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The Effectiveness of Fiscal and Monetary Policy Shocks on External Balance in Nigeria, 1981-2019

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Abstract:
The study sought to take an objective view into investigating the effects of fiscal and on external balance in Nigeria, within a period of 39 years, 1981 – 2019. The study adopted the Vector Autoregressive (VAR) model to estimate the short run impact, and the Vector Error Correction Model (VECM) to analyse the short run dynamic effect and long run impact on trade balance, after establishing a cointegrating relationship between indicators. Findings reveal a short run positive contractionary fiscal and expansionary monetary effect on trade balance and a long run positive expansionary fiscal and contractionary monetary effect on trade balance, with a 71.27% adjustment rate towards long run convergence. The study also confirms government revenue and monetary policy rate adjustments are key policy instruments in maintaining external balance, however, enacting such policies may incur currency depreciation.

Keywords: *Fiscal policy, monetary policy, external balance, VAR model*

1. Introduction

The two principal policies that have been employed to maintain macroeconomic stability include the fiscal policy, which is usually carried out by the government that involve the adjustments of expenditures and taxes; as well as monetary policy, which is usually carried out by the country's regulatory institution (Central Bank) in the form of adjusting the country's money supply and interest rates both in a closed and open economy. Therefore, government and institutional intervention are highly relevant in maintaining external balance through surplus trading, which will reflect on the country's key macroeconomic indicators in a long run (Jhingan, 2010).

The globalized economy paradigm as a result of technological advancement and global interconnectedness have played an intricate role towards regional/international trade, by relaxing barriers and achieving consensus regarding trading activities, with the expectation of providing growth opportunities to developing countries as that of advanced economies when they were emerging.

However, problems arise when a Less Developed Country is subjected to unfair trade agreement negotiations due to the fact that they have limited resources to supply to the international market, making little contributions to the international market, relative to its developed counterparts. Hence, there is a tendency for countries with relative abundance to dump substandard products on developing markets, in turn, distorting the domestic industrial sector (Rugman & Collinson, 2009). It is left for the government and institutional authorities to impose protectionist policies that will support infant local industries to survive international competition and predatory pricing strategies.

Moreover, a country that is highly dependent on its natural resources such that it primarily relies on commodity trading as a source of domestic income are usually vulnerable to external shocks, which can potentially lead to trade imbalances (Zhu, 2010). Ever since Nigeria joined the Organization of Petroleum Exporting Countries (OPEC) in 1971, its dependence on crude oil has been persistently rising. Currently, crude oil and gas account for almost 95% of its total Nigerian exports, and approximately 70% of its annual revenue (Central Bank of Nigeria, 2019), in the process, making the country's external sector highly volatile due to an already volatile trend in crude oil prices relative to other international prices.

Therefore, the primary purpose of this particular study is to derive the extent of which fiscal discipline and monetary policy initiative into ensuring a stable external balance by focusing on the effectiveness of monetary policy decisions that are based on fiscal policy changes, and vice versa, seeing that both initiatives are known to be a necessary precondition for a successful functioning economy. In other words, it is therefore, imperative for policy implementors and decision makers to employ the consistent and sustainable policy mix framework, within which fiscal and monetary policies are appropriately harmonized (Adegoriola, 2018).

The rest of the paper is organized as follows. First, we explore prior literatures that cover the extent to which policy instruments have affected the external sector, specifically towards the causal relationship between policy instruments and foreign sector statistics. Next, we provide a methodological framework such that we are able to analyse the impact of policy instruments on international trade balance. The final section draws conclusions and derives recommendations based on research findings.

2. Literature Review

One of the most recent instances in Nigeria where the implementation of fiscal and monetary policy mix initiatives was during the recent economic recession that occurred between 2014 and 2016, as a result of the rapid decline in oil prices that occurred within that time period. Raising revenues is considered to be of paramount priority of the federal government in order to avoid a volatile economy. Seeing that the country can no longer rely on the crude oil market due to its falling prices, alternative measures were considered in order to raise total revenues. Although, subsidizing the agricultural sector proved to have a huge impact towards the economy, it was the imposition of a contractionary fiscal policy strategy that was instrumental in revenue generation. As at 2017, the Federal Inland Revenue Service (FIRS) launched an aggressive campaign of obtaining company income taxes from small, medium and large scale in Nigeria, raising a record-high aggregate estimate of ₦4.3 trillion (Fowler, 2018).

The Mundell-Fleming model employs both fiscal and monetary policy initiatives towards ensuring internal balance in a closed economy, as well as an external balance in an open economy. Several literatures reveal the application of the Mundell-Fleming principle of imposing key economic policies into an open economy in order to ensure external and internal balance, through achieving full employment and BOP equilibrium. Flen et al (2011) studied the Marshal-Lerner condition in China and discovered that depreciation leads to an improvement with net capital flow. The application of an expansionary fiscal policy alongside with a contractionary monetary policy has been an effective tool in regulating interest rates such that full employment and BOP equilibrium is achieved, seeing that it is quite evident that the country has the highest growth rate of output in the world. On the other hand, Udomkerdmonkol, Greg and Mornsey (2006) were able to validate the consistency of the Mundel-Fleming principle by illustrating the initial negative effects of a contractional fiscal policy and an expansionary monetary policy on exchange rates in a short-run however, ensuring BOP and full employment equilibrium in a long run in the US relative to 16 of its trading partners.

The issue of constant capital outflow and trade deficit that usually occurs in Nigeria inspired scholars like Asogwa et al (2014) applied the Vector Autoregression and granger causality methodology to estimate the impact of monetary and fiscal policy instruments towards capital inflows entering Nigeria between 1970 and 2012, and test the empirical validity of the Mundell-Fleming framework by capturing the inflows in Foreign Direct. Although, findings indicated a significant impact between variables predicted within the VAR analysis, however, there was no granger causality between the endogenous variables which is not predicted by the Mundell-Fleming model. Nevertheless, the study concluded that interest rate can effectively be used as a monetary policy tool for affecting the external sector, in other toachieve adesired outcome.

The above conclusions are consistent with foreign economists like Huh (1999) and Hsieh (2009) who conducted a similar research using similar methodologies. Using the Vector Autoregressive (VAR) model driven by five exogenous disturbances, Huh (1999) found that a positive money supply shock leads to a temporary fall in the domestic interest rate and a permanent depreciation of the nominal exchange rate, while positive shocks in while positive shocks in fiscal instruments appreciates the rate in Australia after the collapse of the Bretton Woods system. Hsieh (2009) conducted a research of the behaviour of the Indonesian rupiah and US Dollar exchange rate and its policy implications, and it was discovered that a higher domestic interest rate could cause real depreciation of the US dollar and a lower interest rates would appreciate the value of the currency through the appreciation of stock prices in the capital market index. As such, expansionary monetary policy alongside with contractionary monetary policy are useful tools in ensuring external balance in a free-market economy with relative capital mobility like the United States.

Likewise, Babatunde and Olasunkami (2013) were able to empirically verify the Mundell-Fleming model, while looking at fiscal policy shocks and current account dynamics in Nigeria between the quarters 1980Q1 and 2010Q4, also using a Vector Autoregressive (VAR) model. The result showed a positive impact of interest rates on exchange rate and negatively impacts current account balance, which therefore, goes to say that the improvement of the value of the domestic currency has an expansionary fiscal and contractionary monetary effect in Nigeria, but at a cost of a reductions in the current account balance. Alternatively, a surplus in the country's current account balance has a contractionary fiscal and an expansionary monetary effect in Nigeria, but at a cost of the devaluation of the domestic currency.

However, economists like Siklos (1988) were not able to verify the Mundell-Fleming model, despite verifying the Marshal-Lerner condition. His research was centred around establishing a relationship between interest rates and international balance of trade in Canada, with the aim of verifying the Mundell-Fleming model using the Vector Autoregression (VAR) model as a methodological tool to obtain results. His findings indicated that there was no significant relationship between international trade balance (specifically, output deficits) and interest rates, however, results were able to recognise that devaluation as a policy instrument tend to raise exportation in a short run.

Studies like Allegret & Benkhodja (2015) and Oyelalmi and Omolola (2016) referred to generic growth theories and open economy Keynesian framework to correlate external shocks vulnerability in the oil markets to monetary policy instruments in Algeria and Nigeria, respectively. Using a Dynamic Stochastic General Equilibrium (DGSE) modelling technique, the former observed that impulse response functions of external shocks are associated with monetary policy rules in Algeria. Using the Vector Autoregressive (VAR) model, the later on the other hand, were unable to incorporate instantaneous response to shocks with interest rates and money supply in Nigeria. However, Abere & Akinbobola (2020) used the Structural Vector Autoregressive (SVAR) approach and concluded favourable institutional environments are instrumental towards macroeconomic performance in Nigeria, especially with response to external shocks.

Following Asogu's (1998) work regarding the relative potency of fiscal and monetary policy instruments, it was discovered that the coefficients of imports was not statistically significant which goes to say that fiscal policies do not have a significant impact towards international trade balance, implying that interventions from the Nigerian government

usually create greater distortions regarding the open-economy. Findings are consistent with Ubogu (1985) where the efficacy of the relative impact of monetary and fiscal policy towards economic activities in 15 different African countries were investigated using a dynamic regression model. However, both recommend that both macroeconomic policies should be complemented while exploring different approaches and domestic institutions should create an enabling environment for international competition.

3. Methodology

Prior literature reviews have confirmed the use of Vector Autoregressive (VAR) model have yielded significant results pertaining to the relationship between policy instruments and key macroeconomic indicators, trade balance included, and even went further to verify the empirical validity of the Mundell-Fleming model developed between 1962 and 1968. Hence, this study took a similar approach towards establishing policy effectiveness on external balance. Secondary time-series data was captured within a 39-year period of 1981 – 2019 from the Central Bank of Nigeria (CBN) annual statistical bulletin. This period was deliberately constructed to reflect the recent policy adjustments from governments and institutions, as a result of recent fluctuations in the oil market, which has reflected on the country's trade balance.

3.1. Model Specification

The specified regression model will take a VAR(*p*) framework such that it was able to estimate the parameters of a $(n \times 1)$ vector time series endogenous variables Y_t, and its corresponding cumulative $(n \times n)$ lagged operators Y_{t-i} and $(n \times 1)$ unobservable error terms U_t, using the Ordinary Least Square (OLS) method.

$$Y_t = B + \sum_{i=1}^{p} B_i Y_{t-i} + U_t \quad (3.1.1)$$

Equation 3.1.1 can be reparametrized into the following VAR(*p*) vector matrix.

$$\begin{pmatrix} \ln BOT \\ \ln GR \\ \ln GE \\ \ln MS \\ MPR \end{pmatrix}_t = \begin{pmatrix} \beta_{10} \\ \beta_{20} \\ \beta_{30} \\ \beta_{40} \\ \beta_{50} \end{pmatrix}_t + \sum_{i=1}^{p} \begin{pmatrix} \beta_{11} & \beta_{12} & \cdots & \beta_{15} \\ \beta_{21} & \beta_{22} & & \beta_{25} \\ \vdots & & \ddots & \vdots \\ \beta_{51} & \beta_{52} & \cdots & \beta_{55} \end{pmatrix}_i \begin{pmatrix} \ln BOT \\ \ln GR \\ \ln GE \\ \ln MS \\ MPR \end{pmatrix}_{t-i} + \begin{pmatrix} \mu_1 \\ \mu_2 \\ \mu_3 \\ \mu_4 \\ \mu_5 \end{pmatrix}_t \quad (3.1.2)$$

Where $\ln BOT_t$ is the natural log of balance of trade (NGN), $\ln GR_t$ and $\ln GE_t$ represent the natural logs of Government Revenue (NGN) and Government Expenditure (NGN) respectively, each acting as proxies for fiscal policy instruments. $\ln MS_t$ is the natural log of M3-money supply (NGN) and MPR_t is the Monetary Policy Rate (%) which are proxies for monetary policy instruments. $\beta_{10t}, \beta_{20t} \dots \beta_{50t}$ denote the y-intercept for each corresponding dependent variable; *p* is the lag order for parameters $\beta_{11i} \dots \beta_{55i}$ which would be determined by the recommendations of the AIC, SC or HQIC for lag selection and $\mu_1, \mu_2 \dots \mu_5$ represent the residual error terms.

3.2. Model Justification

The study centrally focused on determining which policy mix is most effective in maintaining external balance, as well as adjusting underlying policy implementations, both in a short and long run. The application of the VAR(*p*) model is considered to be one of the key empirical tools in modern macroeconomics(Del Negro & Schorfheide, 2010) as it is especially useful in analysing the dynamic behaviour of arrays of time-series data and identifying causal relationships between one variable and another lagged variables (Zivot & Wang, 2006).

The model consists of 5 endogenous variables, classified into one control variable $\ln BOT_t$, and four model variables $\ln GR_t$, $\ln GE_t$, $\ln MS_t$ and MPR_t. Balance of Trade (BOT) is the difference between the gross value of a country's commodity exports and imports for a specified period of time *t* (Amadeo, 2019) which is an appropriate tool in measuring the external balance and terms of trade in a country, as it is the most crucial component of a country's BOP.

Government Revenue and Expenditure are included as proxies for fiscal policy initiatives, as the former accumulates public funds and simultaneously absorbs the excess circulation of liquid through taxes and custom duties to name a few, while the later make payments and assist in supplying additional funds into the public through budget allocation and subsidies (Alade, 2017). Likewise, Money Supply and Monetary Policy Rates are included to represent monetary policy initiatives, as the former aggregates the amount of cash, deposits and securities from bonds and treasury bills in circulation over a period of time *t*, while the later refer to the interest rates charged by monetary authorities (i.e. CBN) to ensure macroeconomic stability (Central Bank of Nigeria, 2019).

In order to avoid spurious results and the axioms of the underlying model to hold, estimation diagnostics were conducted. First, unit root tests were carried out to check for stationary series for each variable in equation 3.1.2, using the Augmented Dickey Fuller (ADF) and Philips Peron (PP) methods. Next, the Johansen cointegration technique was applied to check for long run relationship between variables in the equation, and it was followed by the estimation of model 3.1.2 using the Vector Error Correction Model (VECM) to determine the speed of adjustment from a short run to a long run equilibrium.

Also, the Jarque-Berra tests, Skewness and Kurtosis distribution tests were applied to check for normality across disturbances, and the Lagrange Multiplier (LM) test for autocorrelated residual error terms. For robustness, Wald test granger causality to analyse causal relationships and impulse response function was carried out for the VAR model to show the shock effect on variance.

4. Empirical Analysis

4.1. Analysis for Stationarity

The ADF and PP tests checks for stationarity by determining whether there is a unit-root presence for each variable in the regression model both at base level and taking first difference.

t-statistic	Augmented Dickey Fuller (ADF)		Philips Peron (PP)	
Variable	Base level I(0)	1st difference I(1)	Base level I(0)	1st difference I(1)
ln BOT	-2.337	-4.289***	-1.928	-6.262***
ln GR	-2.057	-3.373**	-1.349	-6.214***
ln GE	-2.163	-2.936**	-1.070	-7.210***
ln MS	-1.129	-2.790*	-0.700	-4.208***
MPR	-2.467	-5.853***	-3.221**	-

Table 1: Unit Root
Note: Lag length selection based on AIC, SBIC & HQIC recommendations
, **, * statistical significance at 10%, 5% & 1% respectively*
H_0: Unit root presence
Source: Author's compilation from Stata 16

Result from both ADF and PP tests from Table 1 confirm stationary series for each variable, mostly at I(1), although, PP was able to confirm I(0) stationarity for *MPR* at 5% significant level. Results were able to reject H_0 at 1% significance for ln BOT and *MPR* at I(1), and at 5% significance for ln GR and ln GE at I(1). Although, ADF diagnostics were only able to detect stationarity at 10% statistical significance for ln MS, but PP was able to confirm stationarity at 1% statistical significance at I(1).

4.2. Analysis for Cointegration and VECM

The Johansen technique was applied to check for cointegrating equations, determining whether the model has a long run relationship.

4.2.1. Johansen Tests for Cointegration

Max. Rank	Eigen Value	Trace	Critical Value	Max-Eigen	Critical Value
0	-	73.9850	68.52*	33.6051	33.46*
1	0.59667	40.3529	47.21	18.3548	27.07

Table 2: Johansen Tests for Cointegration
Note: H_0: No Cointegration
** Reject Null Hypothesis at 5% Significance Level*
Source: Author's compilation from Stata 16

The Trace and Maximum-Eigen value diagnostics were able to confirm the presence of one cointegrating equation as they both exceed critical value, at 5% significance level in rank 0, and are within the critical region at rank 1. Hence, there exist a long run relationship between variables in our regression model.

Having determined the presence of cointegration, the study proceeded to establish the speed of adjustment from a short run dynamic to a long run equilibrium using the VECM analysis. The model is thus, specified by taking first differences of equation 3.1.1 or 3.1.2

$$\Delta Y_t = \Phi + \sum_{i=1}^{p-1} \Delta\Phi_i Y_{t-1} + \lambda_i EC_{t-1} + U_t \quad (4.2.1)$$

Where Φ_i is the short run dynamic coefficient of the vector model's adjustment to a long run equilibrium, λ_i is the speed of adjustment parameter for long run equilibrium convergence, and *EC* is the error correction term obtained from the cointegrating regression of the dependent variable on the regressors, specified as follows:

$$EC_{t-1} = \varphi + \ln BOT_{t-1} - \gamma_1 \ln GR_{t-1} - \gamma_2 \ln GE_{t-1} - \gamma_3 \ln MS_{t-1} - \gamma_4 MPR_{t-1} \quad (4.2.2)$$

Variables	$\Delta \ln BOT_t$	$\Delta \ln GR_t$	$\Delta \ln GE_t$	$\Delta \ln MS_t$	ΔMPR_t
EC_{t-1}	-0.71272 (0.3825)*	0.15226 (0.1348)	0.08648 (0.0814)	-0.00856 (0.0479)	0.34686 (1.322)
$\Delta \ln BOT_{t-1}$	-0.22379 (0.3926)	-0.14528 (0.1162)	-0.13187 (0.0701)*	-0.01847 (0.0412)	-1.05795 (1.1394)
$\Delta \ln GR_{t-1}$	0.36716 (0.8070)	0.25762 (0.2845)	0.36905 (0.1717)**	0.08464 (0.1011)	4.97285 (2.7897)*
$\Delta \ln GE_{t-1}$	2.23136 (1.3406)*	0.23161 (0.4727)	-1.16763 (0.2853)	0.24082 (0.1679)	-8.05455 (4.634)*
$\Delta \ln MS_{t-1}$	-0.99550 (1.4736)	-0.54853 (0.5196)	-0.12988 (0.3136)	0.19845 (0.1846)	-7.49487 (5.0938)
ΔMPR_{t-1}	-0.08605 (0.0581)	-0.0438 (0.0205)**	-0.02490 (0.0123)**	-0.00732 (0.0072)	-0.17966 (0.2011)
Φ	0.98298 (0.5316)*	0.03316 (0.1876)	0.08025 (0.1121)	0.12443 (0.6660)*	1.98830 (1.8377)
R^2	0.1851	0.3890	0.5818	0.8072	0.3369
Jarque-Berra	1.209	0.517	18.637***	0.630	0.186
Skewness	-0.325	-0.118	0.563	-0.298	0.297
Kurtosis	2.399	2.471	6.289***	2.774	2.658
LM_{t-1}	0.45127				
LM_{t-2}	0.53761				

Table 3: Vector Error Correction Model
Note: Lag Length Selection Based on AIC, SBIC & HQIC recommendations
( ) standard errors
, **, * reject H_0 at 10%, 5% & 1% significant level respectively*
Source: Author's compilation from Stata 16

Table 3 depict estimation results obtained from equation 4.2.1. Results were able to detect a 71.27% adjustment rate towards long run equilibrium convergence within the current year at 10% significant level on the target variable (i.e., $\Delta \ln BOT_t$). Findings also indicate a short-run dynamic impact of government expenditure on balance by 2.23%, statistically significant at 10%, monetary policy rate on government revenue by -0.04%, significant at 5% level, balance of trade, government revenue and monetary policy rate on government expenditures by -0.13%, 0.36% and -0.02% respectively, significant at 10% and 5% levels respectively, and finally government revenue and expenditure on monetary policy rates by 4.97% and -8.05% respectively, significant at 10% levels. The Jarque-Berra, Skewness and Kurtosis test were able to confirm normal distribution for all equations in the VEC system except for government expenditure. LM tests confirm absence of autocorrelation in the error terms for both lags.

Table 2 was able to confirm one cointegrating equation in the entire system, implying a long run relationship between variables, as specified in equation 4.2.2.

EC_{t-1} = 1.62 + $\ln BOT_{t-1}$ + 2.34$\ln GR_{t-1}$ − 1.2$\ln GE_{t-1}$ − 0.15$\ln MS_{t-1}$ − 0.09MPR_{t-1}
0.249]*** [0.381]*** [0.190] [0.021]*** (4.2.3)

Equation 4.2.3 depict long run estimates and corresponding standard errors of each variable represented by each parathesis derived from the cointegrating model in 4.2.2.Findings indicate a long run impact of government revenue, expenditure, and monetary policy rate on trade balance by 2.34%, -1.2% and -0.09% respectively, statistically significant at 1%. Money supply, however, does not exhibit statistically significant estimates.

4.3. VAR Estimation and Impulse Response Function

In order to draw viable conclusions regarding the macroeconomic policy effectiveness on external balance, there is need to obtain the parameters of the regression model outlined in equation (3.1.2).

Variables	$\ln BOT_t$	$\ln GR_t$	$\ln GE_t$	$\ln MS_t$	MPR_t
$\ln BOT_{t-1}$	-0.19798 (0.3414)	-0.07047 (0.1172)	-0.05135 (0.0811)	-0.005 (0.0445)	-0.55457 (1.2616)
$\ln BOT_{t-2}$	-0.12675 (0.2785)	0.01671 (0.0956)	0.13969 (0.0662)**	0.00867 (0.0363)	1.40054 (1.0291)
$\ln GR_{t-1}$	1.78699 (0.846)**	0.72758 (0.2905)**	0.20297 (0.2011)	0.07837 (0.1104)	2.98617 (3.1259)
$\ln GR_{t-2}$	-0.28982 (0.6763)	-0.20612 (0.2322)	-0.36247 (0.1607)**	0.0065 (0.0883)	-6.29907 (2.4988)**
$\ln GE_{t-1}$	1.7846 (0.9397)*	0.6704 (0.3227)**	0.86791 (0.2233)***	0.15901 (0.1227)	-5.11667 (3.4721)
$\ln GE_{t-2}$	-1.3915 (1.1281)	0.1915 (0.3874)	0.7034 (0.2681)	-0.13354 (0.1473)	7.92135 (4.1684)*

Variables	$\ln BOT_t$	$\ln GR_t$	$\ln GE_t$	$\ln MS_t$	MPR_t
$\ln MS_{t-1}$	-0.8772 (1.3202)	-0.4859 (0.4534)	-0.03605 (0.3138)	0.94892 (0.1724)***	-4.00543 (4.8781)
$\ln MS_{t-2}$	0.31305 (1.2515)	0.21601 (0.4298)	0.13125 (0.2975)	-0.06047 (0.1634)	3.66915 (4.6244)
MPR_{t-1}	-0.14461 (0.0622)**	-0.03341 (0.0213)	-0.16873 (0.0147)	-0.00265 (0.0081)	0.61997 (0.2298)***
MPR_{t-2}	0.08222 (0.0495)*	0.03348 (0.017)**	0.03001 (0.0117)**	0.00218 (0.0064)	0.09715 (0.1831)
B_{i0t}	-0.77083 (0.7071)	0.25114 (0.2428)	0.28338 (0.1681)*	0.20273 (0.0923)**	7.347 (2.612)***
R^2	0.9209	0.9890	0.9936	0.9986	0.5299
Wald	17.057**	23.962***	12.237	15.363*	12.237
Jarque-Berra	2.213	0.421	14.97***	0.333	1.052
Skewness	-0.5889	-0.1373	1.0144**	-0.0565	0.4106
Kurtosis	2.7799	2.5552	5.3652**	2.5489	3.0865
LM_{t-1}	28.4857				
LM_{t-2}	21.1532				

Table 4: Vector Autoregression Model
Note: Lag Length Selection Based on Aic, Sbic & Hqic Recommendations
( ) Standard Errors
, **, * Reject H_0 at 10%, 5% & 1% Significant Level Respectively*
Source: Author's Compilation from Stata 16

Table 4 illustrates the results obtained from estimating the parameters of the VAR equation specified in 3.1.2. Pairwise-granger causality test was additionally applied to analyse collective causality between dependent variables, using the Wald statistics. Results indicate variables granger-cause $\ln BOT_t$, $\ln GR_t$ and $\ln MS_t$, statistically significant at 5%, 1% and 10% respectively.

Results from the VAR model also indicate some statistically significant findings. First, the first lags of government revenue and expenditure have symmetric causal effects on trade balance by 1.78%, significant at 5% and 10% levels, respectively. We also observed joint impact of monetary policy rates on trade balance by -0.14% from the first lag and 0.08% from the second, at 5% and 10% significance level, respectively. The first lag of government expenditure and the second lag of monetary policy rate also have an effect on government revenue by 0.67% and 0.03% respectively, at 5% statistical significance. The second lags of trade balance, government revenue and monetary policy rate have causal effects on government expenditure by 0.13%, -0.36% and 0.03% respectively, at 5% significance level. Finally, the second lags of government revenue and expenditures have an impact on monetary policy rate by -6.29% and 7.92%, significant at 5% and 10% level, respectively.

Findings also indicated a bi-variate causal relationship between government revenue and monetary policy rate at the second period by -6.29% and 0.03% respectively, statistically significant at 5%, which goes to say that short run expansionary measures could simultaneously raise revenues and reduce bank rates. There is also evidence of bi-variate causal relationship between government revenue and expenditure, between the first and second period by 0.67% and -0.36% respectively, statistically significant at 5%, affirming government revenue as the principal source of public spending. Finally, results were unable to indicate any statistically significant causal relationship between money supply and the other indicators, both in a short and long run basis.

The Jarque-Berra, Skewness and Kurtosis test were able to confirm normal distribution for all equations in the VAR system except for government expenditure. LM tests confirm absence of autocorrelation in the error terms for both lags.

Impulse Response Function (IRF) shows the shock effect and the degree of responsiveness of equations in a system by depicting how such variables will respond to a standard deviation shock towards another variable in a short and long run.

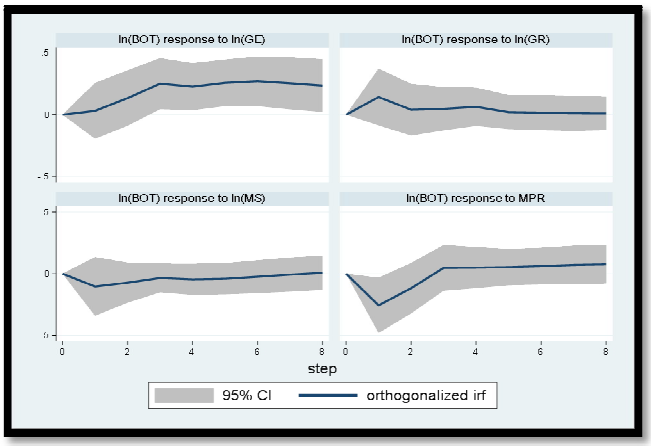

Figure 1: Orthogonalized Impulse Response Function
Source: Author's compilation from Stata 16

The above illustration depicts the shock effects of the model variables (ln GE_t , ln GR_t , ln MS_t and MPR_t) towards the target variable ln BOT_t, providing additional insight in establishing the effectiveness of policy instruments on external balance, within a period of 8 lags. To an extent, the graphical illustration corroborates the depictions in tables 4.2.2, 4.3.1 and equation 4.2.3 respectively, particularly with regards to government expenditure and monetary policy rate where steep interactions are initially observed, before stabilizing in a long-term basis. Likewise, a relatively dormant response is observed in money supply, although a slight decline observed in the first period. Government revenue on the other hand, show a slower shock effect on trade balance in a long run, although an instantaneous shock effect by the first period.

5. Conclusion

Empirical evidence from this study suggests there exist a short-run and long-run relationship between policy initiatives and external balance, as well as a 71.27% rate of adjustment towards long run convergence from a short run dynamic. In addition, evidence points out government expenditure and revenue as the two key fiscal instruments in maintaining external balance in a short run and long run respectively, and the monetary policy instrument as key monetary instrument for maintaining external balance in both a short run and long run. The empirical evidence is consistent with the findings of Babatunde and Olasunkami (2013), Asogwa et al (2014) with regards to the effectiveness of policy instruments towards the external sector, justifying the Mundell-Fleming framework and the Marshall-Lerner condition.

Hence, the study recommends an expansionary fiscal policy and contractionary monetary policy in a short run basis. Public finance allocation, particularly towards personnel and economic services will reflect on consumption expenditure and raise trade surplus in Nigeria in terms of commodity import substitutes, rather than sole dependence on the oil sector. Although, increased bank rates may initially distort trade balance, but it will also serve as a useful instrument in raising government revenues and absorbing any potential inflationary gaps that may have been incurred from expansionary fiscal measures.

n a long run, the study proposes a contractionary fiscal policy and an expansionary monetary policy, as suggested by Hsieh (2009). Having confirmed revenue is the main source of expenditures in Nigeria's public finance, raising revenue is instrumental in maintaining external balance, and this can be done by raising taxes on large businesses, imposition of tariffs on imported commodities, collectively aiding domestic infant industries. Reducing lending rates will simultaneously encourage domestic and foreign investment, which will in turn, reflect on domestic productivity and revert any imbalances that occurred initially. This, however, comes at a risk of devaluating the domestic currency.

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