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Remittances And Fiscal Sustainability In Nigeria: Is There Any Link?[1]

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Abstract

Remittances have attracted extensive debate over their use and the role they play in an economy for some decades now. Nigeria had always been faced with diminishing revenue each time oil price nosedives, forcing the country into massive borrowing to fund budgets. This study is an attempt to elicit interest once more, on the subject of remittances and to contribute to the on-going debate, of its efficacy or otherwise in curing society's macroeconomic ills. The objective of this study is to investigate whether remittances affect fiscal sustainability in Nigeria. Johansen cointegration test was employed to check for long run relationship. The study used annual time series data from 1977 to 2014 obtained from the Central Bank of Nigeria and the World Bank. The study applied Ordinary Least Squares (OLS) estimation technique within an error correction modelling context, and the results indicate that remittances have significant impact on fiscal sustainability in the long run but not in the short run. One year lag of remittances improved fiscal sustainability (by reducing debt to GDP plus remittances ratio) by about 1.28% on average every year. Further findings suggest that the Nigerian government should collaborate with other countries that receive remittances in massive size and champion for its inclusion in fiscal sustainability analysis as this would help expand the governments' borrowing capacity and risk rating.

Keywords: Remittances, Fiscal Sustainability, Risk Rating, Borrowing Capacity, Error Correction Modelling, Debt Sustainability, Nigeria

1. Introduction

The structure of the Nigerian economy, no doubt, places her among economies constantly seeking for funds when commodity prices plummet. As a nation heavily dependent on oil for a greater percentage of revenue acquisition, the impact of other inflows of capital cannot be overlooked. Remittances which are seen as a potential and the best measure of migration experience is crucial to the foreign exchange position of many labour exporting countries (Stahl, 1982; Adams, 2003). Nigeria, benefits from this phenomenon as a result of her large migrant population all over the world, estimated to be around five million brought on by economic downturn and repressive military regime in the 1980s (Adedokun, 2003; Orozco & Millis, 2007). On the whole, the World Bank (2015b) estimated that in 2013 international stock of migrants stood at 247 million. As a capital that cannot be discounted, global remittances were estimated to have reached $583 billion in 2014 while developing countries received $436 billion (World Bank, 2015a).

Although remittances are exclusively private transfers, the dearth of inflow of other forms of capital like official development assistance, foreign direct investment and official aid have made them an attractive source of capital (Ratha, 2013). This idea may be connected to the fact that remittances have overtaken other sources of foreign capital both in size and rate of growth, and serves as one of the most vital sources of income to developing countries (Buch *et al*. 2002; Chami *et al*. 2005; Chami *et al.* 2007; Barajas *et al.* 2012). According to Agu (2009), remittances are second to oil as a source of foreign income to Nigeria, prompting the Central Bank of Nigeria (CBN) to initiate the survey of the remittance industry.

Recently, the effect of remittances on a country's fiscal position has been gaining some attention. Until now, Nigeria has been faced with dwindling revenue, occasioned by the fall in the price of crude oil which is the mainstay of the economy. This leaves the government with no other option than to borrow to finance her budgets. Interestingly, the International Monetary Fund and the World Bank (2009) have discovered that remittances just like exports boost foreign exchange available to a country and could enhance a country's

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capacity to repay debt. For a country like Nigeria, in this setting, debt sustainability will be measured by using debt-to-GDP plus remittances ratio rather than debt-to-GDP ratio (Abdih *et al.* 2009). This would lead to improvement in a country's solvency position and equally help to reduce a country's debt distress. Moreover, this could only be applicable to countries that attract huge remittance receipts since it has the potential to increase the revenue base through consumption, trade-based taxation, higher savings and seigniorage (Abdih et al., 2009). As observed by Barajas *et al.* (2010), Nigeria receives remittance inflows in excess of 10 per cent of GDP. Amongst the top ten remittance recipient countries in the developing world in 2014, Nigeria occupies the 5th position and receives about two third of remittances flowing into sub-Saharan Africa (World Bank, 2015a; World Bank, 2015b).

To provide further insights to the influential role of this private capital, there was an observed improvement in the overall balance of payments in Nigeria in 2011, from a deficit of ₦1491.5 billion or 5.97 per cent of GDP to a surplus of ₦40.34 billion partly contributed by remittances (Debt Management Office, 2012). Similarly, this positive effect was acknowledged by the Central Bank of Nigeria (2013) in relation to surplus in the current transfers' account which increased by 0.9 per cent from ₦3, 435.1 billion in the preceding period to ₦3, 467.0 billion, attributed mainly to remittances from Nigerians living overseas. From available statistics, it is evident that the inflow of remittances to Nigeria is a potent force that cannot be ignored as official recorded figure amounted to US$20 billion in 2014 in nominal terms (World Bank, 2015a) and when converted using current ₦305 naira to a dollar interbank exchange rate, reached a mammoth sum of ₦6.1 trillion. This amount was ₦1.6 trillion more than the budget of the Federal Government for 2015 fiscal year which stood at ₦4.493 trillion and ₦22 billion more than 2016 budget at ₦6.077 trillion. According to Abdih *et al.* (2008) remittances have similar budgetary implications and incentive effects on government behaviour akin to natural resources such as oil.

Considering the poor revenue of the present day Nigerian government, owing to the fall in the price of crude oil, which led to much borrowing to fund budgets, this study therefore, seeks to find out, if the huge inflow of remittances could influence fiscal sustainability in Nigeria thereby availing the government more borrowing window from international institutional lenders. The remainder of the paper is as follows: section 2 outlines the conceptual literature, while sections 3 and 4, will deal with the theoretical and empirical literature respectively. Sections 5, 6 and 7, will deal with the methodology, the results and analysis, and the conclusion, in that order.

2. Conceptual Issues

2.1 *Remittances*

Viewed from a simple angle, remittances are inflow of resources from residents of a country residing in another country. According to Yang (2011), remittances are household income, received from abroad, resulting mainly from international migration of workers. In the literature, there has been disagreement over what constitutes remittances. The type called workers' remittances only, as posited by Chami *et al.* (2008) is seen to best represent what researchers use when modelling. Other researchers/economists state that remittances have three parts which includes workers' remittances, compensation of employees and migrant transfers (Yang & Choi, 2007; Beine *et al.* 2010). Besides these dissenting voices, remittances are unrequited transfers from family members on which there are no claims by the sender (Kapur & Centre for Global Development, 2003); hence, they are unlike other financial flows such as equity flows or debt. In addition remittances may be sent in cash or kind, and could be sent through formal or informal channels (Yang, 2011). The implication is that remittances can be received in the form of pure money or other commodities. This study will focus on remittances received only through official channels, viz., banks et cetera.

2.2 *Fiscal Sustainability*

One of the primal ways, governments maintain their obligation of providing for its citizens is through ensuring that they are solvent, and the ability to perpetuate this solvency, at all times without default is termed fiscal sustainability. It seems, however, that there is no clear definition of what fiscal sustainability means (Chalk & Hemming, 2000). According to Schick (2005), fiscal sustainability encompasses government solvency, continued stable economic growth, stable taxes and intergenerational fairness. This definition connotes that governments should strive, at all times in providing mechanisms that will ensure the fiscal position of any economy remains afloat. Schick further added that in low income economies, fiscal sustainability involves the concern of governments on whether they can service debt, in the presence of capital flight, interest rate surge and when there is currency depreciation. Another definition by European Union (2012) relates fiscal sustainability as the ability of the government to assume the financial burden of its debt in the future. In essence, it implies,

avoiding an excessive increase in government liabilities, a burden on future generation and at the same time ensuring that the government is able to deliver the necessary public services, including the necessary safety net in times of hardship (European Union, 2012). Therefore, fiscal sustainability thus requires that today's government debt is matched by an excess of future primary surpluses, over primary deficits in present value terms (Chalk & Hemming, 2000). In the context of this study, fiscal sustainability is all about the ability of the government to maintain minimal rate of liability while still providing its basic duty to the citizenry. Intuitively, any factor that increases governments' solvency is expected to decrease debt to GDP plus remittances ratio (increase fiscal sustainability) and vice versa.

3. Theoretical Issues

Right from the time of Adam Smith, debt had been advocated as a means through which governments can fill their financing gap. The issue of whether the government has the ability to run deficits as much as it wants, because at this point, repayment becomes paramount, has attracted wide attention in economics. The works of Hamilton and Flavin (1986) sought to flesh out the theoretical underpinnings surrounding the sustainability of government debt. They argued that government deficits are seen as an implied promise to creditors that they would run offsetting surpluses in the future. Since this appear as a constraint to the government, they termed it as present value borrowing constraint and suggested that the expected present value of future debt equals zero. The implication is that the current debt should be equal to the present value of future surpluses. When this condition holds, debt would become sustainable. Remarkably, the traditional theory of debt sustainability of a nation starts with government budget constraints which link fiscal deficits to the accumulation of corresponding debt stocks over time (Abdih et.al, 2009). This theory shows that the ability of a nation to repay its debt depends on debt to GDP ratio which in turn depends significantly on the relationship between a country's real GDP growth and the real interest rate on its debt. Therefore, if the real interest rate exceeds the growth rate of GDP, debt will become unsustainable (Abdih et.al, 2009). When it comes to nations that receive significant amount of remittances, the International Monetary Fund & the World Bank (2009) stated that a more accurate representation of debt sustainability would be using debt to GDP plus remittances ratio rather than debt to GDP ratio. With this measure it is argued that remittances could influence and enlarge the borrowing capacity of a nation (Ncube & Brixiova, 2013).

4. Empirical Literature

Vast empirical literature exists on the connection between remittances and economic growth, and other macro and socioeconomic variables on the one hand and scantily on the link with fiscal sustainability on the other hand. Catrinescu *et al*. (2006) analysed the association between remittances, institutions and economic growth in a panel data involving 162 countries from 1970 to 2003 using dynamic panel estimation, Anderson-Hsiao instrumental variable (IV) approach and two step generalised method of moments technique. The study showed that remittances impact on growth positively when considered alongside institutional variables since they affect the volume and efficiency of investments. Kumar & Stauvermann (2014) applied autoregressive lag models to examine the relationship between remittances and economic growth in Bangladesh from 1972 to 2012. The study found that remittances have a significant impact on growth in the long run, thus supporting remittance led growth hypothesis in the country. Giuliano & Ruiz-Arranz (2009) made use of system generalised method of moments (SGMM) to investigate the connection between remittances and economic growth via financial sector in a panel data set of 73 countries from 1975 to 2002. The study showed that remittances boost growth in countries with less developed financial systems and equally contributes in alleviating credit constraints in inefficient credit markets by improving the allocation of capital. Rao & Hassan (2012) explored the direct and indirect growth effect of remittances on a group of economies from 1970 to 2006. The study employed SGMM for analysis and found that remittances have a positive but small permanent impact on growth through the development of the financial sector amongst other findings. Many other studies have found a positive growth effect of remittances (Garcia-Fuentes & Kennedy, 2009; Mundaca, 2009). On the other hand, Chami *et al*. (2005) analysed the effect of remittances in a large group of countries from 1970 to 2005. The analysis was based on whether remittances could be likened to other capital inflows. Evidence from their study suggests that remittances are compensatory in nature and are sent in bad economic condition. The study hinted that using remittances as a labour income would be deleterious to economic growth since receivers might reduce their supply of labour. Using both cross country and dynamic panel data regressions of growth rates on instrumented trade, remittances and institutions, Le (2008) found that remittances have a negative impact on growth. The

study revealed that institutions foster growth whereas remittances hamper growth; it was also found that if log of remittances increased by one unit, income growth will be reduced by 0.76 per cent per annum. Other studies (Barajas *et al*. 2009) have also confirmed that remittances have no influence on economic growth. With respect to poverty, Adams & Page (2005) examined the link between international migration, remittances, inequality and poverty in 71 countries. Empirical findings from their study show that a 10 per cent increase in per capita official international remittances will lead to a 3.5 per cent decline in the share of people living in poverty. Jongwanich (2007) & Imai *et al.* (2012) in both their studies involving large set of countries found similar poverty reducing effect of remittances. Moreover some studies (El-Sakka & McNaaB, 1999; Yang & Choi, 2007) laid more emphasis on the determinants of remittances and how they flow. In another approach, other studies (Acosta *et al*. 2007) noted that remittances cause real exchange rate to appreciate while some (Owusu-Sekyere *et al*. 2014) counter the findings that although real exchange rate appreciates, the increase do not lead to loss of export competitiveness rather the current account deficit experienced by economies that receive substantial volume of remittances is due to overdependence on imports. In addition, Beine *et al.* (2010) used a dynamic generalised ordered logit model together with a two-step least squares technique to assess the impact of remittances on financial openness in 66 developing economies from 1980 to 2005. The study revealed that remittances positively affect financial openness since the more remittances an economy receives the higher the chances it will remain financially open.

On the contrary, few studies have attempted to analyse the impact of remittances on sustainability of government debt. Ncube & Brixiova (2013) examined the macroeconomic impact of remittances in Africa for the period 1990 to 2011, utilising pooled OLS and other methodologies. The study used Egypt as a reference to determine if remittances can influence debt sustainability; and amongst other findings, showed that remittances have a positive impact on public debt sustainability. Chami *et al.* (2007) carried out a study on the effect remittances have on the conduct of fiscal and monetary policy in a business cycle setting. The study employed stochastic dynamic general equilibrium model and found that the presence of remittances change the cost and functioning of government policy instruments because they modify the conduct of optimal policy by improving the ability of the government to service debt. Gnangnon (2012) adopted a conditional logit technique to examine how remittances through increases in the tax base could aid an economy tread the path of fiscal consolidation from 1980 to 2007. The study found that remittances increase the probability of fiscal consolidation in both sub-Saharan and Franc zone countries. Abdih *et al.* (2009) investigated the impact of remittances on fiscal sustainability in Lebanon. The study found that including remittances in the debt sustainability analysis change the amount of fiscal adjustments needed to place debt on a sustainable path.

On the whole, the motivation for this study stems from the fact that there are few studies that have looked into the connection between remittances and fiscal sustainability. In Nigeria, no study has tried to determine the connection. Besides, with the present credit crunch facing Nigeria, there is no gainsaying the fact that the government is faced with the colossal task of maintaining constant solvency in order to fulfil its duties; therein lies the pivot of this study in establishing what the huge inflow of remittances could mean for the country regarding fiscal sustainability.

5. Methodology

The main goal of this study is to ascertain the impact of remittances on the sustainability of government debt using annual time series data from 1977 to 2014. The dependent variable is fiscal sustainability (FIS), measured as the ratio of total debt to gross domestic product (GDP) plus remittances rather than the ratio of total debt to GDP (Abdih *et al.* 2009). It shows the status of the governments' solvency and ability to repay debt. Analytically, debt sustainability is the ability of government to make debt sustainable, whereas, fiscal sustainability encompasses the ability of the government to maintain solvency at all times. If debt sustainability is achieved, fiscal sustainability is implied in some manner because government would have the capacity to repay debt and still provide indispensable services to the masses without much encumbrance. Therefore, increases in fiscal sustainability will ceteris paribus, decrease the debt ratio/burden and vice versa. Other explanatory variables include remittances (REMT), total public debt (DEBT), foreign direct investment (FDI), gross fixed capital formation (GFCF), trade openness (TOP), inflation rate (INFR), and government tax revenue (TAX). The aforementioned variables were taken from the Central Bank of Nigeria (CBN) Statistical bulletin for the years 2011 and 2014 and the World Bank (2016) development indicators. In addition, the variables are expressed in their natural logarithmic form in order to get a vivid picture of the percentage change in the dependent variable owing to a given small percentage change in any of the independent variables (Gujarati & Porter, 2009). In addition, TOP and INFR were not put in logarithm because they are already in percentages.

Interestingly, most time series data are plagued with unit root problem (i.e. nonstationarity) and the concept of making them stationary has played a significant role in the analysis of time series (Wooldridge, 2013). This is to avoid obtaining a spurious result. First and foremost, the annual data series which are known to be affected by structural changes will be subjected to stationarity test to ascertain their true order of integration. This shall be done, employing three different methods of unit root tests because of their distinctive characteristics. The Augmented Dickey-Fuller (ADF) unit root test credited to Dickey & Fuller (1979) will be adopted together with Phillips & Perron (1988) approach, and the Kwiatkowski, Phillips, Schmidt & Shin (1992) method of stationarity test.

The ADF test follows the form in the equation below;

$$\Delta\Psi_t = \alpha_1 + \alpha_2 t + \delta\Psi_{t-1} + \sum_{i=1}^{m} b_i \Delta\Psi_{t-i} + \varepsilon_t \quad \text{.....(1)}$$

where Δ is the difference operator, Ψ_t is the variable of interest; α_1, α_2, δ and b_i are parameters to be estimated while t is the time trend; ε_t assumes the characteristics of a pure white noise error term. In the ADF test, the possibility of having serial correlation in the error term is taken care of by the addition of lagged difference of the dependent variable (Gujarati & Porter, 2009). The major objective in the ADF unit root test is to determine if $\delta = 0$ and also the null hypothesis states that the variable under consideration has a unit root (i.e. is nonstationary).

Contrarily, the Phillips-Perron unit root test uses nonparametric technique to address the problem of serial correlation that might appear in the error term (Gujarati & Porter, 2009). In this sense, it does not use the lagged dependent variable as done by Dickey and Fuller (1979). The test statistic of Phillips-Perron unit root goes thus;

$$\hat{t}_b = t_b \left(\frac{\eta_o}{\varepsilon_o} \right)^{1/2} - \frac{m(\varepsilon_o - \eta_o)(se(\hat{b}))}{2\varepsilon_o^{1/2} S} \quad \text{.....(2)}$$

In equation (2) $\hat{t}_b$ is the t-ratio of b; m is the total number of observations; $\hat{b}$ is the estimate; $se(\hat{b})$ is the standard error; η_o is the a consistent estimate of the error variance in the normal Dickey-Fuller test equation; ε_o is an estimator of the residual spectrum at zero frequency while S is the standard error of the test regression. The Kwiatowski, Phillips, Schmidt and Shin otherwise known in acronymic term as KPSS is different from the standard ADF test in that the null hypothesis states that the series is stationary until proven otherwise (i.e. $H_0: b=0$ as against the alternative that b is nonzero and it reverses the method of ADF test statistic which tests the null hypothesis that $H_0: b<1$ as against the alternative that $b=1$. The KPSS statistic follows the form in equation (3) below and can be obtained using Ordinary Least Squares (OLS) residual from regression like $Y_t = a + \beta X_t + e_t$.

$$\frac{\sum_{t=1}^{T} E_t^2}{T^2 \hat{\sigma}^2} \quad \text{.....(3)}$$

where $$\hat{\sigma}^2 = \frac{\sum_{t=1}^{T} e_t^2}{T} + 2\sum_{j=1}^{L} \left(1 - \frac{j}{L+1}\right) rj \quad \text{.....(4)}$$

and rj represents,

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$$\frac{\sum_{s=j+1}^{T} e_s e_{s-j}}{T} \quad \ldots\ldots(5)$$

In the context of the normality of the OLS residual, the KPSS statistic is a Langrange Multiplier (LM) statistic (Greene, 2012).

Subsequently, if the stationarity test shows that all the variables are integrated of the same order (i.e. they are I(1)) process, this will lead to determining if there is a long run relationship or equilibrium amongst the variables. The cointegration test shall be conducted, employing Engel & Granger (1987) two step method and will be complemented with Johansen & Juselius (1990) approach to get more robust result since we are dealing with a multivariate series and there may be more than one cointegrating equation. If there is evidence of cointegration, an error correction model (ECM) will be carried out[1]. More important, post diagnostic examination of the model will be performed to ensure robustness; this will involve checking for serial correlation, heteroscedasticity, stability (Ramsey RESET test credited to Ramsey (1969) and CUSUM recursive test will be employed) and normality of the residual credited to Jargue & Bera (1987). Besides employing Breusch-Godfrey-Pagan heteroscedasticity test, the Newey & West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors procedure will be used. Gujarati & Porter (2009) observed that this method is robust for solving the problem of pure autocorrelation because of its capacity to correct estimated standard errors. First and foremost, the unit root test (stationarity test) will be conducted on the variables in the following equation:

$$\ln FIS_t = \beta_0 + \beta_1 \ln REMT_{t-1} + \beta_2 \ln FDI_t + \beta_3 \ln GFCF_t + \beta_4 TOP_t + \beta_5 INFR_t + \beta_6 \ln TAX_t + \beta_7 \ln DEBT_{t-1} + \varepsilon_t \quad \ldots\ldots(6)$$

where $\ln$ is natural log; β_0 is the constant; $\beta_1 - \beta_7$ are parameters to be estimated; ε_t is the random error term presumed to be normally distributed. As already aforementioned, TOP and INFR are already in percentages; hence they did not bear the symbol, $\ln$, before them as shown in equation (6) above.

6. Results and Analysis

The stationarity test was analysed on the variables in equation (6), first using the ADF unit root test.

Table 1. ADF Unit Root Test on Variables in equation (6)

Variables	*ADF test statistic(at first difference)*	*Order of integration*
DEBT	-4.647706 (-1.950394)*	I(1)
GFCF	-4.959245 (-1.953381)*	I(1)
INFR	-5.788703 (-1.950394)*	I(1)
TOP	-8.454586 (-1.950394)*	I(1)
FDI	-7.426556 (-1.950117)*	I(1)
REMT	-4.479261 (-1.950394)*	I(1)
TAX	-5.988752 (-1.953381)*	I(1)
FIS	-4.229045 (-1.950394)*	I(1)

*Note. (1)*shows MacKinnon critical values for the rejection of the null hypothesis at 5% level of significance. (2) Test does not include intercept and trend.*

Table 1 indicate that all the variables became stationary after first difference; hence they are integrated of order one. Next, is to make use of the Phillips-Perron method of unit root test. The results are shown in Table 2 below.

[1] The ECM will follow the form:

$$\ln \Delta FIS_t = \partial + \partial_1 \ln \Delta REMT_{t-1} + \partial_2 \ln \Delta FDI_t + \partial_3 \ln \Delta GFCF_t + \partial_4 \Delta TOP_t + \partial_5 \Delta INFR_t + \partial_6 \ln \Delta TAX_t + \partial_7 \ln \Delta DEBT_{t-1} + \varpi ECM_{t-1} + v_t$$

where ϖ is the error correction coefficient and shows the speed of adjustment towards long run equilibrium; Δ is the first difference operator; ECM_{t-1} shows the error correction model lagged one period. Note in order to avoid obtaining biased estimation that may result from the problem of serial correlation, REMT and DEBT was lagged one period (Keele & Kelly,2005).

Table 2. Phillips-Perron Unit Root Test on Variables in equation (6)

Variables	***Phillips-Perron test statistic(at first difference)***	***Order of integration***
DEBT	-4.741038 (-1.950394)*	I(1)
GFCF	-5.851722 (-1.950394)*	I(1)
INFR	-10.55341 (-1.950394)*	I(1)
TOP	-8.435469 (-1.950394)*	I(1)
FDI	-7.427730 (-1.950394)*	I(1)
REMT	-4.476574 (-1.950394)*	I(1)
TAX	-6.680635 (-1.950394)*	I(1)
FIS	-4.229045 (-1.950394)*	I(1)

*Note. (1)*show MacKinnon critical values for the rejection of the null hypothesis at 5% level of significance. (2)Test does not include intercept and trend.*

The result in Table 2 confirms the ADF test that all the variables became stationary after first difference. Finally, the KPSS unit root result is presented in Table 3.

Table 3. KPSS Unit Root Test on Variables in equation (6)

Variables	**KPSS test statistic(at first difference)**	**Order of integration**
DEBT	0.491164 (0.739000)**	I(1)
GFCF	0.436889 (0.739000)**	I(1)
INFR	0.500000 (0.739000)**	I(1)
TOP	0.175257 (0.739000)**	I(1)
FDI	0.500000 (0.739000)**	I(1)
REMT	0.127393 (0.739000)**	I(1)
TAX	0.156682 (0.739000)**	I(1)
FIS	0.527912 (0.739000)**	I(1)

*Note. (1)**show MacKinnon critical values for the rejection of the null hypothesis at 1% level of significance. (2)Test includes only intercept.*

In concordance with the ADF and the PP tests, the KPSS equally show that all the variables are integrated of order one only after getting their first difference. Consequently, the order of stationarity of the variables suggests that there may be a long run relationship or cointegration amongst the variables. Presented below is the result of the Engel and Granger two step method[1]:

Table 4. Cointegration Test on the Residual of Equation (6)

Augmented Dickey-Fuller test Statistic	-6.379515 (-3.626784)* (-2.945842)** (-2.611531)***
Phillips-Perron test Statistic	-6.415603 (-3.626784)* (-2.945842)** (-2.611531)***
KPSS LM-Statistic	0.061143 (0.739000)* (0.463000)** (0.347000)***

Note the asterisks, **, *** indicate 1%, 5% and 10% critical values respectively while the figures outside the parenthesis indicate the statistic of the unit root method used.*

[1] The Engle and Granger method entails extracting the residual from equation (6) and testing if it is stationary at level; thus $\Delta\varepsilon_t = \theta\varepsilon_{t-1} + \Omega i\sum_i^k \Delta\varepsilon_{t-1} + \nu_t$; where Δ is the first difference operator; ε_t is the error emanating from the cointegrating regression; ε_{t-1} is the one period lag of the cointegrating regression; k is the number of lags employed and ν_t is taken to be pure white noise.

The result displayed on Table 4 shows that the residual is stationary at level taking into consideration any of the critical values of the various methods used in checking the stationarity of the residual. To complement the Engel and Granger method, the Johansen technique is presented thus;

Table 5. Johansen Cointegration Test for Variables in Equation (6): Trace Test

Hypothesized No. of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob.****
None*	0.847718	203.6719	159.5297	0.0000
At most 1*	0.735328	135.9192	125.6154	0.0101
At most 2	0.549935	88.06569	95.75366	0.1503
At most 3	0.453013	59.32463	69.81889	0.2567
At most 4	0.395990	37.60474	47.85613	0.3196
At most 5	0.272516	19.45484	29.79707	0.4606
At most 6	0.198464	8.000952	15.49471	0.4653
At most 7	0.001023	0.036856	3.841466	0.8477

Note (1) indicate rejection of null hypothesis at 0.05 level. (2)**indicate the Mackinnon-Haug-Michelis (1999) p-values. (3). Trace test indicates 2 cointegrating equation at 5% level.*

Table 6. Johansen Cointegration Test for Variables in Equation (6): Maximum Eigenvalue Test

Hypothesized No. of CE(s)	**Eigenvalue**	**Max-Eigen Statistic**	**0.05 Critical Value**	**Prob.****
None*	0.847718	67.75268	52.36261	0.0007
At most 1*	0.735328	47.85354	46.23142	0.0332
At most 2	0.549935	28.74106	40.07757	0.5094
At most 3	0.453013	21.71989	33.87687	0.6293
At most 4	0.395990	18.14990	27.58434	0.4827
At most 5	0.272516	11.45388	21.13162	0.6020
At most 6	0.198464	7.964097	14.26460	0.3824
At most 7	0.001023	0.036856	3.841466	0.8477

Note (1) indicate rejection of null hypothesis at 0.05 level. (2)**indicate the Mackinnon-Haug-Michelis (1999) p-values. (3). Max-eigenvalue test indicates 2 cointegrating equation at 5% level.*

The Johansen cointegration test in Table 5 and 6 validates the Engel and Granger test. The trace and the max-eigen statistics indicate that there is cointegration amongst the variables. Sequel to the confirmation of a long run relationship, the long run result is shown in Table 7.

Table 7. Results of the Long Run Estimates of Equation (6)

Variable	**Coefficient**	**HAC std. Error**	**t-Statistic**	**P-value**
C	-9.288668	1.082720	-8.579008	0.0000*
LOGREMT(-1)	-0.012757	0.005102	-2.500392	0.0104*
LOGFDI	-0.274311	0.153373	-1.78850	0.0841
LOGGFCF	0.015771	0.043671	0.361136	0.7206
TOP	0.009425	0.002725	3.458398	0.0017*
INFR	0.001887	0.002422	0.778787	0.4424
LOGTAX	-0.307264	0.111817	-2.747913	0.0102*
LOGDEBT	1.179404	0.066649	17.69580	0.0000*
R2	0.976924		F-statistic	175.3886
Durbin-Watson statistic	2.176046		Prob(F-statistic)	0.000000

A single asterisk (*) denotes statistical significance at 5% level

Table 7 shows that a lag of remittances is statistically significance at 5% level; in the long run, ceteris paribus, a percentage increase in a lag of remittances would on average reduce debt to GDP plus remittances ratio by 1.28% on an annual basis. The implication is that fiscal sustainability (i.e. government solvency) is rising

(because the lower the value of debt to GDP plus remittances ratio, the higher the sustainability). Also, a percentage increase in foreign direct investment (FDI), all other things being equal will on average lead to a fall in debt to GDP plus remittances ratio by about 27% per annum. This amplifies the importance of FDI in promoting fiscal sustainability, however, its coefficient was found to be statistically insignificant at 5% level. On the other hand, when every other variable is held constant, gross fixed capital formation (GFCF), trade openness (TOP) and inflation rate (INFR) increased the ratio of debt to GDP plus remittances (leading to a fall in fiscal sustainability because the higher the value of debt to GDP plus remittances ratio, the lower the sustainability) by about 1.58%, 0.94% and 0.19% averagely respectively per annum; whereas TOP was statistically significant at 5% level, GFCF and INFR were not. This result shows that TOP substantially decreased fiscal sustainability. Furthermore, a percentage increase in government tax revenue (TAX), all other things being equal, decreased debt to GDP plus remittances ratio (increased fiscal sustainability) by about 30.73% on average annually. This goes to show that TAX enhances the ability of government to maintain solvency because the coefficient was statistically significant at 5% level. Contrariwise, a percentage increase in a lag of total public debt will on average lead to 117.94% increase in debt to GDP plus remittances ratio annually. This was statistically significant at 5% level. Additionally, it shows that there would be a fall in fiscal sustainability since debt to GDP plus remittances ratio has risen. Interestingly, the result shows that a lag of remittances (i.e LOGREMT (-1)) and TAX led to increases in fiscal sustainability, whereas TOP and DEBT decreased fiscal sustainability as these were the only statistically significant variables.

Table 8. Results of the Parsimonious Short Run Error Correction Model of Equation (6)

Variable	**Coefficient**	**HAC Standard Error**	**t-statistic**	**P-value**
D(LOGREMT(-1))	-0.088261	0.064335	-1.371910	0.1814
D(LOGFDI)	-0.237418	0.102134	-2.325566	0.0279*
D(LOGGFCF)	0.002013	0.034482	0.058368	0.9539
D(TOP)	0.001272	0.005036	0.252521	0.8026
D(INFR)	0.002568	0.00128	1.999788	0.0577
D(LOGTAX)	0.097008	0.257543	0.376667	0.7094
D(LOGDEBT(-1))	1.069121	0.440256	2.428411	0.0221*
ECM2(-1)	-0.280042	0.087960	3.183743	0.0038*
C	-0.044249	0.093929	-0.471086	0.6414
R2				F-statistic
0.375600			2.430192	
Durbin-Watson statistic				Prob(F-statistic)
1.744179			0.040876	

A single asterisk (*) denote statistical significance at 5% level.

Table 8 shows the parsimonious short run error correction model. This was extracted from the over-parameterised short run dynamic model (Table 9). The variables were chosen after elimination of those that failed a priori expectation and were not statistically significant. Additionally the variables that conformed to a priori expectation even when they are not statistically significant still formed part of the data generating process (DGP). Many lags were attempted but lag two was chosen based on Akaike information criterion (AIC) and others; and also to have enough degrees of freedom. From Table 8, the coefficient of the error correction term (i.e. ECM2) in a statistical manner was significant; it signifies that about 28% of the discrepancy between the long term and short term fiscal sustainability is corrected within a year. Moreover fiscal sustainability adjusts to its explanatory variables (comprising a lag of remittances, foreign direct investment, gross fixed capital formation, trade openness, inflation rate, government tax revenue and a lag of total public debt) with a lag. Besides, in the short run, a percentage increase in a lag of remittances was found not to be statistically significant at 5% level.

Table 9. Overparameterised Short Run Dynamic Estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LOGFIS(-1))	0.096135	0.313955	0.306207	0.7657
D(LOGFIS(-2))	0.241455	0.273748	0.882033	0.3985
D(LOGREMT)	0.036013	0.027507	1.309234	0.2197
D(LOGREMT(-1))	-0.067607	0.027078	-2.496709	0.0316
D(LOGREMT(-2))	0.038036	0.032163	1.182607	0.2643
D(LOGFDI)	-0.013110	0.059298	-0.221090	0.8295
D(LOGFDI(-1))	0.008331	0.057656	0.144498	0.8880
D(LOGFDI(-2))	0.013628	0.037738	0.361122	0.7255
D(LOGGFCF)	-0.019793	0.026903	-0.735700	0.4788
D(LOGGFCF(-1))	-0.008708	0.021288	-0.409039	0.6911
D(LOGGFCF(-2))	-0.021339	0.031514	-0.677139	0.5137
D(TOP)	0.003853	0.001765	2.182790	0.0540
D(TOP(-1))	-0.000640	0.002424	-0.263870	0.7972
D(TOP(-2))	0.000964	0.001896	0.508376	0.6222
D(INFR)	-0.000307	0.001300	-0.236304	0.8180
D(INFR(-1))	0.000289	0.001176	0.245658	0.8109
D(INFR(-2))	-0.001099	0.001226	-0.896897	0.3909
D(LOGTAX)	-0.108789	0.055499	-1.960193	0.0784
D(LOGTAX(-1))	0.016600	0.096599	0.171841	0.8670
D(LOGTAX(-2))	0.027615	0.064749	0.426484	0.6788
D(LOGDEBT)	0.186412	0.361668	0.515422	0.6175
D(LOGDEBT(-1))	1.070631	0.063432	16.87836	0.0000
D(LOGDEBT(-2))	-0.292775	0.333655	-0.877477	0.4008
ECM2(-1)	-0.188152	0.127121	-1.480107	0.1696
C	-0.071766	0.042017	-1.708005	0.1184
R-squared	0.989668	Mean dependent var		0.158028
Adjusted R-squared	0.964872	S.D. dependent var		0.330696
S.E. of regression	0.061981	Akaike info criterion		-2.548175
Sum squared resid	0.038416	Schwarz criterion		-1.437213
Log likelihood	69.59307	Hannan-Quinn criter.		-2.164671
F-statistic	39.91171	Durbin-Watson stat		1.780438
Prob(F-statistic)	0.000000			

Table10. Diagnostic Tests

Test	**Estimated statistic**	**p-value**
Ramsey Reset Test	F-stat (1.742906)	0.1983
Breusch-Godfrey Serial Correlation LM Test	F-stat (0.899438)	0.4196
Breusch-Pagan-Godfrey Heteroscedasticity Test	F-stat (1.240222)	0.3146
Normality Test	JB-stat (1.113929)	0.5729

In addition, Table 10 contains information about the diagnostic tests carried on the model. The results show that the null hypothesis of no serial correlation, no heteroscedasticity, and no misspecification was not rejected at 5% level. Also the null hypothesis that the residuals are normally distributed was not rejected. The stability of the model was inspected employing the CUSUM stability test and the graph indicated that the model was stable (see appendix).

7. Conclusion

As a monocultural economy, Nigeria has only one source (i.e. crude oil receipt) through which majority of its revenue is generated. It is of interest to note that whenever there is any shock to that means, the economy is

thrown into ample danger. Although there is no gainsaying the fact that workers' remittances are by nature a private capital, however, its trajectory over the years have shown that it is a stable resources. Failure of the continuous inflow of household capitals like official development assistance and foreign direct investment et cetera spurred economists worldwide to investigate this exclusive private income. Many studies support the growth enhancing capability of remittances and the various medium through which it affects an economy. Nevertheless, this study examined the implication of remittances via sustainability of government debt in a country that has large volume of receipts; in this instance Nigeria was chosen as a case in point. Furthermore, the study specifically examined if remittances could help a government leverage borrowing from the world institutional lenders. Besides, maintaining solvency is one of the key roles of any government. It was found in this study that remittances improved fiscal sustainability (by reducing debt to GDP plus remittances ratio) by about 1.28% on average every year. This influence was found to be statistically significant, highlighting the need to consider remittances in the fiscal framework. For an economy such as Nigeria, where other forms of capital inflow (e.g. foreign direct investment, official development assistance etc.) has drastically diminished over the years, the urge to borrow appears irresistible with its attendant consequences. The International Monetary Fund and the World Bank (2009) have discovered that remittances just like exports boost the foreign exchange available to a country and could enhance a country's capacity to repay debt. This would lead to improvement in a country's solvency position. In no time should this be given consideration than now as the country battles to borrow to fund its budget. Thus Nigeria should collaborate with other countries that receive remittances in massive size and champion for its inclusion in fiscal sustainability analysis. It would assist in expanding the governments' borrowing capacity and risk rating.

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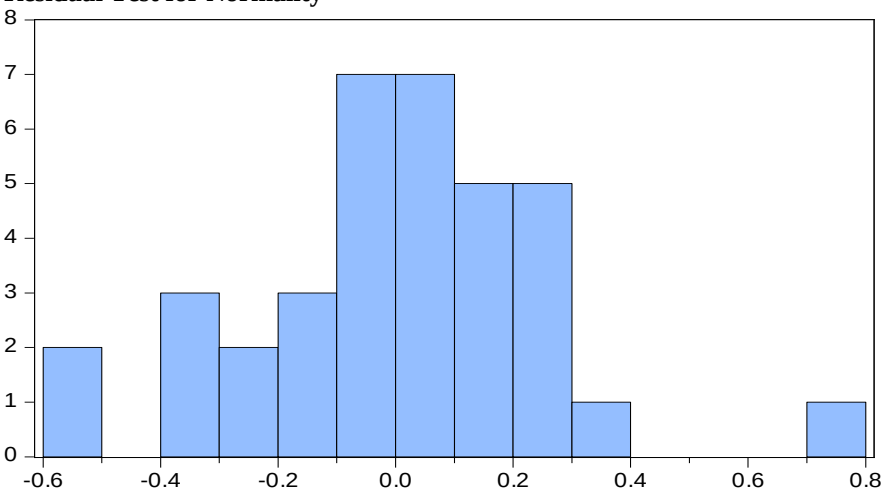
Appendix

Residual Test for Normality



Series: Residuals	
Sample 1979 2014	
Observations 36	
Mean	-4.74e-17
Median	0.032985
Maximum	0.742614
Minimum	-0.581522
Std. Dev.	0.258322
Skewness	0.110312
Kurtosis	3.833033
Jarque-Bera	1.113929
Probability	0.572946

Stability Test