Efficacy of Fiscal and Monetary Policy in Sierra Leone: An Ardl Bound Testing Approach

Abu Bakarr Tarawalie*, Noah Kargbo

Department of Economics and Commerce, Fourah Bay College, University of Sierra Leone, Sierra Leone.
*Email: tarawalieabu@yahoo.com

ABSTRACT

This paper empirically examines the relative effectiveness of fiscal and monetary policies on economic growth in Sierra Leone. The study utilizes annual time series data, spanning from 1980 to 2017, within an autoregressive distributed lag Bound Testing estimation framework popularized by Hashem, and Yongcheol (1998). The unit root test results show that all the variables are integrated of order one, i.e. I(1), and the cointegration bound testing results confirm the existence of cointegration amongst the variables. The study reveals that monetary policy is more effective than fiscal policy in promoting economic growth in Sierra Leone. Specifically, the findings show that money supply, real exchange rate and inflation are the significant variables that influence economic growth in the long run. Whilst the finding shows a positive relationship between money supply and economic growth, it however reveals a negative relationship for both real exchange rate and inflation on growth during the study period. The short run dynamics also reveals that money supply, government revenue, government expenditure and war dummy are the main variables influencing real GDP growth in Sierra Leone. Furthermore, the result shows that 24% of the disequilibrium in real GDP is corrected within a year. The study recommends that monetary and fiscal policies should be well coordinated and government should implement a balanced budget in order to overcome the issue of fiscal dominance in the Sierra Leone economy.

Keywords: Economic Growth, Fiscal Policy, Monetary Policy, Autoregressive Distributed Lag, Sierra Leone
JEL Classifications: E52, E62, E63, C50, P24

1. INTRODUCTION

Since the early 1960's, the relative effectiveness of monetary and fiscal policy action on economic activity has been the source of considerable debate among economists. Both policies are commonly accorded prominent role in the pursuit of macroeconomic stabilization in developing countries. Proponents of the monetarist doctrine believe that monetary policy exert greater impact on economic activity while the Keynesian school suggest that fiscal policy appear to have a greater influence on economic activity (Khosravi and Karimi, 2010). Fiscal policy is considered as a demand side policy used by government to achieve broad macroeconomic objectives, including economic growth, price stability, full employment and economic stability, through

the use of taxation and government spending. On the other hand, monetary policy is also viewed as a demand side policy used by the monetary authority to achieve macroeconomic objectives. These objectives include; sustained economic growth, price stability, low unemployment, balance of payment equilibrium and sustainable development. These objectives are achieved through changes in interest rate, money supply or exchange rate.

In most countries, monetary policy has been subservient to fiscal policy, given that central banks have often been required to finance government budget deficits. Thus, government has to identify the appropriate policy mix of these two policies that will achieve the desired outcome. In doing so, government has to consider two salient issues; first, the overall policy mix as well

as each individual policy must be set on a sustainable trajectory. Second, studies have shown that monetary and fiscal policies operate in different time frame, with monetary policy adjusting on a continuous basis and economic agents reacting with much shorter lag than changes in fiscal policy. On the other hand, fiscal policy takes time to adjust and economic agents react with a much longer lag to such adjustment.

The main sphere of interaction between monetary and fiscal policies relate to the financing of the budget deficit and monetary management. The particular stance of monetary policy affects the capacity of the government to finance the budget deficit by changing the cost of debt servicing and by limiting or expanding the available sources of financing. At the same time, the financing needs of the government and its funding strategy will place constraints on the operational independence of monetary authority.

The empirical literature is replete with studies that investigate the relative effectiveness of fiscal and monetary policies, using different estimation techniques and data type. However, the empirical findings have produced mixed results. Some studies found that the impact of monetary policy on the economy is larger and more predictable than fiscal policy, see Andersen and Jordan (1968); Ajayi (1974); Batten and Hafer (1983); Bynoe (1994); Batten and Thorton (1986) and; Belliveau (2011). On the other hand, studies have shown that fiscal actions have a greater impact on economic activity than monetary actions. Researchers that support the effectiveness of fiscal policy include among others, De Leeuw and Kalshbrenner (1969); Chowdhury (1986); and Moayedi (2013).

In Sierra Leone, the major macroeconomic policy tools available to achieve sustained growth, price stability, and increased employment are fiscal and monetary policies. Despite the intervention of the monetary authority through the manipulation of money supply and demand, combined with fiscal policy management through increased expenditure and revenue mobilization over the past years, the Sierra Leone economy continues to be characterized by sluggish economic growth, rising inflation, massive unemployment, dwindling foreign reserves and persistent balance of payment deficit.

The Sierra Leone economy thrived on a positive growth trajectory in the 1980s as real GDP growth rate increased from 1.3% between 1980 and 1985 to 2.2% during 1986 and 1990, due largely to increased economic activity in the mining and industrial sectors, and a surge in government spending on basic infrastructure following the hosting of the Organization of African Unity (OAU) Summit in 1980 (Bangura et al., 2016). The country was engulfed in a civil war in the 1990s. During this period, economic activities stalled and the social and institutional fabrics of the country weakened. As a result, the country went into recession, recording negative growth rate of 4.8 during 1991-1995, and growth further deteriorated on average to negative 9.5 between 1996 and 1999. Growth rebounded in the early 2000s, as real GDP growth increased to 7.1% between 2000 and 2007, following the implementation of the resettlement, rehabilitation and reconstruction programme during the post war period. Furthermore, growth leapfrogged to an

all-time high of 15.2% and 20.7% in 2012 and 2013, respectively, due to the production and export of iron ore. However, the twin shock following the Ebola outbreak and a decline in the price of iron ore, the main export product affected economic activities in the mining, services and other sectors. As a result, economic growth contracted by 4.6% and 21% in 2014 and 2015, respectively.

In a similar vein, the country witnessed inflationary episodes in the 1980s and 1990 as inflation rate remained in double digits during these periods. Inflation rate jumped from 45.8% during 1980 and 1984 to 93.1% between 1985 and 1989, due largely to monetization of government fiscal deficit coupled with the removal of subsidies on basic commodities following the implementation of the Structural Adjustment Programme (SAP) and the persistent depreciation of the domestic currency- the Leones, against other international currencies. Inflationary pressure eased in the 1990s, as average inflation rate decelerated considerably from 48.1% during 1991 and 1995 to 5.9% between 2000 and 2005, attributed mainly to expectations that rekindled business and consumer confidence following the end of the civil war. However, inflationary pressure rebounded, as inflation rate increased to 12.1% during 2006 and 2010, due to supply shocks following the global food and fuel crises in 2007 and 2008, but decelerated to an average of 11.4% during 2011 and 2014, before increasing to 15% in 2017, following the depreciation of the Leones and removal of subsidies from petroleum products, that resulted in an increase in the pump price of fuel.

Since the early 1970s following the first oil shock, Sierra Leone's fiscal position continues to deteriorate. The hosting of the OAU Summit in 1980 significantly affected the fiscal sector of the economy, as budget deficit (excluding grant) as a percent of GDP averaged 11.1% in the mid-1980s. However, budget deficit improved to 10.1% between 1986 and 1990 and further to 8.3% during 1991 to 1995, following the implementation of the SAP, which restraint government expenditure and enhance government revenue mobilization drive. However, fiscal deficit worsened to 16.3% during the period 2001 and 2005, following an increase in government expenditure on rehabilitation, reconstruction and resettlement programme. Budget deficit improved to 7.3% during 2006 and 2010, due to implementation of prudent fiscal policy, but the deficit worsened to 8.2% during 2011 and 2014. The deficit narrowed from 8.6% of GDP in 2017 to 6.6% in 2018, due mainly to elimination of fuel subsidies, reduction of excessive duty and tax waivers and introduction of a treasury single account.

Sierra Leone's monetary policy is conducted within the framework of a monetary targeting regime. The operational target is reserve money and is used for day-to-day policy to attain the link between the central bank's ultimate policy goals and the operating target. Quarterly targets on reserve money are set within the framework of international monetary fund supported and monitored programmes, consistent with programme targets on inflation and economic growth. Monetary policy implementation remains broadly expansionary, as growth of narrow money increased from 11.77% during the period 1970 and 1975 to 20.6% between 1976 and 1979 and further to 41.37% over the period 1980 and 1985. Growth of broad money increased from 12.7% over the period

1970 and 1975 to 23.7% between 1976 and 1979 and further to 35.3% over the period 1980 and 1985. Growth in broad money decelerated from 27.3 between 1996 and 2000 to 24.0 during the periods 2001 to 2009, and further to 19.6 between 2011 and 2014.

The aim of this article is to empirically examine the relative effectiveness of monetary and fiscal policies on economic growth in Sierra Leone, within the framework of the autoregressive distributed lag (ARDL) bound testing approach popularized by Hashem and Yongcheol (1998). This study contributes to the empirical debate on monetary-fiscal policy nexus in that, it focuses on Sierra Leone, a small open economy typified as a state in fragility. Furthermore, despite the plethora of work on this issue, the authors are not aware of any study that has been conducted for Sierra Leone. Following this introduction, the rest of the paper is structured as follows. Section II reviews the relevant empirical literature, while Section III discusses the methodology, model specification and empirical analysis. Section IV conclude the study and proffers policy recommendations.

2. LITERATURE REVIEW

Considerable volume of empirical work has been carried out by many economists to investigate the relative effectiveness of monetary and fiscal policies and their influence on economic growth. The empirical literature on the effect of fiscal and monetary policies on growth has produced mixed findings and inconclusive results. The empirical work by Andersen and Jordan (1968), Ajayi (1974), Ajisafe and Folorunso (2002), Rahman (2005), Ali et al. (2008), Jawaid et al. (2010) and Senbet (2011) find support for the monetarist view, which suggests that monetary policy generally has a greater impact on economic growth and dominates fiscal policy in terms of its impact on real output. On the other hand, studies by Chowdhury et al. (1986) and Latif and Chowdhury (1998) conclude that fiscal policy is more effective over monetary policy.

In reviewing the literature, most of the earlier studies on the effectiveness of monetary and fiscal policies have focused to large extent on industrialized countries, especially on the US. Anderson and Jordan (1968) tested the relative effectiveness of monetary policy and fiscal policy in the United States using quarterly data. The study found that the effect of monetary policy proxied by money supply is greater, more predictive and faster than that of fiscal policy proxied by government expenditure on economic growth. Unlike the findings of Anderson and Jordan (1968), the findings by De Leeuw and Kalshbrenner (1969) indicated that fiscal policy creates greater effect on growth than monetary policy. Furthermore, Waud (1974) investigated the relative efficacy of monetary policy and fiscal policy economic growth in the US. The study found that the influence of both policies on economic activity is significant and appears equally important. Senbet (2011) used vector autoregressive (VAR) model analysis to investigate the relative effectiveness of fiscal and monetary policies on output in the USA. They found that monetary policy had a strong and positive impact on economic growth. Batten and Hafer (1983) examined the relative effectiveness of monetary and fiscal actions in six industrialized countries covering the UK, the US, Canada, France and Germany for the period of the late 1960s to the early

1980s by employing the St. Louis approach. They concluded that while monetary actions have a significant as well as permanent effect on nominal GNP growth, fiscal actions exert no statistically significant and lasting influence.

In recent years there has been a considerable increase in studies which have examined the effectiveness of fiscal and monetary policies in the context of developing countries. Ezeji and Michael (2013) investigated the impact of monetary and fiscal policies on Nigeria economic growth from 1990 to 2010, using a VAR model. The study found that fiscal policy measures exert greater effect than monetary policy measures on the level of economic development in Nigeria. Adefeso and Mobolaji (2010) employed a different methodology to examine the relative effectiveness of fiscal and monetary policy on economic growth in Nigeria. Using annual time series data from 1970 to 2007, within the framework of co-integration and error correction estimation techniques, the results indicated that the effect of monetary policy on economic growth in Nigeria was much stronger than fiscal policy. Olaloye and Ikhide (1995) tested the relative effectiveness of monetary and fiscal policy by estimating a slightly modified form of the basic St. Louis model using monthly data over the period of 1986 and 1991 in Nigeria. They concluded that fiscal policy creates greater effects on the economy than that of monetary policy.

Cyrus and Elias (2014) investigated the impact of fiscal and monetary policies in Kenya using a VAR model and time series data from 1970 to 2010. Results from the variance decomposition and impulse response function indicated that fiscal policy has significance and positive impact on real output growth in Kenya, while monetary policy shocks have contradiction with fiscal policy shocks. Noman and Khudri (2015) examined the effects of fiscal and monetary policies on economic growth in Bangladesh using annual time series for the period 1979-2013. The study confirmed that both policies showed significant impact on Bangladesh's economic growth. In a similar vein and using time series data from 1975 to 2003, Chowdhury and Afzal (2015) investigated the effectiveness of monetary policy and fiscal policy in Bangladesh. The results showed that there is positive and significant relationship among fiscal policy, monetary policy and economic growth in Bangladesh. Havi and Enu (2014) examined the relative effectiveness of monetary policy and fiscal policy on economic growth in Ghana over the period of 1980 and 2012. The finding revealed that money supply had a positive significant impact on the Ghanaian economy. Şen and Kaya (2015) investigated the effect of monetary and fiscal policies on growth in Turkey. Using quarterly data for the period 2001: Q1 to 2014: Q2, the study found that monetary policy is more effective in stimulating economic growth in Turkey. Jawaid et al. (2010) evaluated the comparative effect of fiscal and monetary policy on economic growth in Pakistan. The study utilized annual time series data from 1981 to 2009 within a cointegration framework. The result revealed that monetary policy is more effective than fiscal policy in Pakistan. Ali et al. (2008) examined the effects of fiscal and monetary policy on economic growth in South Asian countries using ARDL model and annual time series data from 1990 to 2007. The study found that monetary policy is more powerful than fiscal policy in supporting economic growth in South Asian countries.

Empirical Studies on the relative effectiveness of fiscal and monetary policies in Sierra Leone are limited in scope and coverage. Despite the abundant literature, there is no empirical research, to the knowledge of the authors that investigated the relative effectiveness of fiscal and monetary policy in Sierra Leone. Most of the research studies for sub-Saharan African countries that include Sierra Leone in their data conduct their analysis and draw conclusions for the whole pool of countries, ignoring the specifics of each country. For instance, Bynoe (1994) examined empirically the relative impact of fiscal and monetary policy influences on economic activity in five African countries employing a modified St. Louis-type reduced-form equation for the period 1965 to 1990. The regression results suggested that the monetary influence is relatively stronger than the fiscal influence in three of the countries, Ghana, Kenya and Nigeria, while the fiscal influence was appreciably significant in only one country, Nigeria. In two countries, Sierra Leone and Tanzania, neither the fiscal nor the monetary influence was significant in determining nominal income. Tarawalie et al. (2013) investigated the level of coordination between the fiscal and monetary authorities in the WAMZ countries and its implications for the attainment of the inflation and fiscal deficit criteria. The study utilized the Set Theoretic Approach (STA) and the VAR modelling to estimate the degree of policy coordination in the Zone, using annual time series data for the period 1980-2011. The study found that there was weak policy coordination and insufficient policy prudence in all the WAMZ countries during the study period. Specifically, the result revealed that the Sierra Leonean authorities adjust the fiscal position so as to smooth the output growth path.

Thus, review of the empirical literature has shown that the impact of fiscal and monetary policies on economic growth has produced mixed and inconclusive results. Whilst some researchers established strong support for monetary policy on economic growth, others affirm the dominance and relevance of fiscal policy in promoting economic growth. As a result, conducting a study on the Sierra Leone economy will provide useful insight into the actual impact of monetary and fiscal policies on economic growth, that will help policy makers design prudent fiscal-monetary policy mix with a view to achieve broader macroeconomic stability.

3. METHODOLOGY

To examine the efficacy of monetary and fiscal policies on output growth in Sierra Leone, we used the St. Louis equation developed by Andersen and Jordan (1968). This equation can be expressed as:

$$Y = f(F, M, Z) \tag{1}$$

Where: Y represents economic growth; F denotes fiscal policy variables; M symbolizes monetary policy variables, and Z represents other variables influencing economic performance. The methodology used in this research work to determine the existence of long-run equilibrium relationships between variables, is the ARDL model developed by Hashem and Yongcheol (1998). The ARDL approach has the advantage of flexibility, in that it can be applied irrespective of whether the variables are of different order of integration (Pesaran and Pesaran, 1997). In other words, the variables used in the analysis can have a mix of different degrees of integration; that is, they can be

a mix of I(0) or I(1) variables. Also, the ARDL has the advantage of estimating the short-run, long-run effects simultaneously by forming an Error Correction Model (ECM) derived from the ARDL model without loss of long-term information.

The linear specification of the model is based on existing theoretical and empirical foundation and the structure of the Sierra Leone economy. The model is specified as follows:

$$LnY_t = \beta_0 + \beta_1 lnMS_t + \beta_2 lnGEXP_t + \beta_3 LnREV_t$$
$$+ \beta_4 lnRER_t + \beta_5 lnCPI_t + \lambda D + \mu_t \tag{2}$$

Where lnY_t is log of real GDP, $LnMS_t$ is log of money supply, $LnGEXP_t$ is log of government expenditure, $LnREV_t$ is log of government revenue, $LnRER_t$ is log of real exchange rate, $LnCPI$ is log of consumer price index (proxy for inflation), D is dummy variable for war that takes the value of one (1) for war period and zero elsewhere, β_0 is the intercept term, β_i are parameters to be estimated (I = 1,2….5), λ is the coefficient for the war dummy, μ_t is the error term and t is time period.

To determine the cointegration relationship between the independent variables and dependent variable, we specified an unrestricted error correction version of the ARDL model. Thus, the ARDL framework for equation two (2) is given as:

$$\Delta lnY_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta lnMS_{t-i} + \sum_{i=1}^{r} \alpha_2 \Delta lnGEXP_{t-i}$$
$$+ \sum_{i=1}^{s} \alpha_3 \Delta lnREV_{t-i} + \sum_{i=1}^{u} \alpha_4 \Delta lnRER_{t-i} +$$
$$\sum_{i=1}^{v} \alpha_5 \Delta lnCPI_{t-i} + \beta_1 LnY_{t-j} + \beta_2 lnMS_{t-j} +$$
$$\beta_3 lnGEXP_{t-j} + \beta_4 LnREV_{t-j} + \beta_5 lnRER_{t-j}$$
$$+ \beta_6 lnCPI_{t-j} + \lambda D + \mu_t \tag{3}$$

Where Δ is the difference operator, $\mu_\square$ is the error term, i's and j's represent the lags, and β and α are coefficients to be estimated. To establish the existence of co-integration, the study will compute the F-statistic from the ARDL regression of equation (3). The null hypothesis of no co-integration will also be tested by restricting the lagged level variables equal to zero (i.e. $\beta_1 = \beta_2 = \beta_3 = \beta_4 = \beta_5 = \beta_6 = 0$) against the alternative hypothesis that $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq \beta_5 \neq \beta_6 \neq 0$. The bounds tests provide two asymptotic critical value bounds. The lower bound assumes variables are I(0) whilst the upper bound assumes I(1) variables. The null hypothesis of no co-integration is rejected if the computed F-statistic is greater than the upper critical value bound; otherwise the null hypothesis is accepted. Once co-integrating relationship is ascertained, the error correction estimates of the ARDL model are obtained. In the event that cointegration is established, then the restricted error correction representation of equation 3 is specified as follows:

$$\Delta lnY_t = \alpha_0 + \sum_{i=1}^{p} \alpha_1 \Delta lnMS_{t-i} +$$
$$\sum_{i=1}^{r} \alpha_2 \Delta lnGEXP_{t-i} + \sum_{i=1}^{s} \alpha_3 \Delta lnREV_{t-i}$$
$$+ \sum_{i=1}^{u} \alpha_4 \Delta lnRER_{t-i} + \sum_{i=1}^{v} \alpha_5 \Delta lnCPI_{t-i}$$
$$+ \lambda D + \delta ECT_{t-1} \mu_t \tag{4}$$

Where α_i's represent the short run coefficients and δ is the coefficient of the error correction term which represents the speed of adjustment to long run equilibrium following a short run shock.

For the diagnostic tests, the CUSUM and CUSUMSQ tests are used to check the stability of the model. If CUSUM and CUSUMSQ goes out of the straight line once or more than once, in that case it is assumed that the regression model is unbalanced. To examine the effects of monetary and fiscal policies on economic growth in Sierra Leone, we used annual time series data over the period 1980 to 2017. In the study, the Real GDP is used as proxy for the real output growth, Government expenditure and revenue have been used as proxy for fiscal policy. Money supply is used as a proxy for monetary policy. Inflation and real exchange rate are used as proxies for real sector and external sector variables, respectively.

4. EMPIRICAL ANALYSIS

4.1. Summary Statistics
Table 1 presents the summary statistics including mean, median, minimum and maximum values, standard deviation, kurtosis, skewness, and Jarque-Bera test for the variables in levels. Based on the result, we observed a high standard deviation for CPI, which implies inflation is more volatile compared to other variables. The result also showed that real GDP, money supply, government revenue and inflation have negative skewness values ranging between -1 and -0.5, which indicate that the variables are moderately skewed to the left. However, government expenditure and real exchange rate have positive skewness values with implications that these variables are skewed to the right, with real exchange rate being highly skewed. The value of the kurtosis for each of the variables is approximately 3, which indicate that the distributions are mesokurtic, i.e. the distribution approximates a normal "bell-shaped" distribution. The values of the Jarque-Bera statistics and P values for normality for each of the variables indicate that all the variables have normal distribution.

4.2. Unit Root Test
The result of the Augmented Dickey-Fuller (ADF) and Philips-Peron (PP) tests are presented in Table 2. It is evident from Table 2 that the null hypothesis of a unit root at levels cannot be rejected for all the variables, since the test statistics are lower than the critical values. We therefore conclude that all the variables have unit root, i.e. they are non-stationary in levels. However, the variables were differenced once and subjected to ADF and PP tests, and the unit root test results confirmed that all the variables were stationary in first difference at the conventional level of significance, i.e. they are I(1) series. Thus, the estimation of the model and analysis is conducted under the assumption that all variables are stationary in first differences.

4.3. Selection of Optimal Lag Length
To enable us estimate the model, it is imperative that we establish the optimal lag length of the model. The literature prescribes five different criteria for optimal lag length selection namely, Likelihood Ratio (LR), Final Prediction Error (FPE), Akaike Information Criterion (AIC), Schwarz Information Criterion (SC), and Hanna-Quinn information criterion (HQ). The result of the optimal lag length is presented in Table 3. The result shows that the optimal lag length for each of the variables based on the lag length selection criteria is two (2). Thus, the study used two (2) lags for each of the variables.

4.4. Cointegration Test (ARDL F-Bounds Test)
Based on the unit root test results presented in Table 2 above, we performed cointegration test using the Auto Regressive Distributed Lag (ARDL) model. The objective for the cointegration test is to ascertain the existence of a long run relationship between the endogenous and exogenous variables. The decision rule states that the null hypothesis, of no co-integration, must be accepted if the

Table 1: Descriptive statistics of the variables

	LNRGDP	LNM2	LNREV	LNGEXP	LNCPI	LNREXR
Mean	8.6527	2.86234	2.2356	2.2438	4.8127	5.0019
Median	8.6970	2.8403	2.5224	2.2719	6.1195	4.8295
Maximum	9.2765	3.3824	2.8309	2.6626	7.9676	6.3327
Minimum	7.9503	2.2951	0.6458	1.8419	−1.6820	4.5149
Std. dev.	0.3258	0.2992	0.6197	0.1972	2.9275	0.4926
Skewness	−0.4133	−0.0382	−1.0141	0.0007	−0.9996	1.4699
Kurtosis	3.0575	2.9741	2.9508	2.8787	2.9859	3.0709
Jarque-Bera	1.0869	1.0893	1.1656	0.1636	1.4841	1.0768
Probability	0.5807	0.5800	0.4506	0.9214	0.4921	0.6005
Observation	38	38	38	38	38	38

Source: Researchers' computation using Eviews 10

Table 2: Unit root test results of the variables

Variable	Augmented Dickey-Fuller		Philips-Peron		Order of integration
	Level	First difference	Level	First difference	
LNRGDP	−1.3288	−3.3565**	−0.9073	−3.3007**	I(1)
LNM2	−1.6182	−6.2237*	−1.6068	−6.2224*	I(1)
LNREV	−2.7352	−7.6273*	−2.5422	−7.8538*	I(1)
LNGEXP	−2.0431	−8.8019*	−2.0013	−11.3629*	I(1)
LNCPI	−2.5423	−3.4281**	−2.4399	−3.7904**	I(1)
LNREXR	−1.4092	−4.7109*	−1.5060	−4.6959*	I(1)

Source: Researchers' computation using eviews 10. * and ** indicate stationary at 1% and 5% levels respectively using MacKinnon (1996) critical and P-values

Table 3: Optimal lag length of the model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	2.475164	NA	0.076241	0.258562	0.569632	0.365943
1	32.50353	46.32948	0.014554	−1.400202	−1.044694	−1.277481
2	38.57359	9.018376*	0.010933*	−1.689920*	−1.289973*	−1.551858*
3	39.48141	1.296877	0.011041	−1.684652	−1.240267	−1.531250

Source: Researchers' computation using Eviews 10

Table 4: ARDL F-bounds test results for cointegration

Test statistics	Value	Significance (%)	I(0)	I(1)
Asymptotic: n=1000				
F-stat.	8.1442	10	2.12	3.23
K	6	5	2.45	3.61
		2.5	2.75	3.99
		1	3.15	4.43

Source: Researchers' computation using Eviews 10

Table 5: Result of the long run ARDL estimation

Variable	Coefficient	Standard error	t-statistic	Prob.
LNM2	2.007021	0.829213	2.420393	0.0270
LNREV	0.8971	0.5479	1.6373	0.1172
LNGEXP	−0.2368	0.5039	−0.4698	0.6436
LNCPI	−0.2735	0.1408	−1.9421	0.0663
LNREXR	−1.4791	0.5902	−2.5059	0.0210
DUM	0.0721	0.2767	0.2606	0.7970

Source: Researchers' computation using Eviews 10

Table 6: Result of beta coefficient for real GDP growth model

Variable	Beta coefficient	Rank
Money supply	30.99	1st
Inflation	0.717	3rd
Real exchange rate	16.26	2nd

Source: Researchers' computation using Eviews 10

Table 7: Error correction representation of the selected ARDL Model (1, 2, 2, 1, 0, 2, 1)

Variable	Coefficient	Standard error	t-statistic	Prob.
C	2.1158	0.2442	8.6646	0.0000
D(LNM2)	−0.0229	0.0721	−0.3186	0.7533
D(LNM2(−1))	−0.4653	0.0864	−5.3868	0.0000
D(LNREV)	0.0263	0.0566	0.4639	0.6477
D(LNREV(−1))	−0.1026	0.0491	−2.0908	0.0495
D(LNEXP)	−0.1646	0.0559	−2.9458	0.0080
D(LNREXR)	−0.1861	0.0595	−3.1273	0.0053
D(LNREXR(−1))	0.3704	0.0672	5.5147	0.0000
DUM	−0.1426	0.0433	−3.2908	0.0037
ECT(−1)	−0.2428	0.0282	−8.6089	0.0000

Source: Researchers' computation using eviews 10. R-squared 0.8085 mean dependent var. 0.01186, Adjusted R-squared 0.7422 S.D. dependent var. 0.1056, S.E. of regression 0.0537 Akaike info criterion −2.7823, Sum squared resid 0.0748 Schwarz criterion −2.3424, Log likelihood 60.0820 Hannan-Quinn criter. −2.6288, F-statistic 12.1995 Durbin-Watson stat 2.2204, Prob. (F-statistic) 0.000000

f-statistic is less than the lower bound. However, if the f-statistic is greater than the upper bound, the null hypothesis must be rejected. The rule further states that the result will be inconclusive if the f-statistic is greater than the lower bound, but less than the upper bound. The result of the ARDL F-Bound Test results for cointegration is presented in Table 4. Given that the f-statistic

(8.1442) is greater than both the 1% and 5% upper bounds of 4.43 and 3.99 respectively, the study concludes by rejecting the null hypothesis of no co-integration. We therefore confirm the existence of co-integration between the variables of interest.

4.5. Long Run Results
The result of the long run estimates is presented in Table 5. From the result it can be inferred that money supply and real exchange rate are statistically significant at the 5% level in influencing economic growth in Sierra Leone. Furthermore, the result confirms that inflation influences economic growth with statistically significant coefficient at the conventional level (10% level of significance). Specifically, the result establishes a positive relationship between money supply and economic growth. The result suggests that a percentage increase in money supply will lead to a 2.007% increase in real GDP in the long run. The result is consistent with the findings of Goher Fatima et al. (2014), Okorie et al. (2017), Adegoriola (2018). Furthermore; the result reveals that both real exchange rate and inflation have negative effects on real GDP. An appreciation of the real exchange rate decreases real GDP growth, i.e. a 1% appreciation of the real exchange rate, will decrease real GDP growth by 1.48%. This finding is typical for an import driven economy like Sierra Leone, with inelastic demand for both import and export. High inflation dampens real GDP growth in the long run. A percentage increase in the inflation rate will reduce economic activity by 0.27% at the conventional level of significance, a result consistent with an inflation prone economy- Sierra Leone.

4.6. Comparison of Beta Coefficients
A standardized beta coefficient[1] compares the strength of the effect of each individual independent variable to the dependent variable. Comparison of the beta coefficients of the independent variables, as shown in Table 6, reveals that money supply has the greatest effect on real GDP in the long run, followed by real exchange rate, whilst inflation has the least effect. The result confirms that monetary policy is more effective than fiscal policy in influencing economic growth in the long run in Sierra Leone.

4.7. ECM
The short run error correction result as presented in Table 7, shows that money supply, government revenue, government expenditure and war dummy are the main variables influencing real GDP growth in Sierra Leone. Whilst the long run dynamics establishes a negative relationship between money supply and economic growth, the short run result depicts a negative result,

---

1 Beta coefficient (β) of a variable is defined as follows: β = (coefficient of the variable *standard error of the variable)/standard error of the regression. A higher beta coefficient means a stronger influence of that variable on the dependent variable. A lower beta coefficient means a weaker influence of the variable on the dependent variable.

Figure 1: Plot of CUSUM test
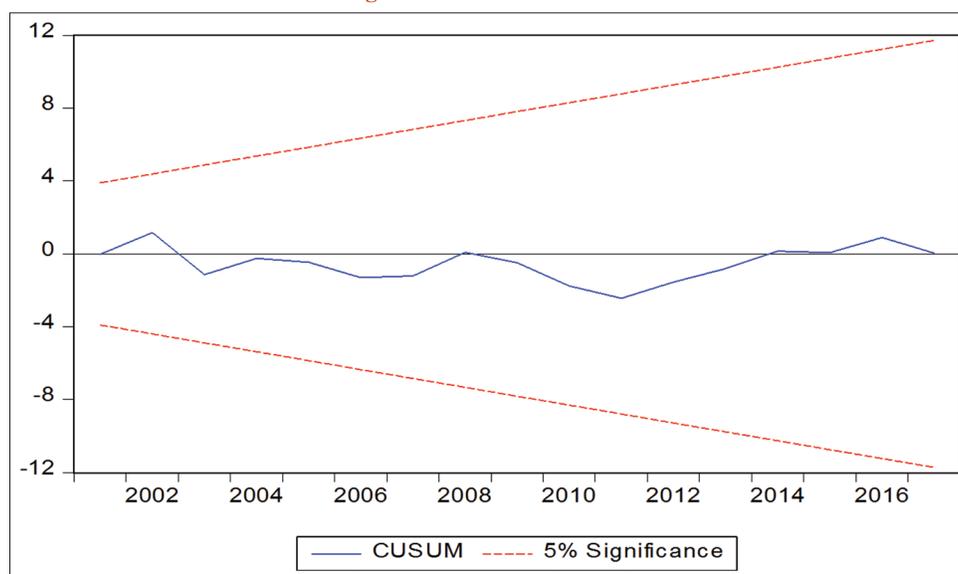
Figure 2: Plot of CUSUMSQ Test
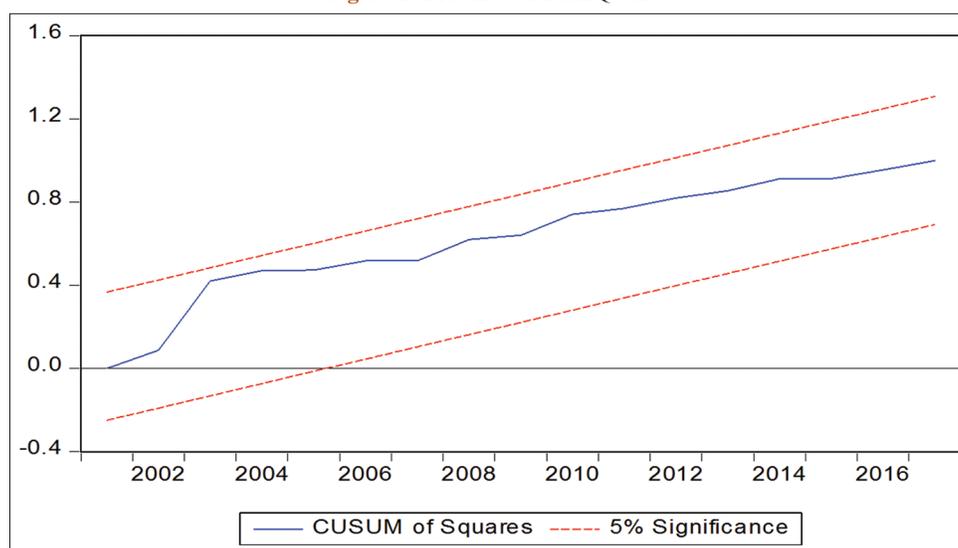
Source: Author's computation using eviews 10

which implies that in the short run, expansionary monetary policy has a contractionary effect on economic growth. The result also reveals a negative relationship between fiscal policy variables (government expenditure and revenue) and economic growth. Increase in government expenditure dampens growth in the short run. Plausible reason for such a result is the fact that government expenditure is mostly on recurrent expenditure especially on wages and salaries, with small fraction of expenditure on growth enhancing sectors of the economy. The war dummy is negative, given the fact that the war period led to the disruption of economic activities, whilst the social and institutional fabrics of the country weakened, which led to negative growth. It is also evident from the result that, the coefficient of the error correction term, which represent the speed of adjustment is statistically significant with a coefficient of 0.24, which implies that 24% of the disequilibrium in real GDP is corrected within a year. The diagnostic statistics reveal that 81% of the variation in real GDP is explained by the

independent variables. Overall, the model is statistically significant as shown by the probability value of the F-statistic (0.000000).

4.8. Stability Test

The stability of the regression coefficients are evaluated using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) test for structural stability. The model is stable, since both the CUSUM and CUSUMSQ test statistics lies within the 5% critical bound as shown in Figures 1 and 2.

5. CONCLUSION AND POLICY RECOMMENDATIONS

This paper empirically examined the relative effectiveness of fiscal and monetary policies on economic growth in Sierra Leone using annual time series data for the period 1980 to 2017. The study

adopted the ARDL Bound testing estimation technique. The study showed that all the variables were integrated of order one, i.e. $I(1)$ and the cointegration result indicated a long-run relationship amongst the variables.

The findings revealed that monetary policy is highly significant in promoting economic growth in Sierra Leone. Specifically, the result revealed that money supply, real exchange rate and inflation are the significant variables that influence economic growth in the long run. Whilst a positive relationship was established between money supply and economic growth, the study found that both real exchange rate and inflation had a negative impact on growth during the study period. The short run dynamics showed that money supply, government revenue, government expenditure and war dummy were the main variables influencing real GDP growth in Sierra Leone. Furthermore, with an error correction term of -0.24, the study showed that 24% of the disequilibrium in real GDP is corrected within a year. The diagnostic statistics revealed that 81% of the variation in real GDP is explained by the independent variables.

Overall, the model is stable as evident by the CUSUM and CUSUMSQ, whilst the Jarque-Bera test revealed that the residuals are normally distributed. The study therefore recommends that monetary and fiscal policies should be well coordinated and government should implement a balanced budget in order to overcome the issue of fiscal dominance in the Sierra Leone economy.

REFERENCES

Adefeso, H.A., Mobolaji, H.I. (2010), The fiscal-monetary policy and economic growth in Nigeria. Pakistan Journals of Social Sciences, 7(2), 137-142.

Adegoriola, A. (2018), An empirical analysis of effectiveness of monetary and fiscal policy instruments in Stabilizing economy: Evidence from Nigeria. Social Sciences, 7(3), 133-140.

Ajayi, S.I. (1974), An econometric case study of the relative importance of monetary and fiscal policy in Nigeria. Bangladesh Economic Review, 2(2), 559-576.

Ajisafe, R.A., Folorunso, B.A. (2002), The relative effectiveness of fiscal and monetary policy in macroeconomic management in Nigeria. The African Economic and Business Review, 3(1), 23-40.

Ali, S., Irum, S., Ali, A. (2008), Whether fiscal stance or monetary policy is effective for economic growth in case of South Asian countries? Pakistan Development Review, 47(4), 791-799.

Anderson, L.C., Jordan, J.L. (1968), Monetary and Fiscal Action: A Test of their Relative Importance in Economic Stabilization. Monthly Review. Vol. 52. St. Louis: Federal Reserve Bank of St. Louis. p7-27.

Bangura, A., Tarawalie, A.B., Fofanah, L., Macarthy, S. (2016), Macroeconomic determinants of budget deficit: Evidence from Sierra Leone. International Journal of Economic Perspective, 10(1), 5-13.

Batten, D.S., Hafer, R.W. (1983), The Relative Impact of Monetary and Fiscal Actions on Economic Activity: A Cross Country Comparison. St. Louis: Federal Reserve Bank of St. Louis. p5-12.

Batten, D.S., Thornton, D.L. (1986), The Monetary-Fiscal Policy Debate and the Andersen-Jordan Equation. St. Louis: Federal Reserve Bank of St. Louis. p9-17.

Belliveau, S. (2011), A St. Louis Equation to Reassess the Influence of Macroeconomic-Policy Instruments. Available from: https://www.mpra.ub.uni-muenchen.de/28839.

Bynoe, A.J. (1994), Monetary and fiscal influences on economic activity in African countries. African Review of Money Finance and Banking, 10, 97-107.

Chowdhury, A.R. (1986), Monetary and Fiscal Impacts on Economic Activities in Bangladesh a Note. The Bangladesh Development Studies, 27(2), 101-106.

Chowdhury, L.S., Afzal, M.N.T. (2015), The effectiveness of monetary and fiscal policy in Bangladesh. Journal of Applied Business and Economics, 17(1), 78-85.

Cyrus, M., Koech, E. (2014), Monetary and fiscal policy shocks and economic growth in Kenya: VAR econometric approach. Journal of World Economic Research, 3(6), 95-108.

De Leeuw, F., Kalshbrenner, J. (1969), Monetary and Fiscal Actions: A Test of their Relative Importance in Economic Stabilization a Comment. St. Louis: Federal Reserve Bank of St. Louis.

Ezeji, C.E., Michael, N. (2013), The impact of monetary and fiscal policies on Nigerian economic growth: 1990-2010. European Journal of Business and Management, 5(2), 13-26.

Hashem, P.H., Yongcheol, S. (1998), Generalized impulse response analysis in linear multivariate models. Economics Letters, 58(1), 17-29.

Havi, E.D.K., Enu, P. (2014), The effect of fiscal policy and monetary policy on Ghana's economic growth: Which policy is more potent?. International Journal of Empirical Finance, 3(2), 61-75.

Jawaid, S.T., Quadri, F.S., Ali, N. (2011), Monetary-fiscal-trade policy and economic growth in Pakistan: Time series empirical investigation. International Journal of Economics and Financial Issues, 1(3), 133-138.

Khosravi, A., Karimi, M.S. (2010), Investigation the relationship between monetary, fiscal policy and economic growth in Iran: Autoregressive distributed lag approach to cointegration. American Journal of Applied Sciences, 7(3), 1-10.

Latif, E., Chowdhury, M.H. (1998), Relative effectiveness of monetary and fiscal policy. Bank Parikrama, 23, 97-105.

Moayedi, V. (2013), Reassessing the effect of fiscal and monetary policies in Iran: The St. Louis equation revisited. Journal of Economic Development, 38(4), 123-141.

Noman, S., Khudri, M. (2015), The effects of monetary and fiscal policy on economic growth in Bangladesh. ELK Asia Pacific Journal of Finance and Risk Management, 6(3), 21-34.

Okorie, D.I., Sylvester, M.A., Simon-Peter, D.C. (2016), Relative effectiveness of fiscal and monetary policies in Nigeria. Asian Journal of Social Science Studies, 2(1), 117-129.

Olaloye, A.O., Ikhide S.I. (1995), Economic sustainability and the role of fiscal and monetary policies in a depressed economy: The case study of Nigeria. Sustainable Development, 3, 89-100.

Pesaran, M.H., Pesaran, B. (1997), Working with Microfit 4.0: Interactive Econometric Analysis. Oxford: Oxford University Press.

Rahman, M.H. (2005), Relative Effectiveness of Monetary and Fiscal Policies on Output Growth in Bangladesh: A VAR Approach. Bangladesh Bank Working Paper Series, No. WP 0601.

Şen, H., Kaya, A. (2015), The Relative Effectiveness of Monetary and Fiscal Policies on Growth: What Does Long-run SVAR Model Tell Us? MPRA Paper No. 65903.

Senbet, D. (2011), The relative impact of fiscal versus monetary actions on output: A vector autoregressive (VAR) approach. Business and Economic Journal, 25, 1-11.

Tarawalie, A.B., Sissoho, M., Conte, M., Ahortor, C.R.K. (2013), Fiscal and Monetary Policy Coordination in the WAMZ: Implications for Member States Performance on the Convergence Criteria. WAMI Occasional Paper No. 4.

Waud, R.N. (1974), Monetary and fiscal effects on economic activity: A reduced form examination of their relative importance. The Review of Economics and Statistics, 56(2), 177-187.