WAGNER'S LAW: AN ASSESSMENT OF ITS RELEVANT TO NIGERIA'S ECONOMIC DEVELOPMENT

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Abstract
The study assessed the prediction of Wagner's Law with respect to Nigeria's economic development. The stationary properties of the time series in public finance data of the Central Bank of Nigeria Annual statistical bulletin (2009) was tested using Augmented Dickey Fuller (ADF) test. Ordinary Least Square (OLS) method of estimation was employed to examine the impact of public expenditure on economic in Nigeria for the period 1960 - 2009. The results revealed the existence of a negative relationship between real government expenditure and real Gross domestic product (-0.045487), which suggested that as real government expenditures increase the entire economy's output performance was decreasing. The results also established that growth in national income led to a slight decrease in government spending which is contrary to Wagner's Law. Out of the three model specifications that were tested, two models indicated that a positive relationship exists between government expenditure and economic growth in the long run. However, the income elasticity was not large enough to suggest that the growth in government expenditure exceeds the growth in national income. It only suggests that the growth in national income exerts upward pressure on the government spending in Nigeria.

Keywords; Augmented Dickey Fuller, Economic development, Nigeria, Wagner's Law

Introduction

The growth of public sector spending has been a subject of extensive theoretical and empirical determination for over three decades now. One of the theoretical explanations that have been advanced is the Wagner's Law which has been used to analyze the relationship between aggregate income and public expenditure. The relationship between economic growth and government spending remains an unsettled issue in public economics, despite voluminous and growing empirical literature since the seminal work of Wagner (1883). Wagner's Law therefore remains one of the most widely used model for the determination of public spending.

Wagner's Law (Wagner, 1883, 1912) suggested that during the process of economic development, the share of public spending in national income tends to increase. This implied that there is a long-run tendency for government activities to grow relative to economic activity. Specifically, the law states that, during the process of economic development, the share of public expenditures in total economic activities increases as the real income per capita of a nation

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increases, Thus, a higher level of economic growth requires higher levels of public expenditure. According to Wagner, three main reasons support this hypothesis: (1) during industrialization, the administrative and regulatory functions of the state would substitute public for private activity; (2) economic growth would result in increased need for cultural and welfare services, which are assumed to be income elastic; (3) State participation would be inevitable to provide the capital funds to finance large-scale projects made to satisfy the technological needs of an industrialized society, where private sector lacks the capacity. In other words, Wagner's law states that government grows because there is an increasing demand for public goods and for the control of externalities. In effect, the law also suggests that causality runs from national income to public expenditure, indicating that public expenditure is considered endogenous to the growth of national income which is contrary to Keynesian view which postulated that public spending is nothing but exogenously affecting economic growth.

Since her independent in 1960, the process of economic growth in Nigeria has been linked to various developments which include the launching of the first, second, third and forth National Development plans in 1962, 1967, 1975 and 1981 respectively. The performance of these developments plans was successful to some extent because government was able to raise a lot of funds from crude oil to implement the plans. However, the oil glut and global economic crisis of the 1980's caused a serious imbalance in the country's economic growth. It was necessary to arrest this situation, and government with the assistance from International Monetary Fund (IMF) and the World Bank introduced the Structural Adjustment Programme (SAP) in 1986. The aim of SAP was to restore and diversify the economy. In order to do this a three-tiers planning system incorporating perspective plan, rolling plan and annual plan were introduced from 1990 - 1992. Despite all these efforts there were little successes. Based on this, it is pertinent to assess the relevance of Wagner's law to Nigeria's path of economic development.

Literature, Wagner's Law and Theoretical consideration

Extensive empirical analysis of the Wagner's law has produced mixed results in the literature. While some studies (Wagner & Weber, 1977; Abisadeh & Gray, 1985; Chang, 2002; Aregbeyen, 2006) have found support for the Wagner's Law, some other studies (Ram, 1986; Afxentiou & Serletis, 1996; Ansari *et al*., 1997; Lin, 1995; Burney, 2002; Huang, 2006) have found a non-existence or weak support for the Law. In the case of Nigeria, Aigbokhan (1996) investigated the impact of government size (measured as expenditure share of GDP) on economic growth between 1960 and 1993 with a focus on the effects of the structural adjustment programme (SAP) introduced in July, 1986. The OLS regression analysis of a simple growth equation was estimated and augmented with the standard Granger-Causality testing approach. The study reported a bi-directional causality between government total expenditure and national income.

Using the Engle Granger two step procedure and standard causality tests, Essien (1997) found that the variables (public spending and real income) were not cointegrated and hence could not establish a long run relationship. In addition, causality tests performed on his models confirmed that public expenditure does not cause growth in income and there was no feedback mechanism. In another study, Aregbeyen (2006) using Johansen cointegration and standard causality tests found a unidirectional causality from national income to total public expenditure, which was in support of Wagner's Law. There was bi-directional causality between non-transfer public expenditure and national income. However, the causality from national income to non-transfer public expenditure was found to be stronger than the reverse direction following variance decomposition analysis.

Babatunde (2011) postulated in his study of a bound testing analysis of Wagner's law in Nigeria (1970-2006) that there exists no long-run relationship between government expenditure and output in Nigeria. In addition, the Toda and Yamamoto's (1995) causality test results showed that Wagner's Law did not hold over the period being tested. Rather the Authors found a weak empirical support in the proposition by Keynes that public expenditure is an exogenous factor and a policy instrument for increasing national income.

The study by Ibok and Bassey (n.d) investigated whether government spending in the Nigerian Agricultural sector was consistent with Wagner' Law. To test the validity of Wagner's law, six alternative functional forms were adopted, using annual data from the Nigerian agricultural sector between 1961 and 2012. The data was analyzed using Cointegration and Granger causality tests. The result showed the existence of a long run relationship between various items of agricultural capital expenditure as well as agricultural contribution to Gross Domestic Product. The Granger causality test result confirmed that Wagner's law holds in the Nigerian agricultural sector. However, there was no clear evidence of government spending causing national income. Hence, the Keynesian proposition of government spending as a policy instrument that encourage and lead growth in the sector was not supported by the data used.

In their study of Nigeria Economic Recession versus Wagner's Law and Keynesian Proposition, Adedokun and Olaniyi (2017) investigated the adequacy of public expenditure led approaches to retract the negative growth of national income. In order to achieve this, the Authors looked at the validity of Wagner's law and Keynesian proposition in Nigeria using Toda and Yamamoto and Dolado and Lutkepohl (TYDL) approaches to causality within the frameworks of augmented VAR and Block Exogeneity Wald test. The study employed aggregate and disaggregated government expenditure under six different sub divisions. The results showed that five of the six pairs of the expenditure components, which includes, total government expenditure, capital expenditure, expenditure on economic activities, expenditure on general administration and expenditure on agriculture, support Wagner's law. Only expenditure on agriculture supports Keynesian proposition on bidirectional causality; no causality was found for recurrent expenditure. It is therefore evidenced that Wagner's law is strongly supported in Nigeria, thus suggesting that private sector led approach would be more appropriate for Nigeria economic recovery than expansionary fiscal policy approach of the government.

Elsewhere, Albert and Ton (2009) used data from the Kingdom of Saudi Arabia (KSA) to empirically test Wagner's Law on public expenditure growth in association with economic growth. The Engle and Granger (E-G) two-step cointegration methods used in the investigation revealed that out of the four model specifications that were tested, two models indicated a positive long run relationship between government expenditure and economic growth. However, the income elasticities were not large enough to suggest that the growth in government expenditure exceeds the growth in national income; only that upward pressure was exerted. It was however, evidenced that governmental expenditures from GDP expansions increased public welfare for Saudis over the test period.

Manuel Jaén-García (2017) in his study of Wagner's law: a revision and a new empirical estimation* conducts an analysis of the various theoretical and practical problems related to Wagner's Law on the growth in public spending. As a contribution, and with the intention of offering a new perspective into Wagner's law, Manuel Jaén-García (2017) used public employment as a measure of public spending, which is in line with the recommendations by Peacock and Scott (2000) to test Wagner's law. Unit root techniques and cointegration with structural breakpoints were used as tools of measurement. The result obtained rejected the

applicability of Wagner's law for Spain based on the belief that there are variables other than that GDP which influence public spending growth.

As Tim (1961) and Bird (1971) also found out, Wagner's law offers no justification for the growth of income, nor for the relative expansion of public spending in relation to national income, neither does it consider the effect of wars on public spending. Consequently, the precepts of the law do not allow a rigorous test to be conducted. Arreaza et al. (1999) generated panel-based estimates of the degree of cyclicality in government consumption, transfers, subsidies, and tax revenues. Their results suggest that current government expenditures increase during recessions, mainly due to an increase in transfers.

Methodology

In this study, we tested for the stationary properties of the time series on public finance data using the Central Bank of Nigeria (CBN) Annual Statistical Bulletin of 2009. The Augmented Dickey Fuller (ADF) Test was used for estimation, while Ordinary Least Square (OLS) method of estimation was employed to examine the impact of public expenditure on economic growth in Nigeria for the period 1960-2009. The model specifies that government expenditure depends on national income. However, for the model to become a robust additional two variables were included (tax revenue and population). Using Gross Domestic Product (GDP) as a proxy for national income, the model specification in explicit form is:

$$\text{Relgexpt} = \sigma_0 +, \text{gdpt} + \sigma_2 \text{ trevt t } \sigma_3 \text{ Popult} + U_t$$

Where,

gexpt = Government expenditure at time t
gdpt = Gross domestic product at time t
trevt = Tax revenue at time t
popult = Population at time t
Ut = Error term

The apriori expectations of coefficients in the specified models above can be shown in table 1.

Table 1: Variable Descriptions and a Priori Expectation

Variables	Variable Description	Expected Signs of Coefficient
Gexpt	Government Expenditure	+
Gdpt	Gross Domestic Product	+
Trevt	Tax Revenue	+
Popult	Population	+

Source: Computed by the researcher

Results and Discussion

Unit root tests were used to determine the stationarity of all the variables because of problems associated with non-Stationary when using time series data. With the use of Augmented Dickey – Fuller unit root test, the result shows that all the variables, except population were non-stationary at first level difference. The variable population was stationary at second level difference and for other three variables to be stationary, their nominal value were divided by the consumer price index (CP_1) which makes them real values. Thus, the model can be specified as:

$$\text{Realg expt} = \sigma_0 + \sigma_1 \text{ realgelpt} + \sigma_2 \text{ relatrevt} + \sigma_3 \text{ popult t } U_t$$

Table 2: Regression on Wagner's Law and its Relevant to Nigeria's Economic Development

Econometric Method: Ordinary Least Square
Period: 1960 - 2009
Dependent Variable: Government expenditure
Observations: 48 after adjustments

Variable	Coefficient	Std. error	t-Statistic	Prob.
C	-10281.15	3056.988	-3.363163	0.0016
REAL GDP	-0.045481	0.009451	-4.812239	0.0000
REAL_T_REV	1.405338	0.239276	5.873302	0.0000
POPUL	0.000254	5.13E-05	4.955316	0.0000
R-squared	0.683651	Mean dependent var		8385.403
Adjusted R-squared	0.662082	S.D. dependent var		4923.873
S.E. of regression	2862.284	Akaike info criterion		18.83628
Sum squared resid	3.60E+08	Schwarz criterion		18.99222
Log likelihood	-448.0708	Hanna-Quinn criter		18.89521
F-statistic	31.69562	Durbin-Watson stat		1.182432
Prob (F-statistic)	0.000000			

Source; Extracted from E - Views 7.0 Output

From Table 2, it is noted that there is a negative relationship between real government expenditure and real gross domestic product as indicated by the values of the coefficient (-0.045487). This implies that as real government expenditures increase the entire economy's output performance which depends basically on the productivity of the country is decreasing. Hence, changes in government revenue lead to changes in government expenditures negatively. The empirical evidence provides indication of a structural negative correlation between public spending and per-capita GDP which is inconsistent with the Wagner's law. Therefore, the result obtained leads us to reject the law for Nigeria based on the belief that GDP's influence on public spending growth is negative.

Tax revenue has positive correlation with the government expenditure at 5% of probability level. This shows that an increase in the level of tax revenue generated leads to an increase in the real government expenditure. Elsewhere, Halicioglu (2005) had also found positive relationship between the share of government in the GDP and real per capital income growth, which support the law.

Population is positively significant to the real government spending. This revealed that the larger the population the greater the real government expenditure. Hence, high economic growth rate would assist a country to achieve high population growth since increase in per capita income shows an increase in the economic growth of a country. In this context our results neither confirm nor deny Wagner's Law. Out of the three model specifications that we tested, two models (tax and population) indicated that a positive long run relationship exists between government expenditure and economic growth. However, the income elasticities are not large enough to suggest that the growth in government expenditure exceeds the growth in national income. It only

suggests that the growth in national income exerts upward pressure on the government spending of Nigeria. The results imply that as a fast growing nation, Nigeria should expect growing government expenditure in the coming years.

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