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A BOUND TEST ANALYSIS OF THE EFFECTS OF GLOBAL ECONOMIC SHOCKS ON NIGERIAN ECONOMY:

The Role of Fiscal and Monetary Policies (1960-2011)

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ABSTRACT

This study examines the effectiveness of both fiscal and monetary policies in mitigating external shocks on Nigerian economy. In addition, it determines which of the macroeconomic policy was more effective in mitigating the possible adverse effects of external shocks; The study uses annual data from 1960 to 2011 and data are sourced from Statistical Bulletin of CBN. Also, Mundel-Flemming theoretical framework is adopted to model the interaction between domestic and international macroeconomic policy variables. The time series properties of the variables are examined before the Autoregressive Distributed Lag (ARDL) analytical technique is adopted to estimate the model. Beta coefficient is also generated to determine the effectiveness of each of the policies. The result showed that external shocks had hindered the effectiveness of domestic policy overtime. The result also shows that monetary policy is more effective than the fiscal policy but a coordination of both fiscal and monetary would give a better result.

Key words: *Macroeconomic Policy, Global Economic Policy Shock , Economic Growth*
JEL Classifications: *F41, E32, E63*

1.0 INTRODUCTION

The global economic meltdown, which persisted until 2009, had significant adverse effects on the real economic activities of many developing countries. For instance the Nigerian real GDP growth rate decline from 7.6 per cent in 2006 to 6.0 per cent at the onset of the crises in 2008. The effect of the global crisis was pervasive and its adverse effect remained noticeable in the areas of agriculture, industry and the wholesale sub-sectors in Nigeria (CBN, 2009). Similar trends were also observed in other countries of the world. To ensure that their economies are insulated or protected from the possible negative effects of such snowballing, many countries especially developing countries had resulted to the use of domestic macroeconomic policy to re-engineer their economy and provide some policy palliative that can assist in stabilizing their economies. Nigeria in particular had, in response to the global economic crisis, introduced both monetary and fiscal stimuli as proactive measures to prevent the economy from nose-diving into further economic depression. The policy measures adopted by government were mainly on three broad fronts namely: monetary policy, fiscal policy and trade policy. On the monetary front, the monetary policy rate was adjusted downward from 9.75 per cent in 2008 to 6.0 per cent in 2009, CRR from 2.0 to 1.0 per cent, and liquidity ratio was retained at 30.0 per cent, resulting in lowering the inter-bank rate and increasing the banking system credit to the private sector. The CBN injected about ₦620 billion bail-out funds into some insolvent banks to shore them up and prevent contagion and a systemic crisis that might have arising from their failure. In addition, monetary policies included the introduction of consolidated and risk-based supervision and the adoption of a common accounting year-end for all banks, effective from end-December 2009, to improve data integrity and comparability. The bank also proposed the establishment of an Asset Management Company of Nigeria (AMCON) to take over the non-performing assets of banks (CBN, 2009).

The easing of fiscal policy by government was also to cushion the effects of the global crisis on the domestic economy. In this regard, the Federal Government, in collaboration with the CBN, floated a ₦200.0 billion bond for the deposit money banks, under the Commercial Agricultural Credit Scheme, to improve mechanized/commercial agriculture. Also, government strengthening compliance with ECOWAS Common External Tariff (CET) to mitigate cross-border smuggling and enhance sub-regional trade, through continued

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implementation of the tariff bands under the "2008-2012 Nigeria Customs and Tariff Book" with the "fifth band" of 35.0 per cent providing modest protection to key local industries. The fiscal thrust adopted a more efficient use of public resources by rationalizing areas of waste and focusing on the critical sectors that would propel economic growth. Government increased investment in critical physical infrastructure, human capital development and the implementation of sectoral reforms. Lastly, government outlook targeted at protecting the integrity of the financial system by introducing measures that would strengthen the financial markets and restore investors' confidence; and ensuring lasting peace, security and development not only in the Niger Delta but across the country.

The issues this paper raises are were the previous macroeconomic policy measures either fiscal or monetary policy and or both effective in mitigating previous external shocks in Nigerian economy? and which of the macroeconomic policy was more effective in mitigating the possible adverse effects of external shocks.

Although, there is extensive theoretical as well as empirical literature studying the effects of external shocks on real economic variables yet little attention has been paid to this important issue especially for a small open economy like Nigeria. More so, the dust raised by 2007 to 2009 global economic meltdown is yet to settle and there is need to understand the workings and effectiveness of stabilization policy in order to nip future occurrence in the bud. For instance, Olomola and Adejumo (2006) and Saibu (2011) examined effect of oil price and energy demand shock on the economy neglecting the effect of other external shocks like exchange rate, commodity prices, FDI etc. Also, Edwards (2006) focused on the effect of monetary policy and fiscal policy separately in alleviating the negative effect of external shocks, neglecting which of these policies is more effective in stabilizing the economy after the negative effect of shocks and there was no mentioned of how these shocks were propagated.

Apart from the above reasons, this paper is distinct from previous attempt at examining the role of monetary and fiscal policy in mitigating external shocks in several other ways. First, it took a more comprehensive measure of external shocks from different perspective. Unlike earlier studies also, which examined only one measure of external shocks The neglect of other measures of shocks without any empirical justification raise doubt about the policy inferences from their studies as there could be more than one sources as suggested by theories and evidence from studies on other economics (Lane, 2010). Second, the study considered annual data instead of quarterly data, as is common in much of the literature. The main advantage of using annual data is that the economic interpretation of external shocks identified with quarterly data may be more problematic, as (substantial) economic reversions do not usually take place at that high frequency. Moreover, potential anticipation effects of fiscal and monetary policy play a smaller role as forcefully argued by Ramey (2006). Other advantages are that one does not need to be concerned with potential seasonal effects in the data and there is less need to be concerned with the details of the institutional setting (Beetsmal et al, 2007).

Apart from this introductory section therefore, the rest of the study is organized into four sections. section 2 provides a synopsis of theoretical and empirical issues, section 3 presents the research methodology, while section 4 presents the empirical results and discussion while section 5 concludes with policy implications.

2.0 THEORETICAL AND EMPIRICAL ISSUES

Recent literatures have raised issues with desirability of extant macroeconomic policy in addressing the recent crisis. Relying on Lucas and Sargent (1979), Liu (2010) had argued that it is not only impossible to increase the average level of output, it is also impossible to stabilize it. Therefore, domestic policies cannot be used to stabilize the economy after the negative effect of external shocks It was further argued that foreign disturbances (external shocks) may be completely outside the control of domestic stabilization policy instruments, thereby making its stabilization power ineffective. As Lucas (2003), observed earlier, even if stabilization policies are effective, they would yield negligible welfare gains and hence it should not be a macroeconomic priority.

Nasir et al (2010) argued that there is a very weak responses of policies to externally induced shocks in major macroeconomic variables. Also, Primiceri (2005), Sims and Zha (2006), and Gambetti *et. al*. (2008) were however more sympathetic to the idea that it is the absence of unfavorable non-policy shocks that contributed to the great moderation that was experienced in the US economy in the 1990s when the Asian market collapsed. In sharp contrast, Cogley and Sargent (2002), and Clarida et al. (1999) had argued that changes in the U.S. macroeconomic dynamics were linked to changes in macroeconomic stabilization policies. The controversy has also been extended to fiscal versus monetary policy. For instance, Wren-Lewis and Leith (2000) argued that macroeconomic policies are effective in mitigating external shocks but argued that much emphasis should be placed on fiscal policy. Ajisafe and Folorunso (2002) had rejected such prescription as their study found monetary policy to be more effective than fiscal policy. Saibu (2008) was of the opinion that it depends on

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which fiscal policy was combined with which monetary policy in designing the policy mix to address economic distortions whether induced by trade openness or oil price shock. Catelli et al (2003) had observed that the strategic complementarity or substitutability of fiscal and monetary policy depends crucially on the types of shocks hitting the economy, and on the assumptions made about the underlying structural model.

The Mundell–Fleming model is an economic model first set forth (independently) by Robert Mundell and Marcus Fleming in the early 1960s. The model is an extension of the IS-LM model. Whereas the traditional IS-LM Model deals with economy under autarky (or a closed economy), the Mundell–Fleming model describes an open economy. The Mundell-Fleming model portrays the short-run relationship between an economy's nominal exchange rate, interest rate, and output (in contrast to the closed-economy IS-LM model, which focuses only on the relationship between the interest rate and output). The Mundell–Fleming model has been used to argue that an economy cannot simultaneously maintain a fixed exchange rate, free capital movement, and an independent monetary policy. This principle is called the Mundell–Fleming "trilemma"
(Weeks,2008; Mankiw, 2007).

The model shows that the effect of almost any economic policy on a small open economy depends on whether the exchange rate is floating or fixed. To be more specific, the Mundell-Fleming model shows that the power of monetary and fiscal policy to influence aggregate income depends on the exchange-rate regime. Under floating exchange rates, only monetary policy can affect income. The usual expansionary impact of fiscal policy is offset by a rise in the value of currency. Under fixed exchange rates, only fiscal policy can affect income. The normal potency of monetary policy is lost because the money supply is dedicated to maintaining the exchange rate at the announced level (Mankiw, 2003).

Empirical Framework

The theory above shows that for a small open economy, the output can be calculated as follows:

$Y = C + S$ …….(1)

The above equation states that income equals the addition of consumption and savings.

$S = I$……(2)

Where S equals savings and I equals investment. This shows that savings equals investment. Therefore, equation two above becomes:

$Y = C + I$ ……..(3)

By adding government expenditure to the above equation, then it becomes:

$Y = C + I + G$ ……..(4)

The above equation depicts a closed economy. By adding net export to the equation to make it an open economy, then it becomes:

$Y = C + I + G + NX$ ……(5)

Where Y is the Gross Domestic Product, which is the addition of household consumption(C), investment(I), government expenditure(G) and net export(NX).

$C = \alpha_1 + \alpha_2 Y_d$ ……..(6)

α_1 is the autonomous consumption i.e. the level of consumption that is independent of income and α_2 is the marginal propensity to consume. This gives the portion of income that is spent on consumption and Yd is the disposable income.

$Y_d = Y\text{-}T$ ……..(7)

disposable income is the difference between income and tax.

$I = \delta_1 - \delta_2 r$ ……..(8)

Where δ1 and δ2 are greater than zero. The parameter δ1 is the slope while δ2 determines how much investment responds to interest rate; because investment rises when interest rate falls, there is minus sign in front of δ2.

$\frac{M}{P} = L(r, Y)$ ……(9)

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where the supply of money is represented as the real amount M/P (as opposed to the nominal amount M), with P representing the price level, and L being the real demand for money, which is some function of the interest rate i and the level Y of real income.
From equation (5) above, Y = C + I + G + NX

By substituting equations (6), (7) and (8) into equation (5), equation (5) becomes:

$$Y = \alpha_1 + \alpha_2 Y_{d\ +} \delta_1 - \delta_2 r + G + NX \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(10)$$

$$Y = \alpha_1 + \alpha_2(Y-T) + \delta_1 - \delta_2 r + G + NX \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots...(11)$$

By expanding equation (vii) above, we have :

$$Y = \frac{\alpha 1+\delta 1}{1-\alpha 2} - \frac{\alpha 2}{1-\alpha 2}T - \frac{\delta 2}{1-\alpha 2}r + \frac{1}{1-\alpha 2}G + \frac{1}{1-\alpha 2}NX \ldots\ldots\ldots\ldots\ldots\ldots\ldots..(12)$$

From equation (9) above, money supply equals money demand, i.e:

$$\frac{M}{P} = L(r, Y)$$

Therefore,

$$L(r, Y) = \lambda_1 Y - \lambda_2 r \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(13)$$

Where λ_1 and $\lambda_2 > 0$. The value of λ_1 determines how much the demand for money rises when income rises. The value of λ_2 determines how much the demand for money falls when the interest rate rises. There is a minus sign in front of the interest rate term because money demand is inversely related to the interest rate. The equilibrium in the money market is now described by:

$$\frac{M}{P} = \lambda_1 Y - \lambda_2 r \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(14)$$

From equation (10) above, make r the subject of the formular. The equation becomes:

$$r = \frac{\lambda_1}{\lambda_2}Y - \frac{1}{\lambda_2}\frac{M}{P} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(15)$$

To find the level of income that satisfies both the IS and the LM equation, substitute the LM equation for the interest rate r into equation (8). Equation (8) becomes:

$$Y = \frac{\alpha_1+\delta_1}{1-\alpha_2} - \frac{\alpha_2}{1-\alpha_2}T - \frac{\delta 2}{1-\alpha 2}\left(\frac{\lambda 1}{\lambda 2}Y - \frac{1}{\lambda 2}\frac{M}{P}\right) + \frac{1}{1-\alpha 2}G + \frac{1}{1-\alpha 2}NX \ldots\ldots\ldots..(16)$$

With some algebraic manipulation, we can solve for Y. The final equation for Y is:

$$Y = \frac{z(\alpha 1+\delta 1)}{1-\alpha 2} - \frac{z\alpha 2}{1-\alpha 2}T + \frac{\delta 2}{(1-\alpha 2)\lambda 2 + \delta 2\lambda 1}\frac{M}{P} + \frac{z}{1-\alpha 2}G + \frac{z}{1-\alpha 2}NX \ldots\ldots\ldots\ldots\ldots\ldots..(17)$$

Let $\beta_0 = \frac{z(\alpha 1+\delta 1)}{1-\alpha 2}$, $\beta_1 = \frac{z\alpha 2}{1-\alpha 2}$, $\beta_2 = \frac{\delta 2}{(1-\alpha 2)\lambda 2 + \delta 2\lambda 1}$ and $\beta_3 = \frac{z}{1-\alpha 2}$, then, equation (13) becomes:

$$Y = \beta_0 - \beta_1 T_t + \beta_2 MS + \beta_3 G_t + \beta_4 NX_t + u_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(18)$$

Where
Y = gross domestic product
T = government revenue
G = government expenditure
MS = money supply
NX = net export.

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Net export can be been assumed to represent the sources of external influence on the economy. Equation (18) represents the baseline equation to examine the effectiveness of monetary and fiscal policy in the presences of external factors. However, Zhiyong (2003), Law and Demetriades, (2004) among others had argued that discretional macroeconomic policy might be hindered by external economic exposure. According to them, a country cannot simultaneously have fixed exchange rates; free movement of capital, and discretionary monetary and fiscal policy. The implication of this proposition for macroeconomic management in trade dependent economy like Nigeria needs to be incorporated in any model designed for postmortem analysis of the past economic crisis and attempt to mitigate them. Hence the model represented by equation (18) must be adjusted to reflect this macroeconomic management reality

3.0 DATA DESCRIPTION AND ANALYTICAL TECHNIQUE

The paper uses annual data to examine the interactive effects of macroeconomic policy and global economic shock on economic growth for Nigeria for the period 1960 to 2011. The annual time series for all the variables obtained from Statistical bulletin and Annual report and Statement of Account of Central bank of Nigeria. All the variables were expressed in log forms before the analysis. A set of four variables is considered in the model: the real economic variable proxied by the real output measures (Q); Fiscal policy measures (F); monetary policy measures and a measure of external shocks (NX) . The specific way each variable is measured in the context of this paper is discussed in detail below.

Fiscal Policy Variable: There are basically three indicators of fiscal policy: government expenditures, revenue (tax) and fiscal imbalance. The literature does not systematically favour one indicator of fiscal policy over the others. The lack of consensus on the most probable indicators of fiscal policy makes the choice of the fiscal policy variable to be model specific and subject to the author's subjective judgment, (Fu et al, 2003). In order not to be biased against any of the measures, two variables are employed to ascertain the more relevant one in Nigeria. These are the government expenditure outlay and government revenue. Expenditure is defined as total government spending including government consumption, investment and public transfers like subsidies. Rather than using the total government revenue, non-oil revenue was used. The revenue measure of fiscal policy usually reflects only the component of the variable which government can directly control and use as policy instrument. The oil revenue is most often determined outside the fiscal policy mechanism. The non-oil revenue is calculated as total government revenue less oil revenue.

Monetary Policy Variable: There is scant theoretical guidance for the selection of a monetary variable between narrow and broad money, volume and cost of credit and interest rate and exchange rate (Nwaobi 1999). Therefore, just like the fiscal variable, there is no a priori justification to prefer one measure to the other, however, Nnanna(2003) and Oyejide (2002) have confirmed the superiority of M2 (over M1) as good monetary policy indicator in Nigeria. The emphasis in this paper is how effective is monetary policy in stimulating growth in the real productive sector economy, thus, availability and cost of capital become important intermediate target variables especially in open and liberalized economy. Therefore in addition to M2 definition money, monetary policy was proxied by interest rate.

External Variable: Three variables came to our mind when choosing the appropriate variables to represent external shock. Studies have established that external shock were transmitted through exchange rate, oil price and net capital inflow either through trade or equity investment. There is serious debate about the superiority of one over the other in the literature. For instance, Yu (2003) used trade. Akinlo (2004) emphasized the role of FDI in promoting economic growth. The trade openness is computed as the sum of non-oil export and import as ratio of GDP. The choice of non-oil export is because export supply component of Nigeria's economy is dominated by the oil export, which has little to do with the trade regime, adopted over the years. Therefore, the share of import shows the penetration of the Nigeria's economy while the non-export indicates the degree of Nigeria's penetration of the world market. Okoh (2004) defined openness in the same way and pointed out that this index of openness is synonymous with the idea of neutrality in the trade policy.

Output Variable: As regards the aggregate output, the gross domestic product which is available in the CBN statistical bulletin was used.

The study adopts Auto-Regressive Distributed Lag (ARDL) approach for testing the existence of co-integration relationship among the variables as developed by Pesaran et. al. (2001). The approach has certain econometric advantages in comparison to other single cointegration procedures (Engle and Granger, 1987; Johansen, 1988; Johansen and Juselius, 1990). Firstly, endogeneity problems and inability to test hypotheses on the estimated coefficients in the long-run associated with the Engle-Granger (1987) method are avoided. Secondly, the long and short-run parameters of the model in question are estimated simultaneously. Thirdly, the econometric

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methodology is relieved of the burden of establishing the order of integration amongst the variables and of pre-testing for unit roots. The ARDL approach to testing for the existence of a long-run relationship between the variables in levels is applicable irrespective of whether the underlying regressors are purely I(0), purely I(1), or fractionally integrated. Finally, as argued in Narayan (2005), the small sample properties of the bounds testing approach are far superior to that of multivariate cointegration (Halicioglu, 2007). The approach, therefore, modifies the Auto-Regressive Distributed Lag (ARDL) framework while overcoming the inadequacies associated with the presence of a mixture of I(0) and I(1) regressors in a Johansen-type framework. The ARDL representation of equation (11) above is expressed as follows:

$$\Delta y_t = \boldsymbol{\alpha}_{10} + \sum_{i=1}^{p} \alpha_{1i}\,\Delta y_{t-i} + \sum_{1=0}^{p} \alpha_{2i}\,\Delta GOVTEXP_{t-i} + \sum_{1=0}^{p} \alpha_{3i}\,\Delta GOVTREV_{t-i} + \sum_{1=0}^{p} \alpha_{4i}\,\Delta INTEREST_{t-i} + \sum_{1=0}^{p} \alpha_{5i}\,\Delta M2_{t-i} + \sum_{i=0}^{p} \alpha_{6i}\,\Delta EXC_{t-i} + \sum_{i=0}^{p} \alpha_{7i}\,\Delta OILPRICE_{t-i} + \sum_{i=0}^{p} \alpha_{8i}\,\Delta OPENNESS_{t-i} + \boldsymbol{\beta}_{10} y_{t-1} + \boldsymbol{\beta}_{11} GOVTEXP_{t-1} + \boldsymbol{\beta}_{12} GOVTREV_{t-1} + \boldsymbol{\beta}_{13} INTEREST_{t-1} + \boldsymbol{\beta}_{14} M2_{t-1} + \boldsymbol{\beta}_{15} EXC_{t-1} + \boldsymbol{\beta}_{16} OILPRICE_{t-1} + \boldsymbol{\beta}_{17} OPENNESS_{t-1} + e_{2t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(19)$$

where e_{2t} and Δ are the white noise term and the first difference operator, respectively. The ARDL method estimates $(p+1)^k$ number of regressions in order to obtain the optimal lag length for each variable, where p is the maximum number of lags to be used and k is the number of variables in the equation. An appropriate lag selection based on a criterion such as Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC).

The ARDL co-integration method is based on the F or Wald-statistics. The F-test is used for testing the existence of long run relationship among. The null hypothesis is tested by considering the Unrestricted Error Correction Model in equation (21) while excluding the lagged variables Δy_t, $\Delta GOVTEXP_t$, $\Delta GOVTREV_t$,$\Delta M2_t$,$\Delta INTEREST_t$, ΔEXC_t, $\Delta OILPRICE_t$ and $\Delta OPENNESS_t$ based on the Wald or F-statistic. The asymptotic distribution of the F-statistic is non-standard under the null hypothesis of no co-integration relationship between the examined variables, without recourse to whether the underlying explanatory variables are purely I(0) or I(1). The null hypothesis of no co-integration (H_0: $\boldsymbol{\beta}_{10} = \boldsymbol{\beta}_{11} = \boldsymbol{\beta}_{12} = \boldsymbol{\beta}_{13} = \boldsymbol{\beta}_{14} = \boldsymbol{\beta}_{15} = \boldsymbol{\beta}_{16} = \boldsymbol{\beta}_{17}$) is therefore tested against the alternative hypothesis (H_1: $\boldsymbol{\beta}_{10} \neq \boldsymbol{\beta}_{11} \neq \boldsymbol{\beta}_{12} \neq \boldsymbol{\beta}_{13} \neq \boldsymbol{\beta}_{14} \neq \boldsymbol{\beta}_{15} \neq \boldsymbol{\beta}_{16} \neq \boldsymbol{\beta}_{17}$). Thus, Pesaran et. al. (2001) compute two sets of critical values for a given significance level. One set assumes that all variables are I(0) and the other set assumes they are all I(1). If the computed F-statistic exceeds the upper critical bounds value, then the H_0 is rejected. If the F-statistic is below the lower critical bounds value, it implies no co-integration. Lastly, if the F-statistic falls into the bounds then the test becomes inconclusive. Consequently, the order of integration for the underlying explanatory variables must be known before any conclusion can be drawn.

If there is evidence of co-integration among the variables, the following long-run model is estimated:

$$\Delta y_t = \boldsymbol{\alpha}_1 + \sum_{i=1}^{p} \theta_{1i}\,\Delta y_{t-i} + \sum_{1=0}^{p} \delta_{1i}\,\Delta GOVTEXP_{t-i} + \sum_{1=0}^{p} \lambda_{1i}\,\Delta GOVTREV_{t-i} + \sum_{1=0}^{p} \omega_{1i}\,\Delta INTEREST_{t-i} + \sum_{1=0}^{p} \beta_{1i}\,\Delta M2_{t-i} + \sum_{i=0}^{p} \psi_{1i}\,\Delta EXC_{t-i} + \sum_{i=0}^{p} \sigma_{1i}\,\Delta OILPRICE_{t-I} + \sum_{i=0}^{p} \gamma_{1i}\,\Delta OPENNESS_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots(20)$$

The ARDL specification of the short-run dynamics can be derived by constructing an error correction model of the form:

$$\Delta y_t = \boldsymbol{\alpha}_2 + \sum_{i=1}^{p} \beta_{2i}\,\Delta y_{t-i} + \sum_{1=0}^{p} \omega_{2i}\,\Delta GOVTEXP_{t-i} + \sum_{1=0}^{p} \lambda_{2i}\,\Delta GOVTREV_{t-i} + \sum_{1=0}^{p} \delta_{2i}\,\Delta INTEREST_{t-I} + \sum_{1=0}^{p} \theta_{2i}\,\Delta M2_{t-i} + \sum_{i=0}^{p} \psi_{1i}\,\Delta EXC_{t-I} + \sum_{i=0}^{p} \varphi_{2i}\,\Delta OILPRICE_{t-i} + \sum_{i=0}^{p} \gamma_{1i}\,\Delta OPENNESS_{t-i} + \psi ECM_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots(21)$$

Where ECM_t is the error correction term and is defined as:

$$ECM_t = \Delta y_t - \boldsymbol{\alpha}_1 - \sum_{i=1}^{p} \theta_{1i}\,\Delta y_{t-i} - \sum_{1=0}^{p} \delta_{1i}\,\Delta GOVTEXP_{t-i} - \sum_{1=0}^{p} \lambda_{1i}\,\Delta GOVTREV_{t-i} - \sum_{1=0}^{p} \omega_{1i}\,\Delta INTEREST_{t-I} - \sum_{1=0}^{p} \beta_{1i}\,\Delta M2_{t-I} - \sum_{i=0}^{p} \psi_{6i}\,\Delta EXC_{t-I} - \sum_{i=0}^{p} \varphi_{2i}\,\Delta OILPRICE_{t-I} - \sum_{i=0}^{p} \gamma_{1i}\,\Delta OPENNESS_{t-i} - \ldots\ldots\ldots(22)$$

All coefficients of the short-run equation are coefficients relating to the short-run dynamics of the model's convergence to equilibrium and ψ in equation (21) above represents the speed of adjustment.

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4.0 ESTIMATION AND INTERPRETATION OF RESULTS

The first step in the estimation of ARDL is to determine the level of stationarity of all the variables so as to be sure that they are not stationary at second difference so as to avoid spurious result. Inferences in the bounds testing procedure that are computed through F-statistics for bounds testing are based on the assumption that the variables are level or first-differenced stationary. To do this, Augmented Dickey-Fuller(ADF) and Philip Perron(PP) with trend and intercept were adopted and the results are shown in the table below.

Table 1: Unit Root Test

Variables	Augmented Dickey-Fuller			Philip Perron		
	Levels	1st Difference	Remarks	Levels	1st Difference	Remarks
GDP	2.535497	7.597344*	I(1)	12.68242*	-6.048580*	I(1)
GOVTEXP	-0.979317	4.196951**	I(1)	0.994237	-6.477099*	I(1)
GOVTREV	-7.421742	-4.267830*	I(1)	-1.415479	-10.07550*	I(1)
INTEREST	-2.181493	-12.468381*	I(1)	-4.154145*	-12.73596*	I(1)
M2	4.757837	4.113272**	I(1)	1.166332	-4.152511**	I(1)
OILPRICE	-1.598942	-3.576037**	I(1)	-1.627622	-5.124261*	I(1)
EXC	-1.109636	-6.8693161*	I(1)	-1.125373	-6.8693161*	I(1)
OPENNESS	-6.680210	-8.589457*	I(1)	-6.680621	-26.072651*	I(1)

*/ **/ *** represent stationary at 1, 5 and 10 percent level respectively.

The result showed that all the variables are stationary of order one, that is, they are not integrated of order zero but they became stationary after their first differences. The PP unit root test result, as presented in table 1 above, confirmed the stationarity results.

Table 2: ARDL Bounds Test for Co-integration

Model		F-statistics
F(govtexp, govtrev, interest, m2, oilprice, exc, openness)		32.5005
Critical Values	Upper Bound	Lower Bound
	K=7; n = 41	
10%	3.0298	1.8352
5%	3.5092	2.1804

Narayan (2005): Critical values for the bounds test: case III: unrestricted intercept and no trend. The critical values reported in Pesaran et al. (2001) are based on large sample sizes; thus, it cannot be used for small sample sizes. Narayan (2004 a,b) generates and reports new sets of critical values for small sample sizes ranging from 30 observations to 80 observations.

Table 2 above reports the result of the ARDL approach to co-integration. The F-statistic result, when the equation is normalized on the economic growth. The search for co-integrating relations has been restricted to growth variable as the dependent variable based on the fact that the study strictly utilized a growth regression model. The computed *F*-statistic (32.5005) is higher than the upper critical bound at 5% and 10% critical values as indicated in **Table 2**. This provided evidence to reject the null hypothesis of no co-integration at 5% and10% significance level for the growth model. It can therefore be concluded from the ARDL bounds test that there is a long-run relationship among the variables.

Following the establishment of long-run co-integration relationship among the variables, the long-run and short-run dynamic parameters for the variables were obtained. The empirical results of the long-run model is presented in **Table 3**, while the results of the error correction model is presented in **Table 4**

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Table 3: Estimated ARDL Long-Run Coefficients.
Dependent Variable: GDP
ARDL(1,1,1,0,0,1,1,0)[a]

Regressor	Coefficient	t-statistics	P-value
GOVTEXP	21.3414	5.0164	0.000
GOVTREV	-25.2441	-3.5885	0.001
INTEREST	66198.6	2.8406	0.043
M2	-0.56098	-0.7749	0.443
OILPRICE	-3812.4	-0.2014	0.041
EXC	7559.5	0.3285	0.744
OPENNESS	-58385.0	- 2.5627	0.014

a. Selected based on Akaike Information Criterion

The estimated coefficients of the long-run relationship of the effects of global economic shocks on domestic macroeconomic policy management produced mixed results in line with the diversity of evidence of existing literature. The long-run ARDL estimates indicate positive and significant effects of government expenditure and government revenue as measures of fiscal policy in Nigeria. Also, interest rate exhibited a positive relationship while openness showed a negative relationship. These implied that both monetary and fiscal policy have effect on the economy with different results. As expected, oil price and openness have negative signs which implies that external shock has negative impact on the economy.

Table 4: Error Correction Representation for the Selected ARDL Model
ARDL (1,1,1,1,1,1,0)[a]

Regressors	Coefficients	t-statistics	P-value
ΔGOVTEXP	6.7514	3.5551	0.001
ΔGOVTREV	-3.1419	-1.6279	0.111
ΔINTEREST	31972.4	2.2893	0.027
Δ M2	-0.2709	-0.79818	0.429
ΔOILPRICE	26484.1	2.2390	0.030
ΔEXC	-68000.0	-4.6791	0.000
ΔOPENNESS	-28198.6	-3.4907	0.001
Ecm(-1)	-0.4829	-4.2449	0.000

a. Selected based on Akaike Information Criterion

Table 4 gives the results of the short-run dynamic coefficients associated with the long-run relationships obtained from the ECM equation. The error correction terms in the models is highly significant and correctly signed. This indicates adjustment to long-term equilibrium in the dynamic model. Bannerjee et. al. (1998) posits this as an evidence of a stable long-term relationship. The coefficients of error correction term is -0.4829, which gives the speed of adjustment . This imply that deviations from the long-term growth rate in output adjust quickly.

Specification problems associated with serial correlation, functional form, normality or heteroscedasticity were checked with diagnostics tests, including the test for serial correlation (LM test), heteroscedasticity (ARCH test), normality (JB (N)) and functional form. The results are presented in table 5 below.

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Table 5: ARDL – VECM Model Diagnostic tests

Test Statistics	**LM (χ^2)**	**F-Statistics**
Serial Correlation	$\chi^2(1) = 7.9941(0.005)$	F(1,38)= 7.0636(0.011)
Functional Form	$\chi^2(1) = 12.6552(0.000)$	F(1,38)= 12.5414(0.001)
Normality	$\chi^2(2) = 2.4876(0.288)$	Not Applicable
Heteroscedasticity	$\chi^2(1) = 5.0180(0.025)$	F(1,49)= 5.3474(0.025)

Table 5 indicates the underlying ARDL equation passes the diagnostic tests. The stability of the long-run coefficients, along with the short run dynamics of the estimated ARDL model were confirmed with the test of CUSUM . Table 6 presents the beta coefficients results which shows that out of all measures of fiscal and monetary policies, money supply (m_2) is significant at 5%. This implies that monetary policy is more effective in mitigating external shocks given the context of this study. Table 7 gives plots of the CUSUM based on the Schwarz Bayesian criterion. As can be seen in Table 7, the plot remains within critical bounds at 5% significance, accepting the null hypothesis that all coefficients and the ECM are stable.

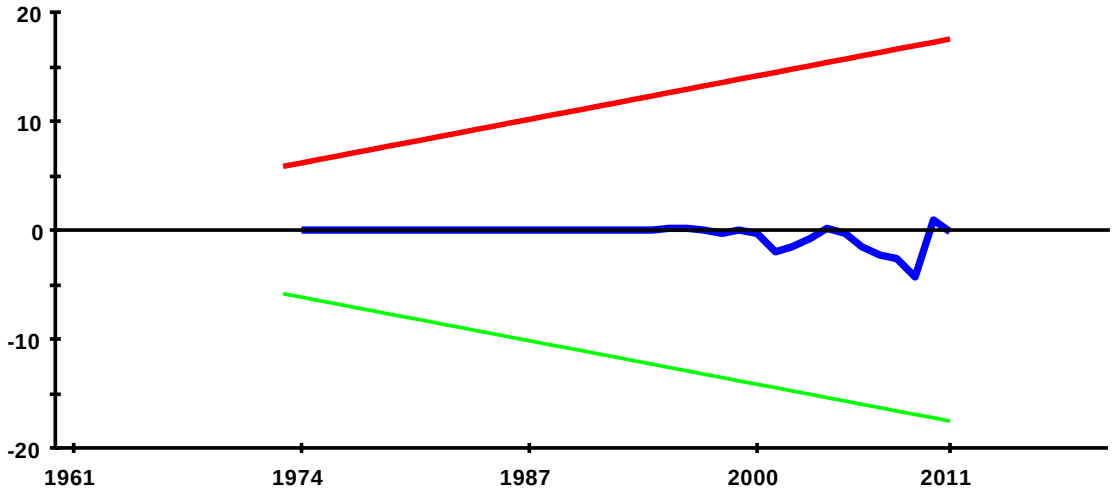
Table 6: Beta Coefficient

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	326568.105	705739.164		.463	.646
	GEXP	-4.771	4.586	-.687	-1.040	.303
	GREV	-4.770	7.295	-.248	-.654	.516
	M2	3.896	.913	1.666	4.264	.000
	INTEREST	-38904.079	47913.993	-.071	-.812	.421

a. Dependent Variable: GDP

Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

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CONCLUSION

The study provides a contribution to the empirical controversy of the Implications of global economic shocks on domestic macroeconomic policy management in Nigeria. The study utilized annual data from 1960 to 2011. The long-run ARDL estimates indicate a positive and significant effects of fiscal policy as a measure of mitigating shocks in Nigeria and a mixed effects of the monetary policy. The beta coefficient shows that monetary policy is more effective in mitigating effects of external shocks. The study therefore suggested that there is no clear cut difference in the effect of fiscal and monetary policy rather a coordination of both fiscal and monetary is most effective in taming external policy shocks.

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