How Sustainable is the Federal Government of Nigeria Debt after the exit from Paris Club?

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Abstract

The study investigated the sustainability of the federal government debt in Nigeria after the exit from the Paris Club while accounting for the role of structural breaks in the fiscal variables. Using the modified Augmented Dickey-Fuller test (unit root test with structural breaks), Engel Granger residual based co-integration test, Bounds Co-integration test and Johansen co-integration test with structural breaks, the results show that the federal government borrowing and fiscal policy actions in Nigeria are not sustainable. This means that government revenue and expenditure grow indefinitely apart, and therefore grows out of bound. In other words, the federal government does not satisfy its inter-temporal budget constraint, and takes no necessary actions to ensure fiscal sustainability. This shows an increasing difficulty by the Nigerian government to meet its borrowing obligation with current revenue. Therefore, it is important for the federal government of Nigeria to reduce overdependence on oil export revenue, and harness other revenue generating capacities while reducing public borrowing.

Keywords: Unit root with structural breaks, Johansen Co-integration with structural Breaks, Fiscal Sustainability, Debt Sustainability, and Fiscal Policy**.**

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1. Introduction

The issue underscoring the necessity of increasing debt as well as the sustainability of fiscal balance has attracted germane intellectual discourse and debate across the globe (Jibao, Schoeman & Naraidoo, 2012). Blanchard (1993) argues that the major concern of the discourse is anchored on the incessant accumulation of public debt; thus, if the public debt is unsustainable, then, fiscal policy would not engender the necessary structural balance in the economy. Prior to the exit of Nigeria from the Paris Club, between the year 2000 and 2006, about three debt sustainability indicators were above the internationally accepted standard. These indicators were total debt/GDP, total debt/ government revenue and Total external debt/Exports (Omotosho et al., 2016), this implies that the government debt and fiscal policy were unsustainable. The trend of the public debt and external debt before this time, in the 1970s were generally insignificant and negligible (Onuoha, 2008). However, with the oil boom of the 70s and 80s the Nigerian government at all tiers embarked on borrowings on a large scale (Rieffel, 2005) owing majorly to the reconstruction and development plan after the civil war.

This increased borrowing as the federal government approved unproductive loans taken by state government and other government parastatals (Onuoha, 2008). In 1981, the oil export earnings crashed depleting the external reserve (Rieffel, 2005), meanwhile spending was high, largely financed by external borrowing, interest payment increased, and the debt crisis began as Nigeria was unable to pay off the borrowed loans resulting in buildup of arrears. The creditors reacted to the fall in foreign earnings and build up of arrears by suspending new line of credit, creating more problems for the country (Rieffel, 2005). As a result of the accumulation of arrears, fall in oil revenue and rising public debt service the Nigerian government approached the Paris Club for debt rescheduling on four different occasions; 1986, 1989, 1991 and 2000 (Rieffel, 2005; Onuoha, 2008). After the payment made to the Paris Club in 1992, Nigeria's payment to the Paris Club dropped. By 2005, over 86% of the total external debt was owed to the Paris club, which constitutes interest arrears, interest charged on the interest arrears, and penalty charges, since no loan was made since 1992. This implies that the debt owed to Paris Club at that point wasn't as a result of new borrowing but as a result the inability to service its debt as at when due (Rieffel, 2005). As a result, resources for developmental purposes were diverted to debt servicing. This necessitated the move for debt relief in 2005.

After the debt relief, with the third phase of the exit structure completed, both the external debt and public debt dropped drastically owing majorly to the fall in external debt observed and compelled by the Paris Club debts becoming zero. Moreover, the fall in the global crude oil price which started in late 2014 limited the ability of the Nigerian government to generate enough revenue to finance her budget. This resorted to increasing debt accumulation amidst the increasing trend of debt accumulation after the debt relief and warnings of the possibility of debt overhang by World Bank and other stakeholders (DMO, 2012; Omotosho et al., 2016). The implication of the growing public debt on the economy is that a large amount of the revenue generated would be used to service debt which otherwise would have been used for other revenue generating activities.

Furthermore, studies in the sustainability literatures have shown that the time series characteristics of fiscal variables may vary overtime, exhibiting structural breaks from time to time, and when structural breaks are included the likelihood of a change in conclusion is very high (Cuddington, 1996). For instance, Tanner and Liu (1994) investigated the work of Hakkio

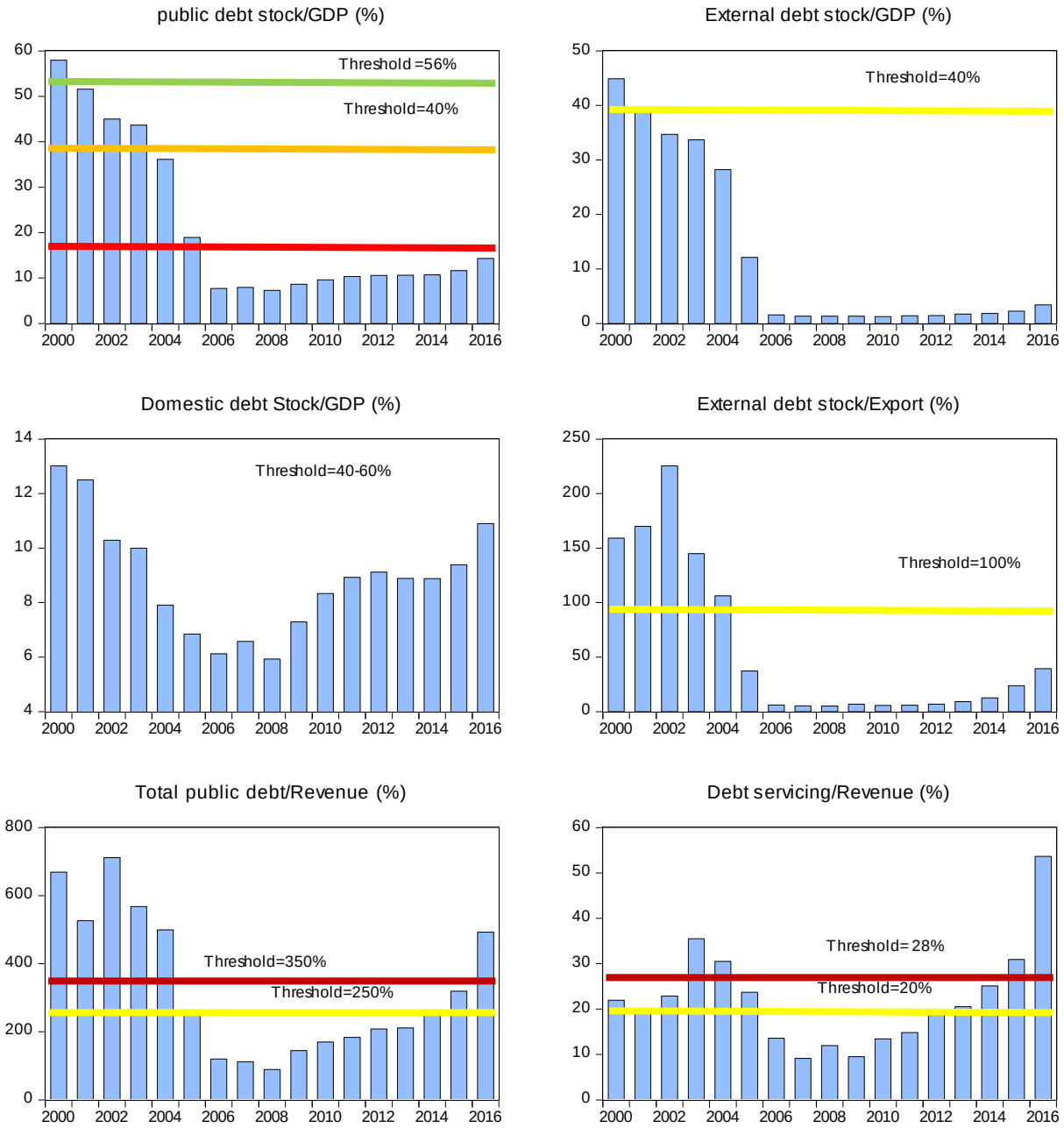
and Rush (1991) while adding level shift dummy variables post 1982:1 to the co-integration relationship involving tax revenue and government expenditure (interest inclusive). The essence of the inclusion of the dummy variable was to account for structural breaks in the fiscal variable during Reagan administration in the United State. They observed that Hakkio and Rush conclusion on the sustainability of US fiscal policy was reversed when structural break was taken account of. The importance and impact of structural breaks on fiscal variables have largely been ignored by authors and specifically Nigeria. This questions the validity of the results obtained on fiscal issues before and after Paris Club exit, which can be misleading. Therefore, this study fills this gap by accounting for structural break (s) in the fiscal variables while examining the sustainability of Nigeria federal government debt after the exit from Paris Club in the phase of the resurgence of fiscal sustainability issues in Nigeria.

The rest of this paper is divided into six sections. Following this introductory section, section two examines the time path of some fiscal sustainability indicators, section three review previous related literatures, section four presents the methodology, section five consist of results and discussion while the last section concludes with policy recommendation.

2. Time Path of some Fiscal sustainability indicators

The threshold analysis of public debt and fiscal sustainability indicators from the year 2000 is presented in figure 1.1. These indicators are divided into solvency and liquidity indicators (DMO, 2012; DMO, 2016). They are total public debt stock % of GDP, total public debt stock % of revenue, total debt services % of revenue, total external debt stock % of GDP, total domestic debt stock % of GDP and total external debt stock % of export. Evidences show that prior to 2006 about four of these indicators were above the International and country specific threshold (DMO, 2012; Omotosho et al., 2016). This implies that Nigeria's public debt before the debt cancellation was to a large extent unsustainable.

Figure 1.1[2]: Selected debt and fiscal sustainability indicators



Source: Author's plot with data from CBN statistical Bulletin 2016

However, after the Paris Club exit, total public debt (% of GDP), external debt stock (% of GDP), domestic debt (% of GDP) and external debt (% of export) which measure the ability of the government to pay its long term debt plus interest were all below the international threshold of 40%, 40% , 40-60% and 100% respectively though increasing at an increasing rate. Moreover, public debt and debt service as a percentage of revenue are above the international and domestic thresholds. This shows an increasing difficulty by the Nigerian government to meet its borrowing obligation with current revenue and a big sign of fiscal un-sustainability.

[2] The red dash line represents the country specific threshold for debt sustainability. The yellow represents the international threshold for debt sustainability while the green represents international threshold for fiscal sustainability

3. Review of Previous Literatures

The review of previous literatures points out two basic facts: one, in Nigeria except Jubrilla (2015), literature has largely ignored the importance and impact of policy shift or structural breaks in the study of fiscal sustainability issues. However, quite a number of studies have examined the issue of fiscal sustainability before exit from Paris Club but very few studies have explored the issue after exit from Paris Club. These studies include Akanbi (2015) who conducted a study on fiscal sustainability in Nigeria between 1970 and 2011, and observed fiscal policy in the non-oil sector to be unsustainable. Jubrilla (2015) examined fiscal sustainability in Nigeria between 1961 and 2014. The study show that there is co-integration between government revenue and expenditure and the slope of the long run elasticity is less than one, which indicates weak sustainability and the fact that the country might face debt financing problem in the long run. Also, Oyeleke and Ajilore (2014) investigated the fiscal deficit sustainability between 1980 and 2010 in Nigeria. The study adopted the error correction model fiscal reaction function after the use of standard unit root and co-integration test. The empirical results from the study showed that fiscal policy was weakly sustainable in the Nigeria economy within the scope of analysis. Ayinde (2014) did a triangulation analysis to examine the sustainability of fiscal management between 1970 and 2011. Findings from the study show that fiscal policy is weakly sustainable when capital expenditure and revenue is considered and strongly unsustainable when recurrent expenditure and revenue is considered. The empirical result also implies that the government is faced with liquidity problem. Similarly, Folorunsho and Folade (2013) on the relationship between fiscal deficit and public debt between 1970 and 2011 in Nigeria used a similar methodology to Oyeleke and Ajilore (2014). However, a slightly different data were collected. The implication of the results obtained is that public debt is strongly sustainable.

Two, the quest for an appropriate technique has led to the application of different methods by different authors. However, literature shows that in the study of fiscal sustainability, the use of unit root and co-integration test is the standard technique of analysis, before the introduction of the use of fiscal reaction function by Bohn (1998). Majority of the studies in literature applied these techniques respectively to examine if time series are consistent with the inter-temporal budget constraint, and if government primary balance responds positively to rise in debt to GDP ratio. For instance, Neaime (2004), Oshikoya and Tarawalie (2010), Fedje (2012), Quintos (1995), Wickens and Uctum (1993) and Ahmed and Rogers (1995) employed the standard unit root and co-integration test in their study of fiscal sustainability. Moreover, some other studies employed the standard unit root and co-integration together with autoregressive distributed lag model (ARDL). These studies are Shastri et al 2017; Ghatak and Sanchez-fung, and Shatri and Sahrawat 2015, Jubrilla, (2015). Some other combined the standard techniques with ordinary least square method (OLS). These studies are Liliaine 2015; Deyshappriya 2012; Bohn 1998, and Camarero et al 2013. Furthermore, evidences also exist that the standard techniques for sustainability has been combined with error correction model (ECM). Studies that employed these methodology include Folorunso and Folade, 2013; Jibao et al 2010; Bohn, 2007; Oyeleke and Ajilore 2014.

4. Methodology and Data

4.1 Theoretical Framework

To empirically examine the issue of fiscal sustainability in Nigeria, this study adopts the fiscal sustainability frame-work, which incorporates factors that affect the government inter-temporal budget constraint (Hamilton and Flavin, 1985, Neaime, 2004; Oshikoya and Tarawalie, 2010). According to Quintos (1995), and cuddington (1996), the theoretical derivation is done under the assumption of constant real returns on government debt, one period government budget constraint, and the 'no ponzi game scheme'. Thus, following Quintos (1995), the one period government budge constraint is stipulated below:

$$\Delta B_t = G_t^r - T_t \qquad (4.1)$$

Where,

B_t = Market value of federal government debt

G_t^r = Government expenditure,

T_t = Revenue from taxes.

The government expenditure is further expressed as:

$$G_t^r = G_t + r_t B_{t-1} \qquad (4.2)$$

Where,

$r_t B_{t-1}$ = Government interest payment expenditure

G_t = Non-interest payment expenditure.

Equation (4.1) holds every period. Inserting (4.2) into (4.1), we have,

$$\Delta B_t = G_t + r_t B_{t-1} - T_t \qquad (4.3)$$

Equation (4.3) gives budget deficit as the rate of change of government stock of debt. The rate of change of government debt equals the difference between government revenue and expenditure, plus the real interest on its debt. With some algebraic manipulation, equation (4.3) becomes,

$$B_t - B_{t-1} = G_t + r_t B_{t-1} - T_t \qquad (4.4)$$

$$B_t = (G_t - T_t) + (1 + r_t) B_{t-1} \qquad (4.5)$$

Where;

$G_t - T_t$ = Primary balance (+ primary deficit and – primary surplus)

r_t = Real interest rate at time t, and it is stationary around the mean value of r .

Therefore, equation (4.5) becomes,

$$B_t = (G_t - T_t) + (1 + r) B_{t-1} \qquad (4.6)$$

The above expression gives the government budget constraint in level form, as against expressing the constraint as a ratio of GDP. Thus, to further capture the framework for the study, the budget constraint is expressed as a ratio of GDP. Expressing (4.6) in present value, and when iterated forward N-periods and summed up, we have:

$$B_{t-1} = \sum_{j=0}^{N} \frac{(G^r - T)_{t+j}}{(1+r)^{j+1}} + \frac{B_{N+1}}{(1+r)^{N+1}} \qquad (4.7)\,.$$

To derive (4.7) it is assumed that the real interest rate is constant overtime and there is 'no ponzi game'. The 'no ponzi game' condition (NPC) is satisfied when the present value of debt in (4.7) approaches zero as the number of period is increased. That is, at limit, (4.8) holds.

$$\underset{N\to\infty}{Lim}\frac{B_{N+1}}{(1+r)^{N+1}}=0 \qquad (4.8).$$

The no ponzi game condition in literature is also known as government solvency condition. This states that the present value of government debt converges to zero in the indefinite future. This is analogous to saying that the deficit is sustainable if and only if the stock of debt held by the government is expected to grow not faster than the growth rate of the economy (Neaime, 2004). According to Neaime (2004) government debt at any point must be equal to the present value of the primary balance.

$$B_{t-1}=\sum_{j=0}^{N}\frac{(G^r-T)_{t+j}}{(1+r)^{j+1}} \qquad (4.9).$$

Equation (4.9) implies that the government borrowing is sustainable, if the government debt is equal to the primary balance. That is, the government is solvent to pay up its debt within the period. It also implies that for government fiscal policy to be sustainable, every deficit should be financed by a future surplus. Converting (4.9) to a one period government constraint, with the interest rate taken as stationary around its mean (Hakkio and Rush, 1991) equation (4.9) yields,

$$B_0=\frac{(G^r-T)}{(1+r)} \qquad (4.10)$$

Furthermore, following Jubrilla (2016), equation (4.10) can be written as:

$$T=\eta+\theta G^r+\xi \qquad (4.11)$$

For equation (4.19) which implies that fiscal policy is sustainable when the government is able to finance its debt by a future surplus to hold, the ability of the government revenue to exceed its expenditure needs to be validated; thus the specification of equation (4.11).

4.2 Model specification

Following from equation (4.11), the standard equation for testing the government budget surplus inter-temporal sustainability can be written as

$$T_t=\eta+\theta G_t^{\,r}+\varphi_1 D_t+\varphi_2 TB_t+\xi_t \qquad (4.12)$$

Where;

T_t= Logarithm of government revenue

G_t = Logarithm of government expenditure including interest payment on its debt.

D_t = Dummy Variable for structural breaks

$$\text{Break}=\begin{cases}1, \text{periods after the breakpoint}\\ 0, \text{periods before the break point}\end{cases}$$

TB_t =Break Date identified

$$\text{Break} = \begin{cases} 1, \text{period where t} > \text{TB} \\ 0, \text{for other periods} \end{cases}$$

Also, η and θ denotes the co-integrating parameters and ξ is the error term that may be serially correlated, which reflect the budgetary disequilibrium between government revenue and its spending. Fiscal sustainability or sustainability of the budget framework requires the co-integration of T_t and G_t (ξ is stationary) and θ=1. These are the hypotheses to be tested. The implications of these hypotheses are that for fiscal sustainability, government revenue and expenditure must move together in the long run. However, the strength of the fiscal sustainability depends on the estimated parameter θ. If θ=1, and there is co-integration between T_t and G_t, then the budget deficit represents strong sustainability. In other words, all government expenditure (including interest payment) will be financed by government revenue and public debt will not have to grow out of bound. However, if these variables are co-integrated but the parameter is between $0 < \theta < 1$, budget and fiscal policy is weakly sustainable. If these variables are not co-integrating the gap between them will be explosive (increasing indefinitely), and the fiscal or budget policy is not sustainable. Meaning that the government may face liquidity problem in the long run and public debt may grow out of bounds.

4.3 Sources and Measurement of data

Data used for this study are sourced from the Central Bank of Nigeria Statistical Bulletin from 2005 to 2016. These variables include gross domestic product, public debt, external debt, export, domestic debt, and government revenue and government expenditure. For the empirical estimation, the data on government revenue and expenditure are interpolated from annual data to quarterly data through E-views to further ensure the suitability of the sourced data.

5. Estimation and Discussion of Results

5.1 Tests for Stationarity of the Series

Table 5.2A and 5.2B present the results of the unit root test using the conventional test of Augmented Dickey Fuller (ADF) test and Philip Peron test, and also using the ADF with structural breaks test. The results show that the variables are of mixed order of integration. LREV and LEXP are stationary at first difference, but exhibit structural breaks at different quarters (first quarter and third quarter 2008 respectively), trend break and shift in the intercept parameter at 1% level of significance to be specific. However, mixed results was observed using the conventional unit root test of ADF and PP, with ADF showing both variables integrate at order 1 while PP shows both variables to integrate at different orders (one and zero).

Table 5.2A: Unit Root and Stationarity Tests

	Unit Roots without Structural Breaks					
		Level			**Difference**	
ADF*	Variable	Constant	Constant & Trend	None	Constant	Constant & Trend	None
	LREV	-2.567	0.292	0.515	-1.709	-5.484***	-1.768*
	LEXP	-3.271**	-0.658	2.528	-1.937	-3.442*	-1.352
		Level			**Difference**	
PP*	Variable	Constant	Constant & Trend	None	Constant	Constant & Trend	None
	LREV	-2.049	-0.288	0.815	-3.257**	-4.064**	0.002**
	LEXP	-1.757	-0.763	2.479	-3.588***	-4.101**	-2.932***

Source: Computation from output of Eview 9. Note: *, ** and *** imply significance at 10%, 5% and 1% respectively. * ADF is Augmented Dickey Fuller Unit root Test, PP* is Philip Peron Unit root Test.

Table 5.2B: Unit Root and Stationarity Tests

Unit Roots with Structural Breaks (Modified ADF Test)						
	Level			First Difference		
Variable	Break Date	T. stat	Pvalue	Break Date	T.stat	Pvalue
LREV	2013Q2	-2.005377c	0.9897	2008Q1	-7.653059***a	< 0.01
LEXP	2008Q2	-3.718330*c	0.2927	2008Q3	-6.949939***a	< 0.01

Source: computation from output of Eview 9
Note: *, ** and *** imply significance at 10%, 5% and 1% respectively. 'a' implies break point test equation with constant and trend, 'b' implies break point test equation with constant only, and 'c' implies break point test equation with trend only.

Table 5.2 C: Summary of Unit roots Test

	Unit root with structural Breaks Results (Modified ADF)		Conventional Unit root Test Results		Comparison
Variable	Break Date	I(d)	(ADF) Result	(PP) Result	Remarks
LREV	2008Q1	I(1)	I(1)	I(1)	Consistent
LEXP	2008Q3	I(1)	I(0)	I(1)	Inconsistent

Source: Computation from output of Eview 9.

5.2 Empirical Results

Fiscal sustainability or sustainability of the budget framework requires the co-integration of government expenditure (LEXP) and government revenue (LREV). This is one of the hypotheses to be tested. The implication of this hypothesis is that for fiscal sustainability, government revenue and expenditure must move together in the long run. Johansen co-integration test with and without structural breaks and the Quandt-Andrews unknown break point test to identify the structural break date were applied. The results of the Quandt-Andrews unknown break point test show the test at 15% trimmed data, and it indicates a break point at

the first quarter of 2009, significant at 1% level of significance. Therefore, an exogenous break point of 2009Q1 is accounted for as a fixed regressor using dummy variables DU and TB. Table 5.3 shows the results of the co-integration test with structural or exogenous breaks, and it reveals that the trace statistics and the maximum Eigen value statistics are not significant at 1%, 5%, and 10% level of significance. That is, there is no co-integrating relationship between LEXP and LREV in the long run. This means that r=0 and it is implied from the probability values, as they are all higher than 0.05, thus the government revenue and expenditure do not move together or in the same direction in the long run. The co-integration test result without breaks also gives similar conclusion.

Table 5.3: Johansen Test of Co-integation

Co-integration Test with Structural Breaks Variables: LREV LEXP Trend assumption: Linear Deterministic Trend (Restricted) Exogenous series: DU TB							
Hypotheses		Trace Test			Maximum Eigenvalue Test		
Null	Alt	Trace Statistic	5% Critical Value	P-Value	Max- Eigen Statistics	5% Critical Value	P-Value
r=0	r=1	18.57197	25.87211	0.3068	11.55475	19.38704	0.4577
r≤1	r=2	7.017226	12.51798	0.3427	7.017226	12.51798	0.3427
Co-integration Test without Structural Breaks Variables: LREV LEXP Trend assumption: Linear Deterministic Trend (Restricted)							
Hypotheses		Trace Test			Maximum Eigenvalue Test		
Null	Alt	Trace Statistic	5% Critical Value	P-Value	Max- Eigen Statistics	5% Critical Value	P-Value
r=0	r=1	14.07044	25.87211	0.6518	7.860138	19.38704	0.8338
r≤1	r=2	6.210303	12.51798	0.4341	6.210303	12.51798	0.4341

Source: Computation from output of Eviews 9. Both Trace Test and Maximum Eigenvalue Test show no co-integration with or without structural breaks.

To ensure robustness, other co-integration tests were employed. The study further applied the bound co-integration test and the Engle Granger single equation residual based test. Table 5.4 presents the result of the bound test. After controlling for trend and intercept, the results show that the F-statistics of 1.8959 is lower than the lower bound critical value at the conventional level of significance. The implication of this finding is that there is no long run movement between LREV and LEXP.

Table 5.4: **Result of Bounds Cointegration Test**

Growth Model: $LREV = f(LEXP)$		
F-stat	1.895863	
Critical Values		
Significance levels	I0 Bound	I1 Bound
1%	8.74	9.63
2.50%	7.46	8.27
5%	6.56	7.3
10%	5.59	6.26

Source: Computation from output of Eview 9

Furthermore, the Engle Granger residual based co-integration test supports the conclusion of the Johansen and bounds co-integration test. To employ Engle Granger residual based test, the

ADF and PP unit root test was applied on the residuals of LEXP on LREV. The ADF-test statistics and PP test statistic at constant, constant and trend, and none are below the critical values for the null hypothesis of no co-integration. This implies that there is no long run co-integration. That is, LEXP and LREV do not move together in the long run. This is shown in table 5.5 below.

Table 5.5: Residual Based Co-integration Test

	Constant	Constant & trend	None
ADF-Test Statistics	-1.52858	-1.43143	-1.726021
PP-Test Statistic	-0.952843	-0.831642	-1.013297
Critical Values[3] for the null of no co-integration			
	1%	5%	10%
No Lags	-4.07	-3.37	-3.3
Lags	-3.73	-3.17	-2.91

Source: Computation from output of Eview 9 & Asteriou and Hall, 2015

Summarily, the results show that the hypothesis that government revenue and government expenditure should co-integrate in the long run for fiscal policy to be sustainable does not hold for Nigeria within the period of consideration. This is because the Johansen co-integration test with breaks shows that both variables do not move together in the long run. This is confirmed by the results of the other co-integration techniques applied to ensure robustness. The co-integration test results implies that government revenue and government expenditure are explosive or grow indefinitely apart, which also means that the debt to GDP ratio does not exhibit mean reversion; that is, it grows out of bounds. Moreover, since there is no co-integration, carrying out the test for the significance and magnitude of the parameters in the model is not relevant. Thus based on the econometrics approach federal government of Nigeria's debt after the exit from Paris Club is not sustainable, and government does not satisfy its inter-temporal budget constraint.

6. Conclusion and Policy implication

Clear conclusions can be drawn as regards the issue of fiscal sustainability in Nigeria. The study provides useful insight on the sustainability of debt and fiscal policy in Nigeria. Using the unit root and co-integration with structural breaks, results showed that the federal government borrowing and fiscal policy actions are not sustainable. This means that government revenue and expenditure grow indefinitely apart therefore the current revenue may not be sufficient to meet expenditure financing including interest payment leading to a liquidity problem in the shortest possible period. These findings have implications on the current fiscal stance of the Nigerian government. Given that debt and fiscal policy are not sustainable, overdependence on oil export revenue should be reduced and other revenue generating capacities such as agriculture, tourism etc., which are major sources of non-oil revenue should be encouraged. Also, government should ensure reduction in borrowing as a source of unproductive expenditure finance. This activity increases interest payment on debt; crowds out public investment and can eventually result to a bigger economic problem of debt overhang.

[3] According to Asteriou and Hall (2015) the critical values for the residual based co-integration test (ADF and PP test on the residuals) are not the same with the standard critical values for ADF and PP stationarity test. The critical values are more negative than the standard and give more robust results. Engle and Granger, (1987) constructed the critical values for the co-integration test and these are shown in table 5.8.

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