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TAX BUOYANCY AND ELASTICITY IN NIGERIA: THE CASE OF AGGREGATE TAX

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ABSTRACT: *This study was motivated by the growing demand for government funds to meet up with their expenditures as well as diversification for different streams of income. Empirical evidence has shown that the buoyancy and elasticity of tax are two clear ways of measuring how tax revenue responds to changes in income. This study adopted secondary data sets, which were sourced from CBN statistical Bulletin, National Bureau of statistics (NBS) and Federal Inland Revenue Service (FIRS) of Nigeria. A standard multiple regression estimation procedure in the form of the vector error correction model (VECM) model was adopted. The result from the study showed that tax revenue is significantly buoyant and elastic in Nigeria. In view of the result the study recommended among others that, the government introduces policies that will help her take advantage of the potentials inherent in the country and increase its tax revenue thereby having another source of financing its budget other than the current crude oil proceeds.*

KEYWORDS: Tax Buoyancy, Tax Elasticity, Tax Revenue, GDP, Nigeria.

INTRODUCTION

Background of the Study

Taxation has remained the most important source of revenue to many governments of the world. Governments use tax proceeds to render their traditional functions of providing public goods, maintenance of law and order, defense against external aggression, regulation of trade and business to ensure social and economic maintenance (Azubike, 2009). The economic effects of tax include micro effects on the distribution of income and efficiency of resources use as well as macro effect on the level of capacity output, employment, prices and growth (Musgrave and Musgrave, 2004). Owing to the inherent power of government to impose taxes, the government is assured at all times of its tax revenue no matter the circumstances. With modifications as a result of different manifestoes of opposing political parties, the government's ability to impose tax is unlimited.

The collection of tax is such that the most veritable tax handles are under the control of the federal government while the lower tiers are responsible for the less strong ones. Specifically, the federal government taxes corporate bodies while state and local governments' tax individuals. A major element contributing to this development was the prolonged military rule that had ignored constitutional provision. This military rule affected utilization of taxation in raising revenue for the public expenditure, and in the process have affected the nation's economic growth.

Besides, Wagner's law stipulates that public expenditure is a natural consequence of economic growth (Demirbas, 1999). The magnitude of government surplus or deficit is probably the

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single most important statistic measuring the impact of government fiscal policy on an economy (Siegel, 1979). Many developing countries including Nigeria in their attempt to increase growth have increased public expenditure but have not been able to match this increase with revenue mobilization through taxation and this has resulted in huge fiscal deficit. In the case of Nigeria, tax mobilization as a source for financing development activities has been a difficult issue primarily because of various forms of resistance such as evasion, avoidance and corrupt practices attending to it. These activities are considered as sabotaging the economy and are readily presented as reasons for the underdevelopment of the country (Adegbie and Fakile, 2011). Again, the Nigerian tax system has been weak in its revenue mobilization due to inadequate data on the tax base.

The literature suggests three issues that should guide decisions on the fiscal deficit profile for an economy. The first relates to the usefulness of fiscal deficit as a tool for enhancing accelerated growth and development. The second issue relates to the mode of financing the deficit. Some of the financing options include the running down of government accumulated cash balance, net borrowing from the banking system or from abroad, issuing of new currency as well as drawing down of foreign assets (Ariyo and Raheem, 1990). Third, and most important, a fiscal deficit profile must be sustainable (Buiter, 1983). Otherwise, the country will become perpetually insolvent (Wickens and Uctum, 1990).

What has become of concern to economists and interested observers in recent times is the rising magnitude of deficits by various governments. There is therefore a growing recognition that the formulation and implementation of macroeconomic management proposals, most especially for economic reforms, should explicitly recognize the implications of fiscal deficit on the economy. These reforms should cover not only the size and financing pattern of government deficits but also the structure of taxation and the level and composition of public expenditure (Chibber and Khalizadeh, 1988). The findings of researchers in this field suggested the need for concern about the problem of fiscal deficit in Nigeria. Some of them reported that fiscal deficit has become a recurring feature of Nigeria's fiscal policy with the absence of any identifiable macroeconomic objective to justify this deficit-prone behaviour (Ariyo and Raheem, 1990). It was also reported that the fiscal deficit in Nigeria has become unsustainable since 1980 (Ariyo, 1993).

An accurate estimate of the optimal level of expenditure requires knowledge of the buoyancy- total response of tax revenue to changes in national income and discretionary changes in tax policy over time; and tax elasticity- automatic response of tax revenue to GDP changes less the discretionary changes. It assists in identifying a sustainable revenue profile for the country and also helps in determining appropriate modifications to the existing tax structure and rates as well as areas for improving tax administration.

Fiscal deficit has become a recurring feature of public sector financing all over the world. Its widespread use is partly influenced by the desire of various governments to respond positively to the ever-increasing demands of the populace and to enhance accelerated economic growth and development (Ariyo, 1993). This tendency toward deficit financing is more pronounced in developing countries where the populace looks to the government for the satisfaction of most needs. However, the rising magnitude of this deficit since 1980 in Nigeria is now of great concern. An appraisal of the budgetary process in Nigeria shows that annual expenditure proposals are always anchored on projected revenue, thus, the accuracy of revenue projection which requires the knowledge of buoyancy and elasticity of tax is a necessary condition for devising an appropriate framework for fiscal deficit management in Nigeria. This however

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infers the poor utilization of the responsiveness of buoyancy and elasticity of tax to tax revenue. Though very relevant there seldom exists empirical works that investigate elasticity and buoyancy in Nigeria. Therefore this study seeks to investigate the tax buoyancy and elasticity of the total aggregate tax in Nigeria

REVIEW OF RELATED LITERATURES ON BUOYANCY AND ELASTICITY OF AGGREGATE TAX IN NIGERIA

Tax performance Assessment Approach

Hinricks (1966) and Musgrave (1969) explained the role of various tax categories in determining tax effort that expresses the ratio of the actual tax collected to potential tax and used as an indicator of how much a country is utilizing its taxable capacity. According to the authors, the four main approaches to assess tax performance are ability to give up approach, efficient resource use approach, ability to collect approach and comparison with average performance (stochastic) approach. The commonly used approach for measuring tax effort is to regress the tax to output ratio on a set of variables including the major determinants of output (Bahl, 1971) that serves as proxies for tax handles. The predicted tax ratio therefore gives the ratio that the country would have if it had made the average tax effort. Thus, it becomes a measure of the taxable capacity of the country while the regression coefficients act as the average effective rates on the base. The tax effort approach to measuring tax performance is termed ―static in that it gives the potential for tax increase at a given point in time through comparisons with other countries. However, in order to determine if a country has made efforts at increasing tax revenue over a period – tax performance in the dynamic sense which measures the sensitivity and response of the tax system with respect to income/GDP such as tax buoyancy should be used.

Tax Structure and Economic Development

A country's tax system is a major determinant of other macroeconomic indexes. Specifically, for both developed and developing economics, there exists a relationship between tax structure and the level of economic growth and development. Indeed, it has been argued that the level of economic development has a very strong impact on a country's tax base (Hinricks, 1966, Musgrave, 1969), and tax policy objectives vary with the stages of development. Similarly, the (economic) criteria by which a tax structure is to be judged and the relative importance of each tax source vary over time (Musgrave, 1969). For example, during the colonial era and immediately after the Nigerian (political) independence in 1960, the sole objective of taxation was to raise revenue. Later on, emphasis shifted to the infant industries protection and income redistribution objectives.

Empirical Evidence of Buoyancy and Elasticity of Aggregate Tax

Empirical evidence abounds on the relationship between buoyancy and elasticity of tax. Some of them include; Ole (1975) who estimated income elasticity of tax structure of Kenya for the period 1962-1972. Tax revenue was regressed on income without adjusting for the unusual observations. The results showed that the tax structure was income inelastic with an index of 0.81 for the period studied. After the study it was recommended that the tax system required urgent reforms to improve its productivity. The results also implied that Kenya's tax structure was not buoyant and therefore the country would require foreign assistance to close the budget

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deficit. Much later, Mtatifikolo (1990) did a study on the performance of the tax system for the period since the major tax reforms of 1973-1984. This study gives an estimate of the buoyancy and elasticity of the major taxes. Mtatifikolo used the same method as one adopted by Thac and Lim (1984) as an indicator of the tax effort of the government of Tanzania. The results showed buoyancy of 0.998 for the total tax system.

Furthermore, Osoro (1993) studied the revenue productivity of the tax system in Tanzania for the period 1969-1990 showed a low elasticity for the total tax system. Elasticity for total tax revenue was 0.76 with buoyancy of 1.06 which means that the Tanzania tax system was unproductive over the study period. The study concluded that the tax system in Tanzania had failed to raise tax revenues. While, Njoroge (1993) studied the revenue productivity of tax in Kenya for the period 1972/73 to 1990/91. Tax revenue was regressed on income after adjusting tax revenues for discretionary changes. The period of study was divided into two to make it easier to analyze the effects of tax reforms on revenue from various taxes. Income elasticity of total tax structure was found to be 0.67 for the period 1972 to 1981. This meant that the government received a decreasing share of rising GDP as tax revenues. The buoyancy for the overall tax system for the same period was 1.19, implying that the tax system was quite buoyant. The study concluded that from a revenue point of view, the system did not meet its target; hence it required constant review as the structure of the economy changes. However, the results could not be relied upon because the study never took into account time series properties of the data.

Kusi (1998) studied tax reform and revenue productivity of Ghana for the period 1970-1993. The results showed a pre-reform buoyancy of 0.72 and elasticity of 0.71 for the period 1970-1982. The period after reform 1983-1993, showed increased buoyancy of 1.29 and elasticity of 1.22. The study concluded that the reforms had contributed significantly to tax revenue productivity for the period 1983-1993.

More recently Twerefou et al (2009) used the Dummy Variable Technique to control for effects of the Discretionary Tax Measures on Historical Time Series Data for the period 1970-2007 to estimate the elasticity of the Ghanaian tax system. Their findings revealed that the overall tax system in Ghana was buoyant and elastic in the long run and buoyancy exceeded the elasticity, but in the short run the reverse was the case. They also observed an improvement in both buoyancy and elasticity over the reform period (1985-2007) as evidenced in pre-reform buoyancy and elasticity coefficient which were generally less than unity but became greater than one after the reform. While, Milwood, T.T (2012) Studied the relationship between GDP growth and the growth in tax revenue as well as the responsiveness of taxes to fiscal policy in Jamaica. He estimated the buoyancy and elasticity of tax revenues spanning the period March 1998 to December 2010, using the Divisia Index (DI) approach. It was found that discretionary tax measures have had an overall impact on growth in total revenue over the period. However, the automatic response of revenue to changes in the base was found to be less than unity.

In Nigeria, Omoruyi (1983) did a comprehensive assessment of the productivity of the Nigerian tax system. He evaluated the buoyancy of the tax system as defined by Sahota (1961) and Ghai (1966) for the period 1960 to 1979. He discovered a general satisfaction on the level of tax productivity in Nigeria during the period under review. And later, Ariyo (1997) in his study of the productivity of the Nigerian tax system improved upon the one done by Omoruyi (1983) in the following respects. First, the study covered the period 1960-1990, and therefore updates the analysis. Second, the study captured the impact of the structural changes in macroeconomic management framework introduced since 1966. Third, Omoruyi (1983) disaggregated his

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analysis in terms of decades (1960-1967, 1970-1980, etc). His research findings were as follows: For the period covered by the study, there was an elasticity of 1.18 for government tax revenue relative to GDP.

Recently, Omojimite and Iboma (2012), study on Fiscal deficit and the Productivity of production of the Nigerian Tax system between 1970 - 2010 using tax buoyancy and elasticity as indexes discovered that aggregate tax elasticity index was significantly less than 0.5. Their result showed that there is presence of relatively weak productive tax system in the country. While, Urama et al (2012), in their study on the possibility of recovering the tariff revenue that will be lost in the process of liberalization through restructuring of the domestic tax system in Nigeria by examining the buoyancy and elasticity of the tax system. They used the dummy method popularly known as the Singer approach and discovered that the Nigerian tax system in Nigeria is relatively buoyant but not elastic. The buoyancy however showed a decline close to 16% after the 1991 trade reform. Import duty despite the decline in its share in total tax from 47.3% before the reform to 28% over the reform period showed a positive increase in buoyancy. Lastly, their result confirm the ineffectiveness of the various reforms and (DTMs) in enhancing the productivity of the tax system, showing that much need to be done in the domestic tax system, both in structure and administration before thinking of engaging in any bi- or multilateral trade agreement.

Fasoranti (2013) examined the productivity of tax revenue and its relationship with the growth of the Nigerian economy. Using data collected on Federal tax revenue, real GDP and total federally collected revenue over the period between 1970 and 2009 which were sourced from the various issues of Central Bank Statistical bulletin. The data was analysed with the aid of multiple regression analysis. Results showed that tax productivity was significantly low as reflected in the elasticity index of the tax revenue. The low elasticity depicts that total tax revenue in Nigeria was not responsive to growth of the economy. Hence, total tax revenue relative to the Real Gross Domestic Product is ineffective in the Nigerian tax system. Her result further indicated that increase in GDP was faster than the increase in tax revenue. She recommended among others, that tax system should be transformed not only administratively but also the method of collecting tax revenue. More so, efforts should be made to reduce the rate of tax evasion and avoidance through adequate information to tax payers.

Umeora (2013) investigated the effects of Value Added Tax (VAT) on economic growth (GDP) and total tax revenue in Nigeria using time series data from 1994 to 2010 from Central Bank of Nigeria (CBN) Bulletin, Annual Report and Statement of Accounts, Various issues. He adopted a simple linear regression model and discovered that VAT has a significant effect on both GDP and total tax revenue. Based on that, he recommended that the government should sensitize the people to enable it increase the tax rate so as to enlarge its annual revenue for economic development.

Chigbu (2014) examined the impact of value added tax on the economic growth of Nigeria using relevant secondary data collected from the Central Bank of Nigeria (CBN) and the Federal Inland Revenue Service (FIRS) from 1994-2012. He analyzed the data with relevant econometric tests of Breusch-Godfrey Serial Correlation LM, White Heteroskedasticity, Ramsey RESET, Jarque Bera, Johansen Co-integration, and Granger Causality. His results showed that there exists a long run equilibrium relationship between economic growth and VAT. It was also discovered that VAT does granger cause gross domestic product of Nigeria. On the basis of the empirical analysis, the paper concludes that VAT is one of the most important components indirect taxes in Nigeria that affects the economic growth of the country

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and therefore should be properly managed to reduce the level of evasion by the input and output relationship in Nigeria. The paper recommended among others that vat-able persons should be properly supervised by the relevant tax authority to reduce the level of tax evasion. Also, the government should show more accountability in the management of tax revenue and finally, the level of corruption in Nigeria and that of government officials should be drastically reduced to win the confidence of tax payers for voluntary tax compliance.

DATA AND METHODOLOGY

This study adopted secondary data, which was sourced from CBN statistical Bulletin, National Bureau of statistics (NBS) and Federal Inland Revenue Service (FIRS) of Nigeria. In line with the major focus of this study which is to empirically investigate the buoyancy and elasticity of aggregate tax in Nigeria with respect to its efficiency in revenue mobilization vis-à-vis the changes in National Income (NI), thus, the study assume aggregate revenue to be a homogenous function of NI. Putting this in a more sophisticated procedure where economic theory suggests equilibrium relationship among aggregate revenue and the national income Also in recognition of the deterministic trend (denoted with h) of fiscal policy instrument, this study formulates the model for her objective estimation, that is, the buoyancy and elasticity of aggregate tax estimate with respect to national income in Nigeria with the following standard regression technique equation;

$$ARV_t = \alpha_{10} + \theta_{11} Z_t^k + \phi_{12} NI_t + \phi_{13} GX_t + \phi_{14} XG_t + \phi_{15} INF_t + \psi_{18} D_t + h_t + \varepsilon_{1t} \ldots\ldots (1)$$

where

ARV = Aggregate Tax Revenue

NI = National Income (GDP)

GX = Government Expenditure

XG = External Grant

INF = Inflation rate

D_t = Dummy variable for tax reforms (where 0= 1980-2003 and 2004-2011)

Z = total base of tax k at time t;

θ = the elasticity of tax base with respect to national income

h = deterministic trend, since most fiscal policy instrument are trending;

ε = stochastic error terms.

Equation 1 estimates the buoyancy and elasticity of aggregate tax revenue with respect to national income.

This study captures elasticity and buoyancy based on their definitions. Tax elasticity is defined as "the ratio of the percentage change in tax revenue to the percentage change in income or GDP" according to Timsina (2006). This therefore implies that tax elasticity is the coefficient of GDP/Income on tax revenue. "In empirical works, an elasticity is the estimated coefficient

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in a linear regression equation where both the dependent variable and the independent variable are in natural logs. Elasticity is a popular tool among empiricists because it is independent of units and thus simplifies data analysis" (Gillette D. and Robert d., 1992).

The coefficient of the GDP describes elasticity and it is therefore defined thus

Table 1: Types of elasticity and designations

Alternative	Coefficient (E)
Perfectly Elastic	$E= \infty$
Relatively Elastic (more than proportionate change)	$1 < E < \infty$
Unit Elastic (equal proportional change)	$E=1$
Relatively Inelastic (Less than proportionate change)	$0 < E < 1$
Perfectly Inelastic	$E = 0$

While, tax buoyancy is defined as "a measurement of the responsiveness of tax revenue to changes in income without controlling for the discretionary changes in tax policy. The discretionary changes are the changes which result in more tax revenue from the same tax base. The sources of such changes are changes in tax legislations or changes in the tax rate" which suggests that the dummy variable for tax reforms of 2004 captures discretional changes in the tax base, hence the buoyancy.

Empirical Results

The study used the augmented dickey fuller technique to test for unit root of both the dependent and explanatory variables used in the model. The results are therefore presented on the table below.

Table 2: Unit Root results for all Variables

Variables	Trend/Or not	No of lags	Order of stationarity	Stationary critical value
Gross Domestic Product (GDP)	Trend	0	I(2)	1%
Aggregate tax revenue	No trend	4	I(2)	5%
Government expenditure	Trend	8	I(2)	5%
External grant (ODA)	No Trend	0	I(0)	5%
Inflation rate	No trend	0	I(1)	1%

The above table depicts that most of the variables had unit roots and hence were not stationary, thereby requesting for differencing to make them stationary. However external grant was stationary at level form. While the others were I (1) and I (2) process. The fact that there exists unit root for most of the variables is a necessary condition for co-integration test. Co-integration

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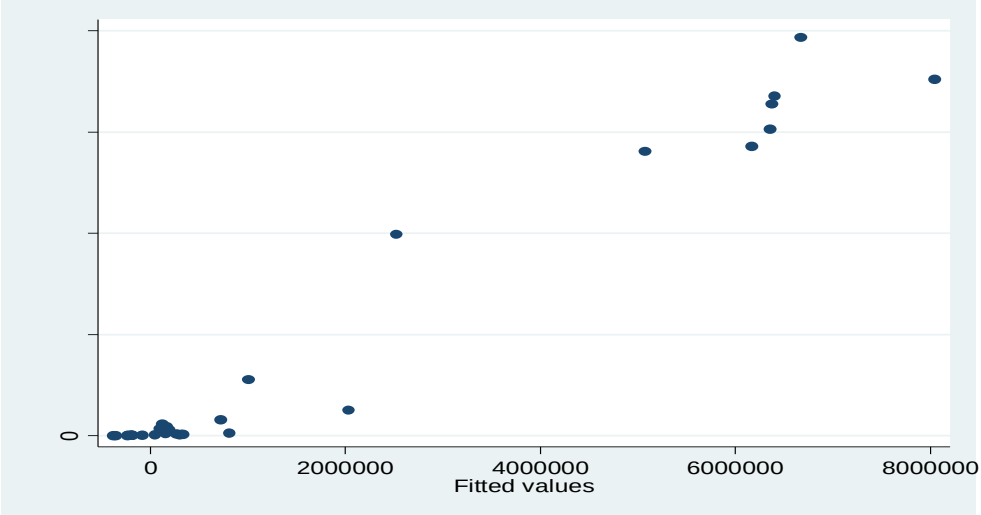
is aimed at testing the long run relationship of the variables, wherein if it is validated then it means there is a problem that needs to be corrected with the error correction model. Surprisingly in this study, the co-integration test which is the unit root test of the residuals of each regression suggests that there exist no co-integration in any of the regressions. This therefore implies that the sufficient condition for an error correction model is not satisfied; therefore we conclude that there exists no long-run relationship amongst the variables.

To achieve the objective of this study, which is to investigate the elasticity and buoyancy of aggregate tax in Nigeria with respect to GDP, the study first of all tests for linearity of the dependent and explanatory variables as prescribed by the assumptions of the classical linear theory. To be able do this, the researcher drew scatter plot of the dependent variable – aggregate tax against its residual and the outcome is shown on the figure below.

Figure 1: Scatter plot of Aggregate tax against its residual



The scatter plot above shows a 45 degree line pattern of the dependent variable and the residual hence suggesting that there exist a linear relationship between aggregate tax and its explanatory variables therefore validating the assumption of linearity for the regression whose results are stipulated below.

Table 3: Elasticity and Buoyancy of Aggregate tax

Variables	Coefficients of determinants
Total Tax (lag1)	0.295**
	(2.89)
Real Gross Domestic Product	1.124
	(0.38)
Government expenditure	0.0745
	(0.23)
External grant	-53520.98
	(-0.45)
Inflation	-1858.5
	(-0.30)
Tax dummy	3219970.5***

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	(6.89)
Constant	-257965.9
	(-0.40)
N	31
R square	0.9868
Durbin Watson	2.683756
F- probability	0.0000

t statistics in parentheses

* p<0.05, ** p<0.01, *** p<0.001

The regression result above suggests that the overall significance of the model is good as the F probability is very low (0.0000), and the R^2 is equally very high (0.9868) suggesting that 98.68% of the dependent variable are explained by the explanatory variables. Also there exists no positive or negative strong auto-correlation in the regression since the Durbin Watson statistic (2.63) falls in the zone of indecision.

The main objective from this result is to ascertain the elasticity of aggregate tax with respect to the gross domestic product which is given by the coefficient of GDP (having linearized aggregate demand and GDP). The degree of responsiveness of tax with respect to GDP is therefore given as 1.124. According to Table 3, 1.124>1 implies that the responsiveness of tax with respect to a change in tax is relatively elastic. Though the elasticity is close to 1, the study opines that policies aimed at increasing the tax base can seriously consider increasing aggregate tax to some extent since it's relatively elastic. This is important to Nigeria, given that over the years efforts have been made to improve on internally generated revenue. Aggregate tax can therefore accommodate an increase at least to some extent.

To ascertain the buoyancy of tax this study considered the 2004 tax reforms and stipulated a dummy to capture the structural break. The dummy variable is significant up to 99.9% confident interval thereby suggesting that aggregate tax was significantly buoyant to the tax reforms of 2004. This also implies that many more vision designed policies like such could be designed to improve the tax base of the economy. Apart from the main objective this result further show that the previous' year's tax is a positively significant determinant of current year's aggregate tax. This is expected given that, Nigeria like many other African/developing countries produces their budgets based on last year's income, and so targets are often set just a little above the previous year's figure and not based on the country's needs and wants.

Also, government expenditure and real GDP were not significant determinants of aggregate tax in Nigeria. However they are all positively and directly related to aggregate tax. This implies that government expenditure is not focused on taxable institutions and organizations which should ordinarily turnaround to generate revenue through tax. In addition gross domestic product also is not significantly based on tax in Nigeria due to the country's overdependence on oil. Furthermore, inflation and external grants are equally not significant but have a negative and inverse relationship with the aggregate tax of Nigeria. This implies that as tax inflation increases aggregate tax drops though this is not significant. This could be attributed to the fact that as inflation rises, some firms may close down hence reducing the amounts that would have been collected from them as tax. Also external grant or official development assistance tends to have an inverse relationship with aggregate tax and could be explained by the fact that most of these grants are usually not taxed, and some of these grants (such as health aids) reduces the

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private firms that would have sold the health facilities and hence the tax that would have been gotten. A good example is the huge sums of money that have been pumped into Africa and Nigeria in particular to eradicate malaria which is most times converted as mosquito nets and hence relegates traders that are involved in mosquito nets.

CONCLUSION AND RECOMMENDATION

Nigeria's potential of crude and other natural resources is uncontestable, however climate change has raised the debate on how sustainable oil revenue can be and hence questioned its overdependence. It is on this premise that this study investigated the elasticity and buoyancy of tax in an attempt to ascertain its flexibility and hence the possibility of increasing the tax base. The study therefore suggested that aggregate revenue is relatively elastic and significantly buoyant according to the 2004 tax reforms. The study therefore concludes that tax in Nigeria is relatively flexible with respect to growth and therefore more could be done to increase it.

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