Business Administration and Business Economics

Testing Wagner's Law in Nigeria in the Short and Long-run

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Abstract: This study tests Wagner's law in Nigeria in both the short and long-run using the autoregressive distributed lag (ARDL) technique of estimation and controlling for structural breaks between the periods 1981-2016. Results showed that both in the short and long-run, evidence pointed to a negative but insignificant relationship between government expenditure and economic growth, with a larger negative effect in the long-run. The study controlled for oil export earnings, which was found to positively and significantly influence government spending in both the short and long-run. Results did not support the Wagner law. It was therefore recommended that the economy be diversified into more labour intensive sectors so as to increase output and income per capita and so that government expenditure can be based more on tax receipts than on oil export earnings as more financially responsible households will demand increase in government expenditure as their level of income increases, especially for the provision of public sector services the households currently bear.

Keywords: Wagner's law; ARDL; Structural Breaks

JEL Classification: C32; H50

1. Introduction

Wagner (1883) postulated that public expenditure is an endogenous variable and that there exists long-run tendencies for public expenditure to grow relatively to growth of the economy. Moreover, public expenditure is a consequence rather than a cause of economic growth. In other words, Wagner's law of increasing state activities viewed that as the economy develops over time, the activities and functions of the government increase.

The relationship between public expenditure and economic growth has been a continuing issue in economics and public finance literatures both at theoretical and empirical levels. Since the magnitude of public expenditure has been increasing over time in almost all the countries of the world, it is therefore necessary for governments

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to know the impact of their spending in bringing about growth in the economy. Hence, there exists a vast amount of empirical studies on the relationship between government expenditure and economic growth in Nigeria but most of them used Vector Autogressive (VAR) techniques and its variants without controlling for structural breaks in the series, especially in Nigeria (Aruwa, 2012; Aladejare, 2013; Awomuse, Olorunleke & Alimi, 2013) and arrived at different and even conflicting results. While the findings of some studies points to the existence and validity of Wagner's law in Nigeria (Aregbeyen, 2006; Ogbonna, 2012; Danmola, Olateju & Abba, 2013; Aladejare, 2013; Akinlo, 2013), the findings of some other studies suggest otherwise (Ighodaro & Oriakhi, 2010; Inuwa, 2012; Awomuse, Olorunleke & Alimi, 2013). Following Antonis, Constantinos and Persefoni (2013) which included testing for structural breaks in its comparative analysis between Wagner and Keynesian law in Greece, this study uses the autoregressive distributed lag (ARDL) technique but it also controlled for structural breaks in the series. This is necessary to recognize pivotal dates in the system that had disruption to the structure of the Nigerian economy.

Premised on the foregoing, this study therefore hypothesizes the existence or otherwise of the Wagner's law which states that increasing growth should translate to increasing government spending in the long-run. The study controls for the influence of revenue from crude oil sale on government expenditure in Nigeria. This will help to decide if the current pace of public spending in Nigeria, after controlling for the influence of oil earnings is influenced by an expanding economy or not. Following the introduction to the study, the subsequent sections include section two, which reviews the literature, section three contains the methodology, section four gives the empirical results and discussion while section five concludes the study and provides policy recommendations.

2. Literature Review

The literature was extensively explored on the link between government expenditure and economic growth, on the basis of which we made our contribution to knowledge through gaps identified.

Ansari, Gordon and Akuamoah (1997) applied both the Granger and Holmes-Hutton statistical procedures to test the income-expenditure hypothesis for three African countries - Ghana, Kenya and South Africa. The findings revealed that the hypothesis of public expenditure causing national income is not supported by the data for these African countries.

Chletsos and Kollias (1997) examined the validity of Wagner's law in Greece by means of disaggregated public expenditure data for the period 1958 to 1993. Employing co-integration and the related notion of error correction, the findings of

the study suggest that the growth of defense expenditure may be explained in terms of Wagner's law in Greece.

Kolluri, Panik and Wahab (2000) examined Wagner's law using time series data drawn from the G7 industrialized countries over the sample period 1960 - 1993. The study presented evidence on both the short and long-run effects of growth in national income on government expenditure by resorting to recent developments in the theory of co-integrated processes. The findings lend credence to the existence of a significant long-run equilibrium relationship between government spending and national income, thus validating the existence of Wagner's Law.

Islam (2001) conducted a study to re-examine Wagner's law using econometric techniques such as co-integration and exogeneity tests that have not been used in previous empirical studies. Also using much longer time series data for the USA than have been previously utilized, the results provided strong support for the existence of Wagner's hypothesis in the USA.

Chow, Cotsomitis and Kwan (2002) evaluated the validity of Wagner's hypothesis in the UK from 1948 to 1997. The study was conducted to show that relying on a bivariate Wagner model (economic growth regressed on government expenditure) was not adequate to understanding the long-run relationship between the variables. Thus, the study introduced a third variable- money supply- and showed that a long-run equilibrium existed between government spending and economic growth. The Granger causality test conducted indicated a one-way direction of causal effect from income and money supply to government expenditure.

Halicioglu (2003) conducted an empirical investigation of Wagner's law in Turkey over the period 1960–2000. Using modern time-series econometric techniques, the findings refuted the empirical validity of Wagner's law for Turkey for the period studied. However, the study found statistical evidence for an augmented version of Wagner's law.

Chang, Liu and Caudill (2004) re-examined Wagner's law using its five different versions for three emerging countries of Asia and seven other industrialized countries. The study employed the Johansen co-integration test and error correction mechanism (ECM) to investigate the relationship between public expenditure and economic growth. Results from the study showed that a unidirectional causality ran from economic growth to government expenditure in South Korea, Taiwan, Japan, the United Kingdom and the United States, thus validating Wagner's law in those countries. The other countries- Australia, Canada, New Zealand, South Africa and Thailand posted no causal effect from economic growth to public spending. The study also confirmed a long-run co-integration existing between the variables.

Loizides and Vamvoukas (2004) investigated the direction of causal relationship between the relative size of government (measured as the share of total expenditure

in GNP) and growth rate of the economy, using a bivariate error correction model within a Granger causality framework, while also adding unemployment and inflation as separate explanatory variables, thereby creating a simple "trivariate" analysis for each of these two variables. Employing data series on Greece, UK and Ireland, the combined analyses of bivariate and trivariate tests shows that relative size government granger causes economic growth in all the countries sampled in the short run, and in the long run for Ireland and the UK only; growth rate granger causes the relative size of government in Greece, and, when inflation is included, in the UK.

Aregbeyen (2006) examined the validity of Wagner's Law against the contending Keynesian proposition using Nigeria's data over the period 1970-2003. Employing econometric techniques of co-integration and causality, the findings indicated a unidirectional causality from national income to total public expenditure, thereby lending credence to Wagner's Law. The result also revealed a bi-directional causality between non-transfer public expenditure and national income. However, following a variance decomposition analysis, the causality from national income to non-transfer public expenditure was found to be stronger, and this therefore affirmed the validity of Wagner's Law in Nigeria.

Mohammadi, Cak and Cak (2008) conducted a study to prove the validity of Wagner's hypothesis using annual data for Turkey from 1950 to 2005. The empirical results using the ARDL bounds tests of co-integration provide strong support for the hypothesis. Also, the results were robust across six alternative specifications of the Wagner's hypothesis as well as four alternative lag length selection criterions.

Ighodaro and Oriakhi (2010) used a disaggregated government expenditure data from 1961 - 2007 to determine the specific government expenditure that economic growth may have significant impact on in Nigeria. The result of the study indicates that Wagner's hypothesis does not hold in all the estimations rather Keynesian hypothesis was validated in all the estimation. Elasticity estimates and Granger causality results were in agreement.

Abu and Abdullahi (2010) investigated the effect of government expenditure on economic growth in Nigeria employing disaggregated data on government expenditure. The findings of the study revealed that total capital expenditure, total recurrent expenditures and government expenditure on education negatively impacted on the economy. However, government expenditure on transport and communication as well as government expenditure on health both wields positive influence on economic growth.

Muritala and Taiwo (2011) examined empirically, the trends as well as effects of government spending on the growth rates of real GDP in Nigeria over the period 1970 to 2008 using the Ordinary Least Square (OLS) technique. The findings indicated a positive relationship between real GDP and both the recurrent and capital expenditure in Nigeria.

Nworji et al., (2012) examined the effect of public expenditure on economic growth in Nigeria for the period 1970 – 2009. Using OLS multiple regression model, the findings revealed that capital and recurrent expenditure on economic services had insignificant negative impact on the economy during the period under review. Also, the growth effect of capital expenditure on transfers was insignificantly positive, but capital and recurrent expenditures on social and community services and recurrent expenditure on transfers had positive and significant effect on economic growth in Nigeria.

Onuorah and Akujuobi (2012) examined the trend and empirical analysis of public expenditure and its impact on the economic growth in Nigeria. The graphs depicted that the growth rates had been undulating over time and the explanatory variables decreasingly explained variations in real gross domestic product by 4%. The vector error correction result indicated that a long run relationship was established between public expenditure and economic growth at 5%. However, there was no statistical significance between public expenditure variables and the growth of the Nigerian economy.

Aruwa (2012) examined the empirical relationship between public expenditure and economic growth in Nigeria on the basis of Wagner's law or the Keynesian theory, and Friedman (1978) or Peacock and Wiseman's (1979) revenue-spend and spend-revenue hypotheses. Using the VAR Error Correction Model to test for causality, the findings revealed that growth in both real GDP and government revenue causes growth in government expenditure. This implies that government expenditure is not employed as a fiscal instrument and revenue growth pushes the government expenditure for the period under review.

Inuwa (2012) explored the relationship between government expenditure and economic growth in Nigeria over the period 1961-2010 using disaggregated data on government expenditure into capital and recurrent expenditure. Employing the Bounds Test approach to co-integration and Pair wise Granger Causality tests, findings from the Bounds Test indicated that no long-run relationship between exists between government expenditure and economic growth in Nigeria. In addition, the causality test result reveals that government capital expenditure granger causes economic growth while no causal relationship was observed between government recurrent expenditure and economic growth.

Ogbonna (2012) examined the validity of Wagner's law in Nigeria for the time period 1950-2008 applying the Johansen maximum likelihood co-integration method, error correction modeling and the Granger causality test to Musgrave (1969) version of the functional interpretations of the law. All the results of the empirical estimations pointed to the fact that Wagner's Law is supported for Nigerian economy during the period under review.

Antonis, Constantinos and Persefoni (2013) compared Wagner's law and Keynesian law in pre-World War 2 Greece with data from 1833 to 1938. In addition to the empirical analysis using the Autoregressive Distributed Lag (ARDL) estimation method, the study also tested for the presence of structural breaks in the series. Findings from the study showed a positive and statistically significant long-run effect of economic growth on public spending thus, confirming the Wagner law in Greece. On the other hand, the Keynesian hypothesis was valid for the entire sample period (1833-1938) but not so for the sub-sample period of 1881-1938.

Okoro (2013) investigated the impact of government spending on the Nigerian economic growth for a period of 32 years (1980-2011) using granger causality test, Johansen Co-integration Test and Error Correction Mechanism. The result shows that there exists a long-run equilibrium relationship between government spending and growth of the Nigerian economy.

Danmola, Olateju and Abba (2013) investigated the linkages between government expenditure and economic growth in Nigeria via their different components. Using econometric techniques such as Granger causality, Error correction model and Co-integration techniques, the findings of the study produced a mixed result. The results revealed that there exists a unidirectional causality running from total capital expenditure to real gross domestic product which supports the Wagner's law while the causal relationship between total recurrent expenditure and real gross domestic product is bi-directional, but the link from total recurrent expenditure to real gross domestic product is stronger.

Aladejare (2013) examined the relationships and dynamic interactions between government capital and recurrent expenditures and economic growth in Nigeria over the period 1961 to 2010 using Vector Error Correction Model and Granger Causality techniques. The results of the study suggested that the Wagnerian and Rostow-Musgrave hypothesis were applicable to the relationship between the fiscal variables used in the study in Nigeria.

Awomuse, Olorunleke and Alimi (2013) investigated the causal relationship between federal government expenditures and growth in real per-capita GDP in Nigeria between 1961 and 2011 applying Toda and Yamamoto and Vector Autoregressive Model. The study found that there is no long-run relationship existing between government expenditure and economic growth in Nigeria. The result of the Toda-Yamamoto causality test further shows that Wagner's Law does not hold over the period tested while the VAR Granger causality test found a weak empirical evidence in support Keynes' proposition that public expenditure is an exogenous factor and a policy instrument for increasing national income in the short run.

Akinlo (2013) investigated the nexus between government spending and national income in a bid to test for the existence or otherwise of Wagner's law in Nigeria over

the period 1961-2009 using a multivariate framework that incorporates population size. The results support the validity of Wagner's law in Nigeria. Furthermore, the results suggest a long-run relationship among real government spending, real GDP and population size.

Egunjobi (2013) conducted a study to examine the relationship between economic growth and government consumption, government investment, private investment and total expenditure using co-integration tests; and determine the causal relationship between economic growth and public expenditure on one hand and public expenditure and private investment on the other by conducting causality tests using secondary data spanning through the periods 1977 – 2008. The results of the study indicated that private investment and public investment exert positive influence on economic growth while total expenditure and public consumption impact negatively on the economy. Also, the results confirmed a long run relationship between economic growth and public consumption, private investment, public investment and total expenditure. Furthermore, a unidirectional causality exists between economic growth and total expenditure, while there was no causality between private investment and public investment in Nigeria.

Bayrakdar, Demez and Yapar (2015) examined the relationship between public expenditures and growth of GDP for the Turkish economy. Using econometric models, the study tested the validity or otherwise of Wagner's law for the Turkish economy. The findings revealed that both variables had two long term structural breakpoints, in other words, both variables affected each other. A unidirectional causality from GDP to public expenditures was also found in long term, thereby proving the validity of Wagner's Law in Turkey at period studied.

Adil, Ganaie and Kamaiah (2017) carried out an empirical investigation into Wagners's hypothesis in India from 1970 to 2013. The study employed the Autoregressive Distributed Lag (ARDL) Model. The study showed a long-run co-integration existed between economic growth and government expenditure but evidence for Wagner's law was not present.

Abbasov and Aliyev (2018) tested Wagner's and Keynesian's law in nine former Soviet Union countries from the first quarter of 2000 to the third quarter of 2017. The study adopted the Autoregressive Distributed Lag (ARDL) model of estimation. Findings from the study validated Wagner's law for Latvia, Lithuania, Uzbekistan, Georgia, Kyrgyz Republic and Ukraine while the Keynesian hypothesis was validated for Estonia, Uzbekistan, Azerbaijan, Kyrgyz Republic and Moldova in the long-run. Unlike Chow, Cotsomitis and Kwan (2002) and Chang, Liu and Caudill (2004) where a unidirectional relationship was established from income to public expenditure, this study found a bidirectional short-run causality in all of the countries studied except Lithuania and Kyrgyz Republic.

Contrary to previous studies that remained silent on the structural breaks in the system, this study recognizes the potential for such breaks to impact government expenditure in Nigeria. Furthermore, the relationship between economic growth and government expenditure will be evaluated in both the short and long-run using the autoregressive distributed lag (ARDL) technique of estimation.

3. Methodology

3.1. Theoretical Framework

Wagner's (1883) Law predicts that government expenditure will increase at a faster rate than the growth of GNP and therefore, as an economy develops, the share of GNP devoted to government expenditure should increase over time. Wagner's classical theory posits this is due to social, administrative and welfare issues which increase in need and complexity as an economy develops, implying that the direction of causation is from GNP to the share of government expenditure (Kumar, Webber & Fargher, 2017).

The functional form of the theory is presented thus:

$$gte = f(\frac{gdp}{capita}) \tag{1}$$

Where:

gte = government total expenditure

This study will control for the influence of revenue from crude oil sale on government expenditure in Nigeria as observed by Apere (2017) and Abdulrasheed (2017). Hence, the following functional relationship will be explored:

$$gte = f(\frac{gdp}{capita}, oee) \tag{2}$$

Where:

oee = oil export earnings

3.2. Analytical Framework

Following the theoretical framework and functional relationship above, this study employed the autoregressive distributed lag (ARDL) estimation technique to study the relationship between GDP per capita and government total expenditure in Nigeria between the periods 1981-2016. The functional form of the model to be estimated is presented thus:

$$GTE = f(GDPPC, OEE) \tag{3}$$

In the equation, GTE is the dependent variable while PCI is the independent variable while OEE is the control variable. The econometric form of the functional equation expressed in equation (3) in ARDL to capture the short and long-run effects of income and government expenditure in Nigeria, following Pesaran, Smith and Shin (1996, 2001) is specified thus:.

$$\Delta \log(GTE_t) = \beta_0 + \beta_1 trend + \beta_2 \log(GTE_{t-1}) + \beta_3 \log(GDPPC_{t-1}) + \beta_4 \log(OEE_{t-1}) +$$

$$+ \sum_{i=1}^{p} \alpha_1 \Delta(GTE_{t-1}) + \sum_{j=0}^{q1} \alpha_{2j} \Delta(GDPPC_{t-j}) + \sum_{j=0}^{q2} \alpha_{3j} \Delta \log(OEE_{t-1}) + \alpha_4 dummy + \varepsilon_t$$

(4)

Where:

GTE_t = Government Total Expenditure at time t

$GDPPC_t$ = Gross Domestic Product Per Capita at time t

OEE = Oil Export Earnings at time t

trend = Time effect

β_0 = Constant Term

β_i and α_i (where i= 1-4) = Parameter Estimates

Δ = Lag Operator Term

(p,q) = Lag length of the dependent and independent variables respectively.

dummy= dummy variable to control for period(s) of structural break(s) in the economy.

ε_t = Error Term at time t

It is expected, a priori that α_i, β_i and > 0

All data for the study was sourced at World Bank's World Development Indicators (WDI) and Central Bank of Nigeria (CBN) Statistical Bulletin. Data on government total expenditure is an addition of capital and recurrent expenditure in the CBN's Statistical Bulletin. Data on GDP per capita was sourced from WDI while data on oil export earnings was sourced from the CBN Statistical Bulletin.

4. Results

4.1. Pre-estimation Tests

4.1.1. Descriptive Statistics

Table 1. Descriptive Statistics of GTE, PCI and OEE

	GTE	OEE	GDPPC
Mean	1431.199	3944.638	247756.6
Median	594.0850	1249.358	212389.2
Maximum	4813.380	14323.15	383023.4
Minimum	9.640000	7.201200	172402.7
Std. Dev.	1687.540	4870.198	68881.83
Skewness	0.887379	0.952993	0.761807
Kurtosis	2.202650	2.461036	2.060523
Jarque-Bera	5.678301	5.884898	4.806028
Probability	0.058475	0.052736	0.090445
Observations	36	36	36

Source: Authors' Computation, 2018

From table 1, maximum government total expenditure, for the period under review stood at about N4,813 billion, recorded in 2016 while its lowest value of about N9.6 billion was recorded in 2016. The mean of government total expenditure for the study period stood at about N1,431 billion. In the period under review, GDP per capita recorded the highest value of about N383,023 in 2015 and a lowest of about N172,403 in 1988. All the variables (including the control variable), from the formal test of normality using the Jarque-Bera test at the 5% level of significance are normally distributed for the study period.

4.1.2. Correlation Test

Table 2. Correlation Matrix

	LOG(GTE)	LOG(GDPPC)	LOG(OEE)
LOG(GTE)	1	0.5684	0.9912
LOG(GDPPC)	0.5684	1	0.5368
LOG(OEE)	0.9912	0.5368	1

Source: Authors' Computation, 2018

From Table 2, it will be observed that both the main independent variable (log(GDPPC)) and control variable (log(OEE)) are positively correlated with the dependent variable (log(GTE)). However, the government total expenditure seems to be more correlated with oil export earnings than GDP per capita. This is not surprising because as noted earlier, a major contributor to government spending in Nigeria is the earnings from crude oil sale.

4.1.3. Unit Root Test

Table 3. Unit root test for individual series

Variable	Level			First Difference			I (d)
	None	Constant	Constant and Trend	None	Constant	Constant and Trend	
LOG(GTE)	-0.1375	-2.3753	0.1501	-0.6523	--1.4942	-4.6399**	I (1)
LOG(GDPPC)	0.6271	0.0387	-2.8494	-4.7692***	-4.8416***	-5.3281***	I(1)
LOG(OEE)	1.8849	-1.3017	-0.8021	-5.0110***	-6.0616***	-5.0703***	I (1)

Source: Authors' computation, 2018

Note: "*", "**" and "*" indicates significance at the 1%, 5% and 10% levels respectively. I (d) represent the order of integration of the series**

Table 3 contains the stationary time series test. The Augmented Dickey-Fuller (ADF) stationary test was used to examine each series' order of integration. Results show that all the series are integrated of order 1, thus making the use of the autoregressive distributed lag (ARDL) estimation technique appropriate in line with Raza et al (2016), which allows for a maximum order of integration of 1.

4.1.4. Structural Break Test

Table 4. Break Test

Sequential F-statistic determined breaks:			2
		Scaled	Critical
Break Test	F-statistic	F-statistic	Value**
0 vs. 1 *	10.86159	32.58476	13.98
1 vs. 2 *	6.221775	18.66533	15.72
2 vs. 3	2.808826	8.426478	16.83
* Significant at the 0.05 level.			
** Bai-Perron (Econometric Journal, 2003) critical values.			
Break dates:			
	Sequential	Repartition	
1	1998	1993	
2	1993	1998	

Source: Authors' Computation, 2018

The break dates recognized in the system are pivotal moments that had disruption to the structure of the system. While in 1998, the economy was preparing to transit from many years of military rule into democratic dispensation, the break date of 1993 marked a period of political upheaval following the annulment of the presidential election. These two periods obviously sent shocks to the system that must be

accounted for in modeling the impact of economic growth on government spending in Nigeria.

4.1.5. Test of Co-integration

Table 4. Bounds test for co-integration

Bounds test for co-integration		
Test Statistic	Value	k
F-statistic	3.928552	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	3.03	4.06
5%	3.47	4.57
1%	4.4	5.72

Source: Authors' Computation, 2018

The result of tests of co-integration as shown in Table 4 is inconclusive at both the 5% and the 10% level of significance as the value of the F-statistics lie between the lower and upper bounds. However, the long-run and short-run co-integration equation indicates an error correction term that is both negative and statistically significant; thus, we went ahead to interpret a long-run outcome for the model.

4.2. Estimation Results

4.2.1. Short-run and Long-run model

Table 5. Short-run and Long-run Estimates

Dependent Variable: GTE

Short Run Model				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLOG(GDPPC)	-0.300478	0.182262	-1.648609	0.1108
DLOG(OEE)	0.307274	0.061441	5.001126	0.0000
D(DUM1)	0.280532	0.113678	2.467787	0.0202
D(DUM2)	0.619894	0.158208	3.918219	0.0005
D(@TREND())	0.059460	0.018434	3.225554	0.0033
CointEq(-1)	-0.728664	0.139181	-5.235384	0.0000
Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(GDPPC)	-0.412369	0.268280	-1.537082	0.1359
LOG(OEE)	0.421695	0.067361	6.260216	0.0000
DUM1	0.384995	0.129601	2.970615	0.0062
DUM2	0.288289	0.178859	1.611821	0.1186
C	6.453994	3.285772	1.964225	0.0599
@TREND	0.081602	0.018719	4.359363	0.0002
R-squared	0.996964			
Adjusted R-squared	0.996177			
F-statistic	1266.715			
Prob(F-statistic)	0.000000			

Source: Authors' Computation, 2018

Short-run Estimate

Table 5 contains the estimates for both the short and long-run models. Results in the short run indicate that GDP per capita influences government expenditure negatively in Nigeria. It is possible, since the individuals and households in the country often take on some of the expenditure responsibilities of the government as their incomes rise. As expected, oil export earning is positively related to government expenditure. While the effect of GDP per capita is not statistically significant on government spending, the effect of oil export earnings is statistically significant.

From the results, for a 1% increase in GDP per capita, government expenditure reduces by about 0.3%. On the other hand, a 1% increase in oil export earnings brings about 0.3% increase in government expenditure. Dummies for the break period are significant, justifying controlling for them in the equation.

Results also show that the error correction term is negative and significant, indicating long-run co-integration among the variables. From the analysis, a shock to the system in the short run will return the series to about 73% of its equilibrium position in the previous year; this indicates a very high speed of adjustment.

Long-run Estimate

The outcome of the estimated model in the long-run is similar to the short-run estimate in both sign and statistical significance, except for the significance of the dummy variable for the second break period. From the estimates, if short-run conditions remain the way they are, the negative impact of GDP per capita on government expenditure will be larger while the positive impact of oil export earnings on government expenditure will equally be larger. In the long-run, a 1% increase in GDP per capita will induce about 0.4% decline in government expenditure in Nigeria while oil export earnings will bring about the same magnitude of positive impact on government spending.

The model has a good fit as about 99.7% of changes in government expenditure are explained by GDP per capita and oil export earnings. Furthermore, the probability of the F-statistics indicates that at the 1%, 5% and 10% levels of significance, GDP per capita and oil export earnings explain government expenditure in Nigeria

4.3. Post Estimation

Table 6. Post estimation result

Diagnostics		Statistics	Interpretation
Serial Correlation	(Breusch-Godfrey Serial Correlation LM Test)	$F_{stat} = 1.412038$ (0.2624)	No evidence of serial correlation
Heteroscedasticity (ARCH LM Test)		$F_{stat} = 1.240465$ (0.3160)	Residual is homoscedastic

Source: Authors' Computation, 2018

Note: Figures in parenthesis are probability values.

5. Discussion and Recommendations

Empirical evidence from this study points to the short and long-run relationship existing between GDP per capita and government expenditure in Nigeria. The relationship is however not statistically significant. The result indicates a larger negative impact of GDP per capita on government expenditure in the long-run than in the short-run. The study has therefore failed to confirm Wagner's hypothesis in Nigeria in both the short and long-run. In the study, that GDP per capita is negatively but insignificantly related to public expenditure in both the short and long-run may be explained, as earlier noted, on the ground that most households in Nigeria take up more public expenditure responsibilities like electricity provision, provision of water, security, roads repairs (in some cases), out-of-pocket health expenditure and education expenditure as their incomes rise, leaving the government less willing to provide those services.

Furthermore, findings from the study have shown that public expenditure in Nigeria responds favourably to oil export earnings than an expanding economy. It is not surprising that government public expenditure spending is positively and significantly related to oil export earnings in the short and long-run in Nigeria since the oil sector accounts for most of the export earnings of the country and upon which yearly budgetary estimates are hinged. However, recent shocks in global oil price have shown that relying on earnings from the sale of crude oil may be disruptive to public expenditure in Nigeria.

Following from the preceding paragraph, one of the reasons why government expenditure, premised on commodity export (especially crude oil) may decline in the long-run is because substitutes to oil as energy source are being developed at a faster rate now than before (especially in countries on which Nigeria relies for oil export earnings), additionally, the development of shale oil in the United States (US)

and the lifting of oil export embargo (in the US) has shifted the supply curve of oil in the international market to the right; these two factors have the potential of reducing crude oil export by Nigeria in the long-run, with a further reduction in earnings from crude and a further reduction in government expenditure.

In conclusion, this study recommends that policy makers diversify the economy away from dependence on earnings from crude oil because the potential long-run impact of a fall in oil earnings may lead to a corresponding fall in government expenditure. The economy can be diversified to more labour intensive sectors like agriculture and the petrochemicals so as to increase output and income per capita and so that government expenditure can be based more on tax receipts than on oil export earnings. More financially responsible households will demand increase in government expenditure as their incomes increase especially for the provision of the public sector services for which they are currently financially committed to.

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