Government expenditure-revenue nexus reconsidered for Nigeria: Does structural break matter?

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ABSTRACT

This paper re-examines the government expenditure-revenue nexus in Nigeria from 1970 to 2015. It utilizes the Lee and Strazicich (2003 and 2004) unit root tests that endogenously determines two/one structural breaks in intercept and slope to ascertain the stationarity of the data. The Toda-Yomamoto modified Wald (MWALD)-based causality test that arbitrage between the results with and without structural breaks was conducted to determine the direction of causality between the government expenditure and revenue. The results for the causality test without break suggest that bi-directional causality exists between government expenditure and revenue suggesting the existence of the fiscal synchronization hypothesis. However, the causality test with break reveals a unidirectional causality running from government expenditure to revenue indicating that the spend-revenue hypothesis holds. This finding is a clear departure from other studies on oil rich countries; thus indicating that accounting for structural break is vital when determining the relationship between government expenditure and revenue for resource countries. This study, therefore, suggests that government should embark on the diversification of the economy away from oil in order to promote reliable and sustained sources of revenue for the nation.

Keywords: Government expenditure, government revenue, structural break, Causality, Nigeria.

JEL Classification: H2, H5, H62.

1. Introduction

The link between government expenditure and revenue has over the years dominate both empirical and policy space in public finance. Theoretically, there is three possible outcomes regarding this relationship. These are revenue-spend hypothesis proposed by Friedman (1978); spend-revenue hypothesis advocated by Peacock and Wiseman (1961, 1979); and the fiscal synchronization proposed by Musgrave (1966) and Meltzer and Richards (1981). The exact relationship that holds has implication on the policy direction of a country. For example, if the revenue-spend hypothesis holds for a country, it means that the country can eliminate budget deficit by stimulating government revenue. On the other hand, when the spend-revenue hypothesis holds, it implies that the country pays for its expenditure by raising

revenue in the future. Finally, if the fiscal synchronization hypothesis holds, it indicates that the country takes its spending and revenue decisions simultaneously.

Empirical studies have shown that in most resource endowed countries the revenue-spend hypothesis usually holds. This is because most of these countries enjoy high proceeds from foreign exchange earnings which to a larger extent determine their spending pattern. Specifically, oil rich countries are mostly found wanting in this regard (see Fasano and Wang, 2002). However, the nature of oil price which is the major determinant of revenue in these countries has not been given due attention. The price of oil over the years are prone to fluctuation indicating the likelihood for structural break in the trend and pattern of revenue in these countries. These breaks go a long way in determining the exact nature of the relationship between government expenditure and revenue that holds for these countries.

Incidentally, most studies on expenditure-revenue nexus for oil producing countries have not accounted for structural breaks in revenue flows before arriving at the hypothesis that holds for the country they studied (See for example, Fasano and Wang, 2002; Narayan and Narayan, 2006; Chang and Chiang, 2009; Saeed and Somaye, 2012; Aregbeyen and Ibrahim, 2012a, 2012b; Elyasil and Rahimi 2012; Ogujibuba and Abraham 2012; Nwosu and Okafor, 2014; Al zeaud, 2014; Obeng, 2015; and Takumah, 2015). Given the importance of structural breaks in determining the exact relationship that exists between government expenditure and revenue, this study examines this relationship for Nigeria by accounting for structural breaks in the trend and pattern of government expenditure and revenue.

The aforementioned objective of this study is achieved through two steps. The first step is the conduct of a unit root test to ascertain the stationarity property of the data in the face of structural breaks using a minimum Lagrange Multiplier (LM) unit root test developed by Lee and Strazicich (2003 and 2004) that endogenously determines two/one structural breaks in intercept and slope. In contrast to other unit root tests, this test is not subject to rejections of the null in the presence of a unit root with break(s). In the second step, the Toda and Yamamoto (1995) procedure to test for causality is augmented by exogenously including a dummy to account for this structural breaks within a VAR framework. The remaining of the paper is organized as follows. The next section, present the literature review. This is followed

by the discussion of the econometric methodology in section 3. The fourth section presents the empirical results, while the final section is the concluding remarks.

2. Literature Review

Starting from the works of Friedman (1978); Peacock and Wiseman (1961, 1979); Musgrave (1966); and Meltzer and Richards (1981) that clearly define the three distinct hypothesis (revenue-spend; spend-revenue; and fiscal synchronization) on the relationship between expenditure and revenue, there exists a number of empirical literatures that have investigated which of these hypothesis holds for a country or a panel of countries. Notwithstanding the inexhaustible literature on the subject matter, the collective verdict on the causality between expenditure and revenue remains inconclusive. For instance, the study by Anderson, Wallace, and Warner (1986) for the US economy between 1946 and 1983 used Granger causality test. The results of this study revealed that the spend-revenue hypothesis holds for the US economy.

In the same vein, Joulifain and Mookerjee (1991) conducted the same study for 22 OECD countries from 1961 to 1986 using Vector Autoregressive (VAR) framework and also concluded that the spend-revenue hypothesis holds for the US, Austria, Finland, France, Greece, Japan and UK economies. However, the revenue-spend hypothesis holds for Italy and Canada while Fiscal Synchronization holds for countries like Australia, Belgium, Denmark, Iceland, Luxemburg, Netherlands, Norway, Portugal, Spain, Sweden, and Switzerland.

Owoye (1995) used the Error Correction Mechanism (ECM) to examine the expenditure-revenue nexus for seven (7) European countries for the period 1961 to 1991. The results of the study indicate that fiscal synchronization holds for all the countries except for Italy and Germany where revenue-spend hypothesis holds.

Fasano and Wang (2002) examined the link between expenditure and revenue in oil-dependent countries like Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates for the period 1961 to 1999. The study utilized the ECM framework and variance decomposition to show that the revenue-spend hypothesis holds for all the countries sampled.

In another study, Narayan and Narayan (2006) investigated the direction of causality between government expenditure and revenue for twelve (12) developing countries using the Toda and Yomamoto (1995) causality test. The findings of the study revealed that the revenue-spend hypothesis holds for Mauritius, El Salvador, Haiti, Chile and Venezuela while there is neutrality between revenue and expenditure for Peru, South Africa, Guatemala, Uruguay and Ecuador implying inconsistent with the fiscal synchronization hypothesis. Chang and Chiang (2009) in another panel study for fifteen (15) OECD countries from 1992 to 2006 utilized panel VAR and found a bidirectional link between expenditure and revenue suggesting that fiscal synchronization holds for the 15 countries.

Also using panel VAR framework, Saeed and Somaye (2012) investigated the causal link between government expenditure and revenue in oil exporting countries during the period 2000-2009 and found a positive unidirectional causality running from revenue to expenditure indicating the existence of the revenue-spend hypothesis.

For Iran, Elyasil and Rahimi (2012) evaluates the link between government expenditure and revenue using the Autoregressive Distributed Lag (ARDL) model for the period 1963 to 2011 and found a bi-directional causality confirming the fiscal synchronization hypothesis for the Iranian economy. Correspondingly in the same region, using the VECM framework, Al-Zeaud (2014) conducted the same study for Jordan between the periods 1990 to 2011 and also found a bi-directional relationship indicating that the fiscal synchronization hypothesis holds for the Jordan economy.

In Nigeria, the study by Aregbeyen and Ibrahim, 2012a and 2012b examined the causal relationship between expenditure and revenue using two different methodologies. Aregbeyen and Ibrahim (2012a) used the ARDL bound test cointegration approach during the period 1970 to 2008. The findings of the study suggest that revenue- spend hypothesis holds for Nigeria. However, in another study, using the Granger causality test for the period 1970 to 2006, the same authors found a bi-directional relationship between expenditure and revenue indicating that the fiscal synchronization hypothesis is confirmed for Nigeria. Similarly, the works by Ogujibuba and Abraham (2012); and Nwosu and Okafor (2014) used the Vector Error Correction Mechanism (VECM) during the period 1970 to 2011 to investigate the expenditure-revenue nexus for the Nigerian economy. The results of Ogujibuba and Abraham

(2012) re-enforced the existence of the revenue-spend hypothesis while that of Nwosu and Okafor (2014) supports the spend-revenue hypothesis.

Elsewhere in Africa, the study by Obeng (2015) for Ghana used the VAR causality test for the period 1980 to 2013 and found causality running from government revenue to expenditure indicating that the revenue-spend hypothesis hold for Ghana economy. However, the study by Takumah (2015) for the same country during the period 1986 to 2012 used VECM and found that there is a bi-directional relationship expenditure and revenue confirming the existence of the fiscal synchronization hypothesis.

Furthermore, the study by Baharumshah, Jibrilla, Sirag, Ali and Muhammad (2016) for the South African Economy used the Threshold Autoregressive (TAR) and Momentum Threshold Autoregressive (MTAR) models to analyze the link between government revenue and expenditure between the period 1960 and 2013. The findings of the study indicate no asymmetric cointegration between expenditure and revenue implying the existence of neutrality. However, using the same models and quarterly data from 1960 to 2016, Phiri (2016) observed a bi-directional causality between revenues and expenditures supporting the fiscal synchronization hypothesis for the South African economy.

Summarily, from the literature reviewed, three major lessons can be drawn. First, it is obvious that the hypothesis showing the link between government revenue and expenditure has no definite pattern among countries. Second, the results and findings from these studies is a function of the data and estimation technique adopted by the author. Third, it is clear that no study to date has considered the possibility of structural breaks in the flows and patterns of government revenue in most oil producing and exporting countries caused by fluctuation in the price of oil in the global market.

3.0. Econometric Methodology

3.1. Unit Root test

As stated earlier, the methodological approach adopted to achieve the objective of this study is in two steps. The first involves the conduct of a unit root test that accounts for structural breaks to establish the stationarity property of the data using a minimum Lagrange Multiplier (LM) unit root test developed by Lee and Strazicich (2003 and 2004) that endogenously determines two/one structural breaks in intercept and slope. This unit root test is adopted

because on like the augmented Dickey-Fuller (ADF) type endogenous break unit root tests such as Zivot and Andrews (1992); Perron (1997); and Vogelsang and Perron (1998) that omit the possibility of a unit root with break, the Lee and Strazicich (2003, 2004) tests are not subject to rejections of the null in the presence of a unit root with break(s).

Moreover, if a break exists under the endogenous break unit root tests null hypothesis, two unwanted results may occur. The first is that the tests will exhibit size distortions such that the null hypothesis is rejected too often. However, it is important to note that this nuisance parameter problem is common to endogenous break tests alone and not with the exogenous break unit root test (Lee and Strazicich, 2004). The second consequence is the incorrect estimation of the break point. As noted by Lee and Strazicich (2001), the endogenous break tests tend to identify the break point at one period prior to the true break point thereby estimating a bias persistent parameter which brings about a spurious rejection of the null or alternative hypotheses.

To correct the problems associated with the endogenous break tests, Lee and Strazicich (2004), utilized the theoretical findings of Lee and Strazicich (2003) to propose an alternative one-break unit root test that is not affected by structural breaks under the null. Similar to the endogenous two-break Lagrange Multiplier (LM) unit proposed by Lee and Strazicich (2003), the one-break test is also invariant to the magnitude of a structural break under the null and alternative hypotheses.

In line with Lee and Strazicich (2004), an unobserved components model is expressed as:

$$y_t = \alpha Z_t + X_t, \quad X_t = \beta X_{t-1} + \varepsilon_t \tag{1}$$

Where Z_t is a vector of exogenous variables and $\varepsilon_t \sim iid\ N(0, \sigma^2)$. Thus, the null hypothesis is given as $\beta = 1,$ if $Z_t = [1, t]'$ which the same as the decision of "no break" for Schmidt and Philips (1992) LM unit root test.

For the one structural break tests, two models are considered namely model A and B. Model A allows for a one-time change in intercept described by $Z_t = [1, t, D_t]'$ while Model B allows for a shift in intercept and change in trend slope under the alternative hypothesis given as: $Z_t = [1, t, D_t, DT_t]'$. Where $D_t = 1$ for $t \geq T_B + 1$, and zero otherwise; and $DT_t = t - T_B$ for $t \geq T_B + 1$, and zero otherwise. T_B is the time it takes for structural break to occur and $\alpha = (\alpha_1, \alpha_2, \alpha_3)^2$.

On the other hand, the two structural breaks assume that Model A allows for a double change in intercept described by $Z_t = [1, t, D_{1t}, D_{2t}]'$. Where $D_{jt} = 1$ if $t \geq T_{Bj} + 1$, for j = 1, 2. Model B allows for double a shift in intercept and trend slope described by $Z_t = [1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}]'$. Where $D_{jt} = t - T_{Bj}$ if $t \geq T_{Bj} + 1$, for j = 1, 2.

To obtain the Lee and Strazicich (LS) minimum one–break and two-break LM unit root statistics, equation 2 is estimated.

$$\Delta y_t = \alpha' Z_t + \lambda \tilde{Q}_{t-1} + \mu_t \qquad (2)$$

Where $\tilde{Q}_t = y_t - \tilde{\varphi}_x - Z_t \tilde{\alpha}$, t = 2, …, T. $\tilde{\alpha}$ are the coefficient of regressing Δy_t on ΔZ_t. $\tilde{\varphi}_x$ is derived by $y_1 - Z_1 \tilde{\alpha}$. y_1 and Z_1 are the first observation of y_t and Z_t respectively. The null hypothesis of unit root is tested using the (LM) t-statistic for $\lambda = 0$. The break point(s) are determined to be where the t- statistic is minimized. To correct for the plausibility of serial correlation, the augmented term $\Delta \tilde{Q}_{t-j}$ for j =1,…,k is included in equation 2.

In conducting break unit root test, the procedure for selecting the maximum lag length (k) is very crucial. To this end, this study adopts the general to specific approach proposed by Lee and Strazicich (2003 and 2004) as against the information criteria used in the Dickey-Fuller type unit root tests which tend to select a lag length that is very small. Thus k for this study was set to equal 2.

3.2. Causality Test

The Granger-Causality proposed by Granger (1969) remains the most common approach to test the causal relationship between two variables. This test involves the estimation of a simple vector auto-regressive (VAR) model. The Granger representation Theorem opined that if a pair of series is integrated of order one, that is I(1) are cointegrated then there must be at least a unidirectional causality running from either way. In such situation, the usual methodological approach adopted by most studies to test for causality between the two variables is in two folds. First is to carry out a unit root test to know the level of integration and then the second is to conduct a cointegration test. Based on the unit root result, the Engle-Granger or Johansen type cointegration is applied to the two variables to ascertain the long run relationship among series. Thus, if the cointegration results show that long run relationship exists, the causality test can be carried out in two ways. The first approach is to conduct causality for the integrated data at levels within a bivariate auto-regressive framework. The second method is the adoption of a bivariate model that contains an error correction term which is in line with the Granger Representation Theorem. However, in the case where the integrated series are not cointegrated, the causality is conducted using the first differenced data that indicates stationarity.

Granger non-causality test can be conducted using an unrestricted VAR model to show whether some parameters are jointly zero through the standard (Wald) F-test. This approach to causality has been discussed extensively in the works of Sims, Stock and Watson (1990) and Toda and Philips (1993). These studies argued that the Wald test for non-causality within an unrestricted VAR system when the variables are integrated has a nonstandard limit distribution. Enders (2004) has also proved that using F-statistic to jointly test first differential VAR in some specific cases is permissible if the two-variable VAR system has lagged length of up to two periods and only one of the variable is nonstationary. Similarly, Toda (1995) has also shown that causality inference based on the error correction model (ECM) can be biased because the Johansen-type ECM are sensitive to the value of the nuisance parameters.

Toda and Yamamoto (1995) proposed an interesting simpler method of causality test based on an augmented VAR modelling that introduced a modified Wald test statistic (MWALD). This approach to causality does not require pretesting for cointegration properties of the

series. The T-Y test is chosen ahead of the conventional Granger causality due to its power property in dealing with series of different levels of integration; and also to avoid specification bias and spurious regression.

The T-Y approach involves three steps. First, is finding the maximum order of integration d-max of the series that are to be incorporated in the model using the conventional ADF unit root test. Second, involves specifying a well behaved kth optimal lag order vector autoregressive model in levels (not in the difference series). This is usually determined based on selection criterion such as the Akaike Information criterion (AIC), Bayesian information criterion (BIC), or Schwarz Info Criterion (SIC) or the democracy of these criterion which will make the VAR model well behaved in term of AR unit root graph, VAR residual serial correlation LM-stat, VAR residual normality tests. Third is carrying out the modified Wald (MWALD) test by intentionally over-fitting the underlying model with additional dmax order of integration. This process would be done twice. The first is for the variables at levels while the second would account for structural breaks in the series in order to reflect the fluctuation in government revenue due to variation in oil price in the global market. Therefore:

Considered the following VAR(*p*) model:

$$y_t = \alpha + \beta_1 y_{t-1} + ... + \beta_\rho y_{t-\rho} + \varepsilon_t \tag{3}$$

Where y_t, α and $\varepsilon_t \sim (0, \Omega)$ are *n*-dimensional vectors and β_k is an n x n matrix of parameters for lag k. To implement the TY approach, an augmented VAR(p +d) model is utilized. This is expressed as:

$$y_t = \hat{\alpha} + \hat{\beta}_1 y_{t-1} + ... + \hat{\beta}_\rho y_{t-\rho} + \hat{\beta}_{\rho+d} y_{t-\rho-d} + \hat{\varepsilon}_t \tag{4}$$

Where circumflex above the variable in equation (4) denotes estimated parameter from ordinary least square (OLS). The *p* order of the process is assumed to be known while *d* is the maximal order of integration of the variables in the model. The null hypothesis presented below is not rejected if the jth element of y_t does not Granger-cause the ith element of y_{t-1}.

H_o: the row i, column j element in β_k equals zero for k = 1,…, *p*. (5)

Thus the matrix representation of equation (5) with optimal lag length estimated as 2 is expressed as:

$$\begin{pmatrix} Lgex_t \\ Lgev_t \end{pmatrix} = \begin{pmatrix} a_{10} \\ a_{20} \end{pmatrix} + \begin{pmatrix} a_{11}^{1} & a_{12}^{1} \\ a_{21}^{1} & a_{22}^{1} \end{pmatrix} \begin{pmatrix} Lgex_{t-1} \\ Lgev_{t-1} \end{pmatrix} + \begin{pmatrix} a_{11}^{2} & a_{12}^{2} \\ a_{21}^{2} & a_{22}^{2} \end{pmatrix} \begin{pmatrix} Lgex_{t-2} \\ Lgev_{t-2} \end{pmatrix} + \begin{pmatrix} e_{1t} \\ e_{2t} \end{pmatrix} \quad (6)$$

Where $Lgex_t$ and $Lgev_t$ denotes the logarithm of government expenditure and revenue respectively. The hypothesis that government revenue does not cause government expenditure is expressed as:

$$H_0 : a_{12}^{1} = a_{12}^{2} = 0 \quad (7)$$

Whereas the hypothesis that government expenditure does not cause government revenue is given as:

$$H_0 : a_{21}^{1} = a_{21}^{2} = 0 \quad (8)$$

The hypothesis stated in equation (7) and (8) are tested using the MWALD test for both models with and without break.

The second procedure is to include dummy variables exogenously in the VAR model to account for breaks in the series. This dummy takes binary number 1 for years where there is break and 0 otherwise. The inclusion of the dummy variables will make possible to compare the causality between government expenditure and revenue with or without breaks.

3.3. Sources of Data

The annual time series data used in this study is for the period 1970 to 2015 and were collected from the Central Bank of Nigeria Statistical Bulletin (2015). The variables of interest are total government expenditure (Lgex) and total revenue (Lgev).

4.0 Empirical Results

4.1 Unit Root Test Results

The results of the Lee and Strazicich (2004) and Lee and Strazicich (2003) tests that allows for one and two structural breaks respectively are presented in Table 1. From the results, both test indicate that all the variables are stationary around a broken trend at least 1% significance level for Model A and B. The Lee and Strazicich (2003) test indicates two breaks for total government revenue (1986 and 2000) for Model A while 1986 and 1995 were the break years in Model B. As seen from the Table, 1986 is a common break year for Model A and B. Furthermore, the year 2000 was also selected as the year of break in Model B for the Lee and Strazicich (2004) one break test. However, 1993 was selected as the break year in Model A for the same test. Coincidentally, 1993 happen to be a year of common significant breakpoint that characterizes both the total government and revenue expenditure in the Lee and Strazicich (2004) one break test.

Parenthetically, what is evident from these results is that the break point years selected happen to fall within the historical years of oil fluctuation in the world. For instance, oil price peaked at 1980 ($103.76) after the Iranian revolution of 1979. However, it dropped slowly to as low as $22 in the 1980s during the reservation and insulation periods. The Persian Gulf crisis and war of 1990 brought a period of global recessions where oil price plummet to below $15 all through the 1990s before it peaked to as high as $45 dollars in 2001. This fluctuation in oil price has serious effect on Nigerian economy since the country's fiscal policy is largely influenced by the development in the oil sector. The years selected as break point years for total government expenditure for both tests also fell within the same period indicating that the Nigerian government expenditure pattern is largely tied to the fluctuation in world oil market price and domestic production of oil. Furthermore, the adoption of the structural adjustment programme (SAP) also affected the expenditure pattern of the country.

Table 1: Unit Root Tests Results (1970-2015) **K = 2**

	Lee and Strazicich (2004) (One break)				Lee and Strazicich (2003) (two breaks)					
Variables	Model A		Model B		Model A			Model B		
	TB	t-Stat	TB	t-stat	TB1	TB2	t-stat	TB1	TB2	t-stat
Lgex	1986	-8.99*	1993	-9.06*	1993	1988	-9.38*	1993	2000	-9.17*
Lgev	1993	-7.59*	2000	-8.23*	1986	2000	-7.79*	1986	1995	-8.51*

Source: Author's Computation

Notes: (1) The critical values for the one break test: Model A: -4.95, -4.44 and -4.19; Model B: (-5.35 to -5.21), (-4.86 to -4.61) and (-4.17 to -4.21) at the 1%, 5% and 10% levels respectively.

(2) The critical values for the two break test: Model A: -4.95, -4.84 and -4.50; Model B: -5.19, -5.13 and -4.89 at the 1%, 5% and 10% levels respectively.

(3) *, ** and *** depicts statistical significance at 1%, 5% and 10% significant level.

4.2. Causality Test Results

In line with the findings of other authors (See for example, Aregbeyen and Ibrahim, 2012a; Aregbeyen and Ibrahim, 2012b; and Nwosu and Okafor, 2014) on the relationship between expenditure and revenue for Nigeria, the issue of cointegration has been settled in the literature however, the direction of causality remains the major unresolved issue because the direction causality determines the hypothesis that holds for a country and this has implication on the policy embarked on by the country. Based on the approach adopted by Narayan and Narayan (2006) in which they concentrated on causal direction between expenditure and revenue using the Toda-Yomamoto granger non-causality test, this study adopts the same methodology and presents only the causality test to ascertain the direction of causality between expenditure and revenue.

The results of Toda–Yamamoto Granger non-causality test with and without breaks are presented in Table 2 and 3 respectively. The results in Table 2 (causality without break) indicate that there exists a bi-directional causality between government expenditure and revenue at 5% level of significance. This result is in tandem with the findings of Aregbeyen and Ibrahim (2012b). However, the results of the model accounting for breaks in Table 3 reveal that there exists a unidirectional causality running from government expenditure to revenue. This result is not in consonant with the finding of Aregbeyen and Ibrahim (2012a), and Ogujibuba and Abraham (2012) but it is the same with the findings of Nwosu and Okafor (2014) who found that the spend-revenue hypothesis holds for Nigeria. In line with the argument of Fasano and Wang, (2002) that the revenue-spend hypothesis holds for most oil rich countries because they enjoy high proceeds from foreign exchange earnings which largely determine their spending pattern, this result is a departure from the findings of most studies on oil rich countries. Nonetheless, the Nigerian case can be said to be peculiar because, within the sampled period of this study (1970-2015), the country operates budget deficit suggesting that the nation embarked on high public debt to augment for the shortfall in

oil revenue since the country's budget is benchmarked with the price of oil. Thus, as government expenditure profile continues to grow due to increased demand for public goods, government continue to borrow to address the fall in revenue occasioned by fluctuation in oil price. This to a large extends explain why the spend-revenue hypothesis hold for Nigeria as against findings obtained from oil producing countries like Bahrain, Kuwait, Oman, Iran, Qatar, Saudi Arabia, Ghana and United Arab Emirates.

Table 2: Toda-Yamamoto Causality (Without breaks) Test Result

Null hypothesis	Df	MWALD	Prob	Decision
LREV does not Granger-cause **LGEX**	2	5.371	0.0181	Reject
LGEX does not Granger-cause **LREV**	2	7.806	0.0202	Reject

Source: Authors' computation

Table 3: Toda-Yamamoto Causality (With breaks) Test Result

Null hypothesis	Df	MWALD	Prob	Decision
LREV does not Granger-cause **LGEX**	2	4.595	0.1005	Do not Reject
LGEX does not Granger-cause **LREV**	2	8.063	0.018	Reject

Source: Authors' computation

5. Conclusion

This study has investigated the relationship between government expenditure and revenue in Nigeria during the period 1970 to 2015. It employs the Lee and Strazicich (2003 and 2004) unit root tests that endogenously determines two/one structural breaks in intercept and slope. It also carried out a causality test that compares the results with and without a structural break using the Toda-Yomamoto causality test. The unit root tests results reveal that all the variables are stationary around a broken trend at least 1% significance level. The causality test results without break indicate that there exists a bi-directional causality between government expenditure and revenue suggesting the existence of the fiscal synchronization hypothesis. On the other hand, the test with break reveals a unidirectional causality running from government expenditure to revenue indicating that the spend-revenue hypothesis holds. Although this result is in dissonance with the findings of most studies on oil rich countries, however, this findings can be attributed to the huge budget deficit embarked on by Nigerian

government due to the fluctuation in oil revenue. Therefore, accounting for structural break is vital when determining the relationship between government expenditure and revenue for resource-based countries. This study suggests that government should embark on the diversification of the economy away from oil in order to promote reliable and sustained sources of revenue to meet the increasing demand for public goods by the citizenry.

References

Al-Zeaud, H. (2014). The causal relationship between government revenue and expenditure in Jordan. *Global Journal of Management and Business Research,* **14**(6), pp. 1-11.

Anderson, W., Wallace, M. S. and Warner, J. T. (1986). Government spending and taxation: what causes what?. *Southern Economic Journal,* **52,** pp. 630–639.

Aregbeyen, O. and Ibrahim, T. M. (2012a). Testing the revenue and expenditure nexus in Nigeria: An application of the bound test approach. *European Journal of Social Science,* **27**(3), pp. 374- 380.

Aregbeyen, O. and Ibrahim, T. M. (2012b). The causal relationship between government spending and revenue in an oil-dependent economy: the case of Nigeria. *The IUP Journal of Public Finance*, **10**(1), pp. 6-21.

Baharumshah, A., Jibrilla, A., Sirag, A., Ali, H. and Muhammad, I. (2016). Public revenue-expenditure nexus in South Africa: are there asymmetries. *South African Journal of Economics*, **84**(4)**,** pp. 520-537.

Central Bank of Nigeria (2015). Statistical Bulletin.

Chang, T. and Chiang, G. (2009). Revisiting the revenue-expenditure nexus: Evidence from 15 OECD countries based on the panel data approach. *Czech Journal of Economics and Finance,* **59**(2), pp. 165-172.

Elyasil, Y. and Rahimi, M. (2012). The causality between government revenue and government expenditure in Iran. *International Journal of Economic Sciences and Applied Research,* **5**(1), pp. 129-145.

Fasano, U. and Wang, Q. (2002). Testing the relationship between government spending and revenue: evidence from GCC countries. IMF *Working Paper WP/02/201,* Policy and Development Review Department, IMF, Washington.

Friedman, M. (1978). The limitations of tax limitations. *Policy Review,* Summer, pp. 7–14.

Granger, C. W. J. (1969). Investigating causal relationship in econometric models and cross spectral methods. *Econometrica,* **37,** pp. 424-438.

Joulfaian, D. and Mookerjee, R. (1991). Dynamics and government revenue and expenditure in industrial countries. *Applied Economics,* **23**, pp. 1839–1844.

Lee, J. and Strazicich, M. C. (2001). Break point estimation and spurious rejections with endogenous unit root tests. *Oxford Bulletin of Economics and Statistics*, **63,** pp. 535-558.

Lee, J. and Strazicich, M. C. (2003). Minimum LM unit root test with two structural breaks. *Review of Economics and Statistics*, **85**(4), pp. 1082-1089.

Lee, J. and Strazicich, M. C. (2004). Minimum LM unit root test with one structural break, Department of Economics, Appalachian State University, Unpublished Manuscript.

Meltzer, A. H. and Richard, S. F. (1981). A rational theory of the size of the government.

Journal of Political Economy, **89,** pp. 914–927.
Musgrave, R. A. (1966). Principles of budget determination, in *Public Finance: Selected Readings* (Eds) A. H. Cameron and W. Henderson, Random House, New York, pp. 15–27.
Narayan, P. K. and Narayan, S. (2006). Government revenue and government expenditure nexus: evidence from developing countries, *Applied Economics,* **38**(3), pp. 285-291.
Nwosu, D. and Okafor, H. (2014). Government revenue and expenditure in Nigeria: A Disaggregate analysis. *Asian Economic and Financial Review,* **4**(7), pp. 877-892.
Obeng, S. (2015). A causality test of the revenue-expenditure nexus in Ghana. *ADRRI Journal of Arts and Social Sciences,* **11**(1), pp. 1-19.
Ogujiuba, K. and Abraham, T. (2012). Testing the relationship between government revenue and expenditure: Evidence from Nigeria. *International Journal of Economics and Finance,* **4**(11), pp. 172-182.
Owoye, O. (1995). The causal relationship between taxes and expenditure in the G7 countries: cointegration and error correction models. *Applied Economic Letters,* **2,** pp. 19–22.
Peacock, A. T. and Wiseman, J. (1961). The growth of public expenditure in the United Kingdom. Princeton University Press for the National Bureau of Economic Research, Princeton, NJ.
Peacock, A. T. and Wiseman, J. (1979). Approaches to the analysis of government expenditure growth. *Public Finance Quarterly,* **7,** pp. 3–23.
Perron, P. (1997). Further evidence on breaking trend functions in macroeconomic variables. *Journal of Econometrics,* **80**, pp. 355-385.
Phiri, A. (2016). Asymmetries in the revenue-expenditure nexus: new evidence from South Africa. *MPRA Working Paper No. 75224*.
Saeed, P. K. and Somaye, S. (2012). Relationship between government spending and revenue: evidence from oil exporting Countries. *International Journal of Economics and Management Engineering (IJEME).* **2**(2), pp. 95-97.
Schmidt, P. and Phillips, P.C.B. (1992). LM tests for a unit root in the presence of deterministic trends. *Oxford Bulletin of Economics and Statistics*, **54,** pp. 257-287.
Sims, C., Stock, J., and Watson, M. (1990). Inference in linear time series models with some unit roots. *Econometrica,* **58**(1), pp. 113-144.
Takumah, W. (2015). The dynamic causal relationship between government revenue and government expenditure nexus in Ghana. *MPRA Working Paper No*. 58579.
Toda, H. Y. (1995). Finite sample performance of likelihood ratio tests for cointegrating ranks in vector autoregressions. *Econometric Theory,* **11**, pp. 1015-1032.
Toda, H. Y. and Philips, P.C.B. (1993). Vector autoregressions and causality. *Econometrica,* **61**, pp. 1367-1393.
Toda, H. Y. and Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics,* **66,** pp. 225–250.
Vogelsang, T. and Perron, P. (1998). Additional tests for a unit root allowing for a break in the trend function at an unknown time. *International Economic Review*, **39**(4), pp. 1073-1100.
Zivot, E. and Andrews, D. W. K. (1992). Further evidence on the great crash, the oil-price shock and the unit root hypothesis. *Journal of Business and Economic Statistics*, **10,** pp. 251-270.