

**SUSTAINABILITY OF FISCAL DEFICIT IN NIGERIA:
A CO-INTEGRATION ANALYSIS WITH STRUCTURAL
BREAK**

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ABSTRACT

The federal and state governments of Nigeria suffer from many fiscal imbalances including a long history of fiscal deficits and unsustainable fiscal policy in the economy. Hence, this paper examines the sustainability of the federal and state fiscal deficits from 1960-2013, using the Gregory-Hansen co-integration test and the Zivot-Andrews unit root test, which allow for structural break. In this connection, the results indicate that the federal fiscal deficit is weakly sustainable while that of the state governments is unsustainable. It is therefore recommended that both the federal and state governments should consolidate their fiscal operations by rationalizing their expenditures and augment their revenue sources. Specifically, the governments should meaningfully cut their expenditures by blocking all fiscal leakages, reducing the

cost of governance through cuts in the pays of political office holders and scrapping unnecessary offices. The governments should also diversify their revenue sources and resuscitate highly competitive public enterprises.

Keywords: Fiscal sustainability; Debt; Fiscal deficits; Structural break; Nigeria

JEL classification: E62; H72; H710

INTRODUCTION

Fiscal deficit persistence is an economic challenge that is prevalent, not only in developing, but also in developed economies (Ezeabasili, Mojekwu, & Herbert, 2012). Focusing on Nigeria, the volatility of the country's revenue base combined with increasing public expenditure profile have made fiscal deficit almost inevitable. The near inevitability of this persistence deficit makes it highly imperative to assess the sustainability of the country's historical deficit given its potential effect on macroeconomic performance. As a nation, Nigeria suffers from many fiscal challenges including a long history of fiscal deficit. For instance, the federal government had deficit budgets for 39 years out of the 44 years between 1970 and 2013. At the state level, the experience is worse, because, for a period of 54 years (i.e. 1961 and 2013), surplus budgets only existed between 1996 and 1999. The governments' fiscal deficit in the early 70's can be largely attributed to the post-civil war fiscal expansion meant for the reconstruction and rehabilitation of the economy. Fiscal mismanagement of the rich oil revenue of the mid 70's might have contributed to the unfortunate deficit experience in the late 70's while the deficit in the 80's may be attributed to the decline in oil output and prices which constrained the revenue of the governments. The persistence of fiscal deficit till the present time can be linked to the volatile revenue base of the economy in spite of an increasing government expenditure profile.

Fundamentally, two questions naturally follow from the above background about the deficit experience of the federal and state governments of Nigeria, namely: (i) can the governments continue to run deficit budgets without a risk of default (ii) should the governments continue with their existing fiscal structure? Although, the two questions are both important, our paper concentrates on the first which is basically about sustainability of the governments' fiscal deficits. This is really important at this time that the governments are faced with considerable fiscal restraint resulting from the drastic fall in oil prices; a development that has made it difficult for many state governments in the country to pay the salary of their workers.

Leaving aside the potential adverse effects of chronic deficit on interest rate and investment as well as inflation and balance of payments, can the federal and state governments of Nigeria continue with their historical deficits indefinitely without a threat of financial insolvency in the long- run? In other words, are the fiscal operations of the federal and state governments sustainable? This is what we assess in this paper. The paper contributes to the existing literature on fiscal sustainability (Goyal & Ray, 2004; Raju, 2008; Afonso & Jalles, 2012) by investigating sustainability of Nigerian fiscal deficit at both federal and state levels taking cognisance of possible structural break. The study fills the existing gap in two main respects. First, it allows for structural break in the deficit process. Second, it assesses separately, the sustainability of the state governments' deficit which previous studies in Nigeria did not incorporate.

Importantly, fiscal sustainability is a broad concept that is defined in varying ways to represent the ability of governments to meet existing program commitments with existing resources, not only in current terms, but also into the future (Ward & Dadayan, 2009). According to Blanchard, Chouraqui, Hagemann and Sartor (1990), a sustainable fiscal policy ensures the convergence of the debt to GNP ratio to its initial level. A fiscal policy is considered sustainable if the present value of future primary surpluses equals the current level of debt such that the government avoids excessive debt accumulation, is able to roll over its debt and there is no risk

of insolvency (Krejdl, 2006). In such a case, the government is able to maintain its current fiscal stance and meet its existing stock of liabilities with no default (or unnecessary adjustments) and without threatening the achievement of its macroeconomic objectives in the long run. Empirically speaking, the literature on fiscal sustainability basically tests whether both expenditure and revenue series would display their historical growth patterns in the future, such that, a fiscal policy that is found to be unsustainable must be changed to guarantee the consistency of future primary balances with the budget constraint (Afonso, 2005).

LITERATURE REVIEW

Theoretical Framework

The assessment of fiscal sustainability in this paper is based on the Present Value Borrowing Constraint (PVBC). Aside the PVBC, there is also the Accounting Approach to fiscal sustainability assessment. However, we consider the PVBC because it allows the assessment of fiscal sustainability from an historical standpoint. The discussion here draws extensively from Afonso (2005). In an attempt to facilitate easy understanding of how the PVBC applies to fiscal sustainability, the possibility of an individual running permanent deficit is imagined. If it is possible for him to borrow continually and get away with it without having to pay anything back, he would definitely succeed in running such deficit. However, since no creditor will lend to such a perpetual debtor, the individual is subject to a borrowing constraint that the expected present value of his expenditure cannot exceed the expected present value of his receipts. The PVBC, applied to fiscal sustainability, therefore tests whether the government is subject to a similar constraint, i.e. whether the government makes implicit promise to its creditors that it will completely offset the deficits by running equivalent surpluses in the future. If the government is subject to this PVBC, the policy of running perpetual deficit is infeasible (Hamilton & Flavin, 1986). The starting point for deriving the PVBC is the government budget constraint and the flow budget constraint is written as:

$$G_t - (1+r_t)B_{t-1} = R_t - B_t \quad (1)$$

Where: G represents government expenditure (excluding interest payments), R is government revenue, B is the public debt and r is the real interest rate. Rewriting equation (1) for the subsequent periods and solving it recursively yields the following inter-temporal budget constraint:

$$B_t - \lim_{s \rightarrow \infty} \frac{B_{t+s}}{(1+r_t)^s} = \sum_{j=1}^s \frac{R_{t+j} - G_{t+j}}{(1+r_t)^j} \quad (2)$$

The present value of the existing stock of public debt will be equal to the present value of future primary surpluses when the second term from the RHS of equation (2) is zero. To make equation (2) appropriate for empirical testing, equation (1) has to be modified algebraically. Assuming that the real interest rate is stationary, with mean r and defining

$$E_t G_t = (r) B_{t-1} \quad (3)$$

The PVBC is derived as:

$$B_t - \lim_{s \rightarrow \infty} \frac{B_{t+s}}{(1+r)^s} = \sum_{j=1}^s \frac{R_{t+j} - E_t G_{t+j}}{(1+r)^j} \quad (4)$$

A sustainable fiscal policy should ensure that the present value of the stock of public debt (the second term of the RHS of equation (4)) goes to zero in infinity constraining the debt to grow no faster than the real interest rate. Faced with this condition, the government will have to achieve future primary surpluses whose present value adds up to the current value of the stock of public debt. With the PVBC i.e. equation (4), two possible complementary definitions of sustainability that set the background for empirical testing are:

1. The value of public current debt must be equal to the sum of future primary surpluses

$$B_t = \sum_{s=t}^{\infty} \frac{R_{t+s} - E_{t+s}}{(1+r)^{s-t}} \quad (5)$$

2. The present value of public debt must approach zero in infinity:

$$\lim_{s \rightarrow \infty} B_{t+s} = 0$$

$$\lim_{s \rightarrow \infty} \frac{B_{t+s}}{(1+r)^{s-t}} = 0$$

Empirical Review

Bravo and Silvestre (2002) examined the sustainability of fiscal policy for the EU countries with annual data covering 1970-1997 using the co-integration method. They found evidence in support of the sustainability of fiscal policy in Germany, Austria, Finland, UK and Netherlands. Victoria (2003) employed a simplified version of the Accounting Approach in assessing sustainability of Nigerian fiscal policy. She concluded that Nigeria faces considerable fiscal risks and that its fiscal stance may be unsustainable over the medium and longer term. However, she noted the sensitivity of her result to differing assumptions (observations) on the interest rate, growth rates and debt. Also, Goyal and Ray (2004) examined fiscal sustainability of both the central and state governments of India using the Gregory-Hansen Co-integration test with structural break. They concluded that the fiscal stances of the central and state governments are individually unsustainable but weakly sustainable when taken together.

Afonso (2005) analysed fiscal sustainability of the European Union (EU) using the unit root and the co-integration tests for the period 1970-2003. He concluded that fiscal policy may not have been sustainable for the EU with the exception of Germany and Netherlands. Moreover, Raju (2008) assessed fiscal sustainability

of Tamil Nadu between 1971 and 2006 using the Gregory-Hansen co-integration test and concluded that, of all the four indicators of fiscal deficit tested; only the gross fiscal gap is sustainable. The other three indicators i.e. the revenue deficit, the primary deficit and the primary revenue balance are unsustainable because the concerned revenue-expenditure variables for these deficit indicators are not co-integrated. Afonso and Jalles (2012) examined the issue of fiscal sustainability for the OECD countries with annual data between 1970-2010 using panel unit root and co-integration analyses and controlling for structural breaks. They found no evidence of sustainability for most countries with the possible exception of Austria, Canada, France, Germany, Japan, Netherlands, Sweden and UK.

Abdullah, Mustafa and Dahalan (2012) empirically investigated sustainability of fiscal policy in Malaysia for the period 1970-2009 using VAR and multivariate co-integration test. They found some evidence supporting the sustainability of Malaysian fiscal stance. IMF (2012) analysed debt sustainability for Nigeria under different thresholds and found that, all (debt) indicators fall within the relevant specific thresholds. Thus, it concluded that Nigeria remains at a low risk of debt distress. Based on the findings from its standardized stress tests, it argued that without significant compensating policy measures, a prolonged negative oil price shock or permanent real growth shock could undermine the country's achievement of macroeconomic and debt sustainability.

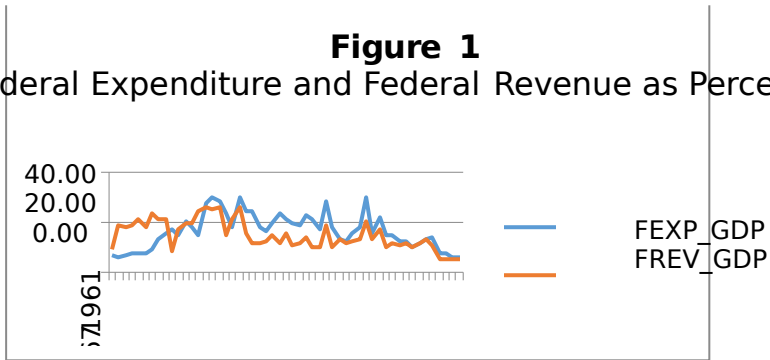
However, Taofeek (2014) assessed sustainability of fiscal deficit in Nigeria for the period 1970-2011, using a 'triangulation' of the threshold parameter, unit root and co-integration analyses. He concluded that fiscal policy is both weakly and strongly unsustainable in Nigeria given the fact that government expenditure and revenue series are integrated of different orders, i.e. $I(0)$ and $I(1)$ respectively. Surprisingly, his study showed that the total federal debt series is stationary at first difference, indicating that the first difference of the stock of federal debt is stationary and implying that the federal debt is sustainable. Even at that, the author concluded that the federal fiscal policy is unsustainable because of the absence of co-integration between

government expenditure and revenue. This inconsistency in the unit root tests on federal debt and co-integration test between expenditure and revenue could have been avoided in the light of a larger data set and provision for structural break. It is in this light that this study was conceptualized. This study also extends that of Taofeek (2014) to include state governments.

Stylised Facts on Federal and State Governments' Finances

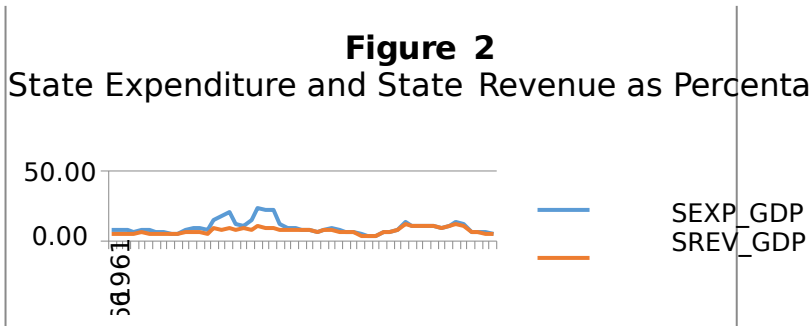
The burdens of government expenditure and revenue on the GDP are shown in figures 1 and 2 for the federal and state governments respectively. The graphs do not show discernible patterns. The curves wander up and down, showing unpredictable trends of both the federal and state expenditure and revenue burdens on GDP. For example, the burden of federal expenditure on GDP rose between 1961 and 1972, 1975 and 1978, 1996 and 2000, fell between 1973 and 1975, 1981 and 1984, 2001 and 2006, and has been slightly upward since 2012. Also, the federal revenue burden on GDP increased between 1971 and 1975, 1977 and 1980, 1997 and 1999, 2006 and 2008 and decreased between 1967 and 1970 as well as between 1976 and 1978. For the state government, the expenditure burden trended upward between 1975 and 1978, 1980 and 1982, 1996 and 2001, 2006 and 2008, downward between 1978 and 1980, 1983 and 1989 and has been downward also since 2012. The state revenue-GDP burden rose between 1996 and 2001, 2006 and 2008. It fell between 1972 and 1974, 1982 and 1986 and has been downward since 2009.

Figure 1
Trend of Federal Expenditure and Federal Revenue as Percentage of GDP



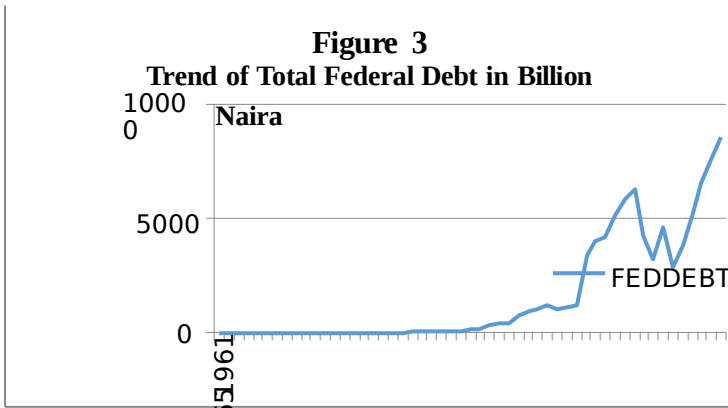
Source: Central Bank of Nigeria (CBN) Statistical Bulletin (2010 & 2013).

Figure 2
Trend of State Expenditure and State Revenue as Percentage of GDP



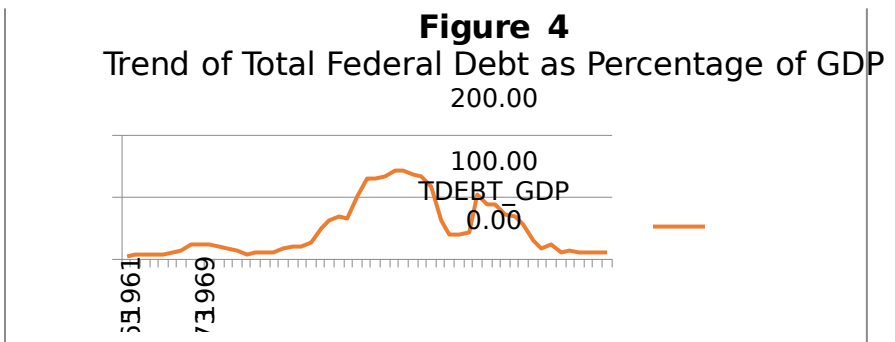
Source: CBN Statistical Bulletin (2010 & 2013).

The trend of the stock of federal debt is depicted in figure 3. The debt series exhibits an upward trend from 1986 to 2004 though it fell slightly in 1996. The period between 1986 and 2004 saw remarkable increase in total federal debt, from about 69.9 billion naira in 1986 to about 6.26 trillion in 2004. Following the debt forgiveness, it fell between 2005 and 2007 and assumed its present upward trend back in 2008, perhaps, due in part to the bail-out fiscal stimulus package necessitated by the global economic meltdown.



Source: CBN Statistical Bulletin (2010 & 2013).

Figure 4 shows the debt burden on GDP. From the figure, the total federal debt as percentage of GDP rose from about 67% in 1985 to a peak of 143% in 1990. It fell substantially between 2001 and 2006, from 89% to 17%, zigzagged between 2007 and 2010 before settling at about 11% since 2012. The figure further indicates that, though the overall debt increased significantly between 1999 (the start of the present political dispensation) and 2004, it fell appreciably from about 106% to 55% when taken as percentage of GDP. This significant fall in the debt profile of Nigeria could be regarded as another dividend of democracy.



Source: CBN Statistical Bulletins (2010 & 2013).

METHODOLOGY

Based on the PVBC analytical framework, a common practice in the literature among others is to investigate if government debt series follows a stationary process or to establish if there is co-integration between government revenue and government expenditure. Hamilton and Flavin (1986) were the first to use the unit root procedure while the co-integration approach to fiscal sustainability was pioneered by Hakkio and Rush (1991). With the unit root procedure, a sufficient condition for fiscal sustainability, as Hamilton & Flavin (1986) argued, is for the first difference of the stock of public debt to be stationary. However, Trehan and Walsh (1991) contended that stationarity of the first difference of the stock of public debt is a sufficient but not a necessary condition for fiscal sustainability. In order to assess fiscal sustainability using co-integration method, the procedure in the literature, according to Afonso (2005) is to test the co-integrating regression:

$$R_t = \alpha + \beta E_t + u_t \quad (7)$$

Where government revenue is regressed on government R_t

expenditure E_t . Several conclusions are then made on the basis of the co-integration result about fiscal sustainability as follow:

1. If there is no co-integration, the fiscal deficit is unsustainable;
2. If there is co-integration with the vector (1, -1) i.e. $\beta = 1$, there is (strong) fiscal sustainability;
3. If there is co-integration with $0 < \beta < 1$, government expenditures grow faster than government revenues and the deficit may be unsustainable. This case is somehow in line with Quintos' (1995) idea of weak sustainability (though he argues this for a situation when there is no co-integration); and
4. If there is co-integration with $\beta > 1$, there is no sustainability.

The above discussions about sustainability test using the co-integration method assumes that both the government expenditure

and government revenue are I(1) series. If both are stationary I(0) series, then the sufficient condition for fiscal sustainability is satisfied. If one of the series is I(0) while the other is I(1), sustainability does not hold. In our analysis, we began with the standard Augmented Dickey Fuller (1981) and the Phillips Perron (1988) unit root tests. For the co-integration approach, where the expenditure and revenues series are I(1), the Johansen co-integration test was also adopted initially. To determine whether or not to include a trend in the unit root tests for the variables, we examined the plot of the series and complemented that more formally, by regressing the variables on constant and trend as well as determining which is significant. For the co-integration analysis, the variables were expressed as ratios of GDP following Hakkio and Rush (1991) who held that analysis based on ratios is more appropriate for growing economies. The studies of Wilcox (1989) and Hakkio and Rush (1991) provide evidence that the results of fiscal sustainability depends on the existence of structural breaks in the deficit process. For this reason, we complemented the standard ADF and PP unit root tests with the Zivot-Andrews test.

Also, the Johansen co-integration test was complemented with the Gregory-Hansen test following Ahmed & Rogers (1995) argument that powerful evidence for or against PVBC is obtained by examining whether there are structural breaks in the co-integrating vectors around times of unusual events such as wars or exchange rate regime switches. In this connection, Gregory and Hansen (1996) developed single-equation models that allow for co-integration with structural change. Given the observed data

$$y_t = \begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix}, \quad y_{1t} \text{ is real-valued} \quad y_{2t} \text{ is an } m\text{-vector},$$

where t and t

they began with the standard model of co-integration with no structural change:

$$y_{1t} = \alpha + \beta y_{2t} + e_t, \quad t = 1, \dots, n. \tag{8}$$

Where y_{2t}

is $I(1)$ is $I(0)$.
and e_t

Allowing for structural change in the intercept μ and/or in the slope β , they proposed the following three models for the level shift, level shift with trend and regime shift, respectively:

$$y_{1t} = \mu_1 + \mu_2 I_{1t} + \beta_1 y_{2t} + e_t, \quad t = 1, \dots, n. \quad (9)$$

Where μ_1 represents the intercept before the shift and μ_2 represents the change in the intercept at the time of the shift.

$$y_{1t} = \mu_1 + \mu_2 I_{1t} + \beta_1 y_{2t} + \beta_2 I_{1t} y_{2t} + e_t, \quad t = 1, \dots, n. \quad (10)$$

$$y_{1t} = \mu_1 + \mu_2 I_{1t} + \beta_1 y_{2t} + \beta_2 I_{1t} y_{2t} + e_t, \quad t = 1, \dots, n. \quad (11)$$

Where μ_1 and μ_2 are as in the level shift model, β_1 denotes the co-integration slope coefficients before the regime shift, and β_2 denotes the change in the slope coefficients.

RESULTS AND DISCUSSIONS

Assessment of federal fiscal deficit sustainability

As earlier outlined in the methodology section, an assessment of the federal fiscal sustainability was done with both the unit root and the co-integration tests both with and without structural break in reverse order. Table 1 shows the result of the unit root test for the first difference of the stock of federal debt.

Table 1. Unit Root Tests for Federal Debt with Constant and Trend		
Augmented Dickey Fuller (ADF) Test		Phillips Perron (PP)Test
Test statistic	-1.88431	-6.435302***
P-value	0.644	0.0000

Note: *** indicates statistical significance at 1%.

The ADF test statistic of -1.884318 is greater than the 1%, 5% and 10% critical values which are -4.192337, -3.520787 and -3.191277, respectively. Thus, the null hypothesis that the debt

series has a unit root cannot be rejected at the conventional levels. The high p-value of the test is a clear indication that the first difference series admits at least one unit root. The ADF test therefore indicates that the first difference of the stock of public debt is non-stationary. On the basis of the ADF result alone, one might be tempted to conclude that the federal debt is unsustainable. However, the PP test result remarkably differs from the ADF, and in fact, it allows the rejection of the null hypothesis.

As shown in the table, the PP test statistic of -6.435302 is lower than the 1%, 5% and 10% critical values which are respectively -4.148465, -3.500495 and -3.179617. The p-value of 0.0000 for the test indicates that the null hypothesis of the presence of unit root in the series is rejected, interestingly at 1%. We complemented the above analysis by re-testing the stationarity property of the debt series using the Zivot- Andrews (1992) test which allows for endogenous structural break in the series at some unknown break date. The result of the test is summarized in table 2 below.

Table 2. Zivot-Andrews Unit Root Test for the Federal Debt Series	
Test Statistic	-6.79177***
Breakpoint	2005
Lag Length	2
Critical Values	1% = -5.57000. 5% = -5.08000. 10% = -4.8200

As shown in table 2, the test statistics of -6.79177 is lower than the critical values at all the conventional levels. Thus, the null hypothesis of unit root in the debt series is rejected at 1%. The result implies that the federal debt is stationary, meaning that the federal debt has been sustainable. It also indicates that there was a structural break in the debt series in 2005. This is true, considering the fact that Nigeria was granted debt relief package by the Paris Club, precisely in June, 2005. For robustness of this assessment of federal fiscal sustainability, the study ventured into the co-integration analysis as discussed in the methodology section of the paper. The unit root test results for federal expenditure and federal revenue series are presented in tables 3a and 3b.

Table 3a. Unit Root Tests for Federal Expenditure and				
Variable	ADF	P-value	PP	P-value
FEDEXP_G	-2.908873**	0.05	-2.694733*	0.08
DP	-	00	-.390599**	00

Note: *, **, and *** indicate statistical significance at 10%, 5% and 1% respectively.

From the results above, both the ADF and PP tests statistics allow the rejection of the presence of unit root in both the federal expenditure and federal revenue series. The null hypothesis is rejected at 5% and 10% respectively for federal expenditure series using the ADF and the PP tests but at 1% by both tests for the federal revenue series. Since both the federal expenditure and revenue are stationary I(0) series, we can tentatively say that, the federal fiscal deficit has been sustainable. But, the above analysis has not taken into account the possibility of structural changes that could have affected the variables over the period of the study. It is however important to account for possible breaks as previously stated, given that many structural changes have taken place in Nigeria between 1961 (less than a year after independence) and 2013 that could have affected the series. Accounting for structural breaks in the series, we re-examined the stationarity property of the expenditure and revenue series.

The Zivot -Andrews test result is presented in table 3b. The test result indicates that both the original expenditure and revenue series admit one unit root because we cannot reject the null hypothesis at the conventional levels. Thus, the series are non-stationary at levels. However, the series become stationary after first differencing and the null hypothesis is now rejected at 1% for both series. Therefore, it can be concluded that the series are I(1). Subsequently, we conducted the co-integration test for federal expenditure and federal revenue starting with the standard Johansen Co-integration test. The *trace* statistic and the *maximum-eigenvalue* allow the rejection of the null of at most 1 co-integrating equation at 10% with a vector of (1, -0.627165),

implying the presence of co-integration between federal expenditure and revenue.

Table 3b. Zivot-Andrews Unit Root Test for Federal Expenditure and				
Variable	Test Statistic	Lag Leng	Break	Critical Values
FEDEXP_GDP	-3.83634	2	197	1% = -5.34000. 5% = -4.80000. 10% = 4.58000.
FEDREV_GDP	-4.50604	2	198	1%*** =
D(FEDEXP_GD	-6.42837***	2	197	5%** = 10%* = -4.82000.
D(FEDREV_GD P)	-5.93693**	2	197 8	1%*** = 5%** = 10%* = -4.58000.
				1%*** = 5%** = 10%* = -4.58000

As with the unit root test, it is important to entertain the possibility of a structural break in the co-integrating vector following Ahmed and Rogers (1995). Sequentially, we used the Gregory-Hansen (1996) Co-integration test which allows for structural breaks. The result of the test is presented in

table 4.

Table 4. Gregory-Hansen Co-integration Test for Federal Expenditure and Revenue Series	
ADF Procedure	Phillips Procedure
ADF* Statistic = -6.595233*** Break Date = 1995 Critical Values. 1% =	Z ₀ * Statistic = -46.14900* Break Date = 1980 Critical Values. 1% =-

The ADF* and the Phillips (Z₀*) test statistic allow the rejection of the null of no co-integration at 1% and 10% respectively. This result profoundly supports the previous analysis that the federal

expenditure and revenue are co-integrated. Based on the foregoing analyses, we find evidence for sustainability of the federal fiscal deficit in Nigeria. Our finding is consistent with that of IMF (2012). However, the sustainability is weak since the value of β is less than unity, indicating that federal expenditure grows at a faster rate than federal revenue. This finding also concurs with the reality on ground as far as federal fiscalism is concerned in contemporary Nigerian economy, especially in recent years.

Assessment of state fiscal deficit sustainability

In what follows, the sustainability of state fiscal deficit using the co-integration approach was investigated. The first task is to test the stationarity property of state expenditure and state revenue using both the standard unit root tests that do not account for structural break and the Zivot-Andrews test which allows for structural break as we did in the federal case. The standard ADF and PP unit root test results are contained in table 5.

Variable	ADF	P-value	Phillips	P-value
SEXP_GD	-	0.049	-2.343507	0.16
SREV_GD	2.927217*	0.30	-2.568983	0.29
P	-2.545076	63		56

The ADF test result allows the rejection of the null of unit root in state expenditure at 5% but not in state revenue. Thus, state expenditure is an $I(0)$ series but state revenue is not, based on the ADF test alone. Contrastingly, the PP test indicates that neither the state expenditure nor the state revenue is an $I(0)$ series. Since we cannot reject the null of unit root in both series based on the PP result, co-integration was tested for series 1(1). Table 6 shows the PP unit root test result for the first difference of both the state expenditure and revenue.

Table 6. Unit Root Test for First Difference of State

Expenditure and State Revenue without Structural Break		
Variable	Phillips Perron Test Statistics	P-value
D(SEXP_GDP)	-7.142604***	0.0000
D(SREV_GDP)	-7.271872***	0.0000

The PP test result above allows the rejection of the null hypothesis that the series have unit roots at 1%. Since both series become stationary after first differencing, they are I(1) series based on the PP result. Before the co-integration test, the unit root test was re-examined by accounting for structural break in the series for a more robust result. The result is summarised in table 7.

Table 7. Zivot-Andrews Unit Root Test for State Expenditure and State Revenue				
Variable	Test Statistic	Lag Length	Break Date	Critical Values
SEXP_GDP	-3.42563	2	1975	1% = -5.34000. 5% = 4.80000. 10% =
SREV_GDP	-2.55344	2	1983	1% = -5.57000. 5% = 5.08000. 10% =
D(SEXP_GDP)	-7.03440*	2	1984	1% = -5.34000. 5% = 4.80000. 10% =
D(SREV_GDP)	-4.66114*	2	1998	1% = -5.34000. 5% = 4.80000. 10% = -4.58000

Notwithstanding our account for structural break in the series, the Zivot-Andrews result conforms with the standard PP test result that both the state expenditure and revenue series are I(1). For the Zivot-Andrews test, the null hypothesis cannot be rejected for the series at their levels. But, after first differencing, the expenditure

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and revenue series become stationary, respectively at 1% and 10%.
Consequently, we tested for co-integration between the series with

and without structural breaks. The trace statistic for the Johansen co-integration test indicates two co-integrating equations at 10% as both the null of none (no co-integration) and that of at most 1 are rejected at that level. The co-integrating vector for the test is (1, -1.699428). Since the (absolute) value of λ exceeds unity, the condition for sustainability is not satisfied and the state fiscal deficit is not sustainable. The above analysis does not take into account possible structural breaks but a robust co-integration analysis should account for structural break. Therefore, the Gregory-Hansen test was also conducted and table 8 presents the result.

Table 8 Gregory-Hansen Co-integration Test for State Expenditure and State Revenue	
ADF Procedure	Phillips Procedure
ADF* Statistic = -4.790256*	Z _τ * Statistic =
Break Date = 1999	-38.67683 Break
Critical Values. 1% = -5.45. 5% = -4.99.	Date = 1999
	Critical Values. 1% = -57.28. 5% =

The Gregory-Hansen test above further strengthens our earlier conclusion that the state fiscal deficit has not been sustainable as the Phillips' procedure of the test indicates that the state expenditure and revenue are not co-integrated at the conventional levels. In fact, the ADF procedure only allows the rejection of the null hypothesis marginally at 10%. Thus, whether or not an account is made for structural break, we find evidence that the fiscal deficit of the sub-national government is unsustainable, especially in the long-run.

CONCLUSION AND RECOMMENDATIONS

Fiscal sustainability of the federal and state fiscal deficits in Nigeria has been examined in this study using the unit root and co-integration tests with and without structural breaks. The findings lend empirical support to weak sustainability of the federal fiscal deficit and non-sustainability of the state fiscal deficit, implying that the federal as well as the state government need to reduce their fiscal deficits to avert fiscal sustainability problem in the long run. Against this backdrop, we recommend broadly that the federal and

state governments rationalize their expenditures, augment their revenue sources and curtail fiscal leakages. In specific terms, the governments should meaningfully cut their expenditures by reducing the cost of governance through meaningful cuts in the pays of the political office holders (this may help discourage the corrupt and encourage only those who are ready for selfless public service) and by scrapping unnecessary offices, agencies and ministries. The governments should also diversify their revenue sources by developing the non-oil sectors of the economy such as the agricultural and mining sectors and by resuscitating highly productive public enterprises that will not only provide cheaper services than the private, but also generate revenue for the government. It is also imperative for the governments to put in place working mechanisms that will help in limiting fiscal leakages in the economy.

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