Public Expenditure and National Income: Time Series Evidence from Nigeria

E. Chuke Nwude[1]*, Tarila Boloupremo[2]

[1]Department of Banking and Finance, Faculty of Business Administration, University of Nigeria, Enugu Campus, Enugu, Nigeria, [2]Department of Banking and Finance, Faculty of Business Administration, University of Nigeria, Enugu Campus, Enugu, Nigeria. *Email: chuke.nwude@unn.edu.ng

ABSTRACT

The paper investigates the relationship between national income and government aggregate expenditure in Nigeria by testing the validity of Wagner's law and Keynes's hypothesis for the period between 1970 and 2014. More specifically, by applying time-series analysis, government-spending and national-income variables were found to be non-stationary and cointegrated, thus satisfying a long-run equilibrium condition. In addition, through the application of Granger causality tests to error correction models, unidirectional causality, running from gross domestic product to government-expenditure variables, could be established between the variables and, therefore, only Wagner's law was found to be valid in Nigeria's case for the period of study.

Keywords: Public Expenditure, Wagner's Law, Causality, Unit Roots, Cointegration
JEL Classifications: H5, P44

1. INTRODUCTION

The link between public expenditure and national income has attracted considerable interest on the part of economic researchers both in the theoretical as well as in the empirical level, Gupta (1967), Rubinson (1977), Singh and Sahni (1984), Afxentiou and Serletis (1991) and Ahsan et al. (1996). Large volumes of research have centered on the direction of the causality between the two variables in order to ascertain whether it is Wagner's law or Keynes's hypothesis, the valid proposition at a specific place and time.

On the one hand, Wagner's law deals with the increase in the size of the public sector as a consequence of the economic growth of a society. According to Wagner, as per capita income rises during a nation's industrialization Bird (1971), the share of its public-sector expenditures also increases Chletsos and Kollias (1997) so as to accommodate the expanded functions of the state, especially those associated with the new, improved and/or expanded public goods and services that the government shall provide at each of the economic and development stages of a society. On the other hand, Keynes's hypothesis deals with the growth of national income as a

consequence of a rise in public sector expenditure, which is treated as autonomous and exogenously given. According to the Keynesian proposition, public expenditure becomes a policy variable that can be used to influence economic expansion Ansari et al. (1997).

Knowledge of the precise causative process has important policy implications. For example, if the causality were Wagnerian, public expenditure is relegated to a passive role, if Keynesian, it acquires the status of an important policy variable for influencing a country's growth. Although neither Wagner's law nor Keynes's hypothesis can be easily denied at a theoretical level, as both propositions have been supported by very convincing logical arguments, the vast amount of empirical studies made on this subject has failed to produce a consistent pattern of results. On the contrary, for most countries and periods, there have been a great variety of conclusions, along with an even greater variety of interpretations, therefore making academic consensus on this issue rather impossible. In the case of Nigeria the literatures have been found to be inconclusive Babatunde (2011). For example, while some of the research on Nigeria found evidence for Wagner's law (Aigbokhan, 1996; Aregbeyen, 2006) others found no support (Essien, 1997) for either Wagner's or Keynes effect.

The main objective of this paper is to examine Wagner's and Keynes' hypotheses for Nigeria employing aggregate government expenditure (GE) variables for the period 1970-2014, using the empirical approach of time-series analysis that includes unit root tests, cointegration analysis, error-correction modeling and Granger causality tests, in order to verify whether Wagner's law and/or Keynes' hypothesis hold for the case of Nigeria. The research differs from the previous studies made for Nigeria's case in the following three aspects. First, a longer data set is used, so as to counteract in a better way the finite sample bias problem. Second, novel econometric techniques, more advanced than the techniques that have been used so far in this field, are applied so as to obtain more consistent, robust and convincing results. Finally, this study confronts the two hypotheses Wagner's law and/or Keynes's in one study.

The rest of the paper is structured as follows: Section 2 outlines the theoretical background on which the researcher's empirical analysis is based. Section 3 presents the methodology used, section four presents econometrics results data, analysis and discussion while the last section provides summaries and concluding remarks.

2. LITERATURE REVIEW

2.1. Theoretical Review

More than 100 years ago, Wagner (1890) formulated the "law of the increasing extension of state activity." He asserted that there is a long run propensity for the scope of government to increase with higher levels of economic development. Wagner's hypothesis deals with the growing relative importance of government activity and has come to be known as Wagner's law. According to Wagner, there are three reasons to expect an expanding scope of public activity: First, as nations develop there is an increased complexity of legal relations and communications and it induces government to produce the regulatory framework that will accompany the greater intricacy of relations among economic agents. Additionally, increased urbanization and population density forces government to greater public expenditures on law and order and other socioeconomic regulations.

Second, as income increases, societies demand more education, entertainment, a more equitable distribution of income, and generally more public services. Wagner felt that the income elasticity of demand for these public services was greater than unity. Finally, the technological needs of an industrialized society require larger amounts of capital infrastructure than are forthcoming from the private sector, hence the need for government to step in to fill in the gap.

The long-run relationship between real output and public expenditure has attracted considerable attention in economic research. In particular, the ability of public expenditure to influence national income is questioned in two levels. First, the nature of the causality pattern is disputed: A number of public finance studies adopt the Wagner's law approach which states that national income causes public expenditure, mainly through an increase in demand for public services. Within this framework, public expenditure is treated as a behavioral variable, similar to private consumption.

On the other hand, a number of macroeconomic models adopt a view closer to the Keynesian postulation which treats public expenditure as autonomous and exogenously given. Here the causation runs from growth in GE to growth in national income. But more importantly, public expenditure becomes a policy variable, which can be used to influence economic growth. Relying on this proposition, many developing countries have assigned to their public sector the role of promoting growth and economic development. The various forms of market failure seem to have reinforced this policy. The government is believed to harmonize conflicts between private and social interests, resist exploitation by foreign interests and increase socially desirable investment. Since large public sector means large GE, GE is seen to promote growth in income.

2.2. Empirical Review

Literatures are inundated on the impact of GE on economic growth. The effects of GE on economic outcomes have given rise to a number of empirical literatures. Ansari et al. (1977) analyzed the effects of GE on gross national product for three African countries namely, Ghana, Kenya and South Africa. The study used annual time series data for the sampled countries (Ghana [1963–1988], Kenya [1964–1989] and South Africa [1957–1990]). Findings from the study show mixed results. First, it was discovered that the data obtained from these countries did not support Keynesian proposition that GE drives economic growth. From the data analyzed, only Ghana showed evidence of GE being influenced by national income. This implies that Ghana's data finds support with Wagner's hypothesis, which emphasized significant role of GE as an endogenous factor of economic development. In line with this submission, (Black et al., 2003) and (Dockel and Seeber, 1978) partially confirmed the relevance of Wagner's law for South Africa. There appears to be regularity in the findings of these studies, which emphasized high-income elasticity for most categories of government spending in relation to economic growth. This implies that GEs "increase more than proportionally with economic growth."

Wu, Shih-Ying et al. (2010) observed that Wagner's law works perfectly in developed countries compared to the developing economies. However, some branches of studies have also suggested that government spending could influence economic growth positively (if they are directed to promote public infrastructure) and negatively (if they are consumed by government in the form investment in growth retarding projects). There are no consensus among the existing studies on the exact relationship between GE and economic growth. This stance could be as a result of the differences in model specification, type of econometric technique used, and proxies used for government spending and measurement. Alm and Embaye (2010) study on the relationship between government spending and real per capita income for South Africa over the period 1960-2007 indicated that government spending is not only being influenced by per capita income and the cost incurred in financing government size but also by fiscal illusion (caused by the gap created by the differences between revenue and expenditure) and external shocks (caused by oil price fluctuations).

Plethora of studies has documented the existence and non-existence of Wagner's law in Nigeria (Essien, 1997; Babatunde,

2011; Aregbeyen, 2006; Ighodaro and Oriakhi, 2010). Ighodaro and Oriakhi (2010) employed cointegration technique to analyze the long run relationship between GE and economic growth. Essien (1997) used the two step procedure of Engle and Granger cointegration approach to determine the relationship between GE and economic growth while Babatunde (2011) employed bound testing technique to achieve the same result. Evidence, which emerged from these studies, showed that Wagner's Law does not hold in Nigeria except for Aregbeyen (2006) study which gave a contradictory result confirming the existence of Wagner's Law.

2.3. Empirical Model
For the purpose of this study, three different models of Wagner's law are employed to test the validity of Wagner's and Keynes's hypotheses[1]. The period analyzed spans from 1970 to 2014. The three empirical models are the following:

$$GE = f(GDP) \tag{1}$$

$$GE = f(GDP/P) \tag{2}$$

$$GE/P = f(GDP/P) \tag{3}$$

Where: GE=Total government expenditure (current + capital), GDP=Real gross domestic product[2], GDP/P=Real per capita gross domestic product, GE/P=Per capita total government expenditure, P=Population.

Version (1) was originally employed by Peacock and Wiseman (1967), Musgrave (1969) and Goffman and Mahar (1971). This is the simplest of all the versions of Wagner's hypothesis and has been widely used in many studies. Model (2) was used by Goffman (1968), which argues that as a nation experiences economic development and growth, an increase must occur in the activities of the public sector and that the ratio of increase, when converted into expenditure terms, would exceed the rate of increase in output per capita (Goffman, 1968). Version (3) was used by Gupta (1967) and Michas (1975) to investigate whether or not the elasticity of public spending per capita with respect to gross domestic product (GDP) per capita is above unity.

Verification of Wagner's law and Keynes's hypothesis is done by testing whether or not GE and GDP possess a long-run equilibrium relationship (cointegrated), and whether or not GDP Granger causes GE and vice versa. If these conditions are met, Wagner's and Keynes's hypotheses are verified. The examination of these economic relationships is based on annual time-series data for a period of 44 years (1970–2014), taken from the Central bank of Nigeria statistical bulletin (2009 and 2014), world development indicators and national population commission, 2006. All the variables are expressed in natural logarithms terms for testing purposes. All equations in this study have been specified in a general form as: ln(Xt)=a+b ln(Zt), where Xt represents real GE,

and Zt represents real GDP as defined above in three different versions. To verify the Keynesian hypothesis, the equation is specified with Z as a function of X, i.e., GDP as a function of GE.

There seems to exist a high degree of correlation of the variables in version one of the law. However, the visual correlation between variables lessens in versions two and three, when the share of GE is paired with real GDP per capita and when the share of real aggregate GE s is paired with real GDP per capita. A point worth mentioning is that in 1986 real GDP per capita reached a historical low-as is evident from the graphical representations in Figure 1-despite increase in GE which might be due to reduction in oil revenues and the introduction of the structural adjustment program designed to move the country from a mono-export dependent nation to other sources of export.

To complement the visual correlations of Figure 1, Table 1 reports pair-wise correlations for all variables utilized in this paper. Pair-wise correlations confirm that there is a high degree of correlation between GDP/P and GDP, GDP/P and GE (GE), GDP/P and GE/P and GE and GE/P. The result also indicates a weak correlation between GDP and GE, GDP and GE/P. The objective of this study is to probe deeper into these correlations to determine the validity of Wagner's or Keynesian hypothesis with various specifications denoting the relationship between government and income.

3. METHODOLOGY

The methodology used in this research consists of three main steps: Unit root tests, cointegration analysis, vector-auto regression modeling and Granger causality tests.
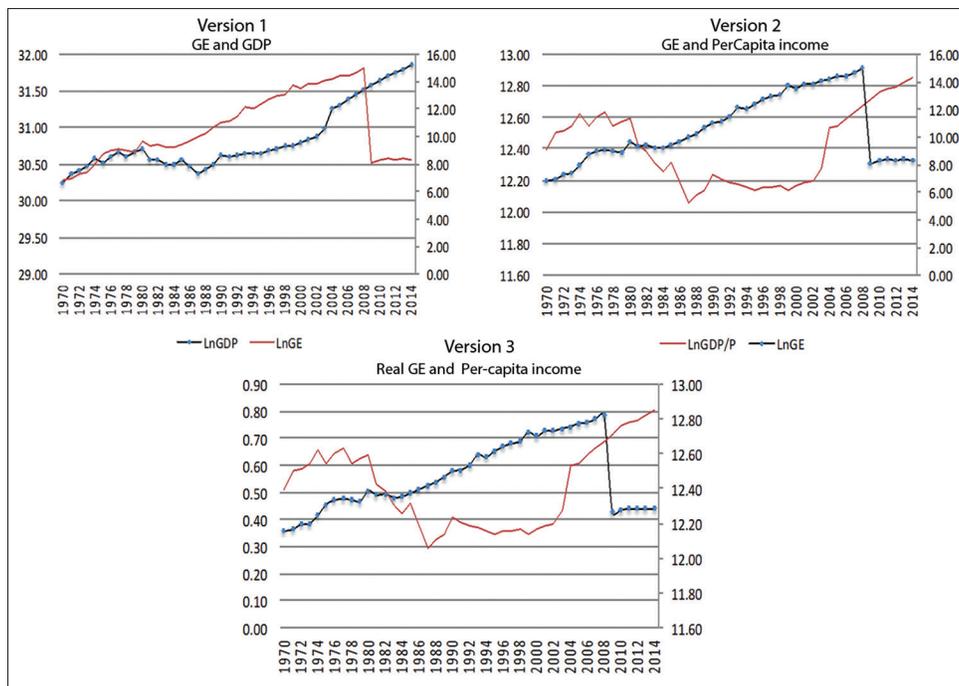
3.1. Unit Root Tests
Testing for unit roots is the first step in time-series analysis as is the case of this study. It is required in order to verify whether the variables under analysis are stationary or non-stationary. If the variables are stationary, classical-econometric methods are sufficient to study equilibrium. But if they are found to be non-stationary in their levels, then one needs to apply cointegration tests (Islam, 2001), since otherwise the application of classical regression analysis would be invalid. When a variable contains a unit root, it is said to be non-stationary (Harris, 1995. p. 27) or integrated of order 1 (denoted by I [1]). This is the property that the variables must satisfy for cointegration analysis to be necessary. The researcher employed the Augmented Dickey and Fuller's (ADF) (1979; 1981) test, and Phillips-Perron's (PPs) (1988) for the unit root test. It is expected that the utilization of both tests will provide greater confidence in the determination of unit roots of the series analyzed in this work.

Table 1: Correlation coefficient matrixes

	LnGDP/P	LnGDP	LnGE	LnGE/P
LnGDP/P	1.0			
LnGDP	0.66	1.0		
LnGE	−0.41	0.18	1.0	
LnGE/P	−0.41	0.18	1.0	1.0

GE: Total government expenditure (current+capital), GDP: Real gross domestic product, GDP/P: Real per capita gross domestic product, GE/P: Real aggregate government expenditure

---

1   Verification of Wagner's law and Keynes's hypothesis is done by testing whether or not government expenditure and GDP possess a long-run equilibrium relationship (cointegrated), and whether or not GDP Granger causes government expenditure and vice versa.

2   Real GDP and national income terms are interchangeably used.

Figure 1: Three versions of Wagner's Law

3.2. Cointegration Tests

Once the order of integration of the variables is verified, and all the variables under analysis are found to be I (1), cointegration analysis can be applied in order to test whether or not a long-run equilibrium relationship exists between the variables and, if so, to analyze their short-run dynamics. The existence of a long-run equilibrium relationship among economic variables is referred to in literature as cointegration (Chang, 2004). The economic interpretation of such a relationship is that although two variables may tend to wander overtime without returning to a constant mean, economic forces do not allow these series to wander apart permanently (Kolluri et al., 2000). The cointegration analysis applied in the present study is the Engle-Granger two-step procedure, which allows for the estimation and testing of one cointegrating relationship (Biswal et al., 1999).

3.3. Error-correction Modeling

The next step of the Engle-Granger procedure consists of estimating an error correction model (ECM) in order to analyze the short-run relationship between the variables or, as it is called, the dynamic model. If the variables are cointegrated, the residuals (εt) from the equilibrium regression can be used to estimate the ECM (Enders, 2004). An ECM combines long-run information with a short-run adjustment (error-correction) mechanism that enables us to see how the variables change from one period to the next in order to converge to their long-run equilibrium. The error-correction mechanism represents a systematic disequilibrium adjustment process through which z_t and y_t are prevented from drifting apart (Burney, 2002).

3.4. Granger Causality Tests

Finally, once an ECM has been estimated, the existence of causal relationships between the analyzed variables can be tested by applying the Granger causality test to the ECM. Two different Granger causality tests are applied in this study, the standard F-test and Lagrange multiplier F-distribution test. A test of causality aims at verifying whether or not the lags of one variable enter into the equation for another variable (Enders, 2004) so as to affect directly and significantly its value. According to Engle and Granger, if two variables are I (1) and cointegrated, then either unidirectional or bi-directional causality must exist in the I (0) variables (Biswal et al., 1999).

4. EMPIRICAL RESULTS AND DISCUSSION

The results of the unit root tests are presented in Table 2.

Table 2 reports the results of the stationarity tests at level as well as at first difference for all the variables. Included in these tests are a constant and trend terms. The optimal lag length of each case for ADF tests is chosen using the Akaike information criteria after testing for higher order serial correlation residuals. As shown in Table 1, after taking the first difference, each series appeared to have stationarity with the ADF test. However, the result of PP unit root test suggest that the variables are integrated of order one and this implies that the series understudy are stationary at first difference. With the exception of only LnGE which was stationary at level i.e., I (0). Virtually all the variables considered in our model reject the null hypothesis of non-stationarity ($P < 0.05$). The stationarity tests suggest the possibility of long run relationship between the variables.

Once a unit root has been confirmed for a data series, the question is whether there exists some long-run equilibrium relationship among variables. The existence of a long-run equilibrium relationship between economic variables is referred to as cointegration. The cointegration results, based all three formulations are reported in Table 3. The results were analyzed based on the Trace and the maximum Eigen-value statistic. In all three functional forms, the null hypotheses of no cointegration between GE and GDP, and

GE and GDP/P, and GE/P and GDP/P are rejected at 5% and 10% levels of significance respectively. These results suggest that total GE and GDP, and total GE and real per capita GDP, and per capita GE and real per capita GDP are cointegrated or they possess long-run equilibrium relationships. On the basis of these findings, the researcher proceeds to test the direction of causation in the Wagner and Keynesian sense in the third step of the procedure.

From the Table 4, bi-directional causality does not hold for version one in the results. As can be observed above, version two and three, the direction of causality run from government national income (GDP/P) to GE which support Wagner's proposition. The results show that growth in aggregate GE (administration, economic services, social and community services and transfers) is explained in terms of Wagner's law.

The findings for versions two to three are consistent with several previous country-specific studies Vatter and Walker (1986), and Yousefi and Abizadeh (1992) for the United States, Ahsan et al. (1996) and Biswal et al. (1999) for Canada, Ansari, et al. (1997) for Ghana, Kenya and South Africa, Chletsos and Kollias (1997) for Aregbeyen (2006) for Nigeria. They run against the findings of Essien (1997), Babatunde (2011), Ighodaro and Oriakhi (2010). Ighodaro and Oriakhi (2010) and Akitoby et al. (2006) found no evidence of Wagner's Law in Nigeria. However, it is believed that the results reported in this study are more reliable than previous ones due to the use of a larger data set and the utilization of more current and comprehensive statistical tools.

5. CONCLUSION

In an attempt to investigate the relationship between GE and national income in Nigeria, in order to verify whether or not Wagner's law and/or Keynes's hypothesis hold for the case of Nigeria it was found that there exists a long-run equilibrium relationship between the variables and that unidirectional Granger causality, running from GDP to government-spending variables, could be established between them. Therefore, only Wagner's hypothesis is found to be valid for Nigeria. The outcome of the result might be due to a general decline and inadequate GE on critical sectors of the Nigerian economy. The direction of government spending over the period studied might also be a factor for the non-existence of the Keynesian hypothesis as huge percentage of recurrent expenditures and embezzlement of budgeted funds has been a bane militating against economic growth in the economy. GE has been widely viewed as a tool to stimulate economic growth especially for developing economy.

The outcome of this and other related studies would inhibit the use of GE as a fiscal policy tool for economic stabilization by policy makers. It would also be judicious to realize that Wagner's proposition implies that with economic growth comes a bigger role for government, not the other way around. Policies whose

Table 2: Result of ADF and PP unit root test

Variables	ADF test statistic value	5% Mackinon critical value	Order of integration	Phillips person	5% Mackinon critical value	Order of integration
LnGE	−6.662068	−2.931404	I (1)	−6.6621	−2.931404	I (0)
LnGDP	−5.646994	−2.931404	I (1)	−5.737612	−2.931404	I (1)
LnGDP/P	−9.003442	−2.935001	I (1)	−5.727539	−2.931404	I (1)
LnGE/P	−6.662068	−2.931404	I (1)	−6.6621	−2.931404	I (1)

ADF: Augmented Dickey and Fuller's, PP: Phillips Perron

Table 3: Cointegration tests results

Maximum Eigen value	Trace statistics	5% Critical value	10% Critical value	Hypothesised Number
0.868849	45.69487	54.68150	44.49359	r=0*
0.632999	29.79707	25.01689	10.07624	r≤1**
0.539697	4.62611	15.49471	2.705545	r≤2*
0.288122	14.2646	5.450132	6.634897	r≤**

*Denotes rejection of the hypothesis at 5% significance level and **denotes rejection of the hypothesis at both 5% and 1% significance levels

Table 4: Granger causality tests (based on error correction term)

Causality from→to	Obs	Lag length	Error correction term (coefficient)	F-stattistics	P	Inference
Version 1	41	1				
GE→GDP			−9.12E-14	0.98157	0.384	No causuality exist KH does not hold
GDP→GE			2.65E-12	1.81525	0.1766	No causuality exist WH does not holf
Version 2	41	1				
GE→GDP/P			−9.12E-14	1.52847	0.2299	No causuality exist KH does not hold
GDP/P→GE			−3.90E-12	4.05826	0.0253	Causuality exist WH holds
Version 3	41	1				
GE/P→GDP/P			19.01952	1.65429	0.2056	No causuality exist KH does not hold
GDP/P→GE/P			−3.90E-12	6.08140	0.0179	Causuality exist WH holds
						No causuality exist KH does not hold causuality exist WH holds

WH and KH stand for Wagner's and Keynes's hypotheses, respectively

sole aim is to increase the role of government may in fact cause the opposite results, hence the need for caution and responsibility in determining where and how much government intervention is needed to complement other growth-generating policies.

REFERENCES

Afxentiou, P.C., Serletis, A. (1991), A time series analysis of the relationship between government expenditure and GDP in Canada. Public Finance Quarterly, 19, 316-333.

Ahsan, S., Kwan, A., Sahni, B. (1996), Cointegration and Wagner's hypothesis: Time series evidence for Canada. Applied Economics, 28, 1055-1058.

Akitoby, B., Benedict, C., Sanjeev, G., Gabriela, I. (2006) Public spending, voracity and Wagner's law in developing countries. European Journal of Political Economy, 22, 908-924.

Aigbokhan, B.E. (1996), Government size and economic growth: The Nigerian experience. In: Beyond Adjustment: Management of the Nigerian Economy, Proceedings of the 1996 Annual Conference of the Nigerian Economic Society, Nigerian Economic Society. p56-70.

Alm, J., Embaye, A. (2010), Explaining the growth of government spending in South Africa, economic society of South Africa. South African Journal of Economics, 78, 152-169.

Ansari, M.I., Gordon, D.V., Akuamoah, C. (1997), Keynes versus Wagner: Public expenditure and national income for three African countries. Applied Economics, 29, 543-550.

Aregbeyen, O. (2006), Cointegration, causality and Wagner's law: A test for Nigeria, 1970-2003. Central Bank of Nigeria Economic and Financial Review, 44, 1-17.

Babatunde, M.A. (2011), A bound testing analysis of Wagner's law in Nigeria: 1970-2006. Applied Economics, 43, 21.

Bird, R.M. (1971), Wagner's Law of expanding state activity. Public Finance, Finances Publiques, 26, 1-26.

Biswal, B., Dhawan, U., Lee, H. (1999), Testing Wagner versus Keynes using disaggregated public expenditure data for Canada. Applied Economics, 31, 1283-1291.

Black, P.A., Calitz, E., Steenkamp, T.J. (2003). Public Economics for South African Students. 2nd ed. Cape Town: Oxford University Press.

Burney, N.A. (2002), Wagner's hypothesis: Evidence from Kuwait using cointegration tests. Applied Economics, 34, 49-57.

Chang, T., Liu, W., Caudill, S.B. (2004), A re-examination of Wagner's law for ten countries based on cointegration and error-correction modeling techniques. Applied Financial Economics, 14, 577-589.

Chletsos, M., Kollias, C. (1997), Testing Wagner's law using disaggregated public expenditure data in the case of Greece: 1958-1993. Applied Economics, 29, 371-377.

Dickey, D.A., Fuller, W.A. (1979), Distributions of the estimators for autoregressive time series with a unit root. Journal of the American Statistical Association, 74, 427-431.

Dickey, D.A., Fuller, W.A. (1981), The likelihood ratio statistics for autoregressive time series with a unit root. Econometrica, 49, 1057-1072.

Dockel, J.A., Seeber, A.V. (1978), The behaviour of government expenditure in South Africa. South African Journal of Economics, 46, 227-236.

Enders, W. (2004), Applied Econometric Time Series. 2nd ed. New Jersey: Wiley.

Essien, E.A. (1997), Public sector growth, an econometric test of Wagner's law economic and financial review. Central Bank of Nigeria, 35, 19-31.

Goffman, I.J. (1968), On the empirical testing of Wagner's law: A technical note. Public Finance, 23, 359-64.

Goffman, I.J., Mahar, D.J. (1971), The growth of public expenditure in selected developing nations: Six Caribbean countries. Public Finance, 26(1), 57-74.

Gupta, S.P. (1967), Public expenditure and economic growth: A time series analysis. Public Finance, 22, 423-466.

Harris, R. (1995), Using Cointegration Analysis in Econometric Modelling. Hertfordshire: Prentice Hall, Harvester Wheatsheaf.

Ighodaro, C.A.U., Oriakhi, D.E. (2010), Does the relationship between government expenditure and economic growth follow Wagner's law in Nigeria? Annals of the University of Petrosani, Economics, 10, 185-198.

Islam, A.M. (2001), Wagner's Law revisited: Cointegration and exogeneity tests for the USA. Applied Economics Letters, 8, 509-515.

Kolluri, B., Panik, M., Wahab, M. (2000), Government expenditure and economic growth: Evidence from G7 countries. Applied Economics, 32, 1059-1068.

Michas, N.A. (1975), Wagner's law of public expenditures: What is appropriate measurement for a valid test? Public Finance, 30, 77-84.

Musgrave, R.A. (1969), Fiscal System. New Haven: Yale University Press.

Phillips, P.C.B., Perron, P. (1988) Testing for a unit root in time series regression. Biometrika, 75, 335-346.

Peacock, A.T., Wiseman, J. (1967), The Growth of Public Expenditure in the United Kingdom. London: George Allen and Unwin.

Rubinson, R. (1977), Dependency, government revenue, and economic growth, 1955-1970. Studies in Comparative Economic Development, 12, 3-28.

Shih-Ying, W., Tang, J.H., Lin, E. (2010), The impact of government expenditure on economic growth: How sensitive to the level of development? Journal of Policy Modeling, 32, 804-817.

Singh, B., Sahni, B. (1984), Causality between public expenditures and national income. Review of Economics and Statistics, 66, 630-644.

Vatter, H.G., Walker, F.K. (1986), Real public sector employment growth, Wagners law, and economic growth in the United States. Public Finance, 41, 117-137.

Wagner, A. (1890), Finanzwissenchaft. Heidelberg: Winter, CF Leipzig.

Yousefi, M., Abizadeh, S. (1992), Growth of state government expenditures: Empirical evidence from the United States. Public Finance, 47, 322-339.