Dynamic Effects of Fiscal Policy on Output and Unemployment in Nigeria: An Econometric Investigation

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This study investigates the effect of fiscal policy shocks on output and unemployment in Nigeria under the Keynesian framework by employing the Structural Vector Autoregression (SVAR) methodology to analyse annual series on the relevant variables for the period 1981-2015. Augmented Dickey Fuller (ADF) test for unit root result shows all variables to be integrated of order one and Johansen Cointegration test confirms the presence of long run association among the variables. Findings of the SVAR model shows shock in public expenditure as having a positive long- lasting effect on output. Revenue shock was found to exert a positive effect (lower than that of public expenditure shock) on output. However, the effect of revenue shock on unemployment was found to be negative but short-lived. The study suggested that government should restructure its spending pattern by allocating more to productive expenditure. In the same vein, it was suggested that government should harness its revenue potentials by expanding its revenue base via effective and efficient taxation system and also through diversification of its revenue base.

Key Words: Economic growth, fiscal policy, output, unemployment, Nigeria.

JEL Classification: H20, H30, H50

1.0 Introduction

The emanation of fiscal policy can be traced to the work of Keynes who proposed the idea of fiscal policy as a measure to stimulate growth during the great depression of the 1930's. Alex and Ebieri (2014) noted that government intervention in the economy through fiscal policy have been to manipulate the receipt and expenditure sides of its budget in order to achieve certain national objectives. As Abdulrauf (2015) opined, the use of fiscal policy is very paramount in every society, most especially Less Developed Countries (LDC's) as a major tool for economic stabilization and enhancing development. The importance of fiscal policy in impacting the dynamics of an economy was echoed by Arnelyn et al (2014) who asserted that; in the short term, counter-cyclical fiscal expansion can help support aggregate demand and growth during cyclical downturns, conversely, fiscal contraction can cool down an economy that is growing at an unsustainable pace and thus faces the

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risk of overheating. In the medium and long term, fiscal policy also plays a significant role in the economy. Although there have been numerous studies on fiscal policy as it relates to economic growth, much attention has not been given to its effect on unemployment despite its importance in theory and practice. In the Nigerian case, although studies such as Momodu and Ogbole (2014) and Obayori (2016) attempted to examine the effect of fiscal policy on unemployment, they failed to incorporate the two instruments of fiscal policy in their analysis; they only included public expenditure and left out revenue (an important component of fiscal policy). In the same vein, not much has been done in empirical studies to capture the effect of fiscal policy shocks on unemployment. In the Nigerian case, despite extensive literature search, prior empirical studies on the effect of fiscal policy shocks on unemployment were not found. The study aims to fill these gaps.

The motivation behind the study stems from the fact that at a time when the Nigerian economy is faced with recession coupled with growing unemployment, a search for solution via fiscal policy in line with the Keynesian thought becomes a source of interest. It is in light of the foregoing that the study investigates the effectiveness of fiscal policy variables in enhancing economic growth (output) and reducing unemployment in Nigeria with a view to contributing to the existing literature and also to proffer policy recommendations to the economic challenges at hand. To do this, the study intends to answer the research questions of: what effects does fiscal policy exert on economic growth and unemployment in Nigeria? And in what ways can fiscal policy tools be adopted to effectively improve economic growth and reduce unemployment in Nigeria? To answer the research questions, the study intends to achieve its objectives of; the examination of the effect of fiscal policy shocks on economic growth (output) and unemployment in Nigeria; and the determination of the fiscal policy tools effective in stimulating economic growth and curbing unemployment in Nigeria.

2.0 Literature Review

2.1 Theoretical Literature

Keynes challenged the classical view that private enterprise economy automatically ensures full employment. On the other hand, he said that employment depends on effective demand and there is no guarantee that there will always be adequate effective demand to generate full employment, and

when there is unemployment, the classical prescription of public finance is no longer valid (Dewett and Navalur, 2012). The Keynesian theory of fiscal policy proposes government intervention as a counter-cyclical measure. Keynesian theory questioned the equilibrating tendencies of market forces and maintained that, if left to themselves, the market forces tend to lead the economy to a stable level of under-employment equilibrium (Tyagi, 2013). Under the Keynesian framework, the aggregate demand function of employment does not automatically adjust itself to the aggregate supply function of employment, so also is demand and supply of output; this adjustment can only be achieved through a positive and dynamic operation of fiscal policy. In the same vein, Keynes believed that the government has to play the positive role of regulating and controlling the economy by means of taxes and expenditure. Abu and Abdullahi (2010) asserted that in the Keynesian model, an increase in government expenditure leads to a higher economic growth. For the Keynesian theory, fiscal policy is a technique to attain and maintain the level of full employment by manipulating public expenditure and revenue in such a way so as to keep equilibrium between effective demand and supply of goods and services.

Dewett and Navalur (2012) noted that if depression occurs, fiscal policy should help in increasing demand and an increase in demand translates to increase in output. For this purpose, the government can increase its expenditure and spend more on public works. This will provide employment to more people. Or else, the government can increase its expenditure on subsidies to producers of mass consumption commodities so as to increase consumer's spending. Similarly, the government can lower its tax rates so as to stimulate consumption and investment. Thus, a budget deficit during a depression is a positive help in fighting unemployment and stimulating output growth.

2.2 Empirical Literature

This section presents the review of empirical literatures on studies related to the theme of this study carried out across countries. The section begins by first presenting a review of cross country empirical literatures before narrowing it down to the Nigerian context. At the end of the section, a summary of major findings from the empirical literature review is presented.

Anthanasios (2013) employed the SVAR methodology to find the relationship between unemployment, growth and fiscal policy in Greece. Results from the study show the effect of cuts in government purchases and government

consumption on unemployment and output to be sizable, while the effect of government investment is to a lesser extent. Tax hikes was found to reduce output and increase unemployment.

Antonio and Ilian (1998) employed the VAR methodology to investigate the dynamic effects of fiscal policy on macroeconomic variables. Findings of the study show positive innovations in government spending to be followed by strong and persistent increases in consumption and employment.

Arnelyn et al (2014) carried out an empirical examination of the relationship between fiscal policy and economic growth in developing Asian counties. The study noted that in comparison to advanced economies, the region's overall level of taxes and government spending as having significant as having significant effect on economic growth. Property taxes were found to exert more benign impact on economic growth than direct while spending on education has a sizable positive impact on economic growth.

Benanaya et al (2014) employed the dynamic panel data analysis to examine the impact of fiscal policy on economic growth of MENA countries. Results of the study showed a long run relationship between fiscal policy and economic growth. Correlation pattern between GDP and budgetary revenue revealed the presence of positive causality between economic growth and fiscal revenues. Effects of taxation were difficult to isolate empirically.

Devarajan and Vinaya (1993) assessed the link between the level of public expenditure and growth, they derived conditions under which a change in the composition of expenditure leads to a higher steady-state growth rate of the economy.

Eric and Jonathan (1992) analyzed data from 107 countries for the period 1970 to 1985 to investigate the impact of fiscal policy on economic growth. Findings of the study show that balanced budget increase in government spending and taxation has the effect of reducing output growth rates.

Erkin (1988) examined the relationship between government expenditure and economic growth by proposing a new framework for New Zealand. The empirical results showed that higher government expenditure does not hurt consumption, but instead raises private investment that in turn accelerates economic growth.

Hussain et al (2009) applied a dynamic panel analysis to examine the impact of fiscal policy variables on economic growth of Asian economies by employing data for the period 1985 to 2001. Health and education expenditure, aggregate expenditure and aggregate of other fiscal variables was found to have a positive impact on economic growth, while defence expenditure, distortionary taxation and budget balance shows a significant relationship with real per capita economic growth.

Kalle (2007) employed a panel data analysis involving 52 countries for the period 1971 to 1980, to examine the effect of fiscal policy on economic growth both in the short run and long run. Results of the study shows that the Keynesian principles do not hold because fiscal policy cannot have remarkable impact on the economy in the short run, however, its effect is confirmed in in the long run. He concluded that the expansionary fiscal policy is not beneficial to the economy at all.

Komain and Brahmasrene (2007) employed the Granger causality test to examine the relationship between government expenditure and economic growth in Thailand, their result suggested a unidirectional relationship, as causality runs from government expenditure to economic growth. However, the result indicated a significant positive effect of government spending on economic growth.

Michele (2005) examined the dynamic effects of fiscal policy shocks on government employment in the U.S economy. His findings show that if government consumption expenditure consists solely of purchases of final goods, then fiscal shock lead to a negative and significant wealth; households reduce consumption and increase labour supply. His findings further reveal that a shock in government employment is negative for private output and a positive impulse for government output because output is reallocated from private to government sector.

Abdulrauf (2015) examined the short run and long run impacts of fiscal policy on Nigeria's economic development by employing the Vector Error Correction Model (VECM) methodology using annual data series from 1981 to 2013. His findings showed government recurrent expenditure and government investment as having a positive short run and long run impacts on economic development, while capital expenditure only had a short run positive impact. Tax revenue was found to have a negative relationship with economic development of Nigeria both in the short run and long run.

Abu and Abdullahi (2010) in their finding shows total capital, total recurrent and government expenditure on education to have a negative impact on economic growth, while health expenditure, transport and communication expenditure was found to have a positive impact on economic growth.

Abubakar (2016) carried out a disaggregate analysis of the imact of public spending on economic growth of Nigeria by employing the VECM methodology. Findings of his study showed public expenditure as having a mixed effect on economic growth. Some components of public expenditure exerted a negative effect, while other components had a positive impact on economic growth of Nigeria.

Alex and Ebieri (2014) examined the Impact of fiscal policy on economic growth of Nigeria by employing the ARDL methodology. The study found the evidence of long run equilibrium relationship between fiscal policy and economic growth in Nigeria. Government capital and recurrent expenditure was found to have a significant positive relation on economic growth, while non-oil tax and government total debt were found to have no significant impact on real GDP. However, only capital expenditure was found to have a short run relationship with economic growth.

Nathan (2012) examined the impact of fiscal policy on the Nigerian economy by evaluating the causal relationship between money supply, fiscal deficits, exports and economic growth of Nigeria for the period 1970 to 2010 using the error correction methodology; his findings show the presence of a significant relationship between the variables and economic growth. The study recommended fiscal policy as an effective tool for ensuring economic growth of Nigeria.

Obayori (2016) examined the effect of fiscal policy on unemployment in Nigeria using the error correction model methodology. Findings of the study revealed that both capital and recurrent expenditure of the government exerted a negative effect on unemployment in Nigeria.

Osinwo (2015) examined the effect of fiscal policy on sectoral growth in Nigeria by employing the ARDL and ECM methodology for the period 1970-2013. Results of his study found total fiscal expenditure to have a positive impact on output of all sectors with the exception of Agricultural sector.

Sikiru and Umaru (2012) employed the Engle-Granger two step cointegration approach to examine the relationship between fiscal policy and economic growth in Nigeria by utilizing annual data series from 1977 to 2009. Findings of the study showed productive expenditure as having a positive impact on economic growth.

From the literatures reviewed above, it can be deduced that studies such as Alex and Ebieri (2014), Hussain et al (2009), Nathan (2012), Abdulrauf (2015), Komain and Brahmasrene (2007), Devarajan and Vinaya (1993), Arnelyn et al (2014), Sikiru and Umaru (2012), Benananaya et al (2014) and Erkin (1988) found public expenditure as having a positive relationship with output growth, while studies such as Erick and Jonathan (1992), Abdulrauf (2015) and Abubakar (2016) found some components of public expenditure as having a negative effect on output growth. On the other hand, Anthansios (2013), Erick and Jonathan (1992) found taxation as having a negative effect on output. However, Obayori (2016), Anthonio and Ilian (1998) found fiscal policy as having a negative impact on unemployment.

3.0 Data and Methodology

3.1 Data Description

The study employed annual data series on the selected relevant macroeconomic variables for the period 1981 to 2015. Data on Public Expenditure and Total Revenue are used as fiscal policy variables, while data on Gross Domestic Product (GDP) and Unemployment Rate are the variables of interest. Data on GDP, Public Expenditure and Total Revenue was sourced from the CBN Statistical Bulletin (2015), while data on Unemployment Rate was sourced from Nigerian Bureau of Statistics (NBS) Labour Force Statistics (several years). Data on the variables were converted to their log form, and analysis was carried out using the econometric software Eviews9.

3.2 Methodology

The study adopted the Structural Vector Auto Regression (SVAR) methodology with long run restrictions first proposed by Blanchard and Quah (1989) for analysis. This methodology was adopted because it allows us impose restrictions on the model framework based on economic theory and also retrieve the responses of the variables to structural shocks. As Enders (2014) stated, the aim of SVAR is to use economic theory to recover the

structural innovations from the reduced form residuals. Sims (1980) criticized the idea of single system of equation used in economic analysis and further stated that variables should not be dichotomized into dependent and independent variables, but rather, variables should be termed as endogenous variables. As an alternative, Sims introduced the Vector Autoregressive (VAR) method of analysis, where each endogenous variable is determined by the lag value of itself and of other endogenous variables in the model. To illustrate this, consider a simple bivariate model:

$$y_t = b_{10} - b_{12}z_t + \gamma_{11}y_{t-1} + \gamma_{12}z_{t-1} + \varepsilon_{yt} \quad (1)$$

$$z_t = b_{20} - b_{21}y_t + \gamma_{21}y_{t-1} + \gamma_{22}z_{t-1} + \varepsilon_{zt} \quad (2)$$

From equations (1) and (2), y_t and z_t are endogenous variables, b_{12} and b_{21} captures the contemporaneous effect of z_t on y_t and y_t on z_t respectively. The coefficients γ_i captures the lagged relationship between the variables, while ε_{yt} and ε_{zt} are structural errors. Equations (1) and (2) can be jointly written in a matrix form, and when we form the matrix and collect like terms, we can present the matrices as:

$$\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix}\begin{bmatrix} y_t \\ z_t \end{bmatrix} = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}\begin{bmatrix} y_{t-1} \\ z_{t-1} \end{bmatrix} + \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix} \quad (3)$$

The matrices (3) can be represented by the equation:

$$Ax_t = \Pi_0 + \Pi_1 x_{t-1} + \varepsilon_t \quad (4)$$

Where A = $\begin{bmatrix} 1 & b_{12} \\ b_{21} & 1 \end{bmatrix}$, $x_t = \begin{bmatrix} y_t \\ z_t \end{bmatrix}$, $\Pi_0 = \begin{bmatrix} b_{10} \\ b_{20} \end{bmatrix}$, $\Pi_1 = \begin{bmatrix} \gamma_{11} & \gamma_{12} \\ \gamma_{21} & \gamma_{22} \end{bmatrix}$, and $\varepsilon_t = \begin{bmatrix} \varepsilon_{yt} \\ \varepsilon_{zt} \end{bmatrix}$.

Note that equation (4) is the VAR model in the structural form, but since we cannot estimate the structural parameters directly because z_t is correlated with $\varepsilon_{yt}$and y_t is correlated with ε_{zt}. To estimate, we will have to transform the structural model to its reduced form, where the endogenous variables i.e. the left hand side of the equation will be a function of the predetermined variables (i.e. the right hand side of the equation will contain predetermined variables alone), this is referred to as the standard VAR or Reduced form VAR.

To get the standard VAR from the structural equation, pre-multiply equation (4) by A^{-1}. If done, the equation becomes:

$$x_t = A_0 + A_1 x_{t-1} + e_t \quad (5)$$

Where $A_0 = A^{-1}\Pi_0$, $A_1 = A^{-1}\Pi_1$, and $e_t = A^{-1}\varepsilon_t$.

Equation (5) is referred to as the standard VAR model, we estimate equation (5), and from the reduced form coefficients, we will be able to derive the structural parameters and standard estimation techniques require that the regressors be uncorrelated with the error term. However, it should be noted that the structural parameters can only be derived from the reduced form coefficients if the equation is identified. A structural system is said to be identified if it is possible to recover all the information in the primitive/ structural system from the estimated reduced form model. Since the structural model is found to have more parameters than the reduced form model, it is only possible to identify the structural model if we are willing to place restrictions on the parameters of the structural model.

As Enders (2014) noted, unless one is willing to restrict some of the parameters, the structural system are unidentified. In the same vein, Awad (2011) asserted that unless we appropriately restrict the structural model, it will not be possible to identify the structural shocks from the estimated reduced form. It should however be noted that under the Structural Vector Autoregression (SVAR), identification via imposition of restrictions on the structural parameters is done using economic theory. Theoretical backings are required in the process of identification. In contrast to SVAR approach, Enders (2014) argues that the VAR approach has been criticized as being devoid of any economic sense. The sole role of the economist is to suggest the appropriate variables to include in the VAR, from that point on, the procedure is almost mechanical; we could thus say that there is little economic input in the VAR system, but in the SVAR methodology, restrictions on the structural parameters are done by the researcher himself using economic theory as a backing. It is indeed clear that more economic meaning is expected in the SVAR methodology than VAR. As Enders (2014) stated, the aim of SVAR is to use economic theory to recover the structural innovations from the reduced form residuals.

It is thus imperative to state that under the SVAR methodology, more emphasis is on the structural errors rather than coefficient estimates. Although there are other identification schemes in the SVAR methodology, the study adopts the "recursive system" proposed by Sims (1980). Under the recursive system, the structural model is identified by imposing restrictions on the A-matrix (matrix of contemporaneous relationship among the variables) so that the matrix becomes either lower triangular or upper triangular. If the A-matrix is lower triangular, it means that the structural shocks of the preceding variable affects the succeeding variable, but the shocks of the succeeding variable does not in return affect the preceding variable and for upper triangular, the reverse is the case. According to Enders (2014), exact identification requires that $(n^2- n)/2$ restrictions be placed on the relationship between the regression residuals and structural innovations. Note that by placing restrictions on the A-matrix, the residuals are also decomposed in a triangular fashion; this is referred to as the "Choleski decomposition". To illustrate the process of identification, consider equation (1) and (2), and assume that based on economic theory, $b_{21}=0$, thus the equations become:

$$y_t = b_{10} - b_{12}z_t + \gamma_{11}y_{t-1} + \gamma_{12}z_{t-1} + \varepsilon_{yt} \quad (6)$$

$$z_t = b_{20} + \gamma_{21}y_{t-1} + \gamma_{22}z_{t-1} + \varepsilon_{zt} \quad (7)$$

It can be seen from equations (6) and (7) that since b_{21} was set to 0, z_t has a contemporaneous effect on y_t, but y_t on the other hand has no contemporaneous effect on z_t. In the same vein, it should be noted that ε_{yt} and ε_{zt} shocks affects y_t, but only ε_{zt} shocks affects z_t. To illustrate this, recall from equation (5) that:

$$e_t = A^{-1}\varepsilon_t \quad (8)$$

And since the reduced form errors are a composite of the two structural shocks, the relationship between the two after the imposition of restriction on the A-matrix is given as:

$$e_{1t} = \varepsilon_{yt} - b_{12}\varepsilon_{zt} \quad (9)$$

$$e_{2t} = \varepsilon_{zt} \quad (10)$$

From equation (9) and (10), it can be seen that the residual equation is decomposed in a triangular fashion; this is referred to as the Choleski decomposition. The covariance between the structural shocks ε_{yt} and ε_{zt} is also assumed to be 0 because both are assumed to be pure structural shocks and the variance of each shock is assumed to be time invariant, hence the variance covariance matrix of the structural shocks is a diagonal matrix. Since the major aim under the SVAR is to be able to retrieve the structural shocks from the reduced form errors by using economic theory to impose restrictions on the A-Matrix, we can do this by adapting equation (8) and pre multiplying it by matrix A. If done, the equation becomes:

$$\varepsilon_t = Ae_t \tag{11}$$

Abstracting from equations (11) and using our previous example of equation (6) and (7), our structural shocks equation can be specified as:

$$\varepsilon_{1t} = e_{1t} + b_{21}e_t \tag{12}$$

$$\varepsilon_{2t} = e_{2t} \tag{13}$$

From equations (12) and (13), after estimating the values of e_{1t}, e_{2t}, and b_{21}, we can be able to retrieve our structural shocks.

Another key important aspect of the SVAR analysis is the issue of "ordering". As Enders (2014) noted, the importance of ordering depends on the magnitude of correlation between the errors of the reduced form model. If the correlation coefficient between the errors is zero, the ordering is immaterial, but if otherwise, ordering the variables is important because wrong ordering can significantly affect the results. The study adopted the "Wold Causal Ordering". This ordering categorizes variables in the model into three; fast moving, slow moving and policy variables. Based on this ordering scheme, slow moving variables are entered first, then fast moving variables follow suit and then finally policy variables come in last.

There are basically two tools of analysis under the SVAR model as asserted by Enders (2014), they are:

- **Impulse Response Function (IRF):** This is a tool which allows you to trace out the time path of the various shocks on the variables contained in the VAR system. It shows the time path response of variable to shock in itself and shock to other variables in the model.

- **Forecast Error Variance Decomposition (FEVD):** This tells us the proportion of movement in a sequence that occurs due to its own shocks versus shocks to other variables in the model. In other words, it shows the apportionment of forecasting errors of a variable to itself and other variables in the system.

3.3 Model Specification

To examine the effect of fiscal policy shocks on output and unemployment in Nigeria and with consideration to Wold causal ordering, the endogenous variables to include in the model are ordered as:

[GDP, UNEMP, PEXP, REV]

Where GDP - Real Gross Domestic Product, UNEMP – Unemployment Rate, PEXP – Total Public Expenditure and REV – Total Government Revenue.

The SVAR model is identified to retrieve the structural shocks by using the recursive identification scheme proposed by Sims (1980) wherein the A-matrix is made a lower triangular as below:

$$\begin{bmatrix} \varepsilon_{gdp} \\ \varepsilon_{unemp} \\ \varepsilon_{pexp} \\ \varepsilon_{rev} \end{bmatrix} = \begin{bmatrix} 1 & 0 & 0 & 0 \\ b_{21} & 1 & 0 & 0 \\ b_{31} & b_{32} & 1 & 0 \\ b_{41} & b_{42} & b_{43} & 1 \end{bmatrix} \begin{bmatrix} e_{gdp} \\ e_{unemp} \\ e_{pexp} \\ e_{rev} \end{bmatrix}$$

4.0 Results and Discussion

4.1 Stationarity Test.

The first step in any time series analysis is to test whether or not a variable is stationary and also determine the order of integration of the variable. To do this, the Augmented Dickey Fuller (ADF) test for unit root was applied; the result is presented in Table 1.

Table 1: ADF Unit Root Test Result.

Variables	Level			First Difference			Order
	None	Intercept	Trend	None	Intercept	Trend	
GDP	2.65	0.72	-2.21	-1.99*	-3.38*	-3.60*	I(1)
PEXP	-0.43	-2.21	0.71	-0.64	-1.37	-4.45**	I(1)
REV	2.38	-1.41	-0.86	-4.57**	-5.93**	-3.19	I(1)
UNEMP	0.59	0.93	-2.32	-6.62**	-6.79**	-6.85**	I(1)

Source: Authors own computation using Eviews9.
**and* indicate rejection of Null hypothesis at 1% and 5% respectively.

Under the ADF unit root test, we reject the null hypothesis of non-stationarity of a series when the computed tau statistic is greater than the ADF tau critical value. The ADF unit root test result in Table 1.0 indicates that all variables are integrated of order one i.e. all the variables only became stationary after taking their first difference. We could thus say that all the variables are not stationary in their level form.

4.2 Lag Selection Criteria

In econometric analysis, the number of lags to include in a model has a lot of impact on the result of the analysis; as a result, it becomes necessary to include the optimal lag in running our models. There are several lag selection criteria, the number of lags suggested by majority of the different criteria is considered to be the optimal lag length to include. The lag selection criteria result is presented in Table 2.

Table 2: Lag Selection Criteria.

Lag	LR	FPE	AIC	SC
0	NA	0.002798	5.472708	5.657738
1	257.9151*	3.91e-07*	-3.414845	-2.48969*
2	14.94102	5.89e-07	-3.061724	-1.396449
3	21.80462	5.73e-07	-3.240834	-0.835436
4	21.87376	4.65e-07	-3.770987*	-0.625467

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion

From the lag selection criteria result in Table 2.0, it can be seen that most of the criterions selected a lag of one as the optimal lag length. Based on this, all subsequent analysis will be carried out using the optimal lag length of one.

4.3 **Cointegration Test.**

According to Engle and Granger (1987), regressing a non-stationary series on another non-stationary series yields spurious regression, but if the linear combination of the series is stationary, we could say the variables are cointegrated and the regression is no longer spurious. Variables are said to be cointegrated if they have long run association. Since our variables are non-stationary, it becomes imperative to test whether or not the variables are cointegrated. To do this, the study adopted the Johansen Cointegration Trace test; the result is presented in Table 3.

Table 3: Cointegration Test Result.

	TRACE TEST	
Hypothesized No. of CE(s)	Trace Statistic	0.05 Critical Value
None	48.42207*	47.85613
At most 1	24.19959	29.79707
At most 2	7.219654	15.49471
At most 3	3.467228	3.841466
At most 4	48.42207	47.85613

Source: Author's own computation.
* denotes rejection of the hypothesis at the 0.05 level

From the cointegration test result presented in Table 3, the decision rule is to reject the null hypothesis of no cointegration if the computed trace statistic is greater than the critical value. The test result indicates the rejection of no cointegration under none. We could thus say that there exists the presence of one cointegrating equation among the variables hence indicating the presence of long run relationship among the variables.

4.4 **Structural Vector Autoregression (SVAR) Result**

To examine the effect of fiscal policy shocks on Output and Unemployment in Nigeria, the IRF and FEVD from the estimated SVAR model is used, the results are presented below:

4.5 Impulse Response Function (IRF)

This is used to show the response of output and unemployment to innovations in the fiscal policy variables in the model. The IRFs are presented in the figures below:

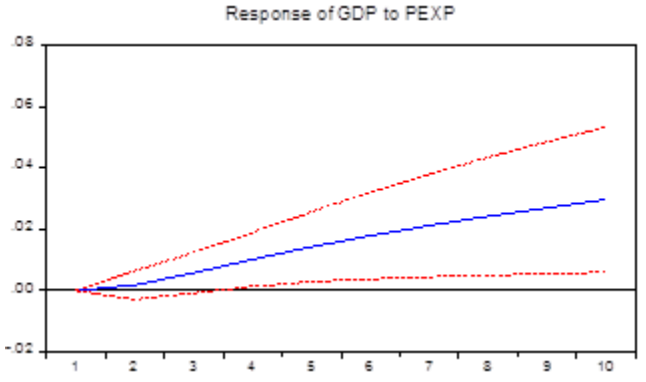

Figure 1: Response of Output to Shock in Public Expenditure.

Figure 1 depict the response of output to shock in public spending in Nigeria. The IRF plot shows a non-response of output to shocks in public expenditure in the first period, but afterwards, the response became increasingly positive all through the time horizon up to the tenth period. The response was mild from the first period to second period, but afterwards, it became a rapid positive response to shocks in public expenditure. We could thus infer from the above that public expenditure has a positive impact on output (economic growth).

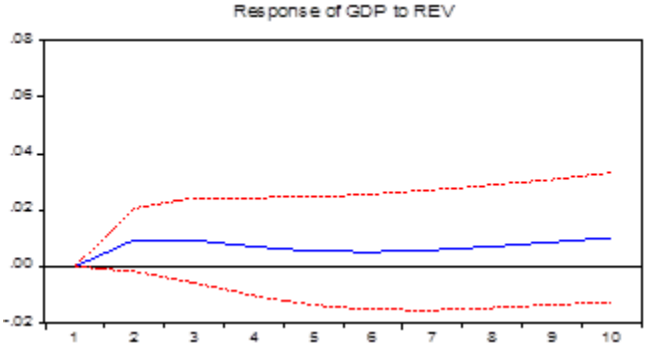

Figure 2: Response of Output to Shock in Revenue.

Figure 2 shows the response of output to one unit standard deviation shock in revenue. From the plot, it can be seen that at the first period, there was non-response of output to shock in revenue, but after the first period, the response was continuously positive up to the end of the tenth period. The peak positive

response was noticed around the second to third period, but afterwards, the positive response began to decline up to the seventh period after which the response began to rise again. It could thus be inferred from the above that the revenue as a component of fiscal policy has a positive impact on output (economic growth) of Nigeria, but not as much as the impact of public expenditure.

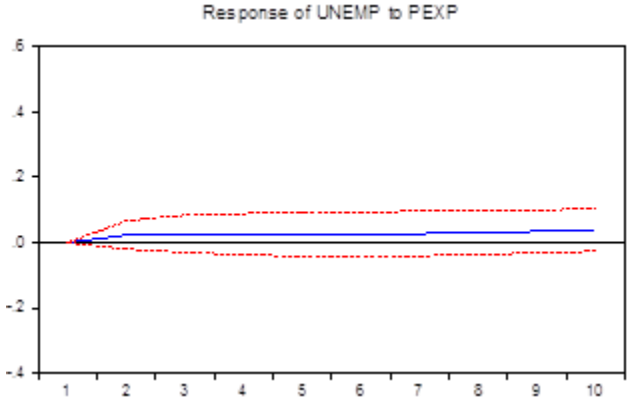

Figure 3: Response of Unemployment to Shock in Public Expenditure

Figure 3 shows the response of unemployment to one unit innovation in public expenditure. From the IRF plot, there was no initial response in the first period, but after the first period, through to the tenth period, a marginal positive response of unemployment to public expenditure shocks was noticed. We could thus posit that public expenditure has an insignificant positive impact on unemployment in Nigeria.

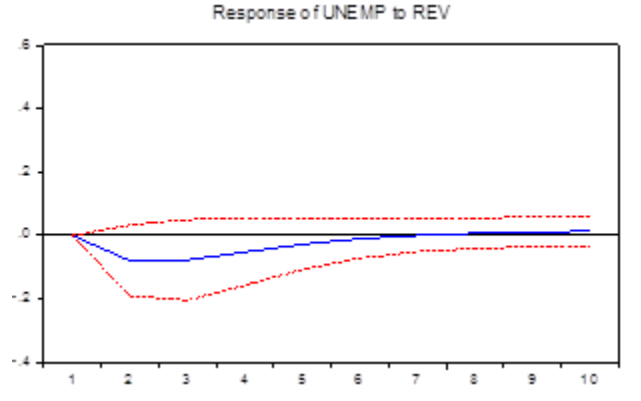

Figure 4: Response of Unemployment to Shock in Revenue

Figure 4 depicts the response of unemployment to shock in revenue. From the IRF plot, the response was negative from the first period through to the sixth

period after which the response returned to the zero line and remained around zero up to the tenth period. From the above, we can conclude that revenue has a negative impact on unemployment in Nigeria.

4.6 Forecast Error Variance Decomposition (FEVD)

The result of FEVD from the estimated SVAR model is presented in Table 4 and Table 5.

Table 4: Forecast Error Variance Decomposition of Output

Period	S.E.	GDP	UNEMP	PEXP	REV
1	0.032902	100.0000	0.000000	0.000000	0.000000
2	0.048068	90.43963	5.575698	0.137943	3.846731
3	0.061979	78.22112	16.28279	0.957047	4.539041
4	0.075335	67.84477	25.74958	2.469164	3.936488
5	0.087730	60.41451	31.84153	4.455138	3.288821
6	0.098918	55.36222	35.00771	6.773870	2.856198
7	0.108966	51.86411	36.14146	9.356935	2.637496
8	0.118096	49.28565	35.94953	12.16048	2.604348
9	0.126550	47.21408	34.91032	15.14253	2.733074
10	0.134537	45.40032	33.34098	18.25701	3.001684

Source: Author's own computation.

Table 4 presents the FEVD of Output in Nigeria. It can be noticed that in the first period, movements in Output is attributed to itself alone, but going down to the fifth period horizon, shocks in UNEMP accounted for about 31 percent of variations in Output, while shocks in PEXP and REV accounted for about 4 percent and 3 percent respectively. But as at the tenth period horizon, UNEMP shocks was found to influence about 33 percent movements in Output, while shocks to PEXP and REV accounted for about 18 percent and 3 percent respectively. From the FEVD result, it can be inferred that among the fiscal policy variables, PEXP exerts more influence to movements in Output than Revenue (which is found to be insignificant from the first period through to the tenth period horizon).

Table 5: Forecast Error Variance Decomposition of Unemployment

Period	S.E.	GDP	UNEMP	PEXP	REV
1	0.329394	0.085817	99.91418	0.000000	0.000000
2	0.430004	0.168325	96.15288	0.297338	3.381458
3	0.473663	0.392065	93.59636	0.576991	5.434579
4	0.491992	0.764023	92.26424	0.810824	6.160911
5	0.500483	1.243560	91.46684	1.028067	6.261533
6	0.505599	1.774149	90.78839	1.260127	6.177330
7	0.509673	2.311078	90.07522	1.534662	6.079039
8	0.513474	2.828126	89.29099	1.873861	6.007021
9	0.517239	3.312750	88.43158	2.293203	5.962463
10	0.521041	3.759853	87.49733	2.801521	5.941297

Source: Author's own computation.

Table 5.0 presents the forecast error variance decomposition of UNEMP. From the result, almost all the movement in UNEMP is influenced by shocks to its self in the first period. Going down to the fifth period horizon, shocks to GDP contributed insignificantly to movements in UNEMP at about 1.2 percent so also is the contribution of PEXP Shocks to UNEMP which stands at about 1 percent. Shocks to REV also influenced just about 6 percent movements in UNEMP. As at the tenth period horizon, the contribution of shocks to GDP and PEXP to movements in UNEMP were also insignificant. However, the contribution of REV Shocks was also marginally insignificant at about 6 percent. From the above, we could thus infer that of the two fiscal policy variables, REV was found to exert more influence on UNEMP. These findings corroborate the result of the Impulse Response Function obtained.

5.0 Conclusion and Policy Recommendations

This study examined the effect of fiscal policy shocks on output and unemployment in Nigeria under the Keynesian framework. Findings of the study showed that shocks to public expenditure have a long-lasting positive effect on output growth. The finding is in tandem with the Keynesian view and with studies such as Nathan (2012), Hussain et al (2009), Sikiru and Umar (2012), and Abdulrauf (2015). Revenue shock was also found to have mild positive impact on output in Nigeria. This finding is not surprising considering the fact that an increase revenue inflow can be channeled into increase in public spending and thus can propel output growth.

Shock to public expenditure was found to have an insignificant positive effect on unemployment in Nigeria. This finding can be rationalized with the argument that public expenditure in Nigeria is skewed towards unproductive expenditure such as salaries, overheads, debt servicing and the like which hardly lead to employment generation. This finding opposes the finding of Obayori (2016) which found public expenditure as having a negative impact on unemployment in Nigeria. Revenue shock was found to have a short-lived negative effect on unemployment in Nigeria. This points to the fact that an increase in revenue can reduce unemployment in the short run through hiring of more employees by the government or carrying out some projects that requires temporary employment of people, thus leading to a reduction in the unemployment rate in the short run.

On the overall, both public expenditure and revenue are found to stimulate output growth, but the effect of public expenditure is more. On the unemployment part, revenue is found to reduce unemployment in the short run, while public expenditure is found to produce no significant effect on unemployment.

As a policy recommendation, the study suggest among others that since public expenditure is found to be an output stimulant, the government should consider restructuring its expenditure pattern by allocating more towards productive expenditure such as capital projects; this will have the effect of both stimulating output growth and reducing unemployment. Government should also consider harnessing its revenue potentials by expanding its revenue base via effective and efficient taxation system, diversification of Nigeria's revenue base by tapping into our solid minerals and agricultural potentials. Now that the economy is in recession, the government should consider massive fiscal stimulus in the 2017 and subsequent budget with at least 50 percent of the spending allocated to capital vote. Above all, government should consider judicious use of the resources allocated and also block all loopholes.

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APPENDICES

LAG SELECTION CRITERIA

VAR Lag Order Selection Criteria
Endogenous variables: GDP PEXP REV UNEMP
Exogenous variables: C
Date: 10/03/16 Time: 18:00
Sample: 1981 2015
Included observations: 31

Lag	LogL	LR	FPE	AIC	SC
0	-80.82697	NA	0.002798	5.472708	5.657738
1	72.93010	257.9151*	3.91e-07*	-3.414845	-2.489692*
2	83.45672	14.94102	5.89e-07	-3.061724	-1.396449
3	102.2329	21.80462	5.73e-07	-3.240834	-0.835436
4	126.4503	21.87376	4.65e-07	-3.770987*	-0.625467

* indicates lag order selected by the criterion

JOHANSEN COINTEGRATION TEST
Date: 10/03/16 Time: 17:56
Sample (adjusted): 1983 2015
Included observations: 33 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP PEXP REV UNEMP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic
None *	0.520022	48.42207
At most 1	0.402227	24.19959
At most 2	0.107483	7.219654
At most 3	0.099736	3.467228

Trace test indicates 1 cointegrating eqn(s) at the
* denotes rejection of the hypothesis at the 0.05 l
**MacKinnon-Haug-Michelis (1999) p-values