EPRA International Journal of Economic Growth and Environmental Issues- Peer Reviewed Journal
ISSN: 2321-6247
Volume: 9 | Issue: 1 | January 2021 | Journal DOI : 10.36713/epra0713 | SJIF Impact Factor (2020): 8.007

RELATIONSHIP BETWEEN GROWTH AND EXPENDITURE: AN EXAMINATION OF WAGNER'S LAW IN NIGERIA

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ABSTRACT

The study fits Wagner's law by examining its applicability to the Nigerian economy. Three variables were considered in the study, these include GDP, government expenditure and inflation. All the three series were subjected to both linear and non-linear unit root testing procedure, which established the existence of long run relationships among the variables. A Granger causality reveals a bi-directional causal relationships between GDP and expenditure. The impact relationship among the variables was examined through a regression model which reveals a positive and significant relationship between the series, which implies that increase in economic activity will increase government spending, thus the study concludes in favor of applicability of Wagner's law to the Nigerian Economy.

1.0 INTRODUCTION

Governments in the developing world serve as economic parents of its citizenry as a result of dearth of infrastructures for the private sector to thrive. Government increasing spending is now the new reality for even the staunchest capitalists of the west. Shocks-after-shocks, Pandemics, demand for new infrastructures as a result of changing technology, higher population, subsidy payments, bailouts of some reckless yet important sector of the economy is now necessary; to avoid total collapse or shutdown and to avoid economic meltdown/recession. The great depression of the 1930s in the US that gave birth to the Keynesian postulation of greater need for government intervention has left a delineation mark. Of recent, the 2008 global financial crisis and of very recent the corona virus pandemic where there has been total shut down in many countries of the world, raised more questions about "The Invisible Hands" of the classical, hence need for increased government spending.

Wagner's law is a principle named after the German economist Adolph Wagner (1835–1917). He first observed it for his own country and then for other countries. The theory holds that for any country, that public expenditure rises constantly as income growth expands. The law predicts that the development of an industrial economy will be accompanied by an increased share of public expenditure in gross national product .According to Musgrave and Musgrave (1989), Wagner distinguished three main reasons why government expenditure should increase: first; there is a sociopolitical reason because of an increase in state functions over time, for example for retirement, insurance, and natural disaster aid. The second reason

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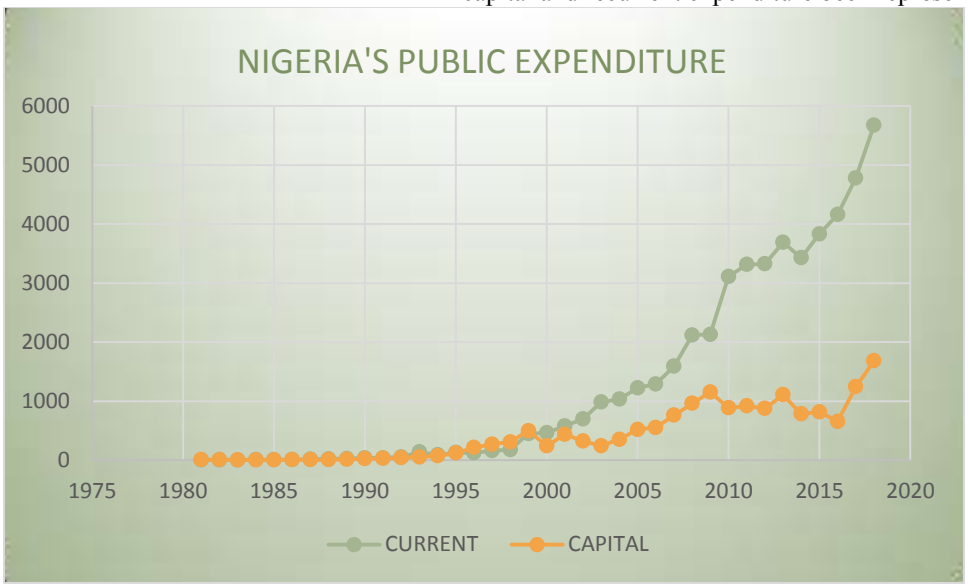
is of economic nature; for example, an increase of state assignments into science and technology and thirdly; historical, for example serving previously accumulated debt.

Many scholars have written on Wagner's law relating to different countries using different econometric models. For example the works of Kolluri et al. (2000) found support in G7 countries, Paparas et. Al (2015) examine the U.K. public spending expansion for the period 1850–2010, Jabir (2019) examines Nigeria's increase public spending. Diamond (1977) used cross sectional data using simple linear regression model as a result of shortage of quantitative and qualitative data in many Less Developed Countries (LDCs). In particular, a lot of similar researches were conducted for the Nigerian economy for example the work of Usman et al(2011), Okoro (2013),Jabir(2019), Onifade et al(2020), however, this study is different from the above studies, because we have used a non-linear unit-root testing approach to support our finding, this is to avoid wrong rejection or acceptance of hypothesis due to assumption of a fixed parameter. In the same vein, we have forecasted the GDP per capita of Nigeria for the fiscal year 2021.

PUBLIC EXPENDITURE IN NIGERIA

Developing economies like Nigeria always crave for high government presence and expenditure as a result of huge infrastructural gap for industrial take off. As the case of europe during it industrial take off or industrialization. Capital intensive infrastructures like railways, electricity, roads, wáter, education are needed to serve as stimulants to economic growth. Karingi (2017) opines that industrial development of a country would require specific infrastructure which suggests industrialization could also be a catalyst for infrastructure development. Rightly put by Wagner (1883) that as an economy develops, social pressure increases for more social considerations by the state and the industry. He observed and predicted an over proportional increase of government spending at least for thepurpose of the welfare state.

The graph below depicts the Nigerian time series public expenditure over the years, with both capital and recurrent expenditure been represented.



SOURCE: CBN Statistical Bulletin

The graph shows steady increase in public spending over the years (although nominal). With both of them increasing from ₦11.41 billion in 1981 to ₦7,357.29 trillion in 2018.

Over the years it is evident that government recurrent expenditure has increased dramatically. Relative to capital expenditure, the margin tends to increase year-after-year notably from the year 2000. In the same year recurrent expenditure was ₦461.6 billion against capital expenditure ₦239.45 billion showing 192.78% difference. This cannot be unconnected with the democratic dispensation from 1999 that saw tremendous expansion in governance with a bicameral legislative arm of government coupled with 36 states house of assembly, Sanusi (former CBN governor) in 2010, evidently asserted that the house of assembly spent 25% of the total overhead cost.Also, creation of new agencies, and appointments of many political aids both in the federal and states level contributed to this undesired disparity.This is a very bad trend for a developing world like Nigeria with high infrastructural deficit that need urgent funding to accelerate

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development. Onifade et al (2019) results revealed that both recurrent expenditures of the government (Nigeria) and public debt have significant negative impacts on economic growth.

2.0 THEORETICAL AND EMPIRICAL REVIEWS

2.1 Theoretical Review

Wagner's law a is law that suggests a positive relationship between economic growth and public expenditure. The law has different versions which scholars believed is the best way to estimate the relation. The first and most popular version of the law is given by Wiseman and Peacock (1967)

$$Y_t = \eta_1 + \varphi X_t + et \qquad (1)$$

Where Y_t represent government expenditure and X_t represent the growth of economic activities. In a different version given by Priyo (1968), he considers Y_t to represent expenditure on consumption. Goffman (1968) considers Y_t to represent public spending as suggested by both Wiseman and peacock (1967) and Priyo (1968), however, he defines X_t as GDP per capita, this is also the suggestion of Musgrave (1970), but his version differs from that of Goffman in the definition of Y_t which he assumes to represent a ratio of Public expenditure to GDP.

2.2 Empirical Reviews

There have been so many literatures on wagner's law that have proven to be dynamic in its findings and conclusions. To most third world countries like Nigeria in its developing stage, wagner's law is apt to be applicable due to huge underemployment of resources that give room for high growth capacity when optimally employed.

Many of the researches so far conducted in many regions using cross-sectional data, as well as time series for individual countries have reported a positive relationship. Bird (1971) tested Wagner's Law for the period 1933–1965 in Canada and found strong support for the law. He uses cross-section data and measured the size of government by government expenditure plus transfers at current prices. At his exposition of the law he had as a dependent variable the total expenditure of central and local government and as an independent variable he had administration, defense, debt, environmental service, good and services and finally transfers.Thornton (1999) deployed data from the nineteenth century (from 1850 to 1913) and found supporting evidence for the law for six European countries (Denmark, Germany, Italy, Norway, Sweden, the United Kingdom).Yasin (2011) using panel data estimation techniques obtained a significant positive impact of government expenditures on the economic growth of some group of Sub-Saharan African countries. Jibir and Aluthge (2019) reported a positive relationship after testing the wagner's law on Nigeria concluding that the quest for industrialization and diversification has made government to embark on the provision of public infrastructures (railway, electricity and so on) which in turn causes expansion in public expenditure. However, huge government expenditure could not necessarily translate to proportionate increase in growth due to huge illicit financial flows. Onifade et al (2020) found thatcapital expenditure of the Nigerian government has a positive, but insignificant impact on the economic growth of the nation in the long-run. IMF (1989) finding shows that at the aggregate level, publics pending does not appear to have exerted a major influence on the real growth of the economy.

However, some findings have shown inverse relationship of the wagner's law. After empirical investigation on the impact of rising public expenditure share to economic growth of forty-one developing countries using cross-sectional data, diamond (1977) found the relationship to be negative. Furthermore, government expenditure on military in a country like Nigeria where almost all the hardwires are imported does not necessarily impact growth. Abu-Bader and Abu-Qarn (2003) have obtained a result showing that larger government spending on the military slows down economic growth in the cases of Syria, Egypt, and Israel.

3.0 METHODOLOGY

This study considers three variables that comprise of total government expenditure which is measured in Billions of Nigerian currency (Naira), GDP per capita which is also measured in Nigerian local currency. The third variable is inflation, measured as a consumer price index for Nigeria, and it is included in the analysis as a control series. The series were collected from the Nigerian statistical bulletin of 2019 released by the central bank of Nigeria. At the outset, all the series were subjected to unit-root test where the breaking and non-breaking unit-root tests were considered. The non-breaking or linear unit-root test considered was Augmented Dickey Fuller (ADF,1979). The application of this test is given by the equation 1 below

$$\Delta y_t = \delta + Py_{t-1} + \alpha t + \Sigma \theta y_{t-n} + et \qquad (2)$$

Where Δyt is the first difference level of the series, py_{t-1} measures the first lagged of the historical

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component of the series, αt is the deterministic trend, while et is the stochastic term of the relation. Thus, ADF, test the null of unit-root against the alternative of stationarity.

In order to confirm the robustness of the finding of the test in equation 1 above, Zivot and Andrew(1992), non-linear or a breaking unit root test was also applied. The result is reported in table 2 below. Under this approach, the test is developed to test the null hypothesis of unit root in the presence of break in level, trend and both level and trend which corresponds to A, B and C models respectively, against an alternative hypothesis of stationary with break in level, trend or both level and trend assumed to happen in the great crash of 1929, and oil price shock of 1973 which was considered as fixed and exogenously determined by Peron (1989) and considered opposite by Zivot and Andrew(1992). The Zivot and Andrew test is an extension of Perron(1989) unit-root test where they employed an adjusted Dickey and Fuller(ADF)(1979) type unit root testing strategy. The specification of the test is presented in the following regression models comprising of A, B, and C Models.

$$y_t = \hat{u}^A + \hat{\theta}^A DU_t + \hat{\beta}^A t + \delta^A D(T_B)_t + \hat{\alpha}^A y_{t-1} + \sum_{j=1}^{k} \xi^A_j \Delta y_{t-j} + \hat{et} \quad (3)$$

$$y_t = \hat{u}^B + \hat{\beta}^B t + \hat{\gamma}^B DT_i^* + \hat{\alpha}^B y_{t-1} + \sum_{j=1}^{k} \xi^B_j \Delta y_{t-j} + \hat{e}t \quad (4)$$

$$y_t = \hat{u}^c + \hat{\theta}^c DU_t + \hat{\beta}^c t + \hat{\gamma}^c DTi^* + \hat{d}^c D(T_B)_t + \hat{\alpha}^c y_{t-1} + \sum_{j=1}^{k} \hat{c}^c_j \Delta y_{t-j} + \hat{et} \quad (5)$$

The Wagner's law suggests that increase in economic activity will increase public spending. In order to ascertain this fact, a Granger Causality framework was applied. This approach tells us the causal relationship between economic growth and public spending. Thus, we expect economic growth to cause public spending. Since our variables are all level stationary, we applied level Granger causality test. The specification of the test can be understood in equations 5 and 6 below

$$Y_t = \alpha_1 + \sum_{q=1}^{i=1} \beta_i X_{t-p} + \sum_{p=1}^{j=1} \lambda_j Y_{t-q} + et_1 \quad (6)$$

$$X_t = \phi + \sum_{q=1}^{j=1} \lambda_j Y_{t-q} + \sum_{p=1}^{i=1} \beta_i X_{t-p} + et_2 \quad (7)$$

Where Y_t and X_t are the two level stationary series that are expected to have a bi-directional or a unidirectional relationship while Y_{t-q} and X_{t-q} are the historical components of the each series. The final stage of this analysis was conducting an impact analysis between our series of concern. To do that, we applied a regression model since our variables are level stationary, and therefore contain long run information of the relation. The regression model used in this analysis is specified as follows:

$$Y_t = \alpha_1 + \alpha_2 X_1 + \alpha_3 X_2 + \alpha_4 X_3 + et \quad (8)$$

Where Y_t is the regressed series and $X_1 \ldots\ldots X_3$ are the regressors of the relation.

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3.0 RESULT DISCUSSION

In this section, we present the result of our analysis, and the objective of this paper is achieved in this section.

Table 1: ADF Unit-Root Test

Variable(s)	T- Statistic(s)		Decision
	Level	First Difference	
Expenditure	5.8546*	-	Level Stationary
GDP Per Capita	-3.966*	-	Level Stationary
Inflation	-2.9585**	-	Level Stationary

*Source: Computed. *1%, **5%, ***10% signifies the rejection of null hypothesis at 1, 5 and 10 percent respectively.*

Table 1 presents an ADF unit-root test result. The three series included in the analysis were subjected to this test in order to confirm the stochastic properties or the order of integration of each series, this will help us in not only selecting the right model, but also setting the model at the right level. The test searches for null of unit-root as against the alternative of stationarity. The result reveals that all the three series are stationary at level, and therefore a number of competing models can be applied according to the literature, like regression model, level VAR model or a Structural VAR(SVAR). Since this is a theoretical study, and regression model is theoretic model, we decided to apply it against the VAR which is a-theoretic model. Thus, the regression result is presented and analyzed in table 3 below.

Table 2: Zivo and Andrew (1992) unit-root Testing Approach.

Variables	Model A	Break Date	Model B	Break Date	Model C	Break Date
Exp	-2.2270N	2015	-2.195N	2007	-2.2234N	2006
GDPPCT	-7.4062A	2005	-5.5033A	2002	-4.800N	2001
INF	-6.6187A	1999	-5.7057A	2010	-5.5010A	2001

Source:Computed

The Zivot and Andrew is a non-linear approach to testing a unit-root. This is an extension Perro (1989) test which also adopted the three ADF(1979) regression models. Perron (1989), came up with this test where he assumes a break to happen in the intercept, slope, or both, in Model A called the growth Model, and Model B called the crash Model or Model C, the combination of both. This came also result of Lucas critique (1976) where he criticizes wrong acceptance or rejection of a hypothesis due to assumption of a fixed parameter over the sample period. To check the finding arrived at, in the ADF result, we applied this test for a comparison. The test assumes a structural break in the intercept, slope or both. It tests the null of unit-root in the presence of one break date in intercept, trend or both as against the null of stationarity in the presence of one break date in the intercept, trend or both. The result in table presents the result which reveals that inflation and GDP per capita series are all stationary except for model C of GDP per capita series. Model A has the highest values of T statistic; this implies that model A is right model to observe for our analysis. Looking at these three series through model A, we can see that GDP per Capita, and Inflation are both stationary in the presence of one structural break in the intercept, GDP per Capita has a structural break in 2005, while inflation has a break in 1999. Nigerian had a transition of power from military to civilian regime in 1999, and there was renewed confidence to the investors and most of the international sanction as result of the continued military rule were relaxed, thus the break in 1999. The most unprecedented event that place in Nigeria in 2005/2006 in Nigeria was earmarking whooping amount to the tune of $12Billion to buy the bulk of debt owed to Paris club. This amount was not a hay, considering the developing nature of the Nigerian economy. To this end, we conclude in favor of no significant difference between the linear and non-linear unit-root testing approach, and therefore can go ahead to apply a regression model believing that our series are level stationary.

Table 3: Regression Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	61.60799	95.05140	0.648154	0.5211
GDPCPT	0.010713	0.000250	42.87780	0.0000
INF	-0.865397	2.997003	-0.288754	0.7745

Source: Computed

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Our main of objective of the study is to find the relationship that exists between economic activity and public spending. Table 3 above presents the outcome and the result reveals that GDP per capita has a positive and significant relationship between GDP and public spending or government expenditure. This implies that, if government activity or economy grows, public expenditure tends to increase in Nigeria. Thus, we can conclude that Wagner's law is applicable to Nigerian economy.

From the above result, we only established the presence of positive or negative relationship between series, and we cannot understand which of the variables is causing the other. To obtain this fact, we proceeded to Granger causality, and the result is presented in table 4 below.

Table 4: Granger Causality

Null Hypothesis:	F-Statistic	Prob.
GDP Does not Granger Cause EXP	4.18837	0.0080
EXP Does not Granger Cause GDPCPT	3.02414	0.0316
INF Does not Granger Cause EXP	0.18438	0.9657
EXP Does not Granger Cause INF	0.31301	0.9003
INF Does not Granger Cause GDPCPT	0.30269	0.9060
GDP Does not Granger Cause INF	0.52924	0.7517

Source: Computed

To find the causal relationship among our variables, the result is presented above. We can observe from the result that there is a bi-directional causality between GDP per Capita and Expenditure with probability values of 0.0080 and 0.031, which implies that, the causality runs from GDP per capita to expenditure and vice versa. Thus, this confirms the complete applicability of Wagner's law to Nigerian economy.

4. CONCLUSION

This study examines relationship between government spending and economic growth by fitting Wagner's law to the Nigerian economy. The study reveals a strong and positive relationship between two variables in Nigeria, thus, the study concludes in favor applicability of Wagner's law to the Nigerian economy.

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