

ENDOGENOUS GROWTH MODEL, TAX REVENUE AND ECONOMIC GROWTH: EVIDENCE FROM NIGERIA MACRO DATA

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Abstract

The study tried to ascertain the applicability of the endogenous growth model postulate on labour and capital tax, in Nigeria. The model postulates that economic growth is endogenously determined through the accumulation of human and capital resources, technological progress, knowledge, tax of labour and capital income. Further studies had shown that imposing a tax on labour and capital income can deter economic growth rate but when used to finance public goods and services that are productive, the economy can be spurred into growth. Anchoring on this background, this study sees tax on labour and capital income as revenue to the government, if used to finance productive public goods and services would spur the economy into growth. Using Nigeria macro time-series data and adopting Error Correction Mechanism as the estimation technique alongside Autoregressive Distributed Lag Model, with Engle and Granger Cointegration approach for a diagnostic test, the result revealed that the current value of tax deters growth while its past value which is seen as revenue, enhances economic growth. Also, the assertion that productive government expenditure would spur the economy to higher growth is confirmed to be affirmative. The study, therefore, concludes that the endogenous growth model is applicable in Nigeria. Tax deter growth but revenue enhances growth. It was therefore recommended among others that government should diversify the economy into non-oil related areas, and its spending must continually be productive.

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Introduction

The endogenous growth model postulates that the economic growth of a country can be endogenously determined rather than exogenously determined as proposed by Solow (1956). The model was of the view that growth of an economy can be spurred through the accumulation of physical and human capital, technological changes and knowledge (Arrow, 1962; Hirofumi, 1965; Romer, 1986; Lucas, 1988). Barro

(1990) introduced a tax on capital and labour income into the model which according to him acts as a deterrent to economic growth but if augmented with productive government expenditure, its influence on growth might be positive. Adopting this background, tax on capital and labour income as a means of revenue generation by the government for the provision of public goods and services is upheld. In other words, fiscal policy (taxation and government spending) is a

major factor to consider as it helps to stimulate growth. This view was corroborated by Myles (2009:5) who stated that the rate of growth can be affected by policy choices through the effect that taxation has upon economic growth. With an efficient tax system, the government of any country can experience an increase in revenue generation which if channelled into productive expenditure will translate into growth, both in the short-run and long-run.

The tax had been a major source of revenue in Nigeria. Nigerian government revenue is composed of oil revenue and non-oil revenue, and revenue from other sources but predominantly oil revenue (petroleum profit tax, crude oil and gas sales, etc), accounting for over 70% of total government revenue. The components of non-oil revenue in Nigeria are majorly revenues from Value Added Tax (VAT), Corporate Tax, Custom Duties, personal income tax, education tax, federal government independent revenue, among other). The overdependence of the Nigerian economy on oil revenue had affected the growth of the economy. The crude oil revenue which serves as a major source of revenue for the government had been fluctuating due to challenges faced by the oil sector, ranging from pipeline vandalization, global oil price shock, activities of the Niger Delta Militants, to theft of crude oil by hoodlums. Okezie and Azubike (2016:42) noted that *it is increasingly becoming difficult to guarantee the stability of revenue inflows from oil sector due to unchanging and complex factors at work in the oil sector/market, locally and globally*. The overreliance on the oil revenue and urgent need for the diversification of the economy and its revenue base had become a priority to all tiers of government (Okezie and Azubike, 2016; Sanusi, 2003). Several efforts have been made by Federal and State governments to diversify their revenue base, shifting from oil revenue to non-oil revenue, focusing more on tax policies, Internally Generated Revenue (IGR), other sectors of the economy (Agriculture, Mining and Quarrying, Service, Information, etc) that would enhance revenue

generation. Revenue generated from these non-oil sources will help to a very large extent in enhancing economic growth. It is important to note that over the years, the percentage of non-oil revenue to total government revenue has not been very significant when compared with the oil revenue. In 1980, it contributed 18.6% to total revenue while oil revenue contributed 81.4%. This rose to 29.4% in 1995 and later fell to 14.2% in 2005. In 2015, because of government efforts in revenue diversification, due to fall in world oil price, non-oil revenue contributed 44.6% to total revenue and as at 2019, its contribution rose by 2.6% from 2015. Non-oil revenue accounts for 0.02% of GDP in 1980 but rose gradually to 4.47% in 2015 which is still insignificant. As of 2019, its percentage share to economic growth stood at 6.62%, attributed to economic growth recovery plan of government. These go to show that more revenue can be generated by the government through the tax system and its contribution to economic growth can be enhanced.

Table 1: Non-Oil Tax Revenue share of Total Revenue and Economic Growth.

Year	Non-Oil Tax Revenue (%)	Non-Oil Revenue to Economic Growth (%)
1980	18.6	0.02
1985	27.4	0.03
1990	26.7	0.14
1995	29.4	0.67
2000	16.5	1.33
2005	14.2	2.09
2010	26.1	3.50
2015	44.6	4.47
2019	46.0	6.62

Source: Author's Computation from the Central Bank of Nigeria online database, 2019

Given the fact that the oil revenue is dwindling in recent times (from N8,879.97billion in 2011 to N6793.82billion in 2014 to N2,693.91billion in 2016) due to the fall in the world oil price, the government is

focusing on revamping the tax system as a means of boosting economic growth. Some of the efforts made by the government are the 2014 tax reform initiative which introduced TIN (Tax Identification Number), VAIDS (Voluntary Assets and Income Declaration Scheme), among others (Obi and Ifelunini, 2019).

The economic growth of most countries, especially the developed countries is driven by tax policies, investment, savings, trade, industrial production (Central Bank of Nigeria, 2017). For sub-Saharan African countries, their growth rates are driven by trade, as they are seen as the largest free trade zone globally (World Bank, 2020). Most countries output grew in 2017 (Obi and Ehiedu, 2020) and subsequent years, having recorded a low growth rate in 2016 (See table 2). Nigeria recorded a negative growth rate in 2016. Given the growth recovery plan, the introduction of TIN and VAIDS, and relative stability of oil price in the world oil market, the economy registered an increase in growth in 2017, 2018 and 2019, which stood at 0.8%, 1.9% and 2.2% respectively. Obi and Ifelunini (2019) questioned the place of tax in the domestic mobilization of resources for economic growth. Though several tax reforms (*TIN*, *VAIDS*) have been made to ensure a rise in the share of tax to GDP, it is still not seen as a major growth driver for Nigeria and sub-Saharan Africa. Could it be that tax imposed on labour and capital in Nigeria acts as a deterrent to growth? This study anchor on the endogenous growth model, taking off from Barro (1990) to provide an answer to the above question.

Table 2: Regional and Nigeria Economic Growth Rate.

Regions	2016	2017	2018	2019
OECD	1.8	2.5	2.3	1.7
Africa	2.3	3.7	3.5	3.0
Latin America and the Caribbean	-1.7	1.3	0.4	0.2
SSA	2.2	2.7	2.3	2.4
Asia and Oceania	5.4	4.5	4.6	3.6
Nigeria	-1.6	0.8	2.9	2.2

OPEC Market indicators, 2020 and World Bank online data, 2019

Review of Literature

Conceptual issues on Economic Growth and Revenue

Most researches conceptualize economic growth as an increase in GDP per capita or rise in per capita income (PCI) (Malizia, 1990). Haller (2012) shared the same view in its study, conceptualizing economic growth as a rise in national PCI. Uwakaeme (2015) further asserts that economic growth translates into PCI when it is measured in terms of population. He defined economic growth as a *positive and sustained increase in aggregate goods and services produced by an economy within a given period*. In a nutshell, growth is associated with a rise in labour income and efficiency, since increased income translates into increased labour productivity and an increase in goods and services produced.

“Revenue” on the other hand is conceptualized as the amount of money income received by the government of any country to carry out its economic and non-economic functions. Obiechina (2010) asserted that government revenue relates to monies generated or mobilized in the economy. Revenue accruing to the government can be referred to as public revenue and is seen as income of the governments generated from all sources. It consists of taxes, fines, levies, public debts, profits from public enterprises, grants, administrative revenue, income from sales of public properties etc. For the Nigerian government of which this study is focused, revenue generated from the oil sector is inclusive. Public revenue in Nigeria consists of oil and non-oil tax revenue. For this study, the emphasis is placed on the non-oil tax revenue, which is seen as revenues not gotten from the oil sector and they include; taxes, fines, levies, debts (external and domestic), grants, among others (Okwori and Sule, 2016; Jegede, 2014). Also, income generated from the non-oil sector such as agriculture, mining and quarrying of solid minerals,

manufacturing, services electricity generation, information and communication, transportation, etc. are included. Non-oil tax revenue is made up of revenue from personal income tax, tax on companies' profit, value-added tax (VAT), customs and excise duties, customs (levies) independent revenue of the federal government, education tax, NITDF (National Information Technology Development Fund) (Jones, Ihendinihu and Nwaiwu, 2015; CBN 2018).

Tax Revenue in Nigeria: An Overview.

The Nigerian non-oil tax revenue component is made up of Company Income Tax (Corporate Tax), Value Added Tax (VAT), Customs Levies, Education Tax, National Information Technology Development Fund (NITDF), Custom and Excise, and Federal Government Independent Revenue. Value Added Tax, Corporate Tax and Custom and Excise contribute the largest

percentage of them all from 2008 to 2015. Value-added Tax which had been exhibiting a cyclical movement, falling from 30.3 per cent in 2008 to 28.3% in 2009, rose to 29.5% and 29% in 2010, 2011 respectively and declined to 24.2% in 2014. Despite these changes, it still contributed meaningfully to non-oil tax revenue composition. Also, corporate tax made the highest contribution to non-oil tax revenue, increasing from 31.2% in 2008 to 36.6% in 2014 but with a decline in 2011 (31.3%) and 33.4% in 2015. National Information Technology Development Fund made the least contribution to non-oil tax revenue. Its percentage contribution is less than 1%. The implication of the above is that non-oil tax revenue generation is mostly from company income tax (capital income tax), VAT (indirect tax of which the burden is on final consumers or households) and custom and Excise.

Table 2: Percentage Composition of Non-Oil Tax Revenue.

Non-Oil Revenue. Composition	2008	2009	2010	2011	2013	2014	2015	2016	2017	2018
VAT	30.3	28.3	29.5	29.0	27.0	24.2	25.2	27.8	30.2	27.4
Fed. Govt. Indep. Rev	8.5	4.4	8.1	8.2	9.3	9.0	10.5	8.1	4.9	9.9
Education Tax	3.5	8.4	6.0	4.5	9.5	5.9	6.6	5.2	-	-
Custom Levies	5.4	6.0	5.4	7.0	5.8	2.7	2.4		-	-
National Info. Tech. Dev. Fund (NITDF)	-	0.5	0.4	0.4	0.3	0.3	0.4	0.3	-	--
Corporate Tax	31.2	34.4	34.5	31.3	33.4	36.9	33.4	33.8	37.6	35.7
Custom and Excise	21.1	18.0	16.2	19.6	14.7	17.3	17.7	18.8	19.6	17.6

Source: Central Bank of Nigeria Online Annual Economic Report, 2008-2018

Despite this composition, it is pertinent to note that non-oil contribution to government total revenue is insignificant as mentioned earlier. In 1980 it only accounted for 19% of total government revenue, rose to 35.6% in 1986, fell to 13.9% in 1992 and rose significantly to 40% in 2001. Until 2015 and 2016

when the non-oil revenue rose to 44.6 and 52.6 respectively, it's a contribution to total revenue had been very minimal. The rise in 2015 and 2016 is as a result of a government effort to revamp the non-oil sector since the revenue from the oil sector dwindled due to falling in the price of oil in the world market.

Despite the contribution made in 2015/2016, its composition is not significantly different from the other years.

Empirical Review of Related Literature

Studies have been done on tax revenue and economic growth, with emphasis on non-oil tax revenue. Some of these studies are chronologically reviewed below.

Okezie and Azubike (2016) carried out a study on non-oil tax revenue contribution to government revenue and economic growth in Nigeria using Ordinary Least Square (OLS) estimation method. Their findings showed that non-oil tax revenue contributes significantly to the growth of the economy but insignificant when compared to total government revenue. In a similar study, Okwori and Sule (2016) appraised the revenue sources of the Nigerian government and its effect on economic growth adopting co-integration test and granger causality as their estimation technique. Variables used include oil revenue, non-oil revenue, external debt and domestic debt. The result showed that there is a bidirectional relationship or causality between GDP and non-oil revenue.

Jones, Ihendinihu and Nwaiwu (2015) empirically examined total revenue and economic growth in Nigeria using OLS univariate regression and Error Correction Mechanism. It was observed that total revenue (oil and non-oil) had an equilibrating relationship with growth in Nigeria. Also, Mwakalobo (2015) investigated the capacity of developing countries in revenue generation (tax revenue), focusing more on three countries in Sub Saharan Africa (Tanzania, Kenya and Uganda). Co-integration and Error Correction Mechanism were employed, and it was revealed that tax revenue changes impact strongly on the human and physical development of these countries.

Ude and Agodi (2014) investigated on the non-oil tax revenue impact on growth in Nigeria. Error Correction Mechanism was adopted, using revenue from agriculture and manufacturing as variables, from 1980

to 2013. Their result indicated that non-oil revenue is a prerequisite to unlocking the economic potentials of the country. Ayuba (2014) studied the impact of non-oil tax revenue on economic growth in Nigeria using the OLS method of estimation. The result revealed among others that non-oil tax revenue positively impacts on economic growth in Nigeria. Jegede (2014) econometrically analysed how effective public revenue is in the economic growth of developing countries using the OLS technique. The result revealed that public revenues promote effectively economic growth. On the other hand, Jones,

Riti, Gubak and Madina (2016) researched on the growth of the non-oil sector as a key to diversification. They employed Auto-regressive Distributed Lag model and Vector Error Correction Mechanism, Granger Causality Model in their analysis. It was observed that agriculture, manufacturing and telecommunication granger cause growth in Nigeria. This finding was corroborated by the study carried out by Igwe, Edeh and Ukpere (2015) researched the impact of the non-oil sector on the economic growth of Nigeria using granger causality. Their findings revealed among others that the non-oil sector is a determinant of economic growth. Olurankinse and Bayo (2012) on the non-oil sector impact on economic growth. It was revealed among others that non-oil export positively impacts on economic growth in Nigeria. Ordinary Least Square method of analysis was employed.

The above-reviewed literature showed that most of the studies used non-oil revenue variable as a source of revenue to the government ascertaining if it augments growth or retard growth using OLS which when applied to time series data gives a spurious result. Other methods applied were Granger causality, Cointegration and Error Correction Mechanism. The most result showed enhanced growth.

This study differs from the others as it tries to test the efficacy of endogenous growth model by Barro (1990) in Nigeria, seeing non-oil revenue as tax, and ascertaining if it enhances growth or retard growth.

This was done using the Engle-Granger Cointegration and Error Correction Mechanism.

Theoretical Framework and Research Method

The study adopted Barro (1990) modified endogenous growth model which incorporated labour tax and government spending into the original endogenous growth model postulated by Solow (1956). The endogenous growth model holds that economic growth can be attained not only through capital accumulation (human and physical capital) with technological change and improved knowledge but also human and capital tax. Government generate revenue from the tax on labour/household income and capital income. High tax rate on household income (personal income) and private sector capital investment (capital income) reduces economic growth. The reduction in growth and savings rates stems from the disincentive to savings by household because of high tax which also affects their investment decision, since accumulated household savings are channelled into productive investment. Household consumption expenditure will also be affected, and this affects aggregate demand which in the long run exerts a negative influence on economic growth.

On the other hand, high capital income tax rate discourages private sector from investment as this reduces their amount of profit that can be ploughed back into the business and this will affect the growth rate of the economy.

When government spending is productive, it improves the growth rate since revenue from the tax is ploughed back into the economy through public investment, provision of infrastructure and provision of public goods. This helps in improving the lowered growth rate caused by the high tax rate on household income and capital income. Barro (1990) also noted that with the high tax rate, unproductive government spending will retard economic growth further. Therefore, for a favourable economic growth rate, the government must channel its revenue into productive spending. Thus,

revenue from tax must equal government expenditure and to achieve this government must ensure a balanced budget in which case, total revenue generated from tax (T) must equal total expenditure (G) i.e.

$$T = G. \text{-----} (1)$$

Thus, economic growth is a function of total revenue from taxation and government capital expenditure. This is expressed mathematically as

$$g = f(Y_T, CGEXP) \text{-----} (2)$$

where

g = Economic Growth

Y_T = Income from Taxation

$CGEXP$ = Government Capital expenditure

Most developing countries embark on deficit financing since the revenue generated from tax falls short of expenditure. In order to bridge the gap, they resort to borrowing either from the domestic economy (domestic debt) or externally (foreign debt.). This implies growth. The condition for growth in equation (2) will no longer hold under such circumstance since government spending is greater than tax revenue i.e. $G > T$. Income from debts are used to bridge government financial gap (CBN, 2017). If the debt is channelled into the productive venture, there is every likelihood that it will influence growth positively. On the contrary, the debt is not channelled into productive ventures, it will retard growth. This nonproductive debt is what Barro (1990) referred to as "nonproductive government expenditure". In other words, for government expenditure to be productive, revenues (tax and debt) must be channelled into productive activities. In this model, other sources of revenue are considered. Therefore, revenue from other sources (Y_0) can be categorized into domestic debt and foreign debt (Okwori and Sule, 2016). Thus,

$$g = f(Y_T, D_B, F_B,) \text{-----} (3)$$

where

g = Economic Growth

Y_T = Income from Tax

D_B = Domestic Borrowing

F_B = Foreign Borrowing

Model Specification

Anchoring on the theoretical framework, the model is thus specified;

$$RGDP = f(TR, DB, EBX, CGEXP, U_i) \text{-----}(4)$$

where;

RGDP= Real Gross Domestic Product

TR= Tax Revenue

CGEXP= Government Capital Expenditure.

DB= Domestic Debt.

EXB = External Debt

Estimation Technique

Engle and Granger cointegration and Error Correction Mechanism (ECM) approach was used. The time series variables were first subjected to unit root test using Augmented Dickey Fuller (ADF) Test to ascertain their stationarity status. Afterwards, the long-run relationship of the nonstationary series was determined. It is also necessary to determine the short-run evolution of variables used and the speed of adjustment to equilibrium in the case of displacement from equilibrium using the Error Correction Mechanism expressed as;

$$LRGDP = \beta_0 + \beta_1 LRGDP_{t-1} + \beta_2 LRGDP_{t-2} + \beta_3 LTR + \beta_4 LTR_{t-1} + \beta_5 LTR_{t-2} + \beta_6 LDB + \beta_7 LDB_{t-1} + \beta_8 LDB_{t-2} + \beta_9 LEXB + \beta_{10} LEX_{t-1} + \beta_{11} LEX_{t-2} + \beta_{12} LCGEXP + \beta_{13} LCGEXP_{t-1} + \beta_{14} LCGEXP_{t-2} + ECM_{t-1} + U_i \text{-----}(6)$$

Equation (6), implies that past values of the exogenous and endogenous variables may complement current exogenous variables in influencing the current level of the dependent variable (LRGDP).

Data Sources and Research Design

This study used secondary sources of information from online journals, Central Bank of Nigeria Bullion. Data used for this study were sourced from the Statistical Bulletin of the Central Bank of Nigeria, and the World

Bank online database. Annual time series data ranging from 1970-2017 was used. The choice of the data range was to assess the performance of tax revenue from the early years when the Nigerian economy relied more on non-oil revenue, up to 2017 when there was a persistent clarion call for diversification into the non-oil sector before economic recession of 2016.

Results

The ADF test result revealed that all the variables are stationary at the first difference, i.e. $I(1)$, based on the values of their ADF Statistic (First Difference) which is greater than the ADF Critical value of 2.92 at 5% level of significance (see table 4).

Table 4: ADF Test for Stationarity

	ADF Statistic	ADF Statistic	Decision
Variables	Levels	First Difference	5%
LRGDP	0.827803	-5.751903	1(1)
LTR	-2.272038	-8.095391	1(1)
LDB	-2.651428	-16.92381	1(1)
LEXB	-2.049242	-4.368362	1(1)

ADF Critical Value at 5% = 2.92

Source: Author's Regression Result

Having determined their order of integration, it is paramount to ascertain their long-run relationship. The result revealed that the residual has no intercept and trend judging from the probability values (49% and 64%) which is greater than 5% significant level (see table 5). Thus, we proceed to test for the order of stationarity of the residual.

Table 5: Estimating the Residual with Intercept and Trend

Variable	Coefficient	Standard Error	t-statistic	Prob.
C	-0.022503	0.032630	-0.689629	0.4940

@Trend	0.000555	0.00120	0.45938	0.648
		9	3	2

Source: Author's Regression Analysis.

The ADF test results in table 6 showed that the ECM is integrated of order zero [1(0)] i.e. stationary at levels since the ADF Statistic value (-4.183994) is greater than the ADF Critical Value (1.948313) at 5% level of significance. Thus, we reject the null hypothesis of no cointegration and state that the variables are cointegrated i.e. a long-run relationship exists among the variables.

Table 6: ADF Test for the unit root of the Residual with no intercept and trend.

Variable	ADF Statistic (Levels)	Decision 5%
ECM	-4.183994	1(0)

ADF Critical Value at 5% = -1.948313

Source: Author's Regression Estimate

Table 7 is the over-parameterisation equation under the ECM model. This approach of over-parameterisation can also be termed "general-to-specific" procedure, that eliminates the insignificant variables until a 'Parsimonious ECM Result' is attained. Akaike Information Criteria (AIC) is used as a check on the elimination of the variables. Once the value of the AIC starts rising, it becomes necessary to stop the elimination process. The accepted parsimonious result is subjected to diagnostic test (serial correlation and stability test) using the Breusch-Godfrey Serial Correlation LM Test and CUSUM Test. The AIC value is -2.384537. The next over-parameterised result is shown in table 8.

Table 7: Over-parameterised Result

Variables	Coefficient	Standard Error	t-statistic	Prob.
C	0.007440	0.030603	0.243105	0.8097
D(LRGDP(-1))	0.400598	0.218682	1.831873	0.0776
D(LRGDP(-2))	0.179210	0.210312	0.852114	0.4014
D(LTR)	-0.015279	0.012626	-1.210147	0.2363
D(LTR(-1))	0.031082	0.014419	2.155543	0.0399
D(LNR(-2))	-0.008262	0.012970	-0.637014	0.5293
D(LCGEXP)	0.076528	0.041075	1.863116	0.0730
D(LCGEXP(-1))	-0.105536	0.037959	-2.780257	0.0096
D(LCGEXP(-2))	0.056431	0.044076	1.280304	0.2109
D(LEXB)	-0.058733	0.023903	-2.457160	0.0205
D(LEXB(-1))	0.038305	0.032578	1.175777	0.2496
D(LEXB(-2))	-0.001179	0.027409	-0.043028	0.9660
D(LDB)	0.076380	0.084224	0.906874	0.3722
D(LDB(-1))	-0.102910	0.074238	-1.386224	0.1766
D(LDB(-2))	0.027927	0.032231	0.866456	0.3936
ECM(-1)	-0.338872	0.184876	-1.832973	0.0775

R-squared	0.441351	Mean dependent var	0.033038
Adjusted R-squared	0.142075	S.D. dependent var	0.069098
S.E. of regression	0.064001	Akaike info criterion	-2.384537
Sum squared resid	0.114693	Schwarz criterion	-1.735741

Log likelihood 68.45982 Hannan-Quinn criter. -2.143933
F-statistic 1.474727 Durbin-Watson stat 2.070772
Prob(F-statistic) 0.181847

Source: Author's Regression Estimate

Table 8: Adjusted Over parameterised Result

Variables	Coefficient	Standard Error	t-statistic	Prob.
C	0.012968	0.027191	0.476912	0.6368
D(LRGDP(-1)	0.386180	0.202720	1.904989	0.0661
D(LRGDP(-2)	0.238262	0.186554	1.277173	0.2110
D(LTR)	-0.016681	0.011927	-1.398552	0.1719
D(LTR(-1)	0.030259	0.012126	2.495377	0.0181
D(LCGEXP)	0.080807	0.039265	2.057985	0.0481
D(LCGEXP(-1)	-0.093117	0.034253	-2.718507	0.0106
D(LCGEXP(-2)	0.038927	0.036797	1.057881	0.2983
D(LDB)	0.079238	0.078158	1.013820	0.3185
D(LDB(-1)	-0.113378	0.068851	-1.646732	0.1097
D(LEXB)	-0.057551	0.022928	-2.510027	0.0175
D(LEXB(-1)	0.041574	0.030815	1.349152	0.1871
ECM(-1)	-0.389846	0.154226	-2.527763	0.0168

R-squared 0.422726 Mean dependent var 0.033038
Adjusted R-squared 0.199266 S.D. dependent var 0.069098
S.E. of regression 0.061831 Akaike info criterion -2.488106
Sum squared resid 0.118517 Schwarz criterion -1.960959
Log likelihood 67.73834 Hannan-Quinn criter. -2.292615
F-statistic 1.891726 Durbin-Watson stat 1.958459
Prob(F-statistic) 0.075776

Source: Author's Regression Estimate

Table 9 below shows the Parsimonious result. As earlier stated, once the AIC value begins to rise, the removal of insignificant variables stops. With the AIC value of -2.498097, it becomes necessary to stop removing insignificant variables and interpret the Parsimonious ECM result. The Error Correction Mechanism is statistically significant given the probability value of 0.0251 (2.5%) which is less than 5% level of significance. Its coefficient is largely negative with a value of -0.354592. This implies that the model will adjust to equilibrium in the short run.

The short-run coefficient of LTR(-1) is positive (0.027216). This implies that LTR(-1) is positively related to the dependent variable (LRGDP). The t-statistic of LTR(-1) (2.306114) with a probability value of 2.8%, is statistically significant in explaining the dependent variable.

The short-run coefficient of LCGEXP (0.097792) exhibits a positive sign, implying a direct relationship between LCGEXP and LRGDP. It's t-statistic (2.724123) with a Prob. Value of 0.01(1%) showed that it is statistically different from zero (statistically

significant in explaining the dependent variable). The coefficient of the past value of LCGEXP (-0.097802) is negatively related to LR GDP and it is statistically significant judging from the probability value of 0.7% with t-statistic of -2.874116.

The coefficient of the current value of LEXB (-0.052516) is negative, meaning that it influences economic growth negatively. It is statistically significant in explaining economic growth judging from its t-statistic (-2.337089) and Probability value

(2.6%). The t-statistic of its first lag of external debt is not statistically significant and its coefficient is negative. Both the current value and lag value of LDB (Domestic Debt) are not statistically significant in explaining economic growth and the lag values (lag 1 and lag 2) of the dependent variable (LR GDP) are not statistically significant in explaining the current level of the dependent variable judging from their Prob. Values of 12% and 11% respectively, which are greater than 5% level of significance.

Table 9: Parsimonious ECM Result

Variables	Coefficient	Standard Error	t-statistic	Prob.
C	0.011322	0.027197	0.416307	0.6800
D(LR GDP(-1)	0.286944	0.180045	1.593737	0.1208
D(LR GDP(-2)	0.289139	0.180584	1.601136	0.1192
D(LNR)	-0.020075	0.011509	-1.744268	0.0907
D(LNR(-1)	0.027216	0.011802	2.306114	0.0277
D(LCGEXP)	0.097792	0.035899	2.724123	0.0104
D(LCGEXP(-1)	-0.097802	0.034028	-2.874116	0.0071
D(LEXB)	-0.052516	0.022471	-2.337089	0.0259
D(LEXB(-1)	0.031137	0.029247	1.064617	0.2950
D(LDB)	0.109003	0.073054	1.492094	0.1455
D(LDB(-1)	-0.092944	0.066208	-1.403816	0.1700
ECM(-1)	-0.354592	0.150862	-2.350434	0.0251

R-squared	0.401887	Mean dependent var	0.033038
Adjusted R-squared	0.196285	S.D. dependent var	0.069098
S.E. of regression	0.061946	Akaike info criterion	-2.498097
Sum squared resid	0.122795	Schwarz criterion	-2.011500
Log likelihood	66.95813	Hannan-Quinn criter.	-2.317643
F-statistic	1.954687	Durbin-Watson stat	1.858813
Prob(F-statistic)	0.068814		

Source: Author's Regression Estimate

Diagnostic Test

A diagnostic test to ascertain if the Parsimonious ECM Result has serial correlation, and also to check its

stability status was done. The Breusch-Godfrey Serial Correlation LM Test was used to test serial correlation while the CUSUM Test, for stability.

Table 10: Breusch-Godfrey Serial Correlation LM Test:

F-Statistic	0.706720	Prob. F(2,30)	0.5013
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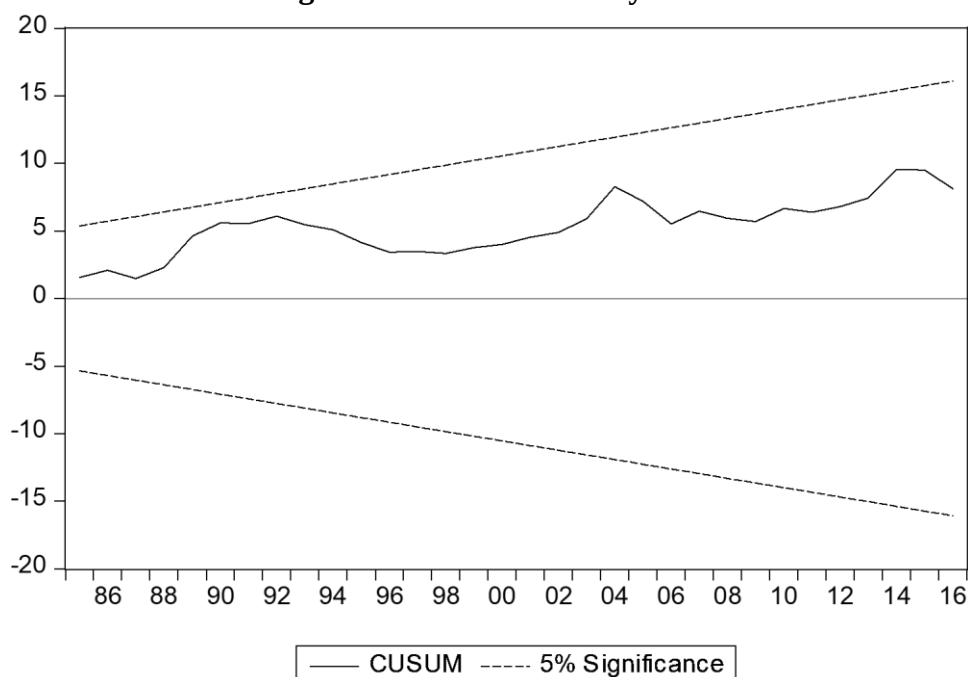
Obs*R-squared	1.979770	Prob. Chi-squared (2)	0.3716
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Source: Author's Regression Estimate

Judging from the probability values of F-statistic (0.5013) and Chi-squared (0.3716), we accept the null hypothesis of no serial correlation in the model. Thus, the result of the model can be accepted. On the other hand, the CUSUM stability test is shown in figure 1

The CUSUM stability line lies between the 5% significance lines. This implies that the model is stable. Therefore, we accept the null hypothesis of the stability of the model

Figure 1: CUSUM Stability Test



Discussion of Findings

From the analysis, it can be deduced that tax revenue generated in past years influences economic growth in the current year. Its impact is felt on the economy after one year of generating the tax. At this point, the tax acts as revenue to the government and can be expended. On the other hand, tax revenue generated in the current year negatively influences economic growth, implying that the current value of labour and capital tax does not significantly influence growth, rather, it retards growth. This corroborates Barro (1990) assertion that tax imposed on labour and capital income, acts as a deterrent to growth.

This current study also revealed the strength of government spending on the growth of the economy.

Government capital expenditure in the current year, financed with the tax revenue from the previous year influences growth positively. Interestingly, this finding has revealed that government spending is productive and it enhances growth. An interesting twist from the finding is that government spending of previous years does not culminate into the growth of the current year, meaning that current capital expenditure impacts of growth instantly. This can only mean that capital expenditure made in previous years is not a long-term capital expenditure but rather a yearly expenditure. It is therefore affirmed that short term government capital expenditure is not infrastructurally (construction of road, railway, power, etc.) inclined.

The non-significant and negative effect of external debt on growth affirms that debt as a stock does not influence growth positively. This corroborates the findings of Uma, Eboh, Obidike (2013); Muritala; (2012) Ajayi and Oke, (2012), that debt does not enhance growth.

Conclusion

The study tried to ascertain the applicability of the endogenous growth model postulate on labour and capital tax, in Nigeria. The model postulate that economic growth is endogenously determined through the accumulation of human and capital resources, technological progress, knowledge, tax of labour and capital income. Having critically analysed the data and result discussed; the study concludes that the endogenous growth model is applicable in Nigeria. Tax deter growth but revenue enhances growth endogenous. Tax deterring economic growth is affirmed, judging from the negative sign of the coefficient of the current value of non-oil revenue which is seen as a tax. The positive influence of the past value of the non-oil revenue on economic growth can be attributed to the fact that government expenditure was productive. But it is interesting to note that despite the neglect of the non-oil sector revenue generation, its impact can still be felt positively. If the government can retrace its steps back to harnessing the potentials in the non-oil sector, especially tax, the economy will grow with less attention to the oil sector. Diversifying the economy will be of great benefit to the nation. It is therefore recommended that;

1. The government should diversify the economy from oil and gas sector into other sectors of the economy (manufacturing, services, agriculture, etc)
2. Available data showed that the non-oil revenue components are mainly VAT, Corporate Tax, Custom and Excise. To sustain this, the government should encourage more private sector investors (local and foreign investors) to

invest in Nigeria so that more revenue can be generated through their payment of tax.

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