Journal of Economics and Development Studies
June 2016, Vol. 4, No. 2, pp. 145-158
ISSN: 2334-2382 (Print), 2334-2390 (Online)

Published by American Research Institute for Policy Development
DOI: 10.15640/jeds.v4n2a12
URL: https://doi.org/10.15640/jeds.v4n2a12

By How Much will Faster Economic Growth Boost Government Revenue in Nigeria?

Ebi, Bassey Okon[1] & Samson Adeniyi Aladejare[2]

Abstract

With the continuous fall in the price of crude oil which is the primary revenue source of Nigerian government, it has obviously become imperative to examine how buoyant the revenue sources of the government. This study thus examines by how much revenue yield of the government grows with recorded growth in the economy from 1980 to 2013. The study adopted the Auto-Regressive Distributive Lag approach to examine the short and long run buoyancy of government revenue sources which were decomposed into: total tax revenue, oil revenue and non oil revenue. Empirical submissions reveal very weak buoyancy of government revenue in both the short and long run periods. Based on the findings, it was recommended that pervasive corruption at both the collection and remittance point of revenue should be tackled in the system, the principle of true federalism should be encouraged, training and motivation of tax administrators is important and the development of the non oil sector should not be taken lightly.

Keywords: Buoyancy, Revenue, Government, Growth, Nigeria.

I. Introduction

It is no longer news that Nigeria economy is presently experiencing significant fiscal challenges as a result of on-going fall in price of its main revenue product (crude oil). The unabated nature of fall matched with skyrocketing fiscal deficits without a concrete and immediate action plan in terms of re-enforcing fiscal buffers by the fiscal authorities posed a serious challenge on market confidence as well as debt sustainability. The continuous rise in population figures and the associated development needs also has not helped to relax further pressures on public expenditure demands and risk of unsustainable debt path.

The above scenario triggered the question; can higher economic growth help lessen fiscal deficits; and by how much? Attempting these questions from the revenue perspective requires a sound knowledge of how buoyant the tax revenue is. Tax buoyancy is a measure of how tax incomes vary with changes in economic growth measured often by Gross Domestic Product (GDP). Consequently, growth in GDP has the potential to advance the tax base of a country; which enables a significant transfer of the private sector's earnings to the government inform of tax revenue to provide the required public goods and services. Buoyant tax system is expected to compliment other government revenue earning sources, as a means of generating the required income to offset the deficit in the budget vis-à-vis buffer economic consequences of short falls in oil price.

When the tax buoyancy is unity or 1, it would imply that an extra percent of GDP would increase tax income also by 1 percent; thereby leaving the tax-to-GDP ratio unchanged. However, tax buoyancy in the excess of 1 is much more desired in any tax administration. This is because it helps the government to meet increasing demand for public goods and maintain financial strength. The increase in tax revenue will outweigh GDP growth, and potentially lead to reductions in the deficit ratio.

[1]Department of Economics, University of Calabar, Nigeria. ukotebi@yahoo.co.uk
[2]Department of Economics, Federal University Wukari, Nigeria.

Lower tax buoyancy may result in discretionary changes to recompense for the fall in tax buoyancy and may be correspondingly high. However, unlike high elasticity, high buoyancy does not always mean that buoyancy will continue to be high in the future, since rates may have reached their ceiling such that they cannot be raised any further (Mary and Joseph, 2013).

Nigeria in her attempt to increase growth has continued to increase public outlay without being able to equate this increase with adequate tax revenue generation; which is responsible for the enormous fiscal deficit of the government. The root cause of poor tax mobilization as a way of funding fiscal deficit has been various forms of resistance such as: tax evasion, tax avoidance, and corrupt activities to mention a few. These activities are considered as disruption in the economy; always fingered as part factors responsible for the underdevelopment of the country (Debbie and Fakile, 2011). Another limiting factor has been the poor database with regards to the tax base, plus the over dependence on oil revenue which in recent times has become unreliable. With the continuous volatility in crude oil prices and rising demand for public spending, exploration of alternative revenue sources via taxation deserves more attention than ever before.

Against this backdrop, this study concerns itself on how tax revenues responds to changes in economic growth; since an understanding of this relationship can help in evaluating the potency of tax, as a buffer from the unrelenting drop in government revenues which is much witnessed in recent times.

2. Literature Review

2.1 Theoretical Literature Review

As stated by Ariyo (1997), "a country's tax system is a major determinant of other macroeconomic indices. Specifically, for both developed and developing economies, there exists a relationship between tax structure and the level of economic growth and development". The works of Hindrichs (1966) and Musgrave (1969) explained the role of various tax classifications in determining *tax effort* that shows the ratio of the actual tax mobilized to potential tax and used as an indicator of how much a country is utilizing its taxable capacity. The authors enumerated four main approaches to gauging the performance of a tax which are: the ability to give up approach, the efficient resource use approach, the ability to collect approach and the comparison with average performance (stochastic) approach (Daniel et al., 2012).

The familiar technique adopted for evaluating tax effort is to regress the tax to output ratio on a set of variables including the primary contributing factor of output (Bahl, 1971) that serves as proxies for *tax handles*. The forecasted tax ratio therefore yields the ratio the country would have if it had made the average tax effort; thereby becoming a measure of the taxable capacity of the country while the regression parameters act as the *average* effective rates on the base (Daniel et al., 2012). This procedure of measuring tax productivity is regarded as a static approach because it gives the potential for tax increase at a given point in time by juxtaposing with other countries (Daniel et al., 2012). Nevertheless, to establish if a country has made attempts at accelerating tax revenue over a period; the tax performance which is a measure of the sensitivity and response of the tax system with respect to income/GDP ratio such as tax buoyancy is recommended (Daniel et al., 2012). The buoyancy of taxis a measure of the total response of tax receipts to changes in national income; as well as discretionary changes in tax policies over time. Though closely related to buoyancy, the elasticity of the tax system measures the responsiveness of tax revenue to changes in national income resulting from discretionary changes in the tax structure. Hence, measuring the elasticity of the tax system requires a correction for the impact of discretionary changes in tax policy on historical tax revenue series (Daniel et al., 2012).

Obtaining both the buoyancy and elasticity of a tax system is very much imperative because the responsiveness of tax revenue to changes in GDP can be classified into two categories which are: the automatic response to GDP change and the response resulting from discretionary changes in the tax policy such as changes in the tax rate and/or base. The second category is the changes in the efficiency of tax administration; which involves the introduction of new taxes and the abolition of others, etc. According to Teera (2002), the income tax elasticity evaluation is important if it is pointed at showing the depth to which tax system is responsive to changes in the tax composition and the value of GDP. In the course of low responsiveness of major revenue sources as a result of low base or evasion or avoidance; fiscal authorities can generate extra resources through discretionary measures. Then, the growth of tax revenue comes through high buoyancy rather than through elasticity.

2.2 Empirical Literature Review

There appears to be several empirical literatures on the buoyancy impact of GDP on tax revenues. This study narrows its focus on the buoyancy of tax. However, researches conducted to measure buoyancy and elasticity of tax in various countries is being reviewed in this section.

Choudhry (1979) conducted a study estimating the elasticity of tax revenue of the United States, United Kingdom, Malaysia, and Kenya. The study found at ax elasticity of 1.04 for the United States and 1.24 for the United Kingdom. Elasticizes of both Malaysia and Kenya were found to be higher at 1.57 and 1.32 respectively. The buoyancy estimation showed that in the United States and the United Kingdom, low buoyancy, and elasticity were as a result of revenue reducing discretionary changes in income taxation. While in Malaysia and Kenya, revenue increasing discretionary tax policies contributed to their relatively higher buoyancy and elasticity results.

Osoro (1993) studied the revenue productivity implications of tax reforms in Tanzania for the period 1979 to 1989. The study adopted double log form equation to measure tax buoyancy and the proportional adjustment method to measure the elasticity of tax. The estimated result gave an overall elasticity of 0.76 and a buoyancy of 1.06. The study deduced that reforms in Tanzania tax administration system had failed to improve tax revenues. The study findings based the result on the government granting numerous tax exemptions and poor tax administration within the sample period.

A similar study by Osoro (1995) for Tanzania, measured the tax elasticity for each of the base as well as for the entire tax system from 1970-1980. The study confirmed that the responsiveness of the general tax system fell from 0.85 in 1970 to 0.782 in 1980. Furthermore, income tax and Sales tax, which were elastic in the 1970s, became inelastic in the 1980s. The import duty, which was reported to be inelastic in the 1970s, also became elastic in the 1980s. These changes were linked to low import duty rates and a rise in import level, sudden changes in the tax base, as a result of extreme exchange rate depreciation.

Ariyo (1997) examined the productivity of the Nigerian tax system for the period 1970 to 1990. The study adopted the double log form and the proportional adjustment methods. The findings of the study support a general acceptable tax productivity level, but with significant variations in the level of tax revenue by various tax sources which is related to the permissiveness in the administration of non-oil tax sources during the oil 'glory day' period.

Kusi (1998) examined the effect of tax reform and revenue productivity of Ghana for the period 1970 to 1993, by adopting the Proportional Adjustment method which established a pre-reform period (1970 to 1982) buoyancy of 0.72 and elasticity of 0.71. The post reform period (1983 to 1993), revealed higher buoyancy of 1.29 and elasticity of 1.22. The low buoyancy and elasticity recorded in the pre-reform period according to the research, was supposed due to activities of smugglers, unaccounted trade, tax evasion and weakness in tax collection. The study conclusion was the submission that the reforms introduced in the tax administration, had significantly impacted on tax revenue productivity from 1983 to 1993.

Temitayo and Edu (1999), in a similar study for Nigeria for the period 1970 to 1995 obtained a buoyancy of 1.6 with the base year as the denominator; while obtaining a buoyancy of 1.3, when the current year was adopted as the denominator, and a 1.4 buoyancy value when the mean of the base and current periods was adopted has the denominator. Hence, their study deduced that, total government revenue was generally buoyant for the study period.

Bilquees (2004) evaluated the Elasticity and Buoyancy of the Tax System in Pakistan by adopting the Divisia Index method over the 1974/75 to 2003/04 period. The study findings reveal a post reform period total buoyancy of tax and responsiveness value of 0.92 and 0.88 respectively. Hence, postulating that the general adoption of discretionary tax measures has been much depended upon to a significant level as a means of revenue generation in Pakistan.

Kabbashi (2005) adopted the use of dummy variable to examine the impact of trade liberalization on revenue mobilization and stability in Sudan. The result revealed that the total responsiveness of tax was inelastic with an index of 0.82; whiles independent elasticity of the individual taxes varied with the following indices: import duty-0.83, Excise tax- 0.82, income tax-1.26 and profit tax-1.57. The study conclusion was that the reduced tax efforts, as well as the depreciating form of government outlay can be traced to the less buoyant and elastic tax system.

Brafu-Insaidoo and Obeng (2008) studied the impact of import liberalization on Tariff revenue in Ghana for the period 1966 to 2003, by employing the Singer (1968) technique in estimating the duty buoyancy and elasticity. The result revealed total buoyancy of 0.56 and elasticity of 0.28. The pre-import liberalization period (1965-1982), yield a buoyancy of 0.33 and elasticity of 0.81; while the post-import liberalization period (1983-2003), had a buoyancy of 0.31 and elasticity of 0.05. Also observed from the study findings, is duty buoyancy outweighing duty elasticity for the entire study period; which interprets to mean that discretionary tax measures have promoted tariff income generation over the period.

Daniel et al. (2012) researched on the buoyancy and elasticity of tax for Ghana for the period 1970 to 2007. The study used the Dummy Variable Technique to control for effects of the discretionary tax measures to estimate the elasticity of the tax system. The study findings revealed that the overall tax system was buoyant and elastic; with buoyancy exceeding elasticity in the long run, but in the short run the reverse was the case. Improvement was also observed for the reform period (1985 to 2007) in both buoyancy and elasticity, comparatively with coefficient in pre-reform buoyancy and elasticity being less than 1. The value was found to exceed beyond unity. The study further decomposed the buoyancy coefficients into tax-to-base and base-to-income elasticity's. The result revealed that the former was greater than the latter by their indices; indicating that there is potential revenue in the economy which is untaxed. Thus, the study measured the overall tax elasticity to be about 1.03, proposing that the elasticity of the tax system to a unit change in GDP was more than unity. Which translate Tomean the rejection of the hypothesis that the overall tax system is income inelastic in the long run. The study recommended general and specific measures aimed at improving tax collection.

Saibu and Olatunbosun (2013) investigated the macroeconomic determinants of tax revenue in Nigeria from 1970 to 2011. The study used the error correction mechanism to establish both the long run and short run relationships among the variables. The essential empirical finding of the study was that tax revenue appears to be significantly responsive to changes in the level of income, exchange rate and inflation rate. The income responsiveness of tax shows that a unit percent increase in income level will probably lead to tax revenue increase by 0.63% in the immediate and 0.33% in the second year. The paper thus submits that instability of macroeconomic variables as well as the level of economic activities; serve as important determinants of tax buoyancy and tax effort in Nigeria.

Obviously, there are good numbers of related literature on this subject within and outside Nigeria as illustrated in empirical literature reviewed above. However, issues on public revenue are very dynamic and require constant evaluation in the face of changing economic events. Again, changing economic events have a way of changing economic models and theorizing. Hence, the present study employed "Auto-Regressive Distributive Lag (ARDL)" model. Unique model different from what other related studies used in the context of Nigeria and examine revenue buoyancy in the face of a stained fiscal crisis.

3. Study Methodology

Data for this study was sourced from the Central Bank of Nigeria's statistical bulletin for various year periods. The study time frame covered the period 1980 to 2015. To captured the dynamic relationship between the revenue variables, the GDP variable and the control variables; this study will adopt the Auto-Regressive Distributive Lag (ARDL) model. The choice of the model is based on the advantage it offers in terms of allowing us to gauge the long and short run buoyancy of government revenue; as well as capture the discretionary effects in the revenue mobilization process. Put differently, it also allows for flexibility in the relationship between revenue mobilization and GDP. The ARDL approach is also most appropriate for correctly specifying models with variables of both level and first difference stationary.

3.1 The Model

Economic theorizing stipulates that government revenue is function of economic growth and others (Hindrichs, 1966; Musgrave, 1969; Daniel et al, 2012; etc).

Accordingly, the study specifies that:

$$REV = f(GDP, DOP, REXCH, CPI) \qquad (Equ.1)$$

The model functional form is represented as:

$$REV = a_0 + \beta_1 GDP_t + \beta_2 DOP + \beta_3 REXCH + \beta_4 CPI + \varepsilon_t \qquad (Equ.2)$$

Where: REV= Revenue, a_0= intercept, GDP= Gross Domestic Product (a proxy for economic growth), DOP= Degree of Openness, REXCH= Real Effective Exchange rate, CPI = Consumer Price Index (a proxy for inflation) and Ɛ= Error term. To effectively measure the buoyancy of government income; revenue is decomposed into Total Tax (TTAX), Oil Revenue (OREV) and Non Oil Revenue (NOREV) in the study.

As a way of effectively accounting for the dynamic discretionary relationship between the variables in equation 2; the adoption of the error correcting factor is introduced. The technique permits logical determination of the most buoyant revenue from a list of repressors and their lag structures. It also enables the incorporation of the feedback mechanism from the long run model into the short run dynamic analysis. In view of the above, equation 2 can be stated in dynamic autoregressive distributive lag model as shown below:

$$\Delta Z_t = a_0 + \sum_{i=1}^{k} \delta X_{t-1} + \sum_{j=1}^{p} \gamma \Delta Z_{t-1} + \theta u_{t-1} + \varepsilon_t \qquad (Equ. 3)$$

Where: Δ= the difference operator, a_0= intercept, δ and γ = are parameters of all long run and short run variables respectively, $X$is a 5x1 dimensional vector of long run variables, Z is a 5x1 dimensional vector of short run variables, θ= speed of adjustment factor and Ɛ= stochastic white noise.

3.2 Unit Root test

This study adopts a much more reliable univariate Dickey Fuller-GLS test for autoregressive unit root recommended by Elliot, Rothenberg, and Stock (ERS, 1996). The test is a modification to the conventional Augmented Dickey-Fuller(ADF) *t*-test as it applies generalized least squares (GLS)de-trending prior to running the ADF test regression. When examined with the ADF tests, the DF-GLS test has the best overall performance in terms of sample size and power. It "has substantially improved power when an unknown mean or trend is present" (ERS, 1996). The test regression included both a constant with no trend and a constant with trend for the level as well as the first differences for all variables. The Phillips Perron (PP) unit root test was also employed as a means of verifying the order of integration of the variables. Perron(1988) proposed an alternative (nonparametric) method of controlling for serial correlation when testing for a unit root. The PP method estimates the non-augmented DF test equation, and modifies the -ratio of the coefficient so that serial correlation does not affect the asymptotic distribution of the test statistic.

Table 1: Unit Root Test for Relevant Variables (Level)

	Dickey-Fuller (DF-GLS)		**Phillips-Perron Test (PP)**	
Variables	Without Trend	With Trend	Without Trend	With Trend
ln(RGPD)	-1.71259*	-2.141231	-3.184268**	-2.77896
ln(TTAX)	-0.158822	-2.77513	-0.430418	-2.813260
ln(DOP)	-1.211991	-1.818967	-3.047751**	-1.745601
ln(REXCH)	-1.55942	-1.827835	-2.022585	-1.748697
ln(CPI)	-0.307507	-1.572915	-1.313117	0.739516
ln(OREV)	-0.293984	-2.223077	-0.446989	-2.458350
ln(NOREV)	0.271341	-2.679424	0.657386	0.163776

Note: *, **, ***denotes significant at 10%, 5% and 1% significance levels respectively.
ln = logarithm factor
Source: E views Estimated Output.

Table 2: Unit Root Test for Relevant Variables (1ST difference)

	Dickey-Fuller (DF-GLS)		Phillips-Perron Test (PP)	
Variables	Without Trend	With Trend	Without Trend	With Trend
in(RGPD)	-0.170366	-5.169589***	-6.976378***	-7.566846***
in(TTAX)	-5.924113***	-6.215543***	-9.79236***	-9.316175***
in(DOP)	-5.66682***	-6.042045***	-5.600247***	-6.610510***
in(REXCH)	-4.171247***	-4.097438**	-4.171247***	-4.097438***
in(CPI)	-2.757783**	-3.785403**	-2.585529	-2.616289
in(OREV)	-4.829311***	-5.929733***	-6.417365***	-6.416342***
in(NOREV)	-6.001108***	-6.173392***	-6.996561***	-6.712856***

Note: *, **, ***denotes significant at 10%, 5% and 1% significance levels respectively.
in = logarithm factor
Source: views Estimated Output.

The result in table 1 shows that RGDP and DOP attained level I(0) stationary. A further probe at first difference as contained in table 2, reveals stationary or integration of order one I(1) for all the variables. The mixed nature of stationary in the study variables therefore lends credence to the methodological use of the ARDL approach in this study.

3.2 Bound Test for Co integration

In testing for co integration among the variables of interest, a lag length selection test was performed to determine the optimum lag to be used. The result reveals an optimum lag of one (1) based on the Akaike Information Criterion.

Table 3: Bounds Tests Result for Co integration.

Variables (K=5,5,4 N=32)	AIC lags	F- Statistic	Probability	Outcome
Fln (TTAX)(ln (TTAX\RGDP,DOP,REXCH,CPI))	1	5.112618	0.0062**	Co integration
Fln (OREV)(ln(OREV\RGDP,DOP,REXCH,CPI))	1	9.131974	0.0004***	Co integration
Fln (NOREV)(ln(NOREV\DOP,REXCH,CPI))	1	4.966156	0.0050**	Co integration

Note:**, *** represents significance at 5% and 1% respectively.
ln = logarithm factor
AIC represents the Akaike Information Criterion
K= number of variables, N= number of observations
Source: E views Estimated Output.

The bound test conducted reveals that the three decomposed components of revenue do have long run association with the explanatory variables they were regressed on. In the first equation, the F- statistic value of 5.112618 is above the lower bound value of 3.087 and the upper bound value of 4.518 at the 5 percent significance level; indicating the presence of co integration. Likewise in the second, the F-statistic value of 9.131974 is beyond the lower bound value of 4.477 and upper bound of 6.258 at 1 percent significance level; indicating the presence of long run relationship. Finally, the F-statistic value of 4.966156 in the third equation is also above the lower bound value of 3.296 and upper bound value of 4.696 at the 5 percent significance level; indicating the presence of long run association.

3.3 Long run Revenue Buoyancy Analyses

Table 4: Estimated long run coefficient using ARDL Approach

Lag length based on AIC, Dependent variable: ln(TTAX)				
Regressor	Coefficient	Standard Error	T-value	Probability
ln(RGPD(-1))	0.076089	0.126192	0.602964	0.5518
ln(TTAX(-1))	0.392170	0.150730	2.601802	0.0151**
ln(DOP(-1))	0.040891	0.022659	1.804642	0.0827*
ln(REXCH(-1))	-0.302531	0.184517	-1.639583	0.1131
ln(CPI(-1))	0.685573	0.169616	4.041920	0.0004***
C	5.808706	2.237503	2.596066	0.0153**
Residual Tests				
Serial correlation	F-statistic Obs*R-squared	0.967358 2.387182	Prob. F(2,16) Prob.Chi-Sq(2)	0.3944 0.3031
Heteroskedasticity Test	F-statistic Obs*R-squared	1.441964 6.947170	Prob. F(2,16) Prob.Chi-Sq(2)	0.2427 0.2246

Note: ***, **,* represents significance at 1%, 5% and 10% respectively.
ln = logarithm factor
AIC represents the Akaike Information Criterion
Source: Eviews Estimated Output.

Table 4 reveals a weak buoyancy of the tax revenue system in the long run. This is measured by the very low coefficient value of the RGDP. The result showed that a percentage increase in lagged RGDP would yield a 0.08 non significant increase in the buoyancy of tax revenue. When compared with the lagged tax revenue, current tax revenue happens to be significantly influenced by previously collected tax revenue. Similarly, degree of openness also positively impact on current total tax receipt; likewise CPI impacts positively on total tax receipt. The positive impact of CPI on TTAX can be traced to the attendant rise in inflation which occurs from growing economic activities in the country. The result also shows that EXCH in the long run has an insignificant positive influence on total tax revenue.

The residual test conducted on the long run model shows the absence of serial correlation as well as the validity of homoskedastic variance of the residuals. The yardstick was gauge using the chi square probabilities from the observed R-squared for the two tests.

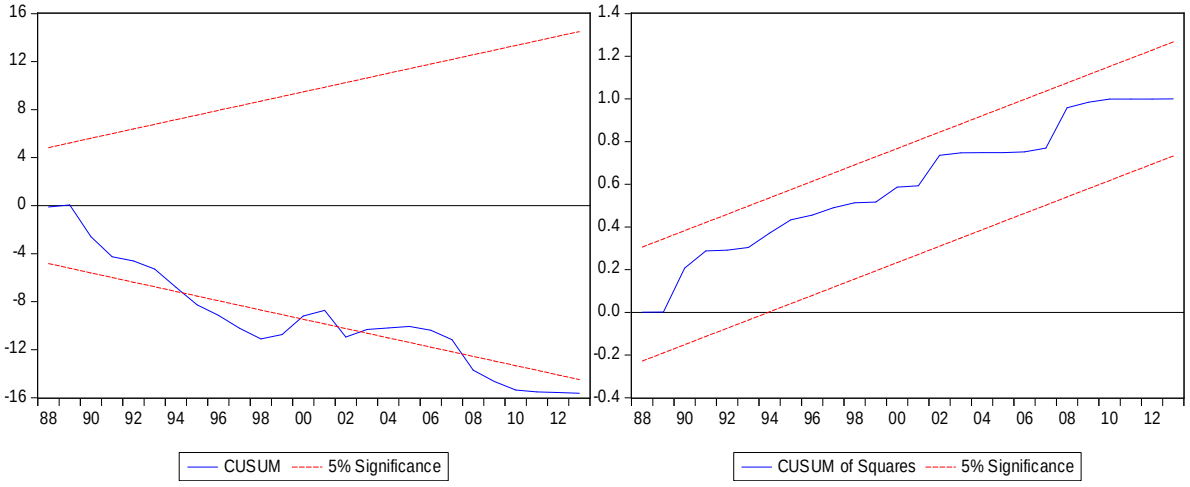

Figure 1: Total Tax Long run stability test.

Using the Cumulative Sum graph, we tested the stability of the residual mean which shows its stability at the 5 percent level of significance. The Cumulative Sum of Square which is used to test the stability of the long run residual variance; also shows stability at the 5 percent level of significance.

Table 5: Estimated long run coefficient using ARDL Approach

Lag length based on AIC, Dependent variable: ln (OREV)				
Regressor	Coefficient	Standard Error	T-value	Probability
ln(RGPD(-1))	-0.025011	0.091715	-0.272699	0.7872
ln(OREV(-1))	0.279277	0.200742	1.391228	0.1759
ln(DOP(-1))	0.008942	0.021670	0.412641	0.6833
ln(REXCH(-1))	-0.434057	0.197590	-2.196756	0.0372**
ln(CPI(-1))	0.860369	0.273575	3.144906	0.0041***
C	9.546152	2.829971	3.373233	0.0023***
Residual Tests				
Serial correlation	F-statistic Obs*R-squared	0.433986 1.940235	Prob. F(2,16) Prob.Chi-Sq(2)	0.6570 0.3790
Heteroskedasticity Test	F-statistic Obs*R-squared	1.049133 15.87165	Prob. F(2,16) Prob.Chi-Sq(2)	0.4636 0.3906

Note: ***, **,* represents significance at 1%, 5% and 10% respectively.
ln = logarithm factor
AIC represents the Akaike Information Criterion
Source: Eviews Estimated Output.

Table 5 reveals a weak buoyancy of oil revenue system in the long run. This is measured by the very low negative coefficient value of the RGDP. The result showed that a percentage increase in lagged RGDP would yield a -0.03 non significant fall in the buoyancy of oil revenue. When compared with the lagged oil revenue, previous oil revenue also happens to have insignificant impact on current oil revenue. Consequently, DOP has a positive insignificant effect on oil revenue; while, REXCH has a significant negative effect on oil revenue. The result shows that amongst the explanatory variables, CPI appears to exact the most significant influence on oil revenue.

The residual test conducted on the long run model shows the absence of serial correlation as well as the validity of homoskedastic variance of the residuals. The yardstick was gauge using the chi square probabilities from the observed R-squared for the two tests.

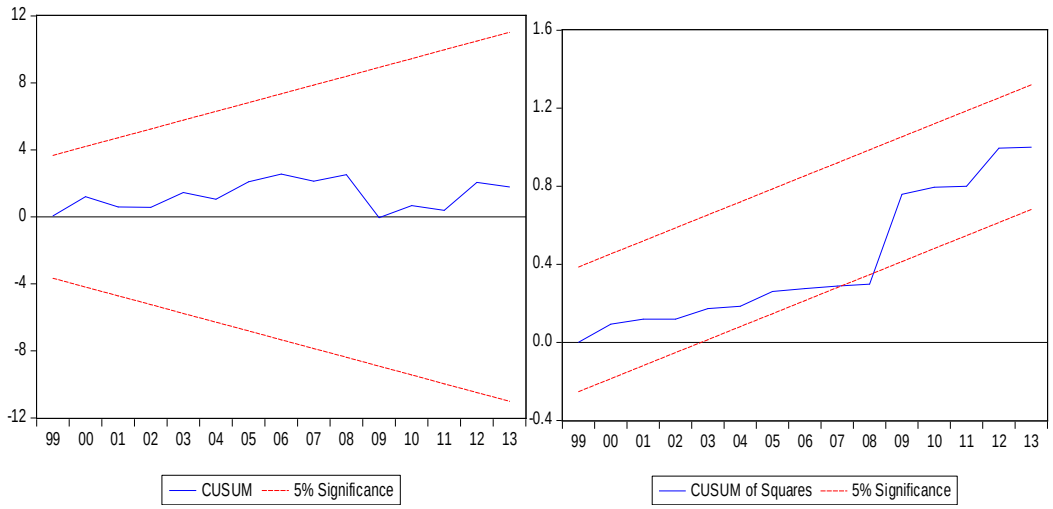

Figure 2: Oil Revenue long run Residual Stability Test

Similar to the preceding residual test, the Cumulative Sum graph, we tested the stability of the residual mean which shows its stability at the 5 percent level of significance. The Cumulative Sum of Square which is used to test the stability of the long run residual variance; also shows stability at the 5 percent level of significance.

Table 6: Estimated long run coefficient using ARDL Approach

Lag length based on AIC, Dependent variable: ln(NOREV)				
Regressor	Coefficient	Standard Error	T-value	Probability
ln(RGPD(-1))	-0.084627	0.112183	-0.754365	0.4574
ln(NOREV(-1))	0.332233	0.171514	1.937064	0.0637*
ln(DOP(-1))	0.011167	0.022529	0.495693	0.6243
ln(REXCH(-1))	-0.270671	0.177397	-1.525795	0.1391
ln(CPI(-1))	0.810317	0.230436	3.516458	0.0016***
C	8.170253	2.459571	3.321820	0.0027***
Residual Tests				
Serial correlation	F-statistic Obs*R-squared	0.144540 0.550153	Prob. F(2,16) Prob.Chi-Sq(2)	0.8665 0.7595
Heteroskedasticity Test	F-statistic Obs*R-squared	0.871180 11.38951	Prob. F(2,16) Prob.Chi-Sq(2)	0.5873 0.4959

Note: ***, **,* represents significance at 1%, 5% and 10% respectively.
ln = logarithm factor
AIC represents the Akaike Information Criterion
Source: Eviews Estimated Output.

In a similar result like the preceding analysis, table 6 reveals a weak buoyancy of non oil revenue system in the long run. This is measured by the very low negative coefficient value of the RGDP. The result showed that a percentage increase in lagged RGDP would yield a -0.08 non significant fall in the buoyancy of non oil revenue. When compared with lagged non oil revenue, previous non oil revenue depicts a significant impact on current non oil revenue. With the exception of CPI which has a high statistical impact on OREV, DOP and RECH are found not to impact significantly on NOREV.

The residual test conducted on the long run model shows the absence of serial correlation as well as the validity of homoskedastic variance of the residuals. The yardstick was gauge using the chi square probabilities from the observed R-squared for the two tests.

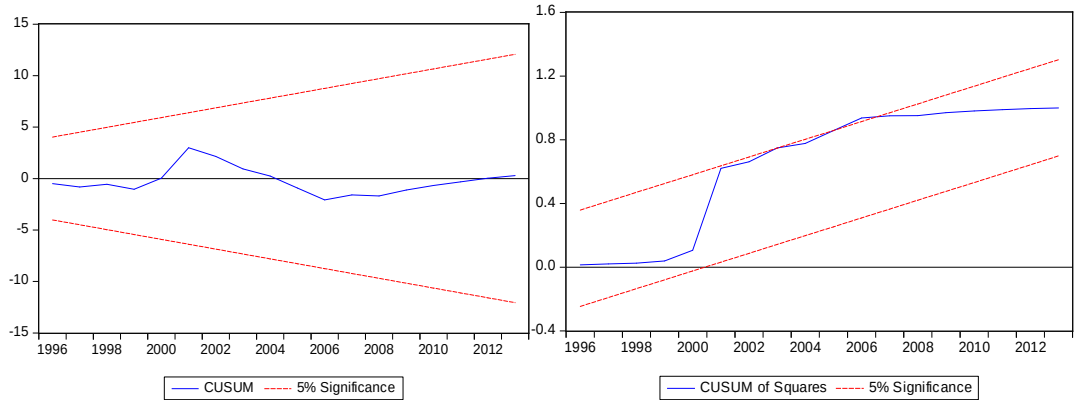

Figure 3: Non-oil Revenue long run Residual Stability Test

The Cumulative Sum graph shows that the mean of the residual is stable at the 5 percent level of significance. Likewise the Cumulative Sum of Square which is used to test the stability of the long run residual variance; also shows stability at the 5 percent level of significance.

3.4 Short run Revenue Buoyancy Analyses

Table 7: Estimated short run coefficient using ARDL Approach

Lag length selected based on AIC, Dependent variable: D ln (TTAX)				
Regressor	Coefficient	Standard Error	T-value	Probability
DIn(TTAX(-1))	0.171351	0.159857	1.071898	0.2949
DIn(RGDP(-1))	-0.119750	0.155278	-0.771196	0.4484
DIn(CPI(-1))	0.705889	0.351345	2.009105	0.0564*
DIn(DOP)	-0.075163	0.024446	-3.074624	0.0054***
DIn(DOP(-1))	0.078906	0.034476	2.288729	0.0316**
DIn(REXCH)	-0.271822	0.242470	-1.121054	0.2738
DIn(REXCH(-1))	-0.262994	0.198223	-1.326756	0.1976
ECM(-1)	-0.288879	0.143004	-2.020078	0.0552*
R-squared	0.586701		Adjusted R-squared	0.460914
Residual Tests				
Serial correlation	F-statistic Obs*R-squared	0.417769 1.872112	Prob. F(2,16) Prob.Chi-Sq(2)	0.6670 0.3922
Heteroskedasticity Test	F-statistic Obs*R-squared	1.423501 18.20859	Prob. F(2,16) Prob.Chi-Sq(2)	0.2512 0.2519

Note: ***, **,* represents significance at 1%, 5% and 10% respectively.
AIC represents the Akaike Information Criterion
ln = logarithm factor and D = represent the difference factor
Source: Eviews Estimated Output.

Analysis of the total tax buoyancy result in the above table reveals an interesting output. The negative buoyancy of the total tax system in the short run is evident by the negative coefficient value of RGDP; which translate to mean as economic growth is achieved, the amount of tax receipt on the other hand falls. However, CPI and lagged DOP both positively significantly influence TTAX; current and lagged REXCH as well as current DOP exact significant negative effect on TTAX. The speed of adjustment factor is rightly signed as well as significant; indicating that about 28 percent of short run distortion from long run equilibrium is being corrected for annually. Furthermore, the value shows it would take an estimated time period of three years and six months (ceterisparibus) for long run equilibrium to be restored. The residual test conducted reveals the absence of serial correlation as well as absence of heteroskedacticity in the model.

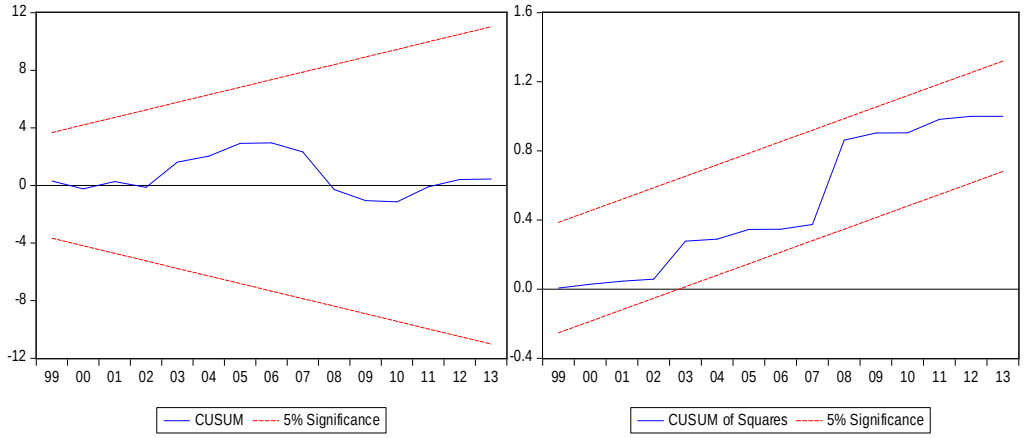

Figure 4: Total Tax short-run Residual Stability Test

The Cumulative Sum graph shows that the mean of the residual is stable at the 5 percent level of significance. Likewise the Cumulative Sum of Square which is used to test the stability of the short run residual variance; also shows stability at the 5 percent level of significance.

Table 8: Estimated short run coefficient using ARDL Approach

Lag length selected based on AIC, Dependent variable: D ln(OREV)				
Regressor	Coefficient	Standard Error	T-value	Probability
DLOG(OREV(-1))	0.133031	0.138078	0.963454	0.3453
DLOG(RGDP(-1))	-0.084185	0.103799	-0.811037	0.4257
DLOG(CPI)	0.478195	0.382237	1.251043	0.2235
DLOG(DOP)	0.041364	0.017053	2.425580	0.0235**
DLOG(DOP(-1))	-0.035889	0.020485	-1.751925	0.0931*
DLOG(REXCH)	-0.455336	0.168143	-2.708035	0.0125***
ECM2(-1)	-0.892205	0.187922	-4.747743	0.0001**
C	0.085926	0.087217	0.985205	0.3348
R-squared	0.657260		Adjusted R-squared	0.552948
Residual Tests				
Serial correlation	F-statistic Obs*R-squared	0.087881 0.257303	Prob. F(2,16) Prob.Chi-Sq(2)	0.9162 0.8793
Heteroskedasticity Test	F-statistic Obs*R-squared	1.215072 8.369032	Prob. F(2,16) Prob.Chi-Sq(2)	0.3343 0.3012

Note: ***, **,* represents significance at 1%, 5% and 10% respectively.
AIC represents the Akaike Information Criterion
ln = logarithm factor and D = represent the difference factor
Source: E views Estimated Output.

Table 8 gives the empirical analysis of oil revenue buoyancy result. The outcome is similar to the long run negative buoyancy as presented earlier. The negative short run relationship is presented by the negative insignificant coefficient of the RGDP; which also mean as the economy is growing, the amount of oil sale receipt on the other hand falls. However, CPI has a positive statistically insignificant impact on OREV. While current DOP has a statistically significant effect on OREV, lagged DOP as well as current REXCH both exact negative significant influence on OREV. The speed of adjustment factor is also rightly signed as well as significant; indicating that about 89 percent of short run distortion from long run equilibrium is being corrected for annually. Furthermore, the value shows it would take an estimated time period of thirteen months (ceterisparibus) for long run equilibrium to be restored. The conducted residual test reveals the absence of serial correlation as well as absence of heteroskedacticity in the model.

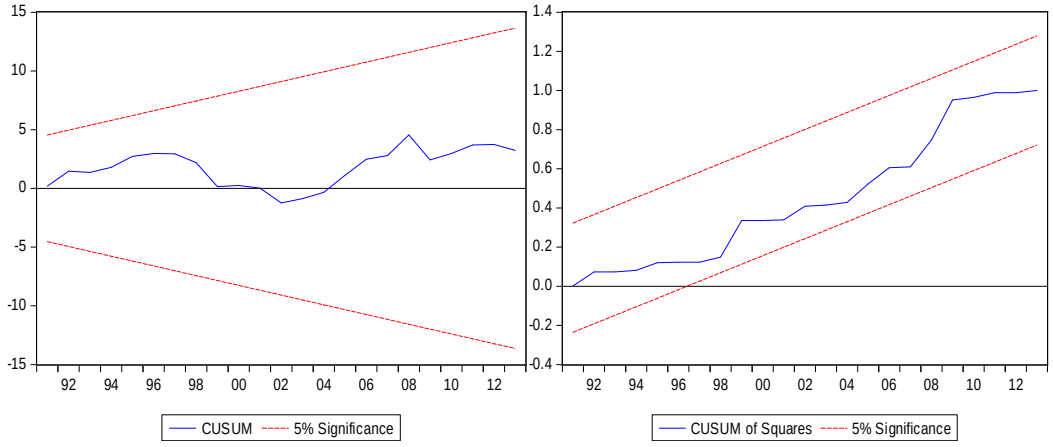

Figure 5: Oil Revenue short-run Residual Stability Test

The CUSUM and CUSUM of squares graph in figure 5 above shows that the mean and variance of the short-run residual are stable at the 5 percent level of significance.

Table 9: Estimated short run coefficient using ARDL Approach

Lag length selected based on AIC, Dependent variable: DIn (NOREV)				
Regressor	Coefficient	Standard Error	T-value	Probability
DLOG(NOREV(-1))	0.392126	0.202270	1.938629	0.0661*
DLOG(CPI)	1.041185	0.696756	1.494331	0.1500
DLOG(CPI(-1))	-1.151769	0.841293	-1.369045	0.1855
DLOG(DOP)	0.035985	0.025522	1.409945	0.1732
DLOG(DOP(-1))	-0.025063	0.029754	-0.842348	0.4091
DLOG(REXCH)	-0.326314	0.254952	-1.279906	0.2145
DLOG(REXCH(-1))	0.185895	0.222204	0.836596	0.4122
ECM3(-1)	-0.969614	0.234247	-4.139277	0.0005***
C	0.140963	0.139338	1.011660	0.3232
R-squared	0.508268		Adjusted R-squared	0.297526
Residual Tests				
Serial correlation	F-statistic Obs*R-squared	0.096775 0.312608	Prob. F(2,16) Prob.Chi-Sq(2)	0.9082 0.8553
Heteroskedasticity Test	F-statistic Obs*R-squared	0.387981 4.419703	Prob. F(2,16) Prob.Chi-Sq(2)	0.9276 0.8817

Note: ***, **,* represents significance at 1%, 5% and 10% respectively.
AIC represents the Akaike Information Criterion
In = logarithm factor and D = represent the difference factor
Source: Eviews Estimated Output.

Table 9 reveals the empirical analysis of non oil revenue buoyancy result. The outcome shows no relationship or link with RGDP. Furthermore, the result reveals no significant relationship with any of the other variables in the model; except for lagged NOREV. However, the speed of adjustment factor appears to be rightly signed as well as significant; indicating that about 97 percent of short run adjustment to long run equilibrium is being corrected for annually. Furthermore, the value shows it would take an estimated time period of twelve months (ceterisparibus) for long run equilibrium to be restored. The conducted residual test similarly, reveals the absence of serial correlation as well as absence of heteroskedacticity in the model.

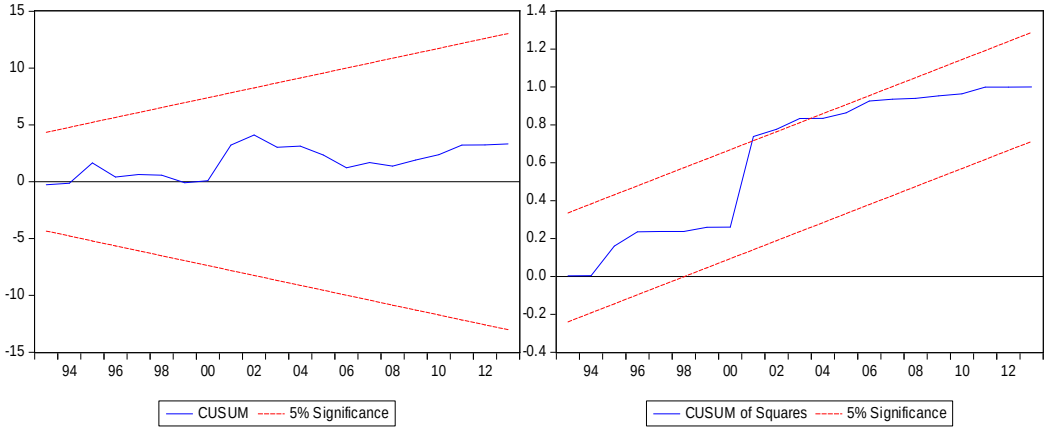

Figure 6: Nonoil Revenue short-run Residual Stability Test

The CUSUM and CUSUM of squares graph in figure 6 above shows that the mean and variance of the short-run residual are stable at the 5 percent level of significance.

4. Conclusions and Policy Recommendations

4.1 Conclusions

The below conclusions were deduced from the empirical findings of the study as contained in the preceding section. Revenue response to growth in the economy has either not been buoyant in the long run or short run. In fact, buoyancy of oil receipt as observed from the result has been moving in the reverse direction against growth in the economy. What we can understand from this behaviour is that with growth in the economy, comes increase in oil revenue theft by those who claim to be stakeholders in the sector. For instance, the audit report of Price Water Coopers (PWC) published in "The News" confirmed the former Central Bank of Nigeria's Governor Sanusi Lamido's claim of unremitted oil sale receipts of twenty billion dollars from January 2012 to July 2013 by the National Petroleum Corporation of Nigeria (NNPC). His predecessor Charles Soludo, in a long public treatise further claimed that more than such amount had been unaccounted for in time past. This was a period when the economy was estimated to have grown between 6.6 and 6.2 percent annually (CIA World Fact 2015). Consequently, any impact from policy effort by the government to improve the yield of this revenue base is expected to last for an estimated thirteen month period.

Similar to the buoyancy report of oil revenue in the preceding paragraph, total tax from non oil sources have also not been significantly buoyant through the time frame. One of the reasons for this is not farfetched from the preceding observation. Another is the weak tax administrative system in the country; as many taxable base such as: property income tax, educational tax, capital gain tax, toll fees, etc are almost extinct from the tax base. The short run speed of adjustment time of three year and six months could be taken to indicate the time frame effect of discretionary tax policy changes in the system.

Non oil revenue buoyancy of government has also been very weak as observed from the long run output. The short run output further paints a more unacceptably true picture of no relationship with growth in the economy. This in our opinion simply means that, the development of the non oil sector has within the study period been neglected by various administrations. When in actual sense, the sector is supposed to be the anchor of growth in the economy. Policy effort to improve the yield of the sector is expected to have a twelve month adjustment period on the sector. This in our opinion is plausible because of the nature of the sector's composition which includes: agriculture, manufacturing, construction, telecommunication, tourism, etc.

4.2 Recommendations

The below recommendations were proposed based on the conclusions put forward in the study.

I. The principle of true federalism should be encouraged in other to avoid the issue of multiple taxation of the tax base. Clear definition of tax base boundaries for federal and states revenue agencies should be known.
II. Endemic corrupt processes in the collection and remittances of government revenue should be curbed. In line with the aforementioned, recent efforts of the government at fighting corruption are applauded as a step in the right direction; in ensuring that all government revenue are being remitted accurately by the collection body.
III. Another challenge of tax administration include the need not only to build, but also to utilize institutional and human capacity, financing and logistics as well as curbing tax evasion, tackling fraud and misappropriation of collected revenue, improving voluntary compliance, and quick arbitration on legal matters. To have an efficient and impactful tax administration would require; well trained and motivated officials, who are professionally inclined. The tax laws need to be simple, clear, and unambiguous; likewise, the assessment and collection process must be transparent and payer-friendly.
IV. Development of the non oil sector to make it the anchor for growth should be encouraged. Thus, recent policy moves at revivifying the sector should be seen as long overdue. In return, the development of the sector would increase the buoyancy of government's revenue base; guaranteeing a sector growth led revenue drive for the government.

References

Adegbie, F. F and Fakile, A.S. (2011).“Company Income Tax and Nigeria Economic Development”. *European Journal of Social Scienc*e. Vol. 22 No. 2.

Ariyo, A. (1997). “*Productivity of the Nigeria Tax System: 1970-1990”.* AERC Research paper 67 African Economic Research Consortium, Nairobi Kenya.

Bahl, R.W. (1971). “A Regression Approach to Tax Effort and Tax Ratio Analysis”. *IMF Staff Papers*, Vol. 18, pp. 570-612.

Bilquees, F. (2004).“Elasticity and Buoyancy of the Tax System in Pakistan”:*The Pakistan Development Review* 43:1 (Spring 2004) pp. 73-93.

Brafu-Insaidoo, W.G. and C.K Obeng (2008).“Effect of Import Liberalization on Tariff Revenue in Ghana”. *African Economic Research Consortium Research paper* No.180.

Choudhry, N.N. (1979). “Measuring the Elasticity of Tax Revenue: A Divisia Index Approach” .*IMF Staff Paper*, vol. 26.

Daniel K.T., Abel F., Eric O. A. And Emmanuel E.A. (2012).“Buoyancy and Elasticity of Tax: Evidence from Ghana”. *Journal of Monetary and Economic Integration.*Vol. 10, No 2. *Eviews help topics page 478*

Hindrichs, H.H. (1966). “A General Theory of Tax Structure Change during Economic Development”. *Law School of Harvard University*, Cambridge.

Kabbashi, M.S. (2005). “The Impact of Trade liberalization on Revenue Mobilization and Stability in Sudan”. A revised report submitted to the International Research Project, organized by the Global Development Network.

Kusi, K.N.(1998). “Tax Reform and revenue Productivity in Ghana”. *African Economic Research Consortium Research paper* No. 74

Mary M. And Jospeh N (2013).“An Empirical Investigation of Tax Buoyancy in Kenya”. *African Journal of Business Management.*

Musgrave, R.A. (1969). ”Fiscal Systems”. New Haven: Yale University Press.

Osoro, N.E. (1993). “Revenue Productivity Implications of Tax Reform in Tanzania”. *Research Paper No.20, AERC*, Nairobi.

Osoro, N.E. (1995). “Tax Reforms in Tanzania: Motivations, Directions, and Implications*”. African Economic Research Consortium Research* paper No. 38

Perron, P. (1988). “Trends and Random Walks in Macroeconomic Times Series: Further Evidence from a New Approach”. *Journal of Economic Dynamics and Control*, 12, 297-332.

Saibu O. M. And Olatunbosun O. S. (2013).“ Macro Determinants of Tax Revenue in Nigeria (1970-2011)”. *World Applied Sciences Journal 28(1): 27-35.*

Teera, J.M. (2002). “Tax Performance: A comparative study”. *Centre for Public Economics*. University of Bath. Working Paper 01-02,

Temitayo O. G and Edu O. U. (1999).“Sources and Structure of Government Revenue”: in Oluranti S.K., Hossein J. And Mark H. eds, Fiscal Policy and Management in Nigeria. Ibadan, (NCEMA).