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ORIGINAL RESEARCH ARTICLE

# Government expenditure and economic growth nexus: How valid is Wagner's law in the Nigeria situation?

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## ABSTRACT

This study specifically aims at verifying if Wagner's law is consistent with the Nigerian situation by adopting the ARDL method. Findings from the estimation prove that Wagner's law is a fallacy in Nigerian experience. In contrast, the Keynesian theory of national income is applicable to the economy of Nigeria, as demonstrated by the strong positive impact of government expenditure on economic growth. Equally important, FDI inflows demonstrate a strong positive relationship with the economic growth of Nigeria. Note that Nigeria went into recession recently and is now going through the recovery stage. This, in line with the findings, calls for the adoption of an expansionary fiscal policy in order to stimulate aggregate demand and, by implication, improve output performance in the economy. Most importantly, the increased government spending should be tailored toward viable sectors with close monitoring to avoid diversion of resources through corruption. Efforts should also be made to attract foreign companies to invest in the economy.

***Keywords:*** economic growth; import; foreign direct investment; government expenditure; Nigeria

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## 1. Introduction

The influence of government expenditure on economic growth has generated serious arguments in the research world. While some previous studies lent support to the government-expenditure-induce economic growth nexus, others are of the opinion that economic growth has been the driver of government expenditure. Theoretically, while economic growth-induced government expenditure falls within the tenet of Wagner's law (1883), the government expenditure-led economic growth nexus, on the other hand, stands for the Keynesians' model of national income (1936). According to Wagner's law, the level of economic progress determines the level of the spending behavior of the government—an increase in economic growth will induce government expenditure. This assertion is not without empirical backing. For example, Usman et al.[1] examine a causal relationship between government expenditure and economic growth in Nigeria. The revelation from the study shows the existence of a unidirectional connection running only from economic growth to government capital expenditure. Implying that and an increase in economic growth drives government expenditure in line with Wagner's law. This is similar to the work of Muritala and Taiwo[2]. Muritala and Taiwo[2] found a one-way causal link running only from economic growth to government capital expenditure in Nigeria. On the other hand, the Keynesians' model of national income asserts that government expenditure projects economic growth

significantly. In essence, the theory submits that government expenditure can be used as a policy instrument to salvage an economy suffering from depression or regulate an overheated economy. In clear terms, the Keynesians' view is that government expenditure stimulates aggregate demand in an economy, which in turn triggers the expansion of the productive capacity to meet demand. Thus, this circle keeps operating until economic growth is eventually achieved through the multiplier effect. Empirically, studies also abound in support of the Keynesians' assertion. For instance, Nworji et al.[3] examine the relationship between sectoral government expenditure and economic growth in Nigeria and conclude that government capital expenditure on transfers demonstrates a weak positive influence on economic growth, while capital and recurrent government expenditure on social and community services and recurrent expenditure on transfers exert a strong positive impact on economic growth. Similarly, Nurideen and Usman[4] investigate the relationship between economic growth and government expenditure in Nigeria and conclude that increasing government spending on transport, communication, and health causes improvements in economic growth. In the work of Joshua[5], government expenditure proves to be a catalyst that drives economic growth in Nigeria. The study maintains that increased government spending will generate the desired macroeconomic goal of economic growth and subsequently lead to economic development. The work of Oluwatobi and Ogunrinola[6] acknowledges the positive impact of government expenditure on economic growth through human capital development. According to the study, government recurrent expenditure on human capital development induces output performance significantly in Nigeria.

In recent years, specifically since 2015, during the first recession, the size of government budgets and expenditures has witnessed significant increases without a corresponding effect on the gross domestic product per capita (growth). For instance, government expenditure increased from ₦4210.06 billion in 2015 to 4650.3 billion in 2016, while gross domestic product per capita decreased from ₦385236.1 billion in 2015 to ₦369178 billion in 2016 (see **Table 1**). This trend continues as government expenditures expand from ₦6022.29 billion in 2018 to ₦7357.3 billion in 2019, while gross domestic product per capita witnesses a decrease from ₦360109.6 billion in 2018 to ₦358742 billion in 2019. Can it be presumed that the increasingly high government expenditure incurred by the Nigerian government does not translate into economic growth in Nigeria? In essence, between Wagner's law and the Keynesians' theory of national income, which one is applicable to the Nigerian economy in the face of increasing spending? Or are both models fallacious or valid in the case of Nigeria? Thus, this study seeks to empirically re-examine the potency of government expenditure or otherwise in Nigeria to ascertain which of the two—Wagner's law and the Keynesian theory of national income—is applicable to the current situation in Nigeria. Besides, although this study is in line with previous empirical studies considered for the Nigerian situation, it is a departure from Nworji et al.[3], whose study considered the relationship between disaggregated government expenditure and economic growth, representing Wagner's law, without investigating the reverse relationship, which stands for the Keynesian theory of national income. This is the contribution of this work to the existing literature. More so, this work adopts the ARDL method, which is superior to the OLS method employed by most of the previous studies. Besides, the dynamic ARDL method provides both the short-run and the long-run relationship between the variables, which can be used to formulate both short-term and future policies. Other advantages of this study over the previous studies include the time frame. The time frame chosen by this study covers the recession periods experienced recently, which makes the study up-to-date. In essence, this study intends to investigate and ascertain the reality of the two theories concurrently in the case of Nigeria in an attempt to find a possible policy recommendation that is expected to fit the economy of Nigeria. The rest of the study is divided into the literature review, the methodology, the result presentation, and finally the summary and policy recommendation.

**Table 1.** Trends of government expenditure and gross domestic product per capita.

| Years | GGE | GDPPC |
|---|---|---|
| 2015 | 4210.06 | 385236.1 |
| 2016 | 4650.3 | 369178 |
| 2017 | 4813.72 | 362574.1 |
| 2018 | 6022.29 | 360109.6 |
| 2019 | 7357.3 | 358742 |

Note: Central Bank of Nigeria, Statistical Bulletin (2019)[7].

## 2. Empirical review

The contention in the research world as regards government expenditure and the economic growth nexus is still very fresh. For instance, Babatunde[8] tested the validity of Wagner's law on the Nigerian economy using time series data between 1970 and 2006. The Toda and Yamamoto causality test results reveal that Wagner's law holds only for the period being tested. Also, it found weak empirical support in the proposition by Keynes that public expenditure is an exogenous factor and a policy instrument for increasing national income. Aluthge et al.[9] examine the impact of Nigerian government expenditure on economic growth for the period 1970–2019 using the Autoregressive Distributed Lag (ARDL) model. The result of the study shows that capital expenditure exerts a significant positive impact on economic growth, both in the short run and the long run. Selvanathan et al.[10] investigate the impact of government expenditure on economic growth in Nigeria using the ARDL framework. The result shows that capital and recurrent expenditures exhibit a positive effect on economic growth in both terms. Usman and Agbede[11] examine the relationship between government expenditure and economic growth in Nigeria between 1970 and 2010 using a co-integration and error correction model. The long-run analysis result shows a strong positive relationship between government expenditure and economic growth, while the short-run result reveals that economic growth demonstrates a positive and significant linear relationship with recurrent expenditure and a strong negative relationship with capital expenditure. Joshua[5] investigates the impact of government expenditure on economic growth in Nigeria from 1981 to 2016 by adopting the dynamic Auto-regressive Distributive lag (ARDL) method for the analysis. Findings indicate that government expenditure exerts a strong positive impact on economic growth, both in the short run and the long run. In contrast, Aluthge et al.[9] found that recurrent expenditures exhibit a weak negative impact on economic growth both in the short run and long run. Babatunde[8] tests the validity of Wagner's law in the Nigerian economy using time series data between 1970 and 2006 by adopting the use error correction model (UECM). The result of the analysis reveals that there is no long-run relationship between government expenditure and output in Nigeria. Selvanathan et al.[10] investigate the impact of government expenditure on economic growth in Nigeria using the ARDL framework. The result shows that government welfare expenditure has a negative effect on economic advancement. Ajayi and Aluko[12] analyze the causality between government expenditure and economic growth in Nigeria between 1985 and 2014. The study adopted the Toda-Yamamoto Granger causality testing approach for the analysis. The result reveals that government expenditure and economic growth do not aggravate each other. The result of this study invalidates Wagner's law and the Keynesian proposition in Nigeria. Joshua[5] investigates the impact of government expenditure on economic growth in Nigeria from 1981 to 2016. The pairwise Granger causality test shows a unidirectional causality flowing only from economic growth to government expenditure in support of Wagner's law for the Nigerian economy. Olanrewaju and Funlayo[13] test to validate Wagner's theory and Keynes's hypothesis between three main government expenditure components (health expenditure, education expenditure, and capital investment expenditure) and economic growth in Nigeria and Angola. Johansen co-integration and pairwise Granger causality was employed for the estimation. The result shows there is no evidence of long-run relationships between government expenditure components of health, education, and

capital investment and economic growth. The study also reveals the validation of Wagner's theory between growth and expenditure on health in both Nigeria and Angola. Further revelation indicates evidence that validates both Wagner's theory and Keynes's hypothesis between growth and expenditure on education in Angola, while that of Keynes was only applicable in Nigeria. Loto[14] investigates the growth effect of government expenditure on economic growth in Nigeria from 1980 to 2008. The study employs an error-correction test. The finding reveals that, in the short run, expenditure on agriculture and education was found to be negatively related to economic growth, while health expenditure demonstrated a positive impact on economic growth. Torruam et al.[15] analyze the government expenditure and economic growth nexus in Nigeria for the period between 1970 and 2008 using co-integration and causality analysis. The finding indicates that there is a long-term relationship between government expenditure and economic growth. While the test for causality shows that economic growth increases government expenditure, the result also indicates that there are two unidirectional causalities running from GDP to Total Capital Expenditure (TCE) and GDP to Total Recurrent Expenditure (TRE). The regression results indicate that the coefficients of Total Recurrent Expenditure (TRE), Total Capital Expenditure (TCE), Total Defense Expenditure (TDE), and Total Health Expenditure (THE) exert a strong positive effect on economic growth. Okoyeet al.[16] investigate government expenditure and the economic growth nexus in Nigeria from 1981 to 2017. The study employs auto-regressive distributive lag, and the result reveals a strong positive effect of capital expenditure on growth. However, within the scope of this study, there is no evidence of the long-run effect of government expenditure on economic growth. Gukat and Ogboru[17] examine the government expenditure and economic growth nexus in Nigeria from 1981 to 2016. The impact of government recurrent and capital expenditures on economic growth was tested using two separate models by adopting the ordinary least squares technique with an error correction model. The result of the first model reveals that social and economic services exert a negative effect on growth, while administration exhibits a strong positive impact on growth. The result for the second model indicates that administration and social services were negatively connected with economic growth in an insignificant way, while economic services showed a weak positive link with growth. Hence, the study concluded that government expenditure has not translated into meaningful economic growth. Oyinlola and Akinnibosun[18] analyze the relationship between public expenditure and economic growth in Nigeria during the period 1970–2009. A disaggregated public expenditure level was employed using the Gregory-Hansen structural break co-integration technique. The result indicates that economic growth and development are the major targets of government expenditure, especially investment in infrastructure and human resources. Ebong et al.[19] investigate the impact of government capital expenditures on economic growth in Nigeria during the period of 1970 and 2012. The ordinary least squares technique (OLS) was applied to analyze the time series. The finding shows that capital expenditures on agriculture did not exert any significant influence on growth, both in the long and short run. Nurudeen and Usman[4] assess the relationship between government expenditure and economic growth in Nigeria from 1979 to 2007 using the ordinary least squares technique. The result shows that government total capital expenditure, total recurrent expenditure, and government expenditure on education exert a negative effect on economic growth. While increasing government expenditure on transport, communication, and health results in a rise in economic growth, Anoke et al.[20] test the validity or otherwise of Wagner's theory in Nigeria from 1980–2015, using time series data. The study employs VECM and Granger causality tests for the analysis. Findings reveal a long-run equilibrium relationship between the targeted and independent variables. The causality test that determines the validity of Wagner's law shows bidirectional causality from national income (RGDP) to government expenditure (TGEX), invalidating the applicability of this hypothesis in Nigeria within the study period. Udo and Effiong[21] investigate Wagner's hypothesis between the time periods of 1970 and 2012 for the Nigerian situation. Ordinary least squares and Granger causality were adopted for this analysis. The result of the Granger causality test reveals that there exists a bidirectional relationship between government spending and economic growth in Nigeria; thus, we find

support for Wagner's and Keynesian hypotheses. Furthermore, the analysis shows that government expenditure exerts a direct effect on economic growth. Ighodaro and Oriakhi[22] seek to examine if the relationship between government expenditure and economic growth follows Wagner's law in Nigeria. A multivariate pairwise Granger causality and co-integration technique was employed using a time series of annual data from 1961 to 2007. The author's finding reveals that Wagner's hypothesis does not hold in all the estimations; rather, the Keynesian hypothesis was validated in all the estimations. This conclusion is also consistent with the work of Bappahyaya et al.[23]. Ogbonna[24] seeks to validate Wagner's law in Nigeria using time series data from 1950 to 2008 by employing Granger causality and the Error Correction Model for its estimations. The result from both methods adopted reveals that Wagner's law is applicable to Nigeria during the period under review. Alimi[25] tests augmented Wagner's law for Nigeria from 1970 to 2012 using co-integration and error-correction modelling techniques. Findings show that there exists a bi-directional causal relationship for the short-run dynamics for most of the formulations, while the long-run empirical evidence seems to be more favorable to Wagner's hypothesis than Keynesian's proposition. Samuel and Oruta[26] examine the relationship between government expenditure and economic growth in Nigeria between 1981 and 2020. The study adopted the Error Correction model and Granger Causality Test. The result reveals that in the long run, all the components of government expenditures employed showed a significant effect on economic growth, cementing the work of Wu et al.[27]. To Devarajan et al.[28], government total capital expenditure causes a slowdown in the process of economic growth. In line with the work of Chipaumire[29] and Zhang and Zou[30], Kolawole[31] asserts that government capital expenditure is an agent that reverses the process of economic growth in Nigeria. This means that the more the government allocates its budget for capital expenditure, the more backwardness the economy will experience.

# 3. Methodology and data

## 3.1. Empirical methods

This study starts the econometric procedure with a preliminary test (unit root test) to determine the method of estimation. This is followed by the ARDL approach and the Granger causality test. The ARDL approach estimates both the short-run and long-run relationships between the variables, while greater causality determines the causal effect between two series.

### 3.1.1. Source of data

The data used in the estimation of the model of this study is sourced from two major sources, which include the Central Bank of Nigeria Statistical Bulletin[32] and the World Bank data base[33]. Specifically, data on government expenditure was sourced from the CBN[32], while data on gross domestic product per capita and FDI were obtained from the WDI[33], respectively.

### 3.1.2. Model specification

Wagner's law asserts that economic growth drives government spending, which is the opposite of Keynes' theory of national income. According to Keynes[34], an increase in government expenditure induces output performance in an economy. These conflicting views have generated serious concern in the research world, as the applicability of each one of them varies from country to country. This study stands on this premise to analyze two operational models, one for each of these opposing arguments, to ascertain which one works for the Nigerian situation. More generally, the model of this work is built on the existing Keynesian theory of national output or income, as demonstrated in Equation (1).

$$Y = C + I + G + (X - M) \tag{1}$$

In the equation above, *Y* stands for the economic growth (GDPPC) while *G* represents government expenditure, while *I* represents foreign direct investment (FDI inflow). Thus, the two operational models are stated as:

$$GDPPC = f(GGE, FDI) \tag{2}$$

$$GGE = f(GDPPC, FDI) \tag{3}$$

where:

*GDPPC* represents Gross Domestic Product Per Capita, *GGE* stands for Gross Government Expenditure, and *FDI* represents Foreign Direct Investment.

### 3.1.3. Stationarity tests

Macroeconomic variables are mostly known to be non-stationary at level; thus, there is a need to subject them to a unit root test[35]. One major significance of the unit root test is that the outcome of this test determines the method of analysis. Thus, this study adopted the common Augmented Dickey-Fuller[36] and the Phillips-Perron[37] method of stationarity tests. The generalized equation is expressed as follows:

$$\Delta Y_t = \beta_1 + \beta_2 + \delta Y_{t-1} + \sum_{i=1}^{m} \alpha_i \Delta Y_{t-i} + \varepsilon_t \tag{4}$$

where, Gaussian white noise that is assumed to have a mean value of zero is represented by $\varepsilon_t$, and possible autocorrelation represents series to be regressed on the time *t*.

### 3.1.4. ARDL bounds testing to cointegration

ARDL was developed by Pesaran et al.[38] for the purpose of econometric analysis to ascertain both the short-run and the long-run relationship between the regressors and the targeted variable. Another major task performed by the ARDL method is the determination of co-integration and the long-run relationship between the series of a model. Most importantly, the order of integration does not necessarily affect the adoption of the ARDL method because of its dynamism[39]. In essence, the method can go for either I(1)/I(0), I(1)/I(1), or I(0)/I(0). Thus, the generalized equation is stated as follows:

$$\Delta Z = \varepsilon_0 + \varepsilon_1 t + \lambda_1 \delta_{t-1} + \sum_{i-1}^{k} \phi_1 \nu_{it-1} + \sum_{j-1}^{n} \varphi_j \Delta Z_{t-j} + \sum_{i-1}^{k} \sum_{j-1}^{n} \omega_{ij} \Delta V_{it-j} + \Upsilon \mathcal{D}_t + \mu_t \tag{5}$$

$$H_0: \varphi_1 = \varphi_2 = \cdots . = \varphi_{n+2} = 0$$
$$H_1: \varphi_1 \neq \varphi_2 \neq \cdots . \neq \varphi_{n+2} \neq 0$$

where the rejection of $H_0$ indicates a proof that the series converged in the long run to correct any initial short run disturbance.

## 4. Estimated result presentation and analysis

This section presents the estimated results from the two models of this study. A preliminary test—unit root test—is carried out, and the outcome is present in **Table 1**. The unit root test naturally determines the method of estimation. This study employed the Augmented Dickey-Fuller[36] and the Phillipd-Perton[37] tests to dictate the level of stationarity of the series. Findings from the ADF test (see **Table 2**) reveal that only FDI inflow achieves stationarity at level, whereas per capita growth and government expenditure turn out to be stationary after the first difference. The outcome of the PP test (see **Table 2**) is indifferent. In essence, only the FDI inflow is found to be stationary at level, while per capita growth and government expenditure became stable at first difference, thereby suggesting the adoption of the ARDL method of estimation.

**Table 2.** Stationarity test result.

| Variables | ADF | | PP | |
|---|---|---|---|---|
| | **Level/1st df.** | **O(I)** | **Level/1st df.** | **O(I)** |
| LnGDPPC | –3.8745*** (*0.0052*) | I(1) | –3.8745*** (0.0052) | I(1) |
| LnGGE | –7.5391*** (0.0000) | I(1) | –7.2051*** (0.0000) | I(1) |
| LnFDI | –3.0362*** (0.0034) | I(0) | –3.0362*** (0.0034) | I(0) |

Source: Author's computation, O(I): Order of integration.

This study was set out mainly to ascertain whether or not Wagner's law is consistent with the Nigerian economy. Findings from the first model indicate that Wagner's law is not applicable to the Nigerian economy. According to the law, an increase in economic growth induces government expenditure. Contrary to the law, findings from this study (see **Table 3**) show that a 1% increase in GDPPC slightly reverses government expenditure by 82% in the short run and a 402% significant reduction in government expenditure in the long run. Further results show that a 1% increase in FDI inflow strongly induces economic growth by 13% and 35% in both terms, validating the FDI-led growth nexus, which aligns with the MacDougall-Kemp Hypothesis of capital inflows as developed by MacDougall[40] and subsequently expounded by Kemp[41]. The hypothesis asserts that both the investor and the recipient country benefit from the FDI inflow. The recipient country's benefits come in the form of spillover effects such as technological advancement, while the investing country gains through profit transfers back to their home country. The work of Güngör and Ringim[42] throw support to this outcome in Nigeria. On the other hand, model 2 presents the outcome from the second model estimation, which represents the Keynesian model of national income. The outcome shows that a 1% increase in government expenditure generates a 1.6% and 16% significant increase in GDPPC in both terms, confirming the Keynesian theory of national income or output as also buttressed by the work of Selvanathan et al.[10] and Aluthge et al.[9] in Nigeria. The Keynesian theory holds that government expenditure is a key determinant of economic growth. According to the theory, government expenditure is a potent macroeconomic instrument used in regulating the operation of an economy—an expansionary expenditure will stimulate economic activities, while a contractionary expenditure will minimize an overheated economic situation. Further research reveals a positive relationship between FDI inflow and economic growth. A 1% increase in FDI inflow generates 34% and 44% increases in both terms. In general, the result confirms that the Keynesian model of national income is a reality in the Nigerian situation, while Wagner's law is a fallacy. In conclusion, the result of the co-integration test indicates that there is long-run interaction among the series for both models, as confirmed by the rejection of the null hypothesis (see **Table 4**). The ECT, which represents the speed of adjustment, reveals that any disequilibrium experienced in the short run is adjusted in the long run by 36% and 10% for both models, respectively.

**Table 3.** ARDL short run and long run forms.

| **Model 1** | | | | |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **Short run** | | | | |
| LnGDPPC | –0.828702 | 0.762981 | –1.086137 | 0.2864 |
| LnFDI | 0.130129 | 0.047355 | 2.747937 | 0.0102 |
| CointEq (–1) | –0.362038 | 0.064239 | –5.635768 | 0.0000 |
| **Long run** | | | | |
| LnGDPPC | –4.021966 | 0.850433 | –4.729317 | 0.0001 |
| LnFDI | 0.359434 | 0.117865 | 3.049532 | 0.0049 |

**Table 3.** (*Continued*).

| **Model 2** | | | | |
|---|---|---|---|---|
| **Variable** | **Coefficient** | **Std. Error** | **t-Statistic** | **Prob.** |
| **Short run** | | | | |
| LnGGE | 0.016670 | 0.005057 | 3.296483 | 0.0023 |
| LnFDI | 0.008701 | 0.009122 | 0.953793 | 0.3469 |
| CointEq (–1) | –0.107325 | 0.024397 | –4.399051 | 0.0001 |
| **Long run** | | | | |
| LnGGE | 0.155326 | 0.040289 | 3.855303 | 0.0005 |
| LnFDI | 0.081069 | 0.104026 | 0.779317 | 0.4412 |

Source: Author's computation 2022.

**Table 4.** ARDL bound test.

| **Model 1** | | | | |
|---|---|---|---|---|
| **Test statistic** | **Value** | **Signif.** | **I(0)** | **I(1)** |
| F-statistic | 7.196052 | 10% | 3.663 | 4.378 |
| *K* | 2 | 5% | 4.36 | 5.138 |
| | | 1% | 5.98 | 6.973 |
| **Model 2** | | | | |
| **Test statistic** | **Value** | **Signif.** | **I(0)** | **I(1)** |
| F-statistic | 6.092186 | 10% | 3.373 | 4.377 |
| *K* | 2 | 5% | 4.133 | 5.26 |
| | | 1% | 5.893 | 7.337 |

Source: Author's computation 2022.

For this research work to be considered publishable as findings, it had to be subjected to five diagnostic tests for reliability and stability in line with econometric standards. The results of these tests are presented in **Table 5**. The residual normality test basically measures the probability that the residuals of the target variable are normally distributed, which would imply that no other significant inference can be further derived from the target variable. From **Table 5**, this null hypothesis could not be rejected because the probability (37%) is greater than 5%. Thus, the residuals of the dependent estimated model are normally distributed. Similarly, the probability that there is serial correlation in the model (i.e., that estimated values of the dependent variable correlate with their residuals) (69%) is greater than 5%. Similar conclusions are reached for heteroscedasticity (15% > 5%) and the regression specification error test (RESET, 24% > 5%). Thus, it is obvious that there is no heteroscedasticity in the model, and it is well specified. Conclusively, the CUSUM and CUSUM square graphs were plotted to determine the stability of the models, as reported in **Figures 1** and **2**. Since the blue line falls within the critical bond at the 5% level of significance for the two models, we reject the null hypothesis and conclude that the models are stable and fit for policy direction for the Nigerian economy.

**Table 5.** Diagnostic tests.

| **Model 1** | | |
|---|---|---|
| **Tests** | **F-statistic** | ***P* value** |
| $\chi 2$ NORMALITY | 1.9789 | 0.3717 |
| $\chi 2$ SERIAL | 0.3682 | 0.6954 |
| $\chi 2$ WHITE | 1.6729 | 0.1551 |
| $\chi 2$ RAMSEY | 1.4590 | 0.2444 |
| **Model 2** | | |
| **Tests** | **F-statistic** | ***P* value** |
| $\chi 2$ NORMALITY | 0.0561 | 0.9723 |
| $\chi 2$ SERIAL | 1.7923 | 0.1564 |
| $\chi 2$ WHITE | 1.8826 | 0.1511 |
| $\chi 2$ RAMSEY | 0.7897 | 0.3806 |

Source: Author computation 2022.

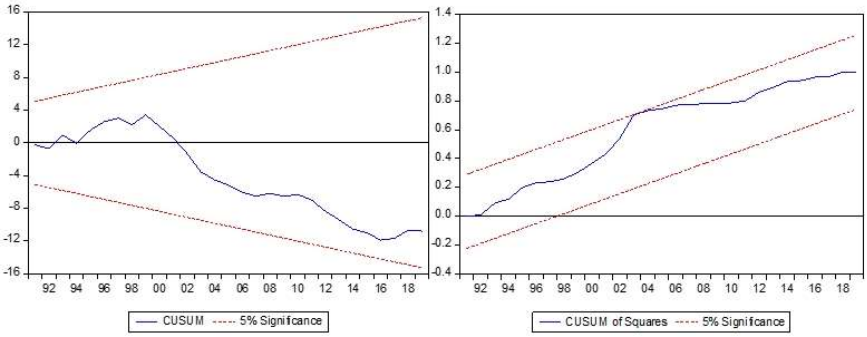


**Figure 1.** CUSUM and CUSUM square tests—Model 1.

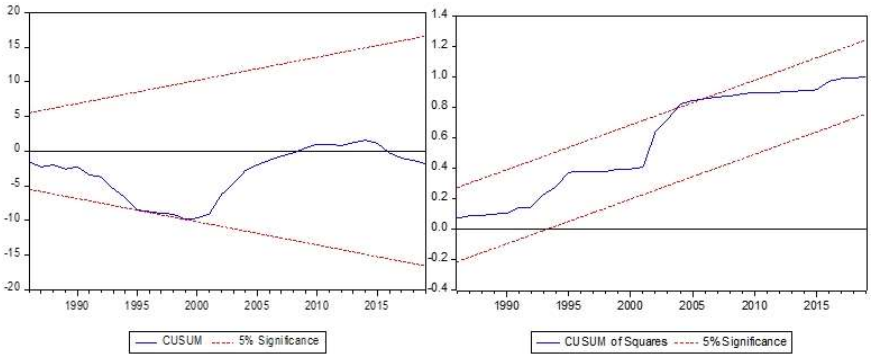


**Figure 2.** CUSUM and CUSUM square tests—Model 2.

The Granger causality measure measures the probability that a variable *X* is caused by a variable *Y*. In this way, a causal relationship is said to run from one variable *Y* to another variable *X* when variable *Y* is responsible for significant changes in variable *X*. Findings from this study (see **Table 6**) reveal a unidirectional connection running only from government expenditure to GDPPC. The implication is that government expenditure is a driver of economic growth in Nigeria, which confirms the Keynesian theory of national income as revealed by the ARDL method earlier reported in this study. The empirical work of Aluthge et al.[9] lends support to this outcome. Also, the result reveals the reality of the FDI-led growth nexus in Nigeria, in line with the empirical study of Güngör and Ringim[42] in Nigeria. This is indicated by a unidirectional link running only from FDI inflow to GDPPC. Finally, a non-causal effect exists between government expenditure and FDI inflow. This means that the two series do not drive each other.

**Table 6.** Granger causality test.

| Null hypothesis | Obs | F-statistic | Prob. |
|---|---|---|---|
| LNGGE does not Granger Cause LNGDPPC | 38 | 16.9293 | 0.0002 |
| LNGDPPC does not Granger Cause LNGGE | | 1.75155 | 0.1943 |
| LNFDI does not Granger Cause LNGDPPC | 38 | 9.68270 | 0.0037 |
| LNGDPPC does not Granger Cause LNFDI | | 0.60921 | 0.4403 |
| LNFDI does not Granger Cause LNGGE | 38 | 0.15669 | 0.6946 |
| LNGGE does not Granger Cause LNFDI | | 0.00288 | 0.9575 |

Source: Author computation 2022.

## 5. Conclusion and recommendation for policy implication

Wagner's law is a long-existing hypothesis in economics that represents the opposite of the Keynesian theory of national income. The two models operate in opposite directions, which spurred the decision of this study to ascertain which of them is consistent with the current reality of the Nigerian economy. The findings reveal a strong positive relationship between government expenditure and gross domestic product per capita in Nigeria. This implies that government expenditure spurs economic growth significantly in Nigeria, which

confirms the reality of the Keynesian theory of the national economy. Specifically, the finding shows that government expenditure is a key variable in the growth equation of the national economy of Nigeria. In contrast, the result from the second model reveals evidence of a negative relationship between economic growth and government expenditure. This suggests that an increase in economic growth causes a reversal of government expenditure instead, thus invalidating Wagner's law for the Nigerian economy. Other results validate the FDI-induced growth nexus in Nigeria as expected. This implies, in general, that economic growth in Nigeria is significantly enhanced by FDI inflow and government expenditure. Given that Nigeria just exited an economic recession in 2020, expansionary fiscal policy is highly recommended for the national economy. This would help in reducing the effect of the economic recession experienced recently, particularly in 2015, 2018, and 2020, and to fast-track the current economic recovery stage of the economy. Furthermore, the government should set up policies in an attempt to deliberately induce foreign investors into the economy. Improving the national absorptive capacity, such as infrastructural development coupled with a stable exchange rate, are necessary steps towards attracting foreign companies to invest in the national economy, thus promoting output through the multiplier effect.

## Author contributions

UJ conceptualized the idea, provide background, wrote the literature review of the study and made the estimations of the model, APU wrote the methodology of the study, while ATO interpret the result and wrote the conclusion of the manuscript.

## Conflict of interest

In this study, there is no conflicting interest between the authors.

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