Umoru, David; Eromosele, Harrison Ogbeide

Article

Growth stabilisation effects of macroeconomic policy coordination in Nigeria : an econometric analysis

Academic Journal of Economic Studies
Vol. 6, No. 1, March 2020, pp. 51–60
ISSN 2393-4913, ISSN On-line 2457-5836

Growth Stabilisation Effects of Macroeconomic Policy Coordination in Nigeria: An Econometric Analysis

David Umoru[1], Harrison Ogbeide Eromosele[2]

[1]Department of Economics, Faculty of Arts, Management & Social Sciences, Edo University Iyamho, Edo State, Nigeria,
E-mail: david.umoru@yahoo.com/david.umoru'edouniversity.edu.ng (Corresponding author)
[2]Department of Economics, Faculty of Social Sciences, Federal University, Otuoke, Bayelsa State, Nigeria

Abstract

The study substantiates effects of policy coordination between fiscal and monetary policies correspondingly on economic growth in Nigeria. We specified dynamic simultaneous equation to describe mutual quest for macroeconomic stabilization within coordinated policy framework between fiscal and monetary policies in Nigeria. Employing annual data, from 1980 to 2017 with application of GMM technique, implication of results is that fiscal policy and monetary policy variables mutually explain output growth significantly with view to stabilizing Nigerian economy. Indeed, with policy coordination between monetary and fiscal authorities, output growth is significantly remarkable. This advances validation of optimal policy mix for macroeconomic stabilization. Fiscal policy is countercyclical in its effects which conform to Keynesian stabilization assertion while monetary policy was is pro-cyclical. This result could be implying fiscal dominance in determination of price level. In effect, it could be said that size of Nigerian financial system is small. So, we recommend that government should enable institutional environment that foster relationship between authorities of fiscal and monetary policies.

Keywords

Output stabilization, policy coordination, economic growth, pro-cyclical, counter-cyclical

JEL Codes: F48, D56, S24

Received: 28 December 2019 **Revised: 15 January 2020** **Accepted: 25 January 2020**

1. Introduction

Macroeconomic stabilization policy is characterized by detachment of errands between monetary and fiscal authorities. The monetary authority upholds price stability by setting policy rate according to an inflation target, whereas fiscal authority ensures fiscal solvency through appropriate adjustments in the budget surplus. The use of macroeconomic policy in developing countries has often been described as a problem in countless respects. Ensuring output and price stability overtime is role of policy direction but mostly infracted with interminable pursuit of economic growth in the short run and development over longer periods. This has led to confusion regarding what direction policy should face at any given point since output stabilization in the short run may often imply weakening of structures that may guarantee growth in the long run. To attain workable growth, government may need to increase fiscal surplus in short term in order to ensure increased private sector investment and stimulate local production. Such policy stance would however hurt short term output in relation to its potential level, especially when monetary policy does not play complementary role.

The basic rationale for monetary and fiscal policy coordination as aptly summarized by Hanif and Arby (2003), includes situating internally and mutually agreed targets of monetary and fiscal policies with a view to reaching non-inflationary growth; expediting effective execution of policy decisions to achieve fixed targets of monetary and fiscal policy efficiency; and compelling government and central bank to adopt a sustainable policy. The issue of coordination becomes important to sustained pattern of steady growth path (Trecroci, 2004)). Whether this has been the case in Nigeria is not too clear. In stability analysis, recourse had been made to fiscal policy measures of tax rates and government size in Nigeria. For instance, Chuku (2009) notes that institution of non-Ricardian fiscal policy in price adjustment model alters stability conditions connected with central bank's interest rate policy. In this process, fiscal policies affect equilibrium price-level in short run which in turn tends to change real value of net assets of private sector. The resultant change in private-sector demand produces one price level that results in aggregate demand that equals aggregate supply (Woodford, 1995 and Kumhof and Laxton 2009). These stable conditions generated by fiscal policy may however be quite far-fetched in a structurally deficient economy like Nigeria.

Thus, our position is that though studies on policy coordination have been conducted on country-basis, still fewer have focused on developing economies. It has been argued that stabilization-oriented policies with little or no growth effects in

the 1980s in developing nations greatly impaired their economies and may have contributed to lost decade of1980s (Montiel and Agenor, 1999). So, objective of the present research is to examine effect of macroeconomic policy stabilization on economic growth in Nigeria. For sake of articulation, our study is subdivided into five sections. In addition to section one, section two reviews empirical literature while sections three and four respectively dealt with research methodology and discussion of empirical results. Section five is conclusion with policy options.

2. Literature review

The goal of macroeconomic policy is accomplishment of output stabilization in short run and diversified self-sustaining economic growth in long run (Iyoha, 2004). Empirical studies on role of fiscal policy in macroeconomic stabilization came into light with pioneering work by Galì (1994), and more recent studies by authors like Fatás and Mihov (2001) and Debrun and Kapoor (2010), who investigated directly the cross-country relationship between fiscal policy indicators and output volatility. Lee and Sung (2005) investigated the effect of fiscal policy in stabilizing economy and found that government works as a stabilizer of economic fluctuations. To Nordhaus (1994a), there is large output price to pay for lack of coordination of macroeconomic policies while observed gains from coordination are extremely positive. Nasir et al (2010) investigate the presence of coordination between fiscal and monetary policies for Pakistan and suggest weak evidence of policy coordination in driving growth rate of national output. Nordhaus (1994a) logically used his results to conclude that more coordination among policymakers is needed to stabilize the economy and insulate it from external shocks. This conclusion has since then enjoyed wide acceptability and thus applicability.

Kishan and Opiela (2000) considered the Stackelberg game approach where one policy-maker treasury dominates monetary authority. West African Monetary Institution (2003) adopted utility coordination arrangement between fiscal and monetary policies framework for six selected countries in Gambia, Ghana, Guinea, Liberia, Nigeria and Sierra Leone. Accordingly, frequently used utility functions for fiscal and monetary authorities are usually functions with three arguments namely, unemployment, inflation and potential output growth (Andib *et al*., 2012, Raj *et al*., 2011). It was identified that the difference between the utility functions of two policy institutions sterns from fiscal authorities assigning more weight to unemployment than inflation while monetary authorities are biased towards inflation by assigning greater weight to it than unemployment. Hasan and Isogut (2009) later noted that the VAR model produces a simple means of explaining or predicting the values of a set of economic time series at a particular time period.

Thus, it provides a powerful statistical forecasting tool for analyzing historical data. The advantage of a VAR framework over structural modeling is that it avoids all structurally induced restrictions or coefficient exclusions in order to get the model. In particular WAMI was able to investigate monetary behaviour to fiscal policy formulations. In all, it was able to conclude that weak responses to shocks in these economies are an indication of uncoordinated policy stance and vice versa.

2.1. Model Specification

The general form of policy coordination model is presented following Lambertini and Rovelli (2004). For government, the loss function is:

$$J^J_t = a_1(Yqa_t - Yqa^*_t)^2 + a_2(Aqa_t - Aqa^*_t)^2 + a_3(Bqa_t - Bqa^*_t)^2 + a_4(J_t - J^*_t)^2 \quad (1)$$

Where: Yqa = real GDP growth rate; A = inflation rate; Bqa = payments balance; J = fiscal policy quantity.

Also * indicates desired level of a given variable, t is time. This implies that the following definitions can be made:

$Yqa_t - Yqa^*_t$ = output break

$Aqa_t - Aqa^*_t$ = inflationary break

$Bqa_t - Bqa_t$ = external sector disequilibrium

$J_t - J^*_t$= fiscal policy

Equation (1) states that government chooses fiscal policy instrument at any time t, achieve desired policy targets by keeping desired budget balance to its actual value. The parameters a_1, a_2, a_3 and a_4 are relative weights that government places on argument of loss function.

The constraints convoying government fiscal behaviour include fiscal and monetary stance as:

$$Yqa = sJ_t + qK_t \quad (2)$$

$$Aqa = sJ_t + qK_t \quad (3)$$

$Bqa = sJ_t + qK_t$ (4)

Where: K is monetary policy stance instrument. Similarly, loss function of monetary authority is given by:

$K^K_t = a_1(Yqa_t - Yqa^*_t)^2 + a_2(Aqa_t - Aqa^*_t)^2 + a_3(Bqa_t - Bqa^*_t)^2 + a_4(K_t - K^*_t)^2$ (5)

Kt – K*t, = money growth break. Accordingly, equation (5) point out that central bank minimizes loss function by choosing monetary policy instrument Kt. The constraints facing monetary authority are given in equations (6), (7) and (8) respectively:

$Yqa = sJt + qKt$ (6)

$Aqa = sJt + qKt$ (7)

$Bqa = sJt + qKt$ (8)

These constraint equations signify degree of stimulus both authorities have on policy-target variables. By minimizing each loss function with respect to Jt, subject to its constraints and Kt, subject to its constraints, we arrived at reaction function (Lambertini & Rovelli, 2004) specified as:

$J_t = w_{10} + w_{11}Yqa_t + w_{12}Aqa_t + w_{13}Bqa_t + w_{14}K_t + w_{15}K_{t-1} + w_{16}J_{t-1}$ (9)

$K_t = w_{20} + w_{21}Yqa_t + w_{22}Aqa_t + w_{23}Bqa_t + w_{24}J_t + w_{25}K_{t-1}$ (10)

The reduced form parameters take these theoretical positions: $w_{11} < 0$, $w_{12} < 0$. It is expected that money stock contract following rise in income and price level. This denotes that reduced form parameters of income (i.e. w_{21}) and inflation (i.e. w_{22}) would maintain same theoretical positions $w_{21} < 0$, $w_{22} < 0$.

With coordination, monetary authority may choose to play complementary or accommodating role. In fiscal model, $w_{14} < 0$. In other scenario, accommodating instrument (Mt) may be expected to reduce in face of fiscal expansion, if monetary authorities perceive that the economy is already near full employment. This is to keep with both authorities' policy consistency in achieving same macroeconomic goals namely, steady growth in output, low inflation and stability in economy (Opiela, 2000). The theoretical contextual of fiscal balance and BOPs would be $w_{13} <$ or > 0. A rise in Mt raises income which in turn deteriorates current account balance and it reduces interest rate and hence weakens capital account. So $w_{23} < 0$. The fiscal policy reaction function contains lagged monetary policy variable as well as lagged fiscal policy variable. It shows that current fiscal policy stance would be driven by expectations based on past information about monetary and fiscal policy outcomes. The lagged fiscal policy variable also indicates the persistence of disequilibrium that could result from deviation from alliance with monetary policy. The absence of lagged fiscal policy variable in the monetary policy reaction function indicates the dominance of fiscal policy in Nigeria.

Equations (9) and (10) show response of policy measures to variations in macroeconomic variables of output gap (Ygap), inflationary gap (Agap) and external sector disequilibrium (Bgap). Also, reduced form in equation (9) shows how fiscal policy reacts given desire for monetary authority to achieve internal and external stabilization in short run based on coefficient, w_{14} while (10) shows reactions of monetary policy to fiscal stance with desire to stabilize short term internal and external fluctuations based on coefficient w_{24}. The signs and magnitudes of reduced form coefficients in (9) and (10) provides foundation for evaluating stabilization function and coordination between monetary and fiscal policies in Nigeria. If both policy instruments play a substitutionary role, negative relationship between fiscal and monetary policies would result. This indicates that desire by monetary policy to go expansionary is convoyed by contractionary fiscal policy.

The argument we put forward in this study is that we should move beyond sign to evaluate policy coordination in long-run following works of Bonam & Lukkezen (2013) and Sehovic (2013). There is need to consider extent of adjustment made by policy authority which intends to harmonize actions of other authority. Hence, equation (11).

$Y_t = a_0 + bCOV[J, K] + a_1C_t + a_2I_t + a_3O_t + \varepsilon_t$ (11)

Where: Y_t is annual growth rate of real income, *COV* is covariance between fiscal and monetary policies, *b* is coordination coefficient, *J* is fiscal policy measure, K is monetary policy measure, *C* is consumption, *I* is the investment rate and *O* is trade openness. The error term ε is assumed *IID*.

3. Methodology of research

The present research adopts reaction function approach to policy coordination. This approach is drawn from theoretical foundation of Lambertini and Rovelli (2004) with slight modifications to suit Nigeria's context. It is presented in dynamic simultaneous model which described mutual pursuit of stabilization and growth within a coordinated framework between

Federal Government and CBN. Based on this approach, estimation was carried out with GMM. The consistency of GMM estimator depends on validity of instruments used as well as assumption that error term does not exhibit serial correlation and valid instruments are relevant and strictly exogenous. This implies that IV must satisfy two requirements: it must be correlated with included endogenous variable(s), and orthogonal to error process (Baum *et al.*, 2003).

Since system of equations is specified, instruments are chosen from lagged endogenous and explanatory variables as well as first differences of endogenous variables (Arrelano and Bond, 1991). For equation (9), set of instruments used are L = [Y_{t-1} P_{t-1} BoP_{t-1} K_{t-2} J_{t-2} ΔJ_t] where Δ is difference operator. For equation (10), set of instruments are L_2 = [Y_{t-1} P_{t-1} BoP_{t-1} K_{t-2} J_{t-1} ΔM_t]. In order to test validity of selected instruments two conditions mentioned above must be met. To test for first condition, we examine fit of first stage regressions which entails estimating equation (12) for fiscal policy equation and equation (13) for monetary policy equation.

$$Jt = f(Y_{t-1}\ A_{t-1}\ B_{t-1}\ K_{t-2}\ J_{t-2}\ \Delta J_t) \quad (12)$$

$$Kt = f(Y_{t-1}\ A_{t-1}\ B_{t-1}\ K_{t-2}\ J_{t-1}\ \Delta K_t) \quad (13)$$

The fit of first stage regressions is estimated as F-test of joint significance of instruments. This shows explanatory power of instruments. The decision rule is that F-statistic must be greater than ten before instruments can be adjudged as valid. The second test of instrument validity is to ascertain instruments' independence from an unobservable error process. Our over-identifying restrictions test was performed via J-statistic due to Hansen (1982).

3.1. Model Identification

In order to demonstrate identification status of models based on the instrumental variable GMM technique, we follow the procedure by Baum et al (2003). Each equation in system of simultaneous equations to be estimated is can be presented in matrix notation as

$$y = Md + u;\ E(vv') = \Omega \quad (14)$$

In equation (14), matrix of regressors M is $n \times S$, where n is number of observations. Some of regressors are endogenous, so that $E(X_i v_i) \neq 0$. If set of regressors is be partitioned into [$M_1 M_2$], S_1 regressors M_1 can be assumed under null to be endogenous and (S – S_1) remaining regressors M_2 assumed exogenous. The vector of IV, Z is exogenous, i.e., $E(Z_i u_i) = 0$.

Again, instruments were partitioned into [Z_1 Z_2], where L_1 instruments Z_1 are excluded instruments and remaining ($L - L_1$) instruments $Z_2 \equiv M_2$ are included instruments/exogenous regressors. In IV regression, whether coefficients are identified depends on relation between number of instruments (L) and number of endogenous regressors (S). In particular, order condition for identification of equation is L ≥ S; there must be at least as many excluded instruments as there are endogenous regressors (Baum *et al*., 2003). For equation (9), L = 6 and S = 1; L > S and the equation is over-identified with level of over-identification at 5 (i.e., L-S = 6-1 = 5). For equation (2) endogenous variables, L = 2 and number of excluded instruments, S = 6; L > S implying that equation is also over-identified. The inference of this is that a Hansen J test must be carried out on the model to determine degree of over-identifying restrictions and ascertain validity of the instruments.

3.2. Data Sources

Annual data from 1980 to 2017 were utilized for analysis and bulk of the data was sourced from CBN Statistical Bulletin and CBN Annual/Quarterly reports. Table 1 provides explanation of variables and measurements.

Table 1. Variables in the Model

Variable	Measurement
Fiscal Policy (J)	Public spending
	Fiscal deficit ratio
	Regularly adjusted balance
Monetary policy (K)	Growth in money stock (m_2)
Output gap (Yqa)	Series based on HP filter of real GDP growth rate
Inflation gap (Aqa)	Series based on HP filter of inflation rate trend
BoP disequilibrium (Bqa)	Series based on HP filter of current account balance in BoP
Consumption (C)	Measured in millions of naira
Investment (I)	Proxied by gross fixed capital formation
Trade openness (O)	Ratio of sum of import and export to GDP

Source: Author's compilation

4. Analysis of Results

4.1. Descriptive Statistics

In Table 2, mean of Bgap is 9.3E-15 with standard deviation (SD) of 4.17. The value of skewness for Bqa is -0.14. This means that Bqa is skewed to the left. Its kurtosis value of 2.87 which is less than 3 indicating that distribution of Bqa is normally distributed. Jacque Bera (JB) of 3.65 with probability greater than critical value of 5% indicates that Bqa is normally distributed. For C, mean is N304.51 billion. Its Kurtosis (2.6524) showed that C is normally distributed. JB result of 4.3933 with probability value of 0.1112 which is higher than the critical value of 5% further showed that C is normally distributed.

Yqa has a mean of -1.72E-10 and SD of 916.67. It skewness coefficient (-0.3949) shows that Yqa is slightly skewed to the left and centered about its mean value. The JB of 0.82 with probability of 0.67 suggests normality in distribution. The kurtosis of 2.8011 showed that distribution of fiscal policy variable (J) s relatively flat indicating normal distribution. The JB of 0.1325 and its probability of 0.94 indicate normal distribution. Aqa is slightly skewed to the right and centered about its mean value. Its Kurtosis (3.4913) indicates that the distribution is normally distributed. The JB value of 0.9104 with probability of 0.63 also suggests it normality. I has mean and SD of N59.43 billion and 39.67 respectively. The JB of 2.0157 and its probability of 0.37 which is higher than critical 5% level is also an indication of normal distribution.

Furthermore, monetary policy variable (Ks) has mean and SD values of N3, 226.16 billion and 5122.83 respectively. It skewness coefficient of 1.5777 indicates that money supply distribution is positively skewed. Its kurtosis value of 4.1151 showed that the distribution is relatively peaked. The JB statistic of 15.866 is an indication that money supply is not normally distributed. O is slightly skewed to the left. The JB of 7.5678 and probability of 0.02 showed the variable is not normally distributed.

Table 2. Descriptive Statistics

Variables	Mean	StD. Dev.	Skewness	Kurtosis	JB	Probability
Bqa	9.30E-15	4.173516	-0.13915	2.873245	3.649163	0.161285
C	304.5076	137.9631	0.670995	2.119692	5.792827	0.055221
Yqa	-1.72E-10	916.6607	-0.39485	3.137860	0.815760	0.665059
J	2323.130	3078.883	1.151343	2.801059	0.132489	0.935902
Aqa	-1.90E-13	15.21743	0.543474	3.491298	0.910414	0.634317
I	59.42706	39.66918	0.811646	2.317283	2.015677	0.365007
K	3226.163	5122.826	1.577666	4.115069	15.86595	0.000359
OPN	31.19882	12.96116	-0.22749	2.392689	7.567752	0.022734

Source: Author's Computation (2016) using Eviews 8.0

4.2. Correlation Analysis

To further examine contextual behavioural patterns in our series, correlation analysis is conducted. The correlation matrix for all variables is reported in Table 3.

Table 3. Correlation Matrix

Variables	J	Yqa	Aqa	Bqa	K
J	4.817896				
	1.000000				

Yqa	-38.23067	815553.1			
	-0.019287	1.000000			
	0.9138	-----			
Aqa	0.150098	705.1422	224.7593		
	0.004561	0.052082	1.000000		
	0.9796	0.7699	-----		
Bqa	-0.089070	199.4495	-5.123031	16.90594	
	-0.009869	0.053714	-0.083109	1.000000	
	0.9558	0.7629	0.6403	-----	
K	5.140935	-13.55484	0.838801	-0.169431	5.554163
	0.993812	-0.006369	0.023741	-0.017485	1.000000
	0.0000	0.9715	0.8940	0.9218	-----

Source: Author's Computation (2016) using Eviews 8.0

In the Table 3, all correlation statistics among J, Yqa and Bqa are negative indicating that Yqa and Bqa move in same direction as government expenditure. While Aqa and K have negative correlation with government spending indicating that these variables move in opposite direction with government spending. Yqa and Bqa are negatively correlated with government expenditure in Nigeria. Nonetheless, Aqa and K are positively correlated with government expenditure.

Correspondingly, K, Yqa and Bqa are negative indicating that Yqa and Bqa move in opposite direction as money supply. Also, Yqa and Bqa are negatively correlated with money supply while Aqa and J are positively correlated with money supply. A closer look shows that correlation coefficient of log of money supply with log of government expenditure is 0.99. This may be pointing to policy coordination between these policy variables.

4.3. Unit Roots Test

The ADF test results are given in Table 4. In sum, test results show that all variables are 1[1].

Table 4. Augmented Dickey-Fuller Unit Root Results

Variable	ADF Statistic(s)		Order of Integration
	Level	First Difference	
Bqa	-4.848221*	-6.322047*	I (1)
C	-3.078079	-8.557034*	I (1)
Yqa	-3.212889	-4.318460*	I (1)
J	1.340620	-4.075008*	I (1)
Aqa	-2.958235	-6.158791*	I (1)
I	-2.234286	-5.409891*	I (1)
K	-2.793327	-9.734189	I(1)
O	-4.443001*	-4.782346	I(1)
Note *&** indicate significance at 1% and 5% levels separately. The critical values at 1% & 5% are -4.2733 and -3.5578 correspondingly.			

Source: Author's computation (2018) using Eviews 8.0

4.4. Pair wise Granger Causality Tests

Table 5 reports causality test results between variables using Pairwise Granger causality tests with lag length of 2. The results show uni-directional causality existed between K and J; K and Aqa, while no causality existed between Yqa and J, Aqa and J, Bqa and J, K and Yqa, K and Bqa. This indeed denotes that Ks Granger causes J, but J does Granger cause K, while K does not Granger causes Aqa, but Aqa does Granger cause K. This prompted results with lag 3 shown in Table 5.

Table 5. Pairwise Granger Causality Test Results, lag 2

Null Hypotheses	F-Statistic	Probability	Remark	Direction of Causality
Yqa $\longleftrightarrow$ J J $\longleftrightarrow$ Yqa	0.66604 0.09294	0.5220 0.9115	Accept Accept	No causality
Aqa $\longleftrightarrow$ J J $\longleftrightarrow$ Aqa	0.31938 0.61804	0.7293 0.5394	Accept Accept	No causality
Bqa $\longleftrightarrow$ J J $\longleftrightarrow$ Bqa	0.36783 0.05394	0.6957 0.9476	Accept Accept	No causality
K $\longleftrightarrow$ J J $\rightarrow\leftarrow$ K	1.30374 3.64800	0.2881 0.0396	Accept Reject	Uni-causal relationship
Ks $\longleftrightarrow$ Yqa Yqa $\longleftrightarrow$ Ks	0.93728 0.23073	0.4041 0.7955	Accept Accept	No causality
K $\longleftrightarrow$ Aqa Aqa $\rightarrow\leftarrow$ K	0.62535 3.77290	0.5426 0.0532	Accept Reject	Uni-causal relationship
K $\longleftrightarrow$ Bqa Bqa $\longleftrightarrow$ K	0.40872 1.02131	0.6685 0.3736	Accept Accept	No causality
$\rightarrow\leftarrow$ denotes Granger causality, $\longleftrightarrow$ denotes absence of Granger causality				

Source: *Authors' computation (2018) using Eview 8.0*

From Table 6, it is also observed that uni-directional causality existed between Ms and Gexp; Ms, Agap, while no causality existed between Ygap and Gexp, Agap and Gexp, Bgap and Gexp, Ms and Ygap, Ms and Bgap.

Table 6. Pairwise Granger Causality Tests. Lags: 3

Null Hypotheses	F-Statistic	Probability	Remark	Direction of Causality
Yqa ⟷ J J ⟷ Yqa	0.51053 1.40312	0.6788 0.2662	Accept Accept	No causality
Aqa ⟷ J J ⟷ Aqa	0.33639 0.08638	0.7991 0.9668	Accept Accept	No causality
Bqa ⟷ J J →← Bqa	0.64322 3.30404	0.5947 0.0374	Accept Reject	Uni-causal relationship
Ks ⟷ J J ⟷ K	0.84880 0.23369	0.4809 0.8720	Accept Accept	No causality
K ⟷ Yqa Yqa →← K	0.83708 2.61479	0.4868 0.0744	Accept Reject	Uni-causal relationship
K ⟷ Aqa Aqa ⟷ K	0.31932 1.07872	0.8113 0.3769	Accept Accept	No causality
K ⟷ Bqa Bqa ⟷ K	0.31932 1.07872	0.8113 0.3769	Accept Accept	No causality
→← denotes Granger causality, ⟷ denotes absence of Granger causality				

Source: Authors' computation (2018) Using Eview 8.0

4.5. Test of Instruments

The instrumental variables include J(-2), J(-3), Ks(-2), Ks(-3), Yqa(-1), Aqa(-1) and Bqa(-1). The results of the test are reported in Tables 7 and 8. Table 7 presents results of IV test used for fiscal policy variable (government disbursement). Relatively, Table 8 reports results of IV test for monetary policy variable (money supply).

Test of validity of instruments for log of government spending and log of money supply is based on F-statistic which describes joint significance of instruments as it denotes explanatory power of instruments. The F-statistics for instruments test of both policy variables are 1434.5 and 1331.3 separately. These statistics exceed 10 and highly significant at 1 percent level. So, our IV is valid for GMM estimates.

Table 7. IV Test for Fiscal Policy Variable

Dependent Variable: J		
Regressor	**Coefficient**	**Probability**
C	0.194008 (0.749496)	0.4612
J(-2)	0.396925 (2.686589)	0.0132 (sig)
K(-2)	0.225578 (0.829719)	0.4152
Yqa(-1)	23.58572 (6.780280)	0.0000 (sig)
Aqa(-1)	0.011792 (1.716649)	0.0995
Bqa(-1)	-0.109065 (-2.957907)	0.0071 (sig.)
J(-3)	0.370610 (2.345182)	0.0280 (sig)
K(-3)	-0.177861 (-0.177861)	0.4597
R-Squared = 0.9977; R-Bar-Squared = 0.9970 F-Statistic (p-value) 1434.496 (0.0000)		DW-Statistic 1.8938

Source: Authors' computation using Eview 8.0

Table 8. IV Test for Monetary Policy Variable

Dependent Variable: K		
Regressor	**Coefficient**	**Probability**
C	-0.426170 (-1.483933)	0.1514
J(-2)	0.355598 (2.169377)	0.0406 (sig.)
K(-2)	0.635105 (2.105535)	0.0464 (sig.)
Yqa(-1)	0.746749 (0.193489)	0.8483
Aqa-1)	0.020893 (2.741380)	0.0116 (sig.)
Bqa(-1)	0.070560 (1.724815)	0.0980
J(-3)	0.123418 (0.703915)	0.4886
K(-3)	-0.051740 (-0.197179)	0.8454
R-Squared = 0.9975; R-Bar-Squared = 0.9968 F-Statistic (p-value) 1331.286 (0.0000)		DW-Statistic 1.9457

Source: Authors' computation using Eview 8.0

4.6. GMM Estimates of Economic Growth

The results of GMM estimates of economic growth model with coordinated policy variables are reported in Table 9. R^2 and $\bar{R}_2$ are 0.88 and 0.86 separately. Hence, unexplained variations in GDP growth are about 14 percent based on adjusted R-squared. The coefficient of policy coordination variable (COV [J, K]) is 0.083 with a t-value of 3.70. The coefficient passed significance test at one percent level. This reveals that policy coordination has positive significant impact on economic growth in Nigeria. Similarly, coefficient of C is 0.597 with t-statistic of 7.79 and p-value of 0.001. This implies that consumption has a positive significant impact on economic growth in Nigeria. Unexpectedly, coefficient of I was found to be negatively insignificant. Its coefficient is -0.094 and it has a t-value of -1.12 with a p-value of 0.27. The coefficient of O is 0.731 and a t-value of 4.23. Its p-value is less than 0.001. Impact of openness on Nigeria's growth is different from zero.

Table 9. GMM Estimates of Economic Growth Model with Coordinated Policy Variables

Regressor	**Coefficient**	**Probability**
C	4.336147 (18.86710)	0.0000 (sig.)
COV(J, K)	0.082709 (3.700820)	0.0010 (sig.)
C	0.597042 (7.785989)	0.0000 (sig.)
I	-0.094004 (-1.118562)	0.2732
O	0.731278 (4.523623)	0.0001 (sig.)
R-Squared = 0.8805 R-Bar-Squared = 0.8628 J-Statistic 0.001(0.975) DW-Statistic 2.1961		

Source: Authors' computation using Eview 8.0

4.7. Policy Implications of Results

The implications of results of policy coordination variable COV(J, K) is that with policy coordination between monetary and fiscal authorities, output growth would be positively remarkable. This further validates optimal policy mix for output stabilization. Also, fiscal policy and monetary policy variables both respond significantly to output behaviour with a view to

stabilizing the economy. Fiscal policy seemed to be countercyclical which conforms to Keynesian stabilization tenet. This is also in line with the works of Fatas and Mihov (2001) and Debrun and Kapoor (2010). This calls for the fiscal front so as to effectively guarantee desirably fiscal policy outcomes on the economy. However, monetary policy is procyclical in its effects on output growth.

5. Conclusions

This study estimated effects of policy coordination between fiscal and monetary policies on economic growth in Nigeria. The empirical findings revealed that policy coordination in Nigeria is relatively effectual in improving economic performance. Empirical estimates show that fiscal policy is countercyclical while monetary policy is procyclical in its effects on output growth. This result could be implying fiscal dominance in determination of price level. In effect, it could be said that size of Nigerian financial system is small and so corroborating Oyejide's results (Oyejide, 2003) that relative to gargantuan volume of Nigeria's fiscal deficits, CBN has no choice but to monetize the deficits. This also lend support to Mas's argument (Mas, 1994) that in countries with shallow financial systems, monetary policy is simply reverse side of coin of fiscal policy and can only play an accommodative role, an indication that CBN lack seemly instruments of monetary control thereby inducing fiscal dominance. This calls for fiscal preference in core of policy coordination to effectively guarantee anticipated fiscal policy outcomes on the economy. The government should facilitate institutional environment that fosters relationship between Federal Treasury and CBN with aim of strengthening coordination of policies between fiscal and monetary authorities. The fiscal authority should be more committed in accomplishing output stabilization goal. Besides, we recommend that all institutions of Nigerian government likewise coordinate their policies in fashion that resolve imbalance in resource distribution.

References

Andib, Z., Khan, A. & Ul Haq, I. (2012). *The Coordination of Fiscal and Monetary Policies in Pakistan*. (An Empirical Analysis 1975-2011), Internet.

Arellano, M., & Bover. O. (1995), "Another look at the instrumental variable estimation of error-components models," *Journal of Econometrics,* 68(9), 29–51.

Batini, N. (2004), Achieving and Maintaining Price Stability in Nigeria. IMF Working Paper 01 197, Washington DC, IMF

Baum, C. Schaffer, M. & Stillman, S. (2003), "Instrumental Variables and GMM: Estimation and Testing," *Stata Journal*, 3(1), 1-31

Bonam, D. & Lukkezen, J. (2013), Fiscal and Monetary Policy Coordination, Macroeconomic Stability, and Sovereign Risk.

Chuku, A.C (2009), "Measuring the Effects of Monetary Policy Innovations in Nigeria. A Structural Vector Autoregressive Approach," *Africa Journal Acc Econo Finance Bank Res*, 15 (5), 278-299.

Chukuigwe, E.C. & Abili, I.D. (2008), "An Econometric Analysis of the Impact of Monetary and Fiscal Policies on Non-Oil Exports In Nigeria," *African Economic and Business Review*, 6(2).

Collignon, S. (2012), "Fiscal Policy Rules and the Sustainability of Public Debt in Europe," *International Economic Review*, 53(2), 539-567.

Debrun, X. & Kapoor, R. (2010), *Fiscal Policy and Macroeconomic Stability: Automatic Stabilizers Work*, always and everywhere WP/10/111, Washington: International Monetary Fund.

Debrun, X., L. Moulin, A. Turrini, Ayuso-i-Casals, J. & Kumar, M. S. (2008), "Tied to the Mast? National Fiscal Rules in the European Union," *Economic Policy*, 3(4), 299-362.

Fat´as, A. and Mihov, I. (2001), "*The Effects of Fiscal Policy on Consumption and Employment: Theory and Evidence*", CEPR Discussion Paper no. 2760. Fiscal Responsibility Act, 2007

Galì, J. (1994), "Government Size and Macroeconomic Stability," *European Economic Review* 38(7), 117–132.

Hanif, M.N. & Arby, M. F. (2003), ''Monetary and Fiscal Policy Coordination,'' MPRA Paper, No. 10307.

Hansen, L. (1982), "Large Sample Properties of Generalized Method of Moments Estimators," *Econometrical*, 50.1029-1054.

Hasan, A & Isogut, A. (2009). "*Effective Coordination of Monetary and Fiscal Policies: Conceptual Issues and Experiences of selected Asia-Pacific Countries*". A Paper Presented at United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)'s Regional High Workshop on Strengthening Response in

Global Financial crisis in Asia-Pacific: The Role of monetary, Fiscal and External Debt policies," 30 July 2009, Dhaka, Bangladesh.

Iyoha, M. (2004), *Macroeconomic theory and practice*. Benin City: Mindex press.

Kishan R.P. & Opiela, T.P. (2000), "Bank Size, Bank capital, and the Bank lending channel". *Journal of money, credit and Banking*. Blackwell publishing. 32(1):121-141.

Kumhof, M. & Laxton, D. (2009), "Chile's Structural Surplus Rule: A Model-Based Evaluation," *IMF Working Paper* No 09/88, (Washington, D.C: IMF).

Lambertini, L. & Rovelli, R. (2004), "Independent or Coordinated? Monetary and Fiscal Policy in EMU", in Beetsma, R., et al. (eds), *Monetary Policy, Fiscal Policies and Labour Markets: Macroeconomic Policymaking in the EMU*, Cambridge, UK, Cambridge University Press, Ch.6.

Lambertini, L. & Rovelli, R. (2004), Monetary and Fiscal Policy Coordination and Macroeconomic Stabilization. A theoretical analysis. Paper presented at the ASSA annual meeting Washington D.C.

Lee, Y.S. & Sung, Y.K. (2005), "What Determines Saving Rates In Korea?" Theory of Demography," *Journal of Asian Economic*s, 16(5), 861-873.

Montiel, P. & Agenor, P.R. (1999), "Development Macroeconomics" 2nd Edition. Princeton University Press. Long Island City, NY, U.S.A.

Nasir, Z. M. & Igbal, N. (2010), "Employment Size Wage Differential: Does Investment in Human Capital Matter?" MPRA paper. 27164, University Library of Munich, Germany.

Nordhaus, W.D. (1994a), "Matching to Different Drummers: Coordination and Independence in Monetary and Fiscal Policies," Cowles Foundation Discussion Paper No. 1067, January, Yale University.

Raj, J., Khundrakpam, J. K & Das, D. (2011). Empirical Analysis of Monetary and Fiscal Policy Interaction in India, working paper series, WPS (DEPR).

Saibu, M.O. & Nwosa, L.P. (2011), "Effect of Monetary Policy on Sectoral Output Growth in Nigeria (1986-2008)," *Journal of Economics and Behavioral Studies*, 2(6), 245-254

Šehović, C. (2013), "General aspects of monetary and fiscal policy coordination," *Journal of Central Banking Theory and Practice,* 3(7), 5-27.