in another and that makes both of them long and very imperfectly known. Further, Keynesians assume that the existence of government policy does not modify the behaviour of individual agents to alter the coefficients (parameters) of the structural equations constituting the model. Therefore, neoclassicals believe that fiscal policy is less important than monetary policy due to insufficient knowledge of the dynamics of the economy and the rational expectations of the private sector.

The Neo-Keynesianism has absorbed the notion of monetary policy being important during economic fluctuations (Minford & Srinivasan, 2011). Due to the economy being incomplete and prices being sticky, the effects of money supply on the economy are sustainable. The Neo-Keynesian School of economics adhered to the Keynesian view. Different with the Monetarist School, the Neo-Keynesian economists agree that changes in the money supply are neutral in the long-term. Hence, Neo-Keynesian economists advocate using monetary policy for stabilization. Neo- Keynesianism believes that monetary policy is necessary to stimulate the aggregate demand. Therefore, this theory confirms the role of monetary policy on the economy and supports the monetary policy has effects on the economy.

In this regard, fiscal policy may have more impact on the level of output in the short term. Depending on the strength of the impact of fiscal policy on aggregate demand on labour, real wages may increase and ultimately result in a higher consumption either through substitution or credit constraint effect.

In the New Neo-classical synthesis, also known as the New Economic Consensus (NEC), Tcherneva (2008) explored that Monetary and fiscal policies are also mutually linked. Thus, the best course of action for maximum effectiveness is a monetary-fiscal policy mix (Teigen, 1978). Monetary and fiscal policies are found to have an indirect effect on each other. If expansionary fiscal policy results overheating in the economy, this would affect price stability, thus requiring a counterbalancing monetary intervention. In addition, an increase in government debt reduces the level of savings and raises interest rates, which induces reduced potential output, hence requiring a restrictive monetary policy. Furthermore, ineffective tax systems, unproductive public projects, and huge transfer packages may negatively affect the potential output level and therefore require a more restrictive monetary policy.

2.2 Empirical literature

Most of the empirical studies on the analysis of the efficacy of several macroeconomic policies on economic growth show different results. This is since most empirical studies used fragmented approach using different indices and econometric model. Besides, diminutive consideration is given to the possible indirect impact and dynamic link of macroeconomic policy on output growth through the macroeconomic variables.

The empirical literature on the relative effectiveness of monetary and fiscal policies has produced contrasting results, making it impossible to rule in favor of either policy. For instance, Bruce and Tricia (2002), Senbet (2011) for the US, Batten and Hafer(1983) for six industrialized countries presented evidence in favor of monetary policy.

Senbet (2011) also examined the growth effects of fiscal policy and monetary policy on economic growth in the USA during the period from1959: Q1 to 2010: Q2 using the VARs approach. He found significant evidence that monetary policy is more powerful than fiscal policy in influencing economic growth. Its findings are consistent with Adefeso and Mobolaji (2010), which also studied the relative effectiveness of fiscal and monetary policy on economic growth in Nigeria. Their results indicate that monetary policy has a stronger impact on real output when compared to fiscal policy, supporting the results previously obtained by Ajisafe and Folorunso (2002). Ogunmuyiwa and Ekone (2010) reported similar findings for Nigeria. However, using the St. Louis equation and OLS analysis in the UK, US, France, Germany, and Japan, Batten and Hafer (1983) found

that fiscal policy is more effective) than monetary policy in altering economic growth in all countries included in the study.

Owoye and Onafowora (1994) also investigated the growth effect of macroeconomic policy in 10 African countries by using a Trivariate Vector Autoregressive (VAR) model for the period from 1960 to 1990. They found that the Monetarist view of monetary policy is more powerful/effective than fiscal policy in affecting economic growth is valid in 5 of 10 countries, and Keynesian view, which is that fiscal policy is more powerful/effective than monetary policy in influencing economic growth, was valid in other 5 of 10 countries.

Adeniji and Olaniyi (2013) applied the St. Louis equation with a panel data technique for some SSA countries (South Africa, Nigeria, Niger, Cote d'Ivoire, Malawi, Togo, Tanzania, and Madagascar) using data from 1970-2012 and found support for the argument that both the monetary base and government expenditure are viable instruments in stabilizing output. However, monetary policy was found to be more powerful than fiscal policy. Using a modified reduced form of the St. Louis equation for the period from 1980 to 1995, Jayaraman (2002) examined the relative effectiveness of monetary and fiscal policy in four South Pacific Island Countries (Fiji, Samoa, Tonga, and Vanuatu). Apart from Samoa, where both monetary and fiscal policies had no effect on growth, in the rest of the region, the results suggest that monetary policy was more effective than fiscal policy in explaining economic growth. Bruce and Tricia (2002) employed an Error-Correction-Vector autoregression to examine the relative effectiveness of monetary and fiscal policies in stabilizing the US economy. They concluded that monetary policy is relatively more powerful than fiscal policy.

Similarly, Havi and Enu (2014) assessed the relative effectiveness of monetary and fiscal policy growth in Ghana and concluded that monetary policy had a positive and significant impact on Ghana's economic growth. In contrast, others, such as Darrat (1984) for five Latin American countries (Brazil, Chile, Mexico, Peru, and Venezuela), Darrat et al. (2014), and Mutuku and Koech (2014) for kenya argued for fiscal policy rather monetary policy. Mutuku and Koech(2014)used a recursive VAR framework on data for the period 1997-2010 to investigate the relative potency of monetary and fiscal policies in altering real output in Kenya. The results

revealed that fiscal policy has a significant positive impact on real output growth, while monetary policy shocks are completely insignificant in Kenya.

Some other studies, especially those that were conducted on country groups, yielded highly mixed results. For instance, Hussain (2014) and Petrevski et al. (2016) also got a mixed result for their studies using panel data for South Asian Association of Regional Cooperation and three South-Eastern European countries using VAR model respectively. Hence, monetary policy has been more active on GDP than fiscal policy in the case of Pakistan, Sri Lankaand Bulgaria. However, the fiscal policy contributes more potent than the monetary policy for Bangladesh, India, Nepal, Croatia and Macedonia.

With regard to the interaction between fiscal and monetary policies, Ravnik and Žilić (2010) provide evidence that output in Croatia is negatively affected by both government expenditure and tax revenue shocks. In addition, they found that while fiscal shocks have negligible and short-lived effects on inflation, interest rates respond strongly to fiscal shocks.

Caraiani (2010) also found that an expansionary fiscal policy positively affects both output and inflation in four Central Eastern Europe (CEE) countries, while interest rates act in the opposite way. Rukelj (2009) also studied the interaction between monetary and fiscal policy and economic activity in Croatia and found that monetary and fiscal policy shift in opposite directions: fiscal shocks generate strong negative effects on narrow money, while monetary shocks induce negative effects on government expenditure (they are substitutes). On the other hand, Ravnik and Žilić (2010) observed that fiscal policy had a negative effect on monetary policy. Further, Using VAR methodology based on quarterly data from 1999-2011

On the other hand, studies by Noman and Khudri (2015) and Chowdhury and Afzal (2015) revealed that a proper policy mix of fiscal policy and monetary policy has a positive and significant effect on economic growth. Thus, they concluded that both policies were balanced and complementary to each other. In addition, Waud (1974) examined the relative effectiveness of monetary policy and fiscal policy on economic growth in the US using the econometric model which is similar to the model used by Andersen and Jordan (1968) and found that both policies significantly and equally affect the economic growth.

Summing up in reviewing the literature, one can easily see that although there has been an enormous but still growing body of studies regarding the relationship between macroeconomic policy and economic growth, empirical findings so far do not provide a clear-cut persuasive result

or do not allow us to generalize about the effectiveness of fiscal and monetary policy in enhancing economic growth.

3. METHODOLOGY

3.1. Model specification

In order to investigate the relationship between macroeconomic policy and economic growth in Sub-Saharan Africa, the study adopted the simplified version of a growth model developed in Otani and Villanueva (1989) and modified Saint Louis' Equation where Gross Domestic Product (GDP) is a function of Government Expenditure (GEX), revenue (REV), real exchange rate(RER) , and broad money supply (BRDM). In this equation, government expenditure (GEX) and revenue (REV) serves as a proxy for fiscal policy while real exchange rate(RER), and broad money supply(BRDM) serves as a proxy for monetary policy. Therefore, the empirical framework that could be used to investigate the effects of macroeconomic (monetary, and fiscal) policies on output growth may be written as follows:

$$\Delta y = \alpha_0 + \mathrm{REV}_{it} + \mathrm{GEX}_{it} + \mathrm{RER}_{it} + \mathrm{BRDM}_{it} + \varepsilon_{it} \quad (1)$$

Where Subscripts i and t refer to country and time, respectively.

Δy is the change in gross national income, α_0 is the constant term that captures the combined effect of total factor productivity, REV is tax revenue, GEX is government expenditure, RER is the real exchange rate, BRDM is broad money supply and ε is error term

3.2. ESTIMATION METHOD

We use a reduced-form Panel Vector Auto-Regression (PVAR) model with fixed effects to capture the interdependency between SSA countries' economies in assessing the impact of fiscal and monetary policy shocks on economic growth. This type of VAR model allows a flexible framework in which all variables in the system of equations are treated as endogenous. A panel VAR (PVAR) has since become a normal tool in assessing the effects of policy transmissions as well as other shared behaviours among economic variables. Applying a standard VAR model to panel data has increased in popularity quite recently following studies by (Love and Zicchino, 2006; & Goodhart and Hofmann, 2008). The panel VAR structure benefits from the advantage of the VAR approach when dealing with endogeneity as well as panel data techniques in improving estimation efficiency (Yuan and Chen, 2015).

A panel VAR model with fixed effects is used as follows:

$$y_{it} = A_1 y_{it-1} + A_2 y_{it-2} + \cdots + A_{p-1} y_{it-p+1} + A_p p y_{it-p} + C_i + \varepsilon_{it} \quad (2)$$

The reduced a dynamic panel model is expressed as follows:

$$y_{it} = \rho y_{it-1} + C_i + \varepsilon_{it} \quad (3)$$

where Yit is a vector of our endogenous variables, namely log of gross national income, log of revenue, log of government expenditure, log of broad money supply, log of real exchange rate (LNGNI, LNGEX, LNREV, LNRER, LNBRDM). C_i accounts for the unobservable country characteristics and any global shocks that may affect all countries in the same way (fixed-effects-country and time, respectively). Finally, ε_{it} denotes the error term. Furthermore, Subscripts i and t refer to country and time, respectively.

We assume that the vector of endogenous variables included in the system can be represented as: $LNGNI_t = [LNGEX_t, LNREV_t, LNBRMG_t, LNREER_t]'$.

Finally, given that we consider a unified model for both policies, our assumption is that fiscal policy reacts to monetary policy actions, as it is faster for policy makers to adjust the central bank rate than to implement changes in the government spending. Some authors have also analyzed the effects associated with the coordination between fiscal policy and monetary policy, especially, in the context of a currency union. In this context, Gali and Monacelli (2008) consider the case of monetary policy being conducted by a common central bank and fiscal policy being implemented at the country level.

we estimate the system by GMM using the lags of the regressors as instruments (Blundell and Bond, 1998). Various estimators based on generalized method of moments (GMM) have been proposed to calculate consistent estimates, mostly based on the first difference transformation of Equation (1) (See Bun and Carree, 2005; kiviet, 1995). However, given the assumption that errors are serially correlated in a dynamic equation the first difference transformation may provide estimates that are not consistent. It is in that context that Arellano and Bover (1995) proposed an alternative transformation known as the forward orthogonal deviation (FOD). With the FOD, each observation is subtracted by the mean of the remaining future observation available in the sample. As in the traditional vector Auto-Regression (VAR) approach, forward mean-difference and, thus, remove only the mean of all future observations available for each country-year (Arellano and Bover, 1995)—i.e. the so-called 'Helmert procedure'.

For the computation of the impulse-response functions, we also follow the usual Choleski decomposition of variance–covariance matrix of residuals, that is, we transform the system in a "recursive" VAR and impose a triangular identification structure (Hamilton, 1994). Given that VAR models rely mostly on impulse response functions and variance decomposition to explain the different effects of economic shocks, this paper identifies these shocks by applying contemporaneous identification restrictions based on choleski decomposition.

It is important to emphasize that although the main aim of the paper is to assess how monetary and fiscal policy affect economic growth in SSA countries. In doing so, the paper will contribute to the debate on whether change in the value of macroeconomic policy instruments has contributed to large economic growth rate.

4. ANALYSIS AND DISCUSSION OF RESULTS

4.1. PRE-ESTIMATION CHECK

4.1.1. Data description and Descriptive statistics

We use data for the 35 SSA countries. The data for this study were sourced from the annual reports of the selected listed countries, World bank development indicators and Africa Development Bank databases. The data are available at annually frequency over the period 1980–2018, enabling us to investigate the effect of the macroeconomic policy.

Table 1 indicates that the pooled average annual gross national income growth (%), tax revenue as % GDP, government spending % GDP, real exchange rate per US$, broad money supply % GDP in 35 SSA countries between 1980 and 2018 stood at 6.17%, 23.9%, 27.5%, 174, and 27.5%, respectively.

Table 1: Description Statistics for variables

Variable	Obs	Mean	Std. Dev.	Min	Max
GNI	1365.00	17.80	53.00	0.13	550.00
GNIG	1365.00	6.17	18.39	-66.26	336.76
REV	1365.00	4.13	13.10	0.03	135.00
REV_GDP	1365.00	23.89	11.93	1.64	103.54
GEX	1365.00	4.17	11.20	0.03	95.10

GEX_GDP	1365.00	27.51	11.71	2.55	85.83
RER	1365.00	175.95	267.89	0.00	3,008.74
BRDM	1365.00	7.38	29.30	0.02	347.00
BRDM_GDP	1365.00	27.54	20.37	2.78	368.32

Source: Author calculation

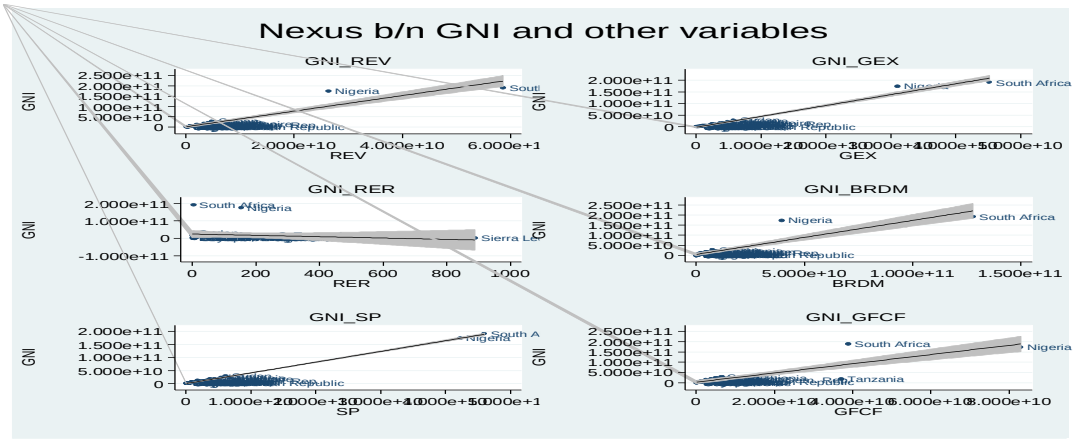
we report the correlation in Figure 1. It is worth noting that all variables exhibit a significant correlation with the gross national income.

Figure 4: Scatter Correlation Matrix Plot of Variables

Source: Author Computations from research data, 2020

As seen in Figure 2 while many countries align along a linear relationship between GNI and the other variable such as REV,GEX,RER,BRDM there are a few countries such as Nigeria, South Africa and Tanzania that lie outside the 95% confidence interval for this linear relationship. This suggests that there may be heterogeneity in the GNI slope parameter across countries.

Figure 2 : Scatter Plot of GNI vs. REV, GEX, RER, BRDM,XM,SP and GFCF



Source: Author Computations from research data, 2020

From the above graphs, we also see outliers and a skewed distribution. Given the skewness of the data and the existence of outliers, log transforming of the data is particularly useful with skewed data to normalize the data distribution. Therefore, it is important to use logarithmic transformation of the GNI, REV, GEX, BRDM, RER, SP and GFCF variables data series to make better predicted outcomes from the PVAR and Dynamic Common Correlated effect model. By transforming the variable into log form, we can transform a highly skewed variable into a more normalized dataset taking the advantage of statistical tool, producing the smallest error possible when making a prediction, and effectively change the case from a unit change to a percent change.

4.1.2. TEST OF CROSS-SECTION DEPENDENCE AND SLOPE HETROGENITY

To begin the analysis, first, we start by examining cross-sectional dependence and slope homogeneity among the series in our panels.

A) Cross-Sectional Dependence Test Results

Cross-sectional correlation often emanates from unobserved common “shocks” and unobserved, time-invariant heterogeneous error components (Eberhardt & Teal, 2011; Pesaran & Tosetti, 2011; Sarafidis & Wansbeck,2012). The existence of cross-sectional correlation between error terms can have severe implications for the estimation of both coefficients and standard errors using standard panel data estimators. This can lead to poor policy decisions based on biased parameter estimates. For this purpose, the three most often used cross-sectional dependence test procedures- Pesaran (2004), Friedman (1937),

and Frees (2004) cross-sectional dependence (CD) tests- were employed to examine the between-group correlation in error terms (as a post-estimation diagnostic test) and panel time series variables (as a pre-estimation diagnostic test).

Table 2 presents the test results for cross-sectional correlation. It shows the average, country-specific correlation coefficients for the panel series full matrix and off-diagonal matrix elements, as well as Pesaran's cross-sectional dependence test statistics. The results indicate high positive, pairwise cross-sectional correlation of panel time series for all variables included in this study The results of Pesaran's CD test also show the presence of cross-sectional dependence across panel units.

Table 2: Panel Time Series Cross-Sectional Dependence Test Results

Variable	CD-test	P value	corr	abs(corr)
LNGNI	136.61	0.00	0.90	0.90
LNREV	125.32	0.00	0.82	0.82
LNGEX	120.46	0.00	0.79	0.79
LNRER	70.99	0.00	0.47	0.52
LNBRDM	122.14	0.00	0.80	0.80

Notes: Under the null hypothesis of cross-section independence CD ~ N(0,1)

abs(corr)- average absolute value of the off-diagonal elements correlation

Source: Author Computations from research data, 2020

As a result of the tests statistics above, the null hypothesis of cross-sectional independence is rejected for all variables under consideration. This indicates that the individual country, panel data series employed in this study are cross sectionally dependent and correlated, likely due to similar patterns of common macroeconomic shocks. The standard (or parametric) average absolute correlation indicates high (above 0.5) and positive pairwise correlation coefficients of all the estimated residuals from replicated models. Also, the pairwise average Spearman rank correlation estimates from the models are found to be positive and high above 0.6. This indicates that the upper-diagonal has positive and negative elements of country-specific pairwise correlations coefficients, which cancel out each other during averaging. In

contrast, Frees' CD test, based on the average sum of squares of the rank of pairwise correlations, rejects the null hypothesis of cross-sectional independence at the 1% significance level. Similar results are obtained using Pesaran's CD test. As a result, we conclude that the models' error terms are characterized by significant cross-sectional dependence.

Table 3: Estimated residual Cross-sectional dependence test results

	CD tests	P-value	abs(corr)
Pesaran's test	4.51	0.0000	0.324
Friedman's test	83.61	0.0000	0.324
Frees' test	4.38	0.0000	0.324
Notes. Under the null hypothesis of cross-section independence, abs(corr)- average absolute value of the off-diagonal elements correlation			

Source: Author Computations from research data, 2020

B) Heterogeneous Slope Estimators

A test of slope homogeneity was performed as a robustness check using the test statistic suggested by Swamy (1970). A test of slope homogeneity in panels based on Pesaran &Yamagata (2008) and Blomquist & Westerlund (2013) is performed. Accordingly, the result in Table 4 shows the existence of heterogeneous slope.

Table 4:Test for slope homogeneity

	Delta	P value
	-6.91	0.00
adj.	-7.16	0.00
(H0: slope coefficients are homogenous)		

Source: Author Computations from research data, 2020

From the above preliminary tests, we can conclude that the use of dynamic PVAR and Dynamic common correlated effect estimation approach is more efficient and reliable than an ordinary least-squares (OLS) approach for estimation analysis in a situation where cross-sectional dependency and slope heterogeneity does exist in the data.

4.1.3. STATIONARITY TEST

Before the main results are discussed, a panel unit root tests are conducted to ensure the reliability of the model. In the presence of cross-section dependence, we refrain from testing panel unit root using the first generation" panel unit root tests. Therefore, we apply the second-generation tests of panel unit root tests unlike the first-generation tests that consider interdependence across units as a nuisance, aims at exploiting these co-movements in order to define a new test statistic (Hurlin and Mignon, 2007).

Following from empirical literature, the study employs the Fishers type- Phillips-Perron (P-P) unit root test, which is a second-generation panel unit root test as proposed by Moon & Perron (2004a) and Phillips & Sul (2003a).

Table 5: panel unit root test

		Level		First difference	
variables		Statistic	p-value	Statistic	p-value
LNREV	Inverse logit t(179)L*	4.68	1.00	-54.12	0.00
LNGEX	Inverse logit t(179)L*	7.61	1.00	-50.89	0.00
LNRER	Inverse logit t(179)L*	-6.59	0.00	-95.04	0.00
LNBRDM	Inverse logit t(179)L*	9.43	1.00	-40.81	0.00

Source: Author Computations from research data, 2020

From the Table 5, it is observed that at the 1% level of significance, the endogenous variables of log of private saving, log of real exchange rate and trade balance as of GNI are stationary at their levels or integration to the order zero while the variables of log of government spending, log of GNI, log of tax revenue, and log of broad money supply are non-stationary at level. They indicate that these variables are integrated to the order one or are stationary at their first difference.

4.1.4. cointegration test

In this analysis, Westerlund & Edgerton (2007) cointegration test is deployed to test the existence of long run equilibrium relationship between macroeconomic policy and growth, because this test considers a large degree of heterogeneity and cross-sectional dependence across panel units.

Table 6: Panel co-integration tests

restricted case with single lag and lead								
	constant				constant and trend			
Statistic	Value	z-value	P-value	Robust P-value	Value	Z-value	P-value	Robust P-value
Gt	-2.50	-0.34	0.37	0.02	-3.02	-0.99	0.16	0.02
Ga	-9.84	2.41	0.99	0.03	-11.20	4.22	1.00	0.03
Pt	-12.43	0.26	0.60	0.15	-15.82	-0.28	0.39	0.01
Pa	-7.39	1.50	0.93	0.05	-9.54	2.99	1.00	0.02

Source: Author Computations from research data, 2020

According to the test statistics presented in Table 6, in the restricted case without trend and with trend almost the null hypothesis of no cointegration of the group-mean tests (Ga and Gt)) and the panel tests (Pt and Pa) is rejected at 5% significant level by robust p-values, implying that almost all variables are cointegrated (Table 7).

4.1.4. PVAR model selection criteria

To estimate a panel vector autoregression model, a priori knowledge of the number of lags to be included in the model for the endogenous variables is required. PVAR usually provide a selection criterion appropriate for running the model. This is very critical to the strength of the parameter estimates to be derived. Applying Andrews and Lu's MMSC to the GMM estimator, we identify the length of lag order that minimizes MMSC and the J statistic of over-identifying restriction for a PVAR of order 4. From Table 7, it is observed that the optimal lag length for the estimation of the model as selected by the criteria are lags first (1) as the optimal lag length for the estimation that has the minimum value among all MBIC, MAIC, MQIC, or other information criteria statistics.

Table 7**:** model selection criteria

lag	Selection order criteria					
	CD	J	J pvalue	MBIC	MAIC	MQIC
1	0.9999997	241.376	0.009	-1118.312	-142.624	-510.31
2	0.9999997	131.051	0.409	-775.408	-124.949	-370.073
3	0.9999999	88.147	0.024	-365.083	-39.853	-162.415
4	0.9999998	.	.	.	.	.
Note: CD is the coefficient of determination						

Source: Author Computations from research data, 2020

4. 1.5. Test of autocorrelation

The Arellano–Bond test for autocorrelation is valid for any GMM regression on panel data. To confirm the absence of serial autocorrelation in the error, we should expect that Ar(1) should be significant at 5% (AR (1) pr > z < 0.05) and the probability of Ar(2) (pr > z) will be not significant at 5%. The result in Table 5.9 shows that the probability of AR(1) is significant at 1% significance level, while AR(2) is insignificant, confirming that the errors term is not serially correlated.

Table 9. Arellano-Bond test for zero autocorrelation in first-differenced errors

Order	z	Prob > z
1	-3.28	0.00
2	0.26	0.80
3	1.11	0.27
4	-0.55	0.58

H0: no autocorrelation

Source: Computations from research data, 2020

4.1.6. Test for normally distributed disturbances.

Generating a reliable and consistent estimate require that the residual in the regression follows a normal distribution and that the models are not miss-specified. Non-normality can distort the sign of the co-efficient generated from the PVAR output as well as their significance. We therefore conduct a post-estimation normality test on the PVAR output against the null hypothesis that the disturbances for each equation forming the PVAR system and for all equations jointly are normally distributed and an alternative hypothesis that states that they are not normally distributed. Therefore, the non-rejection of the null hypothesis shows that all equations jointly are normally distributed and that the models are correctly specified. The test for normality of residuals was one of the criteria for choosing the first lag PVAR model for analysis. The results on Table 10 show that following the Skewness criterion, the residuals of the VAR model in this study are normally distributed. The probability value for joint test for Skewness is larger than 0.05 (the significance level), implying the non-rejection of the null hypothesis of normality of residuals. All the three test statistics are reported on PVAR models estimated as illustrated by Tables 10.

Table 10: test of normality

	Observed	Bootstrap			Normal based	
	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
Skewness_e	-0.28	0.25	-1.14	0.25	-0.77	0.20
Kurtosis_e	6.73	2.19	3.07	0.00	2.44	11.03
Skewness_u	0.01	0.50	0.02	0.98	-0.98	1.00
Kurtosis_u	0.48	1.07	0.45	0.66	-1.62	2.57
Joint test for Normality on e:			chi2(2)=10.74		Prob>chi2=0.005	
Joint test for Normality on u:			chi2(2)=0.2		Prob>chi2=0.905	

Source: Computations from research data, 2020

From Table 10, it is observed that the lower part of the output shows the joint test for normality on each component of the error term and the respective p-values. The tests reveal that residual error component is asymmetric (with left symmetry), while the country specific error component is asymmetric (with the right).in addition only the residual error component has slight excess kurtosis. These asymmetries thus produce the rejection of the null hypothesis of normality in residual error components, while the non-rejection of the null hypothesis of normality for the country specific error component. Therefore, this test indicates that the disturbances in the PVAR model one (1) are normally distributed hence there is no problem of model misspecification.

4.2 ESTIMATING A PANEL VECTOR AUTOREGRESSION (PVAR) MODEL

After determining the optimal lag length for the models specified, the study proceeds with the estimation of the PVAR models to achieve the objectives. First, we present the results from the estimated PVAR (1) the GMM coefficients.

The main objectives of this study rest on the first row, that is the response of gross national income by the impulse of monetary and fiscal policy stances. Here we can think that if we chock a change in tax revenue, or government spending, or broad money supply or real exchange rate in the previous period by one percent, ceteris paribus, gross national income is supposed to increase today by 0.37, or decrease by 0.37, or decrease by 0, 04, or increase by 0.001 percent respectively.

Table 8: Macroeconomic policy and growth

Dep.v.	Independent variables							
	ΔLNGNI	ΔLNREV	ΔLNGEX	ΔLNRER	ΔLNBRDM	XM_GNI	LNSP	LNGFCF
ΔLNGNI	0.91***	0.37***	-0.37***	0.001	-0.04	0.00	0.03***	0.09***
ΔLNREV	0.14***	1.02***	-0.19***	0.00	-0.11***	0.00**	0.04***	0.10***
ΔLNGEX	0.07**	0.37***	0.51***	-0.01	-0.09***	0.00	0.06***	0.10***
ΔLNRER	1.34***	2.11***	-1.64***	0.30***	-1.11**	-0.01***	-0.27**	0.07
ΔLNBRDM	0.07***	0.16***	-0.01	0.00	0.73***	0.00	0.04***	0.07***

*= 10% significance level, **=5% significance level and ***=1% significance level.

Source: Author Computations from research data, 2020

As it is observed from Table 8, except for real exchange rate, broad money supply and trade balance the coefficients in the first equation of the PVAR system are significantly different from zero at 1% significance level. In other words, there is a significant linear relationship between the regressand (LNGNI) and the regressors except real exchange rate, broad money supply and trade balance.

4.2.1. Post-estimation Robustness checks

After estimation of the PVAR model, it is imperative to conduct a post-estimation check to justify the reliability of the parameter estimates.

4.2.1.1. PVAR stability condition

Interpretation of the results of Granger causality tests, impulse–response functions and forecast-error variance decomposition in PVAR model analysis requires more stringent stability condition. It is therefore of essential to examine the eigenvalue stability condition of the model.

Therefore, to say that a PVAR model is stable it is necessary to test whether the resulting output has all eigenvalues of a modulus less than 1(one).

To provide a visual and clearer view of the tests, we present the graph of the eigenvalues of the companion matrix of the entire estimated model. The graph presents the eigenvalues with the real components on the x-axis and the complex components on the y-axis.

Figure 6: model stability

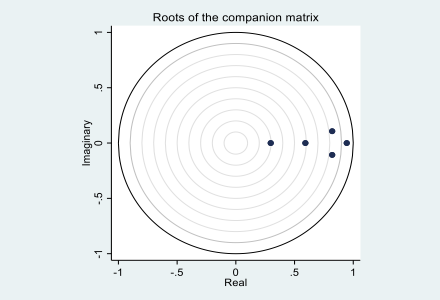


Table 11.: model stability

Eigenvalue		
Real	Imaginary	Modulus
0.94	0.00	0.94
0.82	0.11	0.83
0.82	-0.11	0.83
0.59	0.00	0.59
0.30	0.00	0.30

Source: Computations from research data, 2020

From Figure 6 and Table 11, it is observed that for the first PVAR model with the lowest and highest being 0.30 and 0.94, respectively. The modulus of each eigenvalue is strictly less than one and, they all fall within the unit circle. This means that model is stable and hence satisfies the PVAR stability condition. Therefore, the estimates generated from the model are reliable, and there is no problem of model misspecification. Hence, the interpretations made from them are meaningful.

4.2.1.2. GRANGER CAUSALITY TESTS

After estimation of the PVAR models, the objective of this analysis is to explore the causal relationship between growth and the different measures of macroeconomic policy and structural variables over their common history. As PVAR do not make a priori assumption on the direction of causality in a regression as imposed in a normal regression, this objective is achieved by employing the Granger causality test on the outputs of the first PVAR models. The Granger causality as explained in the study operates as follows; a variable Z is said to be Granger-caused by another variable X if Z can be predicted more efficiently when

the information on the past and present values of X is taken into account than when it is not in addition to all other available information.

Next, we examine the Granger causation of macroeconomic policy and growth among countries. In Table 12, we report the chi-square Wald statistics for the null hypothesis that the macroeconomic policy variables do not Granger cause gross national income and vice versa. The final column reports the joint probability of all lagged variables in the equation, in which we test the null hypothesis that all lags of all variables can be excluded from each equation in the VAR system.

Table 12: the granger causality tests

	Chi2					
Equation/excluded	LNGNI	LNREV	LNGEX	LNRER	LNBRDM	ALL
LNGNI		33.84***	32.42***	0.20	0.63	56.75***
LNREV	20.07***		8.17***	0.01	6.92**	50.42***
LNGEX	5.70**	40.48***		1.68	6.11***	80.56***
LNRER	8.84***	10.94***	6.07***		5.59**	21.30***
LNBRDM	6.21***	10.99***	0.02	0.13		43.52***
Note: ***, **, * indicate statistical significance at the 1%, 5% and 10% levels.						

Source: Computations from research data, 2020

Considering the first PVAR model for the study, it is observed that causality flows from fiscal policy variables (government spending and tax revenue) to gross national income growth evidenced by at 1% significance level. On the other hand, as it is observed from the granger causality test, we cannot reject the null hypothesis that monetary policy variables do not granger causal gross national income growth. All fiscal policy variables have a bidirectional causal relationship with gross national income, while all monetary policy variables have a unidirectional relationship with gross national income that runs from gross national income to monetary policy variables.

4.3. The relationship between macroeconomic policy and economic growth

Following the estimation of the PVAR model, we compute orthogonalized impulse response functions (IRFs)[1] and forecast error variance decomposition (FEVD) to track the impact of each variable in the system over time. The ordering of the variables for Cholesky decomposition is the same as appears in the PVAR specification, that is, LNGNI = LNREV, LNGEX, LNRER, XM_GNI, LNBRDM, LNSP, LNGFCF.

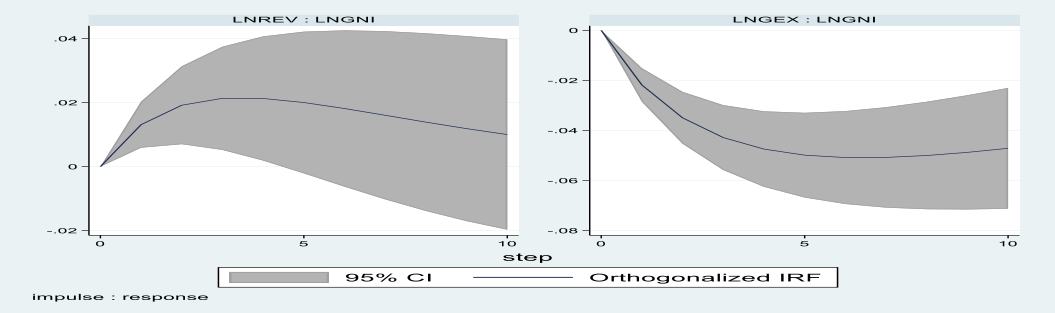
This sub-section provides and discusses the recursive impulse responses and variance decomposition results in order to demonstrate the effect of monetary and fiscal policy on gross national income, and possible interaction between the two policy variables, by employing 4-lag endogenous variables. In order to trace the effect of a one-time shock to one of the innovations on the current and future values of the endogenous variables and exogenous variables, impulse response functions for the recursive PVAR, ordered LNGNI, $LNREV_t$, $LNGEX_t$, $LNRER_t$, LNBRDM are computed and plotted in different figures. Figures capture the effect of an unexpected one percent increase in a variable of interest on another variable of interest.

4.3.1.1. The impact of fiscal policy on gross national income

As it is observed from Figure 7, an increase in government spending has a negative and significant effect on gross national income in SSA. At the 10-quarters horizon, an increase in government spending leads to a fall in gross national income. Table 13 summarizes the variance of the k-step-ahead forecast error of the different variables of the system that can be attributed to revenue and the government spending shock.

Figure 7: Impulse responses of gross national income to shock in fiscal policy variables

[1] IRF error bands are also generated by Monte-Carlo simulations with 1000 iterations for the horizon of 10 years



Source: Computations from research data, 2020

Regarding the tax revenue effect, an unexpected change in tax revenue positively and significantly affects gross national income. Similar results were also reported by Perotti (2002). Moreover, Alesina et al. (1999) provided theoretical arguments and empirical evidence on the positive effects of a tax increase on output. They stated that under certain circumstances such as high or rapidly increasing ratios of debt to-GDP, the fiscal consolidation effect may be expansionary even in the short term due to expected lower deficits. Therefore, higher taxes would induce agents to expect lower interest rates resulting from the consolidation process.

On the other hand, this study shows that there is a negative and significant relationship between government spending and gross national income in SSA. This result contrasts with that of Blanchard and Perotti (2002), Perotti (2002), and Mirdala (2009).

The effect of fiscal policy variables on gross national income was also revealed through the variance decomposition approach and results are presented in Table 13. At the 10-quarters horizon, tax revenue contributes to 5% of fluctuations in gross national income in SSA's economy, while government spending shock is responsible for 31% of the variation in the gross national income; supporting the results obtained using impulse responses.

Table 13: Variance decomposition: Fiscal variables effect on gross national income

Response variable and Forecast horizon	Impulse variable	
LNGNI	LNREV	LNGEX

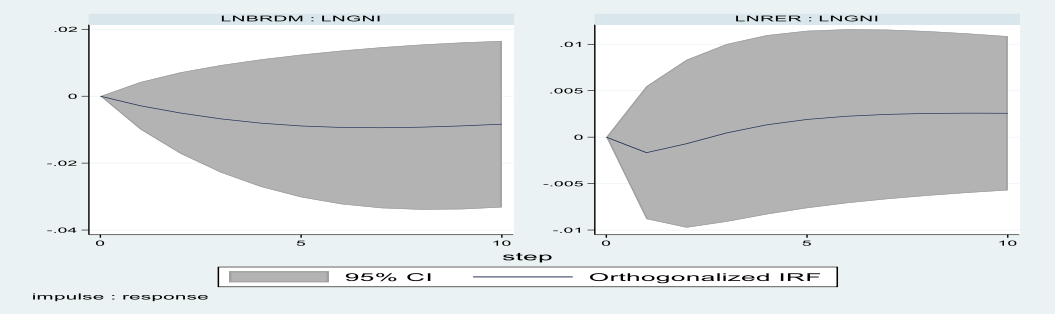
1	0.00	0.00
5	0.05	0.19
10	0.05	0.31

Source: Computations from research data, 2020

4.3.1.2. The impact of monetary policy on gross national income

As can be seen in Figure 8, an expansionary monetary policy via an increase in broad money supply leads to a decrease in gross national income, whereas monetary policy through an increase in real exchange rate has a negative impact on gross national income during short horizon but it has a positive impact on gross national income starting from the 5th quarter in SSA.

Figure 8:Impulse responses of gross national income to shock in monetary policy variables



Source: Computations from research data, 2020

Results indicate that through broad money supply, monetary policy exerts a significant negative effect on gross national income. The effect remains relatively high at 9th quarter. These results suggest that expansionary monetary policy through broad money supply can be used to influence gross national income in SSA, at least in the short and long term.

As depicted in Figure 8, the real exchange rate (proxy for the monetary policy rate) exerts negligible impact on gross national income till 5th quarter. The contribution of exchange rate to gross national income seems very weak. In historical perspective, exchange rate was designed to use as an instrument to create a competitive environment in the international trade, in which the authority aimed to attract both

domestic and private investments to foster economic growth of the country. Owing to the fact, SSA gave up fixed exchange rate system a long time ago in 1960s by adopting a managed float system in 1980s. However, the desired objective cannot be achieved due to policy mismatch and high fiscal deficit of the government which was eventually led to a high inflation for a prolonged period. In this respect, authorities have sometimes used exchange rate as an anchor of controlling inflation rather than directing it to attract private investments and generate competitiveness in the international trade. Hence, the contribution of exchange rate to the country's GDP is still at a very marginal level and due to the high volatile situation in the foreign exchange market, output cannot be enhanced whatever the innovations take place in exchange rate in SSA. In line with the findings of this study and justification similar results were reported by Mugume (2011), and Agha et al. (2005) were not able to find evidence on the relevance of and channels of the exchange rate for monetary policy transmission as not fully useful in India, Uganda and Pakistan, respectively.

As can be seen from the forecast-error variance decomposition, the results also show that unexpected variation in the monetary policy variables (broad money supply and real exchange rate) explain 0.1% and 0.9% of the dynamics in gross national income at the 10-quarters horizon in SSA, respectively in line with the result of IFRs. From these results, we can conclude that monetary policy has a weak effect on gross national income in SSA countries.

In contrary with this finding, numerous empirical studies such as Havi and Enu (2014) for Ghana, Davoodi et al. (2013) for the East African Community (Burundi, Kenya, Rwanda and Uganda), Senbet (2011) for US, Ogunmuyiwa & Ekone (2010) and Onyeiwu (2012) for Nigeria and Fasanya et al. (2013) for Pakistan suggest that monetary policy is vital to and has a strong effect on economic growth.

Table 14: Variance decomposition: Monetary variables effect on gross national income

Response variable and Forecast horizon	Impulse variable	
LNGNI	LNRER	LNBRDM
1	0.00	0.000
5	0.000	0.005
10	0.001	0.009

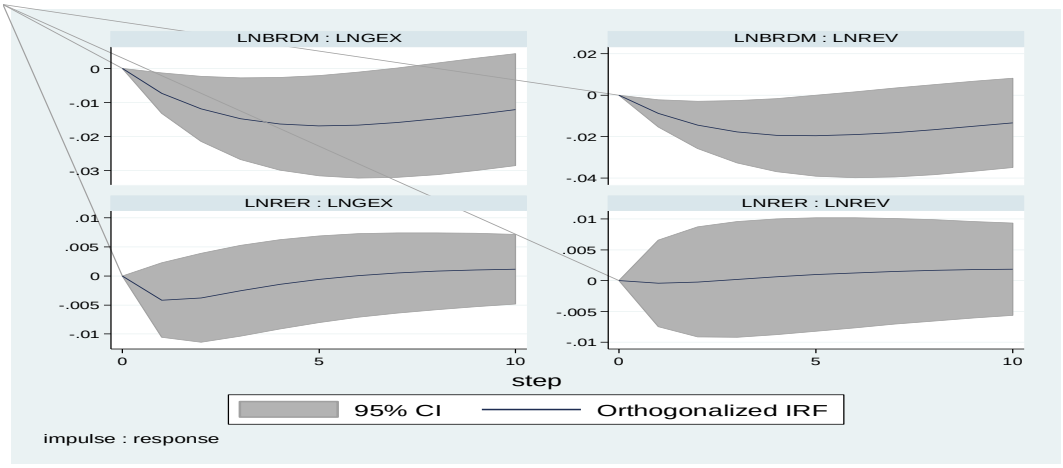
Source: Computations from research data, 2020

4.3.1.3. Mutual interaction between monetary and fiscal policies

Regarding the effect of monetary policy on fiscal policy variables, results obtained in Figure 9 indicate that government expenditure negatively and significantly respond to unexpected change in broad money supply in SSA.

According to the results of the response of government spending to shock in real exchange rate presented in Figure 9, we can conclude that fiscal policy variable (government expenditure and tax revenue) negatively and significantly responds to shocks in monetary policy shocks (broad money supply). Similar results were found for the response of government spending to shock in real exchange rate till 3rd horizon but the shock in real exchange rate does not have significant impact on tax revenue in SSA. Overall, monetary policy shocks negatively and significantly influence fiscal policy variables in SSA. The shock in broad money supply has a stronger impact than that of the shock in real exchange rate in the change in fiscal policy. Likewise, Rukelj (2010) conducted a study on the mutual effect of these economic policies and found similar findings.

Figure 9: The impact of monetary policy on fiscal policy

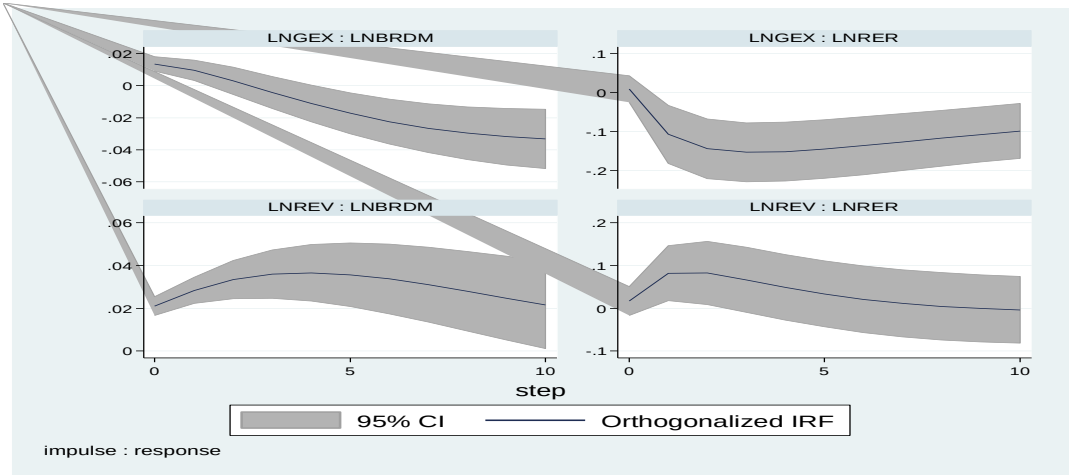


Source: Computations from research data, 2020

Regarding the effect of fiscal policy on monetary policy variables, results obtained in Figure 10 indicate that monetary policy negatively and significantly respond to unexpected change in government expenditure shock, while it responds positively and significantly to shock of tax revenue in SSA. Overall,

fiscal policy shocks positively and negatively influence monetary policy in SSA. The shock in government expenditure has a stronger impact than that of the shock in tax revenue in the change in monetary policy.

Figure 10: The impact of fiscal policy on monetary policy



Source: Computations from research data, 2020

Other results support the presence of interaction between monetary and fiscal policies. It is shown that following to gross national income, broad money supply explains 4% and 5% of the fluctuations in tax revenue, and government spending, respectively. On the other hand, following gross national income, taxes revenue and government expenditure are significantly explaining the movements in money stock and real exchange rate respectively, it contributes to the variance decomposition of broad money supply and real exchange rate with the highest value of 20% and 24% during the 10th quarter, respectively.

In a nutshell, monetary and fiscal policies are complementary. This interaction implies an indirect effect of fiscal policy and monetary policy on gross national income through money stock, real exchange rate, and government spending and tax revenue. In addition, both in the short and long run, monetary policy and fiscal policy have positive and negative relationship in SSA. These findings are in contrast with that of Ravnik & Žilić (2010) who found that fiscal policy and monetary policy have a negative relationship.

4.3.1.4. THE RELATIVE EFFECTIVENESS OF FISCAL AND MONETARY POLICIES

We use the error variance decomposition to analyze the relative impact of macroeconomic policy variables on gross national income. Table 15 shows the forecast error variance decomposition (FEVD) for

the time horizon of 1, 5 and 10 quarter as they appear in the order of PVAR setup. The results of this analysis describe the relative effect of policy variable in explaining the variation in gross national income. FEVD results pertaining to the baseline global sample estimations are reported in Table 15.

As expected, most of the forecast error variance is attributed to own innovations. Yet fluctuations in macroeconomic policy variables tax revenue, government expenditure variables and broad money supply, - do have notable explanatory power, and the patterns are consistent with the insights from the IRFs and the Granger causality tests. Focusing on the impact of fiscal policy variables (LNGEX and LNREV) fluctuations contribute notably to the variance of GNI. Much of the variability in GNI is attributed its own shock in the first year after the initial shock with 100% and is gradually declining and eventually reaching 63% over the 10th quarter. Innovations in tax revenue, government expenditure, and broad money supply explain up to 5%, 31%, and 0.9% of 63% variation in GNI over the 10-year horizon, respectively. While innovations in real exchange rate explains 0.1% of the variation in GNI over the 10-year horizon.

Table 15 also shows that tax revenue and government spending are significant in explaining changes in gross national income, with a higher contribution of 5% and 31%, respectively during the 10th quarter. However, broad money supply and real exchange rate have weak (1%) and negligible (0%) in explaining the impact in fluctuations in gross national income. Regarding fiscal policy variables' effect on gross national income, the results reveal that government expenditure contributes more to fluctuations in gross national income. However, tax revenue tends to explain fluctuations over time and the effect is low during the 10th quarter. Similar findings were found using the granger causality test. This implies that, the causal relationship between fiscal policy and national income growth is bi-directional flowing from fiscal policy variables to the gross national income, while monetary policy and gross national income does not have causal relationship in SSA. The overall implication of these results is that fiscal policy through tax revenue and government spending is more effective in explaining changes in gross national income in SSA countries.

The overall implication of these results is that fiscal policy through tax revenue and government spending is more effective in explaining changes in gross national income in SSA countries. Similar findings were documented in the studies include Galí et al. (2007); Giordano et al. (2007); Romer and Romer (2010), Darrat et al. (2014), and Mutuku and Koech (2014).

However, it is in contrary to those of previous studies such as Adeniji and Olaniyi (2013) found support for the argument that monetary policy was found to be more powerful than fiscal policy in explaining the

variation in output for some SSA countries (South Africa, Nigeria, Niger, Cote d'Ivoire, Malawi, Togo, Tanzania, and Madagascar) using data from 1970-2012.

Therefore, fiscal policy was found more important than monetary policy in explaining the change in gross national income in SSA as suggested by the variance decompositions and impulse response results as well as the granger causality test.

Table 15: Variance decomposition: Mutual interaction between monetary and fiscal variables and their individual effect on gross national income

Forecast horizon	Impulse variable				
	LNGNI	LNREV	LNGEX	LNRER	LNBRDM
Variance Decomposition of LNGNI					
1	1.00	0.00	0.00	0.00	0.000
5	0.75	0.049	0.194	0.000	0.005
10	0.63	0.047	0.311	0.001	0.009
Variance Decomposition of LNREV					
1	0.23	0.77	0.00	0.00	0.00
5	0.31	0.59	0.07	0.00	0.03
10	0.35	0.43	0.17	0.00	0.04
Variance Decomposition of LNGEX					
1	0.17	0.33	0.49	0.00	0.00
5	0.28	0.50	0.19	0.00	0.03
10	0.33	0.41	0.21	0.00	0.05
Variance Decomposition of LNRER					

1	0.04	0.00	0.00	0.96	0.00
5	0.16	0.03	0.12	0.64	0.05
10	0.19	0.03	0.20	0.52	0.06
Variance Decomposition of LNBRDM					
1	0.05	0.06	0.02	0.00	0.86
5	0.22	0.21	0.02	0.00	0.55
10	0.34	0.24	0.09	0.00	0.32
Cholesky Ordering: LNGNI, LNREV, LNGEX, LNRER, LNBRDM					

Source: Computations from research data, 2020

4.4. ROBUSTNESS TESTS

As a robustness test, we first use an alternative the dynamic common correlated effect mean group estimator (DCCEMG) as described by Chudik and Pesaran (2015) is reported in Table 17. The result shows that fiscal policy and gross national income have a positive relationship in the short run but insignificant, while monetary policy through real exchange rate and gross national income also have a negative and significant relationship while monetary policy via broad money supply has a positive and significant relationship with gross national income in the short run at 5% significant level. Other factors kept constant, one % increase in government spending or revenue leads to an increase in gross national income by 0.05% and 0.03%, respectively in the short run, but insignificant. Other factors kept constant, a one % increase in real exchange rate and broad money supply leads to a decrease and an increase in gross national income by 0.04% and 0.07 % and statistically significant at 5% and 1% significance level, respectively in the short run. Therefore, in the short run, monetary policy is more effective than fiscal policy in explaining the change in gross national income.

In the long run, through the change in revenue, fiscal policy positively and significantly influences gross national income, while the change in government spending has a positive but insignificant impact on the gross national income. On the other hand, monetary policy and gross national income have a positive and significant long run relationship. Other factors kept constant, a one percent increase in broad money supply and real exchange rate causes a rise in gross national income by 0.07% and 0.12% in the long run

at 1% and 5% significance level, respectively. Overall, the change in monetary policy has a strong and effective impact on gross national income in the short and long run, while fiscal policy was not effective in explaining the change in gross national income in the short run, but it was effective in explaining the change in gross national income through tax revenue in the long run. This result is different from the result of the benchmark model and the alternative specification of PVAR model.

Table 17: Dynamic Common Correlated Effects Estimator - Mean Group

Dept variable-D.LNGNI	Coef.	Std. Err.	z	P>z	[95% Conf. Interval	
Short Run Est.						
D.LNREV	0.05	0.04	1.21	0.23	-0.03	0.13
D.LNGEX	0.03	0.04	0.69	0.49	-0.05	0.10
D.LNRER	-0.04	0.02	-2.00	0.05	-0.09	0.00
D.LNBRDM	0.07	0.03	2.46	0.01	0.01	0.13
Long Run Est.						
ec	-0.40	0.04	-10.71	0.00	-0.47	-0.33
LNREV	0.21	0.05	4.61	0.00	0.12	0.30
LNGEX	0.04	0.04	0.93	0.35	-0.04	0.13
LNRER	0.12	0.03	3.55	0.00	0.05	0.19
LNBRDM	0.07	0.03	2.37	0.02	0.01	0.12

. Source: Computations from research data, 2020

5. CONCLUSION

This section presents conclusion and necessary recommendations for policy implementation, practitioners on the relationship between macroeconomic policy and economic growth in thirty-five SSA countries. At the onset, this study set out three core objectives that were met. These were: to examine the relationship between macroeconomic policy and long-term growth in SSA; to determine the effectiveness of monetary and fiscal policies on output; and to determine the type of relationship that exists between monetary policy and fiscal policy in SSA for the period from 1980 to 2018. Based on each objective, several empirical tests were conducted. In addition, a panel vector auto-regression framework-based analysis (Granger causality test, IRF, FEVD) and DCCEMG were done to examine and to check the robustness of the relationship and relative effectiveness of macroeconomic policy and economic growth, respectively.

Using a PVAR approach, we show that an expansionary fiscal policy through tax revenue and an unexpected expansionary monetary policy via real exchange rate have a positive effect on gross national income, whereas an expansionary fiscal policy through the government spending and monetary policy via broad money supply have a contractionary impact on gross national income.

Finally, we show evidence supporting the existence of spillovers between fiscal and monetary policies. These results are in line with the finding of Žilić (2010) observed that fiscal policy had a negative effect on monetary policy,

From a policy perspective, the current work suggests that central banks and governments can use their policies as important macroeconomic stabilization tools. Moreover, policy coordination can prove useful in boosting the economic growth. In fact, economic decisions and policy making can benefit from this feature that shapes the relationship between fiscal and monetary policies. Government spending and tax revenue are the important channels of fiscal policy transmission in SSA; thus, the policy makers should use government spending and tax revenue to influence gross national income in SSA.

Based on the findings, we concluded that broad money supply rather than real exchange rate are the best channels of monetary policy transmission for long term growth. Similarly, government spending rather than tax revenue is an important and more significant channel of transmission of fiscal policy in affecting the change in gross national income. However, fiscal policy is more effective than monetary policy in explaining changes in gross national income. These results suggest that the Government of SSA should rely more on fiscal policy than monetary policy to achieve higher growth, Government should also favor

the coordination of these policies. In our PVAR model, the IRFs, FEVD and Granger causality test results discussed are also consistent with economic theory and empirical literature.

The analysis of the impact of monetary policy on gross national income via its transmission channels has shown that broad money supply is an important channel through which monetary policy affects gross national income (proxy measure of economic growth) in SSA. This implies that the Central Bank needs to focus more on managing broad money supply to control inflation and thus enhance growth. In terms of fiscal policy, government spending was found to be more effective, suggesting that government should keep spending on those sectors that enhance the private sector by improving tax collection capabilities, but also pay more attention to its inflationary aspect by managing the money supply. The findings on the relative impact of monetary and fiscal policy in explaining the change in gross national income indicates that fiscal policy plays a significant role in explaining changes in gross national income.

Given the SSA country governments' objective of achieving sustainable and inclusive growth in the region, it is suggested that more emphasis be placed on fiscal policy than monetary policy. The government's fiscal and monetary policies should also focus on creating conducive environment which is more stable and healthier. These policies, however, must be designed to improve the macroeconomic environment in general rather than specific sectors since there is complementarity among these macroeconomic fundamentals. To practitioners, findings from this research provide the credible level of evidence that the macroeconomic fundamentals in an economy play a critical role in their financing decisions.

6. REFRENCE

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ACKNOWLEDGEMENTS

Firstly, I thank GOD ALMIGHTY for giving me the strength, knowledge and guidance to complete this essay. wholeheartedly would like to express my sincere gratitude to my principal supervisor Fung KWAN and my Co-supervisors Professor Patrick Wei HO and Professor Yibai YANG and acknowledge for their continuous unflinching attention, encouragement, outstanding support, guidance, and critical evaluation as well as priceless and intuitive contributions and the relentless support received throughout the study. Their valuables comments and inspirational advice made commitment within me to explore every possible corner of the research area and come up with more accurate inferences than previously thought. More especially, their guidance and comment from conception of the research idea to the final stage with advice and direction that enabled me to conceptualize enrich and develop the idea that led to achievement of the study goal.

I am also indebted to University of Macau for facilitating the space to continue my PhD studies and giving the financial support to conduct my research and cover my expenses during the study period. Together with that, I am also thankful for permission and recommendations given by the Government of Ethiopia and Ministry of Trade and Industry. Without their permission and recommendations, I would not have been in Macau to continue my PhD studies.

In pursuing this study, I am highly indebted to several people who made the completion of this essay possible through their positive support and continuous encouragement in various capacities. I am grateful to all my friends here at University of Macau who elsewhere provided vital support, encouragement, and fruitful discussions.

Finally, this essay would not have been possible without the love and support of my family, Tsehay mulugeta, Surafel Ayana, Yonathan Ayana and Mihret Ayana who are my source of inspiration and strength. I also wish to express my heartfelt gratitude for all my friends who share my happiness and worries and be with me in every circumstance, support my studies discussing and providing ideas for the essay related issues to improve it in every possible way.

Originality Claims

I declare that this article here submitted is original except for the source materials explicitly acknowledged and that this article is a product of my independent research work under the guidance of my supervisors. I also acknowledge that I have read and understood the Rules on Handling on academic journal publishing. I undertake all the legal responsibilities entailed in the claims.